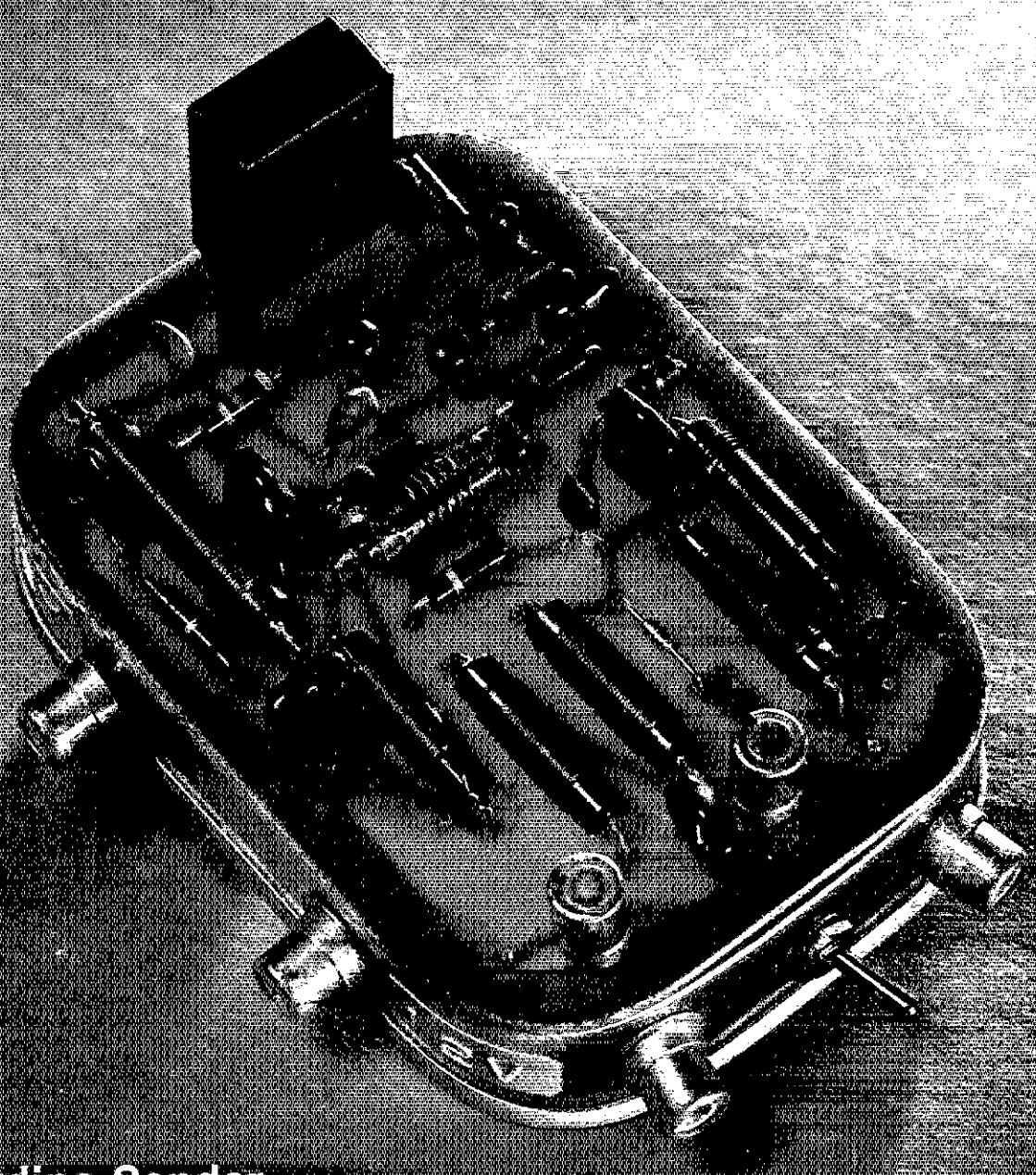
QST

devoted entirely to Amateur Radio

October 1978 $2.00



The Sardine Sender — have fun with this 3/4-watt 80-meter weekend project.

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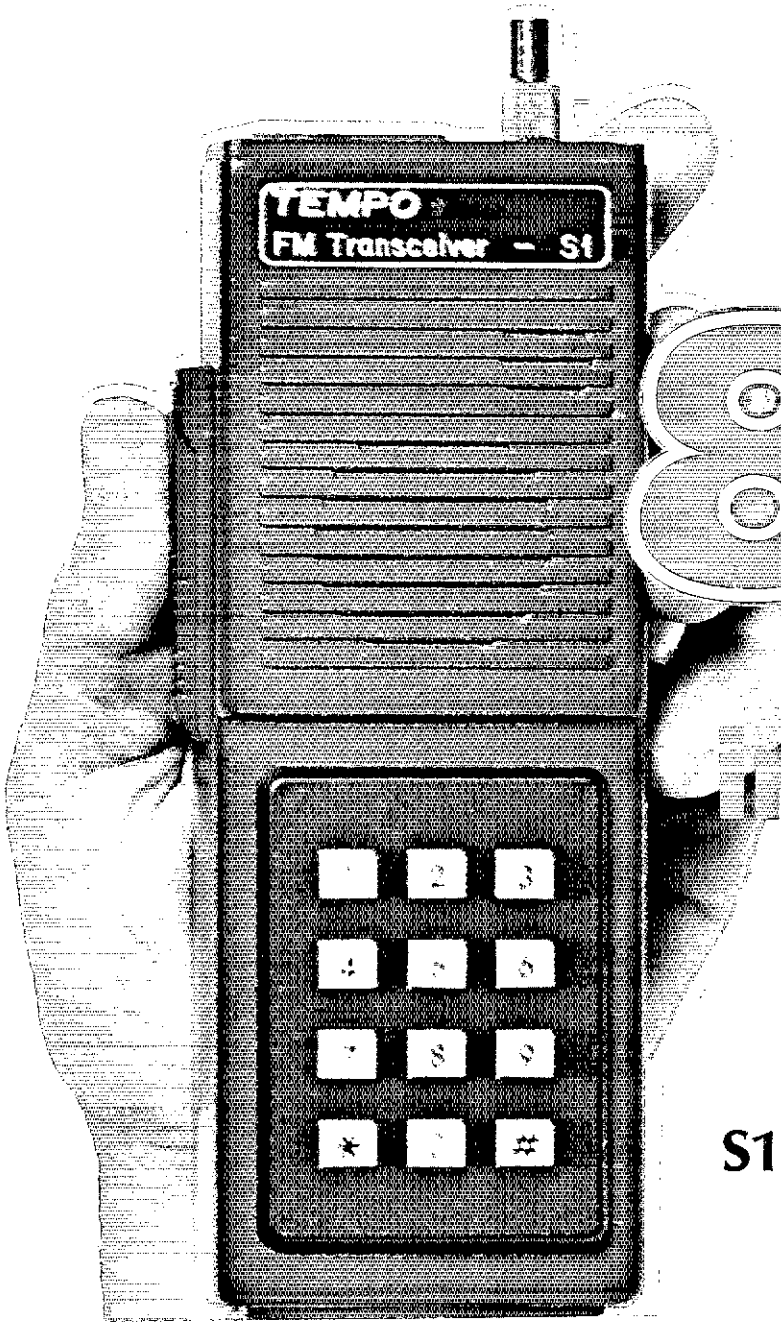

Shown with accessory touch tone pad

800 channels in the palm of your hand

Tempo presents the S1 SYNCOM...the world's first synthesized 800 channel hand held transceiver

This amazing pocket sized radio represents the year's biggest breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The SYNCOM'S price includes the battery pack, charger, and a telescoping antenna. But, far more important is the 800 channels offered by the S1. The optional touch tone pad shown in the illustration adds greatly to its convenience and we have available a 30 watt solid state power amplifier designed to give the SYNCOM S-1 the flexibility of operating as a mobile and base station as well.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Every 5 KHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma - standby 400 ma - transmit
Batteries:	Ni-cad battery pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5"
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

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

OPTIONAL ACCESSORIES

Touch tone pad, tone burst generator, CTCSS chips, Rubber flex anten

Price . . . $349.00 (or with touch tone pad . . $399.00)

Tempo also offers a complete line of solid state power amplifiers, pocke receivers, the FMH-2, 5 & 42 portables, the VHF/ONE PLUS mobile transceiver, and the FMT-2 & FMT-42 remote control mobile transceiv All available from Tempo dealers throughout the U.S. Call or write for full information.

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Ham Radio

Prices subject to change without notice.

Announcing

HENRY RADIO'S

1KD-5

A BRAND NEW MEMBER OF THE FAMOUS HENRY RADIO FAMILY OF FINE AMPLIFIERS

The 2KD-5 and 2K-4 linear amplifiers completely fulfill the needs of discriminating amateurs who want the very best and are willing to pay the price. But we have long felt that many amateurs would be satisfied with less power if they could still have the same high quality and dependability. The 1KD-5 fulfills that need beautifully.

- **Quality that is unmatched in any other linear in its class. The same high standards of engineering and construction as the 2KD-5 and 2K-4. Heavy duty components guarantee years of trouble free, dependable performance.**
- **Smaller and lighter. Weighs about 27 pounds less . . . easier to take along on vacation trips and DXpeditions.**
- **Less expensive. If your budget is limited, but you still want a GOOD quality linear to kick your signal way up, with sharp, clear signals, the 1KD-5 will give you just about everything you want . . . and without sacrificing quality.**

GENERAL INFORMATION
The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20 and 15 meter amateur bands. (10 meters on units shipped outside the U.S.)
Tube Complement: Eimac 3-500Z glass envelope triode operating in a grounded grid circuit.
ALC Circuit: ALC Circuit to prevent overdrive from high power exciters, also boosts average talk power.
Type of Emission: SSB, CW, RTTY or AM.
Antenna Relay: DC relay system for hum-free operation, requires shorting contact to ground during transmit to key amplifier into transmit.
Power Output Indicator: Self-contained relative RF power meter.
Tank Circuit: Pi-L place circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
Input Circuits: Cathode Pi input matching circuits for maximum drive and linearity.
Power Supply: Conservative power supply with solid state rectifiers for reliable, long term operation.
Dimensions: 8.75" high x 14" wide x 15" deep. Weight: 42 pounds.
Price $695.00.

2K-4 floor console linear amplifier . . . still the "workhorse" of Amateur Radio. Engineering, construction and features second to none. Provides a long life of reliable service while its heavy duty components allow it to loaf along at full legal power. $1095.00

2KD-5 desk model linear amplifer . . . lighter, more compact and less expensive, but still a heavy duty, high quality linear that will operate at full legal power month after month for years to come. $895.00

Tempo 2002 amplifier for 2-meter operation. 2000 watts PEP input on SSB or 1000 watts input on FM or CW. $745.00

Tempo VHF/UHF solid state power amplifiers for use in most land mobile applications. Call or write for list of models available.

Tempo 100AL10 VHF linear amplifier. Power output of 100 watts (nom.) with only 10 watts (nom.) in. $209.00

3K-A linear amplifier (for export and military use only) Superior quality, extremely reliable. At least three kilowatt PEP input on SSB . . . 2000 watt PEP output. $1495.00

4K-ULTRA linear amplifier (for export and military use only) For the most demanding operation . . . SSB, CW, FSK or AM. For general coverage operation from 3.0 to 30 MHz, but can be modified for operation on frequencies up to 100 MHz. 100 watts drive delivers 4000 watts PEP input. $3250.00

All of the above except the 2002, 3K-A & 4K-ULTRA are available at Tempo dealers throughout the U.S.

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Henry Radio

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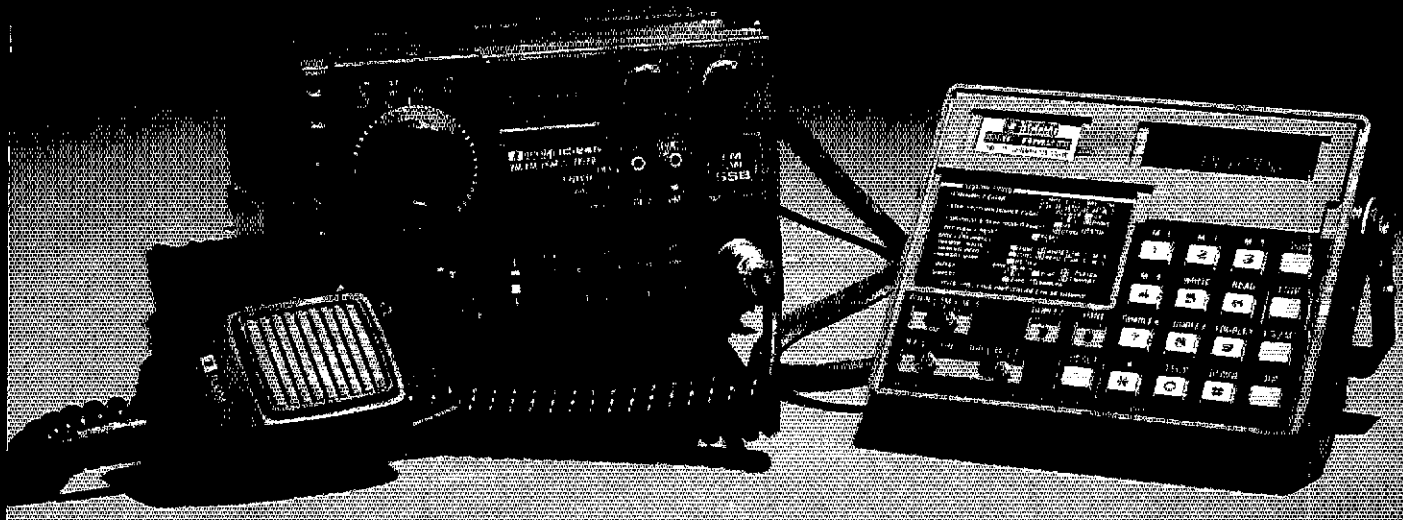
The Computerized Mobile Elite

The World's Best 2 meter Mobile Team.



ICOM's superior mobile IC-245/SSB teams up with the new RM2 to provide the most versatile, convenient and high quality 2 meter mobile station available anywhere. The IC-245's outstanding LSI performance, controlled by the RM2's microprocessor frequency selection and multi-frequency memory storage, puts full-band coverage speed and accuracy right where you want it—at your fingertip.

With remarkable compactness, outstanding stability, and Amateur Radio's most advanced computer technology, ICOM's Mobile LSI Team makes all others, new and old, seem obsolete. Now incremental step programming and instant recall memories are added to the IC-245's fully synthesized, multi-mode mobile operation.

The IC-245/SSB alone, even before the introduction of the RM2 remote microprocessor, has proven itself to be the most versatile 2 meter mobile radio made. With quality features like two built-in VFO's, which can handle splits of 600 KHz and 1 MHz easily, the IC-245 is the full-feature, top quality radio that every 2 meter mobile Ham wants.

Those Hams who have sought out the best and who are now operating with the IC-245 often report their satisfaction to us. Here is just some of the feedback ICOM has received on the IC-245:

"A really flexible radio. SSB has very good copy over long distance when mobile: tested at 25 miles so far."
Richard, KØGHC

"Beautifully made radio: and the signal reports have been great."
Donley, N6CD

"Exceptional receiver; and simple to use while mobile."
Clark, WD6AVT

"Very pleased with design and construction."
Horace, K3KT

"Your equipment is excellent: keep it coming."
Gary, WD8CAO

"Very pleased with unit."
Kenneth, W3EMT

"Excellent Equipment."
Tom, WB7SAB

"A great rig to get into 2 meters with. It's super!"
Edward, W6OSV

All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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THE COVER

If you've been hungry for an 80-meter companion to the Tuna Tin 2, see page 15.

Contents

The evolution of the MLA

When the MLA-2500 was first introduced it was a new concept in high performance amplifiers. Low and sleek yet powerful enough for the military. Some wondered . . . needlessly.

A promise kept.

The MLA-2500 promised 2000 watts PEP input on SSB. A heavy duty power supply. Two Eimac 8875's. And as thousands of Amateurs across the world have proven, the MLA-2500 delivers!

Now DenTron is pleased to bring you **The new MLA-2500 B.** Inherently the same as the original MLA-2500, the B model includes all of the above specifications plus a few refinements. New high-low power switching for consistent efficiency at both the 1KW and 2KW power levels, and 160 - 15 meters.

Tested and proven.

What better test for an amplifier than the Clipperton DXpedition? Even after 32,000 QSO's, and an accidental dunk in the ocean, the same 3 MLA-2500's are still amplifying other rare DXpeditions around the world – listen for them.

Convinced? Isn't it time you owned the amplifier that powered Clipperton and thousands upon thousands of radio stations throughout the world?

MLA-2500 B **$899.50.**

DenTron Radio Co. Inc.
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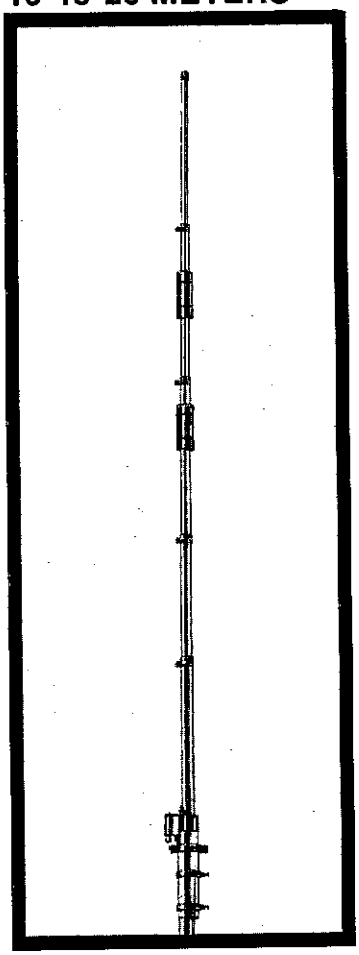
(216) 425-3173

NEW

HF VERTICALS BY CUSHCRAFT

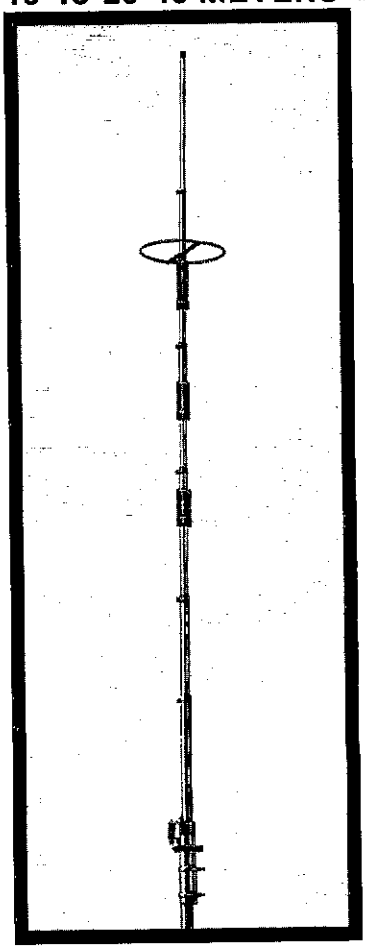
Cushcraft's new multiband vertical antenna systems have been optimized for wide operating bandwidth and provide the low angle of radiation which is essential for long-haul DX communications on the high-frequency amateur bands. The high Q traps which were designed especially for these verticals use large diameter enamelled copper wire and solid-aluminum air-dielectric capacitors; the trap forms are manufactured from filament-wound fiberglass for minimum dielectric loss and high structural strength. High strength 6063-T832 aluminum tubing with 0.058" (1.5 mm) walls is used for the vertical radiator. The massive 2 inch (50 mm) OD double-walled base section and heavy-duty phenolic base insulator ensure long life and durability. For maximum performance with limited space, choose a Cushcraft multiband vertical, all models may be roof or ground mounted on a 1¼" - 1½" (32 - 48 mm) mast.

10-15-20 METERS



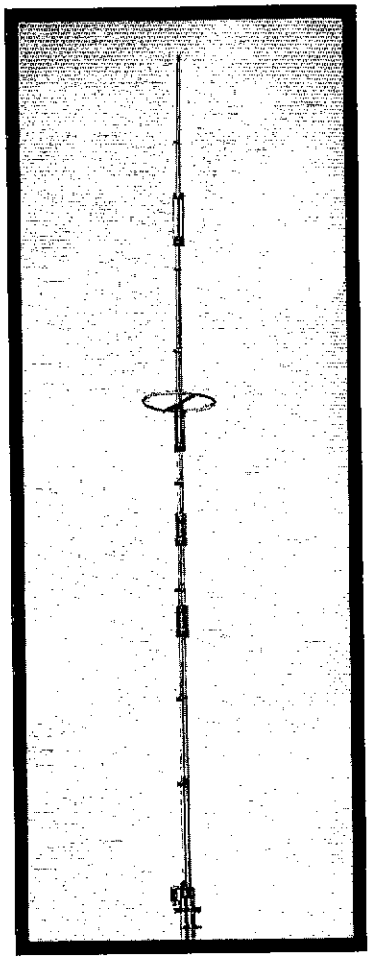
ATV-3 Cushcraft's ATV-3 multiband vertical provides low VSWR operation for both SSB and CW on 10, 15, and 20 meters. Matched to 50 ohms; built-in connector mates with standard PL-259. Stainless-steel hardware is used for all electrical connections. The ATV-3 is a compact 166 inches (4.2 meters) tall. Rated at 2000 watts PEP.

10-15-20-40 METERS

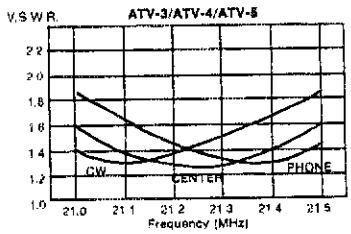


ATV-4 The Cushcraft ATV-4 four-band vertical antenna has been optimized for wide operating bandwidth on 10, 15, 20, and 40 meters. SWR is less than 2:1 over the CW and SSB segments of 10, 15, and 20. The 2:1 SWR bandwidth on 40 meters is approximately 240 kHz; may be quickly and easily adjusted to favor any part of the band. Coaxial fitting takes 50-ohm transmission line with PL-259 connector. Overall height, 233 inches (5.9 meters). Rated at 2000 watts PEP.

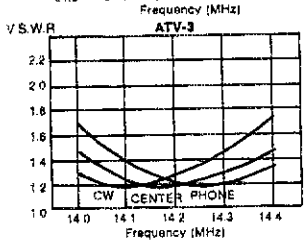
10-15-20-40-80 METERS



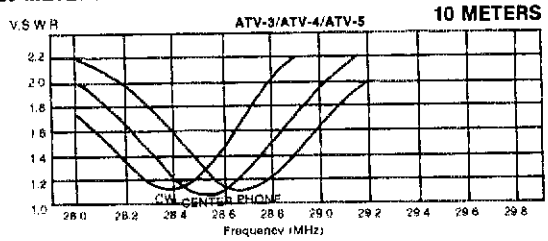
ATV-5 The ATV-5 trapped vertical antenna system has been engineered for five-band operation on 80 through 10 meters. The high Q traps are carefully optimized for wide operating bandwidth: 2:1 SWR bandwidth with 50-ohm feedline is 1 MHz on 10 meters; more than 500 kHz on 15 and 20 meters; 160 kHz on 40 meters; and 75 kHz on 80 meters. Instructions are provided for adjusting resonance to your preferred part of the band, CW or SSB. Built-in coaxial connector takes PL-259. Nominal height, 293 inches (7.4 meters). Rated at 2000 watts PEP on **all** bands.



15 METERS



20 METERS



10 METERS

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A little more than $900 still buys you one of the world's best HF transceivers

TS-820

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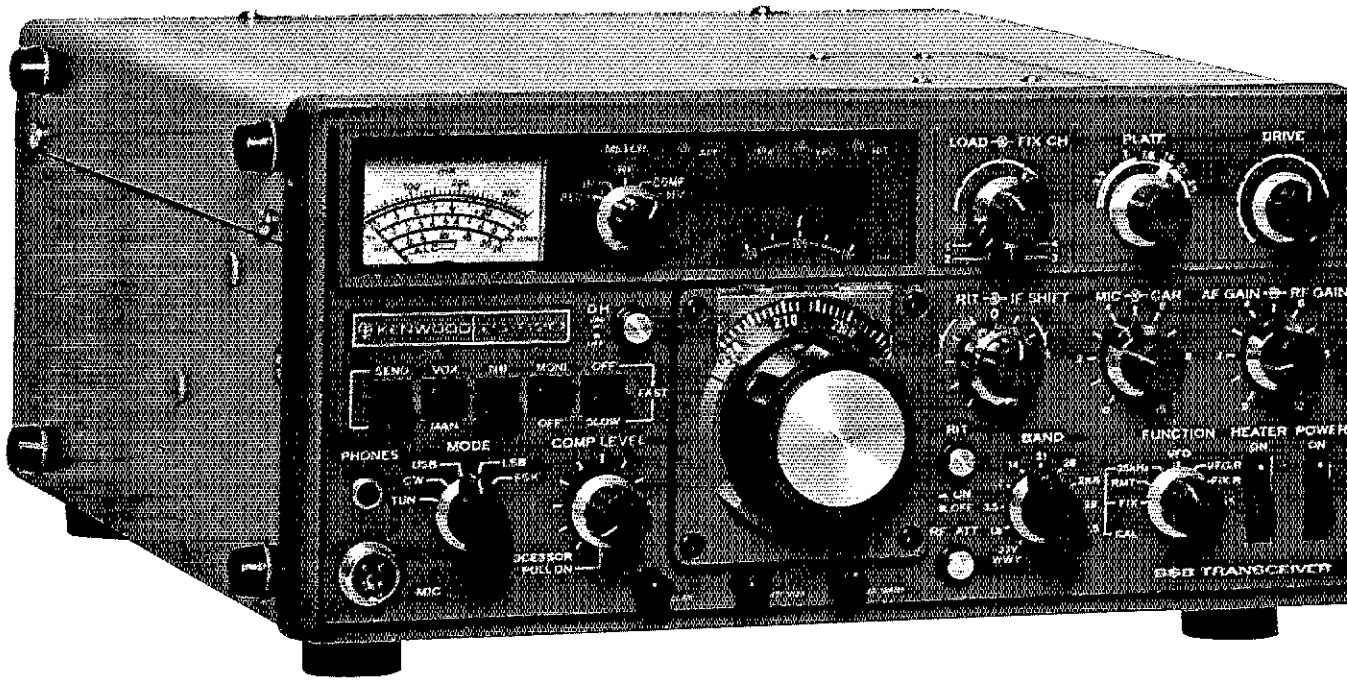
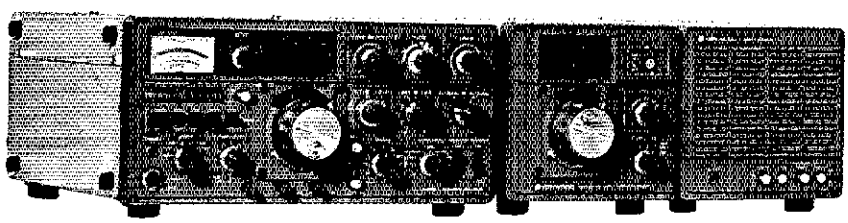
The TS-820 stands out from all the other rigs o the band. Its adjustable RF speech processor utilizing a 455 kHz circuit to provide quick-time constant compression, will get your message through the pile ups. RF negative feedback is applied from the final to the driver to improve linearity, and third-order products are at least —35 dB. Harmonic spurious emissions are less than —40 dB and othe spurs are less than —60 dB. RF input power is 200 W PEP on SSB, 160 W DC on CW, and 100 W DC on FSK. Receiver sensitivity is better than 0.25 μV for 10 dB S/N. The TS-820 is known for its superb receiver selectivity, and its famous IF shift easily eliminates heavy QRM. That's why the TS-820 series is the DXer's choice.

And, of course, anytime you might want to add a digital display, it's simply a matter of installing the DG-1 option.





TS-820 VFO-820S SP-820

Kenwood's unbeatable combination. The VFO-820 solid state remote VFO adds greatly to the versatility of your TS-820. It has its own RIT circuit and control switch and is a perfectly matched accessory. The SP-820 deluxe external matching speaker includes audio filters for added versatility on receive and two audio inputs.

TRIO-KENWOOD COMMUNICATIONS INC.
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INTERNATIONAL CRYSTALS

70 KHz to 160 MHz

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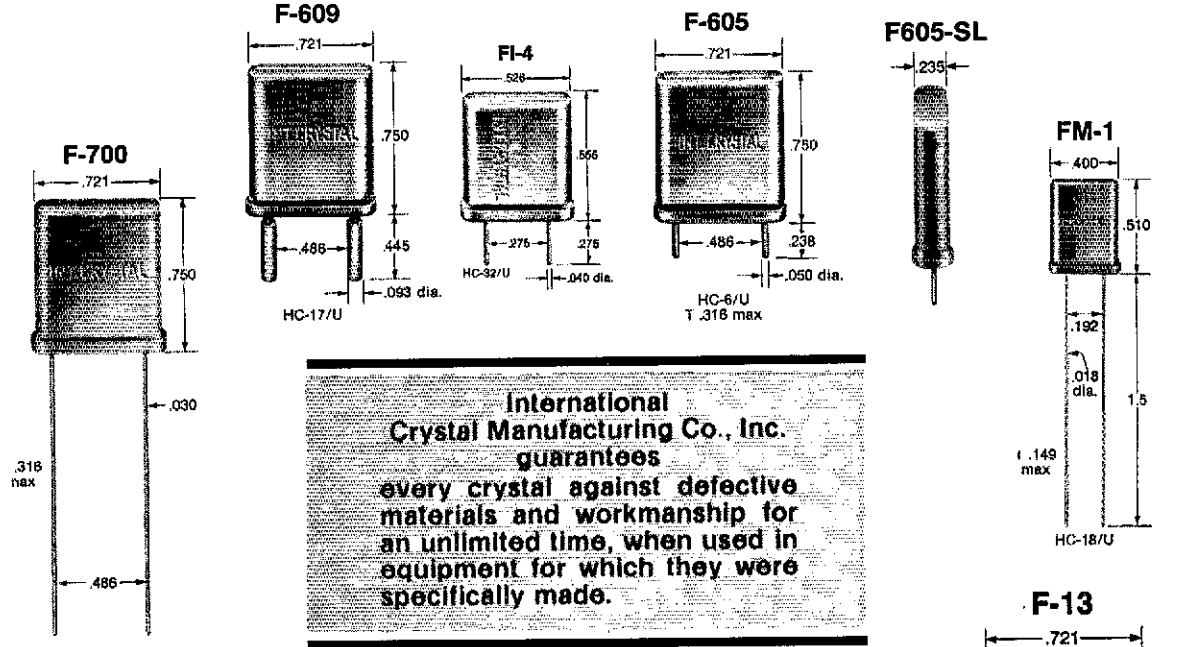

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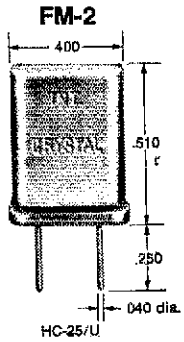

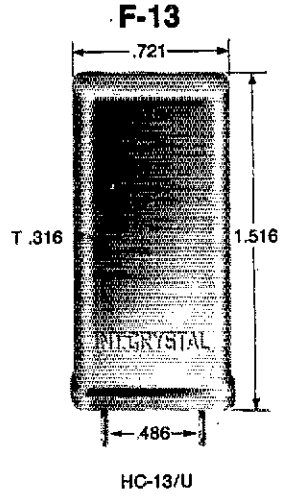

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Delta Division

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Louisiana — S. T. "Tom" Losey, Jr., K5TL, 172 Moor Rd., Shreveport 71106
Mississippi — E. Ed Robinson, W5XT, P. O. Box 602, Laurel 39440 (601-425-2381)
Tennessee — O. D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory 37138 (615-758-2329)

Great Lakes Division

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Michigan — Stanley J. Briggs, W8MPD/K8SB, 1885 Pinetree Rd., Trenton 48183 (313-676-6248)
Ohio — Harold C. Chapman, WB8JGW, 990 Northwest Potee Rd., S. Vienna 45369

Hudson Division

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N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, WA2MVQ, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

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New Hampshire — Robert Mitchell, W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — John Titterington, W1EOF, 45 Mountain Ave., Riverside 02915 (401-438-3619)
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Wyoming — Chester C. Stanwaity, W7SDA, 353 S. Ferris St., Powell 82435 (307-754-3624)

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Canal Zone — Alvin Sholk, KZ5AS, Box O, Balboa Heights
Georgia — Alpheus H. Stakely, K4WC, 2220 Lyle Rd., College Park 30337 (404-767-4837)
Northern Florida — Frank M. Butler, Jr., W4RH, 323 Elliott Rd., S.E., Fort Walton Beach 32548 (904-244-5425)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Drittwood Ln., Largo 33540 (813-584-0984)
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Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

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.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

Double-Digit Damage

Is there anyone out there untouched by the double-digit inflation that continues to plague us? If so, please let us know how you escape unscathed.

The rising cost of paper and printing labor, increases in postal and trucking rates, higher interest rates on borrowed money, the decrease in the value of the dollar, higher hotel and air transportation rates, the higher cost of gasoline, increased pension costs forced on us by ERISA — all of these increased costs and others are causing ARRL considerable difficulty.

On top of all of this relentless inflation, we are faced with higher-than-usual expenses in 1979 because of the three-month World Administrative Radio Conference which will begin in September of next year and at which we will be responsible for the expenses of more than six delegates.

There are some ironies in the situation. For example, League membership is at an all-time high, and still growing — nearly 170,000 members. Yet, because of the wide range of membership services that we provide, and because of the effects of inflation on the cost of providing those services, League membership at $12 is underpriced. Thus, the increasing membership only compounds our problems.

Like many other membership societies, the League relies on two additional sources of income to make it possible to provide a myriad of membership services. One of those sources of income is advertising, primarily from *QST*. We're glad to report that advertising income from *QST* is at an all-time high, and those who support *QST* with their advertising dollars are helping to support the work of the League. To be completely realistic, we have to point out that *QST* has the largest circulation of any of the Amateur Radio magazines, and the advertisers themselves reap no small benefit from appearing in the pages of *QST*.

A second source of League income is from the sale of *Handbooks, License Manuals, Tune in the Worlds, Antenna Books* and other publications. This income is mighty important to us, and to you, as can be seen from the little pie chart which appeared on page 51 of the September issue of *QST*. However, sad to relate, our *Handbook* and other publication sales are down. Why? We're not entirely sure. We pushed hard and may have oversold in 1977. We may need more extensive revision of our titles. The preponderance of commercially built equipment may work against the sale of technical books. The decline in the number of new CB licensees may have adversely affected the market for literature.

The result of all of these pressures is that the League is having a difficult time breaking even, of having income match outgo.

What to do?

Economize. We've trimmed nearly 20 people from the staff since the beginning of the year. We are monitoring expenditures as carefully as we know how. We are cutting every possible corner with as little harmful effect as possible on membership services. But we may have to take another look at the cost of some of the services we provide. (And, we also have to take a look at how many of these services we can continue to provide to nonmembers.) Did you know, for instance, that it costs us some $45,000 per year to operate W1AW? And that's only one of a number of similar programs. Even the outgoing QSL Bureau is not entirely self-supporting, despite the $1 fee for the use of the bureau.

Get more income from, for example, the sale of League publications. You'll notice a heavy promotional campaign in *QST* this fall, and that'll continue. If that campaign doesn't spur you into buying at least one other ARRL publication, it has failed! Another source of income is the advertising in *QST*, and effective with the January issue the page rate is being raised by 15 percent.

In the final analysis, however, it comes down to the fact that the League is providing membership services at a cost per member which exceeds the $12 membership dues. The cost of WARC preparation, the Technical Information Service, the public service program, travel to clubs and conventions, representation in Washington, response to thousands of membership requests about all sorts of Amateur Radio matters, support of the radio amateur satellite program — these and many other membership services cost somewhat more than $12 per member per year, and it is a subject which the Board of Directors may have to address in January 1979. — *W1RU*

League Lines...

Good news for WARC-79 preparation! Don Schliesser, K6RV, president of the Northern California DX Foundation, has just advised us that the NCDXF Board of Trustees has okayed a proposal made by Board member Jack Troster, W6ISQ, to provide matching funds for the IARU transmitter/receiver kits (see the editorial on page 9 of the April 1978 issue of QST, and "International News" on page 57 of this issue). For the first $10,000 contributed by amateurs to finance the purchase and distribution of these kits, the Northern California DX Foundation will match 35¢ for each dollar contributed. For the second $10,000 contributed, the Northern California DX Foundation will match 50¢ for each dollar contributed. For your contribution to be matched by NCDXF, send your check to ARRL, Newington CT 06111, and mark it for the "IARU transmitter/receiver kits." There is a December 31, 1978 deadline. Our thanks to NCDXF!

Thanks to the hundreds of members and affiliated clubs who filed comments responding to FCC's Eighth Notice of Inquiry in Docket 20271, the WARC proceeding, and especially to those who sent us copies. From the reaction we've seen in Washington, the effort was well worth it. See page 46 for a summary of the League's response.

The United States has signed a reciprocal Amateur Radio operating agreement with Haiti; however, the effective date of this agreement has been delayed for an indefinite period of time. WIAW will carry news of the effective date when available. Watch for details in the "International News" columns of QST.

Election time! Members in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions may soon receive ballots in the mail, on which to choose between candidates for director and vice director of ARRL. (No ballots will be sent if only a single candidate has been nominated by the members, of course.) The ballots have to be back at Hq by November 20 to count. If members around you have ballots and you do not, by November 1, please notify Perry Williams, W1UED, or Marge Tenney, WB1FSN, at hq.

Legally blind applicants, as well as those unable to travel, can now be tested by volunteer examiners for all classes of amateur licenses. The applicant must submit a completed form 610 along with a physician's certification of protracted disability or legal blindness, and a letter requesting a volunteer examiner, to the FCC engineer-in-charge of the nearest field office (see "Washington Mailbox," September 1978 QST for addresses). The field office will locate the closest available volunteer examiner. Applicants who live in rural areas may experience a delay in processing of the application.

If you would like to be a volunteer examiner to assist the handicapped in getting an Amateur Radio license, write to the FCC field office nearest you. Remember that you must be at least 18 years of age and hold a General Class license or higher.

Look at your Form 610 before you fill it out -- if it is dated earlier than 1977, don't use it! Use of obsolete forms increases the error rate -- in some cases amateurs wanting to stick with their present call signs have lost them for this reason!

ARRL insurance questions? Please make note of the new address and phone numbers for the G&H Insurance Administrators. The new toll-free number is 800-527-3304. Members in Texas, Alaska, Hawaii, and Canada must call direct 214-388-4455. The new address is 8330 Moberly Lane, Dallas, TX 75227.

Need Sweepstakes entry forms? Help us help you (and Hq. printing costs!) by requesting just one SS package and then "copying" the forms in the amounts you need. Your 15¢ stamp, and a self-addressed, stamped envelope, will get you one each of the SS summary, log sheet, and dupe sheet.

A Newly Discovered Mode of VHF Propagation

Shattering the 2-meter DX record has become commonplace lately. Equatorial FAI is one theory on what's behind these super band openings.

By Joseph H. Reisert,* W1JR, ex-W6FZJ, W1JAA and Gene Pfeffer,** KØJHH

On October 29, 1977, at 0200 UTC, LU1DAU, La Plata, Argentina, worked YV5ZZ/6, Bocha de Uchire, Venezuela, on 145.9-MHz cw! By 0310 UTC, the signals had improved greatly, and a two-way ssb contact was made. Both stations were running less than 100 watts and used 10- to 12-dB gain antennas. When the signals faded at 0400 UTC, a new terrestrial-only 2-meter record of 3135 miles (5045 km) had been set.

For many years, vhf operators have known of transequatorial (TE) radio propagation on 6 through 15 meters.[1-4] While it was speculated that this mode could support the propagation of 2-meter signals under the right circumstances, such conditions had never been reported. It now appeared that TE had made it to 2 meters. Again and again, YV5ZZ worked into Argentina. By the end of November, such contacts became almost commonplace. With reports of bigger and better openings coming each day, we began trying to correlate contemporary solar-terrestrial conditions with those present during prior TE-mode QSOs. We noticed many discrepancies, leading us to conclude that this fantastic propagation was not TE, but possibly a result of magnetic-*field-aligned irregularities* (FAI) in the equatorial ionosphere.

Some Background Information

The push for a new 2-meter record had been spurred on by the observations of YV5ZZ. On November 8, 1976, Edgar heard OSCAR 7 Mode A uplink (145.9-MHz) signals from LU7DJZ. He was not listening to the downlink signal on 10 meters — what he heard was really on 2 meters! This prompted weekend schedules at first, eventually leading to nightly attempts at a QSO. Contact was made on either 21.4 or 50.1 MHz. If conditions looked good, attempts were made on 145.9 MHz. To prevent OSCAR QRM, the frequency was later changed to 145.1 MHz.

After nearly a year of trying, they made it. Since the first contact, there have been over 40 days when known openings have occurred, and they have been observed on all continents. The more noteworthy events are listed in Table 1. Also shown are the times during which the openings were observed. Fig. 1 is a map showing the location of stations active in these openings. The bulk of the favorable conditions seem to occur within the period from sunset to midnight. Signal strength was not the same for each opening and varied considerably during the course of a contact. Stations sometimes reported that received signals "sounded like moonbounce," but more often they were well above the noise. Even low-power (100 watts effective radiated power) ssb and fm stations participated. Stations over 500 miles (800 km) apart often participated in an opening.

TE-Mode Propagation

By reviewing some prior work and findings in the field of TE propagation, we hope to point out comparisons that indicate another mode is responsible for the more recent contacts.

A TE path is generally considered to be between stations located 1500-2500 miles (2400-4000 km) either side of the magnetic equator.[5] No east-west paths have been reported. Backscatter sounding studies have identified the paths as being the result of two or more successive reflections in the F-layer region of the ionosphere. The ray path for such a signal is shown in Fig. 2. Because no intermediate ground reflections are involved, signal strength is greater than might be expected. TE depends on a phenomenon called "ionospheric tilt." Instead of an ionosphere which is concentric with Earth, a tilt may occur, especially after sunset or sunrise at the ionosphere. An ionosphere having opposite tilts over a large area is required to support successive reflections. In the equatorial region, tilts occur daily near sunset, when the height of the ionosphere begins to increase, rising higher than that to the north and south. Later in the evening the ionized layer settles and the tilts disappear. Waves striking this tilted layer have a lower angle of incidence then would normally be the case. This allows higher frequencies to be propagated, typically 1.5 times the daytime maximum usable frequency

Table 1
Propagation "Firsts" via FAI

Date	*UTC*	*From/To*	*Comments*
November 8, 1976	0037	YV5ZZ/LU7DJZ	LU7DJZ OSCAR Mode A uplink signal heard
July 1, 1977	unknown	PY2OD/TU2EF	TU2EF OSCAR Mode A uplink signal heard
October 29, 1977	0200-0400	YV5ZZ/LU1DAU	First reported QSO via this mode
February 12, 1978	0005-0020	LU/KP4-YV	No 6-meter path but good 2-meter signals
February 13, 1978	0004-0110	LU/KP4-YV	YV5ZZ heard LU3AAT on 432 MHz but no QSO
February 20, 1978	0400-0405	YV6ASU/LU3AAT	LU3AAT only station heard in north. Note relatively late time
February 24, 1978	1200	VK8GB/JH6TEW	First VK-JA QSO on 2 meters
April 10, 1978	1800	ZE2JV/5B4WR	First Asia-Africa QSO via this mode
April 12, 1978	1800	SV1AB/ZE2JV	First Africa-Europe QSO via this mode

*17 Mansfield Dr., Chelmsford, MA 01824
**49 Burham Rd., North Billerica, MA 01862
†Footnotes appear on page 14.

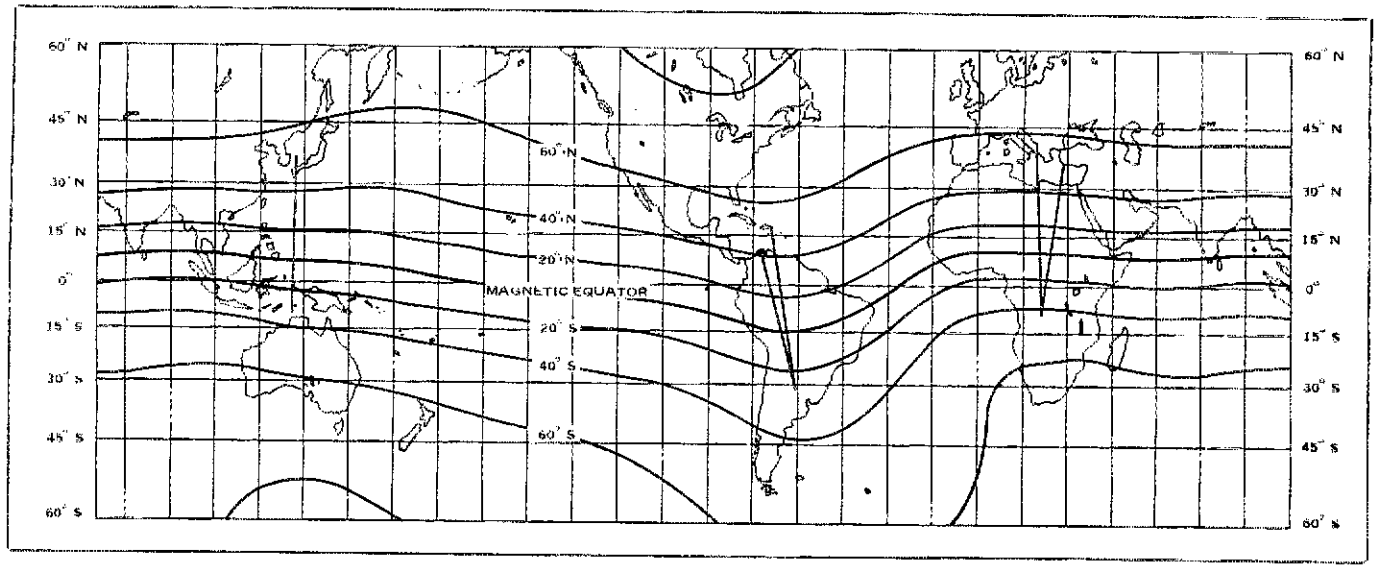

Fig. 1 — Approximate location of stations which successfully made use of FAI can be seen on this map. The contour lines indicate geomagnetic latitudes.

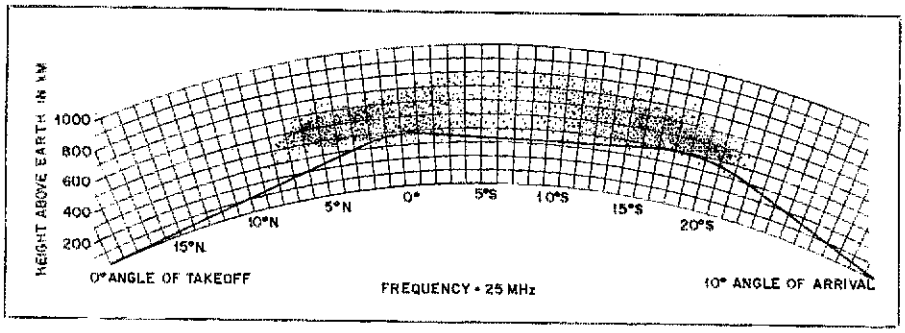

Fig. 2 — Cross section of a transequatorial ray path, showing the effect of ionospheric tilt on a 25-MHz signal. This drawing shows a typical example of TE propagation. (From Davies, "Ionospheric Radio Propagation," U.S. Government Printing Office, Washington, DC, 1965.)

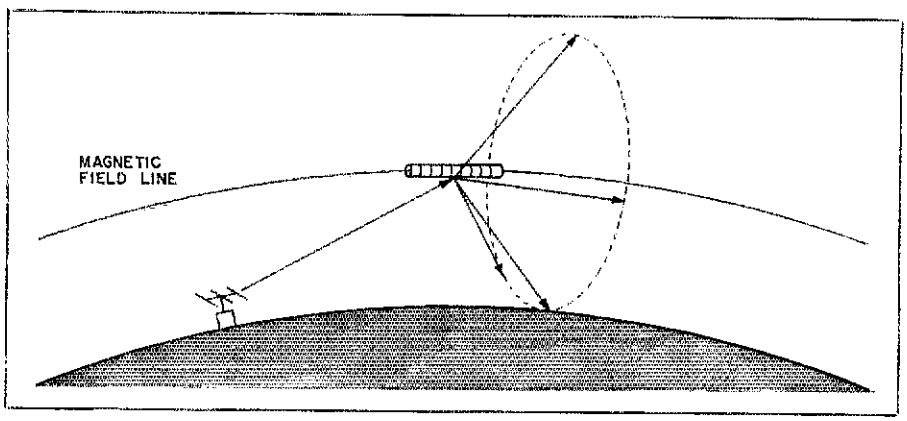

Fig. 3 — This diagram gives an example of ray scattering. Irregularities aligned with Earth's magnetic field are illuminated by a radio wave. Energy is scattered back to Earth in a cone-shaped pattern. Stations within the area intersected by the cone can receive the signal.

(muf). Attenuation of frequencies above 80-100 MHz is severe.[6] Six-meter openings are usually coincident with enhanced 10-and 15-meter propagation, and signals are usually distorted with a characteristic flutter fading. TE propagation is most often noted between 1700 and 2100 local time at the path midpoint, moving from east to west as the earth rotates, but some afternoon openings have been observed as well.[1,7] TE occurs most often during the equinoctial periods (around March 21 and September 23). It is least common during solstitial periods (around June 22 and December 22).[1,5] The best TE conditions seem to occur at or near a sunspot-cycle peak.

Comparison with Recent Openings

The 2-meter contacts between Australia and Japan and in South America have been between stations located approximately 1500-2000 miles (2400-3200 km) from the geomagnetic equator. One exception was the reception of OSCAR 7 Mode A uplink signals (145.9 MHz) from TU2EF, Ivory Coast, by PY2OD, Santos, Brazil. This path lies along the geomagnetic equator and represents the only known east-to-west propagation of this type. Because this observation was made prior to the first confirmed 2-meter contact, it was met with no small amount of skepticism! Classical notions of TE do not account for this path. Since the effect was noticed, on July 1, 1977, TU2EF has moved to Brazil. It is hoped that other African stations will be found who are willing to experiment with South American amateurs on this path.

The 2-meter openings to date have shown little correlation with equinoctial periods. In fact, 10 openings have occurred within 30 days of a solstice. It remains to be seen whether the frequency of openings increases as an equinox approaches. Two meters is 2 to 3 times higher in frequency than the greatest mufs observed during the 1957-58 peak of sunspot cycle 19. This period was an all-time high for solar activity. In fact, 2 meters is not the highest frequency at which this phenomenon has been observed. On February 13, 1978, YV5ZZ heard weak but identifiable signals from LU3AAT, on 432.1 MHz. Two-meter and 432-MHz propagation far exceeds the capability of the TE mode. YV5ZZ was using his satellite antenna system, which is steerable in azimuth and elevation. In the direction of LU3AAT, his horizon is obstructed by a range of mountains. The lowest elevation angle which allows for clearance of the mountain range is 8 degrees. On February 16, 1978, YV6ASU heard LU3AAT on 432 MHz, with his

antenna at about the same angle of elevation. On yet another occasion, KV4FZ heard LU3AAT on 145.1 MHz. He reported that a peak in signal strength occurred when the antenna elevation angle was 8-10 degrees. This geometry suggests that single-hop F-layer reflection isn't involved. The angle also seems high for the tilt associated with TE.

At first, 2-meter tests were conducted only when strong 50-MHz TE signals were noted. However, on February 12, 1978, KP4EOR contacted two Argentine stations at a time when no 50-MHz path existed. This effect, which was also noted by YV5ZZ on occasion, would not normally be expected for TE.

When the occasions of openings were compared with solar flux and geomagnetic indices for the dates involved, no correlation was seen. The first contact did take place on a day when auroras were reported in the Northern Hemisphere. This appears to have been coincidental as the condition did not repeat. TE is most prominent at a solar cycle peak. We are presently ascending from a solar minimum.

Because these observations indicated the recent contacts did not result from fantastic TE propagation, we began to look for another propagation mode to account for them. Our attention was immediately drawn to the possibility that they were somehow related to irregularities in the equatorial ionosphere.

Scattering Mode

One phenomenon related to the ionosphere is called *scintillation*.[8] This is seen as amplitude and phase variations of signals which transit a nonuniform ionized region. Scintillation causes the signal to fade by breaking it up into several ray paths which may or may not arrive in phase at the receiver. The ionospheric irregularities which cause the scattering may be thought of as bubbles of electron density different from that of the surrounding medium. These bubbles can become directional reflectors of radio signals. They behave roughly as thin elongated rods aligned with Earth's magnetic field.[9] A representation of one rod is shown in Fig. 3. The angle of reflection of a wave is equal to the angle of incidence, but both paths need not lie in the same plane. A wave incident on a cylinder excites conically shaped reflections. If the transmitter properly illuminates irregularities aligned with the magnetic field, the cone will intersect Earth. Signals may then be received within the area covered by the cone. Scattering tends to add still more paths, allowing reception throughout a belt-shaped area, rather than a circular or elliptical one.

Vhf signal-scattering irregularities can occur daily in the equatorial region. In fact, the occurrence of scattering irregularities is greatest near the magnetic equator and in the polar regions. The phenomenon is least seen in the middle latitudes. Polar-region aberrations are associated with the auroras. In the equatorial region they commence abruptly about 1900 local time, become more patchy and sporadic through the night. Disruption in the equatorial F region has been linked with an increase in the height of this layer, the same phenomenon responsible for TE. The optimum time for scatter propagation via these field alignment irregularities (FAI) is about one hour later. FAI show seasonal variations. The precise pattern also depends on the longitude and period of the solar cycle. FAI tend to be more common during equinoctial periods, the winter months and years of high solar activity.[10] In the Americas, FAI seem to be concentrated in the period from October through March, all but disappearing during June, July and August. In the Africa-Mediterranean region, occurrences also are frequent from October to May. There are many openings in the period June through August. For the Asia-Australia region, present data indicate the maximum may even be in June and July.

FAI tend to occur within 10 degrees of the geomagnetic equator. Satellite studies have indicated that irregularities large enough to scatter 144-MHz signals exist at heights of up to 620 miles (1000 km) just at and shortly after sunset. Recently, studies have been made with the 50-MHz scatter radar in Jicamarca, Peru. They indicate that the irregularities may last as late as midnight, local time. It was found that plumes of electrons in the otherwise depleted regions form ducts which can trap vhf signals. They are then scattered

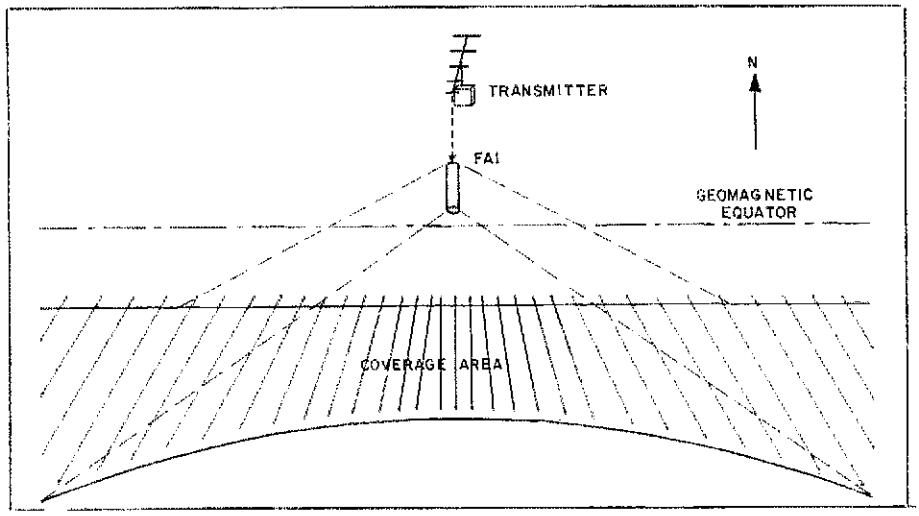

Fig. 4 — When a station north of the equator is transmitting in a southerly direction, the southern coverage area will be similar to that shown in this drawing, shown as if looking down from a great height. Size of this area is dependent upon the length and horizontal extent of the scattering medium, and its position relative to the transmitter and receiver. The coverage pattern for a southern station beaming north would be a mirror image of that shown here.

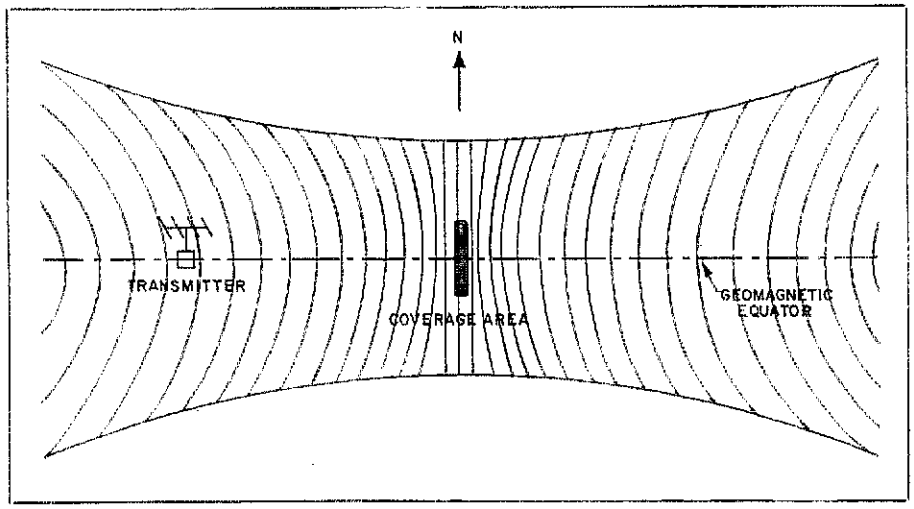

Fig. 5 — Scatter-mode coverage in an east-west direction along the magnetic equator. As in the case shown in Fig. 4, coverage area is dependent upon the horizontal extent of the scattering medium. A relatively wide coverage area may be possible if north-south alignment of the irregularities is not an important aspect of the phenomenon.

back to Earth at the point they exit the duct. Strong scintillations noted on satellite signals received near the geomagnetic equator have been tied to these features. FAI ranging in height from 375 to 500 miles (600 to 800 km) could account for propagation on even the longest of the observed paths. [11]

In the early 1970s, several government agencies participated in an experiment to study the effects of artificial irregularities in the ionosphere.[12] Since naturally occurring auroras were known to scatter vhf signals, man-made irregularities were tested for the same properties. Reflection of frequencies up to 430 MHz was found at times when normal transmission was possible only through 10 MHz. So strong were the reflections that cw and ssb communication at frequencies of 20-50 MHz was possible using 100-watt-output transmitters and 10-dB-gain antennas. Above 50 MHz the reflection coefficient fell off steadily, so that 430-MHz receiver-noise figures on the order of 1 dB were needed to produce usable signals over long paths. Fading rates increased with frequency. Naturally occurring irregularities in the nighttime equatorial ionosphere can produce similar effects and the geometry is correct for long-distance north-south propagation. If there is a coherence (adding effect), from the banded structures which occur naturally in the equatorial FAI, the observed signal strengths could be supported with modest amateur equipment.

It is interesting to note that, since the geomagnetic field lines in the ionosphere above the magnetic equator are nearly parallel to the Earth's surface, communications in both north-south and east-west directions should be possible, given adequate power levels.[13] In the case of north-south propagation across the geomagnetic equator, the propagation mode is as depicted in Fig. 4. East-west propagation via FAI is theoretically possible near the geomagnetic equator. Possible coverage is diagrammed in Fig. 5. This could account for the reception of OSCAR uplink signals from TU2EF in Brazil, an east-west path along the geomagnetic equator.

Another interesting property of propagation via FAI is that long-range transmission from within or above the ionosphere to the ground is possible. The cone of signals generated by satellite transmissions incident on equatorial FAI can intersect the ground when the geometry is correct. Such a mode could explain the reception of OSCAR downlink signals when the satellite is well below the listener's horizon.

Scatter propagation causes the signal to flutter. Either or both increased frequency and fewer reflections will enhance the severity of flutter. KP4EOR noted that received signals sounded like a buzz saw! Tests conducted after midnight, local time, have uncovered no recurring openings. Radar data from Jicamarca indicate that such openings, if possible at all, should be rare, because of the absence of suitably sized scattering surfaces after local midnight. Prediction of FAI presence may be possible with the aid of amateur satellites. Ionospheric scattering results in an observed Doppler frequency shift which differs from the expected value. An accurate Doppler plot may reveal shifts in a patchy ionosphere. Amplitude flutter on the beacon and downlink signals might also reveal the existence of an opening via FAI.

Conclusions

The recent record-breaking 2-meter openings exhibited many characteristics which were previously unobserved and unexplained. In an effort to explain to ourselves what was happening, we noted many characteristics directly related to the occurrence of irregularities in the alignment of Earth's magnetic field. It seems likely that these contacts resulted from propagation by the fine-scale structure of the equatorial ionosphere, rather than broad tilts related to normal ionospheric conditions. Confirmation awaits further testing by amateurs. If we are correct, the implications are exciting for vhf operators worldwide. Contacts between South America and Africa, and Africa and Asia on frequencies up to 432 MHz may be possible. We congratulate the avid vhf operators who have participated in this work so far, and urge them to continue trying for new DX records.

Our sincere appreciation goes to Mr. Edgar Mueller, YV5ZZ, for the excellent data he provided. Also our thanks to Mr. Jack Klobuchar, W1BZT; Mr. Richard Allen and Mr. W. E. Brown, ex-W1ZIG, for their assistance in providing technical comments and propagation information.

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[2]Southworth, "A Look Back and Ahead at PRP," *QST*, June, 1959.
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Additional References

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Feedback

☐ There was a pricing error in the footnote about *QST* binders in "What's So Rare as a *QST* from 1915?" (August 1978 *QST*, page 43). Small-size (pre-1976) binders are $5 postpaid, and large-size ones (1976 and on) sell for $6 postpaid. Also, the World War I publication hiatus began after the September 1917 issue, not the December issue.

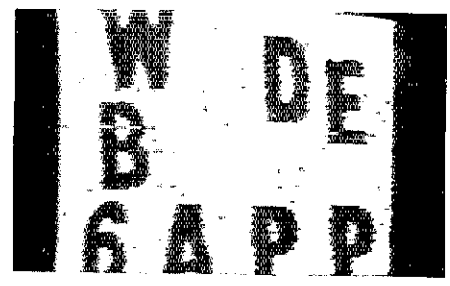
☐ There were two errors in the Contest Advisory Committee list in September 1978 *QST*, page 52: W2FVS is now K2SX and K9UIY lives at 1258-1/2 S. Galena, Freeport, IL 61032.

☐ In "CQ Ham Radio" (August 1978 *QST*), the Westchester Emergency Communications Association Field Day station should have been identified as W2IT.

☐ The list of improvements for the SB-100 referred to in the June "Hints and Kinks" item, "Better S/N and Gain for SB Series," can be found in May 1968 *QST*, page 53.

☐ On page 57 of "How's DX?" (August 1978 *QST*), the photo on the left is A9XBJ. A9XBC is the operator on the right.

Strays



Earl Mathison, WB6APP, sent this SSTV picture to Jed Jenson, WA6WTN. Their shacks are eight miles apart in Antelope Valley. However, their SSTV pictures travel about 1100 miles via OSCAR.

Build This "Sardine Sender"

Basic Amateur Radio: Weekend projects are fun! This 80-meter cw QRP rig will provide entertainment in the home workshop and on the air. A good antenna and 3/4 watt of power will net a lot of solid QSOs.

By Doug DeMaw,** W1FB

Did you have fun and excitement with the Tuna-Tin 2 from May 1976 *QST*? Chances are that you did if you're a QRP-rig operator. Many requests followed publication of the little 40-meter rig, asking for an 80-meter version of the circuit. Well, here it is, and all of the parts except for the chassis are stocked by Radio Shack. Of course you'll need your own crystals, power supply and key, but those are pretty standard items in most ham shacks today.

**Senior Technical Editor, ARRL.

There's no mandate that says you need to use a sardine can. Any metal foundation will be suitable, so take your pick from what's available to you. The important thing is that you follow the circuit given and keep the leads neat and short.[1]

A Simple Circuit

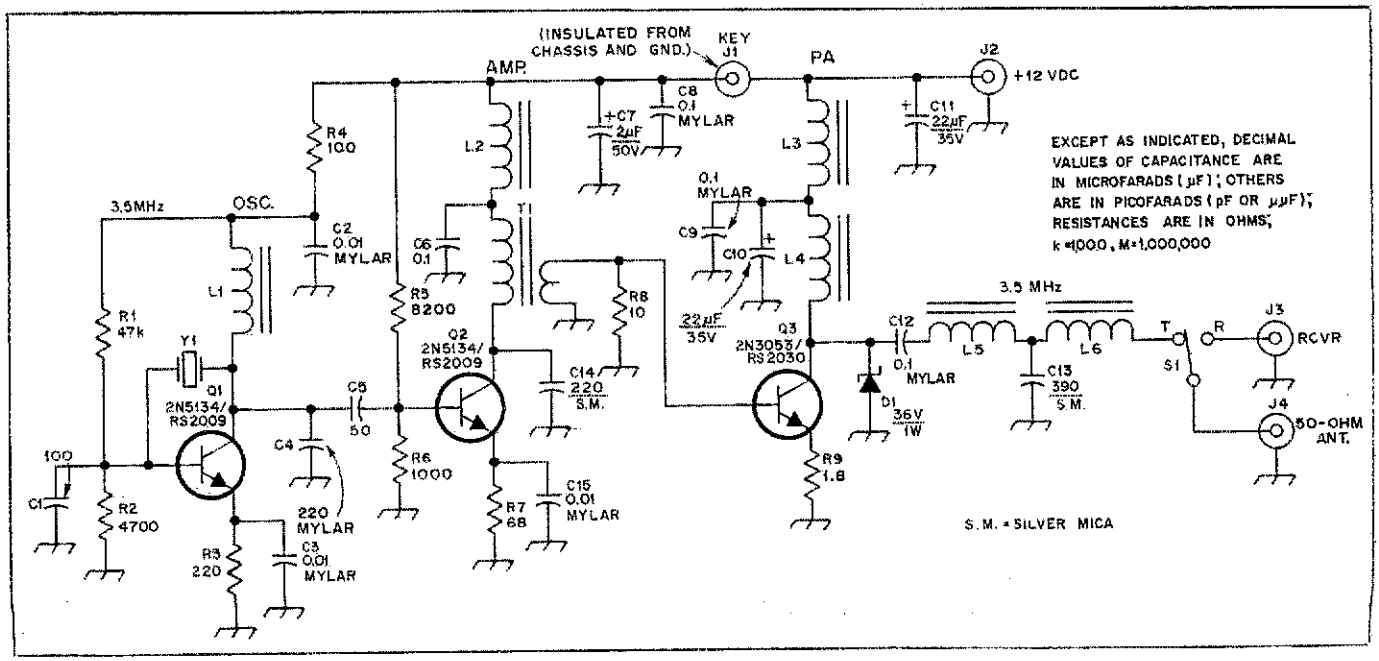
Three bipolar transistors are specified in the circuit of Fig. 1. Transistors with characteristics similar to those listed should work satisfactorily. The important matters to consider when making substitutions are the maximum collector-emitter voltage (24 or greater), maximum dissipation (2 watts or more) and the f_T rating (20 MHz or higher). For example, 2N2222A transistors can be used at Q1 and Q2, and a 2N2102 will work at Q3. There's no harm in experimenting: It helps you learn more about semiconductors.

Q1 performs as a Pierce oscillator. The crystal is placed in the feedback path from collector to base. An untuned collector circuit is used. Q2 functions as a Class A

[1]Pc negatives, pc boards and parts kits for this project are available from Circuit Board Specialists, Box 969, Pueblo, CO 81002.

Fig. 1 — Schematic diagram of the Sardine Sender. Capacitors are disk ceramic unless otherwise noted. Resistors are 1/2-watt composition. Numbered components not appearing in the parts list are identified numerically for parts-placement information only. Polarized capacitors are electrolytic.

D1 — 36-V, 1-W Zener diode.
J1-J4, incl. — Single-hole mount phono jack.
L1 — 100-μH choke (Radio Shack 273-102).
L2-L4, incl. — 10-μH choke (Radio Shack 273-101).
L5 — 12-μH inductor (Radio Shack 273-101 with 4 turns no. 26 enam. wire added).
L6 — 8.9-μH inductor (Radio Shack 273-101 with 3 turns removed).
S1 — Miniature spdt toggle or slide switch.
T1 — Broadband transformer (Radio Shack 273-101 for primary, with 5-turn secondary of no. 26 enam. wire over C6 end of primary).
Y1 — 80-meter fundamental type of crystal (crystal socket optional).



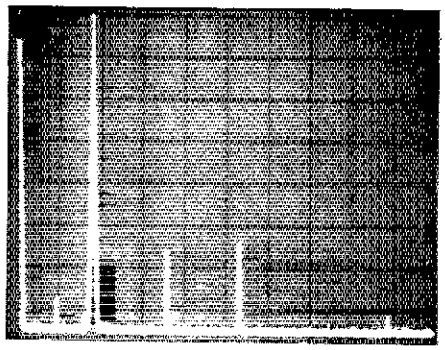


Fig. 2 — Spectrum-analyzer display of the transmitter output. The full-scale vertical line near the left is the carrier. The vertical scale is 10 dB per division, and the horizontal scale is 2 MHz per division. All spurious responses are at least 54 dB below peak carrier value, more than conforming to the FCC requirement of 40 dB or greater reduction.

broadband driver which has a broadband solenoidal transformer in the collector (T1). Q3 operates Class C and is supplied with operating voltage all of the time. It conducts when the 12-volt line to Q1 and Q2 is keyed at J1. Conduction is brought about by the application of driving power from Q2. R9 is used in the emitter of Q3 to prevent burnout and to improve stability through the introduction of degenerative feedback.

Additional protection is offered to Q3 by the inclusion of a Zener diode, D1. This diode clamps on rf voltage peaks in excess of 36 volts. The collector level could exceed that amount if Q3 broke into self-oscillation, or if no load was attached at J4 during key-down conditions.

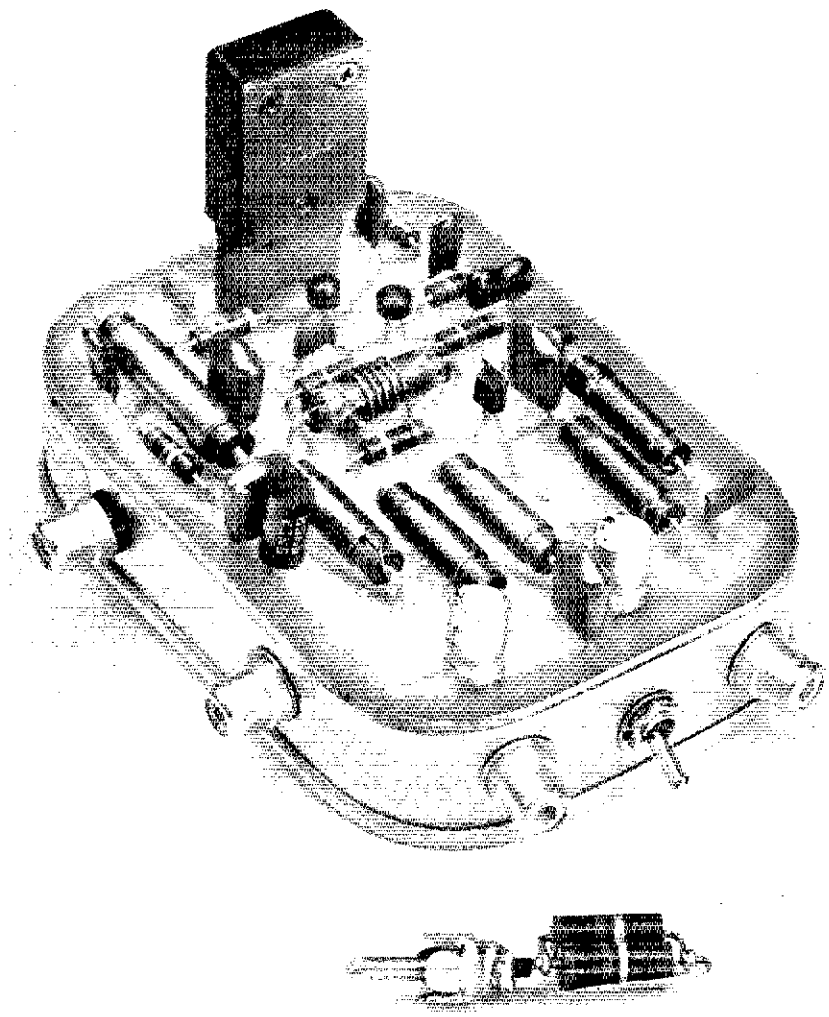
L2 and L3 are decoupling rf chokes which help prevent rf energy from one stage reaching another — a condition which could cause transmitter instability and spurious output. The associated bypass capacitors are part of the decoupling networks.

R8 is bridged across the secondary of T1 to help prevent self-oscillation of Q3, by lowering the Q in that part of the circuit. S1 is used as a simple T-R switch to change from transmit to receive.

A fixed-tuned low-pass T network is used as the Q3 output tank. It requires no tuning. Operation will be satisfactory from 3.5 to 3.75 MHz with this circuit. An oscillograph is given in Fig. 2 to show the spectral purity of the transmitter. Harmonics are 54 dB or greater below the peak carrier value indicated.

Testing and Operation

After the components are mounted as shown in the layout of Fig. 3, a 47- or 56-ohm 2-watt resistor can be connected across J4 to serve as a dummy load. Plug in a key at J1 (note that both contacts of J1 are *above* ground, thereby placing the key in series with the 12-volt line to Q1 and Q2).



The Sardine Sender, sequel to the Tuna-Tin 2 40-meter transmitter from May 1976 *QST*. The sardine-can chassis is optional. Note that the key jack is insulated from the chassis by a piece of phenolic or plastic on each side of the metal chassis.

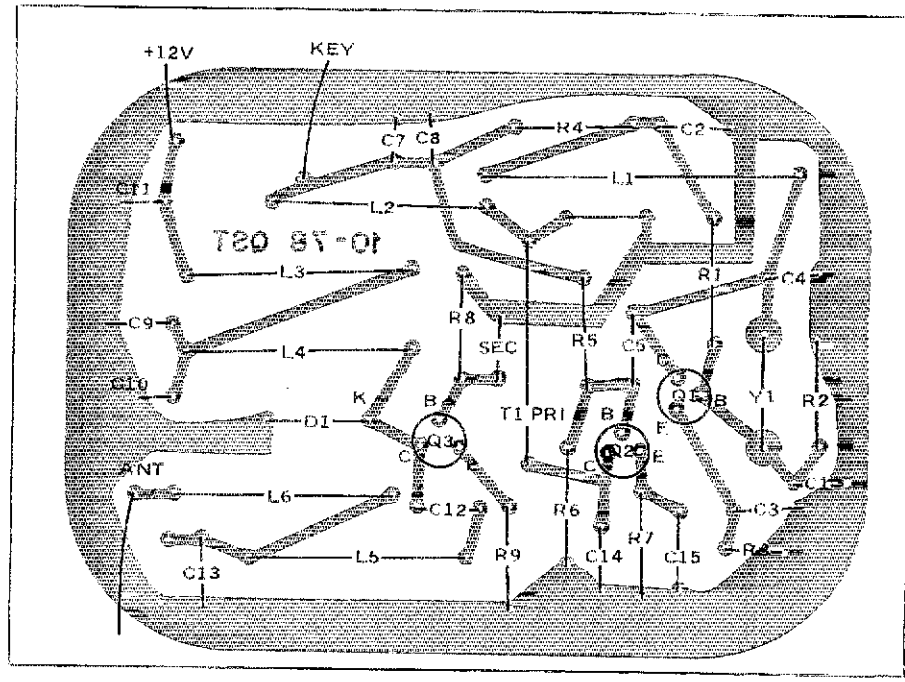


Fig. 3 — Parts placement diagram for the Sardine Sender. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the "Hints and Kinks" section of this issue.) The K indicates the cathode of D1.

Next, a dc power supply which furnishes 11 to 14 volts (not critical) is connected to J2. If an rf probe and VTVM are available, connect the probe from J4 to ground and key the transmitter. A power output of 3/4 watt should provide an rms voltage of 6.5 across a 56-ohm dummy-load resistor.

Monitor the signal in a receiver and make sure that there is no chirp. The principal cause of chirp with this circuit would be a sluggish crystal at Y1. Should a chirpy note result when a *good* crystal is used, experiment with the value of capacitance at C4, the feedback capacitor. Try values between 100 and 680 pF, selecting a value that provides a good cw note.

Table 1
Voltages at Key Points in the Circuit

	DCV (key up)	*DCV (key down)*	*RMS Volts (key down)*
Q1-E	0	+ 3.2	0
Q1-B	0	+ 1.1	2.2
Q1-C	0	+10.6	0.8
Q2-E	0	+ 2.0	0
Q2-B	0	+ 1.3	1.3
Q2-C	0	+12.0	7.7
Q3-E	− 0.05	+ 1.8	0
Q3-B	− 0.05	− 0.04	0.9
Q3-C	+12.0	+12.0	8.2

Dc and rms voltage readings at the terminals of Q1, Q2 and Q3 as measured with a Heath VTVM and diode rf probe. Departures of 10 percent from the above readings are not indicative of problems.

Table 1 provides dc and rms voltage readings at check points in the circuit. This table will be helpful if difficulties with performance are encountered. Measurements should be made with a VTVM and rf probe.

When this transmitter is used with an effective 80-meter antenna it will be possible to have QSOs with stations 1000 or more miles distant. The important thing to remember is to pick a clear frequency on which to call CQ. When answering CQs, respond to the loud signals for best results. If you hold a General or higher license class, look for other QRP denizens around 3540 kHz — on the spot on 80 meters where your brethren congregate.

Strays

HAMS' EARS HELP COAST GUARD SIEZE SMUGGLERS

☐ One night in St. Thomas, VI, an Amateur Radio operator tuning across the band heard some unusual traffic on 7218 kHz. Three vessels were discussing a rendezvous for that night off French Cay in the Turks and Caicos Islands. He immediately reported this to the U.S. Coast Guard.

Earlier, the U.S. Customs Service had reported that a vessel laden with marijuana had been seized east of Puerto Rico. It had been in communication with two other vessels on 7268 kHz. Coast Guard personnel noted that the call signs and names used were identical.

The El Paso Intelligence Center was contacted for additional information. A vessel of the same name and description had been suspected of smuggling in the fall of 1975 and the summer of 1976. Thanks to the alert ears of an Amateur Radio operator another link was forged in the chain that will eventually remove this vessel from the narcotics trade.

This case, and a similar case on the West Coast, leads the Coast Guard to believe that some narcotics smugglers are taking advantage of the amateur bands for long-range communications on frequencies that are not usually monitored by law-enforcement agencies.

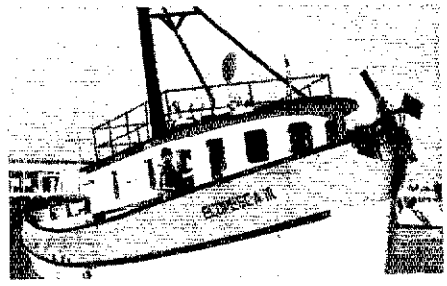
Fortunately, over the years, the Coast Guard and Amateur Radio have developed a good working relationship. There are many examples of search and rescue such as the sailing vessel *Kluanne*, a 31-foot sloop that was rescued thanks to the alert ears of the ARRL. This same public-spirited assistance can also aid the Coast Guard in law enforcement.

If an Amateur Radio operator overhears a vessel or vessels using the ham bands to carry out criminal activities, this information should be conveyed to the Coast Guard for the purpose of enforcement of applicable federal laws (Table). The Coast Guard welcomes any information amateurs may provide to help them protect those who use the sea for pleasure and trade, and prevent the use of oceans by smugglers, hijackers, thieves and other criminals. — *Ensign Paul Breckenridge, USCG*

U.S. Coast Guard Districts

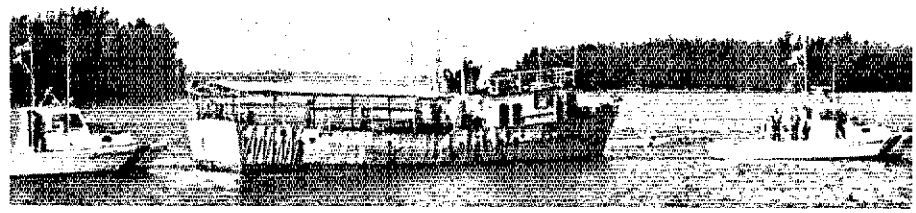
The following telephone numbers reach United States Coast Guard District Operations Centers and are manned 24 hours a day.

First District
Boston, MA 617-223-3644
Second District
St. Louis, MO 314-425-4614
Third District
New York, NY 212-264-4800
Fifth District
Portsmouth, VA 804-398-6231
Seventh District
Miami, FL 305-350-5611
Eighth District
New Orleans, LA 504-589-6225
Ninth District
Cleveland, OH 216-522-3984
Eleventh District
Long Beach, CA 213-590-2225
Twelfth District
San Francisco, CA 415-556-5500
Thirteenth District
Seattle, WA 206-442-5886
Fourteenth District
Honolulu, HI 808-546-7340
Seventeenth District
Juneau, AK 907-586-7340
U.S. Coast Guard Headquarters
Washington, DC 202-426-1830



Smuggler *Ecopesca III* is boarded by Coast Guard. Another potential ham-band intruder is captured. *(U.S. Coast Guard photo)*

A ship's contraband is unloaded under Coast Guard supervision. Hams provide valuable clues to illegal operations. *(U.S. Coast Guard photo)*



The *Yosuru* in tow. Amateur Radio operators help Coast Guard by monitoring ham bands. *(U.S. Coast Guard photo)*

The Canadian Wonder

Some tall trees, wire and a bit of Canadian ingenuity provide a 20-meter wire beam that's just the ticket for working into your favorite part of the world.

By R. J. Barrett,* VE7AUZ

As a former holder of a G call recently emigrated to British Columbia, I was anxious to keep in touch with my ham friends back in the United Kingdom. Being blessed with several tall trees to be used as supports, I made my first antenna a dipole. It ran east-west, providing a good shot over the North Pole into Europe. Soon I discovered a rather sad fact of life; big beams and high power are popular in North America and contacts on 14-MHz phone for a QRPer with a dipole are marginal at best.

My first attempts to improve the situation found me reading antenna books for information on wire arrays. These books showed that a simple two-element beam for 14 MHz could be made using wire elements and wooden spreaders about 11 feet long. The radiation pattern of this antenna is bidirectional. The W8JK array is a good example of this type of beam. The 11-foot spreaders were made from wood, and the whole thing hung from the trees. On the ground, 11-foot spreaders look a lot smaller than they are.

Problems arose when it was finally erected. First, the antenna snaked about and became tangled in the tree branches. Worst of all, there was no rejection to signals coming from the U.S. A unidirectional antenna was a must, preferably one without 11-foot wooden spreaders. It was back to the books for a few evenings.

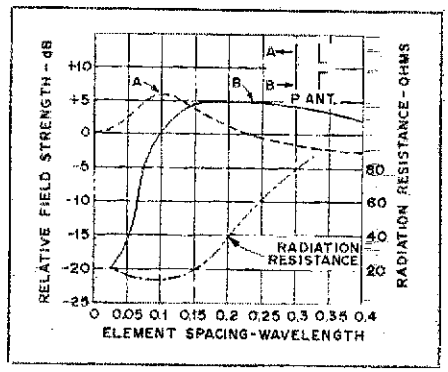
And then I saw it. In Fig. 1 is a graph reproduced from *The ARRL Antenna Book*. It shows that the theoretical gain of a two-element parasitic array with 0.05-wavelength spacing is approximately 3 dB. The front-to-back ratio for this spacing is approximately 20 dB. The radiation resistance is 12 ohms. This graph also implies that both driven element and director are self-resonant. However, at 0.05-wavelength spacing the director must be tuned to a *lower* frequency than the driven element. To realize maximum performance, trimming may have to be carried out and SWR checked at the height at which the antenna will be used. By careful tuning, both the gain and front-to-back ratio can be improved.

The main difficulty with narrow spacing occurs if the beam is constructed of aluminum tubing using the plumber's delight technique of construction. The input impedance will change as the elements wave about in the wind. By constructing the antenna from wire and using spreaders at the ends and center, this effect can be minimized.

Armed with all this information, I decided to build a scale-model beam for the 2-meter band using no. 26 wire, and 3-1/2-inch wood spreaders. The antenna could then be scaled for 20-meter operation after the 2-meter design was optimized (Fig. 2). This approach worked very well indeed!

The feed-point impedance was converted from approximately 12 ohms to 50 ohms by using a folded dipole for the driven element. A folded dipole looks like a thick dipole and broadens the frequency response and this type of driven element is recommended for all frequencies. Also 50-ohm coax can be used as feed line.

Fig. 1 — Theoretical gain of a two-element parasitic array over a half-wave dipole as a function of element spacing when the parasitic element is self-resonant.



The 2-meter model was adjusted by carefully changing the spacing between the elements, while observing an SWR indicator for a minimum reflected reading. The parasitic director was pruned by snipping off 1/8-inch pieces and checking the signal strength of a known signal on a 2-meter receiver. Antenna adjustments are tedious, but careful and repeated measurements soon indicated a forward gain just a little over 4 dB and a front-to-back ratio of 18 dB. The final dimensions of the 2-meter model are shown in Fig. 2. You may want to make one to gain experience with close-spaced beams. The finished product is not suitable for normal amateur use as it is rather fragile and a bit too small to be practical.

Construction and Adjustment

On 14 MHz, the spacing of 0.05 wavelength comes out to only 3.5 feet. The antenna is light and easy to handle. The antenna may be cut to the dimensions given in Fig. 2 and used as is, but time spent pruning and improving the front-to-back ratio by slightly adjusting the spacing between the elements and director length will be repaid by optimum performance. You may use a balun in the center of the driven element to convert the balanced antenna to unbalanced coaxial feed line. I did not, and results were still excellent.

The feed-point impedance, and therefore the SWR, is affected by the height of the antenna above ground and by the element spacing. If your rig is SWR-protected, you may adjust the SWR by slightly altering the element spacing. Adjustments should be made for the

*12040 — 98th Ave., Surrey, BC V3V 6P7

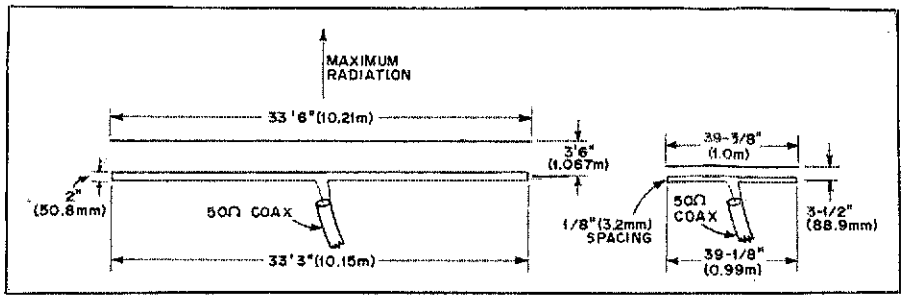


Fig. 2 — Dimensions for the Canadian Wonder close-spaced beam for both 2- and 20-meter versions. The 2-meter version is used only as an experimental model.

operating height of the antenna. Lower the antenna, make an adjustment, and haul it up again to check the SWR. This is a long procedure, but may be necessary if the SWR is initially high.[1]

Here are a few things to bear in mind when pruning antennas for the hf bands. Antennas will show high front-to-back ratios and expected gain only on *low angle* signals. Practically all vhf signals are received at low angles, but a great many hf signals arrive at rather high angles. Very few beams display optimum performance on such signals. Don't expect that S9+ 40-dB signal coming in from 500 miles away to just disappear off the back. You will get much better results on a signal emanating from a local station about five miles down the road.

Twenty meters has been providing good propagation so perhaps results on DX worked means little. However, the Canadian Wonder at 70 feet seems to hold its own very well. Many more European stations are worked now than previously.

I would recommend this antenna to any amateur, stuck with a simple dipole, who would like to try something better with a minimal outlay of cash.

[1][Editor's Note: As Fig. 1 shows, the front-to-back ratio changes more quickly with spacing than does the radiation resistance, so it may be necessary to adjust both the director length and element spacing for a compromise between low SWR and high front-to-back ratio.]

Strays

PENNSYLVANIA HAMS PROVIDE MARATHON ASSISTANCE

☐ With only one week's notice, Judy Manola, WB3GRT, enlisted 13 fellow hams to provide communications checkpoints for the Carlisle, PA, 10,000-meter marathon. She set up a portable station at work and asked for assistance through the local repeater, WR3ABR, 146.28/88 MHz.

Volunteers came from three clubs in the 35-mile area: The South Mountain Repeater Association, the Cumberland Amateur Radio Club and the Central Pennsylvania Repeater Association. Pete Cooper, WB3BTU, acted as net control.

Fortunately, the only injury sustained during the race was a runner who broke some blood vessels in his knees. Joe Keller, WB3IDC, got him to the police, who in turn took him to the hospital for treatment.

Patients accompanied by Amateur Radio operators with handhelds are loaded into waiting ambulances at the old St. Mary's Hospital.

HOW FAST ARE YOU SENDING?

☐ Bill Fisher, W2OC, suggests this formula for determining code sending speed. First count the number of seconds it takes to send the word PARIS. Then divide that number into 51.6. The result is words per minute. For example, if takes you four seconds to send PARIS, the speed is approximately 13 wpm.

HAMS FOLLOW THE BEDS AS HOSPITAL MOVES PATIENTS

☐ How do you move 69 patients, some in critical condition, across town to a newly constructed hospital? The answer is — very carefully! Communications provided by Racine and Kenosha (WI) hams helped make such a move come off without a hitch.

It was necessary for St. Mary's Hospital to coordinate this move to the point of following each patient from his hospital room in the old hospital to his room in the new hospital. Three of the patients were rolled, while still in their beds, into a very large truck and transported. Aside from the movement of the patients, other critical hospital equipment and supplies had to be moved simultaneously. — *W9HAG*

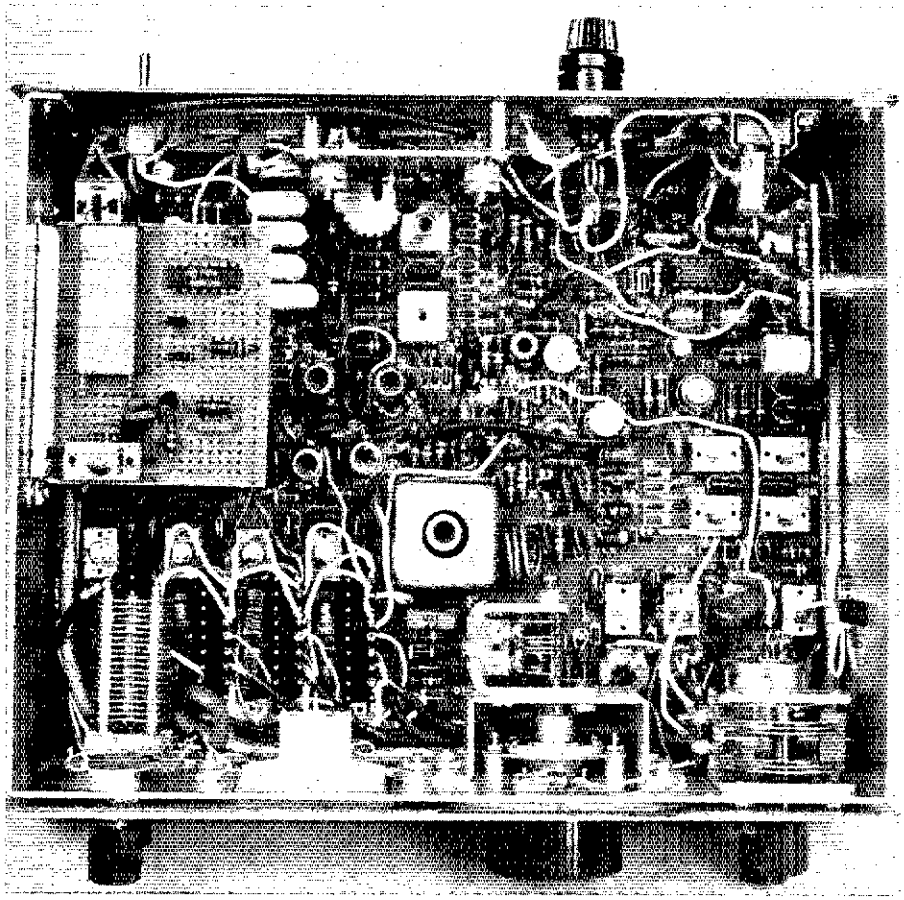
Patient on stretcher completes trip to the new St. Mary's Hospital. Ham in foreground with 2-meter handheld rig keeps in constant contact with the net control center.

A 25-kHz Calibrator for the HW-8

Ever get a pink slip or OO report for out-of-band operation? Now even the operator of low-cost QRP equipment can have the luxury of a 25-kHz calibrator. The added circuitry won't cost you more than your whole station either.

By Dave Karpiej,* K1THP

The calibrator is mounted on the upper left wall of the HW-8 and is controlled by the subminiature toggle switch on the rear apron. The small board mounted vertically on the rear apron is an added-on SWR indicator.



In just a few short years the Heathkit HW-8 has become one of the most popular QRP rigs on the air. For a modest price it covers several bands and offers many operating conveniences. One drawback, however, is in the dial calibration. The dial is calibrated in 5-kHz increments, adequate for most operations but a little hard to read if you are one of those operators who must stay in a specific subband. Most of these subbands are in increments of 25 kHz from the bottom of a band. More than one Novice, General or Advanced class amateur has probably felt a little shaky while operating within 5 kHz of a subband edge.

The solution is quite simple and can be found at your local Radio Shack store. Of course it may be used with receivers other than the HW-8, too. A 100-kHz calibrator kit (Radio Shack 28-140) is available for less than $10. All that is needed to turn it into a 25-kHz calibrator is one 7473 dual J-K flip-flop integrated circuit. The output from the 100-kHz calibrator is fed into one half of the 7473 and is divided by two. This 50-kHz signal is fed to the other half of the 7473 where it undergoes a further division by two. The output is a 25-kHz square wave, five-volts peak-to-peak, that is rich in harmonic content. The calibrator is powered from the HW-8 12-volt bus. A five-volt Zener diode

*Editorial Assistant, *QST*

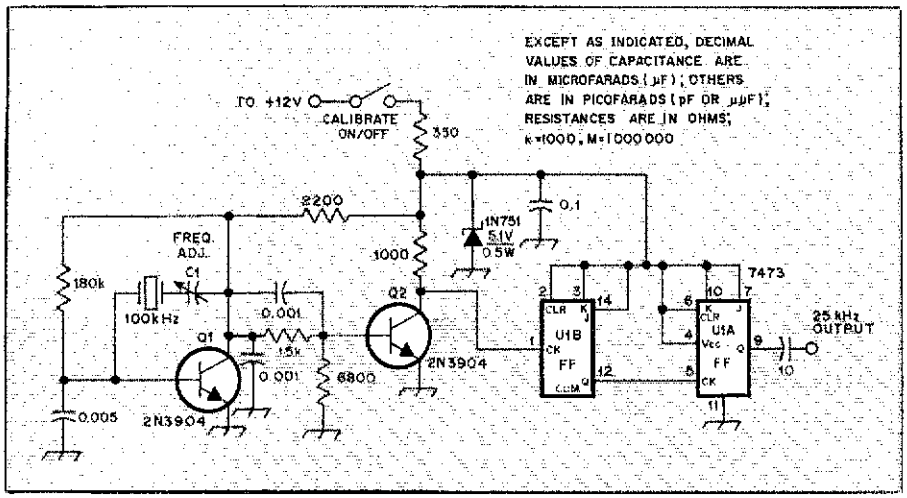


Fig. 1 — The complete schematic of the 25-kHz calibrator. Application is not limited to the HW-8. For use with older vacuum-tube types of receivers the circuit board can be installed in a small box and powered by a 9-volt battery. Most parts shown are available in kit form from Radio Shack (see text). The integrated circuit and Zener diode must be purchased separately.
C1 — 4- to 40-pF trimmer. U1 — TTL dual J-K flip-flop, type 7473.

supplies regulated voltage for the oscillator and the divider chip. The schematic is shown in Fig. 1.

Construction

The calibrator, as it comes from Radio Shack, is meant to be built on a plastic "P-Box." I rejected this method of construction because the end result does not readily fit into the HW-8 cabinet. The preferred method is to mount the components on a small printed-circuit board that can be attached to the upper left-hand portion of the inner cabinet with no. 6-32 spade bolts. Other acceptable methods are Vectorbord and flea clips, or a piece of "kluge card" that has DIP patterns on it and point-to-point wiring with small-gauge hookup wire. A subminiature toggle switch is mounted on the back panel of the HW-8, just above the antenna connector. This is used to turn the calibrator on and off. The output from the calibrator is coupled to the receive side of the antenna relay through a 10-pF capacitor. Power for the calibrator can be picked up from the power switch on the HW-8.

Operation

After the circuit is wired and installed in the HW-8, the only step left is calibration. The easiest way to do this is to enlist the aid of a receiver capable of tuning WWV. Tune in WWV and connect a piece of hookup wire from the output of the calibrator to the antenna terminal of the receiver. Apply power to the HW-8 and turn on the calibrator switch. Adjust C1 on the calibrator board until the calibrator is zero beat with WWV. Remove the piece of hookup wire and the calibration job is complete. It should now be possible to hear the calibrator output at the lower edge of an amateur band on the HW-8 and every 25 kHz up the band. This little calibrator should find much use in keeping your HW-8 receiver tuned up and those pink slips out of your mailbox. ☐

Strays

Great Lakes Division Director Richard A. Egbert, W8ETU (left), awards a certificate of appreciation to Maurice E. Hope, W8EMD, at the Great Lakes Division Convention. Maurice has been an ARRL official observer, ARRL emergency coordinator and Michigan RACES radio officer. Looking on is Michigan SCM Stanley J. Briggs, W8MPD.

A TIP FOR HAMS TRAVELING ABROAD

☐ A large number of amateurs are planning trips abroad, and many will take their rigs with them. My recent experience in Holland shows there is one universal thing you can do to help pass a technical examination — be friendly! Remember, you are a guest and are being granted a privilege.

The Dutch equivalent of the FCC, Radio Controle Dienst, informed me by letter that my station was to be inspected in two weeks. However, the time was inconvenient, so I immediately called to ask for a later hour. By establishing this early contact, I helped set up a friendly atmosphere. I also let the inspector know the extent of my language capabilities, with an eye to avoiding any possible misunderstanding.

On the "big day" the inspector arrived with his arms full of sophisticated test equipment. He took measurements of drift, bandwidth and the field strength of my signal. He also checked my logbook and antenna. All in all, it was a very thorough examination.

If you are faced with a similar test, here are a few helpful hints. (1) If the time of the test is inconvenient, try to set a new time at their convenience. (2) If you do not speak the language, try to have someone there who does, preferably another ham who knows the technical terms. (3) If your QTH is difficult to find, send them a simple map.

Above all, remember you are a guest. Remain friendly and help make it easier for your fellow amateurs to be granted the same privileges you are enjoying. — *Maury A. Swartz, WA4LYL*

ANTIQUE WIRELESS CLUB FORMS

☐ An antique wireless club has formed in Schenectady, NY, named the Antique Radio Collectors of Schenectady. So far, it has 68 members. Anyone wishing to join should contact Jack Nelson, W2FW, 915 Sherman St., Rotterdam, NY 12303.

Hello there! My name is O. Q. Buro. That's short for Overseas QSL Bureau. I'm the star of the new audio-visual production, "The Official ARRL Overseas QSL Bureau" (SC-18). The premiere netted rave reviews, and I'm now available to local slide projectors around the country for your viewing pleasure. In a style all my own, I take you step by step through *your* outgoing QSL Bureau and show you how to get the most out of it. To arrange for a showing in your local ham community write to the Club and Training Department for a CT-20 order form. I'll be happy to ham it up for your club meeting.

Build This High-Performance Top-Band Converter

You need a good converter if you're contemplating regular operation on 160 meters. A strong front end is essential if bc stations are operating nearby. This converter will let you live next door to commercial a-m stations without overloading problems.

By Max Arnold,* W4WHN and Doug DeMaw,** W1FB

What's that you said? You've been an amateur for many years and have never closed a key or push-to-talk switch on the "top band"? If your curiosity has finally driven you to investigate this fascinating band, you're probably wishing you had some good receiving capabilities — a setup that has a "crunch-proof" receiver and plenty of bandspread to stretch out the 1800- to 2000-kHz slice of spectrum on 160.

This smooth-performing converter is designed for use with an existing receiver which covers 20 meters. In other words, the *up-converting* technique is used to get from 1.8 to 14 MHz, the latter being the tunable i-f. The converter front end contains a Butterworth band-pass filter (fixed tuned) which will cover 1800 to 1900 kHz. Those wishing to operate in the upper part of 160 meters can peak the filter for 1900 to 2000 kHz.

*612 Hogan Rd., Nashville, TN 37220
**Senior Technical Editor, ARRL

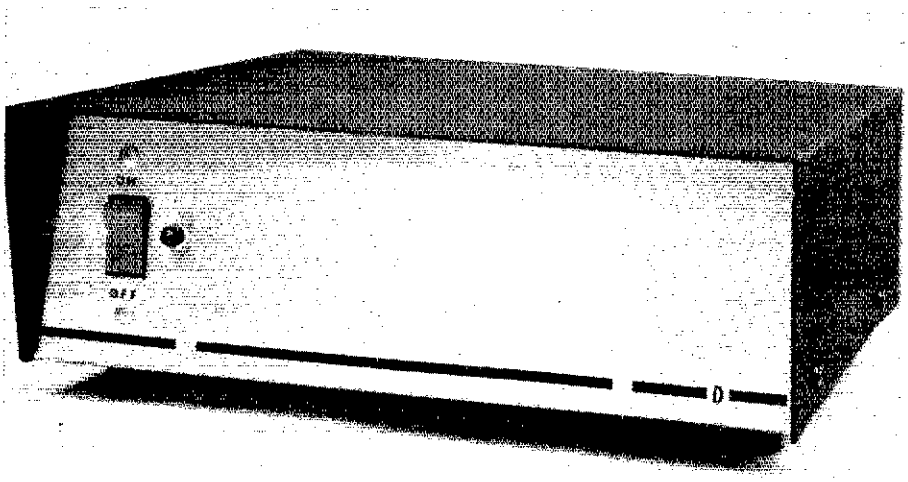
Circuit Highlights

A schematic diagram of the solid-state converter is provided in Fig. 1. FL1 is a two-pole Butterworth filter with a 3-dB bandwidth of 100 kHz. The design was developed by means of a computer during some work done by W7ZOI. Specific design information for this type of filter is given in *Solid State Design for the Radio Amateur* (ARRL) and in the *ARRL electronics data book*.

Q1 serves as an rf amplifier to compensate for the conversion loss of the diode-ring mixer, U1. The mixer is followed by a diplexer (L4, L5 and the related capacitors). This provides a proper 50-ohm termination for the mixer to enhance the IMD characteristics. The L5 pi network also functions as a low-pass i-f output filter. L4 and the two 82-pF capacitors form a high-pass network at three times the i-f (42 MHz). Conversion loss for U1 is approximately 8 dB. The LO injection level is +7 dBm.

The local-oscillator section operates at 12.2 MHz to establish a converter i-f of 14.0 to 14.2 MHz. C4 is used for netting the crystal to 12.2 MHz. This causes 1800 kHz to fall at 14.0 MHz and 2000 kHz to coincide with 14.2 MHz. Q3 functions as an amplifier/buffer to boost the oscillator output to the required +7-dBm LO injection level. A pi network matches the collector impedance of Q3 to the 50-ohm LO port of U1. It serves also as a low-pass filter.

The front-panel controls required for the converter are conspicuous by their absence. A power switch and an LED indicator — that's it. Input and output jacks are located on the rear panel.



Assembly

Double-sided, copper-clad pc board is used. The copper on the component side of the board functions as a groundplane. The ground foils on each side of the board should be joined at several points. This aids electrical stability by reducing unwanted rf ground loops on the board. Circuit boards, negatives and complete parts kits for this project are available from WA0UZO.[1]

Fig. 2 shows an interior view of the first model that was built by W4WHN. An Apollo utility cabinet contains the converter and a 12-volt, regulated dc power supply. Ample room remains for one or

[1]Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

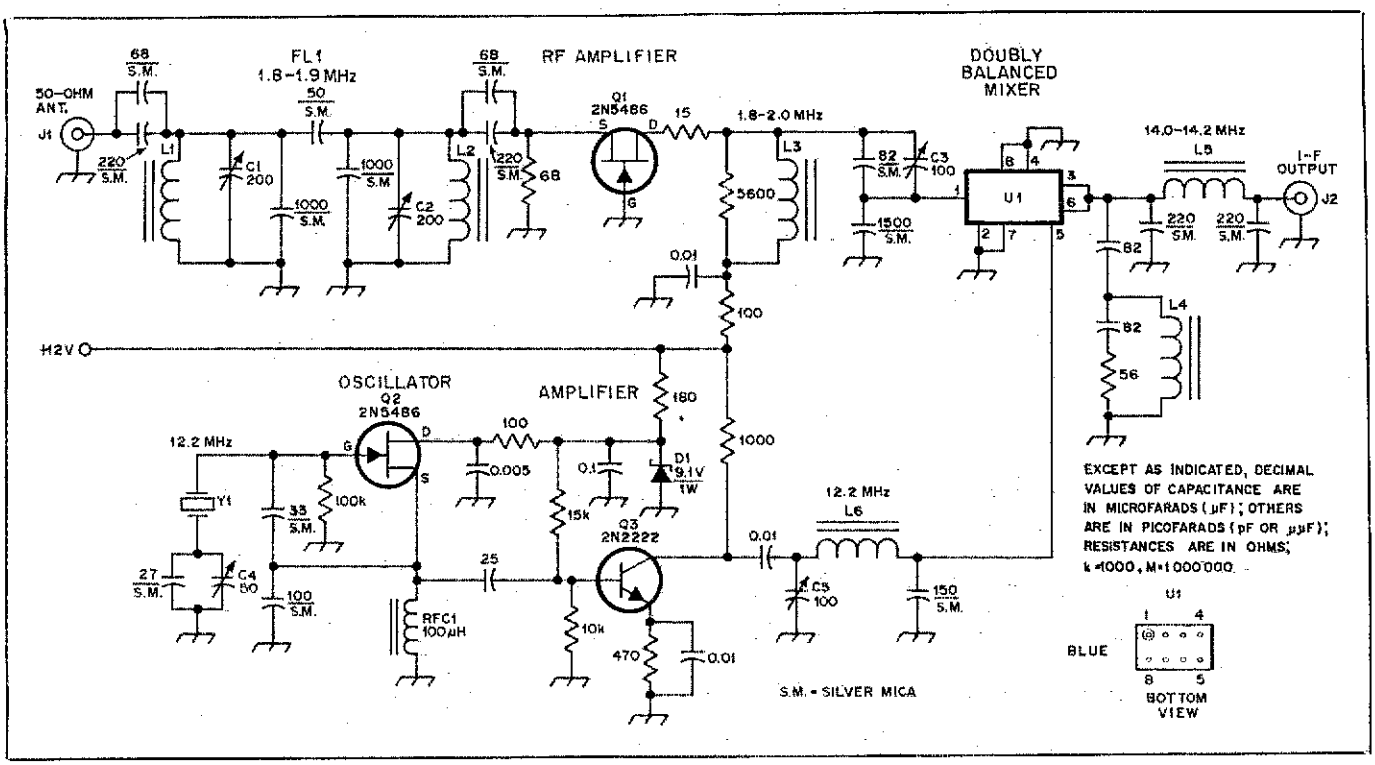


Fig. 1 — Schematic diagram of the high-performance converter. Fixed-value capacitors are disk ceramic unless otherwise noted. Fixed-value resistors are 1/2-watt composition.

C1, C2, C3, C5 — Mica compression trimmer.
C4 — Miniature ceramic trimmer.
D1 — 9.1-volt, 400-mW, or 1-W Zener diode.
J1, J2 — SO-239 style coaxial connector.
L1, L2 — 31 turns no. 22 enam. wire on T68-6 toroid core (5.1 µH).
L3 — 66 turns no. 28 enam. wire on T68-1 toroid core (50 µH)
L4 — 7 turns no. 24 enam. wire on T50-6 toroid core (0.2 µH).
L5 — 11 turns no. 24 enam. wire on T50-6 toroid core (0.55 µH).
L6 — 26 turns no. 28 enam. wire on T50-6 toroid core (2.8 µH).
RFC1 — Small 100-µH choke.
U1 — Diode-quad, doubly balanced mixer module ML-1; SRA-1 or CM-1 suitable. Base connections are the same for each brand, (ML-1 from Mini-Circuits Laboratory, Brooklyn, NY 11203. CM-1 from Cimarron, Denver, CO 80207).
Y1 — 12.2-MHz fundamental crystal, 32-pF load capacitance, type GP, (International Crystal Mfg. Co., Oklahoma City, OK).

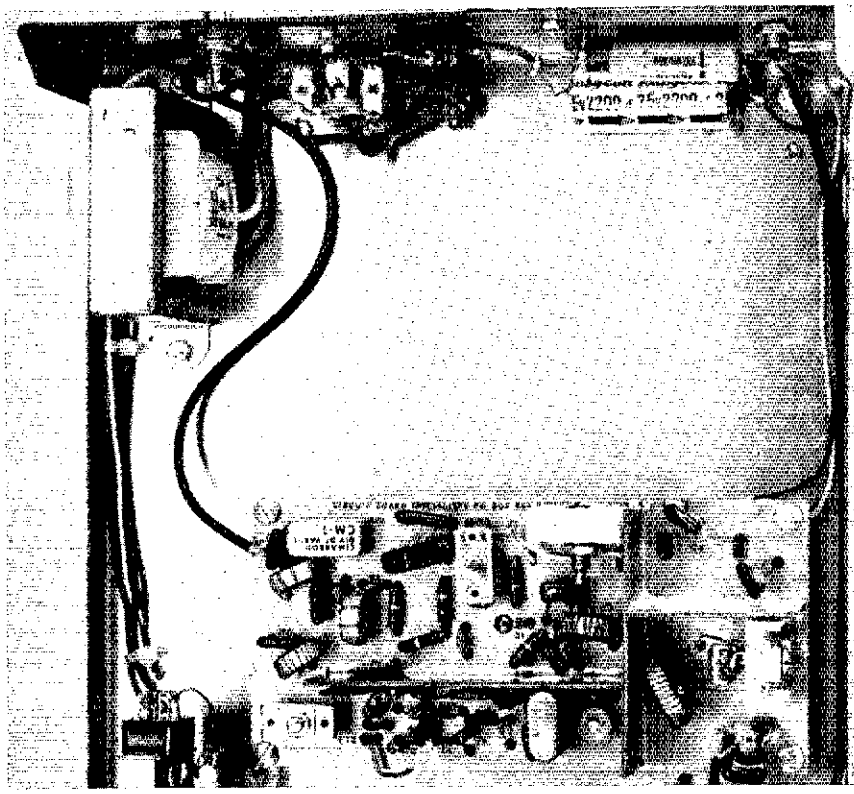


Fig. 2 — Interior view of the W4WHN prototype version of the converter. Some modifications were made after this photograph was made. The diagram of Fig. 1 and the board layouts in this article reflect the final design.

two small converters for other bands. The components seen on the pc board in Fig. 2 do not correspond entirely with the circuit of Fig. 1 and the layout given in Fig. 3. This is so because some circuit changes were made after the prototype model was completed. The pc-board shield dividers shown in the photograph are optional. There is room on the pc board to include them, if desired.

The turns of wire on all of the toroidal inductors should be spaced uniformly. Also, they should occupy all of the core area rather than being bunched together over one section of the core. A coating or two of Q dope can be applied to the toroids after they have been wound. That will keep the turns firmly in place.

Alignment

Connect the converter to a 14-MHz receiver by means of 50-ohm coaxial cable. Supply a weak signal at J1, setting the signal source at 1850 kHz (or 1950 kHz for high-end operation). Observe the receiver S meter and adjust C1 and C2 for maximum signal response. Repeat this adjustment again. Next, tweak C3 for maximum signal output from the converter. C5 is adjusted in a like manner. If a VTVM and rf probe are available, set C5 for approximately 1.6 volts rms. Finally, adjust

C4 so that Y1 is exactly on 12.2 MHz.

Using the Converter

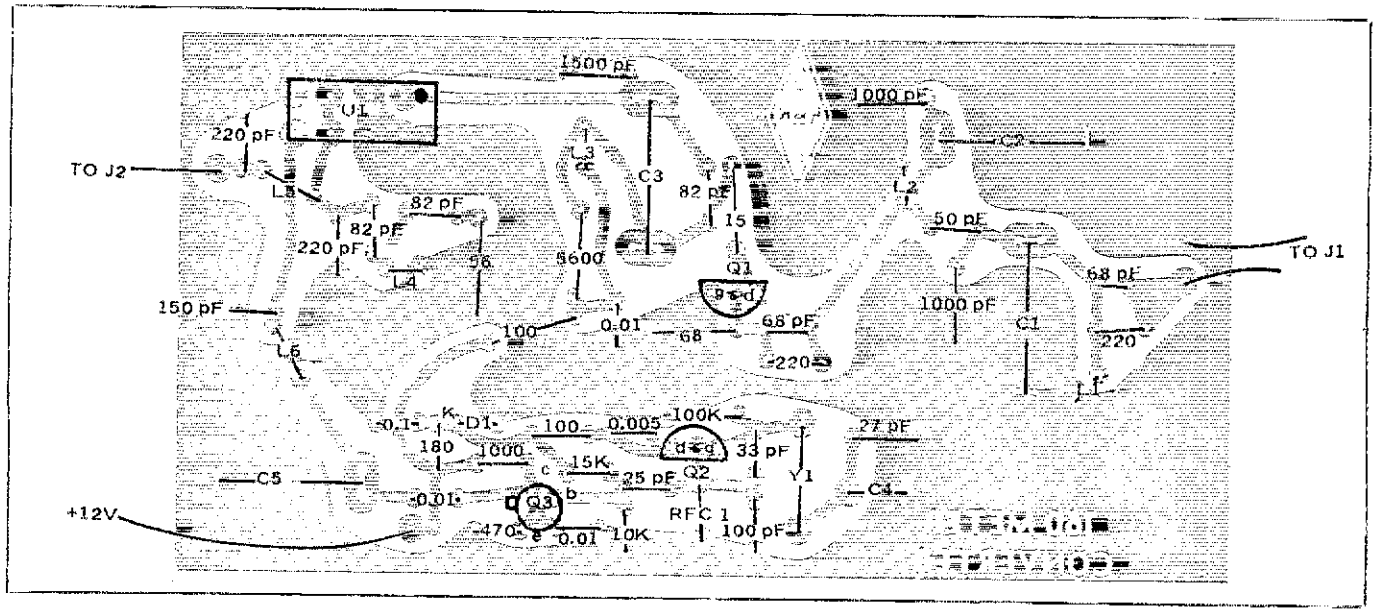
Depending upon the area in which the converter is used, LORAN signals (loud buzz of considerable bandwidth) may be heard even during the daylight hours. Chances are that not much phone or cw activity will be found during the day, but once the sun sets there should be a lot of activity between 1800 and 1850 kHz. Likewise from 1950 to 2000 kHz for the West Coast area. The cw operators are found most often in the 1800 to 1810 part of the band, with ssb and limited a-m operation taking place between 1810 and 1850 kHz. The "DX window" is between 1825 and 1830 kHz. Courteous U.S. and Canadian amateurs stay out of the window to permit foreign amateurs to call CQ and work U.S. and Canadian stations as they transmit elsewhere in the band — usually between 1800 and 1805 kHz.

The greatest period of activity on 160 meters is from September through April when QRN is at its lowest level. The band is quite noisy during the warm months of the year, and propagation is generally inferior during that period.

The Butterworth filter used at the input of this converter is designed for a 50-ohm impedance. It will not perform properly if the antenna is not matched for 50 ohms. If random lengths of wire or dipoles for other bands must be used, a Transmatch should be placed in the line to establish a 50-ohm termination for the filter.

The overall gain of the converter has been purposely set near unity. This will help prevent front-end "bashing" of the tunable i-f receiver when strong signals are present: Too much converter gain will severely degrade the dynamic range of the i-f receiver, leading to cross modulation, desensing and IMD responses.

Fig. 3 — Parts placement guide for the converter. The circuit board has foil on both sides. The etching pattern for the non-groundplane side appears in the "Hints and Kinks" section of this issue, and is shown in X-ray view here as the shaded area. Whole-number values with no units represent resistances in ohms; k = 1000. Decimal-value numbers alone represent capacitance in microfarads. K indicates the cathode of a diode.



Strays

ANTENNAS, NOT TOWERS

☐ The new rule said, "no towers," and the Oakland County, MI, Amateur Radio Emergency Service (ARES) was put off the air for five years until a bit of detective work unraveled the mystery. We discovered the phrase originated with the architect who designed the new sheriff's building. He had asked the radio man in charge, "What do you require for all the present and future needs of the County Radio Services?" After much study and figuring, the architect proposed a tower 200 to 300 feet high. Then in good faith, he ruled, "No towers on the building." At great expense, the antennas were located some two miles away and phone lines were leased to take care of the radio needs.

In our letter to the county, we pointed out we did not need towers, only antennas. The antennas were described in simple fashion: "They look like fish poles." We even suggested an antenna that was not too long and did not require radials. Our letter was simple and to the point: We could not provide emergency backup for the county if we had to use phone lines and complex rigs. We wanted things simple, low cost and mobile to serve the needs of the county residents.

We were pleased when we received word to "go." We immediately put up the antenna, ran the cable, and put the rig on the air. K8NKB was the first to reactivate from the County Building Complex.

Could the simple phrase, "no towers," affect your civil defense, ARES or Skywarn program? Is there a vacuum somewhere in the system that keeps you from taking part in some public service program? Could an innocent phrase such as "no towers" cause your well-running emergency program to come to a grinding halt? Yes, there is a lot of public relations work needed to keep an Amateur Radio Emergency Service fully utilized. — *W8HS*

These distinguished visitors dropped by ARRL headquarters recently. Meredith and Pete Hoover, W6ZH, were in the Newington area while attending the 1978 National Red Cross Convention in Hartford where Pete was elected to the National Red Cross Board of Governors. Congratulations, Pete!

SSTV Pictures from Your Microcomputer

Everyone asks, "How can microprocessors be used in Amateur Radio?" If slow-scan TV is your thing, here is a startling answer.

By Barry Sanderson*

Many amateurs have had a desire to get into slow-scan TV reception and transmission. More are interested in microprocessors and their role in Amateur Radio. This article puts the two together. Using the technique described here, you can generate simple graphic and alphanumeric characters without a camera! First, let's review the slow-scan signal, its makeup, and characteristics.

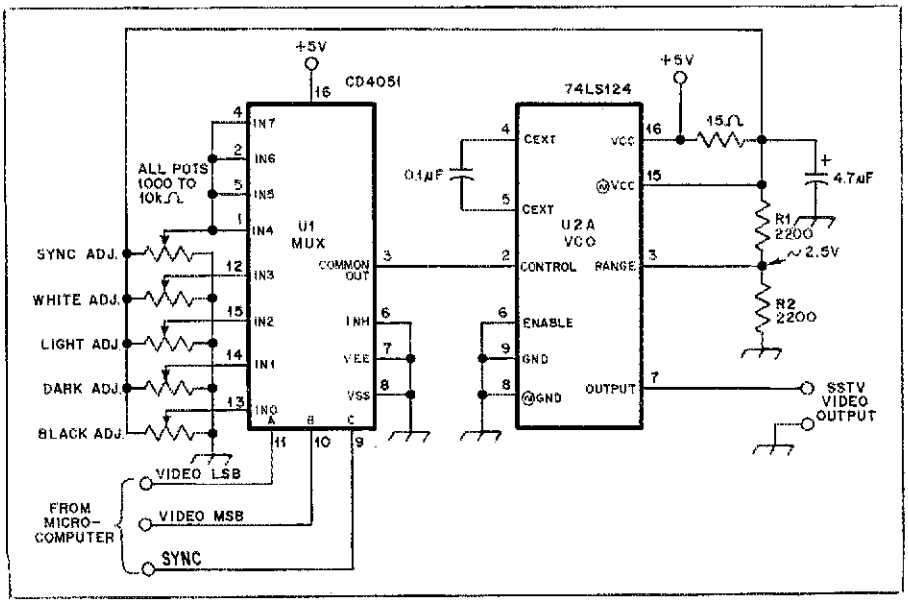
Slow-scan TV signals consist of two parts, the picture information and the synchronization information. The picture information is represented by a signal in the frequency range of 1500 Hz to 2300 Hz (1500 Hz corresponds to black and 2300 Hz corresponds to white). The frequencies in between correspond to shades of gray between black and white.

The synchronization information is represented by a frequency of 1200 Hz. The duration of the 1200-Hz signal distinguishes horizontal and vertical synchronization signals. The horizontal sync signal lasts for five ms and the vertical sync signal for 30 ms. The horizontal sync signal marks the boundary between the end of the picture information for one line and the start of the picture information for the next line. The vertical sync signal marks the boundary between the last or bottom line of one picture and the first or top line of the next picture.

At 15 lines per second, the time required by one line is 66.7 ms. Of this, five ms are required for the horizontal sync signal. The remaining 61.7 ms are filled with the picture information for that line. One entire picture is composed of 30 ms of sync signal (the vertical sync signal takes approximately one-half a line time) followed by 128 lines containing picture information and horizontal sync.[1]

*402 N. LaSalle, Indianapolis, IN 46201

Fig. 1 — A digital-to-analog-to-frequency converter for slow-scan television. No connections are made to IC pins not shown.
U1 — CMOS analog multiplexer, type CD4051.
U2 — TTL dual voltage-controlled oscillator, type 74LS124; one section unused.

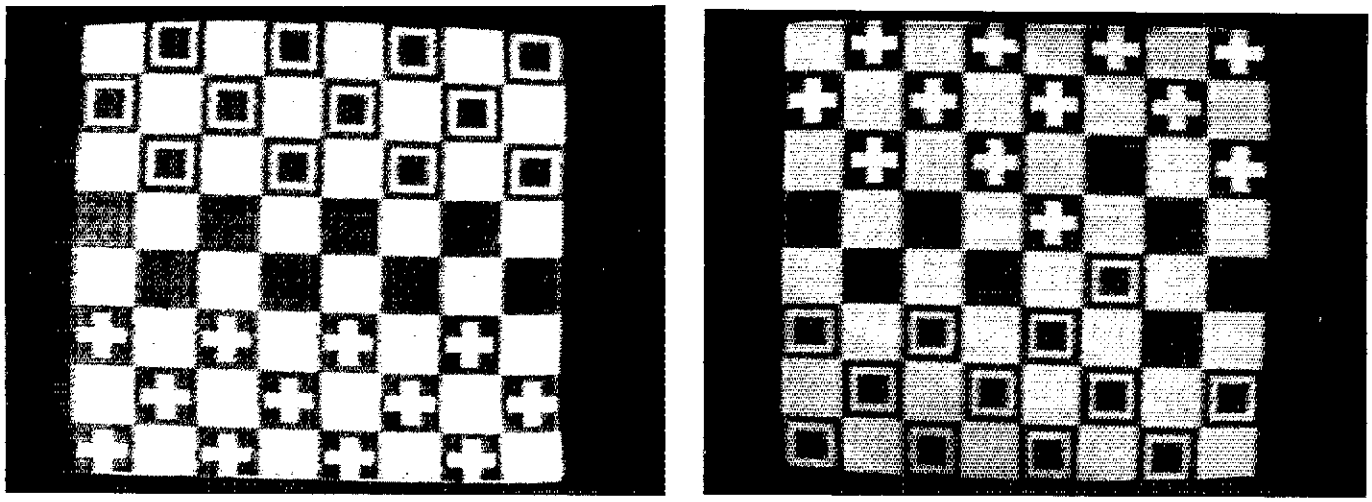


Picture Format

I made some changes in the picture format to simplify the signal-generation process. Rather than allowing 128 different lines in each picture, I allowed only 64 different lines in each picture. In order to make 128 total lines I repeated each line once so that the vertical dimension of each of my picture elements (pixels) is two of the 128 total lines or 1/64 of the total picture.

Also, I decided to make only 64 different pixels possible horizontally. Thus my pictures are an array of 64 by 64 squares or pixels. Each of these pixels is one of four shades of gray. In order of increasing brightness, these shades of gray are named: black, dark, light and white.

[1][Editor's Note: The amateur standard, adopted by gentlemen's agreement in 1968 when SSTV was first authorized for general use in the U.S. and Canada, calls for 120 lines per frame, requiring eight seconds to transmit a complete picture. In recent years the trend has been toward 128 lines per frame, especially when digital-logic circuitry is used to develop the sync signals, requiring 8.53 seconds to send a picture. With proper adjustment of the vertical sweep circuitry in a receiving monitor, either rate may be received satisfactorily.]



In the photo on the left is shown the screen at the starting point for a game of checkers. The white crosses and the light squares represent opposing sides in a game. At right, the board is shown as it might look after a couple of moves have been made.

I lumped the pixels together in groups of eight both vertically and horizontally. Each of these groups is called a character. Each character is a square of 64 pixels (eight pixels on a side). Thus the entire picture consists of a square of 64 characters. There are eight rows of characters with eight characters in each row.

There are no further limitations on what the characters look like. Besides the letters, numbers and punctuation marks that the word "character" connotes, characters can be made to symbolize anything you want. Some examples of things that characters could symbolize are chessmen, battleships, submarines, torpedoes, mines, tanks, artillery, shells, missiles, space ships, planets, stars, photon torpedoes and so on.

The hardware added to make the conversion from microcomputer logic output to the audio signal required for slow-scan is shown in Fig. 1. The conversion is done in two steps. First the logic levels are converted to an analog voltage by a multiplexer. Next, this analog voltage is converted to an audio frequency by a voltage-controlled oscillator (VCO).

The three microcomputer output bits (two bits representing one of four shades of gray, and one sync bit) are applied to the address inputs of an eight-channel CD4051 analog multiplexer. A separate pot is provided to set each of the five different levels (sync, black, dark, light and white). The selected signal is applied to the control input of half of a 74LS124 VCO. The slow-scan video signal is taken from the output of the 74LS124.

For this circuit to yield desirable results each pot must be adjusted so that the proper frequency is output by the VCO when that pot is selected to provide the control voltage to the VCO. The adjustment procedure consists of selecting each pot in turn and adjusting that pot until the VCO oscillates at the proper frequency for that pot. The proper frequencies are Sync — 1200 Hz; Black — 1500 Hz; Dark — 1767 Hz; Light — 2033 Hz and White — 2300 Hz.

The Program

My program is based on two things. First, a hardware timer that generates an interrupt at a regular interval, and second, a routine that is executed in response to the interrupt that is under program control and changes as the program executes.

The hardware timer is set to generate interrupts at the pixel-output rate. The interval is calculated from the slow-scan specification by dividing the time allotted for the picture portion of a line (approximately 61.7 ms) by the number of pixels per line (64). The result is 963.5 microseconds.

One of three interrupt service routines is executed in response to each interrupt from the interval timer. The three routines are named VSYNC, PICT and HSYNC. VSYNC is executed during vertical sync time. It inserts the vertical sync signal and changes the interrupt response to PICT at the end of the vertical sync signal. This means that the next interrupt will result in PICT being executed instead of VSYNC.

PICT fetches the picture information stored in a portion of memory and outputs it to the proper port. After 64 pixels have been output, it changes the interrupt response to HSYNC. Thus HSYNC will be executed in response to the next interrupt.

HSYNC activates the sync signal for five pixel times and then changes the interrupt response to either PICT or VSYNC. If 128 lines have been output, VSYNC is executed in response to the next interrupt; otherwise PICT is executed in response to the next interrupt.

Since the generation of a slow-scan TV signal corresponding to the stored picture is done by interrupt service routines, the leftover time is available to the main-line program to perform other functions.

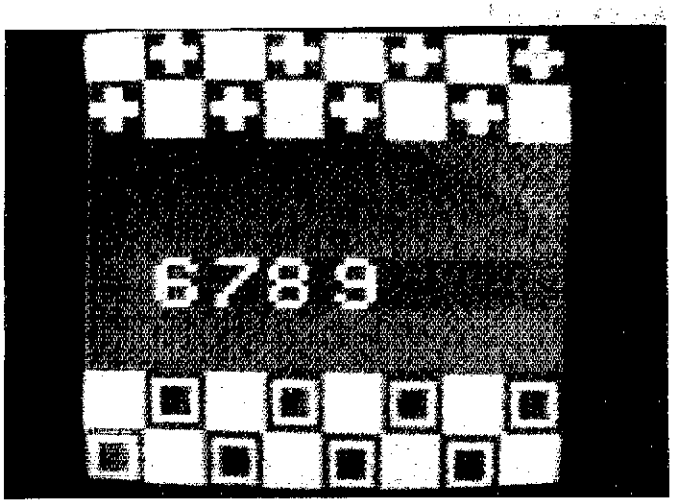
Picture Updating

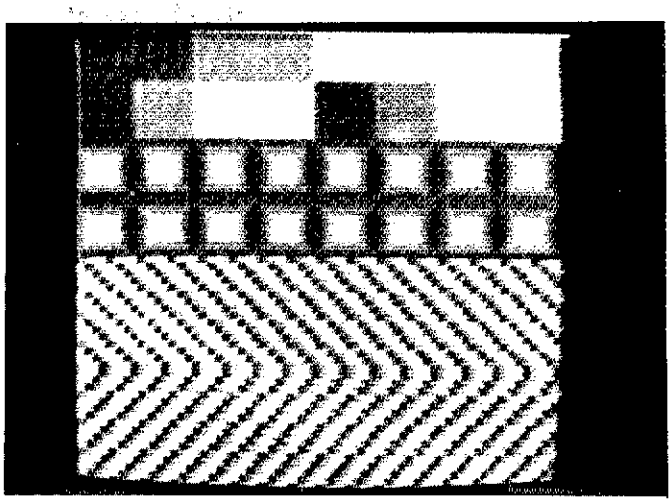
One thing that should be included in the main-line program is a way to change the contents of the memory locations that hold the picture. One approach is to allow a new character to be written into any of the 64 character positions on command from an input device (typically a keyboard). Both the new character and its position in the picture are required each time this command is executed. This type of picture updating is useful in game-playing situations, such as checkers or chess.

Another way to update the picture is to have the position in the picture of the new character incorporated into the program. Thus the input device just supplies a string of new characters and the program places them in the picture. This type of picture updating is useful for alphanumeric pictures or fixed pictures (CQ, QSL, etc.).

Still another way to update the picture is to have both the new characters and their positions in the picture incorporated into the program. This allows a predetermined sequence of pictures to be output.

Since the method of picture updating depends on the situation and the hardware available, I have not included a discussion of my main-line program. However, the three interrupt service routines and a fourth subroutine will actually do all of the work, generating the slow-scan TV signals from stored picture information. With a thorough understanding of the functions performed by these subroutines, you should be able to incorporate them into a program of your own that generates a slow-scan TV signal of pictures of your





At left is an example of 5 × 7 dot matrix numbers fit into characters and displayed on the screen. In the right photo, the top two rows of characters are gray scales. The next two rows consist of a square character that is black around the perimeter, white in the center, and light and dark in between. The bottom half of the picture consists of a sequence of gray scales where the shade of gray changes with every pixel. Each line of pixels is jogged one space to the right for the first 16 lines, then the direction of sliding of gray scales is reversed.

own choosing. This article will provide you with that necessary understanding.

The rest of the article discusses some counters which are used to control program execution, the way the picture is stored in memory, the GET C subroutine which fetches the next pixels to be output, and the three interrupt service routines.

Three eight-bit counters are used to control program execution. These are the X counter, the Y counter, and the PIXEL counter. The X counter is incremented each time a new pixel is output, and is reset to zero at the end of each horizontal sync period. The Y counter is incremented each time the X counter is reset to zero. The Y counter counts the number of picture lines that have been output. It is reset to zero during each vertical sync period. When taken together, the X and Y counters define the position of the pixel on the TV screen at any given moment. The PIXEL counter is used differently by the three interrupt service routines. These uses will be explained separately as the three routines are discussed.

Character Storage

Each pixel requires two bits to specify one of the four shades of gray. An 8-bit word can hold four consecutive pixels. Two consecutive 8-bit words hold eight consecutive pixels, or one line of a character. Thus for each character, 16 consecutive 8-bit memory locations are required to store the two-bit codes specifying the shade of gray for each of the 64 pixels.

In my model, the two video bits required by my interface circuit are connected to the highest order bits of an output port (bit 7 to the video most significant bit, MSB, and bit 6 to the video least significant bit, LSB). Therefore, bits 7 and 6 of the first word of memory for a particular character indicate the shade of gray for the first pixel (upper left corner) of that character. Bits 5 and 4 of that same word correspond to the second pixel of that character. The next two bits correspond to the next pixel, and so on.

Bits 1 and 0 of the second word correspond to the upper right-hand pixel. Bits 7 and 6 of the third word of memory for a particular character correspond to the first (left-most) pixel in the second line of the character. Bits 7 and 6 of the 15th word correspond to the first pixel in the eighth line of the character, and so on. Finally, the lower right-corner pixel is stored in bits 1 and 0 of the 16th word for that particular character.

As a specific example, consider the character diagrammed in Fig. 2A. The cross-hair lines indicate pixel boundaries. This character is a white cross on a black background. Fig. 2B lists the 2-bit codes required for this character according to the following convention: 00 = black, 01 = dark, 10 = light, 11 = white. The solid lines represent microcomputer word boundaries. The table in Fig. 2C shows a hex listing of the contents of the 16 consecutive memory locations required to store this character. A starting address of N is assumed.

Picture Storage

Since a picture is composed of 64 characters, I decided to store a 7-bit value in the first 64 locations on page one of memory to represent each character of the picture. (A page is 256 8-bit words.)

I made these the upper 7 bits of the 8-bit word and forced the LSB to be a zero. The resulting 8-bit word is used to fetch the low order half of a 16-bit address from page two of memory. The high-order half of the address is fetched from the location just above the one containing the low order half of the address. The upper seven bits of the location on page two where the low and high order halves of the address are stored are the same. The LSB is a zero for the low-order half and the LSB is a one for the high-order half. This 16-bit address specifies where the word containing the first four pixels of the character is stored. The remaining pixels are stored in the 15 words following the word in which the first four pixels are stored.

Bits in the X and Y counters specify which of the 16 memory locations associated with each character contains the pixels to be output next. These bits are used to calculate the offset from the word containing the first four pixels to the word containing the pixels to be output next.

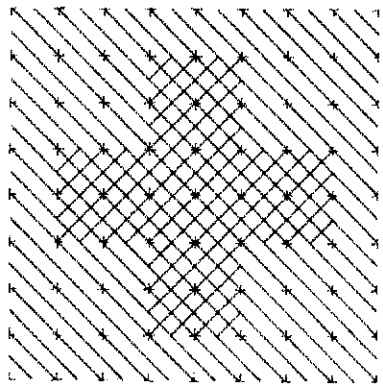
The GET C Subroutine

In order to understand the GET C routine, you should first realize what each bit in the X and Y counters corresponds to with respect to the TV picture. The individual bits are referred to by a letter and a number, the letter being X for the X counter and Y for the Y counter. X7 is the MSB of the X counter, XØ is the LSB of the X counter, Y6 is the next to the MSB of the Y counter, and so on.

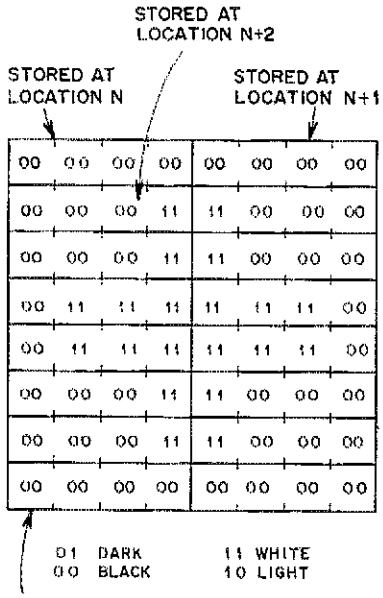
X2, X1 and XØ specify which of the eight pixels on a given line of a given character is to be output next. The next three bits (X5, X4 and X3) specify which of the eight characters on a given line is to be output next. X6 goes from a 0 to a 1 when all 64 pixels on a line have been output.

Y3, Y2 and Y1 specify which of the eight lines of a character are currently being output. Y6, Y5 and Y4 specify which of the eight rows of characters is currently being output. Y7 goes from a 0 to a 1 after all 64 lines have been output twice (each line is repeated to make 128 lines). YØ indicates whether a particular line is being output for the first or second time.

As you can see in Fig. 3, the GET C



(A)



(B)

Address	Data (Hex)
N	00
N + 1	00
N + 2	03
N + 3	C0
N + 4	03
N + 5	C0
N + 6	3F
N + 7	FC
N + 8	3F
N + 9	FC
N + 10	03
N + 11	C0
N + 12	03
N + 13	C0
N + 14	00
N + 15	00

(C)

Fig. 2 — Example of data to represent a character. The cross-hair lines at A indicate pixel boundaries; a complete SSTV frame is 64 x 64 pixels. The 8 x 8-pixel character is stored in 16 bytes of computer memory.

subroutine first assembles the bits from the X and Y counters, specifying one of the 64 character positions, into an 8-bit number. This number is in the range of 0-63 inclusive. Next the number of the character currently in that position is fetched from that memory location in page one. This character number is multiplied by two and the result used to fetch a 16-bit address from two consecutive memory locations on page two.

This 16-bit address gives the location of the word containing the first four pixels of the character. An offset of $0000Y_3Y_2Y_1X_2$ is added to this 16-bit address. The result is an address of the memory location containing the next four pixels to be output. These four pixels are placed in the temporary video storage location. The GET C subroutine then returns control to the routine that called it.

Subroutines

The PICT subroutine (Fig. 4) uses the pixel counter to determine which of the four pixels in an 8-bit word have not been output yet. Each time this subroutine is executed a pixel is transferred from the temporary video storage location to the proper output port. The data in the temporary video storage location are rotated two bits to the left so that the next pixel is in the two highest order bit positions.

After every four pixels have been output, the GET C subroutine is called to update the temporary video storage location with the next four pixels to be output. After 64 pixels have been output, the interrupt response is changed to HSYNC and the pixel counter is loaded with 5. Therefore, the HSYNC subroutine will be executed in response to the next interrupt instead of the PICT subroutine.

The HSYNC subroutine (Fig. 5) uses the pixel counter to make the horizontal sync signal five pixel times long. This results in a horizontal sync signal about four percent shorter than the SSTV specification requires; however, it is close enough. After the pixel counter has been decremented to zero, the X counter is reset to zero and the Y counter is incremented. If all 128 lines have not yet been output, GET C is called (to update the contents of the temporary video storage location). The pixel counter is then set to 4 and the interrupt response is changed to PICT. If, however, all 128 lines have been output, the pixel counter is set to 31 and the interrupt response is changed to VSYNC.

The VSYNC subroutine (Fig. 5) uses the pixel counter to make the vertical sync signal 31 pixel times long. After the pixel counter has been decremented to zero, the Y counter is reset to zero. Then GET C is called (to update the contents of the temporary video storage location), the pixel counter is set to four and the interrupt response is changed to PICT.

Since a slow-scan TV signal is an audio

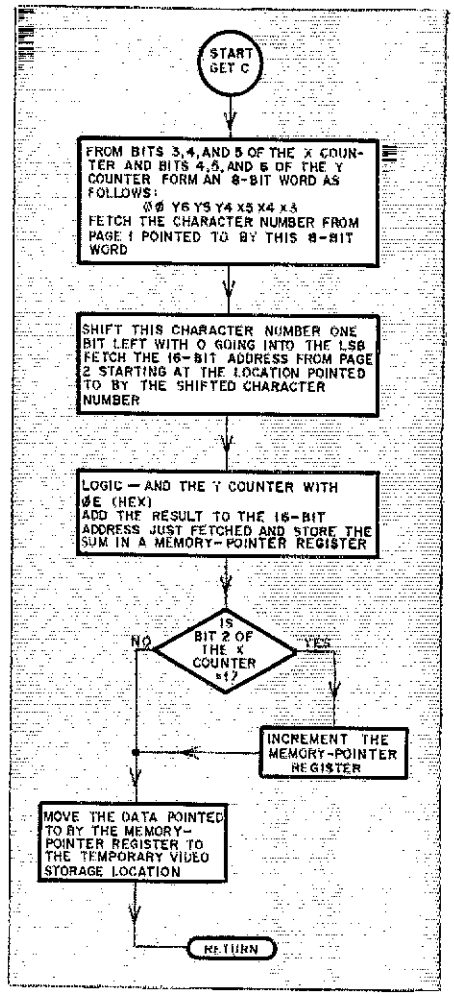


Fig. 3 — Flow diagram of the GET C subroutine.

waveform, it can be transcribed on any tape recorder with low noise, flutter and distortion characteristics. I made up some characters, and then some pictures from those characters. I used my program to generate the slow-scan TV signal corresponding to those pictures and recorded it. I then took this tape to someone who has a commercially available scan converter. This scan converter accepts a slow-scan video signal as an input and outputs a "normal" or fast-scan video signal which can be displayed on a TV monitor. The pictures in this article are ones I took of the TV monitor while it was hooked to the output of a scan converter receiving my taped slow-scan signals.

This particular scan converter did something to pictures with sharp high-contrast edges, causing a decrease in picture quality. The converter superimposed a checkerboard pattern of black dots on the picture. Instead of each pixel being the proper width, each pixel is only half as wide as it should be with the other half being a black dot. The black dot appears either to the left or right of the half-size

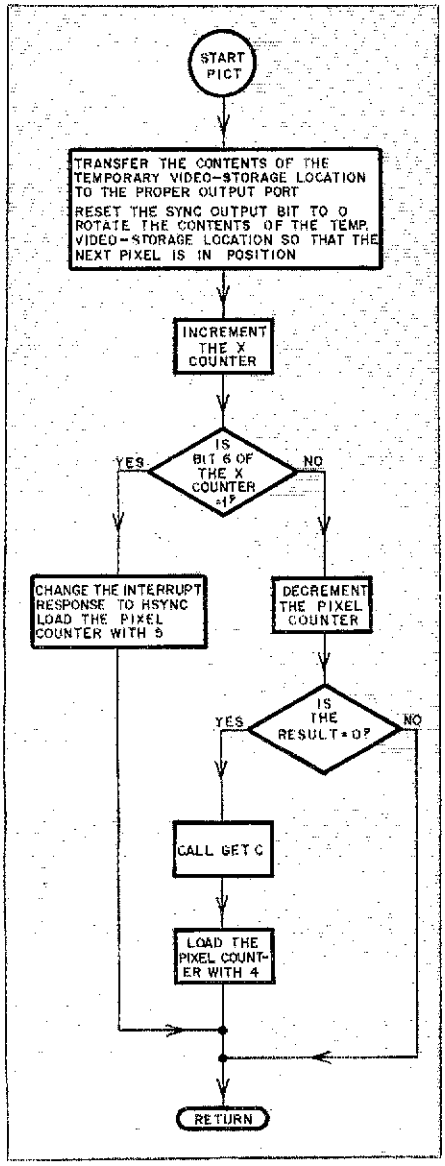


Fig. 4 — Flow diagram of the PICT subroutine.

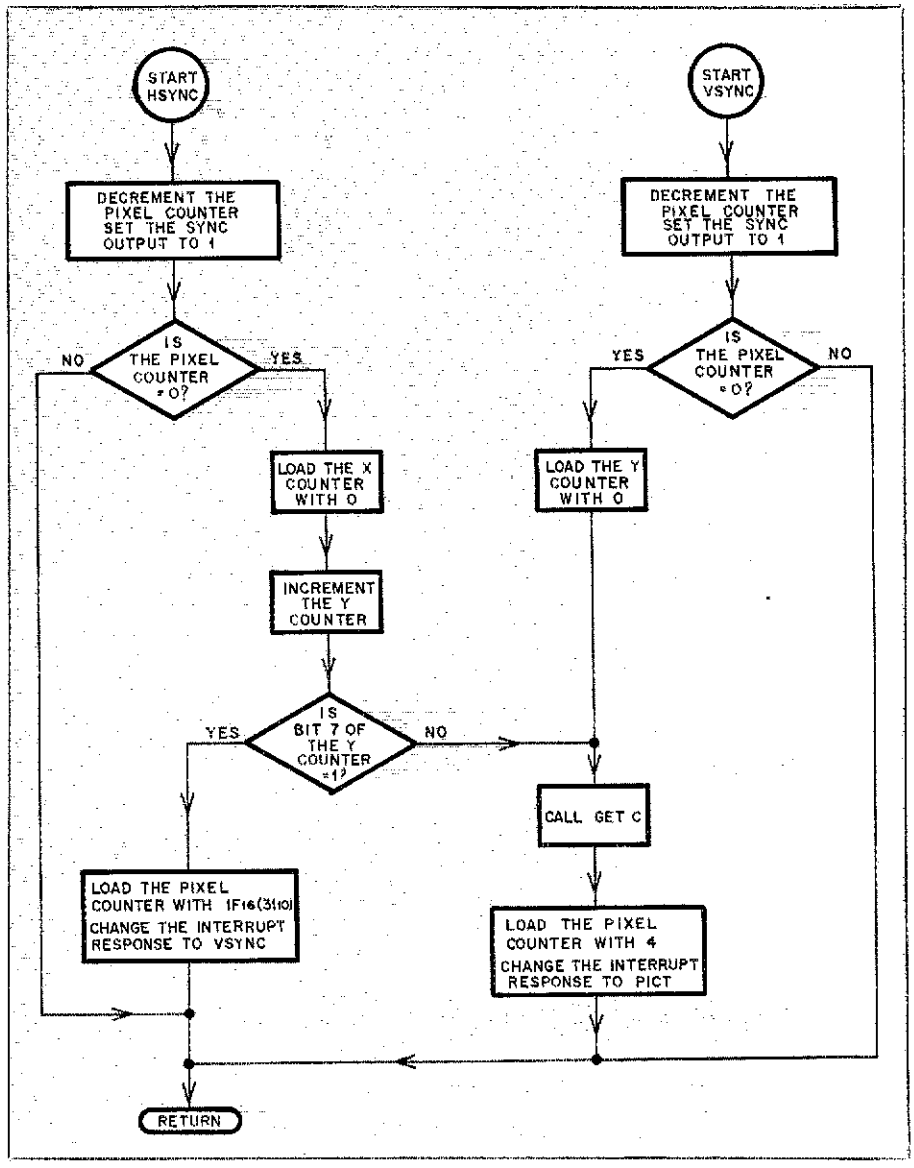


Fig. 5 — Flow diagram of the HSYNC, VSYNC subroutine.

pixel alternating from one line to the next. This accounts for the fuzzy vertical edges in these pictures.

I have purposely not included a listing of my program, because it is written in assembly level language and I attempted to use as many special Z-80 instructions (which are not a part of the 8080 instruction set) as practical. I also freely used special hardware features which I designed into my microcomputer. Thus, a significant number of the instructions in my program involve some special feature of my microcomputer. Rather than "sidetrack" to explain these, I have discussed the algorithm I used and hope you can adapt this algorithm to your microcomputer and application.

Strays

"ROADEO" HAMS

Backing through obstacles, steering around tennis balls and negotiating a serpentine course that would raise the hair of a Grand Prix driver were just some of the difficulties that 279 school bus drivers faced during the recent fifth annual Wisconsin School Bus Safety "Roadeo" in Madison, WI. Devoted to safety for the school-age rider, the event was made possible by the 21 hams who assisted. It was surely a communication and organizational challenge not seen since Field Day!

The Madison Area Repeater Association, Four Lakes Amateur Radio Club and Yellow Thunder Amateur Radio Club undertook the task of providing mobile, portable and fixed 2-meter equipment and personnel to keep track of the drivers, their scores and equipment.

Headquarters for the event was the Madison-Sheraton Hotel, where K9VAL acted as net control. Twenty other hams sporting an assortment of gear and antennas were scattered throughout the road course and elsewhere at the Dane County Exposition Center. K9BIL acted as field coordinator for these locations.

A bus equipped with 2-meter gear was used to shuttle entrants and spectators to and from various events. WR9ABT, the MARA repeater, provided clear, concise communications. — K9ZZ

Medium-Scan Television — A New Amateur Frontier

Just what is MSTV? It's about to happen, on 10 meters!

By Dr. Don C. Miller,* W9NTP

As the radio spectrum becomes more and more crowded, what better way is there to promote Amateur Radio worldwide than to be the first to transmit moving television pictures to Europe, *without* the aid of a repeater satellite? This very task has been undertaken recently by an energetic group of experimental SSTV hams who, with the help of the ARRL, have received a Special Temporary Authorization (STA) from the Federal Communications Commission.

This STA was granted on June 16 to W9NTP, W3EFG, WB9LVI, W6MXV and WØLMD. It permits the testing of a 36-kHz-bandwidth television system on the 10-meter band on a frequency segment of 29.0-29.3 MHz. The task of transmitting moving television pictures in such a bandwidth will not be easy. It rivals much of the work being done in commercial and military fields where systems are being developed for low bandwidth and long-distance transmission.

Why should this group succeed when many other investigators have not had success? Let us look back in history. Twenty years ago SSTV was an infant and there was very little interest in low-bandwidth, still-picture transmission. While SSTV started out with a few technically oriented hams, it has resulted in pictures from Mars and become one of the main tools in commercial and military systems today. This would probably not have happened if amateurs hadn't persisted in promoting SSTV through magazines, STAs and the Military Affiliated Radio System (MARS).

The hams listed on the MSTV STA will need the help of hundreds of others. This is where the reader can help. Cooperation is needed in Europe, too.

Squeezing the Bandwidth

The only possibility of transmitting moving television images over international distances is to reduce the rf bandwidth to near 36 kHz. The problem therefore becomes one of reducing a standard TV video image of 3-MHz bandwidth to one of 15-20 kHz. No magic breakthrough is going to occur in video processing. The designer will be forced to leave "something" out of the regular TV image in order to bring the bandwidth down to the acceptable width. The choices are (1) reduce the number of pixels (resolution cells), (2) reduce the number of lines in the image, (3) reduce the number of fields in the frame, or (4) intermix some of the above deletions of data in some acceptable manner.

Table 1
Suggested Interim MSTV Standards
Field rate: 5 fields/second
Fields: Interlaced
Frame rate: 2.5 frames/second
Lines per field: 64
Lines per frame: 128

Many years ago television was standardized to a field rate of 50/60 Hz in order to reduce viewer flicker. This transmission rate is not necessary today because data-storage systems (digital scan converters with semiconductor memories or possibly P7 phosphor screens) can reduce the necessary data rate and bandwidth to present acceptable moving pictures which have no flicker. Experimenters have demonstrated that field rates as slow as 7.5 fields per second are adequate for many applications of television.

The STA experimenters are suggesting the specifications given in Table 1 in order to get as many hams involved as possible. The final system will be much more exotic, but these standards will permit modification of all existing analog SSTV gear. Later the progress will require the use of a digital scan converter (such as a converted Robot 400) or a microprocessor system such as that produced by one of the STA investigators (Digital Group, WØLMD), to take full advantage of the more complicated system with greater degrees of motion.

The video bandwidth can be calculated from the following formula: Base video bandwidth = (number of field/s) = (number of lines/field) × (number of pixels/line)/2. The video bandwidth based on the above specifications of Table 1 therefore is (5 fields/s) × (64 lines/field) × (128 pixels/line)/2 = 20,480 Hz. These standards can be made synchronous with both 50- and 60-Hz power countries. This video bandwidth will possibly fit the 36-kHz STA segment.

Let's list the work that needs to be done by those who want to help. We would like to enlist each interested amateur in participating in this two-year experiment. The immediate plans are given in the following paragraphs.

1) Develop an fm transmitter (36-kHz bandwidth) on 29.150 MHz. This transmitter will transmit a gray-scale television image when accessed. This will be the test beacon to catch band openings.

2) Develop a 36-kHz fm receiver for MSTV. Perhaps some of the rf modules produced today can be used.

3) Convert the driven-sweep P7 SSTV monitors such as the W6MXV and WØLMD circuits to the new MSTV standards.

4) Convert digital fast-scan converters (like W6MXV's circuit) to the new standards.

5) Convert analog Robot gear to the new MSTV standards.

I would like to hear from any readers who desire to take the responsibility for any of the above conversions. All of the above suggestions should be completed during the first year of the STA (June 1978 to June 1979). During the second year, concentration will be on the development of a digital scan converter or microprocessor software for the finalized standards. The STA investigators would like to send out progress reports individually, even though we hope to publish reports in the amateur magazines. If you would like to be a part of this electronic adventure into experimental ham radio, send a self-addressed envelope to W9NTP. If you are seriously interested in having your name added to the list of the STA investigators (this would permit transmission of MSTV) it will be necessary to show that you have developed receiving equipment before you can apply to the FCC. Recently, personnel on the FCC were heard to say, "Hams should be building their own equipment." I certainly agree.

*RR 1, Box 95, Waldron, IN 46182

Product Review

KDK FM-2015R Two-Meter Transceiver

In today's auto market you can find just about anything you want, from a stripped-down subcompact to the most luxuriously appointed limousine. For radio amateurs, the 2-meter fm market presents a similarly wide choice. The KDK FM-2015R fits somewhere in the luxury class of 2-meter fm rigs.

For the past year I have owned and operated a KDK FM-144, the predecessor of the FM-2015R. Since I have been very pleased with the performance of the FM-144, I thought I knew what to expect from the FM-2015R. As the FM-144, the FM-2015R covers more than the 2-meter amateur band (144-148.995) in 5-kHz steps. The extended frequency range and the 5-kHz-step provisions make the FM-2015R attractive in view of the new repeater subband with proposed inputs and outputs that will not necessarily fall every 15 kHz.

That much was expected. I had seen some ads for the FM-2015R indicating that its appearance was not much different from the FM-144, except that it had more knobs and switches. The FM-144 fits what I call the generic description of a 2-meter fm rig, "a small rectangular black box having three knobs and two switches; the overall effect suggesting that it came from the cockpit of a DC-9 or from an army jeep." The FM-2015R does not begin to fit that description, nor do the pictures in the ads do it justice. That was pleasant surprise number one. It is a singularly attractive piece of equipment.

That is all well and good, but not of as much significance as what's *inside* the rig. The transmitter produces true fm by using a Varicap as a reactance modulator. Several operators have commented on the fine audio quality of the transmitted signal. A three-position toggle switch on the front panel selects either high power (15 watts) or low (1 watt), with the center position being off.

The receiver uses double-tuned rf circuits (Varicap) peaked automatically at the operating frequency and dual-gate MOSFETS to achieve very low levels of cross modulation and intermodulation while at the same time providing good sensitivity over the entire 5-MHz range. My personal use indicates that Kyokuto Denshi has achieved excellent results by designing the receiver this way. I have used the FM-144 in downtown Hartford and midtown Manhattan with no evidence of intermodulation distortion. I have used the FM-2015R in downtown Hartford and Boston with no sign of "intermods." Suffice it to say that these areas are "polluted" with rf. Sensitivity of the FM-2015R is as good as that of any other rig I have used, being better than 0.25 μV for 20 dB of quieting.

A five-position rotary switch is used to choose the MHz portion of the operating frequency. The hundreds-of-kHz and tens-of-kHz portions of the operating frequency are selected by two concentric knobs. The operator can add 5 kHz to the operating frequency by throwing a toggle switch. The receive frequency is read on four *large LED*s (the first two digits, "14," do not change and are painted on the dial). The hundreds-of-kHz switch and the tens-of-kHz switch both have built-in stops so they will rotate only from zero to nine; thus, the frequency can be set totally "by feel," which is important to blind operators or to is otherwise busy watching something else, e.g., the road!

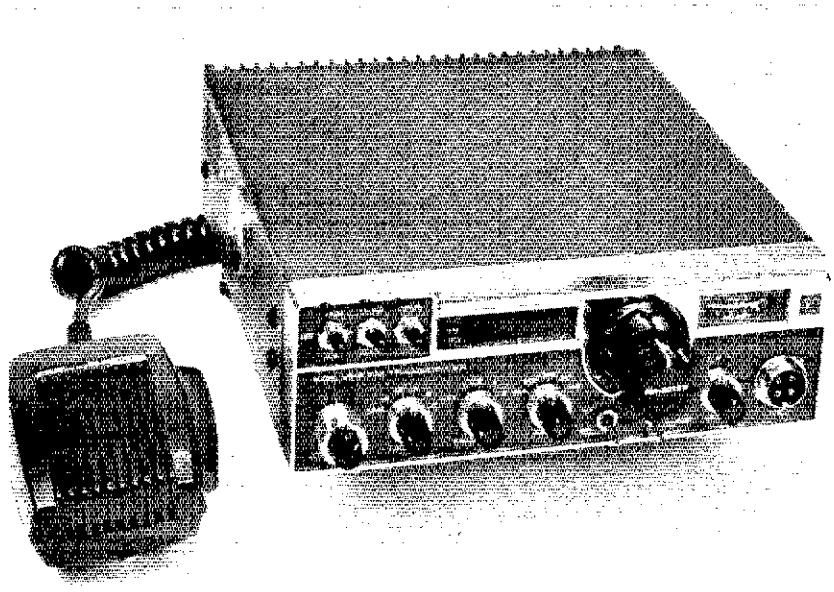
A six-position rotary switch is used to select the mode of the transmitter. For simplex operation the transmitter is operated on the receive frequency. The standard plus- and minus-600-kHz offsets are also built in. Three additional positions are available for nonstandard offsets. The operator merely plugs in the proper crystal to get a particular nonstandard offset — the owner's manual gives explicit directions for determining the frequency of the crystal. So far, this is pretty much similar to the FM-144, so there were no surprises.

Do You Remember Me?

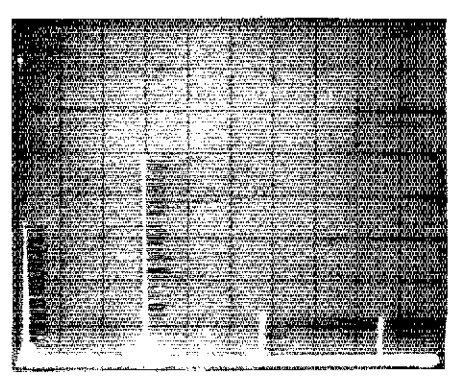
Suppose you have two favorite repeaters with outputs on frequencies such as 147.06 and 146.91 MHz. With a synthesized rig you could be at a slight disadvantage over someone using a "rock-bound" rig. To go from one to the other you have three switches to throw, while your friend has only to twist one knob. The FM-144 gets around this problem partially by including an extra position on the MEGAHERTZ switch that gives you a "priority" frequency regardless of how the other knobs are set. To change the frequency of the priority channel, the operator must remove the case and "reprogram" a diode matrix board. Although this certainly beats buying more crystals, it could be easier.

And it is, with the FM-2015R. The concept of priority or favorite frequencies has been carried much further. The diode matrix board has been replaced by high-speed CMOS RAMs which provide not one but *four* memorized

The KDK FM-2015R cabinet is finished in dark gray, providing a very modern appearance. The density of knobs and switches gives some indication of the number of features and "luxury options" that have been incorporated into the basic design.



Transmitter output of the FM-2015R as displayed on a spectrum analyzer. Vertical divisions are 10 dB per division; horizontal divisions are 50 MHz each. This shot was taken with the '2015R running at rated output on 146.52 MHz. The top reticle line represents the full amplitude of the fundamental, which was partially notched out here to prevent overload distortion in the analyzer. The second harmonic at 293 MHz and the third at 439 MHz are both more than 67 dB below the fundamental. All other spurs are at least 73 dB down. These measurements were taken in the ARRL lab.



frequencies. Furthermore, the operator can reprogram them at will without taking the rig apart. A five-position rotary switch selects among OFF and the four frequencies — in the OFF position the normal switches control the operating frequency. To program a particular frequency, the operator simply sets the regular frequency controls for that frequency, turns the memory switch to the chosen "channel" and throws the toggle switch. To program a different frequency, the operator repeats the steps with the new frequency. It may sound complicated, but it isn't. The first time this reviewer tried it, it took two minutes, 12 seconds (including one mistake) to program all four memories.

When the memory channels are programmed, and the memory switch is moved from OFF to one of the other positions, the normal frequency controls are overridden. Whatever frequency is programmed into the memory becomes the operating frequency (and is read out on the display). A built-in NiCad battery keeps the memory from being erased when power is turned off. Thus, for the mobile operator (or anyone else in a hurry) the FM-2015R provides easy and speedy operation comparable to a crystal-controlled rig.

Hide and Seek

The memory channels also have a versatile scanner built in. As with most scanners, the operator simply throws a switch and the scanner starts looking for a "busy" channel. The unique function here is that, instead, the scanner can hunt for a "quiet" channel and will lock on that frequency when it is found. In an area such as Connecticut, where the repeaters are in almost constant use during certain portions of the day, this feature can save lots of dial twisting. The scanner overrides all other frequency controls. If the scanner is activated, it immediately begins to scan the four memory frequencies regardless of the setting of the other switches. Since the scan-lockup functions are controlled by the presence of a squelch signal, the scanner can't be used for transmitting.

A New Era for Discrimination

When I read the manual and found out that the S meter also doubles as a discriminator meter, I was indifferent. In this day and age of frequency counters could there possibly be a repeater that was not "exactly" on frequency? Oh well, it would be a nice toy and it might help in tuning up one of my crystal rigs when I change crystals — or so I thought at the time. To my surprise I have found about 30 percent of the repeaters I have worked to be significantly off frequency! The FM-2015R also has a receiver incremental-tuning (RIT) feature built in. With the use of the discriminator meter and the RIT, I suddenly discovered that the repeaters I had previously accused of having "lousy audio" were, in fact, off frequency. The RIT certainly makes copy much more pleasant under such circumstances.

Other Features and Options

The FM-2015R also has a built-in tone-access system which can be turned on from the front panel. The operator can choose between a continuous subaudible tone (67 to 207 Hz) and a tone burst (1750 Hz). An *internal* switch selects one of these two modes. The frequency of the tone can be adjusted by changing the value of capacitors. Provisions are also made for connecting a Touch-Tone pad to the unit.

KDK FM-2015R 2-Meter Transceiver

Dimensions (HWD) and weight: 2-1/2 × 7 × 7-1/2 inches (65 × 180 × 190 mm), 5 lbs (2.3 kg).
Power requirements: 12-15 V dc at 3 A (high power transmit).
Frequency range: 144.0 — 148.995 MHz in 5-kHz steps.
Power output: 15 watts (high) or 1 watt (low).
Receiver i-f bandwidth: 6 kHz at −6 dB, 12 kHz at −70 dB.
Transmitter deviation: 5 kHz.
Price class: $420.
Supplier: Amateur Wholesale Electronics, 8817 S.W. 129 Terrace, Miami, FL 33156.

Options available for the FM-2015R include a MARS/CAP kit which permits operation below the regular amateur band. This modification requires the "dedication" of two of the memory channels. It *does* provide the operator with direct readout of both transmit and receive frequencies. At a recent hamfest an amateur who had made the modification said that it took him about an hour.

Amateur Wholesale Electronics also has a "super scanner" option available which will enable the operator to scan any frequency between 144 and 148.995 MHz, any segment of this band, or the entire band.

The FM-2015R has one disadvantage: The knobs on the mode switch, memory switch and MEGAHERTZ switch are a bit small for someone as "ham-fisted" as this writer. But given the number of functions that have been built into this small package, this inconvenience is small.

A Word About Service

During the course of this review the ARRL lab crew routinely subjected the KDK FM-2015R to a spectrum analysis. Although spurious output suppression on the simplex and plus-600-kHz offsets exceeded FCC requirements by a comfortable margin, it was found that on the minus-600-kHz offset, the review unit did not quite meet FCC specifications. Amateur Wholesale Electronics was contacted and informed of the problem. It was their opinion that the unit was slightly out of alignment.

The review unit was returned to Amateur Wholesale Electronics where they verified the findings of our spectrum analysis. The unit was realigned and returned to ARRL. The unit was then resubjected to spectrum analysis, and this time easily surpassed all government requirements on all frequencies in all offsets.

A lesson to be learned from this is elementary: "Things *ain't* as simple as they used to be!" The FM-2015R (or any other synthesized rig) is a complicated piece of equipment. Proper servicing requires some pretty sophisticated test equipment, including a spectrum analyzer. Although saying this may go against the grain of tradition, lacking the expertise or the test equipment, the average amateur is advised to return a defective synthesized rig to the factory for service.

Price class of the KDK FM-2015R is $420. Detailed information can be obtained from Amateur Wholesale Electronics. — *Pete O'Dell, N1UM*

HY-GAIN MODEL 214 TWO-METER YAGI

This is a review that almost wasn't written. For awhile it looked as if Hy-Gain Electronics was going out of business, a bankruptcy victim of the deflated CB market. It was good news indeed when Telex Communications, Inc., a name familiar to hams from their audio products, announced that it was buying Hy-Gain's non-CB business and that Hy-Gain's well-known line of amateur antennas would return to production. In fact, there's a certain poetic justice to it. The CB business and the old management, which pushed Class-E CB, are gone, but the ham business lives on, with many of the same fine people who have staffed it for years.

The Hy-Gain model 214 is a 14-element Yagi for 2 meters. Hy-Gain Yagis have long been in use by serious 2-meter operators, especially the wide-spaced 8- and 15-element versions. The 214 is a significant departure from the old designs; the feed system is the same (a split dipole, insulated from the boom, with beta match), but the elements are close-spaced (boom length is 15-1/2 feet or 4.72 m) and the parasitic elements are made of solid rod mounted *through* the boom. Hy-Gain uses a clever method of mounting these elements, the details being shown in Fig. 1. The antenna is very light in weight (about 5-1/2 pounds or 2.5 kg) and is relatively inexpensive. Therefore it is realistic, both physically and economically, to think in terms of stacking two or more Yagis for improved gain and directivity. The array we tested was a set of four 214s, horizontally polarized and cut for the lower half of the band (144-146 MHz).

Construction of the individual Yagis is an easy two-hour job with the aid of the illustrated instructions supplied by Hy-Gain. The only problem encountered, and a very minor one at that, was that the driven element did not line up exactly in the same plane as the parasitic elements. The mounting hole for the driven-element insulator was not exactly perpendicular to the holes for the parasitic elements. This was easily remedied by bending the tubing used in the driven element slightly, and may not be characteristic of all production runs of the antenna.

Ample warnings against letting the antenna come into contact with power lines are supplied, in recognition of the number of accidental electrocutions of inexperienced antenna installers which have occurred recently.

The model 204 stacking kit provides for a stacking distance of approximately 12 feet (3.7 m) between antennas. In our case, the entire array was assembled on the ground and then hoisted into place atop a 70-foot (21-m) tower. This was a bit tricky, though only two people were needed to do the job. Some of the elements were bent in the process, but it was no problem to straighten them with a long pole once the array was safely bolted to the mast. Light weight does not equate with flimsy construction, and there is no reason to believe the antennas would not survive a New England winter. The serious operator probably would want to replace the RG-59/U coax phasing lines supplied by Hy-Gain with RG-11/U to reduce losses. Also, the RG-58/U used for the balun could be replaced with RG-8/U or similar coax. Taking these steps would raise the power-handling capability of the antenna above its rating of 250 watts, continuous duty.

Performance of an antenna is difficult to evaluate objectively without an antenna test range, and the League does not have one available. However, Hy-Gain does, and its engineers supplied us with a radiation pattern for the array which seems to agree closely with

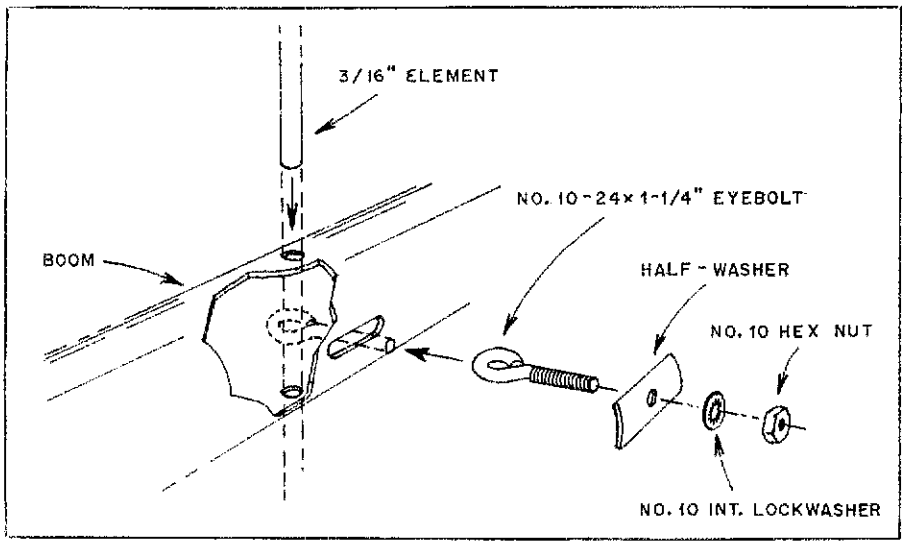
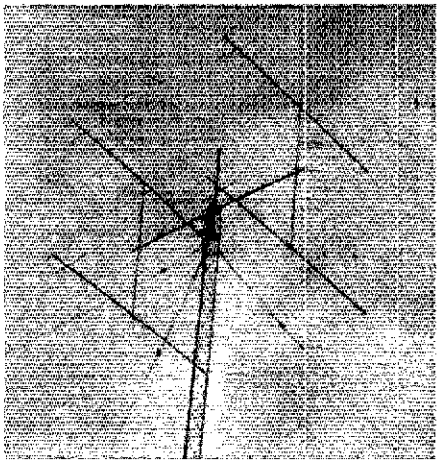


Fig. 1 — Details of the method used to mount and secure the elements *through* the boom.



The array of four 14-element Hy-Gain Yagis as installed at K1ZZ.

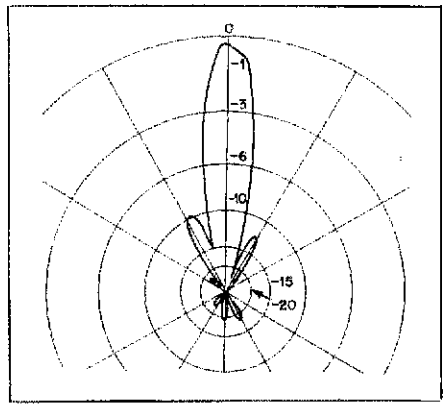


Fig. 2 — Horizontal-plane radiation pattern of the pictured 56-element array at 145 MHz, as measured on the Hy-Gain antenna test range and verified in operation at K1ZZ. The plotted points show the radius calibration in decibels.

findings from our on-the-air tests. The magnitude of the side lobes may surprise you if you have not used stacked antennas before. However, they are typical of an array of this type, and can be reduced by changing the spacing (at some expense in gain). Some comparisons were made with a single Yagi of different design atop the other tower at K1ZZ, about 115 feet (35 m) above the ground. While the single Yagi gave comparable performance over some relatively short paths, in no case was it better than the 56-element array, and on longer paths the array had a definite edge in spite of its lower height. As one might expect, fading is less of a problem on the large array.

What can you expect to work with this sort of antenna? K1ZZ, in the middle of the Connecticut River valley, is not exactly in a classic vhf location. Shortly after the antenna went up, we caught a minor aurora and traded S7 signal reports on cw with K8III near Cleveland, almost 500 miles (800 km) away. Paul suggested we try working on the direct path, and sure enough, signals were about S6 without any assistance from the auroral curtain! Since then, we've confirmed that we can work reliably. It's not unusual to work 10-watters out to 250 miles (400 km) or so, and in the June contest seven hours of operation yielded 166 QSOs in 23 sections. The station transmitter supplies about 300 watts to the antenna, which certainly helps.

In summary, the Hy-Gain 214 is worth considering if you're looking for a lightweight, reasonably priced antenna for 2 meters. (We haven't spoken about performance at the high end of the band, but dimensions are given for cutting the elements for operation there, and mounting the antenna for vertical polarization is no problem.) It lends itself well to stacking; an array of 214s should be practical in many cases where an array of heavier, longer boom Yagis would not. And, if you think it would be fun to tell your contacts, "The antenna here is 56 elements," you're absolutely right!

The individual Yagis retail in the $27 class. The model 204 stacking kit, as reviewed, is in the $115 class; model 202, for stacking two Yagis vertically polarized, is $40. — *Dave Sumner, K1ZZ*

SAY SPS-20M POWER SUPPLY

Vhf fm power amplifiers and the new wave of 12-volt-powered hf transceivers have generated an unprecedented demand for high-quality, low-voltage power supplies. Manufacturers have been responding by producing new power supplies every week. But how can you tell a *good* power supply from one which might be inadequate, or even damage your equipment? You look for good regulation (voltage remains constant with and without load), no ripple (no hum in the signal), equipment protection (overvoltage and overcurrent protection for both rig *and* power supply), and quality construction for long life. The Say Electronics Inc. SPS series sports these features and more.

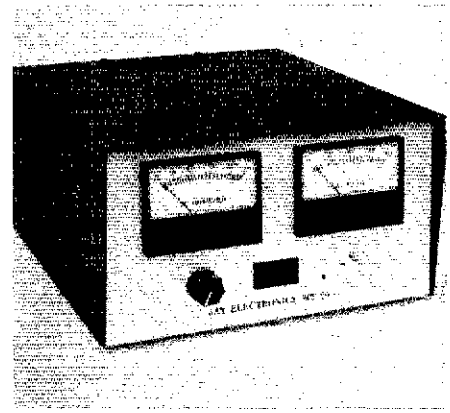
QST tested the top-of-the-line SPS-20M model, which features a rating of 20 amperes continuous, 25 peak, fully adjustable output between 3 and 14 V dc, and both voltage and current meters. Most of the hefty 18-lb (8-kg) box is concentrated in the transformer, 50,000-μF capacitor and large heat sinks. The circuit diagram reveals additional protection in the form of a fuse in the transformer primary (protecting the single most expensive component) in addition to automatic current limiting, overvoltage and short-circuit protection. A Darlington regulator with four 2N3771 transistors in parallel is controlled by the 723 IC, with near-perfect regulation. Rapid switching between no load and a 5-A load varied the voltage less than 0.5 percent! Ripple was nearly undetectable, thanks to a full-wave bridge rectifier and extensive filtering ahead of the regulator. The output is fully bypassed, and no af or rf feedback was observed.

The handsome, brushed-aluminum front panel contains the illuminated power switch, 20-A circuit breaker, meters and voltage control. The output terminals are under the large heat sink on the back of the unit.

Say Electronics (750 N.W. 57th Court, Fort Lauderdale, FL) makes a complete line of power supplies, the SPS-2, -4, -8 and -20. The last three are also available in adjustable, metered versions, such as the SPS-20M. — *Chod Harris, WB2CHO*

SPS-20M Specifications

Power input: 105-125 V ac at 60 Hz.
Output voltage: Adjustable from 3 to 14 V dc.
Ripple voltage: 0.2 mV RMS.
Current limit: 25 A.
Overvoltage: +17 V dc nominal.
Continuous current: 20 A.
Meters: Individual volt and current meters.
Dimensions (HWD): 5-1/4 x 9-1/4 x 12-1/4 inches (135 x 235 x 310 mm).
Weight: 18 lbs (8 kg).
Price class: $180.



The brushed-aluminum front panel on the SPS-20M contains meters, power switch, voltage-control potentiometer, and circuit-breaker reset button.

Technical Correspondence

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

ON SOLID-STATE PA MATCHING NETWORKS

I would like to pass along some observations I've made which are of interest to builders of solid-state Class C hf transmitters.[1] I have found that the use of such matching networks as the commonly recommended L and T,[2] as well as any other network with an inductor or series LC as the input element,[3] will inevitably result in improper circuit operation. The circuit will exhibit poor collector efficiency, spurious output, or a high transistor failure rate, unless one of these conditions is met: (1) the output transistor is very rugged (in which case it won't fail, but the other conditions will remain); (2) the transistor output capacitance is 100 pF or higher; (3) a Zener diode is connected across the transistor (more about this later); or (4) the network is modified in a manner I will describe.

Let's see what causes the problem. Although there is an optimum resistive impedance for a transistor to "see" (approximately $V_{cc}^2/2P_o$),[4] the transistor does not present this or any other impedance. Rather, it acts much as a simple on-off switch. At the instant the transistor is turned off, current flowing through the rf choke is dumped into the circuit elements. The dominant circuit presented to this current is parallel resonant, with L being the network input inductor and C the transistor output capacitance, C_o. C_o is in parallel with stray circuit capacitance. This circuit "rings" at its resonant frequency, which is not necessarily related to the operating frequency.

Fig. 1 shows the schematic of a typical 40-meter, 2-watt-output amplifier. Fig. 2A is a photo of the oscilloscope waveform at the collector of Q1. The presence of 70-volt, 50-MHz ringing at the collector may be readily seen. I was able to obtain this picture only because the particular transistor was exceptionally rugged — several devices were destroyed in the attempt. Although this condition could be detected with a wavemeter coupled loosely to the collector circuit, it can only be observed with the aid of a wide-bandwidth scope. The instrument used to obtain these photos has a 250-MHz bandwidth.

A photo of the waveform at the load is shown in Fig. 2B. Distortion may be reduced by filtering, but — assuming the transistor is not destroyed — collector efficiency will be less than optimum. Typical efficiency will be on the order of 40 to 60 percent, rather than the 70 to 80 percent obtained from a well-designed amplifier stage.

An advanced circuit-analysis computer program was used to investigate the circuit of Fig. 1, assuming perfect inductors, capacitors, source, load and a good model of the 2N3866 transistor. The graphical results of this analysis are shown in Fig. 3. Because of the use of perfect components, frequency and amplitude of the simulated waveform vary slightly from the real waveforms shown in Fig. 2. The striking similarity to Fig. 2 and the presence of ringing in the simulation verify that the phenomenon is *not* a spurious oscillation in the usual sense, nor is it due to stray capacitance or inductance or poor circuit layout. *It is inherent in the use of this type of network!*

A capacitor connected from the collector to ground or, preferably, from collector to emitter, will solve the problem if it approximately resonates with the input inductor at the operating frequency. The capacitor will reduce collector-voltage swing to less than 30 volts with a 12-volt supply. The effect on the Q of common networks will be negligible and only slight readjustment of the variable capacitor(s) will restore the correct match.

A Zener diode connected across the collector will sometimes solve the problem, but not because of Zener action! A typical 33-volt, 1-watt Zener diode has a capacitance of 200 to 800 pF, depending on the amount of reverse bias. This is generally sufficient to prevent the ring in the first place.

This letter has been necessarily brief but I hope it will enable the reader to take advantage of these matching networks without wondering — as I did for a long time — why sometimes they work and sometimes they don't. — *Roy W. Lewallen, W7EL, 5470 S.W. 152 Ave., Beaverton, OR 97005*

Fig. 1 — Schematic diagram of the 7-MHz Class C amplifier used to examine the oscillation problem.

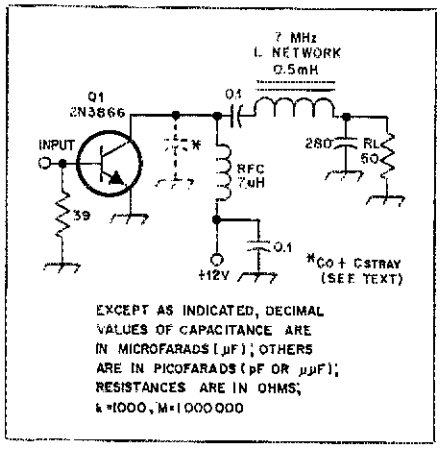
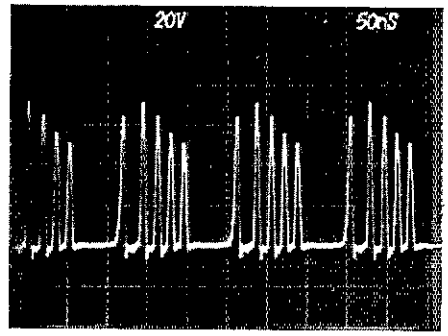
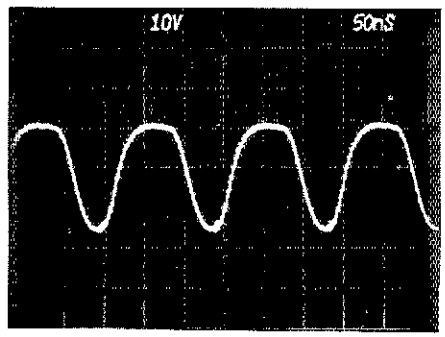


Fig. 2 — Photos of the actual waveforms obtained with the amplifier. Operation was observed with a high-speed oscilloscope. At A, collector waveform; at B, waveform at the output.



(A)



(B)

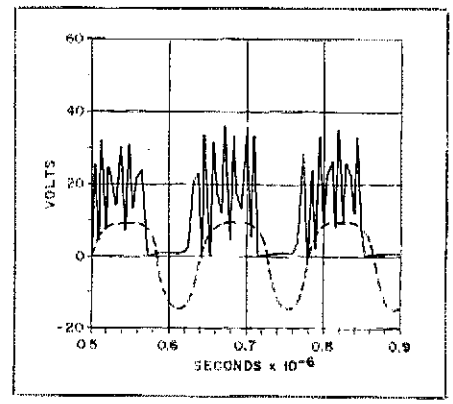


Fig. 3 — When the circuit of Fig. 1 was analyzed on a computer, the waveforms shown were predicted. The solid line indicates how the computer expected the waveform at the collector to look. Expected output waveform is shown by the dotted line.

Footnotes

[1]Strictly speaking, the Class C amplifiers used by amateurs may be better described as Class D, as they are typically driven to saturation. In fact, this is the reason for the problem described here. However, such operation does allow high collector efficiency. For a more detailed discussion of this topic, see Sokal and Sokal, "Class E — A New Class of High-Efficiency Tuned Single-Ended Switching Power Amplifiers," *IEEE Journal of Solid-State Circuits*, Vol. SC-10, No. 3, June, 1975.

[2]Hayward and DeMaw, *Solid State Design for the Radio Amateur*, ARRL, 1977, pp. 52-53.

[3]*The Radio Amateur's Handbook*, 54th Edition, 1977, ARRL, p. 161.

[4]Hayward and DeMaw, p. 24.

CORRECTION TO "SIMPLIFIED ANALYSIS OF RF CIRCUITS"

☐ Regarding my remarks in "Technical Correspondence," February 1978 *QST*, the equation should be

$$(10 + j\omega L) \text{ in parallel with } \frac{1}{j\omega\varepsilon} = 50 \qquad \text{(Eq. 1)}$$

This translates to

$$\frac{(10 + j\omega L) \times \frac{1}{j\omega\varepsilon}}{(10 + j\omega L) + \frac{1}{j\omega\varepsilon}} \qquad \text{(Eq. 2)}$$

$$\text{i.e., R1 in parallel with R2} = \frac{R1 \times R2}{R1 + R2} \qquad \text{(Eq. 3)}$$

— Louis C. Graue, K8IT, 624 Campbell Hill Rd., Bowling Green, OH 43402

SOLAR WIND A CAUSE OF LDES?

☐ Earth's magnetic field is greatly distorted, being highly compressed on the side of the planet which faces the sun, and stretched out on the opposite face. Ions comprising the solar wind might follow a path roughly as shown in Fig. 4, forming a turbulent area at some distance from Earth. Signals reflected from this area would have little Doppler shift, and may account for the long-delayed echoes reported by Rasmussen.[1] *— Henry C. Wolking, W4BNF, 1723 Wavecrest Ave., Merritt Island, FL 32952*

ON "BUILD THIS NOVICE FOUR-BAND VERTICAL"

☐ Regarding Anderson's article in June 1978 *QST*, good signal reports from stateside stations should not necessarily be taken to mean that an antenna is an exceptional performer. In the case of this antenna, I suspect the reports merely illustrate the fact that with reasonable propagation conditions and 250 watts transmitter input, almost any antenna will get out. While I applaud Anderson's efforts to produce an effective low-cost antenna, only slightly more work will result in a vertical that works really well.

I question operating the antenna in the 3/4-wavelength mode on 10 and 15 meters. To realize the full DX potential of these bands, radiation at a low angle is needed. The lowest angle of radiation from a single vertical element occurs when the element is 5/8 wavelength long. Anderson states that unity VSWR on 80 and 40 meters could be obtained by adjusting the taps on the loading coil. Theoretically, a 1/4-wavelength antenna has a radiation resistance of about 35 ohms. A shortened version such as the one described should present a lower resistive impedance when the capacitive reactance is tuned out by the loading inductor. This makes the claimed 1:1 match to 50-ohm transmission line suspect. If this figure is accurate, then a loss resistance is probably in series with the antenna element. The band-switching arrangement may be the cause of this loss. Notice that in Fig. 1 of the article, the loading inductance is varied by shorting part of the coil. The shorted section is tightly coupled to the "working" section. The loading coil is acting as an autotransformer, with the low impedance of the shorted section transformed to a load across the portion of the coil used to resonate the antenna. The effect is similar to that of a brass slug in a coil — the inductance is reduced to less than that of the same coil with an air core. We now need more turns (higher rf resistance) to obtain a desired inductance, thereby lowering Q and increasing losses. In the antenna described, this loss presents a good impedance match, but dissipates considerable rf power.

I suggest the following modifications to the system:

1) Shorten the radiator to 20 feet, 9.75 inches (6.34 m), 5/8 wavelength at 28.1 MHz.

2) Use a two-pole band switch and separate resonating circuits for each band (Fig. 5).

3) A radiator of this length will function as a shortened half wavelength on 15 meters. Two matching circuits are shown (Fig. 6 and 7). The inductively tapped system is simpler, but the capacitive divider provides better harmonic rejection. Operation on 15 meters is practically independent of the ground system.

4) This type of antenna is entirely suitable for use by General class licensees; therefore 20-meter capability should be included. The vertical element functions as a lengthened quarter wavelength. Its inductive reactance may be resonated with a series capacitor. The radiation resistance of a lengthened quarter wavelength element is greater than the nominal 35 ohms of the resonant length, so a VSWR approaching unity would not be unreasonable here. One setting of the tuning capacitor should allow coverage of the entire band.

5) Use individual loading coils for 80 and 40 meters. Tune the system to resonance and accept whatever VSWR exists (within reason). If the transmitter doesn't like the load, change the length of the feed line.

6) Bring the connection to the antenna out the *top* of the box and make it short and fat. *— George H. Woodward, W1RN, 17 E. Cedar St., Newington, CT 06111*

[1] Rasmussen, "Ghost Echoes on 1296 MHz," June 1976 *QST*, page 36.

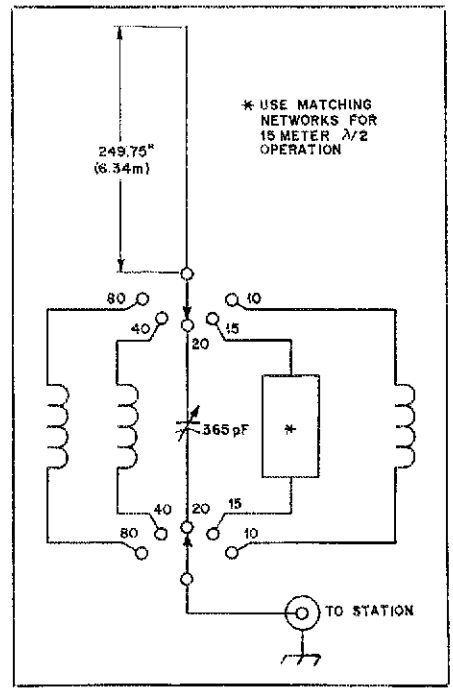


Fig. 5 — A two-pole bandswitch may be used to select the optimum matching network for each band. Coils should be cut to the correct inductance. Shorting turns results in losses, as explained in the text.

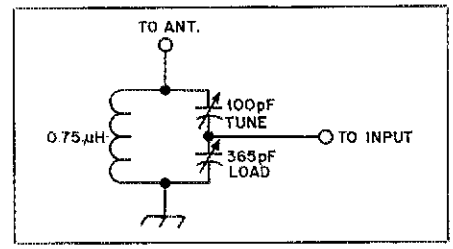


Fig. 6 — A matching network which may be used for half-wavelength operation on 15 meters. This tapped-capacitor arrangement provides better harmonic rejection than a tapped coil but is more complicated.

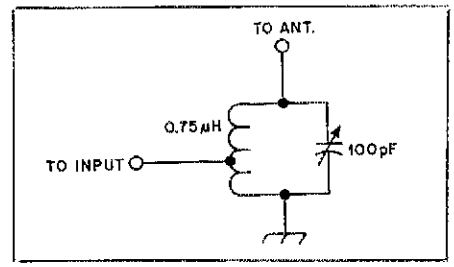
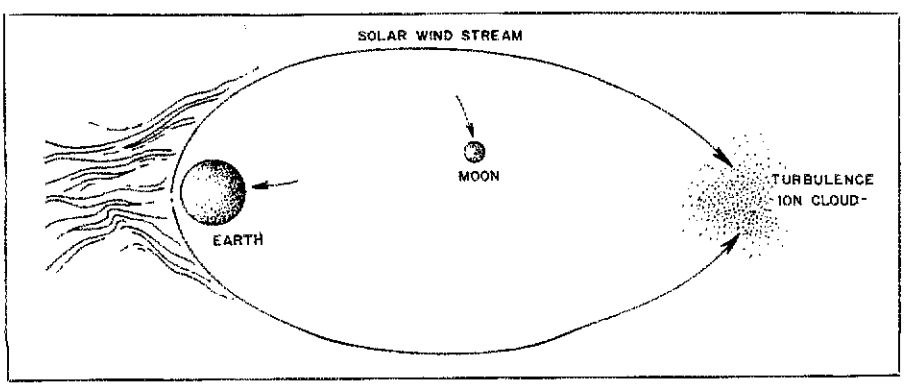


Fig. 7 — Tapped-coil method of resonating the antenna on 15 meters. While not as effective at reducing harmonic radiation as that shown in Fig. 6, this arrangement is easier to construct and adjust.

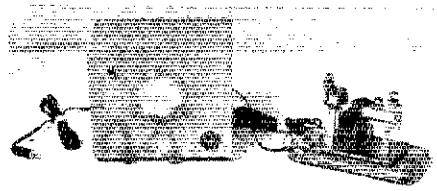
Fig. 4 — As radiation from the sun known as the "solar wind" approaches Earth, it deforms the geomagnetic field, as shown here. A turbulent cloud of ions may be responsible for one form of long-delayed echoes.



Hints and Kinks

THE MUSIC BOX CW-TO-TELEGRAPH CONVERTER

Fifty years ago, when barely tall enough to reach the ticket window at the railroad depot, I was permanently impressed by the mysterious clicking of the telegraph sounder. Today, similar music may be heard at my radio shack. The instrument, however, is not activated from a telegraph circuit to a distant operator. It responds instead to a modern transceiver tuned to the amateur cw bands. This article is written for the benefit of others who may wish to enjoy the pleasure of hearing a sounder faultlessly reproducing cw transmissions.



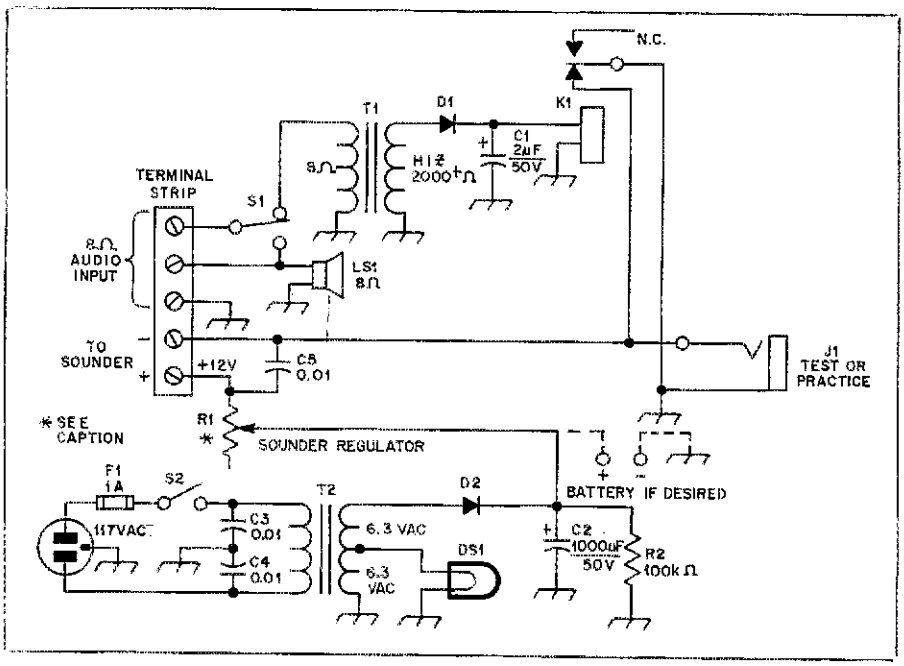
The nostalgic sound of the railroad telegraph set is brought to the ham shack by this converter. It is activated by cw signals from a receiver.

At the heart of the Music Box is a sensitive relay driven by the rectified audio from a transceiver and capable of handling 35 wpm. The relay controls a 12-V dc circuit to my 400-ohm sounder. Adjustment of the dc voltage to the sounder from 5 to 18 volts permits the use of a variety of sounders.

This cw-to-telegraph converter may be built on an open chassis or even in breadboard form. Normal workmanship should be applied to wiring. A template supplied with the relay provides drilling information for mounting the relay on a thin piece of Formica that may be placed over a hole cut in the chassis. The converter, pictured in the photograph, has the speaker and components mounted in the 4-1/4 × 4-1/2 × 5-3/4-inch (108 × 114 × 146-mm) cabinet. The ring trimming the speaker opening was cut from the frame of an old 2-inch speaker and the grill came from an old transistor radio.

There are no particular restrictions on the lengths of the connecting leads between the 8-ohm output of the receiver or transceiver and the input to the Music Box. After these connections are made, the receiver is tuned to a chosen cw signal and adjusted for best readability while listening to the monitor speaker. The sounder should then clatter away to one's heart's content.

Schematic diagram of the Music Box cw-to-telegraph converter.
C1 — 2 μF, 50 V.
C2 — 1000 μF, 50 V.
C3, C4 — 0.01 μF, 400 V.
C5 — 0.01-μF disk ceramic.
D1, D2 — Diode, type 1N4000, 1 A, 50 V, Radio Shack no. 276-1101 or equiv.
DS1 — 6.3-V pilot lamp.
F1 — Fuse, 1 A, 250 V.
J1 — Phone jack.
LS1 — 2-inch speaker, 8 ohm.
R1 — 1000 or 1500-ohm, 2-W potentiometer.
R2 — 100,000 ohm, 1 W.
S1 — Spdt rotary switch.
S2 — Spst rotary or toggle switch.
T1 — 8-ohm audio output transformer (installed in reverse).
T2 — Heavy-duty filament transformer, 117 V ac primary, 12.6 V ac secondary, 3 A, Radio Shack no. 273-1511 or equiv.



By adjusting the potentiometer for the proper dc voltage, the unit may be used to power and key a code-practice oscillator. The converter acts as a scrubber which eliminates any interference, leaving just the copy that's tuned in. A prerecorded message from a tape recorder will actuate a sounder by means of this device. That could interest amateurs at a museum or an exhibit.

The signal-to-noise ratio must be good enough to prevent tripping the relay by noise. The cw filter of a modern receiver usually compensates for much of the noise. — *D. S. Getchell, W9KSR, ex-W1GKA*

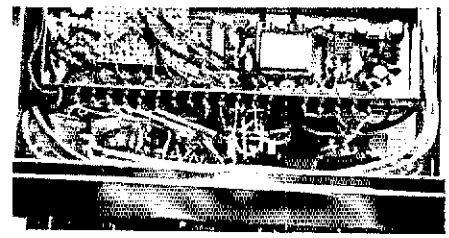
A SCANNER FOR THE KDK

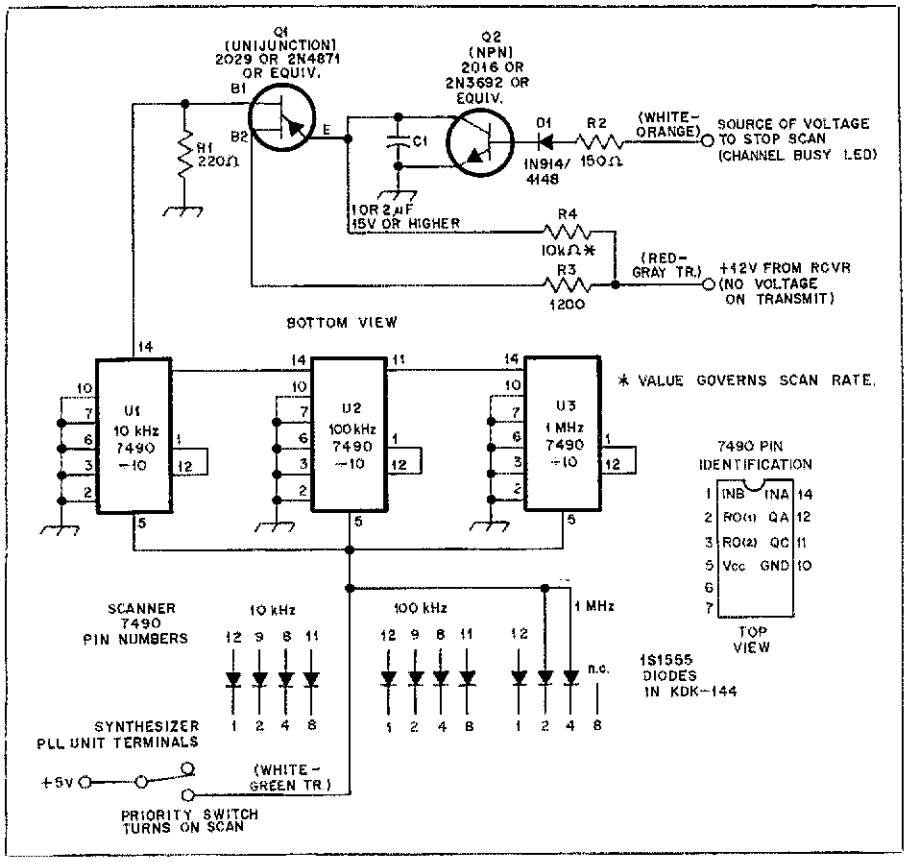
Phil Deem, K9PD, designed an excellent scanner for use with the KDK-144 2-meter transceiver. The circuit, strikingly simple, may be assembled on Micro-Vectorbord. I placed one within the PLL unit of my FM-144-10SXR-II without the need for external switches. Only two leads must extend from the PLL chamber. One is connected to the +12-V supply at the receiver side of the T-R relay. The other is wired to the Channel Busy LED which provides the voltage to stop the scan on frequency. Scanning range is from 146 to 147.99 MHz.

Placing the MHz switch of the transceiver in the priority position activates the scanner supplying +5 V dc to the three 7490 decade counters. The scanner clock (unijunction oscillator) receives power from the receive B+, insuring that the unit will stop scanning if the microphone button is pressed. Driving the Channel Busy LED is the squelch circuit which also controls the clock. Scanning will stop when a signal strong enough to open the squelch turns on the Darlington-connected transistors Q1 and Q2, shorting out the unijunction timing capacitor. A light squelch-control setting works best.

In my opinion, the use of the Channel Busy LED to provide a source voltage to stop the scan is not as precise as using a discriminator voltage. I find, however, that it rarely stops other than on the correct frequency. If it should stop 10 kHz too soon, correction is made by momentarily depressing the PTT

The small circuit board mounted in the PLL chamber of the KDK-144 contains the K9PD-designed 2-meter scanner. Installation requires only two leads and no external switches.





The K9PD scanner circuit designed for use with the KDK-144 transceiver. It scans from 146 to 147.990 MHz. Outputs of the 7490s are connected to the loop programmable counters in the KDK by way of the diodes formerly used to program the priority channel. IC connections not shown are not used.

C1 — 1 to 2 μF, 150 V or higher.
D1 — 1N914 or 1N4148.
Q1 — Unijunction transistor, type 2029 or 2N4871.
Q2 — Npn transistor, type 2016 or 2N3692.
R1 — 220 ohm, 1/4 watt.
R2 — 150 ohm, 1/4 watt. (May be needed.)
R3 — 1200 ohm, 1/4 watt.
R4 — 10,000 ohm, 1/4 watt. (Resistance value determines scanning rate.)

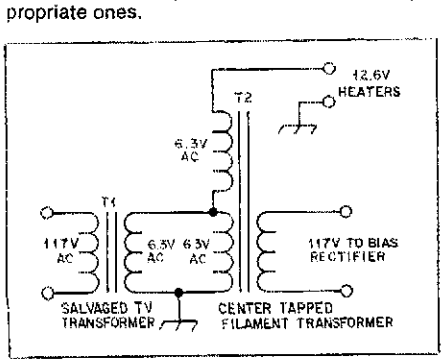
switch. Whenever a signal drops out, scanning is resumed. In that case, and if so desired, scanning may be halted by opening the squelch.

I'm excited about Phil's idea. Surely, other amateurs should give it a try. The cost, by the way, is just under $5. — *Robert W. Shoemaker, Jr., W9MTU*

PINCH HITTING WITH TV TRANSFORMERS

Stuck for a source of bias and filament voltages? I was recently, when a project required 12.6 V ac for the heaters in addition to −100 V for bias. Lacking the appropriate transformers, I rigged up two, salvaged from old TV sets. One may see from the accompanying diagram that T1 is wired in the normal manner, but T2 is installed in reverse and is used partially as an autotransformer. The customary primary winding of T2 furnishes 115-V ac for the bias circuit, while the secondary handles both the input and filament voltages. This transformer should have a small current rating margin over operating current requirements. — *Peter Gilson, WA2TSF*

WA2TSF used this circuit configuration with two salvaged TV transformers to obtain bias and filament voltage when he lacked more appropriate ones.



A USEFUL CLAMPING TOOL

For that third hand, obtain a surgical hemostat. It resembles a pair of scissors but is designed for clamping. Because this device has a snap lock, it is ideal for holding parts to be soldered or for retrieving nuts, bolts and washers. — *Carl Nebelsky, WB1BPZ*

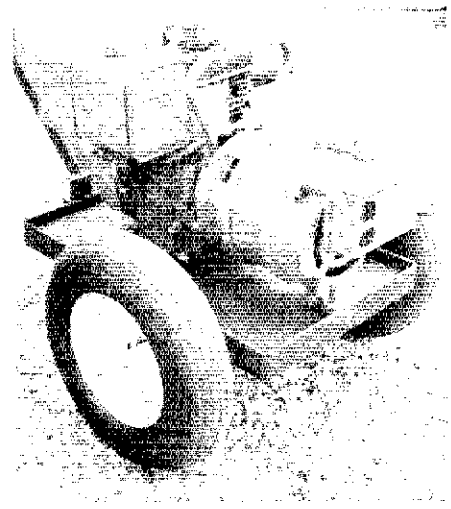
IMPROVING THE HEATH HD-1250 CARRYING CASE

To prevent the foam in the Heath HD-1250 dip-meter carrying case from activating the on-off button, cut a one-inch-square piece from the pad in two places. This will protect the button regardless of the position of the meter. — *Tom Lauderdale, WA6QQY*

READY POWER WHEN YOU NEED IT

I've had a 3-kW generator for several years. It was always parked in an awkward spot in the garage. Putting the generator to use or moving it to another location was short of being an impossibility. With help from a welding shop, the generator is now mounted on a frame with 8-inch heavy-duty pneumatic tires on ball-bearing wheels as shown in the accompanying photograph. With an added tote handle this emergency power source may be moved around easily or put on our utility trailer for use anywhere. — *Bud Norwood, WA4QGV*

This 3-kW generator is moved about easily at WA4QGV now that it is mounted on a professional-appearing moveable frame.



NOISE REDUCTION FOR THE MOBILE YAESU FT-227R

The Yaesu FT-227R, when powered from the cigarette lighter circuit, may or may not be well endowed with noise, depending upon the make of car it is used in. My solution for the car with the noise problem is to install a physically small axial-lead 1000-μF, 25-V capacitor from the 12-V input to the flange of the rf coaxial connector (PL-259) inside the Yaesu. This capacitor will flatten out most transients and transistorized ignition noise on both transmission and reception. Some of our good old American cars have a load of ignition noise appearing on the lighter circuit. — *Jacques Beauchemin, VE2YC*

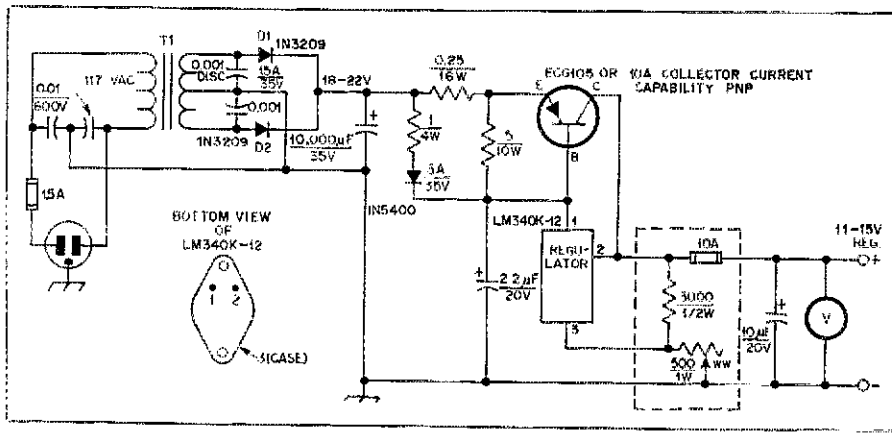
MODIFICATION OF THE UGLY DUCKLING

When I built the Ugly Duckling power supply described in *QST* for November, 1976, the regulated output delivered only 11.4 volts dc. That was lower than the 13.6 volts I had wanted to operate my fm transceiver. With the few changes I have described here, I was able to get from 11 to 15 volts output at 10 amperes with no heating.

Circuit modifications included increasing the filter capacitor to 10,000 μF and placing the no. 3 terminal of the regulator above ground potential by means of a 500-ohm, wire-wound, 1-watt potentiometer. A 3000-ohm, 1/2-watt resistor was connected from the no. 3 to the no. 2 terminal of the regulator in order to place a positive voltage on the no. 3 (case) terminal. In order to eliminate all hum in the supply output, I used a common one-point ground.

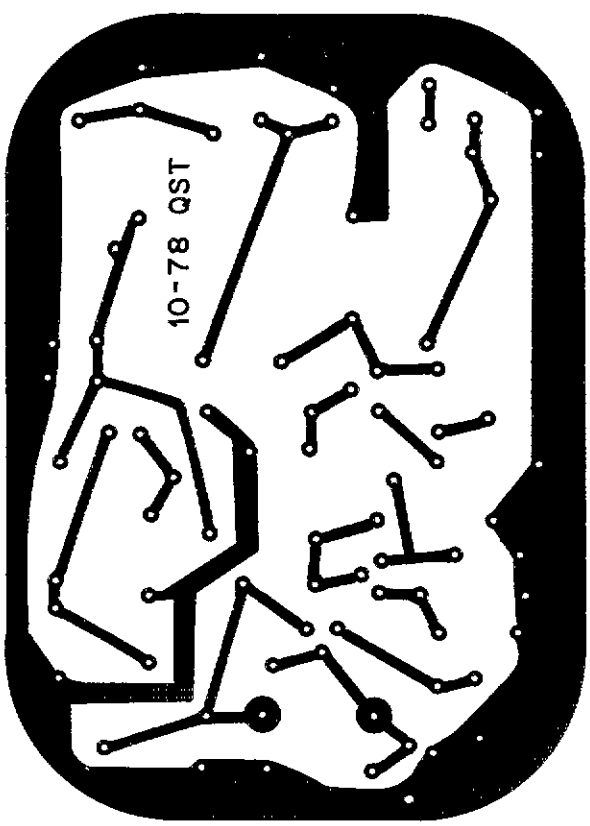
The pass transistor may be any pnp with a collector-current capability of 10 amperes or more. Regulators may be obtained from James Electronics, 1021 Howard Ave., San Carlos, CA 94070.

My 50-watt fm marine-radio transceiver has been working well with the modified Duckling. With the regulated supply providing 13.3 volts, the transceiver can draw 9.2 amperes with the key down and at less than 1/10-volt fluctuation. — *H. R. "Pappy" Conley, W5UY*



This modification by W5UY improves the voltage output of the Ugly Duckling power supply that was described in November 1976 *QST*. Details of rewinding an old TV transformer to furnish 18 volts across the secondary were presented in that article.

Circuit-board etching pattern for the Sardine Sender, left (see the parts layout in Fig. 3, page 16 of this issue). Black represents copper. The pattern is shown at actual size from the foil side of the circuit board. Right, pattern for the 160-meter converter (see Fig. 3, page 24 of this issue). The board is double sided, with one side etched to the pattern shown here (shown at actual size, black representing copper). The opposite side of the board may be unetched, with clearance holes drilled in the foil for component leads.



How Safe Is Your Ham Shack?

Part 3: Lightning, running amok, can ruin a whole day. Here's how to protect your shack, your gear and yourself by directing strokes into the ground.

By Bill Wilson,* VE3NR and James M. Morris,** K1UJ

Lightning is a problem faced by nearly every amateur operator. From time to time, QST *publishes material describing how to protect your station, home and family from a disastrous lightning stroke. There is no absolute protective procedure which will prevent lightning damage, however. The amateur is encouraged to take every possible measure to assure proper grounding of antennas, masts and radio equipment.*

Disconnecting antenna feed lines and rotor cables from equipment before *a storm develops is a safety requirement. In fact, during the storm season, it is best to connect antennas only when the station is in actual operation. Probably one of the best ways to afford some lightning protection to equipment from a direct or secondary stroke is to disconnect the coaxial and control cables coming into the radio room and place them outside of the building.* — W1XT

Nature's strike force, awesome as it is, normally doesn't worry most amateurs as they put up antennas. The reality hits when thunder rumbles and the sky darkens, only to be pierced by blazing flashes of lightning. Their power is immense. A typical discharge can be anywhere from 10 to 100 million volts at 1000 to 300,000 amperes, peaking in two microseconds and decaying to a 50-percent value in 40 μs. Amateur antennas present a tempting target for lightning strokes, as they often soar above the highest trees and rooftops in an area.

Station Protection[1]

Equipment is often connected to antennas by coaxial cable which, unfortunately, represents a good solid conductor. Any protection, in effect, is a *filtering* process. Every ampere taken to earth through a *shunt* path is one less reaching the vulnerable equipment. The policy should be "shunt, then isolate." Virtually all antenna elements can be grounded by plumber's delight techniques or stubs. Remember that high broadcast antennas and professional communications stations are designed to survive direct strokes. Solidly bond the grounded portion of the antenna to the grounded support structure. Optimize the tower-to-ground link until you run out of ideas or money. The rods should be copper-clad, at least 1/2-inch (13-mm) diameter and 10 feet (3 m) long. Bond the coaxial cable shield to the tower at the takeoff point.

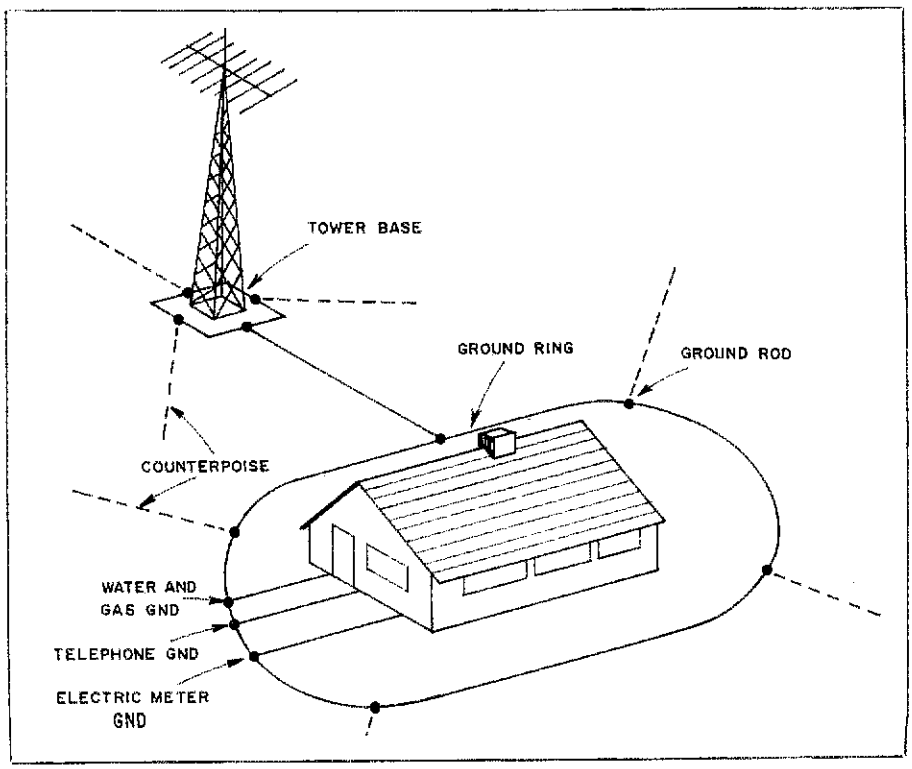
To *isolate* currents coming off the coax, bring it off the tower with the minimum permissible bending radius, introduce as many right-angle bends as possible, and wind it into a coil of several turns near the equipment cabinet entry. To deal with the surge that does reach the equipment, the cabinets should be effectively grounded with heavy-gauge leads such as no. 6 AWG. For a good path these earth leads should be short, fat and as straight as possible, in the clear, and not in conduits. Bring the coax alongside this earth lead, and bind them together.

Lightning Rods and Primary Conductors

Unfortunately, a grounded antenna system by itself will not sufficiently protect nearby structures. Rather it may become a lightning attractor that can induce *sideflashes* and *step voltages* into unprotected structures and persons.

In any lightning-protection system there are three unique features which distinguish it from the usual radio aerial configuration. Taking them from the top, literally, they are (1) the lightning rods (called "air terminals") and the primary conductors, (2) the grounds, and (3) the common linking by secondary conductors of all metallic objects in, on and around the dwelling.

Fig. 1 — A typical grounding arrangement for a ham shack and a free-standing metal tower. The dotted-line counterpoise conductors should be used where the driving of rods is impractical or for supplemental grounding where conditions indicate the need. The buried peripheral ground rings are uninsulated no. 2 AWG tinned, solid copper conductors.



*1427 Cavendish Rd., Ottawa, ON K1H 6C1
**Copy Editor, *QST*

[1]This section is based on A. K. Guthrie, "Lessening Lightning's Effects," *IEEE Newsletter of the Vehicular Technology Group*, July, 1975.

At least two paths should go to ground from all lightning rods, except those atop narrow structures such as the antenna support. For hams the most essential item to check is the primary or "down" conductor, which interlinks the lightning rods and feeds those circuits to ground. It should be braided out of no. 17 or larger wire, with a total cross-section area of about 59,500 circular mils (c.m.), equivalent to a cable between no. 2 and no. 3 AWG. If aluminum wire is used the strands should be no. 14 or larger and the cable should have 98,000 c.m. (no. 0 AWG). Other main-conductor material includes one-inch wide aluminum or copper tape, no. 12 or no. 14 AWG, respectively. Form gradual bends in at least an eight-inch (203-mm) radius, being careful not to make any "U" or "V" pockets. Remember that these are for hefty currents.

Suitable Grounds

All efforts should be undertaken to supply generous contact between earth and the antenna system. Rather than just have a low-resistance ground junction, one must first have a sufficient metal distribution in the earth (or on the surface if you are dealing with rock). Should the soil under the house be moist and a good conductor to a considerable depth, then simply extend each primary down conductor to one or two ground rods. They should be located about two to eight feet (0.6 to 2.4 m) from the building corner and driven to a 10-foot (3-m) depth.

Should the top soil be shallow, terminate each conductor into a tree-trunklike ground system. For clay, the system trunk should extend at least 12 feet (3.7 m), with several branches at least 10 feet long, all buried one or two feet down. If the shallow soil is sandy or gravelly, four or more of those branches should run out to at least 24 feet (7.3 m). Where possible use ground rods, though this may not be feasible in shallow soils.

On rock or very shallow soil (less than a foot) it is advised that the building be surrounded by a counterpoise ring of a main-size conductor laid in crevices or a shallow trench. Connect the down conductors to the ring. From that, extend radial conductors out at least 12 feet and connect them to copper plates of at least nine square feet (0.83 square meters) or to corrosion metal such as a car radiator, an old copper wash boiler, or similar materials buried in hollows or landfill. Very good ground connections can be made from metallic water supply pipes and well casings.

Do not solder connections. Clamps for at least 1-1/2 inches axially along the conductors, pipes, lightning rods, ground rods, and other metal objects are mandatory. See that all of the ground system is well buried, with the soil carefully tamped in place around the conductors and ground rods. Where the installation is on rock it is particularly important to have the crevices, hollows, ground plates and scrap metal carefully buried to protect and maximize contact with the rock.

Secondary Conductors for Other Metal Objects

Metallic objects which might be found in and around the building can be classified into two groups: bodies of inductance and bodies of conductance. No definite rule exists for determining which is which.

If the metallic object is likely to be charged at times with a potential opposite that of the grounded system, it is considered to be a body of inductance. Generally, they can be found in the first story above ground, both inside and outside. Should a body of inductance be located within six feet (1.8 m) of the lightning conductor it may induce a flash across the gap. Therefore, connect each body of inductance to a main conductor with a secondary conductor not less than 20,000 c.m. (no. 7 AWG) in size.

Bodies of conductance are also inside and outside of structures, though usually higher up. Since they may conduct some of the current direct from a lightning stroke they must be grounded by main-size conductors.

A short article of this type cannot cover all aspects of lightning-protection systems. The references listed below include extensive information on installation requirements. But if this presentation has sharpened your interest in reducing the potential hazards in your ham shack, then it has served its purpose. QST

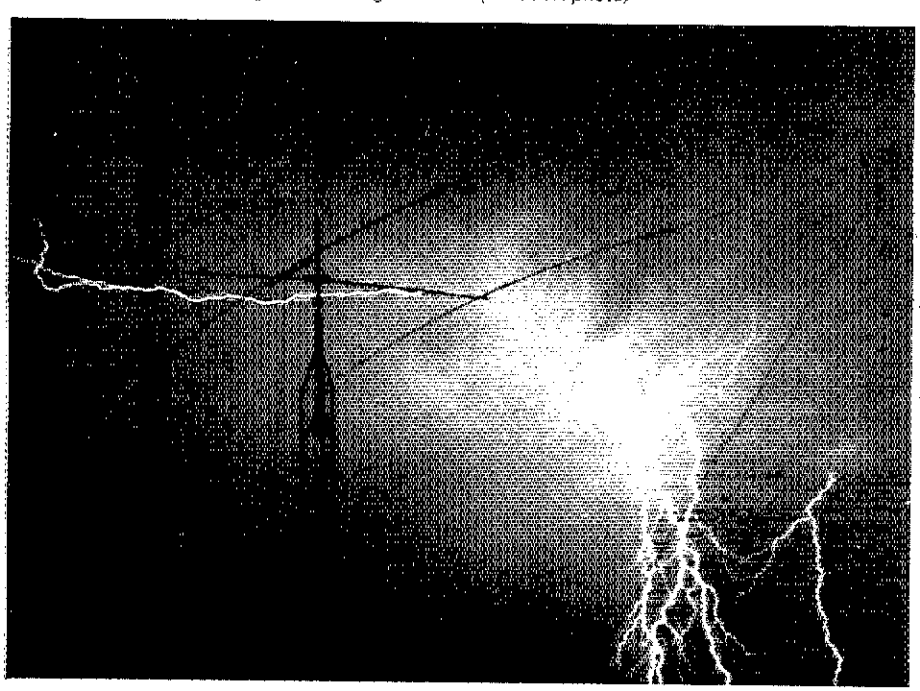
References

Installation Requirements, Master Labelled Lightning Protection Systems, UL 96A, 8th ed., 1963. Underwriters Laboratories Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

The National Electrical Code (NFPA no. 70), Article 810, Section C, National Fire Protection Association.

The Radio Amateur's Handbook, 1978, 55th ed., ARRL, pp. 643-645.

150,000 megawatts heading in the wrong direction. *(WA6YVA photo)*



Heed the ARRL Safety Code

While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL Safety Code will make your ham experience more enjoyable. Read it, understand it, and practice it.

ARRL Safety Code

1) *Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.*

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot in a transmitter when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household HOW to turn to power off, and HOW to apply artificial respiration. Instruction sheets on the latest approved method of resuscitation can be obtained from your local Red Cross office.

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) If you must climb into a tree, or work on a roof, remember that you're not standing on the ground. That first step down can be a very long and painful one. Never work alone.

11) Develop your own safety technique. *Take time to be careful. Death is permanent.*

A Different Kind of Courage

Amateurs with handicaps haven't allowed their lack of sight or mobility to prevent them from serving their neighbors and making friends around the world.

By Mark S. Starin,* WA1TZK

One of the ironies of Amateur Radio is never really knowing who you are talking to on the first contact. Unless you are using SSTV or ATV it is virtually impossible to determine personal characteristics other than perhaps a name and a station location. Perhaps the supreme irony is working someone who appears to be just "another ham down the street" until you invite the OM or YL to visit your shack.

When they politely refuse, you are surprised and a bit hurt, until you discover there is no way to transport that person's wheelchair to your QTH.

It might seem to most of us an impossible feat for a blind, deaf or paralyzed person to become a radio amateur. Yet there are hundreds of handicapped people active in our hobby. They demonstrate that, with determination and proper training, almost any physical disability can be overcome. *QST* visited nine handicapped hams who have surmounted their physical limitations. We invite you to share in their achievements.

Two Remarkable Women

Betsey and Barbara Lombardi (yes, they are twins) are remarkable women. Betsey, K1EIC, is an assistant professor of mathematics at Housatonic Community College in Bridgeport, CT. Barb, K1EIR, is employed as a rehabilitation counselor in nearby New Haven. Both are Advanced class amateurs, recognized for their traffic handling abilities and their dedication to Amateur Radio. Both are also blind.

Their blindness does not prevent them from enjoying activities which many sighted people enjoy. At the Oak Hill School in Hartford, Betsey and Barb ran ham radio classes for 19 of their fellow students. Barb later became trustee of K1QCK, the club station at Oak Hill. Their enthusiasm has not waned in the years since first getting on the air.

*3248 Winton Rd. S., Apt. K-34, Rochester, NY 14623

Betsey is NM (Net Manager) for the Connecticut Phone Net, while her sister, the cw specialist of the pair, has been RM (Route Manager) and NM for the Connecticut Net since 1970. Betsey enjoys 75 and 20 meters; Barb hangs out on 80 meters. They check in regularly to the Nutmeg VHF Traffic Net looking for through messages or serving as NCS (net control station). Both are also members of the ARRL's A-1 Operator Club and have received many public service awards from ARRL for their efforts in disaster communications.

She Tries Harder

Gayle Sabonaitis, WA1OPN, lives with her mother in Worcester, MA, on the first floor of a three-family house. She is an Advanced class ham who is active on several 80-meter traffic nets. WA1OPN is a special person, not only because she is blind and deaf but because she is one of a handful of radio amateurs in the world having both handicaps.

Although a nerve disorder prevents her from maintaining equilibrium, she still manages to negotiate the cellar stairs to her ham shack to operate. "Walking" for Gayle means going down those stairs on her hands and knees and then crossing the floor on her knees until she pulls herself into a chair in front of the table where her gear sits. The next challenge is communicating. Gayle uses only cw, which she copies by placing her left wrist on a transducer, a device that vibrates with each code character. With her right hand she operates a bug. Cw ops take note: Gayle does 20 wpm!

Communicating with Gayle "conversationally" is an experience in itself. A person speaking to her in person has two choices: allow Gayle to place her fingers on your lips and the side of your throat where she "feels" the vibrations from

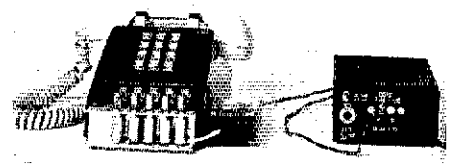
Gayle Sabonaitis, WA1OPN, operating her station with her left hand resting on a transducer. *(WB1ADL photo)*

Answering the Phone Is Not Always Easy

Amateur Radio operators have a long history of being at the right place at the right time. In Miami, local hams and electronics buffs solved a blind radio amateur's tricky problem.

"I met Jeff Wallis, WB4LGI, via amateur radio," said Ian Seidler, W4MRR, "and over a period of time became aware of his lack of sight." Jeff soon related a problem to his ham friend. It seems Jeff's job at the U.S. Customs Office in Miami calls for him to answer a conventional five-line telephone with flashing lights. How does a blind person accomplish such a task? Ian and some co-workers had a solution. "Due to phone company regulations," Ian explained, " we were unable to wire anything directly to the phone. A group of us designed a cover for Jeff's phone that optically reads the lights and correspondingly raises a separate button to indicate the light activity. The system is set up so that when a line is ringing, the button in front of the light on the phone raises and lowers slowly. When a line is on hold, the button raises and lowers rapidly. If a line is in use, the button stays up, and when it is not in use the button remains down."

Ian acted as project engineer but others contributed as well. Len Klein, WB4YJG, designed the circuitry while Earl Dammann supplied components. Bob Erickson provided a phone cover. The actual fabrication of the phone and circuit wiring was performed by Cliff Bloom, WD4PLU, a technician at ETC Radio in Lauderhill, FL. He also scrounged the power supply and interface cabinet. Total time spent on the project was six weeks from drawing board to working model. *(photo courtesy of* Florida Skip*)*



your vocal chords, or tap Morse code on her wrist. Despite these limitations, she understands most of what is said to her. Because she has the ability to speak, and her facilities for communication are adaptable to the outside world, Gayle has led an active life. She had sight until 18 months of age and did not lose her hearing until she was 15. As a result, she was able to sing in a choir, join Girl Scouts, and take piano lessons. Her interest in Amateur Radio began in 1968 when she wrote a term paper on radio communications while at the Perkins School for the Blind at Watertown, MA. First licensed as a Novice in 1971, Gayle upgraded to Advanced after special testing arrangements were coordinated with the FCC.

"Blindness Is No Detriment . . ."

Born without any handicap, Dick Eichhorn, WBØCPC is in a different category than most of the others. An active person with a family and a successful career, Dick apparently had everything going his way. His only problem was a diabetes condition discovered during an Army physical in World War II.

Then, in 1975, Eichhorn's diabetes led to retinal hemorraghing and total blindness within one year. Dick was determined not to let this disability limit his activities, however. He received mobility training and Braille instruction from the Minneapolis Society for the Blind. And he continued to work for the Northwestern Bank, transferring to the Multigraph Department as a machine operator.

During a session at Camp Courage in Golden Valley, MN, Eichhorn became hooked on ham radio. He first qualified for the Novice ticket and now holds a General class license. Today, he is very much involved with Handi-Hams and makes his main activity in Amateur Radio the PICONET (Public Interest, Convenience or Necessity Net), which meets from 0900 to 1700 local, daily on 3925 kHz. According to Dick, some 70 percent of the net's members are handicapped, and 20 to 25 percent of these have visual disabilities.

WBØCPC says, "Blindness is no detriment to being an Amateur Radio operator. If anyone is interested they should get in touch with Handi-Hams* and we will be glad to help them get started."

The Wizard of Wadena, MN

Leroy Ljungren, WBØWWW, is one of those hams you meet any day of the week over the airwaves. Except for limited travel in a wheelchair and a portable respirator, he has been confined to an iron lung since he was struck down by polio 25 years ago.

Ljungren uses a mouth stick to operate his Atlas 210X and rotate his beam. With the aid of VOX, he concentrates on phone, principally on 75 and 20 meters.

In 1975 Bruce Humphrys, KØHR, Courage Handi-Hams director, visited Leroy to talk to him about Amateur Radio for shut-ins. By early 1977, Leroy was licensed as WBØWWW, going from unlicensed to General class in one jump.

*3915 Golden Valley Rd., Golden Valley, MN 55422

Dick Eichhorn, WBØCPC, has spent much of his free time on the amateur bands since losing his eyesight several years ago.

Leroy Ljungren (right), WBØWWW, at the 1977 Camp Courage Radio Camp taking — and passing — his FCC Advanced test.

Presently holding an Advanced license, he will try for Extra on his next visit to Camp Courage, a summer camp for the handicapped in the Minneapolis area.

Copies the Blinking Code

Don Conover, WA6MJZ, is one of those handicapped amateurs who when faced with a difficult physical problem, plus a need to upgrade his code speed, attacked it in true amateur style. He simply designed an eyeglass-mounted blinker which enables him to use what little vision he has to copy the code. It works nicely at speeds approaching 17 wpm. In fact, it worked nicely enough to be featured in February 1978 *QST*. He credits his "Elmer," Chuck, W6MNO, with the idea of using an LED, but it was Don who engineered the project. Quite an effort for some one who is paralyzed, blind and deaf!

Conover was not always in such circumstances. Like Dick Eichhorn, WBØCPC, he lead a more or less normal life until April, 1974, when he suffered a stroke and became both blind and deaf. His physical problems date to 1943, when he was injured in a bomb explosion while stationed on New Guinea. Following treatment back in the States, Don had to use crutches in order to get around. Finally, in 1970, he could no longer walk, even with crutches, and was confined to a wheelchair.

Licensed as a Technician class operator, Don is active on vhf, RTTY and the Novice bands. He is working hard to build up his code speed for the General class test. Back in the 1930s when Don first became interested in radio communications, he built a homebrew receiver and operated W9CEV as a third party, but other activities kept him from trying Amateur Radio seriously. His handicaps now give him plenty of time to experiment. "To my way of thinking, ham radio is the greatest hobby in the world," he says.

Canadians Win a Big One

Kay Clark, VE3KAY, of Caledonia, ON, was the 13th known deaf-blind radio amateur in the world to be licensed. Her licensing was the culmination of more than two years of joint efforts by the CNIB (Canadian National Institute for the Blind) and a group of Ontario hams.

In 1975, Mrs. Margaret Huston, VE3AIZ, long interested in deaf-blind people, discovered that several Americans with those handicaps were licensed hams. She contacted the CNIB about bringing the satisfaction of Amateur Radio to a Canadian with those handicaps. Mrs. Joan Mactavish of the CNIB suggested Kay, and work began to get her on the air.

Jim Swail, VE3KF, technical consultant at the CNIB (who is also blind) constructed a transducer for Kay to copy cw with. It also converted the sidetone from her code-practice oscillator to vibrations which Kay "read" whenever she practiced sending. In addition, he rigged a tape recorder to play back through the transducer, enabling Kay to use tapes for code practice. Theory instruction tapes were produced by Ralph Turner, VE3UY, with a different twist — the text was in Morse code. Bob LaRose, VE3EEK, a blind ham in Ottawa, made code-practice tapes for Kay. Soon Kay was copying the 15 wpm she needed to qualify for the Advanced Amateur license. In June, 1977, she passed her exams and received VE3KAY shortly afterward.

On November 20, 1977, Kay made her first contact. John Musselle, VE3FWC, transmitted in cw and Kay responded on voice. Ralph, VE3UY, was at her shack guiding her along.

Blind amateurs operate 2-meter fm as well as the low bands. Here is K1PQE's IC-230 with modified dials to help her locate various repeaters. (*WB1ADL photo*)

The Handiest Ham Around

No article about the blind and handicapped is complete unless Bob Gunderson's story is included. No other ham deserves the title of "the patron saint of blind radio amateurs" more than W2JIO.

Gunderson is an old-timer in Amateur Radio circles. Blind from birth, he was first licensed as W2JIO in December, 1935. While he was still in high school, Bob began teaching Amateur Radio classes at the Institute for the Education of the Blind in New York City. The job became permanent in 1937 when he graduated from school; Bob continued to teach there until 1974. During WW II, Gunderson taught radio to U.S. Army Signal Corps students. He received General Electric's Edison Award in 1956 for his singular contributions to Amateur Radio.

Bob is an Amateur Extra Class licensee and works on his own equipment, paints his house, and replaces its electrical wiring as well. He has designed an adaptor for his Ham-M rotor control box along with audio tune-up meters for the blind. (K1EIR and K1EIC are still using their W2JIO tune-up meters built by Bob some 20 years ago.) Bob's wife Linda, K2LY, is also a very active ham.

Some Elmers are Handicapped, Too

Nearly all amateurs rely on the "Elmer" system to get them started. In the case of Suzy Oswell, K1PQE, two of her "Elmers" are featured in this article! She also had assistance from Dr. Andrew Peterson, W1ZJJ, now a Silent Key. With that kind of high-powered help, small wonder blindness was no stumbling block to her advancement in Amateur Radio.

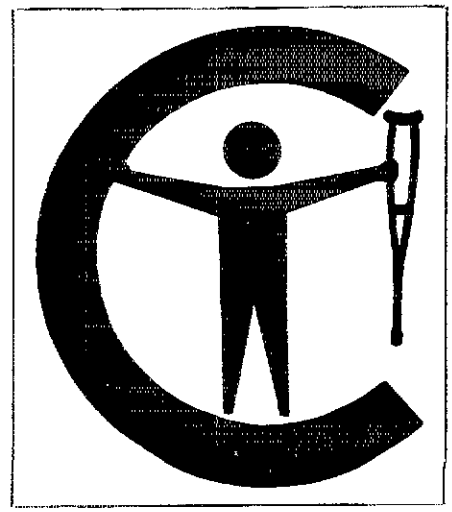
Suzy is a native of Newington, CT, who graduated from the Oak Hill School for the Blind and came under the tutelage of Betsey and Barbara Lombardi, K1EIC and K1EIR. She was first licensed as KN1PQE in 1960 at the age of 15. In 1963, she received her Conditional and in 1970 the General class license. Special arrangements with the FCC in Boston allowed her to take — and pass — the Advanced in 1975. Suzy is very active on 75-meter phone, principally the Texas Tower Net, where she acts as NCS every Friday at 1230 local time. She finds time for 2-meter fm and 80-meter cw as well.

Her other interests include reading, sports (baseball and hockey are Suzy's favorites) and knitting. She lives at home with her mother, with whom she travels a great deal on vacations. QST

ARRL Services to the Handicapped

The ARRL will provide, upon request, a Blind and Handicapped Information Kit. This includes a list of regional libraries for the blind and physically handicapped, a listing of Braille and taped study guides for Amateur Radio, sources of special equipment, and other radio-related information of interest to handicapped people. A brochure for the Courage Handi-Ham system, a nationwide organization for hams with handicaps, is also included in the kit. A no. 10 self-addressed, stamped (28 cents) envelope will facilitate handling of each request. — *WB1FAU*

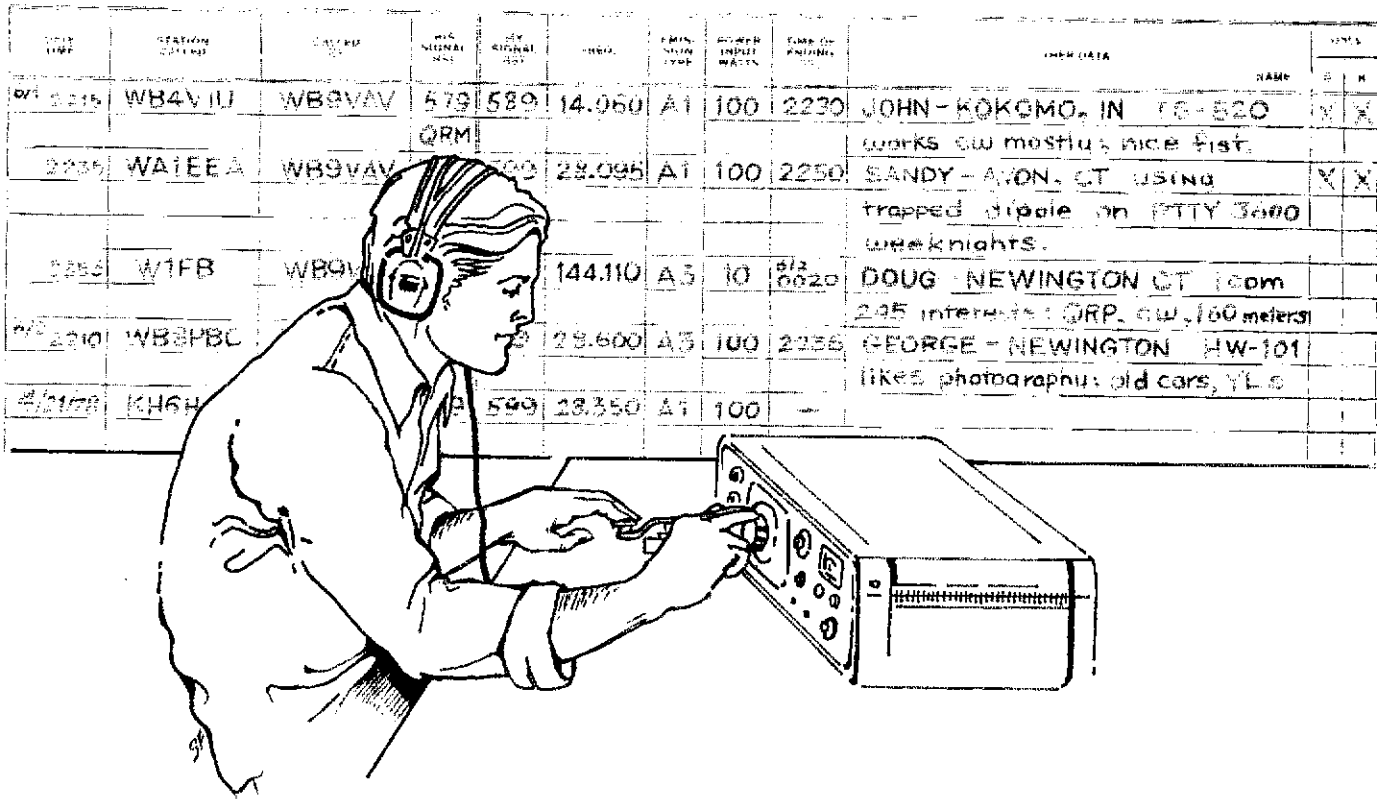
The Chinese saying, "One picture is worth a thousand words," is the spirit embodied in the Courage Center symbol. It is the letter "C," inside of which a figure is represented. The figure's outstretched arms hold a crutch in the left hand and nothing in the right. There can be no better way to convey the message of Handi-Hams: "Handi-Ham Radio knows no barriers."



You and Your Log

Basic Amateur Radio: It can be the most valuable piece of equipment in your ham shack. It can defend you, protect you, amuse you, remind you, and keep you out of trouble.

By Jim Bartlett,* K1TX



The value of your log as a record of station activities is undeniable, but have you ever considered how it can defend you against unwarranted TVI complaints? How it can help you keep track of your gear as you purchase or build it? How it can protect you from bootleggers? How it can serve as a record of your milestones: first contact, first DX, that 50th state, DXCC? How it can help you duplicate the antenna you used to work through OSCAR 6? Your amateur station log can be a valuable record of performance.

Recently, as part of its deregulatory program, the FCC reduced the amount of information to be kept in the station log. What was previously a comprehensive account of station activities has now been boiled down to essentials. This effort by the Commission to simplify the amateur's bookkeeping, as well as its own, is to be admired. However, you will not be penalized for entering more than the legal logging requirements. Fig. 1 is an example of a well-planned log layout containing several entries.

FCC Logging Requirements

Basically, the current FCC regulations require logging only the operator's signature, call sign, station location and dates upon which operation at that location was initiated and terminated. Station logs are required to be preserved for one year. If another person operates your station, the time and date of that operation must be in the log along with the operator's signature. You also have to keep a record of all third-party messages sent through your station.[1]

Writing It Down

Keeping an accurate log has many advantages. It gives you a record of all stations contacted: the frequencies, dates, times and types of equipment. It also gives you information about the other stations' operators: their names, addresses, hobbies, favorite modes of operation and more. All of this can come in handy if a second contact is made with the same station. The log also tells you if you received or sent a QSL card after each QSO.

Other information that can be kept in the log includes an up-to-date record of circuit diagrams, service dates, serial numbers and modifications made on station equipment. You know how irritating it is to run into trouble with your rig and not be able to find the schematic diagram. This can be avoided if diagrams of homemade equipment are kept as part of the log. They can be drawn on the back of the log pages or on separate sheets of paper stapled into the log. More equipment-related data could be entered such as purchase date, price, and the

*Basic Radio Editor, *QST*

[1] *The Radio Amateur's License Manual*, 76th edition, ARRL.

seller's name and address or the buyer's name and address when you sell equipment.

Antenna Notes Are Helpful

Many amateurs constantly experiment with antenna designs, especially if they are stuck with relatively inefficient apartment-type antennas. These arrays and the data regarding their effectiveness can all be recorded in the log book. When a new antenna is erected at your QTH, you log can show such information as the design parameters, feed line used, height above ground, polarization and any difficulties encountered in getting the system to perform. Other antenna notes might include field patterns, matching problems, and standing-wave-ratio information.

Good Logs Help Win Awards

Many new hams set their sights on an ARRL Worked-All-States award. The log can be indispensable when it comes time to check for accumulated states. In fact, some amateurs make it a habit to specifically mark a QSO when it represents a new state for the band, or mode of operation. Each state can be marked with an "X" and even color-coded by band so that they can be easily identified later on. Phone contacts can be marked differently than cw QSOs, and special modes such as RTTY or slow-scan TV might be indexed separately.

Keeping Track of Date and Time

There are a number of ways to enter the time of a contact in the log: local time with standard A.M. and P.M. designations, the 2400 (military) system in local time, or Universal Coordinated Time (UTC). UTC is the modern term for Greenwich Mean Time (GMT) using the 2400 format. Most hams prefer the UTC system, as it is recognized around the world.

One thing must be noted when using UTC: the change of date prior to midnight local time. This can be confusing when comparing times and dates on QSL cards with those entered in the log. Midnight UTC is from four to 10 hours earlier than local midnight in the U.S., depending on daylight savings time and the geographical location of the station. This means that if you are operating at 10 P.M. local time on August 20, you are actually somewhere between 0200 and 0800 UTC *the next day*. Thus the log would read August 21 if the time were being logged in UTC.

Visitors Please Sign In

When visitors come to your station, their names and calls can be entered in the log. This is not required unless they serve as control operators, but it is nice to have a record of all visitors. Even nonhams can be logged as visitors. In fact, they are required to be listed if they send with your key or talk in the mic. This third-party traffic notation is required by the FCC, even when you operate mobile.

A Problem Solver

Your log can also help when you are faced with TVI or RFI complaints from your neighbors. Unfortunately, TVI can be like an obsession for some people, almost to the point where it can be induced by the sight of a new antenna in the neighborhood.

One ham recently installed a new set of dipoles on the roof of his apartment building. Within a few days, his wife received numerous complaints from neighbors stating that her husband was really "tearing up the TVs." Fortunately, he had the foresight to leave the antennas disconnected for a while after the installation to check for this type of "TVI." After he demonstrated to his neighbors that the antennas had not been hooked up yet and that there were no recent entries in his log, they forgot their interference problems.

This is not to say that genuine interference does not occur in many cases. Here again the log can be of assistance. If your neighbors experienced TVI every night you operated your low-band rig, a simple check of the log would show whether you had been on the air, and on what band when the interference was occurring. But remember, you must enter the information in your log regularly for it to be helpful in interference problem solving.

"Bootleggers" Look Out

An increasing amount of illegal activity on the hf bands by nonhams is another problem we face. A well-kept log can help here, also. If someone "bootlegs" your call and you receive a notice of violation, or QSL cards start rolling in from QSOs you never had, log entries can be a lifesaver! Unless you sit on one frequency all the time, it would be practically impossible to recall what band, frequency, time and emission type pertained to each QSO. Again, consistent use of the log is necessary if you expect it to be a meaningful reference. Murphy's Law states that the one QSO you forget to log will be the one you'll need to check back on.

There are probably many other things you will want to log as you progress in Amateur Radio, but the most important thing is to start keeping your record of progress and performance. Once you form the habit of keeping your records and notes in the log book, you'll be preserving all the information that is important to you (especially important if you get a "QSL" from the FCC). Just think of your ham log as a diary of all your activities in Amateur Radio. As the years go by, you'll get a lot of satisfaction from reviewing your old notes. Who knows? Maybe someday you'll be famous and your signed log might be worth the price of a new rig!

Fig. 1 — A typical log format. Note that several entries have been made, but that extra lines have been used for additional information. Don't hold yourself to only one line per QSO — use extra lines when necessary.

DATE TIME	STATION CALLED	CALLED BY	HIS SIGNAL RST	MY SIGNAL RST	FREQ	EMISSION TYPE	POWER INPUT WATTS	TIME OF ENDING QSO	OTHER DATA NAME	QSLs S	QSLs R
6/1 2215	WB4VIU	WB9VAV	579	589	14.060	A1	100	2230	JOHN - KOKOMO, IN TS-520	X	X
			QRM						works cw mostly; nice fist		
2235	WA1EEA	WB9VAV	599	599	28.095	A1	100	2250	SANDY - AVON, CT using	X	X
									trapped dipole on RTTY 3600		
									weeknights.		
2353	W1FB	WB9VAV	59	59	144.110	A3	10	6/2 0020	DOUG - NEWINGTON CT Icom		
									245 interests: QRP, cw, 160 meters		
6/2 2210	WB8PBC	WB9VAV	58	59	28.600	A3	100	2236	GEORGE - NEWINGTON HW-101		
									likes photography; old cars, YLs		
1/21/78	KH6HQG	WB9VAV	599	599	28.350	A1	100	—			

Hams "Five by Nine" with WARC Comments

Hundreds of amateur filings with FCC leave no doubt where we stand on 3950-4000 kHz, other issues.

By David Sumner,* K1ZZ

If anyone thought that amateurs would quietly and meekly accept a proposed narrowing of the 75-meter band to accommodate International Broadcasting, that notion was dispelled by the massive reaction to the Commission's Eighth Notice of Inquiry in Docket 20271.[1] Approximately 300 sets of comments filed by individual amateurs, clubs and nonamateur organizations supporting our position, arrived at the Commission's offices before the July 14 deadline.[2] Amateur comments far outnumbered those submitted by all others in this proceeding, whose purpose is to permit public participation in the development of the U.S. position for the 1979 ITU World Administrative Radio Conference (WARC). Many of the amateur filings represented clubs rather than individuals, and quite a few bore multiple signatures; thus, the level of amateur participation was much higher than the number of filings might indicate. Not only were the comments numerous, but generally they were of high quality as well, providing persuasive documentation of the vital public services being performed by amateurs in the 3950- to 4000-kHz band and elsewhere in the spectrum.

Why all the fuss? Quite simply, because the 1979 WARC will be the first time in two decades that the all-important International Table of Frequency Allocations will be subjected to top-to-bottom scrutiny and possible revision. Late next year, the nations of the world will decide in Geneva how the radio spectrum will be apportioned for the remainder of this century. In telecommunications matters, the U.S. still has an influence which greatly surpasses its single vote out of 154; therefore, the position the U.S. carries to Geneva is crucial to the continued well-being of the Amateur Radio Service.

During the past two years, the FCC has released three versions of a draft Table of Frequency Allocations to show how the present Table might be modified to better serve U.S. telecommunications interests. Each succeeding version reflected a greater degree of coordination between government and nongovernment interests. How each version affected the Amateur Radio Service was reported in *QST* as soon as it was released, and in time for responses to be submitted to the Commission. Arguments presented by the League, by the Commission's own Advisory Committee for Amateur Radio (ACAR), and by individual amateurs and clubs helped convince the Commission to make each succeeding version of the draft Table somewhat more favorable to the Amateur Radio Service, though none has fully met the requirements for new high-frequency allocations which were documented in a 1976 ACAR report.[3] The third version, summarized in June *QST*, represented an important breakthrough for Amateur Radio: For the first time, the FCC was proposing new amateur bands at 10 and 18 MHz to accommodate present and future growth and to bridge the gaps between the present 7, 14 and 21-MHz bands. Unfortunately, at the same time the Commission proposed cuts at 1.8 and 3.5 MHz in favor of Broadcasting.

The League's Response

From the earliest domestic preparations for WARC, it was apparent that there would be pressure to expand the allocations to the Broadcasting Service at the expense of others. If new outlets for local broadcasting are needed, the League's comments noted, they can be provided in several ways within the present allocations and without reducing the 160-meter amateur band. Changing the decades-old channel spacing from 10 kHz to 9 kHz would provide 12 more channels; to 8 kHz, possibly in conjunction with compatible single-sideband emision, 27 more. In the FM Broadcasting Band, the present specifications for channel spacing and deviation date to the era of vacuum-tube receivers with poor selectivity and stability; today, spacing could be reduced substantially by reducing the occupied bandwidth of an FM Broadcasting station to something less than its present 180 kHz.

Finally, the League's filing argues, the public would be poorly served by an expansion of the A-M Broadcast Band. We said:

Hundreds of milions of broadcast receivers are already in existence which tune only from 535 to 1605 kHz, with some slight overlap at each end of the dial. Any new station on another frequency would be at a severe competitive disadvantage for decades, and its listeners would have to bear the economic burden of purchasing new receivers or modifying existing ones. In addition, the frequencies in question have poor groundwave coverage as compared with the frequencies at the lower end of the A-M Broadcast Band, and are subject to severe skywave interference in the late afternoon, night and early morning hours. Co-channel interference and severe phase distortion are common occurrences at the high end of the A-M Broadcast Band, and would be even more severe in the extended band.

The League also disagreed strongly with the contention that the Commission's proposal, of 40 kHz for amateurs on an exclusive basis and 100 kHz on a shared basis, was an improvement over the present situation at 1.8 MHz.

With respect to 3950-4000 kHz, the League argued that the requirements of International Broadcasting were minimal, and that continued availability of the band was vital to the public-service capability of the Amateur Service. In this, we were supported by comments submitted by civil preparedness and Red Cross officials. We said:

It has already been demonstrated, above, that the Commission's proposals in the Eighth Notice do not constitute an improvement with respect to 1.8 MHz, and it is unrealistic to expect that any amateur communications now conducted at 3.5 MHz could be shifted to that band. . . . Similarly, while the Commission is hopeful that its proposals at 7 MHz will result in an improvement for the Amateur Service in that band, which is today much abused by the International Broadcasting Service, there is no guarantee whatsoever that this improvement will in fact come to pass. . . . As the represen-

*Assistant General Manager, ARRL
[1]Notes appear on page 47.

tative of the Amateur Radio Service in this country, the League cannot accept the argument that amateurs should be expected to "trade" a portion of the heavily occupied 3500- to 4000-kHz band for a hypothetical improvement of status in another portion of the spectrum. Even if a guarantee of improved status at 7 MHz could be made, the two bands serve entirely different communications purposes for U.S. amateurs.

The League's comments then detailed the high level of amateur activity in the 75-meter phone band, concluding that the occupancy exceeded 40 stations per 3-kHz channel during the hours of peak activity. We continued:

The importance of the communications conducted by amateurs in this band should not be underestimated. The band supports the vast majority of public-service amateur communication of other than a strictly local nature. The message-handling networks which meet here regularly are designed to develop and improve skills which are invaluable under emergency conditions. In addition, because of the interference level encountered at 7 MHz, the band must also support much of the long-distance (DX) communication which takes place during the hours of darkness.

With the expected growth of the Amateur Service during the remainder of this century, it is clear that the Service cannot afford to lose 50 kHz of its heavily utilized 3500- to 4000-kHz allocation. It is respectfully submitted that the public interest would best be served by maintaining this allocation in its entirety.

Who Listens to Shortwave Broadcasting?

One of the least efficient users of the hf spectrum is International Broadcasting. This service still uses double-sideband a-m emission; transmits the same program on several frequencies in the same band, often to the same target area; and operates with seemingly unlimited power. Yet, a very basic question is seldom answered, or even asked, by broadcasters: Who is listening? Think of the people you know. How many of them use shortwave broadcasting as a source of news or entertainment? Unless you know an SWL hobbyist who collects QSL cards and who probably cares very little about the program content of the stations he is listening to, chances are that you know very, very few people who pay any attention at all to these high-powered broadcasts. In their travels to dozens of countries on all continents, the members of the International Amateur Radio Union (IARU) headquarters team have asked the question time and again, and generally have received the same answer: Even in the remote corners of the world, the regular audience for shortwave broadcasting is vanishingly small. Yet, the greatest demands for more spectrum between 3 and 30 MHz are coming from the broadcasters.

Broadcasters often speak in terms of "hundreds of millions" of listeners, and use questionable statistical techniques to bolster this claim. Last year, the League commissioned SRI International (formerly the Stanford Research Institute) to study the available reports on the size and composition of the shortwave broadcasting audience and prospects for future growth. The 40-page SRI report, which was included as an appendix to the League's filing concluded: "Reduced to a single comprehensive statement, this study clearly shows that any demands made by hf broadcasters for increased spectrum *due to increased audience demand* simply cannot be supported by the information now available."

New Bands

Referring to the proposals for new and expanded hf amateur bands, the League noted that amateurs in Region 2 may operate in 1100 kHz between 4 and 27.5 MHz, or 4.68 percent of the available spectrum. The proposed expansions would bring this to 6.17 percent, *if* the Executive Branch will agree to two 50-kHz segments at 6.95-7.00 and 20.95-21.00 MHz, and to only 5.74 percent otherwise. Yet, the worldwide amateur population today is *30 times* the size it was in 1927, and the hf allocations have remained essentially the same. The League's filing reviewed in detail the allocations in the vicinity of 10 and 18 MHz, concluding that the Fixed Service retains extremely generous allocations here which could be further reduced without harmful effect. Another 200 kHz could be made available to the Amateur Radio Service at 18 MHz on an exclusive basis; another 200 kHz at 10 MHz on at least a shared basis; and the 100-kHz expansion of the 14-MHz band, as originally proposed, could be restored.

Other Issues

The League's filing dealt with a number of other issues which were raised in the Eighth Notice of Inquiry. Several amateurs submitted extensive documentation of the desirability of a low-frequency amateur allocation with a relatively low power limit in order to provide for amateur experimentation in this part of the spectrum. The League supported these submissions, pointing out in reply comments that the interference potential of such amateur signals was being greatly exaggerated by the electric utilities who use this part of the spectrum for unlicensed Power Line Carrier Systems. Two filings insisted that possible interference was just as serious a problem from amateurs as from 50-kW broadcast stations. However, the difference in radiated power between the two services would be about 60 dB, which would place the amateur signal at about the same signal level as a *spurious* emission from a broadcast station!

At uhf, two issues needed to be addressed: continued access to 1215-1240 MHz, which is to be occupied by a military Radionavigation-Satellite system, and additional bands for the Amateur-Satellite Service. Information available to the League suggests that the system in question would not be susceptible to interference from amateur signals; indeed, it could not be susceptible and still accomplish its mission in the face of possible enemy jamming. In defining the future frequency requirements for amateur satellites, the League pointed out that congestion already exists in the present allocations, and that, in view of the projected growth of the Amateur Radio Service, much of the long-distance communications requirements of the service would have to be transferred to satellite circuits in the future.

The Commission proposed that narrow segments of each band be designated for use only for communications to and from a disaster area, in the event of a natural disaster. After studying the proposal, the League concluded that it would be difficult to implement in practice, would not enhance amateurs' ability to provide disaster communication, and was unnecessary.

What's Next?

The Commission's WARC preparations have come a long way since they began in earnest more than three years ago, but there is still some distance to go, and time is running out: The U.S. proposals must be submitted to the ITU for distribution by January. There has been some suggestion that the Commission might release another Notice of Inquiry of the same general type, soliciting one final round of public comment on another revision of the draft Table of Frequency Allocations. Whether it is physically possible for the Commission's beleaguered staff to accomplish this, and whether there is information to be presented which is not already contained in the 17 volumes of comments filed to date, is another matter. The next three months are likely to see frantic attempts to resolve the differences which remain between the dozens of competing interests, with little opportunity for formal public comment. Whether or not another round of comments needs to be made, the nation's amateurs can take great pride and satisfaction from the public record of their participation in this vital WARC proceeding.

Notes

[1]Sumner, "Last Call for Comments on FCC WARC Proposals," June 1978 *QST*, page 52.

[2]The original deadline of June 30 was extended by two weeks.

[3]For background on how we got to where we are today, see the articles listed in the *QST* Index (December issue) for 1976 and 1977 under "World Administrative Radio Conference." Or send an s.a.s.e. with 41 cents in stamps attached (first class) to ARRL Hq., Newington, CT 06111. We'll send you a "WARC Kit" which consists of reprints of these articles.

Sweepstakes for the Little Guy

Have fun in the big November bash with a barefoot transceiver and a dipole.

By Jim Price,* K6ZH, ex-WB6DPV

WA2HLP takes advantage of Sweepstakes to see what his new rig can do. *(WA2EUP photo)*

Do you know what your station can do? How sharp are your operating skills? Need some rare states for WAS? How far can you go on 5 watts?

The Sweepstakes is an excellent time to get the answers to those questions and more. The big guys will be going all out, blowing their minds to run up killer scores. But this article is written for the little guys. What's in it for them?

First off, Sweepstakes is a tremendous resource toward getting several awards. For people pursuing the Worked All States award, especially 5BWAS, what more could you ask? Any significant participation in SS will net at least 45 states. Also, SS includes the friendly neighbor Canadians, and many credits toward Worked All VE (WAVE) and Worked All Canada (WACAN) can be gleaned from a vigorous participation in SS.

Another really neat benefit from SS is county hunting. It often seems that everybody is in Los Angeles or Dallas, but a trip through the *callbook* after an SS will surprise you — lots of people live in little towns in little counties, too! And finally in the award department is the ever-present opportunity to walk off with a section award in SS itself. Now that separate awards exist for low and high power in each section, the little guy has a better shot at it. And besides, the big guys don't show up *every* year. So, SS can help all participants, including the little guy, gather in some wall decorations.

Goodies on Trial

Sweepstakes is an excellent trial for any goodies you may have added to your station in the past year. For example, I built a little switch box for my TR-3 which enables me to use stereo headphones and get sound into both ears. The really neat feature is that I can hear both my receiver and my keyer in the phones, and I can switch it to hear my keyer in one ear the the receiver in the other. I like it for contest use. SS is an excellent test of audio filters, too — any QRM stoppers are indeed welcome! If you've got some new antennas up, you'll know if they're working when you dive into SS. So, if you've made improvements to your station, SS will help you decide if they're doing the job.

Many station performance measures will show up in SS. Can your gear operate for many hours at a stretch? Are you getting out well? Is high SWR in the phone band on 75 hurting your score? Do you have trouble working to the north while easily working to the west?

Contest Clubs

SS is one of several contests that offers the fun of club competition. If you live in an area covered by one of the active contest clubs, it's really exciting to operate SS side-by-side with a lot of your local buddies instead of operating in competition with someone else in your section that you don't even know. Every 1000 points helps your club. A few years ago, when I was living in Virginia, my single entry in the Potomac Valley Radio Club (PVRC) total was enough to beat Murphy's Marauders (sorry about that). It was as close as 80k out of 8 million! Now that's satisfaction!

You say you'd like to try a little DX-pedition for SS? Well, there are pros and cons. SS is seemingly a good opportunity for a Field Day type operation to Vermont, Wyoming or some such. But, the ultimate test of SS success is your signal, not your location. If you happen to have both, then you're in fat city (e.g., K7NHV or WØSD). But even if you're in a rare section, if they can't hear you, they can't work you.

Be a Guest

Now guest operating is another thing. If your station just can't quite cut it in contests, or if you know someone in Rhode Island who isn't much of a contester, but does have a very nice setup, use someone else's station in SS! It's good to practice for a few evenings at an unfamiliar station prior to contest operation, but once you've done that, you're set — you really can test your true operating skills once most of the hardware limitations are out of the way. By the way, you can still qualify for SS awards as a guest operator.

Operating skills, in conjunction with your station performance, are really the ultimate test of the Sweepstakes. You've just got to dive in there and work them. One of the nicest benefits that SS offers is a year-by-year check of your station and operating abilities. Operating skills don't just happen — you work at it. If you're just starting into SS, make it a point to keep track of your scores and rates for the next few years (see Fig. 1).

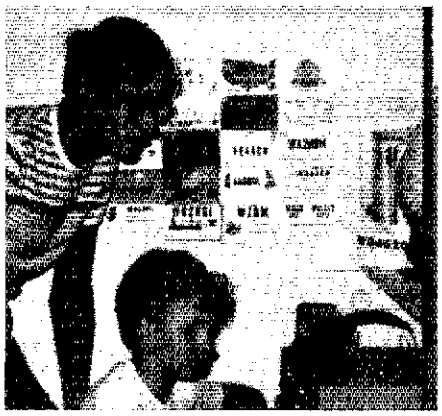
Some Preparatory Hints

Order your log sheets, dupe sheets, and summary sheets from ARRL well in advance of SS, and make sure you understand how to use them. Be sure your gear is operating well. The last thing you want is to be bothered with a shorted headphone cable, a bad mic cable, and the like. You may have some, as the utilities say, unscheduled outages of your own anyway. Make sure you know how to zero beat the station you're calling on cw, especially if you're using a transceiver. With all the 500-Hz (or less) receiving filters around these days, many people simply won't hear you if you call too far off frequency. Finally, look over previous years' SS results in those same old *QST*s. You can see what the competition has been in your section, and you can get a feel for what a good score is. Be sure to note both the high- and low-power scores.

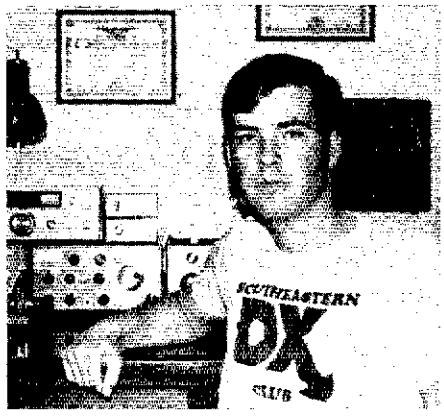
Now you're ready — it's 2100Z on Saturday, the first day of the big contest, and the horses are at the gate. Final tune-ups and "hhheeeellllllooooooos" can be heard all over the band. You've got your mic or key ready. Log sheets and sharpened pencils are at hand, and dupe sheets are nearby. 3-2-1, and the band comes alive! Not to panic — here's where strategy comes to the fore!

What band should you be on? In the East, 40 is *the* band in SS. You just never

*4855 39th St., San Diego, CA 92116



Guest operator WD5EEF gets ready to take over as WD5GXO logs another SS contact.



WA4IAR makes his SS contribution to the Southeastern DX Club score.

WA3TBW fires up rig and wood stove to work the Sweepstakes under Field Day conditions.

seem to run out of 1s, 2s, 3s and 4s on Saturday afternoon, and you can work everyone else on 40 all night! Then move to 20 or 15 Sunday morning (unless you're still doing well on 40). Out West, 40 is of little use until Saturday night — there just aren't many people in 6 and 7 land percentage wise! So, 15, if it's open or 20, unfortunately, are the best starting points. I say unfortunately since 20 is like playing the Vikings — it's never easy! Twenty gets better as Saturday wears on, and by the time it's thinning out, 40 is going well. Be sure to get down to 40 early enough to work the sections close to you. When the long skip sets in about sunset on both 40 and 80, you may not even be able to work your own section unless you call up a neighbor! Stay on 40, or go to 75 or 80 meters until early Sunday morning. Then stay on 20 or 15 for the duration.

Plan for Working SS

Believe it or not, there is a plan for working stations in SS. Start at the low end of the frequency bands you can operate, and gradually move up the band. Work the easy (loud) ones, and as soon as you've worked someone, move up just a smidge to a clear spot and call CQ SS. If you get no answer in a couple of tries, keep moving up the band, working the easy ones, calling CQ. Now if you start getting consistent answers to your CQs, then stay there and "run" QSOs for as long as you can. Running stations is obviously how high rates happen.

Running stations is nice, but it doesn't last forever, especially for the little guy. So, keep moving up the band until you reach the top of the activity. Then — start over at the bottom. If you're adept at it, you can still make 30 or 40 QSOs an hour for the whole contest just by calling.

If your cw speed is a bit on the low side, or if SS just sounds a bit forbidding, go up to the top of the activity (e.g., 14,070-14,100, 7075-7100) or to the Novice bands. There are still lots of folks to contact, and things are a bit less hectic.

Which should you go after — sections or QSOs? There's no formula exactly, but sections are important. How important? Consider that your rate is 30 QSOs per hour, you have 400 QSOs and 65 sections, and then, there he is — Wyoming. He's working a fair-sized pileup, and he's not very strong. Right now you've got 52k points. You can afford to wait as long as 20 minutes to work this guy and still do better scorewise than working regular stations at your established rate. The higher your rate, or the less contacts or sections you have, the less time you can afford to wait to work another multiplier. In general, don't go out searching for sections. But don't pass up opportunities either!

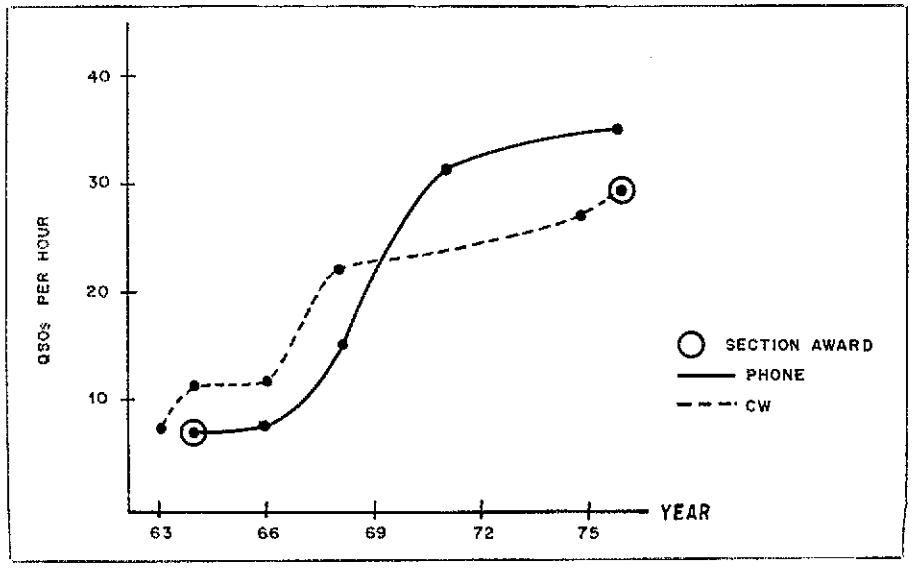
Keep Track of Your Sections

Speaking of sections, keep track of the ones you've worked on the SS summary sheet (or elsewhere). A few hours into SS you won't remember all the sections you've worked, and it can lead to some embarrassment. One year, I almost didn't work Western Pennsylvania because I had it crossed off " in my mind" and didn't seek it out. Also, for the same reason, keep your dupe sheet up to date. Duping a log when SS is over is a terrible job anyway, and lots of dupes make it that much worse. It also avoids the "gee, I don't think we've worked before. . ." type of SS QSO.

SS really has a "bug" all its own — every QSO is a little victory in itself, and you never know when a VE8 will call you (it does happen — honest!). SS is an excellent way to work toward several awards, to test your station performance and any new gadgets you've added, and mostly to test your ability as an operator. When the chips are down in an emergency, it's your ability to use your gear that's going to pay off. You need to know just what you and your station can do!

So jump in there this year when you hear CQ SS. There are lots of big guys and little guys who'd love to work you — every QSO counts. By the way, if you hear me on, give me a shout — I'm a little guy and I need all the help I can get! QST

Fig. 1 — The Sweepstakes offers an excellent check of your station and operating abilities. Make it a point to keep track of your year-by-year scores and rates.



Try a Hamfest Code Contest

Witness the past. At your next ham gathering, you can intrigue and capture spectators and hams alike with the rhythmic beat of Morse code as it has always been known.

By Joe Rice,* W4RHZ

Don't let anyone kid you by saying that cw is old-fashioned and dying out. This is simply not so! Just check out the many people who gather around code contests at hamfests and let everything else go. They know the inseparable romance between radio and the code, the definite fascination for listening to it.

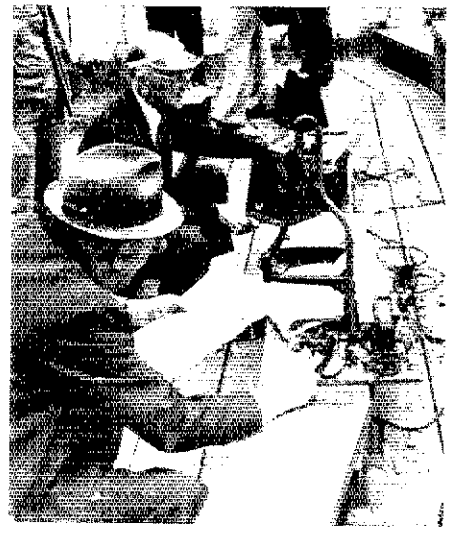
It's one thing to look through glass at a Morse sounder, but quite another to see and hear one in operation.

Witness the demonstration at the Northern Kentucky Ham O'Rama. On display was a real-life working model of Samuel F. B. Morse's code machine, semaphore, wig-wag and blinking lights. It's one thing to look through glass at a Morse sounder, but quite another to see and hear one in operation. The two veteran operators at the display, Al Phelps and Harry Moorman, had worked all their adult lives at either sending or copying press, brokerage reports, stock-market quotations, sports or weather reports. A brief history of the Morse code and its variances accompanied the demonstration.

Get in the Game

For a dozen or so years I've engaged in code contests at various hamfests around the greater Cincinnati area. The following observations are based on that experience. You will discover that the majority of copy will be submitted at speeds under 20 wpm. Higher speeds are for the QRQ boys. When you approach 35 wpm, you only have one or two copying. At higher speeds the test will be for the benefit of one person, with all the rest looking on.

I have decided that it is best to arrange tests in a simple fashion. For instance, send on a hand key at 10, 13 and 15 wpm for all those Novices and Technicians who desire to see what they can do. It is well to point out, also, that there is a vast difference in copying, if the code is sent as a machine would send it or by another method when it is sent with exaggerated spacing. You will find a sharp division in copying ability around 13 wpm. This is caused by the machine-sent code running together in a person's mind as he copies. If each letter is sent at a faster rate and the spaces sent wider, it is easier to read. Do whatever you think is expedient after you have explained what you are doing.



A working model of Morse's original code sounder attracts spectators at the Northern Kentucky Ham O'Rama. Veteran operators Al Phelps and Harry Moorman demonstrate their skills at the code-copying art. The exhibit was accompanied by a brief history of Morse code and how it differs from the International code used today.

Real QRQ

At the Northern Kentucky Ham O'Rama, I decided that high-speed code is indicative of nothing but the ability to guess at what is being sent. Admittedly, it does sharpen up your wits so that on slower speeds you don't miss the first one or two words sent in a message and you hear better for small deviations from the normal word messages if a numeral or other mark is inserted in the text.

Arranging for the means to hear the code and get it down at the correct speed is an exacting business. Recording it takes many days, if this is the method you're to use. In round figures you first decide what speeds you are going to use. In my own case I thought five-word-per-minute increments, from 15 through 55 wpm, would do.

At higher speeds the test will be for the benefit of one person, with all the rest looking on.

At each speed, the text must be selected and the letters counted out to make five minutes of that particular copy. For instance, in the 15-wpm text, you must have five minutes of the required number of words. This means you laboriously count the letters and figures one by one. Counting five letters to the word with punctuation marks counting as two each, you make a mark at the end of 75-counted

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characters. Do this for the two-, three-, four- and five-minute intervals. These marks act as a guidepost when you send the text. By watching the sweep-second hand on a clock or watch, you time yourself as you send. You may vary several seconds on any one particular interval, and if you are slow or fast, you vary your subsequent sending accordingly.

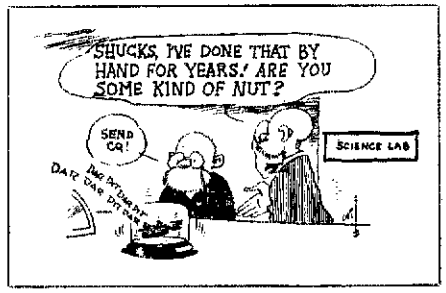
Use the type of telegraph key that seems to fit your own operating habits. I prefer the straight key for speeds to 20 wpm; then I use the electronic keyer for the higher speeds.

. . . it does sharpen up your wits so that on slower speeds you don't miss the first one or two words sent in a message.

At 20 wpm the one-minute intervals now become a text count of 100 letters (or characters) per minute. Most reasonably good senders can use a key at this speed and send with zilch errors. It isn't as easy as you may at first think. People who copy code are used to the perfectly sent code of W1AW. If you make a mistake, you must start over on your recording. This is a heartbreaker if you have already completed four-and-one-half minutes of solid copy and then goof on a simple word like "and." A word of caution: Don't let those little human foibles set in, such as running the letters A and N together to form the letter P instead of what you intended.

Hearing It

I assume you will use the sidetone oscillator in a keyer or other suitable sound source. Watch out for a chirpy note or key clicks just as you would with on-the-air transmissions. Since this tone has to be reproduced over an amplifier for all to hear, it is best to select a tone near 500 hertz as it pierces the din of most hamfests held outdoors.



At 25 wpm you may have to change your technique of recording as it is most difficult to hold a steady speed for five minutes and make no errors. This is a changeover speed for most of us who do this sort of thing. Assuming you are okay at this speed, then we proceed to the next speed.

At 30 wpm I am certain it's best to record at one-half the desired playback speed and double this for your final recording. This means now that you must send for a 10-minute period without error. You count the one-minute intervals as if you were sending at 15 wpm, which you really are. Do this for a 10-minute period.

It is best to select a tone near 500 hertz as it pierces the din of most hamfests held outdoors.

Remember, however, the tone will also change pitch when you double the speed. If the end result you wish is the same 500-Hz note, then you must record at half that tone, or 250 Hz.

With access to some type of device which will operate a relay when a tone is fed into it, you can recreate the code without worrying about the change in tone as all tones will now be the same. Simple RTTY terminals, when properly arranged, will do this for you. Using this device, you can tune in W1AW, wash out the QRM and QRN, and recreate the code if you wish. I don't do this, for the simple reason that I've found that many people who copy code also hear W1AW. When they hear your code contest copied from W1AW, they already know what to expect in their copy.

What Experience Has Taught

I am now of the opinion that the best test is to send at a speed of 18 wpm using an unusual text material such as an OSCAR bulletin. You can obtain this from W1AW. It includes UTC times, equatorial crossings, degrees longitude and so on. Usually such bulletins end with plain text informing you of future happenings. My own sending is relentless at 18 to 20 wpm, and I speed up for the plain-language text at the end.

The general idea is to see who can copy the most, both accurately and legibly. It is rare to find a person who copies solid.

The general idea is to see who can copy the most, both accurately and legibly. It is rare to find a person who copies solid. If the final decision is close, you can add another qualification of having the most-artistic copy. It is best to have all copy done with a stick (pencil) rather than a mill (typewriter). It is difficult to obtain enough typewriters for one thing and we must face the fact that regardless of what a particular amateur operator thinks, he is probably not good enough to copy at a mill.

Selecting the 18-wpm speed was done deliberately as it is known that hand-printing techniques seem to run out at speeds over 15 wpm. A review of the *ARRL Code Kit* would be helpful to all.

So surprise all your friends by staging a code contest at your next hamfest. You'll not only enjoy it yourself, but you will bring much enjoyment to others. QST

Strays

QRP, MONGOLIAN-STYLE

☐ Hunt Turner, KØHT, garnered 101 QSOs with stations in 30 states and five provinces during a one-month period this past winter. Doesn't sound out of the ordinary until you learn that he used an HW-7 to put less than 5 watts into a badly located inverted V. And that operation was from a wooden Mongolian yurt, nestled in the Smoky Mountains of North Carolina.

Where did he get such an idea? From *QST*? From one of the other ham magazines? No, from *Kon-Tiki,* which he read by oil lamp in the yurt one winter. He came across the account of LI2B's 6-watt 20-meter QSO with Norway from the other side of the globe, and his romantic interest in QRP developed from there.

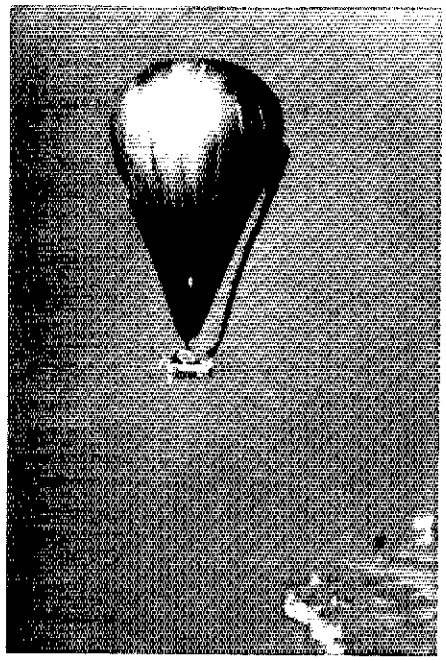
The KØHT operating position inside the yurt at Sandy Mush, NC. Neighbor Jonathan Hearne, WA4NQE, watches while KØHT takes a break and warms his feet on soapstone.

They Made It — W5OPC/Double Eagle II

It was no simple accomplishment. Moving majestically over the cloud-covered coast of France, three adventurers in their helium-filled balloon had overcome many technical problems, discomfort, exhaustion and danger since leaving Presque Isle, ME, less than six days earlier. All of this was traded off for exhilaration and fame when they finished their transatlantic trip by landing in a wheat field some 50 miles west of Paris.

When the *Double Eagle* was launched in September 1977, Massachusetts-area hams tracked the balloon until it was forced down near Iceland.[1] Hams also had a big part in this second attempt. "Doc" Wiley, W5OPC, flight director; Sydney Parks, WA5KGQ, communications director; and Dr. Richard Schwoebel, WB5OJO, technical director, all played key roles in planning the project. This wasn't the first time W5OPC had been connected with something transoceanic: Back in 1949, Doc was at one end of the first two-way Amateur Radio transoceanic radioteletype QSO.[2]

Amateur Radio on board *Double Eagle II* was planned to be used only as a backup for the commercial frequencies and equipment on the craft, to be employed only when absolutely necessary . . . in cases of emergency or where the safety of the mission was in jeopardy. As in the ham tradition of the past, Amateur Radio came through when all else failed. Crystal-controlled sideband gear on commercial frequencies malfunctioned (it turned out to be a bum piece of coax and a connector problem) so that important position, navigational and safety information couldn't be passed while the craft was in international territory over the open sea. So what does one do at 25,000 feet when regular communications fail?



The *Double Eagle II* gently but triumphantly floats over the French coast. *(photo courtesy of* Newsweek/*Elaine Sciolino)*

Up came W5OPC on 20 meters with important traffic. As is usual with ham operations in this kind of emergency situation, cooperation and circuit discipline on the frequency (around 14.301 MHz) was voluntarily maintained with several W8s, 4s, 3s, 2s and a 1 being worked to pass the necessary traffic, air traffic-control clearances and transponder codes.

The accompanying photos show the *Double Eagle II*'s communications center which was mounted in the craft's gondola. At the far left inside the wooden enclosure is the vlf navigation receiver and on its right are two homing beacons at 1677 kHz. The black object outside the enclosure on the right is the ship's compass. The large enclosure on the right contains, at the top left, an Atlas ssb transceiver with its output meter showing to its right. Below it is the antenna switching patch-panel and under it is a marine vhf transceiver. Moving right, the two identical, stacked boxes are two 10-watt ssb transceivers operating in the 5- to 8-MHz commercial bands. At the far right from top to bottom are two 360-channel vhf aircraft transceivers for air-to-air and air-to-ground communications. Below them is a radar transponder to interact with air traffic-control radar stations. Below this is a speaker mounted behind a perforated grill. Not visible but mounted below decks in a sealed container are two transmitters to provide periodic position reports and a coded emergency reporting capability via the Nimbus 6 satellite. Vhf aircraft, vhf marine and satellite antennas were mounted on the gondola itself. Trailing wire antenna reels were located at the rear corners of the gondola to be used for hf communications and the homing beacon. A 20-meter vertical dipole was rigged to halyards high up on the side of the balloon. Power for the ham rig was supplied by automobile storage batteries. The other commercial gear power came from alkaline batteries. The gondola is actually a fairly seaworthy catamaran which could have been rigged for sailing should a water landing have become necessary.

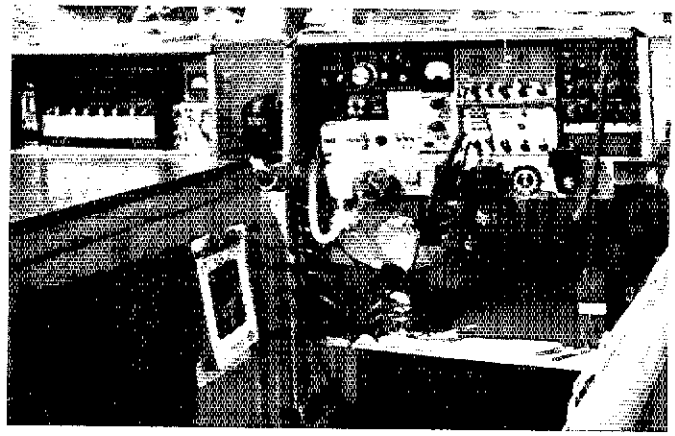
Those lucky enough to contact the airship will receive a special QSL.

Congratulations, *Double Eagle II*, for what you have done. — *WICUT*

Footnotes

[1]Stray, *QST*, January 1978, p. 32.
[2]*QST*, May 1949, p. 40; July 1949, p. 40.

Excitement builds as preparations for the launch continue. Flight Director "Doc" Wiley, W5OPC (left), and Communications Director Sydney Parks, WA5KGQ, pose here with the communications equipment in the gondola. At right is another view of the gear (see text).



Moved and Seconded...

MINUTES OF EXECUTIVE
COMMITTEE MEETING
No. 370
July 19, 1978

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 2:02 P.M. on July 19, 1978, at the Headquarters offices in Newington, CT. Present: President Harry J. Dannals, W2HD, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN, Richard A. Egbert, W8ETU, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were General Counsel Robert M. Booth, Jr., W3PS; Directors Gar Anderson, KØGA, Paul Grauer, WØFIR, Jay Holladay, W6EJJ, Larry Price, W4RA, John Sullivan, W1HHR, and Phil Wicker, W4ACY; Vice Directors Maurice Carpenter, KØHRZ, George Diehl, W2IHA, and Peter Matthews, WB6UIA.

On motion of Mr. Thurston, the Committee recognized the names of 247 newly elected Life Members, and directed the General Manager to list their names separately in *QST*. (It was noted that there are currently 14,561 elected and quarterly-payment Life Members.)

On motion of Mr. Egbert, voted unanimously to confirm its mail approval of the following ARRL convention: Southwestern Division, September 3-5, 1982, San Diego, CA.

On motion of Mr. Clark, voted unanimously to approve affiliation of the following Amateur Radio societies: Alaska DX Association, Kodiak, AK; Amherst Amateur Radio Club, Amherst, NH; Bicentennial Amateur Radio Club, Oklahoma City, OK; Cedar Mountain Amateur Radio Club, Cody, WY; Central Georgia Amateur Radio Club, Warner Robins, GA; Colorado County Amateur Radio Club, Columbus, TX; Dixie Amateur Radio Club, St. George, UT; Eastern Michigan ARC, Marysville, MI; Fayette Amateur Radio Association, Washington C.H., OH; Green Mountain Repeater Association, Inc., Riverdale, MD; High Plains Amateur Radio Club, Torrington, WY; Humboldt Amateur Radio Klub, Humboldt, IA; Iredell County Amateur Radio Society, Statesville, NC; Kings Radio Club Inc., Hanford, CA; Lake Country ARC, Graham, TX; Lake County ARA, Inc., Painesville, OH; Metro Amateur Radio Club, Downsview, Ontario, Canada; Michigan Eastern Thumb Amateur League, Harbor Beach, MI; Mid Range Amateur Radio Club, Hibbing, MN; North Texas High Frequency Assoc., Krum, TX; Prepared Radio in Mighty Orange-Co., Fullerton, CA; Radio Club De Cuba Exilio Inc., Miami, FL; Radio Society of Okinawa, APO San Francisco, CA; Red Rose Repeater Association, Lancaster, PA; Schlumberger Amateur Radio Club, Houston, TX; Society for the Preservation of Amateur Radio, Independence, MO; Socorro Amateur Radio Association, Socorro, NM; South East Okla Amateur Radio Association, Hugo, OK; South Georgia Amateur Radio Club, Valdosta, GA; Tidelands Amateur Radio Society, Texas City, TX; Valley Amateur Radio Club, Apple Valley, MN; Wide Area Data Group, Sparks, NV; Wireless Operators of Winsted, Winsted, CT; Woodland Baptist ARC, Louisville, KY.

The General Manager, in response to a directive adopted at the January Board meeting, reviewed in detail the current status of action being taken in response to motions adopted by the Board at its January meeting. He reported that action had been completed on the directives in Minutes 13, 14, 25, 26, 31, 34, 35, 41, 43, 45, 50, 52, 53, 57, 62, 74, 85 and 88. The action directed in Minute 32 will be accomplished in the January 1979 issue of *QST*, and in January issues thereafter. In response to Minute 40, a report by the President and General Manager has been presented to the Executive Committee, which had referred action on the matter of a Washington Representative back to the July Board meeting. The action directed at Minutes 30 and 38 are on-going items which will be accomplished on a regular basis.

In connection with Minute 38, which directs the publishing of an annual report of officers and directors, the General Manager is to add an insert to the 1977 reports which includes the reports of the three vice presidents.

After discussion, the General Counsel was directed to prepare a response to Sam McCluney, relative to his expulsion from membership in the American Radio Relay League.

On motion of Mr. Thurston, the Executive Committee confirmed its earlier mail action authorizing Michael R. Zeigler, Controller, to sign ARRL documents on behalf of the Treasurer.

The next meeting of the ARRL Executive Committee will be held at 0900 in Newington, CT, on September 16, 1978.

During the course of the meeting, the Executive Committee discussed, without formal action, certain master-of-ceremony DX operations, the co-sponsorship by commercial groups of ARRL conventions, a schedule for the counting of ballots on November 20th, and the possible effect on ARRL election procedures of threatened mail strikes.

There being no further business, the meeting was adjourned at 3:28 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

LIFE MEMBER APPLICANTS
July 19, 1978

George E. Anderson, W7ON; Jerome E. Arnold, WB8GKQ; Wilfred B. Bahr, W9CW; George W. Baltz, N3GB; George T. Barker, WB8PBC; Clifford G. Barringer, WA6OCY; David H. Bartley, K5EI; Donald F. Bauer, WB7TPH; Leonard C. Bauer, WB8LUA; Dennis W. Beach, WD8DUR; Harvey A. Bell, VE7YH; George E. Benko, K8BRW; Edward L. Berkowitz, N3US; Robert H. Bonds, WD4MVU; Michael J. Bottema, K8EX; Donald E. Briggs, WBØDFX; Ronald K. Brown, AA4KT; Ted Bryan, K5IDG; Henry A. Budde III, WB4NQF; Philip C. Burnham, Jr., W3GNG; William W. Carrigan, K3DC; Denis E. Catalano, WD4KXB; Robert W. Chanter III, WB4HAG; W. Bruce Charles, WB5RUT; James M. Chatfield, WD4HJT; Jean Christoffersen, K7MFO; Robert C. Clark, WA6KCV; Wiley Clarkson, WA5OTR; Thomas D. Claycomb, WB6KJN; John S. Cole, WA8ZPF; Bill Coleman, Jr.; James R. Collins, WA7TWU; Thomas F. Cook, Jr., K1OCD; Willis R. Cooke, K5EWJ; Henry J. Cramer, W2DOD; Robert L. Cross, K6EPH; William P. Crowley, WA4UON; Herbert A. Dady Jr., WB9RXI; William H. Davidson, VE3CQU; Adrian D. Davis Jr., N4SX; Sperry D. Davis Jr., N4SD; Miguel A. Delgado O., YV5AIP; Albert V. DiFrancesco, W2EJH; John A. DiMario, WA2HCA; Frank M. Dick II, WA9JWL; Thomas W. Dickeson, WAØUFR; John J. Dietrick Jr., WA9AHZ; Robert Dowd, WB7VQV; Edward E. Duck, WB4JVI; Kenneth Dul, K8ZR; Edward Durston, VE3ISM; Alfred J. Dzialakiewicz, W9HUO; Thomas C. Eagle, KØJPR; James A. Eberwine, W4APV; David R. Ellis, WD4BCW; Jack S. Emerson, WB9VGI; Clifford L. Engle, K4VAH; Marc R. Erickson, WB9SXM; Ronald D. Eveland, W6HFZ; Ralph E. Fedor, KØIR; Lonnie Fekula, WA3ZEP; Leslie H. Fenical, W9CPG; Ronald B. Fisher, K4LEF; Donald D. Fleckenstein, KØRXT; Kenneth Ford, WB9VGT; Willis C. Freested, WB6WLL; Neil D. Friedman, N3DF; Jeff B. Fulmer, WA5QCF; William Francis Gariano, WB3HOZ; Anthony C. Garland, N7DX; Frank J. Garza, WB5ZPX; Harold M. Gay, Jr., K5AQH; Ralph A. Gonzalez, WA2KIP; Ben Gorsky, K8BG; Arthur W. Goulet, Jr., W3IAT; Donald E. Graham, WA5TAW; Fred Gulden, WBØTIY; George W. Gustafson, W2IOV; Michael H. Haag, WB2DKL; Richard Gene Haley, WAØZDE; Harry L. Hall, WB5LBO; Jerome M. Hall, WB4NNA; William J. Hall, W1JP; Gerhard J. Hanneman, WA1PCP; Robert A. Harmston, WB6JOP; Carleane H. Harris, WN4VAS; George H. Harris, W7ALL; Klaus Heintzenberg, DJ6RX; Howard H. Helbert, WAØDUN; Edgar H. Heller, WB9PXL; Jack W. Hess, K8QLL; James H. Higby, WB9JMT; Terry M. Holmes, WA6ZHI; Elza C. Hoover, WB7NBU; Jack A. Hovden, WAØFSQ; Jean W. Howell, WB5POK; William K. Hulse, W5NI; Terry L. Huston, WA8RYC; Donald J. Hutt, WB7BLQ; Mary C. Jacobs, WB5TWK; Bernard W. Joseph, K8LIX; Milton Kalashian, W1NXT; John A. Kalenowsky, K9JK; William Kaufman, WB4VHY; Alan W. Kiecker, KØJFV; Robert A. Kile, WA7GCI; Terry R. Kniffen, WB3HCA; Thomas H. Knowles, Jr., WD4OFT; Craig S. Kortman, WA2NDH; C. A. Kottas, VE1AUC; Stephen J. Kouts, WA8WKF; Wilfred N. Lachance, K3UIW; William D. Lambert, WA4IXT; Harry A. Lane, WB3BYK; Michael E. Larkin, WB9RUB; Neil E. Lawrence, K9DBR; Robert Earl Lehman, WBØPIE; Stephen M. Linscott, W5EGP; Richard A. Little, K9EEH; Charles E. Lowe, Jr., NØBO; Joe J. Lynn, N3JL; John F. Lyon, W6HNI; Richard MacPherson, K1OMT; Kenneth H. Maness, AA4AA; William D. McCaa, Jr., KØRZ; Thomas C. McCain, W9LZP; Anthony B. McClenny, WB3CZK; Edward O. McCracken, WA7OYC; Bob L. McDonald, WBØPBC; Howard M. McElroy, WB4PPV; J. Daniel McNeill, WA4WSV; A. S. Medvedeff, WD4BEA; Ross Z. Merlin, WA2WDT; William D. Meyer, WB6KQU; D. A. Michael, W3TS; Henry C. Miller, W3BWN; Janice P. Miller, WB3KFA; Meyer A. Minchen, KA5ACS; Wardel T. Mitchell, W8RJ; Charles G. Mohr, WB7QZU; James M. Morris, K1UJ; Ray W. Munsey, WA1OWC; T. K. Murphy, VE3ISJ; John O. Nett, K9OHW; Don S. Nichols, W7IEO; James K. Norman, W8RYW; Larry E. Nuhn, WA9CFD; Peter Ray O'Dell, WB8NAS; James F. O'Keefe, Jr., WA1COA; Merle L. Olmsted, WØPQC; Stephen A. Parker, WB5PPW; Ralph W. Parkinson, W3QJ; Adolfo Fernandez Pascon, LU9EMF/W6; James W. Patterson, WØQIZ; Joel M. Peisach, WA1HFN; David W. Penttila, K1COW; Rose Ellen Perley, WB6MNP; Dick S. Pickens, K5UD; David J. Plews, W9TG; Robert W. Poirier, KØDJ; Albert W. Posego, WD9HZI; Richard C. Prather, K7KTP; William D. Price, WA4MCZ; W. Lloyd Pratt, K5ASZ; George D. Pugsley, W6ZZ; Billy W. Putnam, N6VF; Barry Rader, WA9REJ; John L. Ragle, W1ZI; Al Ramirez, WB5IJV; John M. Randall, WB2NOJ; Dennis C. Rasmussen, W6MCG; Pamela R. Rathmell, K4YX; Robert A. Reed, WB5RJU; John W. Reika, WA6OWU; Fred J. Rescorl, W2NLC; James H. Rice; Ray Riling, W3OGY; Daniel K. Robbins, WA9IXF; Robert N. Robbins, WA4UNR; Lee Roehrdanz, WB9YQA; Bradley D. Rohrer, K1CTK; Rodney M. Romberger, WB7CRD; Robert G. Roper, VK5PU/W4; Jim E. Rosseau, WBØNAA; Henry B. Ruh, WB9WWM; F. William Ruhl, WA6WPF; Robert E. Runyon, AAØO; T. A. Davison Ryan, VE3HSA; Frank G. Sadilek, WB9OUE; W. Philip Sawyer, WD4FAK; Curtis J. Schiffner, WB8WDO; John W. Schrage, W2WKL; James T. Schug, WA2YEI; Ernie C. Sears, WØFZ; Stephen J. Shane, WA6NRQ; James G. Shaw, WA6PXU; Donald L. Shearhart, K5BPV; Yoshiki Shimada, JA3BCT; Lesley Lee Shockey, WB8SNO; John M. Siebel, KAØBAI; Robert J. Simon, W6LUL; Marcel Jerry Skinner, K6LU; Robert M. Snyder, W9GT; Dean C. Sorenson, WB9MHI; Percy J. Spencer; Alex J. Stalinsky, WA5UHT; Winfield S. Standiford, W3YTW; Robert M. Stanley, WØITB; William J. Stash, WA3AOQ; Robert A. Steele, WA4KMI; Charles R. Steffler, WB5OHT; Michael J. Stein, WB9NOO; Russell Stevens, WB4HHN; Robert D. Stickrod, WA4JDI; James R. Stuebe; John A. Sullivant, WBØPKN; Bill Talley, WB8WDA; James N. Tanis, WBØTAG; Val G. Tareski, KØQYW; John E. Taylor, W7EAH; Paul Taylor, WB2GIN; Terry L. Taylor, K7XR; Richard H. Tenney, WB1ASG; Michael J. Thibeault, WB1CZU; Robert Arnold Thomas, WD8ANE; William E. Trumbull, WA6DTP; Joseph A. Unsworth, VE2ALE; Donald B. Vaello, WB5KVW; Charles S. Vassallo, WBØOZV; Anthony H. Vigorita, WB3HAZ; James Durward Walker, Jr., WA4ILO; Robert E. Warren, KA1AWK; Thomas Darrell Watkins, N9TW; Dan E. Wells, WD8BUO; John G. Werner, K4SOI; Gordon V. West, WB6NOA; Jonathan C. White, WAØTAQ; Rex H. Wickell, K9ZJV; Steven A. Wickham, WD8BWS; Albert H. Wilcox, W6GVI; Bill Williams, WB2KCQ; William L. Williams, WB1GMN; Raymond N. Witt, WA1OWQ; M. Grant Workman, W7SIH; Darrell E. Wright, WB9NKV; Jackie W. Wright, WBØOYD; Nathan Zane, KH6IHB; Michael G. Keener, WB6IIK; Richard F. Keil, N1JU; Warren E. Marble, N1NS; Allen McRorie, VE3GAM; James A. Morris.

Happenings

Conducted By W. Dale Clift,* WA3NL

ASCII at Last?

At the very start of the Amateur Radio regulations there is a statement of the basis and purpose of the Amateur Radio Service. One section deals with the amateurs' ability ". . . to contribute to the advancement of the radio art." With regard to automatic transmission of words and data — teleprinters and computers — however, another part of the rules, Section 97.69, actually *prevents* amateurs from making contributions to the advancement of the art, by permitting only the Baudot (five-unit start-stop) code. Most Baudot equipment is mechanical as opposed to electronic, is relatively slow (FCC permits amateurs to use it at 100 wpm), and is limited to 64 characters (32 in lower case, 32 in upper).

In comparison, there is the American National Standard Code for Information Interchange (ASCII), pronounced "As-key." It is computer compatible, electronic and extremely versatile, with 128 symbols readily available. ASCII has been authorized by FCC waiver for use on the OSCAR satellites, and some amateurs have sought permission for its general use in the amateur bands, at least since discussions on Docket 19110 began in December 1970.

As a result of RM-2429, filed by W8VRZ in August 1974 and RM-2550, filed by ARRL in April 1975, FCC proposed deletion of Section 97.69 in its modes and bandwidths Docket 20777 in 1976, and thus intended automatically to permit ASCII in the hf bands under its proposed bandwidth limitations. The docket met a good deal of opposition from the Amateur Radio fraternity, mostly on practical grounds: It seemed to place wideband teleprinter in the phone bands, it banned a-m below 28 MHz and television below 1215 MHz, and seemed to require rather expensive test equipment if amateurs were to meet the letter of the proposed law.

Recognizing amateur feelings in these respects, FCC on August 8 voted to terminate (by Second Report and Order) most of the proposals in Docket 20777, keeping modes as the principal classifying feature for the portions of the spectrum where various activities can be carried out.

However, FCC also found that amateurs commenting in the docket seemed to be overwhelmingly in favor of permitting ASCII in the amateur bands. Accordingly, the Commission has issued a Notice of Inquiry and Further Notice of Proposed Rulemaking in Docket 20777. If FCC is to permit ASCII in the ham bands, it feels that standards are necessary. In the current notice, FCC first defines ASCII:

ASCII is a code for the exchange of information. It stands for the American National Standard Code for Information Interchange. Each character in the code is comprised of seven binary data bits, each bit being either "0" or "1." For example, 0100101 represents the character "R" in the ASCII code.

It then poses a number of questions:

a) Should technical limitations be placed on the use of ASCII in the Amateur Radio Service?

b) If yes, should limitations be placed by reference to occupied bandwidth? Data transmission rate? Emission type?

c) If limitations are placed on the bandwidth that a transmission using ASCII occupies, what should the maximum bandwidth be for each amateur frequency band?

d) If limitations are placed on the data transmission rates, should there be standard operating speeds similar to those established by the American National Standards Institute, or maximum speeds (such as "a speed no greater than 3000 baud")?

e) If standard operating speeds are required, what should be the standard speeds for each amateur frequency band? What should the permissible tolerance from the standard operating speeds be?

f) If maximum speeds are used, what should be the maximum speed for each amateur frequency band?

g) Should any limitations be placed on the emission types used in transmitting ASCII?

h) If yes, what should the permissible deviation from the mark signal to the space signal be for frequency-shift keying? Should the permissible deviation be related to data transmission rates?

i) What should the highest permissible fundamental modulating audio frequency be for A2 or F2 emissions? Should this standard be related to data transmission rate?

The Commission continues with questions on the use of the parity bit; synchronous or asynchronous mode; and the order of transmission beginning with least significant bit or most significant bit. Copies of the complete text are available from ARRL's Membership Services Department; ask for NOI 20777 and enclose a self-addressed stamped envelope.

Deadline for original comments is November 15, 1978, with "reply" comments due by December 15. An original and five copies of comments should be filed for official participation; however, even one copy will be acceptable as "informal" participation, provided the docket number appears on the paper. — *Perry F. Williams, W1UED*

FCC ASKS ABOUT EXAMS FOR HANDICAPPED

The Commission has issued a Notice of Inquiry (General Docket 78-250) aimed at improving the administration of Amateur Radio telegraphy exams to handicapped applicants. Although the handicapped are given special considerations in physical conditions for the code test — at a residence, at bedside, use of a typewriter, dictation, use of a Braille writer, and so on — they are held to the same standard of competence as the nonhandicapped. The Commission said it was prevented by the Radio Regulations of the International Telecommunication Union from waiving or eliminating the telegraphy requirement in its entirety. It wants opinions from the amateur fraternity as to partial steps it could take on behalf of the handicapped, and posed these questions:

1) What was the proper Commission approach to the administration of Amateur Radio telegraphy examinations to the handicapped?

2) How should the FCC respond to requests for relaxation of the telegraphy speed requirement submitted by handicapped applicants?

3) Should the handicapped be held to less rigorous standards than the nonhandicapped, and if so should they receive the same operating privileges as the nonhandicapped?

4) Is the Commission doing enough to help the handicapped demonstrate their telegraphy qualifications?

FCC noted that several alternatives existed. It could maintain the status quo, amend the rules to reduce the telegraphy speed requirements for the handicapped, amend the rules to create a new class of amateur operator license without a telegraphy requirement and restrict eligibility to the handicapped, or waive the rules to permit handicapped applicants to demonstrate their telegraphy qualifications at slower speeds than nonhandicapped.

Comments (original and five copies preferred, but even one copy will qualify as "informal comments") are due at FCC, Washington, DC 20554, by November 30. Reply comments are due by December 29. (See "Regulations Revisited," March 1977 *QST*, for hints on preparing FCC filings.) — *Perry F. Williams, W1UED*

ALASKA FREQUENCY PERMANENT; "CALLING" DENIED

Back in December 1974, FCC established 4383.8 kHz as a common emergency frequency for most nonairborne licensees (including amateurs) and government agencies operating communications facilities in or within 50 nautical miles of the state of Alaska. Since then this frequency has provided hunters, trappers and residents of remote areas with a means of summoning medical aid or reporting other kinds of emergencies.

Docket 19909 was kept open to allow for adjustments to the plan after the state of Alaska and other groups had accumulated some practical experience. Generally speaking, the scheme has worked well and there is no need for additional frequencies or for changes in eligibility. The State in a recent report did ask for expansion of the operation to allow for general calling on the frequency as is done in the Maritime Service. In the Commission's view, however, the lack of "common working frequencies" to which communications could be transferred precludes the "calling" concept here. The special frequency can now be

*Asst. Manager, Membership Services, ARRL

considered permanent for emergency work, calling privileges have been denied, and the docket is terminated effective August 4, 1978.

HAMS WIN ANTENNA BATTLES

Guy Smiley, WB2MED, attorney for John De Lorenzo, WB2DWQ, reports a victory in the Supreme Court of New York, county of Westchester. The town of Mount Pleasant denied repeatedly John's request for a variance to the zoning law to allow him to install an antenna and tower with an overall height of 56 feet. In the opinion of the court, sufficient reasons *were* given to the zoning board to show why the 56-foot height was necessary and anything less inadequate. Therefore, the court held that the actions of the zoning board were arbitrary and capricious and ordered that John be allowed to install the 56-foot structure.

Bob Entwistle, N1XX, won a decision in the Fairfield (CT) Court of Common Pleas after a nearly three-year battle with the city of Norwalk. The city argued that sections of the city's building code prohibited any antenna/tower from being erected nearer to the lot line than the total height of the antenna structure. Bob argued that this provision was present only in the section of the code that dealt with antenna structures 12 feet or less in height. Bob also raised the issue that the city "demonstrated a lack of forthrightness" when the building inspector *refused to even accept Bob's application!* In a surprise decision, the judge issued a memorandum that the building code sections applied to roof mounted antenna structures and not to any other antenna structures such as the one maintained by Bob.

INADVERTENT BAN OVERCOME

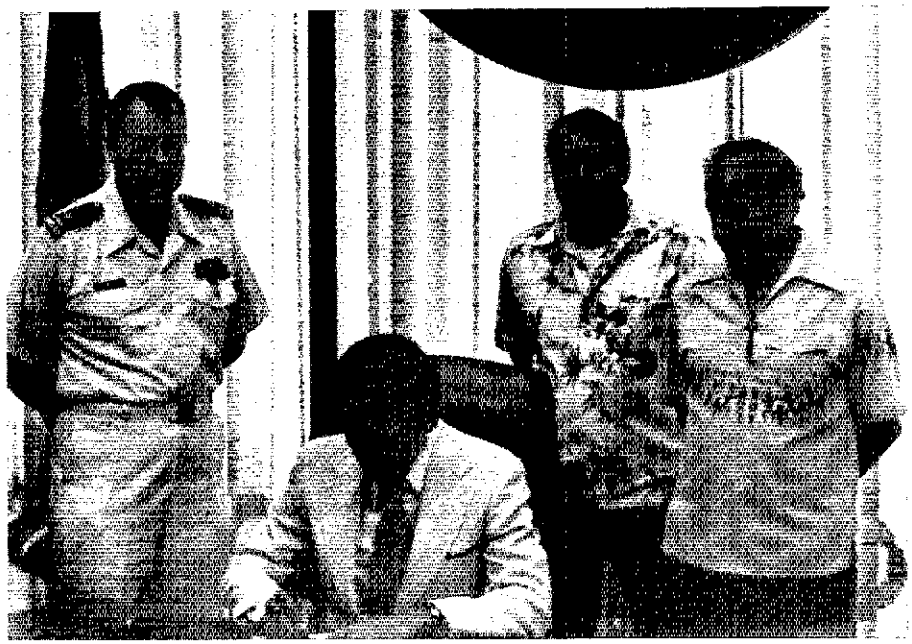
The new rule said, "No towers on our new sheriffs' building," and the Oakland County (MI) Amateur Radio Emergency Service was off the air for five years — until a bit of detective work unraveled the mystery. We discovered the phrase originated with the architect who designed the building. He had asked the radio man in charge, "What do you require for all the present and future needs for the county radio services?" The answer came out as a separate tower a couple hundred feet tall, located two miles from the main building and connected by leased phone lines. And the notation went on the building plans, "No towers."

We simply worked around it — a letter to the county pointed out that ARES didn't need *towers*, but just *antennas*: ". . . They look like fishpoles." We went on, to the point: "We cannot provide emergency backup for the county if we have to use phone lines and complex rigs." Things must be simple, low cost and mobile to serve the needs of county residents.

That did it — the word came back, "Go ahead." ARES was back on the air! — *Robert L. Kurl, W8HS*

BOOTLEGGER BOOTED

Don't lose heart! On June 20, some San Francisco Bay area amateurs intercepted a suspicious signal from "Tim," W6GSM/MM on 20 meters, asking for a patch to his business in Santa Clara. The Honolulu district office of the FCC was notified and asked to investigate. The engineer-in-charge contacted the owner of the vessel *Summer Breeze* at the Honolulu Yacht Club. He verified that a crew member named Tim had brought a transmitter on board before departing San Francisco, and furnished information on Tim's identity. On July 20 FCC officials visited the office of Timothy Joseph Wenger of Santa Clara and advised him of the consequences of operating Amateur Radio transmitting equipment without a license. He said he had read about the use of Amateur Radio transmitters in a yachting magazine, and was unaware of the criminal penalties involved. The FCC made no recommendation toward prosecution, as Wenger was very cooperative. Information courtesy of *West Coast DX Bulletin.* — *Michele Bartlett, WB1FAU*



Both the city of Honolulu and the state of Hawaii observed Amateur Radio Week June 18-24, 1978. Governor George R. Ariyoshi mentioned the alleviation of catastrophies via Amateur Radio as a prime reason for the observation. Here Mayor Frank Fasi, holds *his* proclamation while KH6ION, KH6DD, KH6IPQ, N7HR and KH6IEC look on. *(photo courtesy of N7HR)*

FCC DISTRICT 24 MOVES

The FCC field office in Washington, DC, district office 24, expects to relocate to the Presidential Building, 6525 Belcrest Road, Suite 830, Hyattsville, MD, off East-West Highway (Rte. 410), by late September. Office hours will be from 8 A.M. to 4:30 P.M. Amateur exams will be given on Wednesdays; code tests are scheduled for 9 A.M. and written exams not requiring code from 9 A.M. to 1 P.M. — *Michele Bartlett, WB1FAU*

REQUESTS FOR RULEMAKING

Richard L. Swain, K8AIT, has asked FCC to change its rules so that present holders of Technician, General and Advanced class licenses can request call signs from the 1 × 3 and 2 × 2 blocks in order of seniority over a period of time; RM-3175 has been assigned to this petition.

A request for 2-kilowatt power input in the 144.0-144.5 and 431-433 MHz subbands, to facilitate "moonbounce" communications has been filed by Daniel L. Schwartz, WB2UBQ. It bears the designation RM-3137.

Technically, comments on requests for rulemaking are to be filed within 30 days. In practice, however, the Commission welcomes comments any time before it takes formal action of any kind. Accordingly, readers wishing to register feelings on these two matters may do so now by letter addressed to the Personal Radio Division, FCC, Washington, DC 20554. Be sure to indicate the RM number. A summary of pending rulemakings is available from the Membership Services Department of ARRL; an s.a.s.e. will help.

REQUESTS FOR RULEMAKING DENIED

FCC has denied four requests for rulemaking which had sought expansion of Extra Class and/or radiotelephony subbands in the high frequency part of the spectrum. RM-2150, by Walter A. Schroeder; RM-2828, by North Jersey DX Association; RM-2870, by Theodore Pauck, Jr., and RM-2999 by Paul H. Lee, were dismissed on grounds that decisions reached in Docket 19162, September 27, 1972, covered some of the requests in these petitions, and the subject matter was "duplicative." FCC cited objections of the Radio Society of Great Britain in the earlier docket to expansions in the U.S. phone allocations, as indicative of general opposition overseas. The order continued: "Further, the upcoming World Administrative Radio Conference to be held in Geneva next year, is a factor which must also be taken into consideration. It is not unreasonable to expect that minor, or possibly major, frequency reallocations may occur which will affect the Amateur Radio Service bands. The Commission therefore believes that a more appropriate and useful time to consider subband changes would be after the conclusion of the Conference."

AND 40 YEARS LATER . . .

This summer, George Hart, W1NJM, celebrated his 40th anniversary of dedicated service to the League.

Connecticut Governor Ella Grasso, flanked by Perry Williams, W1UED, ARRL membership services manager (left), and Joe Stofko, WB1AIU, chief radio announcer, WQQW (right), at the signing of the official statement declaring Amateur Radio Week, June 18-24, 1978. *(WB1ADL photo)*

George was first licensed in 1930, but his reputation as a traffic handler really blossomed when he started operating W8YA, which was the station at Penn State. He got his B.A. degree there, and then traveled east in 1938 to join the staff of the new ARRL hq. station, W1AW. The following year, George earned his M.A. from Penn State.

Over the years, he continued to move up through the ranks of the Communications Department at ARRL hq. In 1949, he developed the National Traffic System, which has become the backbone of today's public service communications by hams. His many accomplishments led him to his present position as the manager of the Communications Department and trustee of the most famous amateur station in the world, W1AW.

After 40 years of service, George is looking forward to a well-earned retirement beginning in November. He and his wife, Louise, plan to do some traveling in a newly purchased travel trailer. George also plans to devote more time to writing.

There is little truth to the rumor that the man most responsible for developing effective traffic-handling procedure is a stickler for proper form on the air. Just the other day I asked George what he thought about those guys identifying themselves using funny phonetics. "Would you consider using phonetics for W1NJM other than those approved by the ITU or ARRL?" I asked. With just a slight trace of a smile, George said, "I'll have you know that my call is *No Joking Matter*." — *W. Dale Clift, WA3NLO*

George Hart, W1NJM

WATCHFUL WAITING

Two matters which have been reported in other portions of the communications press have caused some concern to our members: revision of the Communications Act of 1934, as proposed by Rep. Lionel Van Deerlin (D-CA), and the study report which lists the 220-MHz band as one possible place, even now, for a "Class E" Citizens Band.

ARRL appeared before the Subcommittee on Communications (headed by Rep. Van Deerlin) more than a year ago, in support of changes which could be made in the Communications Act that would be beneficial to Amateur Radio. One of these appears now in HR 13015: authorization for the new Commission to use volunteer assistance and to accept donations toward its work. Otherwise, the document says very little about amateurs. There is nothing to worry about at this stage. This bill is a trial balloon, mainly testing the air for a possible philosophy of regulation: the spectrum use fee. The bill faces all kinds of obstacles, and really is only offered for discussion at this point. It will have to be reintroduced next year, at which time dozens of substantive suggestions for amendments will be tendered, from all corners of the communications world.

There is no current proposed rulemaking for a new form of CB on the amateur 220-MHz band. All the talk recently stems from the release of a study commissioned while Docket 19759 was still pending. It lists the 220-MHz band as *one* place where a Class E type service could go, with advantages and drawbacks. The 900-MHz band is also mentioned, with its strong and weak points. The big difference between this and the earlier go-round are the fact that this is only a study rather than a Notice of Proposed Rulemaking and that this time there is no clamor from the CB manufacturers, who are still trying to recover from the market changes which arrived about the same time as 40-channel radios.

On both issues your League is alert and watchful — and nothing more is required right now. — *Perry F. Williams, W1UED*

CHARLES M. COTTERELL, WØSIN

With great sadness we report the death, on August 2, 1978, of Charles M. Cotterell, WØSIN, ARRL director from the Rocky Mountain Division since 1971. He suffered a heart attack only days after he had visited Headquarters, actively participating in the summer meeting of the ARRL Board. Legend has it that when God made the United States, He left Colorado until the last when He found He had much land left over. So He crumpled it all up to make it fit, and that's why the mountains are there! Those mountains were important to Chic; he was active in providing Amateur Radio support for the Search and Rescue teams operating among them. Indeed, Chic was interested in most phases of amateur involvement in preparing for communications emergencies, and authored the *QST* article on the Big Thompson Canyon disaster (March 1977, page 60).

Home was in Lakewood, CO, and his occupation lay in the heavy-construction field, as operator, master mechanic and supervisor with derricks, the big graders, dozers and the like. A past president and past director of the Denver Radio Club, Chic also edited its paper, *The Round Table*, and did a regular column on Amateur Radio for the Denver *Post*. His ARRL credits include Life Membership, OPS, section emergency coordinator, section communications manager and assistant director. WØSIN also served in MARS and RACES. Our condolences to Chic's wife, Helen and his children, Ann, Sandra, Gary, Tom and Don. — *Michele Bartlett, WB1FAU*

[Editor's Note: In accordance with the Articles of Association, Maurice O. Carpenter, KØHRZ, who has been the vice director, succeeds to the office of director for the remainder of the term, until January 1, 1979.]

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

DOC WARC Second Draft Supplement Proposals

In early August, the Department released their WARC Second Draft supplement. There were no changes to amateur frequencies from that as previously proposed; however, there were a few items contained, concerning Amateur Radio, which are worthy of comment.

In the first instance, we were exceedingly pleased to note that Canada has decided to drop its proposal to alter ITU Article 41 which, among other considerations, requires cw qualification for amateur licensing internationally. When DOC first proposed this change, it greatly alarmed the worldwide amateur community and, through IARU, all member-societies appeared determined to strongly recommend to their respective governments that they not give the Canadian proposal support at the World Conference. CRRL, in addition to strongly voicing its opposition to DOC, had prepared to introduce a resolution at the Region 2 IARU September conference, calling for all member-societies to support the policy of no changes to this important Article. This action, we are pleased to report, was not necessary due to the recent Canadian decision to withdraw the Article 41 changes.

Amateur Radio was requested to comment on what was alleged to be an international proposal to set aside 10 kHz in each of the amateur bands for emergency purposes. While it is correct that such a proposal had indeed been fostered in Region 1 some time ago and that it had been supported by the Red Cross, these earlier proposals, we understand, had died. It was therefore quite surprising to see the matter surface, once again, in this DOC document. The League did not consider then, *nor does it consider now*, that such a proposal has any real justification. Apart from other considerations, Amateur Radio traditionally has been always able to set aside and adequately police specific frequencies during *any* emergency and we therefore do not agree to any permanent segments of our bands being specifically reserved for emergency operation. We simply are not that frequency rich! CRRL has responded accordingly.

The last item contained in the DOC document was the comment: "As a result of bilateral meetings with other countries we have been made aware that amateur satellite allocations are unacceptable to many unless the allocation is made on a worldwide basis. It is therefore anticipated that Canada will have difficulty in negotiating the proposed amateur satellite allocation in the 222- to 223-MHz band." We quite appreciate that this situation exists, especially in Region 1, and have advised the Department that we will appreciate their continued effort directed toward endeavoring to achieve the worldwide agreement.

Once again, we have also voiced our opposition over the proposal of the loss of 420-430 MHz, in addition to that of 3800-4000 kHz. As this brief report is being written, the Region 2 IARU Panama Conference is only several weeks away and Canadian Radio Amateurs will be represented by Director Hesler as the official delegate of the Canadian IARU member-society. A full report on this important conference will be forthcoming in a future *QST* article.

THE 1978 NATIONAL (?) AMATEUR SYMPOSIUM

In November of last year, CARF convened a National Amateur Radio Symposium. In good faith, the CRRL sent seven accredited delegates, representative of our membership from coast-to-coast, to this Symposium. Unfortunately there were many factors in the organization and conduct of this conference which left severe doubts in the minds of all of our delegates as to the nonpartisan aspect of the meetings. The delegates felt that it might not be considered truly representative of Canadian Amateur Radio in general (See "Canadian NewsFronts," March 1978).

Earlier this year, we therefore addressed a communication to CARF, supporting the policy of a National Symposium, but suggesting that in order for it to be truly representative, it be co-sponsored by CARF/CRRL in 1978. Not having received a reply to our proposal (other than an acknowledgement), we therefore were disappointed and surprised to see a CARF announcement that they would be convening the 1978 Symposium in Calgary, later this month. All we eventually received was an invitation to send four delegates!

In view of the circumstances and the fact therefore that the 1978 Symposium cannot be considered anything more than a distinctly CARF-oriented conference, we have felt it necessary to decline their invitation. Other than one designated CRRL "observer," the League shall not be represented at the *CARF* 1978 National Amateur Radio Symposium. We regret the necessity of having to write this explanation; however, we feel that it is our responsibility to advise all of our membership as to the reason for our nonattendance.

*Director, Canadian Division

RSO CONVENTION — OCTOBER 13-15

All aboard . . . for the Holiday Inn, London, ON, and the largest and most important Amateur Radio event in Canada this year. In addition to an outstanding program, we have been informed that *all* exhibit space has been completely sold out. The ARRL will be represented by Vice President Carl Smith, WØBWJ and the CRRL by its director, assistant directors, SCMs, etc. Come also to learn, firsthand at the CRRL Forum, what transpired at the Panama meetings, just three weeks previous. The London Amateur Radio Club, this year's sponsor, promises to make this an event which will long be remembered. They anticipate more than 1000 persons to be in attendance. See you in London.

NEW DOC EXAM FORMAT PROPOSAL

We have been reliably informed that the Department is working on a entirely new Amateur Radio examination syllabus, which shall probably go into effect later this year. Examinations shall only be held approximately four times per year. It is understood that the new format will improve the standards of the certificate by replacing the multiple-choice questions *on theory* with straight problem-type questions. Further details will appear in this column, as soon as officially released by the Department.

POTPOURRI

☐ CRRL membership as of June 30: full 5428, associate 1270, subscriptions 213 for a total of 6911.

☐ Len Morgan, VO1CM, is the new CRRL assistant director for Newfoundland and Labrador.

☐ VE5YK is interested in starting a high school net on 20 meters across Canada. All interested please write to him: Syl Kulyk, E. D. Feehan High School, 411 Avenue M. North, Saskatoon, SK S7L 2S7.

☐ On September 18 the London Amateur Radio Club began operating a slow-speed cw *fun* net on 3675 kHz at 7:30 P.M., Monday to Friday at 10 wpm. Further information from Dick Reiber, VE3IBV.

☐ We welcome the Selkirk Amateur Radio Club, Fraser Valley DX Club and the Metro Amateur Radio Club, as new ARRL/CRRL affiliates.

☐ The new ARRL *Repeater Directory* and the *Net Directory* are now available from CRRL Headquarters, P. O. Box 418, Sackville, NB E0A 3C0.

☐ After a considerable period of time and repeated representation to DOC, we have now been advised that a third-party arrangement between Jamaica and Canada is now in the final process and should be concluded shortly. We have also been advised by the Jamaica Amateur Radio Association that they have been informed by their government that there is no objection to the temporary importation of Amateur Radio equipment by visiting amateurs, providing the necessary permit is obtained in advance from their Postmaster General.

☐ The CN1B Amateur Radio Club has just issued an up-to-date four-page list of all of their membership across Canada. A copy of this list may be had by writing Bill Choat, VE3CO, CN1B Headquarters, 1929 Bayview Ave., Toronto, ON M4G 3E8.

Hamfest Calendar

Florida: The Pan American Ham Exposition Jamboree is October 28 and 29 at the National Guard Armory, Rte. 84, Ft. Lauderdale. Outside flea-market space available. Admission, under eight and 54 inches free, to 12 and 60 inches $1, all others $3 at the door or $2.50 advance from Broward ARC, Attn.: Ian Seidler, W4MRR, 10221 N.W. 36th St., Coral Springs, FL 33065.

Florida: The Ft. Meyers ARC Hamarama is November 5 from 9 to 4 in an air-conditioned building at the new Lee County Fairgrounds. Dealers $10, setup at 7. Prizes. Info from Robert W. Sloat, K4VGN, Hamarama Chairman, P. O. Box 0537, Tice, FL 33905.

Indiana: The Marshall County ARC conducts its Swap and Shop hamfest at the Armory, 11th and W. Madison Sts., Plymouth, on October 29. Food and prizes. Donation $2 at the door. No charge for tables and reservations. Talk-in on 52 and 07/67. Contact Melvin Mahler, P. O. Box 151, Plymouth, IN 46563.

Massachusetts: The Quannapowitt Radio Association auction is October 21 at St. Joseph's Parish Hall, near the railroad station, in Wakefield. Doors open at 10, start at 10:30. Write to William G. Watt, WA1WPQ, 29 Robert St., Wakefield, MA 01880.

Minnesota: The Viking ARS holds its eighth annual Swapfest on October 14 from 9 to 4 at Waseca High School. Info from VARS, Box 3, Waseca, MN 56093.

Michigan: The Repeater Association of Downriver Amateur Radio holds its Swap and Shop on October 22 from 9 to 3 at Kennedy High School, Northline Rd. east of U.S. 24, Taylor. Food and prizes. Admission $2. Talk-in on 52, 94 and 93/33. Write to RADAR, P. O. Box 1023, Southgate, MI 48195.

***Mississippi:** The Gulf Coast Ham/Swap Fest is October 22 at the International Plaza, Rte. 90, Biloxi. Donation $1, tables $2. Talk-in on 52 and 13/73. Free parking, including RVs, from 9 A.M. Saturday. Contact Irvin L. Kelly, K5YIN, 116 Wiltshire Blvd., Biloxi, MS 39531. On the 20th and 21st the Jackson County ARC and area clubs will operate from the Explorer Scout Air Show at the Pascagoula/Jackson County Airport. In conjunction with the worldwide Boy Scout Jamboree On The Air, the station will operate 10 through 80 cw and ssb, plus OSCAR. Certificates.

New Jersey: The Livingston ARC flea market is October 14 from 10 to 4 at the Fairfield United Methodist Church, Plymouth and Horseneck Rd., Fairfield. Take I-80 to Rte. 46. Refreshments. Buyers and lookers free, $4 per car space. Info from LARC, 116 Orton Rd., W. Caldwell, NJ 07006, tel. 201-226-7943.

New Jersey: The Knight Raiders VHF Club auction and flea market is October 14 at St. Joseph's Church, Hackensack St. and Hoboken Rd. west of Rte. 17, East Rutherford. Free admission and parking. Advance tables $5 full, $3 half; at the door $6 and $3.50. Refreshments. Talk-in on 52 and 144.65/145.25. Write to Knight Raiders VHF Club, P. O. Box 1054, Passaic, NJ 07055, or call evenings Bob Kovaleski 201-473-7113 or Bob Czyzewski 201-791-5651.

***New York:** The Long Island Mobile ARC Hamfest Happening is October 15 at the Islip Speedway. Go on the Southern State Parkway to exit 43 (Rte. 111), commercial vehicles via LIE to exit 56. General admission $1.50, ladies and under 12 free, exhibitors $3. Bring your 2-meter fm rig and power cord for the tune-up clinic. Theory contest at 1 P.M. Talk-in on 52 and 25/85. Write to Hank Wener, WB2ALW, 53 Sherrard St., East Hills, NY 11577, tel. nights 516-484-4322 or Ken Denston, WB2RYC, nights at 516-379-6463.

***North Carolina:** The first Eastern North Carolina hamfest of the Brightleaf ARC, New Bern ARC and Onslow ARC is October 15 from 9 to 4 at the New Bern Fairgrounds. Registration $3. Prizes, club members not eligible. Additional info from Eastern North Carolina Hamfest, P. O. Box 3033, Greenville, NC 27834.

Ohio: The Defiance County ARC hamfest is November 5 from 8 to 4 at the county fairgrounds, Hicksville. Large, heated building. Free overnight camping (no hookups). Tickets $1.50 advance, $2 at gate. Full tables $1, half 50 cents, trunk space 50 cents. Inquiries to Ed Ballard, Jr., WD8JVU, Rte. 1, Roland Rd., Sherwood, OH 43556.

*ARRL Hamfest

Ontario: The 10th annual Radio Society of Ontario convention will be hosted by the London ARC on October 13, 14 and 15 at the Holiday Inn, City Center Tower, London. Registration $8 RSO members, $9 others. Free Oktoberfest for registrants at 8 P.M. Friday. On Saturday, full range of technical topics, plus forums by RSO, CARF, CRRL and DOC on WARC-79. Banquet and dance at 7 P.M., $15 single or $25 per couple. Sunday, flea market. Exhibitors contact Bill McHugh, VE3CSK, tel. 519-232-4477. VE3RSO talk-in on 3755, 52 and 46/06. Contact LARC, Attn.: Convention Tickets, P. O. Box 82, Station B, London, ON N6A 4V3.

Pennsylvania: The Foothills RC of Greensburg Swap and Shop is November 4 from noon to 5 at St. Bruno's Church, U.S. 119 and state 819 off turnpike exit 8, South Greensburg. Indoor flea market. Talk-in on 52 and 07/67. Contact Mel Ruble, WA3RVD, Mark Dr., Delmont, PA 15626.

South Carolina: The 24th annual Rock Hill hamfest is October 14 at Joslin Park, Lake Wylie, near Rock Hill. Flea market and dealers. Advance registration $2.50, at the gate $3. Chicken and barbecue lunch $3.25. Write York County ARS, P. O. Box 4141 CRS, Rock Hill, SC 29730.

***Tennessee:** The annual Greater Memphis hamfest, sponsored by the Mid-South ARA, is October 14 and 15 in the Youth Center Building, Mid-South Fairgrounds, Memphis. Indoor flea market, exhibits, seminars, ladies activities and hospitality party. About 50 trailer hookups available. Registration $3 or $2.50 advance from Memphis Hamfest, P. O. Box 3845, Memphis, TN 38103, or call Clayton Elam, K4FZJ, nights 901-743-6714 or days at 901-274-4418.

Texas: The Houston chapter of 10-X, S.H.O.T., holds its Houston Hambash on November 4 and 5 at Spring Creek Park. Barbecue, refreshments, prizes and activities for all. Full camping facilities and hookups. Contact Bob Libbers, WB5FII, 4034 Jackwood, Houston, TX 77096.

Coming Conventions

October 13-15
Midwest Division, Kansas City, MO

October 14-15
New England Division, Boxborough, MA

November 11-12
Hudson Division, McAfee, NJ

November 25-26*
South Florida Section, Clearwater, FL

***Date Change**

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

MIDWEST DIVISION CONVENTION

October 13-15, 1978, Kansas City, MO

The Missouri-Kansas Council of Amateur Radio Clubs will host the ARRL Midwest Division Convention, with all activities at the Hilton Airport Plaza Inn Convention Center, I-29 and 112th St. Northwest, adjacent to Kansas City International Airport.

Friday noon the exhibitors area will open; a dinner theater is the evening social event.

Saturday begins with a QCWA breakfast followed by FCC exams. Seminars include "Ham Radio and the Computer" with Ted Holdahl, WØPMY, of Digital Group; "Clipperton '78" with Charles Signer, WA9INK; AMSAT, uhf, MARS, ARRL and FCC forums. An outdoor flea market is included. Luncheon, free tours to the TWA Overhaul Base, nonham programs and a guided tour of Kansas City are provided. An evening cocktail hour and banquet feature special guests ARRL President Harry Dannals, W2HD; Director Paul Grauer, WØFIR; and Lew McCoy, W1ICP. The Wouff Hong ceremony is at midnight.

Sunday begins with a DX Clubs breakfast, more seminars and nonham programs, closing with a large prize distribution. Registration is $3, after September 18 $4. The dinner theater is $12.50 and the banquet $12. Reservations with the Hilton are to be made direct. You must mention the ARRL convention for lower rates.

For more information, write to Mo-Kan Council of Amateur Radio Clubs, P. O. Box 704, Kansas City, MO 64141.

HUDSON DIVISION CONVENTION

November 11-12, 1978, McAfee, NJ

The 1978 ARRL-Hudson Division biennial convention will be held November 11-12 at the Playboy Resort and Country Club at Great Gorge, McAfee, NJ. Sponsored by the Hudson Amateur Radio Council, over 5000 amateurs and other radio enthusiasts are expected to attend. The hotel contains one of the most extensive exhibit areas in the state and many major manufacturers, distributors and publishers have taken space. In addition to the exhibit hall, the convention will use the entire domed sports arena to present one of the largest indoor ham flea markets ever held in the East.

The two-day program is broad-ranging with sessions on DX, traffic, fm, vhf, uhf, ATV, YLRL, nets, AMSAT-OSCAR, MARS, FCC and ARRL forums, PR, RTTY, etc. New this year are sessions on microprocessors, Basic Computer BASIC, Radio Club Info, special Novice program, WARC-79 (both American and international views), "The Law and You," and also new, "Things the FCC Never Taught You." There is a new parking arrangement at the hotel to promptly and adequately handle your parking requirements.

License upgrade exams will be given on Saturday at the convention. To take an exam, send your form 610, with a photocopy of your current amateur license, to Paul Mazer, N2PM, 70-29 Kissena Blvd., Flushing, NY 11365, *by November 3*.

Main speaker at the Saturday evening banquet will be Ron Swoboda, WA2HVM, World Series star outfielder for the 1969 "Miracle" New York Mets. Jean Shepherd, K2ORS, the humorist and star of radio and TV, will be master of ceremonies. Dancing is scheduled after dinner.

Preregistration admission is $3.50, banquet $15 (at the door $5 and $17). Registration also covers all exhibits, forums and flea market. Tickets are available from Nancy Iscaro, WA2GKC, P. O. Box 274, Bronx, NY 10463. Checks should be payable to HARC, and include an s.a.s.e. for prompt return of tickets. Special hotel rates are $38 double, $34 single. Reservations from the hotel, by mail only, to McAfee, NJ 07928. For those arriving Friday, November 10, there will be a special program, including music, complete with cash-bar cocktail party at 8 P.M. All are invited. To obtain flea-market tables and space call (evenings) K2VOB, 201-887-4492 or WB2GFU, 201-779-4590. Tables are $10 for one day, $15 for two days — or bring your own table for a reduced rate. — *WB2FHN*

International News

Conducted By Bruce Alan Johnson,* WA6IDN

Now — There's Something You Can Do!

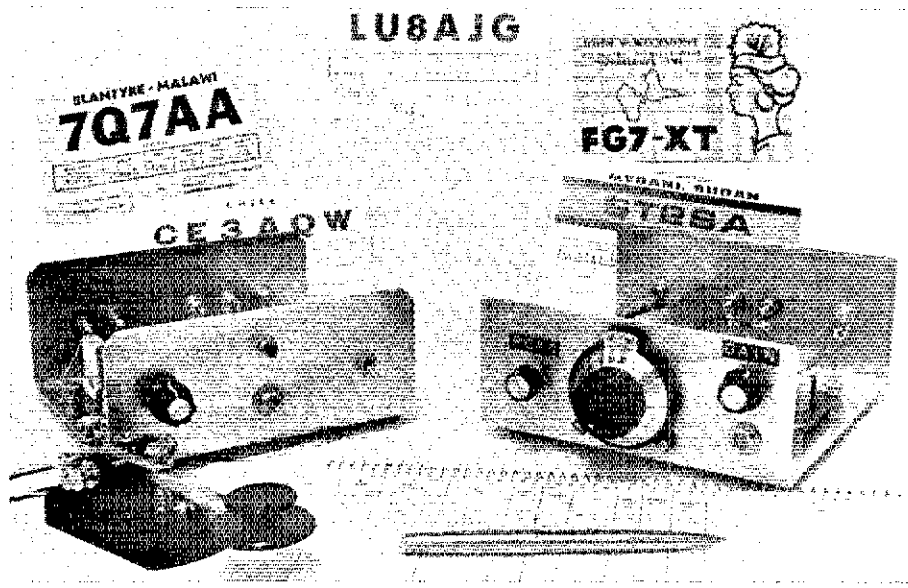
Pictured elsewhere on this page is a complete 20-meter amateur cw station, developed recently at ARRL/IARU headquarters expressly for promoting the growth of Amateur Radio in the Lesser Developed Countries of Africa and Asia. Complete details on the direct-conversion receiver appeared in April 1978 *QST*, pages 11-13, and the transmitter will be presented in an upcoming issue.

Virtually millions of people in these developing countries earn less than $500 U.S. per year. The state of the art in telecommunications is, understandably, equivalent to that enjoyed by the U.S. and Canada in the 1950s and early 1960s. Simplicity and economy, then, must shape the design of amateur gear destined for the people of these underdeveloped nations. The IARU station you see here has been carefully designed to meet these modest requirements. In addition, it was designed as a relatively easy-to-assemble kit, for three important reasons: (1) to facilitate easy and inexpensive passage through customs channels (indeed, in many countries small parts are admitted duty free); (2) to enable the new amateurs of these countries to stress to their national governments that they have *with their own hands* constructed their amateur stations (thereby helping to counter the widely held misconception that radio amateurs are merely "appliance operators"); and (3) to minimize the chances of any of the arriving gear from falling into the hands of local profiteers and black market dealers. This last goal is accomplished simply by sending the rigs as *kits*, which in this form are almost valueless on the black markets.

More sophisticated amateur equipment is not only unavailable in the developing nations, by and large — the parts and necessary technical knowledge for servicing them are equally lacking. So rigs such as these IARU sets are ideal for use in aiding new amateurs in poorer countries to get on the air and to stay with Amateur Radio.

Here's how you can help. Clubs and individual amateurs can send a contribution to the League's WARC fund, which will set off the following chain of events: (1) After we receive your contribution ($25 covers the cost of a receiver, $50 a complete station), we'll send a receiver or complete station either to a trusted, active IARU member-society in a developing country (for delivery to one of their new members), or we'll ship to an individual we know to be genuinely interested in and devoted to Amateur Radio; (2) we'll let the recipient know who donated the gear; and (3) we'll let *you* know who received it. Then comes the part all baseball fans know to be the most important of a batter's swing: the follow-through. All we ask is that you or your club follow up your generosity by sending a few letters of encouragement to the new amateur. This person-to-person contact is a vital part of Amateur Radio's success story in and of itself. And it's absolutely essential in this program. You'll enjoy the opportunity to help put new amateurs on the air, while at the same time you render direct assistance in the ongoing effort to prepare for next year's World Administrative Radio Conference. As pointed out before in this column, as well as other pages of *QST*, the Amateur Radio Service must continue to grow in order for us to justify our requests for more frequencies at WARC-79.

We hope you'll consider this opportunity to help. Contributions can be sent payable to ARRL WARC Fund, c/o International Services Officer, ARRL Hq., Newington, CT 06111. And thanks!



NORWAY'S AMATEUR RADIO EMERGENCY CORPS OFFICIALLY RECOGNIZED

The Norsk Radio Relae Liga is justly proud that the Norwegian government has officially recognized, through the Department of Justice, the Liga's AREC. Norway's 54 police districts, which oversee the same number of rescue centers, have been directed to use the NRRL's Emergency Corps as a communications resource in official rescue operations. This is a great honor both for NRRL and for Amateur Radio itself, for very few nongovernment organizations have achieved such recognition in Norway. — *LA4ND*

The International Radio Consultative Committee (CCIR) is an important permanent committee of the ITU, which will conduct next year's World Administrative Radio Conference. More than 400 persons from 70 countries showed up in Kyoto, Japan, in June, 1978, as the CCIR held its XIVth Plenary Assembly. Keeping Amateur Radio in the limelight was the Japan Amateur Radio League with its special station 8J3ITU, operating from 1.9 to 432 MHz. Shown here during JARL's reception for delegates are (l-r) Dr. Fumio Minozuma, JF1WKG, a director of Japan's Radio Regulatory Bureau; Richard C. Kirby, W@LCT/HB9BOA, director of the CCIR; Shozo Hara, JA1AN, president, JARL. (*JARL photo*)

*International Services Officer, ARRL

Silent Keys

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

*W1BM, Homer E. Nichols, Fairfield, CT
K1BRF, Robert E. Chase, Haverhill, MA
W1KKE, Robert C. Bellisle, Cranston, RI
K1MLV, Robert E. Freeland, Southbridge, MA
W1PTB/WB2DEJ, Harry E. Noyes, Colonie, NY
W2EBK, F. Eugene Young, Saranac Lake, NY
W2HMA, Frank T. Cyrsky, Jr., Warren, NJ
*W2MCO, Paul E. Jones, Vandalia, OH
W2MI, Fred Hartley, Vineland, NJ
W2OQS, Aubrey I. Haines, Delran, NJ
WA2RMQ, Thomas Bromley, Hawthorne, NJ
W2SKX, Harold W. Spangenberger, Lakewood, NJ
W2UVT, William C. Springsteen, Binghamton, NY
W2XX, Harold J. Mabes, Syracuse, NY
WA3BIR, John J. Murray, Lansdale, PA
WB3FNX, Robert C. Boyd, Rockville, MD
WA3GKF, Walter R. Kohl, West Wyomissing, PA
W3HDE, Maurice V. Donahue, Kylertown, PA
W3QQG, Donald C. Wagner, Reisterstown, MD
*K4BPY, Bernie J. Nickles, Huntsville, AL
W4DS, J. Wesley Davis, York, AL
WA4LUZ, Wendell C. Beall, Dunedin, FL
WA4QFS, Gains W. Lawson, Jellico, TN
WB4SYF, Salvatore F. Perrotti, N. Lavallett, NJ
WB4UDV, Daniel R. Simmons, Old Hickory, TN
W4VPO, Roy S. Hager, Orange, VA
WB4YSC, Ernesto J. Maristany, Ft. Lauderdale, FL
K4ZCH, James E. Tingen, Columbia, SC
W4ZZA, Paul A. Smith, Arlington, VA
W5AMZ, Ralph E. Whitaker, Tupelo, MS
W5BKW, William L. Harvard, Friendswood, TX
Ex-W5EMH, Royden Freeland, Oklahoma City, OK
W5FKR, Howell Dickson, Spring Branch, TX
W5KHX, Robert E. Neumann, New Orleans, LA
K5OO, Jack P. Clark, Kingsville, TX
W5THP, Jim F. Horak, Center Ridge, AR
W5WEJ, Wayne S. Scott, Santa Fe, NM
WA5YEA, James D. Dunn, Georgetown, TX
N6BU, Kempster W. Pyle, Carlsbad, CA
W6DA, Russell W. Hillen, Claremont, CA
WA6DLN, I. Lloyd Ebinger, Reseda, CA
K6EMT, Robert M. Bixler, El Segundo, CA
WA6FML, Clarence W. Beck, Squaw Valley, CA
W6GFM, Eugene Alexander, Perris, CA
*K6HW, Gene M. Dotson, Pleasant Hill, CA
WA6SZA, Reed Kelley, Lafayette, CA
K6TRL, Cyrus M. Titus, Indio, CA
WB6YCH, Edith A. Barnes, Morro Bay, CA
W7BQS, John Weaver, Glendale, AZ
W7DE, Grant S. Feikert, Corvallis, OR
W7EXQ, Bruce L. Stokes, Portland, OR
WB7OQR, George S. Stevens, Richland, WA
WB7SYS, Frank L. "Jim" Kelly, Sun City, AZ
WA7TGD, William H. Nibouar, Phoenix, AZ
W7UM, Lester C. Palmer, Verona, NJ
K8CXE, Charles S. Willand, Akron, OH
W8FYR, Aaron C. Self, Dayton, OH
K8GLP, Van W. Callahan, Cleveland, OH
W8GOV, Harold A. Tripp, Kalamazoo, MI
W8IBE, E. Paul Hawkins, Parkersburg, WV
WD8JDT, Merton D. Crandall, Indian River, MI
W8JU, Reino J. Laakko, St. Ignace, MI
WB8LII, Jack W. Finnerman, Sturgis, MI
WA8NCU, Lester H. Stabner, Cincinnati, OH
W8RDT, Albert J. Eckhart, Jr., Litchfield, OH
W8UPK, David C. Hutchcroft, Thompson, OH
K8VKX, George J. Croze, Lansing, MI
W9DII, George J. Wood, W. Allis, WI
W9DVD, George A. Ruger, Milwaukee, WI
W9FLK, Joseph A. Sima, Waukegan, IL
K9FWS, Charles R. Campbell, Lodi, WI
W9JEV, Gabriel Gantchett, Granite City, IL
W9JFB, Kenneth W. Pippen, Nappanee, IN
W9KP, Nick D. Westerveld, Palos Heights, IL
W9LCO, Lester T. Christensen, Kenosha, WI
W9LG, Darl F. Wood, South Bend, IN
W9OW, Charles H. Johnson, Madison, WI
WB9PQG, Robert H. Dreisbach, Fort Wayne, IN
W9SH, Clarke W. Peterson, Chicago, IL
Ex-K9ZQQ, William F. Fiedler, Batchtown, IL
WØFSJ, George A. Hofmann, Sterling, CO
WAØGZO, Almond D. Shaw, Wichita, KS
WAØIKS, Alvin S. Heskin, Norwich, ND
WØJDJ, Francis B. Johnson, Lincoln, NE
WØJHT, Paul Holliway, Nebraska City, NE
WØKHB, Gerald R. Butler, Fort Dodge, IA
KØZJY, Roy F. Walin, Wayzata, MN
VE1AA, H. Earl Thompson, Liverpool, NS
VE1AEI, Arthur J. Melanson, Bathurst, NB
VE1AUG, William Dick, Georgetown, PE
Ex-VE1SJ, The Rev. George L. Landry, Pomquet, NS
VE1XF, Harold B. Hatt, Dartmouth, NS
VE7DK, Alan I. Deacon, Vancouver, BC
DU1CE, Eliodoro Claro, Manila, Philippines
DU1CH, Ciriaco Hocson, Rizal, Philippines
DU1FH, Luis A. Fernandez, Manila, Philippines
DU9WX, Salvador Laya, Ligan City, Philippines
VK5GP, Sesom Gabb, Nairn, S. Australia

*Life Member

50 Years Ago

October, 1928

☐ Frequency measurement will be a major factor to ensure our operation inside the new, smaller bands the first of the year, and Ross Hull provides the necessary design info and construction data for a monitor/freqmeter to do the job, plus several options.

☐ 4AGE is located in a room next to WBT's kilowatt broadcast transmitter, and the operators share with us the receiver design which keeps dance music out of their 80-meter band reception.

☐ Lumber king Crossett has made the 1CCZ installation on his Cape Cod estate available to avid experimenters; this month the main interest is an experimental 10-meter beam — a huge cage affair with wire elements.

☐ The 1929 regulations include a complete new listing of Q signals. *QST*, which formerly meant "call to all stations," is now abandoned and replaced by CQ (without the K at the end of the call). The old R1-R9 readability system disappears in favor of a new QSA 1-5 rating.

☐ 160 meters is a good place for the beginner to start, and Harold Westman has a simple, inexpensive receiver for that band to help the newcomer.

☐ Knowing how your receiver is really performing becomes even more important with the new, smaller (and likely crowded) bands, and V. Landon of Westinghouse lists suitable parameters for selectivity, sensitivity, and even fidelity (!) based on a study by the Institute of Radio Engineers.

☐ Central Division Director Angus, 9CYQ, has incorporated crystal control in his design of a portable transmitter.

25 Years Ago

October, 1953

☐ The League is commencing a campaign to get more activity on 220 Mc., and the opening gun in this issue is a nifty receiver design, especially with the Technician in mind, by W1HDQ and W1VLH.

☐ A speaker in the shack can louse up automatic voice control (VOX) unless you use a cancellation system such as W6IBR describes.

☐ The League's TVI demonstration has completed its first tour, and W1ICP plus a trusty Ford station wagon filled with gear have educated some hundreds of servicemen on how to solve television interference problems. "Mac" rounds out the issue with a special article for the Novice plagued with the problem.

☐ W1DX is a stickler for good keying characteristics, and shares with us his views on various methods — along with a practical circuit.

☐ You don't have to use plug-in coils or even throw a switch to cover 80 through 6 meters if you build W1CLS' amplifier design — an easy half-kilowatt, too.

☐ Impressed with the extent of frequency shift from a metal object placed in the field of a mobile whip loading coil, WØDQW rigged up a movable rod operated by a flexible shaft from the driving position.

☐ W2DSU solves the multiband antenna problem by a groundplane with switchable sections for appropriate lengths.

☐ W6UYG once again goes over the principles of tuning a sideband signal on an ordinary receiver — especially, we have to learn to turn down the r.f. and up the audio, opposite to our a.m. custom.

☐ W4KFC somehow ran only third (behind W2SAI, W3CTJ) in this year's DX fracas. — *WIRW*

Club Notes

Your class — off and running; the summer county and state fair booths — successes and over until next year. The club members settle back, relaxing for a few weeks. It is time for officers to start thinking of new PR ideas to try. We've accumulated a ton of tricks that affiliated clubs across the United States and Canada have used successfully. Want to see them? A conglomeration of these ideas from past issues of *Radio Club News* has been put together for you to request. Send an s.a.s.e. please.

And you say your membership drive is over? Now you need ways to keep those members. "Escalating Membership," a regular column in the quarterly *Radio Club News*, tells all about these ways. Again, we brought together the ideas tried by clubs and published in past issues of *RCN*, and they are available for an s.a.s.e. What other things can we do to help you? Write us.

What? Never seen *Radio Club News*? Then your club isn't actively affiliated. Affiliation is a fairly simple paperwork process. Requirements are few; privileges are many. Clubs are approved at least four times a year. Keeping actively affiliated is easy. Sound good? Let us know you're interested. Affiliated once before but don't know how to reactivate? Or not sure if the club ever was? Tell us. — *Rosalie White, WA1STO*

Strays

INTERNATIONAL MARCO MEETING

☐ The Medical Amateur Radio Council, MARCO, will hold its 12th International Meeting at the Fairmont Hotel in Dallas, TX, October 12-14, 1978. The meeting will focus on the use of satellites in the exchange of biomedical information. Live demonstrations will be given using OSCAR. KERA, Dallas' national educational television station, will carry the demonstrations live. Information may be obtained from Dr. Mervin Grossman, K5CY, P. O. Box 18114, Dallas, TX 75218. MARCO membership is not required.

LA SCALA AWARD

☐ The Milano Radio Club announces the La Scala Award to commemorate the Bicentenary of the famous La Scala Opera House. QSOs with stations of the Milano Radio Club between September 1 and December 31, 1978, will count one point. The same station can be contacted on more than one band.

QSOs with vocal and musical performers in La Scala, (I2CUK, I2DMH, I2UCE) will count three points. To obtain the award Italian stations must earn 30 points, European stations 25 points, DX stations 20 points and Pacific area stations 10 points.

Send the list of QSOs, a QSL card and $3 or 10 IRCs (lire 3000) to Mario Ambrosi, I2MQP, Via Stradella 13, 20129 Milano, Italy. Stations from Milano Radio Club will be on 3570, 7035, 14070, 21070, 28070 for cw; and on 3670, 7070, 14270, 21320, 28570 for ssb (listening on 3815 and 7207).

I would like to get in touch with . . .

☐ on-the-air chess players. Keven Nomura, WD9DMV, 1937 N. Lincoln Ave., Chicago, IL 60614.

How's DX?

Conducted By Bill Lowry,* W1VV

The Northern California DX Foundation

Have you ever wondered who pays for a DXpedition to a rare and remote location? In many cases, of course, all the expenses are covered by the DXers who make the trip. But sometimes the cost of the undertaking is too much for those hams who are otherwise willing to endure the hazards of DXing under primitive conditions. In such situations, the Northern California DX Foundation (NCDXF) may possibly ride to the rescue, checkbook in hand!

In October 1972, Vince Chinn, K6KQN, decided DXing could use more support than it was receiving. The result was the NCDXF, incorporated as a nonprofit scientific and educational foundation. Membership is open to anyone, but more on that later.

Purposes and Goals

Basically the Foundation tries to encourage activity and growth in all phases of Amateur Radio. To date, however, it is best known for sponsoring and assisting various DX activities including "DXpeditions to rare countries, counties, vhf locations or wherever two-way communications may be out-of-the-ordinary or of unusual interest."

While DXpeditions excite interest and gain publicity, the Foundation is willing to support research activities that are less spectacular but nevertheless vital to the development of radio science. Thus it will "act as a sponsor for those who can make significant contributions in their own specialized fields or areas of interest. Particular consideration will be given to projects which stress the public interest aspects of Amateur Radio . . . or advance the state of the art." The Foundation is also willing to give scholarships "to worthy individuals in the pursuit of courses of learning that can benefit Amateur Radio." Finally, it helps disseminate DX information to foreign hams.

What Has It Done Lately?

For openers, the Foundation gave $7000 to help keep the Clipperton effort afloat this year. The Cocos-Keeling trip was supported, as was the trip to St. Peter and Paul Rocks. San Hutson, K5YY, is receiving aid for his East African and Indian Ocean trip this year. The Puerto Rican amateurs poised for Desecheo are also receiving aid. Here are some of the others who, in one way or another, have benefited from NCDXF support in recent years: VR3AG, KP6PA, KP6KR, W6WX/KJ6, HKØAA (Serrana Bank and Bajo Nuevo), A35NN, ZK2AO, 9N1MM/7, TA7ABK, ST2SA, YMØAA (Geyser), ST2SA/STØ, XU1AA, CR9AK, KC4NI, VP8ON (Falkland Is.), Moonbounce HK1TL/KL7/USA, VK9XX, 3B8DT, OHØAM and OHØDX (Aland Is.), JY8BH, SV1GA/A (Mt. Athos), CT9AT (Madeira Is.), HBØAZD, C5AZ, KP6AL, KP6BD and 4U1UN.

Assistance is not limited to cash. Equipment has been given to CR9AK, OHØMA, 3B8DA, 4U1UN, YI1BGD, CEØAE and others.

Selecting Recipients of Aid

The Foundation is NOT interested in paying for someone's vacation trip to a tropical paradise or a European resort! Recipients of aid are expected to pay their own transportation — if a DXpedition is involved — to the point beyond which conventional scheduled transportation is not available. In addition, they must be dedicated amateurs whose objectives satisfy the basic purposes of the NCDXF.

If you want support from the Foundation, write to it, saying exactly what you plan to do. The Foundation is most interested in those proposals that show study, planning and a possibility of bringing the rare and semi-rare on the air. Vague or incomplete plans are given only passing attention. In any case, financing is seldom 100 percent of the expenses.

How Does the NCDXF Function?

A dedicated, hard-working group of trustees and advisors keeps things running. Present trustees are Don Schliesser, K6RV (president); Jack Troster, N6IQ (vice president); Vince Chinn, K6KQN (treasurer); Merle Parten, K6DC (secretary); Hugh Cassidy, WA6AUD; Jim Maxwell, W6CF; Ed Peck, K6AN; C. F. "Bud" Bane, W6WB and Bob Ferrero, W6RJ. Present advisors are Lee Shaklee, W6BH; N. C. "Clint" Luhmann, K6NH; O. G. "Mike" Villard, W6QYT and Wayne Overbeck, N6NB.

Each of the above pays any personal expenses he incurs in helping the Foundation. The NCDXF does not pay for their meetings or telephone expenses, and there are no administrative salaries. As a result, almost all Foundation funds go directly to supporting DXpeditions and other vital activities. Finally, it must be mentioned that in the early stages of the Foundation, a very sizable contribution by Lee Shaklee helped put the operation on a firm financial foundation.

You Can Help

The NCDXF is obviously a great help to DXing, but can do much more with your assistance. At present it has approximately 500 members. You can join this dedicated group by sending at least $5 — but hopefully more — to the Northern California DX Foundation, P. O. Box 717, Oakland, CA 94604.

You can also help by donating Amateur Radio equipment. You will receive a receipt for its fair market value, so you can claim credit for a tax-deductible contribution. If you want to give equipment, write first for shipping instructions.

Remember, the NCDXF gives essential support to DXing. A donation to it is in your own best interests!

QSLING CAN BE DANGEROUS TO FOREIGN HAMS

The following is quoted from a letter received from a U.S. ham working overseas in a politically sensitive country. As requested, his name is withheld.

"Please listen to the DX station when he gives QSL info and then follow it exactly as given. I have particularly asked every W/VE worked NOT to send me a QSL. Yet, I have before me several which say, 'I know you said you didn't need a QSL from this end.' Under the wrong circumstances, a QSL card can be the cause of someone being imprisoned.

"Never, but never, mail a QSL card to a DX station except in a plain envelope with absolutely no mention of Amateur Radio, such as calls, etc., on the outside of the envelope. If the DX station requests that you use the Bureau then please use it.

"In their enthusiasm, American hams in particular do not seem to realize that in most parts of the world, Amateur Radio — on a scale of 'Things We Like Most' — has been placed just below leprosy. In this country it is neither permitted or prohibited. A few 'selected' persons are allowed to use the ham bands but the average man in the street has no idea that such a thing as Amateur Radio even exists. Here, mere possession of such a sophisticated item as an ssb receiver means imprisonment for a . . . national. For me, it would mean a month or more in prison and deportation."

And in addition to making life uncertain for the DX operator, identifying him as a ham may insure that he never receives your letter. In some countries, postal clerks know that IRCs and currency are sent to hams, and pilfer such letters. While Amateur Radio is not hazardous — and QSLs are not subject to theft — in many countries of the world, QSLing instructions should be religiously followed.

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

THE DX SCENE

Abu Ail. F6BBJ and the Colvins, who may be active by the time you read this, are aiming to operate in late September or early October. (LIDXA)

Carolinas DX Club. Gene Tyree, 5222 N. Sumac Circle, Fayetteville, NC 28304, wants to start one in the Carolinas. If interested, write to him.

FB8XS is frequently heard long path at about 1030Z on 20 cw. Bruno's cards are handled by F5VU.

FB8YG. Claude likes the low edge of 14-MHz cw at around 1100Z. QSL to F6BCN.

FB8ZM is often found with his QSL manager W4LZZ handing out cw contacts around 14.040 MHz from 1000 to 1200Z, before moving to 14.225 MHz. (LIDXA)

FR7BE, Reunion. Jean is very active on or about 14.205 MHz, often around 0330Z. W4LZZ handles the QSL situation.

GD5CAA will be operated by K3RV during the WAE and/or CQ WW contests in 1978. QSL to WA3ZAS. (WA3ZAS)

H4, Solomons. Many of the gang are heard sporting their new prefix. H44DN (Dave) is on 14.225 MHz from 0800-1000Z daily. H44KM (Ken) is often on 21-MHz cw after 0200Z. QSL to WA6AHF. H44s DG SI and ZZ are also active on ssb.

HBØ should be heard just as you read this. HB9s AIC BNP and NL plan an all-band effort from September 30 to October 15, using the HBØ prefix before their regular suffixes. (HB9NL)

IT9USV, Sicily, favors 15-meter cw on weekends from 1700Z. (K6RXK)

JW9WT will again be activated, this time for four months beginning in mid-November. Jan (LA9WT) indicates that he prefers 14.220 MHz, although some cw is also probable.

KA1NC, Marcus Island, will be active for 11 months on DX nets, especially the YL Net on 14.332 MHz at 1330Z. QSL via K4JEX. (LIDXA)

KB6. Advanced class licensees in California are finding pileups wherever they go from anxious DXers hunting for a Baker, Howland and Phoenix contact!

KC6GG, Western Carolines. John operates most days from 1030Z in the vicinity of 14.330 MHz from Yap Island. QSLs c/o USCG Loran Station on the island. (LIDXA)

KP1, Navassa. Updated information shows that finalized boat arrangements adjust the operating dates slightly. Plans are to operate four simultaneous stations using ssb, cw and OSCAR Mode B from November 25 'til December 2. Eight ops are scheduled to make the trip, hoping to satisfy as many stations as possible. QSL to NØTG. (NØTG)

KS4, Serrana Bank. An expedition is being planned for January 18-21, 1979, by W9UCW, HKØBKX, WA9EYY, K1PBW and K9RA. Plans are to operate 160-10 meters with two complete stations at all times. (WA9EYY)

KV4AA continues to plug away. Bob, WB3GAV/2, was Dick's 25,000th QSO in 1978, made on July 28. Dick has now averaged 120 QSOs per day this year. (KV4AA)

PYØ, Fernando. QSLs from the PY7APS/Ø operation of 1967 and of PYØAPS in 1968 may be obtained from PY7APS. Gerson also has his logs from the WPX contests of 1969 (PU7APS), 1970 (ZV7APS), and 1971 (PV7APS). (PY7APS)

VK9ZM will be on Willis Island through December, on 14.263 MHz daily, 0600-1300Z. QSL to VK4ABW. (LIDXA)

VK9ZR, Mellish Reef. VK2BJL's revised plans are to operate from September 29 to October 9. (LIDXA)

VQ9, Chagos. Lemuel, WA4YVG/VQ9, will be on until March 1979. QSL to W4XQ. Note that QSLs for S79 should not be sent to the Diego Garcia bureau, as they will be returned to the senders. Jake, WD9FCC/VQ9, continues to be heard on ssb. (WA4YVG)

VR7CR. ZL3TR, who was erroneously given as the QSL manager, reports that he knows nothing of this July IARU contest operation.

Whidbey Island (WA) amateurs offer a challenging award known as the "Island DX Award" (IDX), the basic idea being to confirm QSOs with various islands of the world. Write to WB7BFK.

ZF, Caymans, will be activated by W4YKH, K4VYN and WD4AXM, aiming for the period October 25-November 9. ZF2BC will be the contest call and ZF2BP should be heard at all other times. (W4YKH)

ZK1DR. Alan is often found near 14.250 MHz at 0800Z to provide South Cook QSOs. QSL to WAØWCR.

ZL3HI/C, Chatham. ZL1s ADI AJL AMO BKL, ZL4NF and WA6YOW are targeting October 27 through November 6 for an all-band operation, with a big multi-station setup for CQ WW ssb. QSL via N2CW. (LIDXA)

3V8BZ is often heard near 21.350 MHz at 1300Z. QSL via DL1HH. (LIDXA)

4X3ØCJ. Bob may be found at 0330Z daily on 14.003 MHz. He has 299 confirmed countries on 7 MHz! QSL to K4YSF.

6O1FG, Somalia. 12FGP showed in mid-July on 14.205 MHz, hoping for an extended period of operation. Reports are that licensing is becoming less difficult, with several amateurs worldwide extending inquiries. QSL 6O1FG to I2MQP. (I2MQP)

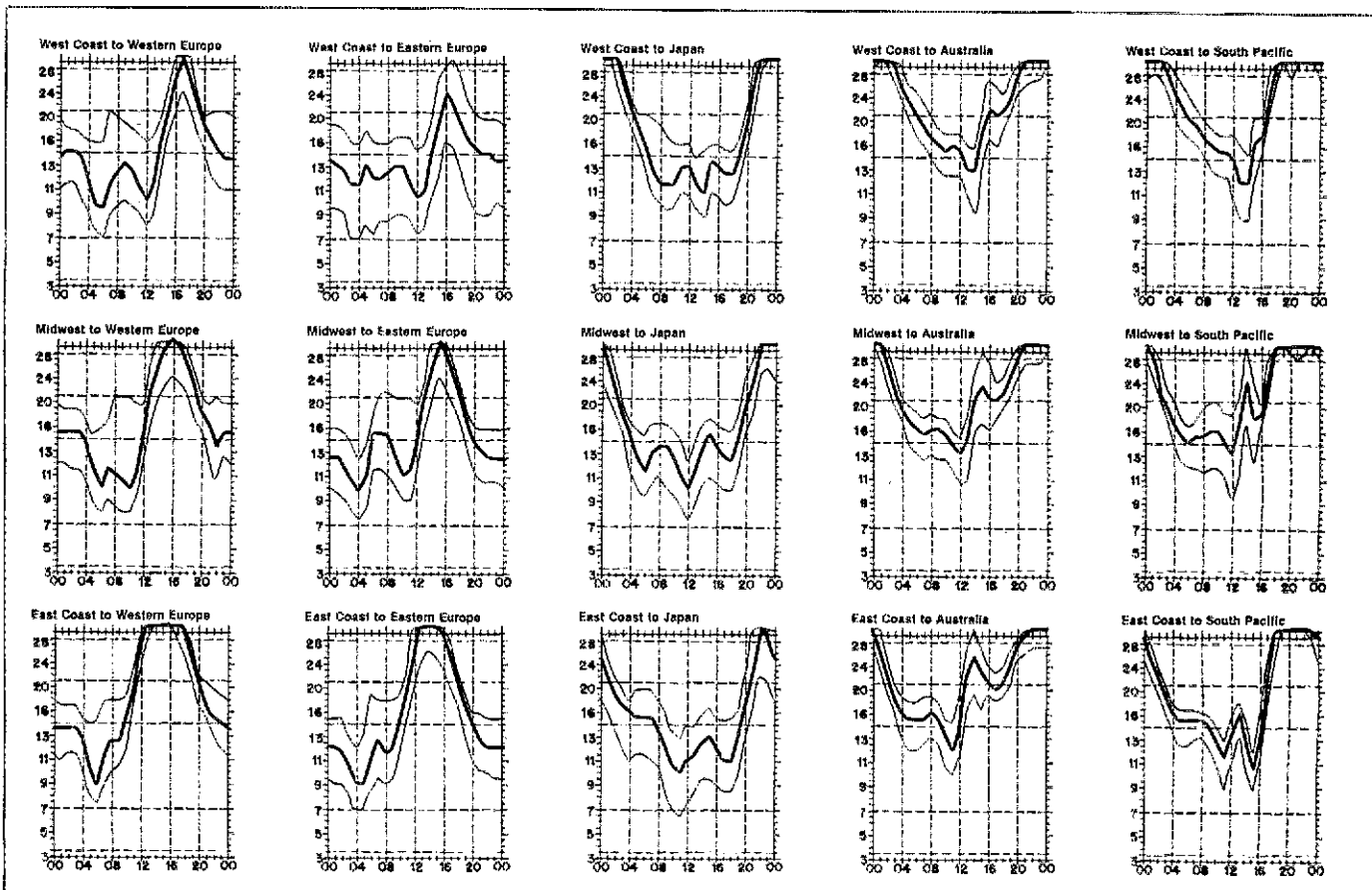
9V1TE. Jim can be found frequenting the long path at 1100Z on or around 14.240 MHz. QSL to WAØTKJ.

QSL MANAGER VOLUNTEERS

These folks offer their assistance to any DX station desiring help with QSLing and should be contacted directly: I2MQP, LU6EF, PY1/7APS, WA1GXE, WB1HLD, WA1GFJ, WB4AEJ, WD5DPP, WD5FWX, WD9DZV, WD9GGY.

THANKS TO OUR NUMEROUS CONTRIBUTORS

Their help is invaluable in assembling this column.



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

QSL Corner

Administered By R. L. White, W1CW

In talking to several of the call area QSL bureau managers, I find that a couple of the same points seem to crop up in the conversations with all of them. This is no great surprise since what I talk to the bureau managers about is QSL bureaus and, aside from some difference in quantity, one domestic QSL bureau and its "problems" is very much the same as the next one. Right now the current "bump in the road" is caused by so many people changing their call sign and not putting in envelopes for the new call. If you have changed calls, be sure to see that your bureau has envelopes on file for the new call as well as your old one. Also, if you haven't sent in some postage to take care of the change from 13¢ to 15¢, on your old envelopes, why not do that?

In the August issue I made the statement: "DX QSLs sent 'via the buro' will go to the bureau in which the individual resides." That statement is correct as long as you are not one of the people who decide to hold on to their call when they move from one call area to another. If, for example, a person licensed in the third call area moves to the sixth call area but retains the third call area call sign and operates with the third area call, the cards coming from DX stations for that person will go to the third call area QSL bureau and not to the sixth call area bureau. Even if the person signed /6, the cards would still go to the third call area QSL bureau.

The following QTH and manager listings cannot be guaranteed but are printed as received.

DU3BS, Box 22, Clearfield, UT 84015
SV1IW, Box 3751, Athens, Greece
VP2MZZ, Box 448, Fonthill, ONT L0S 1E0
W7FFO/KH2, P. O. Box 8305, NAVCAMS WESTPAC, FPO S.F., CA 96630
YN1Z, 2611 Locksley Rd., Melbourne, FL 32935
4S7NE, N.6. Ranasinghe, P4 Bungalow, O.T.S. Poththode, Sri Lanka
7P8BH, Box 333, Maseru, Lesotho
9N1MM, 12802 Sun Valley Dr., Sun City, AZ 85351

A4XGY (K2RU)
A6XF (G4CHP)
A6XR (G4CHP)
A6XT (G4CHP)
AP2AD (K1KNQ)
C21AA (WA6AHF)
CN8CC (F6CVE)
EP2FN (K2RW)
EP2IJ (W7LEE)
FB8XG (F5VU)
FG7TD (W5RU)
FK0BB (SM2EZE)
FO8BB (SM2EZE)
GJ5CNT (DF9FM)
HH2A (WA6RPF)
HK1AMW (W3KT)
JW4FG (LA5NM)
JW4QV (LA5NM)
JW4RV (LA5NM)
JW5IJ (LA5NM)
JW5NM (LA5NM)
JW5ZJ (LA5NM)
JW7FD (LA5NM)
JW8KT (LA5NM)
JW8LU (LA5NM)
JW9UV (LA5NM)
JW9WT (LA5NM)
JX3P (LA5NM)
JX8LU (LA5NM)
JX9WT (LA5NM)
KA1NC (K4JEX)
KA2DX (K5RW)
KG4MM (K1MM)
KG6JLL (KH6ITD)
MP4TEE (G4CHP)
OD5MX (WA6YOU)
OE2VEL/HB0 (OE2DYL)
P29LS (G4CHP)
P29MF (G4CHP)
P29MM (K4MQJ)
PJ9JR (N4MM)
PJ9KK (N4MM)
PY7CC (W4TAJ)
PY0OD (WA4MDS)
TF3CW (K1RH)
TI8BP (WA9UNR)
VK2BTC (K1SC)
VK3BJI (SM2EZE)
VK9YS (F6CYL)
VK9ZR (VK2BJL)
VO1LX/SU (VE3IWI)
VP1DD (W0AWA)
VP2AZB (G3RBB)
VP2VDS (W1WPW)
VR3AK (KH6AHZ)
VS6HK-Sept. 10-24, '78 (W6EL)
VU2CC/7 (VU2PE)
VU2LQA (DK6TU)
VU2TS (SM0GMZ)
W1GNC/PJ2 (WA1AHQ)
WA6YOU/DU2 (WA6YOU)
YJ8BB (SM2EZE)
YS1SC (W3RKP)
ZF2AU (W4MLA)
ZB2CS (W9JVF)
ZP5XBC (JA1QXY)
3A0GY (WB2EZG)
3V8BZ (DL1HH)
4W1ED (G4CHP)
4Z30GH (K5JBC)
5H3FW (DF4TA)
5J4RCA (HK4DBX)
5U7AG (K1VSK)
5W1BN (KH6JEB)
5Z4NH (W2PPG)
5Z4QP (G3TRR)
6O1FG (I2MQP)
8P6HB (WB4HOI)
8P6JD (K5MK)
8P6JV (W1ZT)
8Q7MX (SM3CXS)
9G1JW (DF1FU)
9L1CA (WA3NCP)

To the following thoughtful ones, a great big THANK YOU and may your tribe increase: DF9FM, G4CHP, HK1AMW, LA5NM, OH2BN, SM2EZE, SV1IW, VE3BXY, 7P8BH, K1XA, W1s MV, RF, K2s TV, BK, WB2ENW, K4WSB, N4MM, WA4ZXC, K5MK, KH6GGZ, WA6s RPF, YOU, WB6JPZ, N7EB, W7LEE, WA7PMZ, WA8MOA, W9JVF, NØRF.

ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 × 7-1/2-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

☐ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

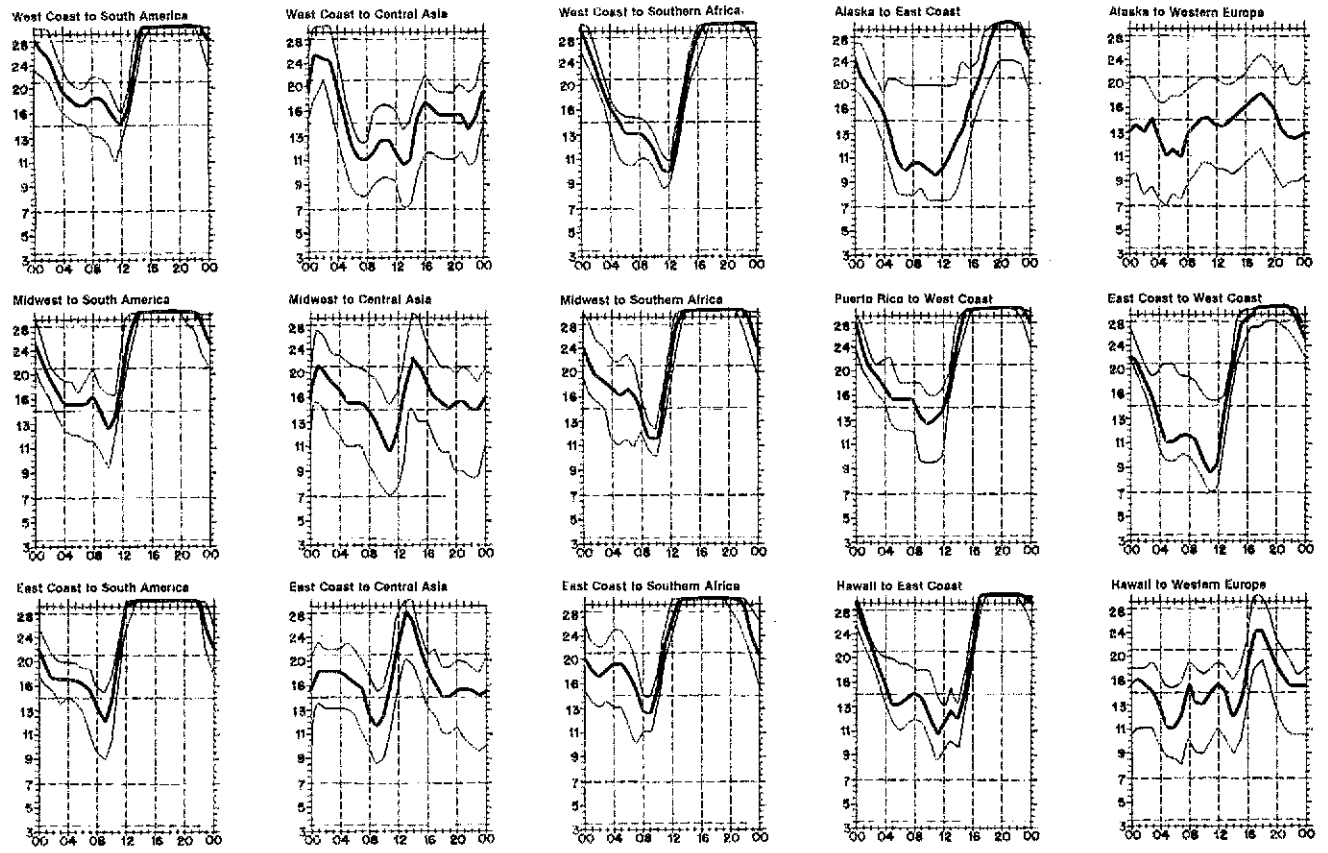
☐ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

☐ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

☐ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

☐ Fourth Call Area: AA, AB, AC4, WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

☐ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for October 15 to November 15, 1978, assume a sunspot number of 111, which corresponds to a 2800-MHz solar flux of 156.

☐ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

☐ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

☐ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

☐ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

☐ Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

☐ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

☐ U.S. Virgin Islands: all calls — Graciano Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

☐ Panama Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

☐ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

☐ Alaska: all calls — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

☐ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

☐ QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

☐ VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

☐ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, Quebec H3R 2E3.

☐ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont. M3M 3A3.

☐ VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man. R3M 3J9.

☐ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Sask. S4S 5E3.

☐ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W. Calgary, Alta. T2K 0X2.

☐ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

☐ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

☐ VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, Nfld. A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in December 1975 *QST*, page 64.

DXAC NOTES

In accordance with a recent DXAC recommendation, the ARRL Board of Directors accepted a report of the DX Advisory Committee (DXAC) which recognizes the United Nations Headquarters in New York, 4U1UN, as a new addition to the DXCC list. Contacts made on or after February 4, 1978, will count. No credits will be made to your country total till after November 1, however. Even though Board Minute 28 ("Moved and Seconded," September *QST*) notes October 1 as an effective implementation date, we anticipate a heavy DXCC workload resulting from preparation of the annual list. Thus, credits will be deferred till after November 1.

The following recommendation from the DX Advisory Committee was submitted to Headquarters by the DXAC: Southern Sudan (STØ) should be added to the ARRL DXCC list. The recommendation was accepted by the communications manager. For more information on the DXAC, see December 1974 *QST*, page 90.

DXCC NOTES

Two new countries to be added to the ARRL Countries List. 4U1UN, United Nations Headquarters, New York. QSOs made on or after February 4, 1978, count for this country. STØ, Southern Sudan, QSOs made on or after May 7, 1972, count for this country. These countries will be accepted for DXCC credits starting November 1, 1978.

These actions bring the grand total on the ARRL Countries List to 365 — 319 current and 46 deleted.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official 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, 1978. 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

SM3CXS/327	K5KT/161	DF2ED/118	AA4MI/107	W9DS/103	WB5LDU/101
VE3EDC/301	JH1BZJ/159	VE3IUE/118	N3EB/107	K9KK/102	WBØSNG/101
K9AJ/291	KH6JEB/139	K8DJC/117	WB8EYL/107	N4DX/102	VE6AJF/100
YU1BPO/263	WB3BMX/137	N6HZ/117	GM4CHX/106	PAØJJB/102	GI4DQO/100
OH1LA/240	W8MFJ/134	AA4KA/113	WB5SSD/106	WB3DDS/102	K3NB/100
SM5AQD/222	N5TV/133	K1RB/113	JH7LMZ/105	WA4UBM/102	WA2OVG/100
N1AC/219	JA1PMS/130	JE1VTZ/110	WA6TFS/105	WB4BAI/102	WA2UDT/100
WA4OOM/212	K3NS/125	K3VDU/110	WBØOTA/105	WB4FTU/102	WB3DWH/100
K5VRX/199	K9KT/122	K4OAH/110	JR1VAY/104	WB4MZO/102	WA4ITA/5/100
ON6BC/189	WA4EJX/122	K2AVX/109	W3APR/104	WB5SNF/102	WB4PUE/100
YU3BO/169	N2JO/121	WA1SSX/109	WA8RXL/104	K4WNQ/101	WD4LCO/100
YU2CDB/168	VE3DUS/121	WB2FCJ/109	VP2MAQ/103	K9BK/101	W6KG/AJ3/100
JA1VN/165	WD5CBA/121	N3NN/4/108	WB7ASR/103	N8BS/101	ZL1ADI/100
JH6RIM/161	6Y5DA/120	WB5TAP/108			

Radiotelephone

W7FXI/224	G3BSA/146	WB4FOT/127	DJ3ND/112	PAØSPD/106	JR1VAY/101
VE1RY/222	W4KFB/143	WB2OLG/126	WA4EJX/111	WB5SSD/105	K5LAC/101
WA4OOM/207	N8AC/142	SM3GWS/121	K6RLY/110	WB5PBA/104	WA8AEE/101
OH1LA/205	DL7JK/139	WD4EYD/120	JHØBQU/109	WD6AIV/104	XE1GBM/101
WBØRTZ/203	JH1BZJ/139	JH6RIM/118	WB5TEE/109	W4SME/103	K9KK/101
SM5AQD/200	W8MFJ/133	W6TGI/116	HI8FEG/108	WA4OQL/103	JH4MVH/100
PY5EX/154	DA1MB/130	JA1XGI/114	W3SPG/108	W8TIV/103	N2DH/100
I8KOS/151	K9EHA/130	K1RB/113	WD4FFP/107	WB2SPO/102	WA6KTZ/100
K5KT/151	N5TV/128	OE8GMK/113	N4ANV/106	SM5BMD/102	WB6DFX/100

CW

K9AJ/215	K3NS/107	N4PY/103	OK1MP/102	WA3GJZ/101	PY2DFR/100
JA2ETQ/151	WB7ASF/107	DK5AD/W3/103	K2TV/101	DL9TJ/100	VE6AJF/100
OK3JW/151	K8IP/105	K3EQ/102	N3NN/4/101	I5IRM/100	WB2FFY/100
SM5AQD/138	JH7LMZ/105	N6VR/102	NØHY/101	K3QIA/100	WA4DAN/100
WØNB/112	K5HK/104	OH1LA/102	W3OGY/101	N7MC/100	WA4QMQ/100
W1OPJ/109					

160 Meters

W9NFC

5BDXCC

JA2HNP	K4RDU	W7YBX	YU2CBK	UK6LAZ	ON6BC
W4BV	N4CQ				

Endorsements

Mixed

VK4QM/358	W3KA/318	W1QV/282	K6UD/253	N3US/201	N4OH/162
ZL1HY/358	W1HGA/317	K4UTE/280	G4BUE/252	W1BL/201	W9YH/161
W1GKK/356	W3GG/316	K4XP/280	W4DZZ/252	WAØAGN/201	K8EH/160
G3FXB/353	W8ZCK/316	W1AW/280	JA1XGI/251	DK3NU/200	K9ARZ/160
W2QM/352	N6GM/315	WA2CBB/280	OZ5VT/251	K1SA/200	N5UX/160
K2LWR/349	W1GME/314	OE1CP/279	KØBJ/250	K4KPH/200	WB4SXX/160
W1FZ/349	N4SA/311	YU4HA/276	N4NW/250	K6BUU/200	WA7URW/160
W6KG/348	W4NO/311	HB9AMO/272	WA3LJP/250	WA4HDD/200	K4NV/159
W3AFM/347	WA4FFW/310	W2TA/272	K3RB/248	WA4WYN/200	N4SX/159
W3GRS/347	W1BFA/308	N4CQ/271	W1YZL/248	WD8EOJ/200	N4ZS/159
W9BM/343	K4SMX/305	YU1NEO/271	I2VDX/244	K1MEM/199	W9ECF/159
XE1AE/343	W2ZZ/303	HB9AQW/270	WB4EQQ/242	YU2ACF/193	K2TJ/158
W9TKD/341	W4KNW/303	N5OK/270	AA4DR/240	W3GTL/186	6Y5MP/153
W6UQQ/340	W1DA/302	K4SV/269	KP4AM/240	W3NF/184	WA5TOS/151
HB9PL/336	W1RLV/301	WA4JTI/269	W5CPI/240	KØKES/183	K4NFE/150
ON4QJ/336	ZS4MG/301	K4LR/265	WAØTKJ/240	W1VH/183	WA4QHV/150
W1QJR/334	AA4CJ/300	WA4ENJ/264	K3AU/239	W6YMH/182	WB9YXY/148
W4QQN/334	DJ5JH/300	N8JW/263	K5PP/239	EP2OD/181	WØTT/148
DJØKQ/332	K4GLA/300	WB2BNJ/263	JA5PUL/233	WA2FUE/181	WA6DVE/144
W6QL/330	K5OA/300	W6PQZ/263	K4YOE/231	K5QEA/180	WB9TIG/142
WØBTD/330	N4RA/300	JA2ETQ/262	K6RSY/226	W2SEG/180	VE4IU/140
W4YN/329	W1EW/300	KH6IGJ/261	WA4VDE/223	WB4WSB/180	KG6RT/139
G3JEC/328	W4LBP/300	K9IUF/260	N4UF/222	W7ISG/180	N8RA/139
W4NL/328	YV5CWO/300	W6MA/260	W2BTG/220	K4BIY/175	W3YQ/139
SM6CWK/327	PAØTAU/299	WB9BGJ/260	K4KFB/211	W8TIV/175	WA1TXI/131
HB9AHA/325	W6SN/297	DL9TJ/259	G3ZOW/210	DL3TN/170	VE3EIM/122
IØJX/325	DL1KS/291	W3KJ/259	W2ZXL/209	W6CRE/167	WB9EEE/122
K1DRN/325	WA6GFY/290	WA3SXH/257	WØDAD/6/209	WA1YAX/165	K5PR/120
K5RC/325	WB6WHM/290	W7QON/257	W6PMT/203	WB3HAZ/164	K6SMH/120
JA2AAQ/324	W5NJ/286	N4HH/256	VE4EW/202	W6MUS/163	W2CHV/120
K3RS/320	JF1PJK/284	GM3AWW/255	W1DYH/202	WB9EIW/163	W2YC/120
K4BVQ/318					

Radiotelephone

W1JFG/352	K4BVQ/306	AA4CJ/260	N4NW/240	W7BG/203	W7ISG/167
W1HX/344	WB4KZG/305	KH6IGJ/260	WA4JTI/239	DF4FX/201	EP2TY/165
ZL1KG/344	F5JA/302	VE4JK/260	WB4VNG/238	DK3NU/200	SM6DSS/165
XE1AE/343	W2MPK/300	WB9BGJ/260	K3RB/234	WA3YYW/200	WB6RMN/9/165
W3GRS/334	K5OA/296	F6CYL/259	K9ES/230	WA4HDD/200	K5IH/160
VK4QM/332	W1BFA/285	W3KJ/259	JA5PUL/224	W6PMT/200	N5UX/160
G3JEC/328	WB6WHM/285	W6KG/259	W6ZUM/223	WB4NVH/199	W5CPI/160
IØJX/325	I7RNH/280	K3RPY/252	WA4VDE/222	ZP5PX/199	W6MUS/160
K1DRN/325	N4RA/280	OZ5VT/251	WØEVE/221	K3MWV/198	WAØTAM/160
W4QQN/324	WA7DRP/279	W4NYN/250	K9HDZ/220	W5NJ/194	6Y5MP/153
WØSFU/324	K4QPR/276	W7JWE/250	W6MFC/220	WØDAD/6/191	K9ARZ/150
JA2AAQ/323	XE1J/275	W5LQN/249	W7RCF/220	DL7SP/188	N1AC/149
W1FZ/323	VE3FJE/274	K6UD/248	WØWO/220	K3AO/188	K8EH/143
K9LKA/321	ZL1AMN/270	K4PQV/247	KG6SW/213	W7FR/187	N2BJ/142
W1GKK/318	W8SET/269	WA4HSE/243	N8JW/211	WØRWC/187	VP2VBK/137
HB9AHA/317	JF1PJK/266	DL6QT/242	K6RSY/208	W7QON/184	K4NFE/135
W1HGA/317	N4CQ/265	EA3AEA/240	JA1LFR/207	WA4QMQ/180	K4SE/133
OH3SR/316	PY6CN/262	G4BUE/240	W3KA/204	EA3OD/173	WA6IJZ/132
W1JWX/315	WB2BNJ/261	KP4AM/240			

CW

W3KT/260	WØBW/203	KØKES/170	AA4M/160	G4BUE/157	N4SX/127
JF1PJK/226	W6ID/200	W3GRS/169	K4NV/159	K8WW/155	K9CT/120
DL8AN/223	DL1PM/197	K1SA/162	WB4KZG/159	K3KFO/141	W4WXZ/119
JH1VRQ/220	N1AC/182				

Washington Mailbox

Conducted By Harold M. Steinman,* K1FHN

Regulations Update

Revisions to the rules and regulations coming out of the FCC have been so numerous this year that it is a good idea to review the status of recent rule changes. We last had such a review in this column in March of this year. Now we recap what's been happening on the regulatory scene during the last six months.

Q. Tell me about all those new-fangled call signs I've been hearing on the bands, such as KA1AD and AB1P.

A. On March 24, 1978, the Commission converted its call-sign assignment system to one which is completely systematic. This new system does not allow for requests for specific call signs, yet does provide for changing one's call (should the individual desire) upon upgrading. (97.51)

Novice class licensees are eligible for 2 × 3 calls, such as KA3XYZ. Technician and General class licensees, upon upgrading or obtaining a license for the first time, are eligible for 1 × 3 calls, such as N4ABC. Licensees upgrading to the Advanced class license may request 2 × 2 calls — KA1AD, for example. Amateur Extra Class licensees are eligible for 2 × 1s, such as AB1P. No one has to relinquish a present primary call under the new system.

Some intricacies of the new system are too detailed to explain here. Refer to a recent *QST* article on the subject (May 1978, pages 49-50), for details on the call-sign assignment system.

Q. What is the latest information on the availability of 10-meter linear amplifiers?

A. The commercial manufacturing and marketing of linear amplifiers capable of operation between 24 and 35 MHz have been banned. This action was taken to prevent these amplifiers from being purchased by those who would use them illegally to boost power in the citizens band. The ban was upheld by the FCC on June 28, 1978, when it denied petitions for reconsideration of the ban. (97.77c)

You may still find some amateur amplifiers that cover 10 meters for sale, and this is OK. The FCC has granted waivers to some manufacturers in order to allow them to clear their inventories. For example, the Dentron MLA-1200 and MLA-2500, Heath SB-200, SB-220, SB-230, Drake L-4B, Trio-Kenwood TL-922 and Yaesu FL-2100-B may be sold until supplies are exhausted. Once the shelves have been cleared, no more of these amplifiers may be sold if they include provisions for operation on 10 meters.

Amateurs are still allowed to build their own amplifiers for individual use on 10 meters, if they wish. Also, individual amateurs may modify their own equipment for operation on 10 meters. Ten-meter amplifiers simply will not be available commercially. (97.75a)

Q. Have there been any recent changes concerning frequency bands authorized to various classes of licensees?

A. Yes. Technician and General class licensees have received expanded privileges. They now are authorized to operate on all amateur frequencies from 50 MHz and up. Formerly, Technician and General class licensees were denied operation on the bottom 100 kHz of the 6-meter band, and Technician class licensees were denied use of the bottom 1 MHz of the 2-meter band.

It should be noted that even though the frequency allocations for Technician and General class licensees have been expanded, only telegraphy operation is authorized on the bottom 100 kHz of 6 and 2 meters.

Q. What about Technicians on 10 meters?

A. There has been no action from the Commission concerning this. Of course, since Technicians have Novice class privileges, they may operate on the 10-meter Novice subband.

Q. Is it true that the Novice class license is now renewable?

A. Yes. In addition, the term of the Novice license is now five years. This means that all classes of Amateur Radio licenses are now valid for five years and are renewable upon application.

Q. How does this affect a person who currently holds a Novice class license of the type that is valid for only two years?

A. His Novice license is now renewable. Its term does not automatically increase from two to five years, however. In other words, he must apply for renewal of his license, prior to the expiration date that appears on the license. He will receive a new license good for five years.

Q. How about an ex-Novice who is still within his "year of grace"?

A. Any amateur whose license expires must cease operating, but he has up to one year after expiration of his license to apply for renewal without having to be retested. If a person holds an expired Novice license, he may apply for renewal of that license within one year of the expiration date. He will receive a new license valid for five years.

Q. I understand that applicants for amateur licenses now receive credit for the telegraphy test if it was administered by an FCC examiner. What exactly does this mean?

A. Under the old procedure for conducting amateur exams, if an applicant passed the telegraphy test but failed the written test, the applicant received no credit for the telegraphy test. Upon returning to the FCC office to try again, he would have to retake the telegraphy test, even though he had already proven he could pass it previously. This seemed unfair, and created extra work for the examiner.

Now, upon passing an FCC-administered telegraphy test, the applicant receives a certificate which gives him credit for that telegraphy test for up to one year. This credit is honored only by the same FCC office which gave the telegraphy test. (97.25b)

Q. Does this credit for the telegraphy test apply to Novice candidates?

A. No. It applies only to examinations administered by FCC personnel.

Q. Can you bring me up-to-date on the latest repeater rules?

A. As of this writing, these rules apply:

All amateurs holding a Technician class or higher license may operate their stations under the repeater, auxiliary-link, or control-station rules without separate licensing or prior FCC approval.

Repeater operation is permitted on 29.5-29.7 (except by Technician class licensees), 52.0-54.0, 144.5-145.5, and 146.0-148.0 MHz. In addition, repeater operation is permitted on all amateur frequencies above 220 MHz with the exception of 220.0-220.5, 431-433, and 435-438 MHz. (97.61c)

An amateur using his primary station for repeater operation must use his primary station call sign followed by "R" or "RPT" if identifying by telegraphy, or "repeater" if identifying by telephony. (97.84d)

Q. What happens to WR repeater call signs?

A. No new WR call signs are being issued. An amateur presently holding a WR call sign has the option of using this call sign to identify while in repeater operation. Once the WR license expires, however, it will not be renewed.

Q. I understand the Commission is no longer issuing secondary station licenses. Is this true?

A. Yes. Secondary station licenses were issued for stations at locations other than the primary station (such as an office or vacation home). Under present FCC rules, however, the primary call can be used at any portable location, with or without any portable designator (at the operator's discretion).

Q. What happens to present secondary licenses?

A. You may use a present secondary station license until expiration; however, you cannot renew or modify it.

Q. I hold both a primary and secondary station license, but I like my secondary call sign better. Do I have to lose it when it expires?

A. No. When it comes time to renew your license, apply as usual, and request that the call presently assigned to your secondary station be reassigned to your primary station. A note should be attached to the 610 form to explain your wishes.

This is the *only* situation in which a request for a specific call sign will be honored.

Q. What is the latest concerning club calls?

A. At this writing (see "Happenings" or "League Lines" for late-breaking news, if any) there has been no action concerning the future of club station call signs. No new club station licenses are being issued; however, present club station licenses *are* being modified or renewed.

*Deputy Manager, Membership Services, ARRL

YL News and Views

Conducted By Louise Moreau,* W3WRE

The YL Book Shelf

One request that "YL News and Views" frequently receives concerns reference material about the history and activities of women Amateur Radio operators. Fortunately, the most popular ones are readily available.

CQ-YL by Louisa Sando, W5RZJ, has long been considered a "must" for the YL library. First published in 1958, then updated after each YLRL International Convention, it is not only a history of YLRL, but covers many of our fascinating activities: women who were active in military service during World War II, YL marine operators, clubs, outstanding public service activities, handicapped YLs, and a full coverage of all the YLRL International Conventions. The booklet is available from Louisa.

For those gals who love DX and are eager to know more about operators worldwide, Darleen Magen's *Globetrotting via Amateur Radio* is an exciting experience. Here it is possible to share Darleen's visits to Amateur Radio operators in 39 countries. She was often the only YL to work from many of these with a specially assigned call, while in others it is possible to meet, through her, the only woman who holds a license in her country. Darleen includes many interesting sidelights, which add much to the DX YL picture.

Each year *YL Harmonics*, the official publication of YLRL, publishes a directory issue complete with the addresses of the international membership of the club. The 1975 YLRL *Directory Issue No. 4*, is of particular value to the YL library, as it lists all the club-sponsored certificates, basic contest rules, and a history of YLRL compiled year by year by Vada Letcher, W6CEE, and Marcia Rast, K6DLL. The Directory Issue of 1975 is invaluable to those who are interested in the development and growth of activities of women Amateur Radio operators since 1939.

One other Directory Issue of *YL Harmonics* that might be of special note in a YL library was published in May 1949 on the 10th anniversary of the club. For those gals who want to know more about each of the women who were very active 30 years ago, this book includes biographical paragraphs of each of the members. It has become a real collector's item in some of our libraries, as has the 1969 issue celebrating YLRL's 30th year.

Voice, the annual journal of YLISSB, published a special historical edition of two separate issues in 1974. Here too, a YL will find the activities and accomplishments of women in radio who are a part of the huge global membership of the System, as it is known, that extends into about every country that has Amateur Radio privileges. Also, she will learn of the great personal service as well as public service that YLISSB has given.

"YL News and Views" in *QST* has covered the history of the YL story, tracing women in Amateur Radio back to 1909. It has described the YL picture on each continent, as well as presenting the origins of our traditions in a series of articles that have appeared in the column periodically since 1968.

Other references concerning YLs may be found in RSGB's publication of the late John Clarricoats' *The World at Their Fingertips*, which recounts the evolution of YLs in England. The Saskatoon Amateur Radio Club's story of Amateur Radio in Canada, *From Spark to Space*, tells about Canada's first YL organization, the Ontario Trilliums. Of additional interest is the fact that Martha Pankratz, VE5YY, was very active on the editorial staff of this publication.

These are the more available references that will tell the newly licensed YL, or those of us who are members of OOTC, what we have done and are doing in our clubs and on the air.

DX-NA YL CONTEST RESULTS

NA winners: cw trophy, WD5FQX; phone trophy, WD5FQX; combined plaque, WD5FQX; 2nd place cw, WA2DMK; 3rd place cw, K6DLL; 2nd place phone, K6DLL; 3rd place phone, WB4PRN. DX winners: cw trophy, VK3KS; phone trophy, LX1TL; combined plaque, DJØNT; 2nd place cw, DJØNT; 3rd place cw (tie), DF2SL, JH1GMZ; 2nd place phone, DJØNT; 3rd place phone, LX1SM. *Cw scores:* DF2SL 5;* DJØNT 9; VK3KS 43.75;* JH1GMZ 5;* WA2DMK 7.5;* W3CDQ 1; WD5FQX 18.75;* K6DLL 8.* *Phone scores:* SA1HO 1,012; DJ1TE 760;* DJ6IN 206.25;* DK9ZL 385; DJØNT 1,012; EA1ARI 855; F6RC 637.5;* G6LY 25;* HB9ARC 209; KL7IQR 21;* KL7JDI 153; LX1TL 1,523.75;* LX1SM 997.5;* VE2JZ 78.75;* VK3KS 471.25;* YS1BW 108; ZL1OC 60; W1DNR 240;* WA1UVJ 208; WA1WQM 45;* W1WS 90;* WA2DMK 120.25;* W2EEO 91; WA2NFY 90; WB2OHD 55; N3JC 252; WB4PRN 325; WD5FQX 902; K6DLL 350; WD6AIV 168; WA8EBS 75;* WDØBAF 140;* WDØAKS 105;* WBØIFF 96;* KØSFB 54.

*Indicates low-power multiplier.

TRILLIUM WEEKEND

The Ontario Trilliums have announced that the 1978 dates for the annual Trillium Weekend will be November 4 and 5, 1978, beginning 0030 UTC November 4, and ending 0030 November 5 UTC. This year the club will include simplex frequencies on 2 meters to facilitate those YLs as well as encourage operation on that band. Club members will be active on all bands to give needed contacts toward the Trillium awards.

YL FALL CALENDAR

The YL activities calendar shifted into gear with the Howdy Days contest in September. The annual YLAP will celebrate the YLRL 39th anniversary with the cw portion beginning October 11, 1978, at 1800 UTC, and ending October 12 at 1800 UTC. The phone portion will be November 2 at 1800 UTC, ending November 3 at 1800 UTC. As with Howdy Days, the logs should be sent to the Contest Custodian W2GLB. Full details for YLAP are listed in *QST* "Operating Events."

F6CYL, AVID DXER

Although she enjoys casually chatting with friends on the air, Ann Koboloff, F6CYL, has been, to use her own words, an "avid DXer" in fact as well as in her amateur activities.

Of British origin, Ann was brought up in Bermuda and attended school in the United States for several years before going to France. Both she and the OM, Mike, F6DOX, received their licenses just four years ago, and since that time Ann has been busy logging DX on the air and acquiring new calls as they travel.

In January this year she operated as P29AC from Papua, New Guinea, for five weeks. While there Ann worked from the station of P29JS and logged over 2000 contacts from 130 countries. In February Ann spent five days in the Solomon Islands with the call VR4YL from Honiara, Guadalcanal, where she became the second YL to hold a call in the Solomons. She has also held 5ZHQH in Kenya. Ann is proud of the fact that in her travels she is representing 50 years of YLs in France.

THOSE CONTEST LOGS

A very special request has been received from YLRL. Please will all the participants in the Howdy Days, YLAP, OM-YL, and DX-NA YL mail their logs to the contest custodian who is also YLRL vice president, and *not* to ARRL or this column. Forwarding the logs to ARRL has quite often caused a delay and the deadline for receipt was not met, thereby disqualifying the contestant. The custodian is always listed in the rules in "Operating Events." QST

Norma Samuels, 6Y5YL, is secretary of the Jamaica Amateur Radio Association. When not on the air she is personnel manager of her husband's (Ron, 6Y5RS) television plant. *(photo courtesy of W4KFC)*

Sherry Taylor, WD6ERX, spends much of her time on 10-meter phone when she isn't working for WAS and DXCC. Licensed just a year ago she is working toward upgrading to Extra Class this year.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.

Correspondence

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

INCENTIVES REMOVED ONE BY ONE

☐ Although I've been interested in electronics since the age of awareness, it was just less than two years ago that I decided to become a ham. Being in a demanding profession, my time was at a premium. But I learned the code with much sacrifice to myself and family. I'm sure this is typical, but my point is made only to emphasize my objection to the trend toward deregulation by the FCC. This is not arrogance nor is it an expression of egotism. Rather it is a concern for the makeup and future of Amateur Radio. Within the period of my interest we have seen among other things: dropping the two-year experience requirement for Extras, expansion of the Technician privileges, credit for code even when failing the written exam, elimination of the incentive preferred 1 × 2 for Extras, and making the Novice license permanent. The latter, in months to come, will turn the Novice bands into 20-wpm frequencies for those interested only in cw. All the incentives are being removed one by one. I welcome and will attempt to assist anyone who *earns* the privilege of being an amateur. But if this trend continues, one day you will tune around on 20 meters and hear someone in the U.S. acknowledging a call from Japan with "10-4, Good Buddy. You are wall to wall and treetop tall in the good ole U.S. of A." — *John Black, WD4CVR, Spartanburg, SC*

☐ Please register our total disgust with the FCC call-letter change. My OM and I have been in ham radio for 25 years. Our daughter is almost old enough to get her ticket but as we understand it, she cannot get either call that my OM and I will have to discard. We have great attachment for these calls. The FCC has no regard for the meaning of the call letters or people's attachment to them. Surely there are enough other call combinations to go around. This change shows bureaucracy at its worst. — *Carole Allen, W5NQQ/K9AMD, Houston, TX*

☐ I would like to yell discrimination. Nobody in their right mind would want one of those so-called 2 × 1 or 2 × 2 calls. I overheard a 2 × 2 trying to get into a QSO with another station. He gave his call for 15 minutes and the other station never did understand it. The next thing we know we will hear 4 × 4s. I really get upset when I hear a new Tech give a 1 × 3 and I know he's been a ham for less than a year. The only way I can get a shorter call is to move or upgrade. I won't move and I won't upgrade only to receive a 2 × 1. If the new call-sign deal is supposed to make it faster to get a ticket, why does it take some people four months to get a call back? If they would charge $5 for a five-year ticket to all hams and CBers, the FCC could hire people to get their work done. — *Herb McAdams, WB9LCN, Richmond, IN*

☐ It seems to me that 100,000 General class Amateur Radio ops use 75-100 kc of the phone bands 100 percent of the time, 85 percent of the Extra and Advanced class use less than 30 percent of the rest of the band. I'm wondering just what good incentive licensing did. — *Carl Redman, W9EJC, Peru, IN*

REPEATER MICROWAVE LINK

☐ Canada's 111th birthday received special attention from amateur groups in two major cities. On July 1 the Winnipeg Repeater Society, VE4WPG and the Montreal Repeater Group, VE2MRC, linked their machines through a broadband microwave circuit. Hams in Winnipeg and Montreal were able to work each other and exchange Canada Day greetings. Seventy-five amateurs took part in the three-hour event which included a message to amateurs from Winnipeg Mayor Robert Steen. Prizes were awarded for unusual or special efforts during the link. One went to VE4AP who worked Winnipeg direct over 109 miles, using 600-watts erp and superior elevation. Others went to VE4VE (aeronautical mobile), VE4TO who checked in from a rural wheat field while running 400 milliwatts, and VE4ADT who had the most unusual setup with a just-completed transmitter strip, an eight-ohm speaker for a mic and an a-m/fm vhf receiver. The receiver groups received assistance from the Canadian Broadcasting Corporation and would like to thank all those who assisted with the organization and net control. This group is looking into a similar link to the Commonwealth Games in Edmonton. — *John Gowron, VE4ADS, Winnipeg, MB*

CAN'T SCAN THERE

☐ Regarding K1THP's review of the Bearcat 210 scanner (page 30, July *QST*): It should be stressed that some states or localities have ordinances against such use. New York generally forbids equipping vehicles with receivers capable of police reception. New Jersey's legislature has been considering amending that state's similar law to exempt amateurs, but one still might have to explain this to a not-so-well-informed cop. Check the statute first. If still in doubt, leave it home. — *Charles Sudranski, W2XY, Brooklyn, NY*

[Editor's Note: New York and Indiana law *have* exempted amateur use of these and New Jersey is still working on it.]

PLATE REPEAT

☐ The letter from Anthony Parise, WA3HRL ("Correspondence," July), missed the point. The 12-month fight for corrective license plate legislation cannot be reduced to Mr. Parise's conclusion: "The fact that all amateurs may now get plates offsets the disadvantage of the $1 per year increase and the exclusion of the word amateur." For over a year now I have been working with Bob Myers, K3HWL, to accomplish two things. We have been trying to have Amateur Radio registration restored to Pennsylvania's Motor Vehicle Code, where it had been from 1955 until last July. Secondly, we are trying to get the plates at a reduced rate. We have been accused of overreacting and yet our pursuit of recognition and a lower fee has the support of the League, many hams, and numerous legislators. Mr. Parise is correct in his figures. But the intent of the original motor vehicle code was to give hams license plates at a $3 *flat* fee not a $3 annual fee. The quote from the vanity plate application is out of context. What form MV-902 really says is "Radio and *television* stations will be issued personal plates containing the station call letters assigned by the FCC." What is missing is the word "commercial" not the word "amateur." Most amateurs who have a car registered in their name are using the old form MV-733 to apply for a call-letter plate. This requires proof that they are licensed amateurs. It is a simple matter of proposing amendments to existing legislation to erase the exclusions which Mr. Parise mentioned in his letter. If you are a Pennsylvania resident and want to help you should write to your Senator and urge him to support the Dwyer Amateur Radio Amendments to HB 1171. — *Rick Barrow, K3WPI, Tannersville, PA*

POPULATE OR PERISH

☐ We now have a practical example (CB) of what happens when we reduce the examination standards — CB Zero. Over the years there have been numerous suggestions, reasons, letters, etc., for lowering the standards of Amateur Radio license examinations together with the never-ending reasons for eliminating the Morse test. There is little doubt that for most purposes, Morse has been superseded. To many people this is a good reason to drop it from the RAE. The people who make all the noise do not say what the replacement test subject will be if any. Any certificate of proficiency must have sufficient subjects on which to test the candidate's ability and interest, otherwise the certificate becomes a meaningless piece of paper. Amateur Radio is an international hobby which operates within or in close contact with international commercial bands. Commercial stations have access to large finance. Amateurs have nothing except their reputation. This reputation can easily be ruined for all time if we allow our examination standards to fall so low as to allow large numbers of undisciplined, unscrupulous operators on our bands; inviting governments and large commercial interests to infer that radio amateurs are just a rabble and their bands could be used to better advantage by commercial interests. In simple psychology: A child who is given everything for nothing appreciates nothing. Morse, together with a full technical examination and good instruction in operating procedures, is the amateur's way of showing the world and commercial interests that we are responsible people. It has been proven over the years that, in the main, a person who has studied hard and passed not only the full technical examination but also the full Morse examination is unlikely to do foolish things that would lay him and his personal call sign open to criticism by fellow amateurs and authorities. Having worked hard to obtain a license, most people are not prepared to just throw it away. We are told to "Populate or Perish." With education and communication we can populate the amateur bands with responsible operators thereby showing the governments and big commercial interests that we are responsible people. — *Tony Tregale, VK3QQ, Watsonia, Australia*

ARRL DAY

☐ I wish to express my appreciation to the ARRL for its support of my students, William Locke, WA1ZUR; Mark Allen, WB1PBH; and Christopher Cabigioli, WB1FBZ; who organized, participated in, and ran our first "ARRL Day" in the electronics lab. During the school day about 130 students (grades 9 — 12) were exposed to an excellent movie production, *Moving Up to Amateur Radio*, pamphlets and actual demonstrations of an operating ham station. The day was as much as we could have hoped for and the contacts made were most interesting. These students provided a fine example of what I'm sure ARRL is all about. — *Lee Goodspeed, David Prouty High School, Spencer, MA*

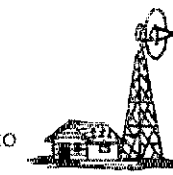
VE2 — VZ2 MIXUP

☐ The April issue of *The Canadian Amateur* states that VE2 stations may use the special prefix VZ2 until October 12, 1978, to mark the 25th anniversary of Radio Canada TV. The May issue advises that the VZ2 prefix was, in fact, not authorized and occurred as a result of a DOC mixup. I made in the area of 100 contacts using the VZ prefix and sent probably 75 or 80 QSLs to DX and USA stations. No doubt some of these QSLs will eventually be submitted for various awards. I know other VE2 stations experienced the same embarrassment and I hope you will understand that the error was the result of misinformation. — *John Mann, VE2ADZ, Two Mountains, PQ*

[Editor's Note: We ran the same error in *QST* (February 1978 "League Lines"), but we did *not* catch the subsequent correction by DOC.]

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO



Are We Ready for the Fireworks on Six?

The next few months may bring the best F2 conditions on 50 MHz since 1959! Sunspot counts are rising at a rate exceeding most average solar cycles. One propagation advisory service, Mail-a Prop, predicts a smoothed sunspot number of over 110 by the end of October, rising to above 130 by next March. (The highest count reached during the last cycle was a little over 100.)

Are we ready to take full advantage of the conditions which higher solar activity is almost certain to produce? Are our stations in good working order? In some parts of the country there isn't too much more time left for antenna work before the snow starts flying. How about crystals for working above 52 MHz? Remember the ZLs and VKs are limited to that part of the band. The Europeans and many Africans are even less fortunate with no 50-MHz assignment at all. Possibly some of them can obtain special permission to operate on 6. It is understood that a few are already on from Gibraltar. Of course, the ZB2VHF beacon was heard on this side of the Pond last summer. See the 6-meter section for more beacon information. For those who cannot obtain permission to transmit on 50 MHz, crossband is the answer. The 6/10 route served during earlier sunspot cycles. It's not the same as making two-way contacts, but it beats not working them at all! What frequency on 10 should we use for crossband operation? I have given the matter some thought and consulted as many knowledgeable 6-meter operators as time would allow. The best compromise seems to be 28.7. It is high enough in the band to be somewhat clear of QRM, but not so high that antennas should loose too much of their effectiveness. A 100-kHz multiple permits the use of crystal calibrators for spotting. Talk up 6 meters in your contacts with DX stations. Let's try to get as many on as possible. For those who can't get permission to operate on 50 MHz, tell them to equip themselves with receiving gear and if they hear anything transmit back on 28.7 or thereabouts. Of course, we on this side of the Atlantic should be sure we are prepared to receive on 28.7 while the rest of the station is on 6. Don't forget that some European countries, including the Gs have a band at 70 MHz, 70.025 to 70.7 to be exact. While it seems unlikely that F2 propagation will ever get that high, it wouldn't hurt for us to be ready just in case. Making the first 70/50-MHz contact between North America and Europe would be the thrill of a lifetime for those who accomplish it.

Another element of preparation for the big events to come is for all of us to become as familiar as possible with the subject of ionospheric propagation including the signs to look for in predicting the specific days and times likely to produce the best conditions. No matter how good 6 meters becomes, it still won't be like 10, so don't expect openings any time you happen to get on the air. The 6-meter DXers who get the best results will be those who plan their operating to coincide with the highest maximum usable frequency, or muf. In addition to providing contacts over far greater distances, F2 has the advantage over Es of being much more predictable. Space does not permit a detailed treatment of the subject of ionospheric prediction. The best advice I can give is to go back and read all you can find on the subject. One good barometer is the propagation information transmitted by WWV and WWVH at 18 minutes after each hour. If the solar flux is above 180 and magnetic activity is low, start watching 50 MHz. Don't forget that, because of the rotation of the sun, ionospheric conditions tend to repeat on a 27-or 28-day cycle. So, be particularly alert for a return of good DX conditions about four weeks after the previous appearance.

No matter how good our stations are and how F2 wise we become, we won't be able to take full advantage of the opportunities which lie ahead if we are all piled up on a single frequency. One operating habit which we have all fallen into over the years is the "50.110 syndrome." Why everyone has decided to crowd onto or as near this one frequency as possible is difficult to comprehend. But the practice has become a fact of life for ssb and even cw operating on 6. Things were not that way 20 years ago in the heyday of Cycle 19. Then, almost everyone was on a-m and many were crystal controlled. As a result, activity was much more spread out and QRM was not the factor during band openings that it is today. It seems apparent that with our present operating habits, many interesting QSOs will be missed. Particularly hurt will be the stations running low to moderate power. But even those with kWs will suffer.

The letter from WA6JRA, reproduced below, contains a proposal for putting a little more order into our 6-meter operating. While some may feel that Sam's approach is a little too structured, most should agree that it is basically sound.

"The following proposed 50-MHz band plan for USA is coupled with the recent FCC action on Docket 20282 effective 15 May 1978, allowing Technicians all vhf privileges above 50.000 MHz, increased solar activities of Cycle 21, and increased interest in the 50-MHz band.

CW Operation
50.000-50.010 EME cw only.
50.010-50.020 Experimental cw work, future plan.
50.020-50.100 Cw DX, weak signal work, and general.
50.070-50.080 Cw beacons, DX.
50.090 International and U.S. DX cw calling frequency, QSY down.
50.100-50.200 Cw used where ssb becomes marginal.
50.200-50.300 Cw QSO, local cw practice where ssb comments can be made.

Voice Operation
50.100-50.125 Ssb weak signal work, DX ssb, International DX ssb.
50.110 International DX ssb calling frequency. (DO NOT USE FOR LOCAL QSOs.)
50.125 U.S. DX and local ssb calling frequency. QSY up.
50.125-50.300 Ssb DX and general ssb use.
Above 50.300 A-m and wide emission modes.

"Note that present FCC regulations on emission modes are still effective, i.e., cw 50.000-54.000, and phone 50.100-54.000. Please refer to the *ARRL License Manual*. With Docket 20282, Technician and General class licensees are now allowed to operate cw below 50.100. The cw and ssb calling frequencies as well as major DX frequencies are placed close enough so that an operator may tune from one portion to another quickly. Also, there is enough separation to minimize QRM when clean transmitters, good receivers, and good operating practice are used. The first 25 kHz from 50.100-50.125 is reserved for ssb weak signal work, U.S. DX, and international DX by various propagation modes. Cw is recommended below 50.100; however, be prepared to use cw in the first 25 kHz for a straight cw QSO or when conditions become marginal for ssb. Please try not to engage your friends in local QSOs in this first 25-kHz ssb portion, especially 50.110.

"The new U.S. DX and local ssb calling frequency shall be 50.125. After establishing a local ssb contact, please QSY up. Many foreign DX stations can operate ssb/a-m below 50.100 so be prepared to receive these phone modes as well as cw. When working a foreign DX station near our phone band edge, please watch your calibration and all phone sideband components.

"Since cw operation will be less, 50.090 MHz will be the combined international and U.S. DX calling frequency. Again, do not use 50.090 for cw tagchew QSO. It is recommended that all cw beacons be moved below 50.080. The WIAW cw bulletin and code practice on 50.080 are good indicators of an opening to that area. During a full Es or F2 opening, please try not to use cw between 50.100-50.200 unless conditions become marginal for ssb. Frequencies from 50.020-50.100 are recommended for cw DX, cw weak signal work, and general cw. The 10-kHz portion from 50.010-50.020 is recommended for experimental cw work, future plan, and establishes a 10-kHz guard band for EME work.

"The proposed 50-MHz band plan is so designed to minimize QRM during full band openings and local work. The plan also establishes three separate calling frequencies for U.S. DX, international DX, and local QSOing. It is recommended that 50-MHz enthusiasts carefully study the band plan and operate accordingly. It is recognized that any 50-MHz band plan is not perfect, therefore, plus and minus comments should be submitted to Sam Goda, WA6JRA, 1815 N. Woodside St., Orange, CA 92665 USA."

As would WA6JRA, I would like to hear what you think about Sam's suggestions. Best of DX to all.

DXPEDITION TO PJ2

This conductor is making plans for a jaunt to the island of Curacao in the Netherlands Antilles in early November. The hope is to work South American stations on both 6 and 2 via TE propagation. There may be some chance for F2 on 6 as well and you can be sure that I will be on the lookout for it. In addition, it should be possible to contact various Caribbean islands and maybe even the southern part of FL on 2 meters. I plan to take along transceivers and solid-state amplifiers for both bands. The power limit on vhf in PJ2 is 150 watts input, so that's all I will be running. Reasonable antennas for both bands atop an existing tower will round out the station. I hope to be able to pass along the call I'll be using next month.

ON THE BANDS

6 Meters — The 1978 summer Es season will hardly go down in history as one of the finest. If there is a correlation between relatively poor Es seasons and good F2, and some think there is, we should be on the verge of great F2 propagation. For many, however, the very long skip and variety of stations available made up for the lesser frequency and shorter duration of openings.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Buttonsville, MD, or call 301-384-6736 and record your message.

One of these is K6RNQ. Bob writes a long letter summarizing the season beginning with a double-hop opening to Fairbanks and Anchorage on May 24 in which he worked KL7s DU (ex-KL7HMU), AG, IFD (now AL7D) and EUU. At the same time he was hearing single hop to KL7IFP, Ketchikan. On June 13 it was W7KFS/VE7 300 miles north of Prince George, BC, as well as KL7s IFP and IBG. Heard was a 10-watt beacon, VE6ARC, 200 miles north of Edmonton. Bob says that this opening lasted for over 12 hours. Of course, there were the JA openings between June 10 and 16. June 24 brought contacts with KP4AHQ, W4UWH/KP2, VP2MX and HI8WPC, the last two being countries numbers 23 and 24 for Bob. Signals from W4UWH/KP2 were peaking over S-9 which, as he indicates, is exceptional for triple hop. Not bad for a "poor" season! Incidentally, K6RNQ believes that the JA openings this year may have been via a different propagation mode than in 1977. Last year the openings came at about 5 P.M. local time whereas this year they occurred around 11:30 P.M.

Another not crying about the '78 Es season is K8WKZ. Dave is one of those fortunate Easterners who pulled off contacts with KL7AG and AZJ, Fairbanks, for state no. 49 in the wee hours of July 5. K8XF thought the season quite good also. Of course it was his first year on. Mike is happy that his TV-506 and 5-element beam at 16 feet produce no TVI. Speaking of new stations, VP9GQ roared into the East Coast the evening of July 30. When WB2RLK/VE1, who worked him just ahead of this conductor, asked him how long he had been on 6, the answer shot back "five minutes." That, apparently, was about the last of the good Es openings for the year, although VP9WB did a brisk business with East Coast stations the evening of August 16-17. Let's hope that VP9GQ and VP9WB stick around for the coming F2 and next year's Es. KH6HI reports a development which will facilitate F2 contacts with the Pacific. Bert says that the P29s are now permitted to operate on 50 MHz rather than being confined to above 52 as are the VKs and ZLs.

The 6-meter beacon list was compiled from various sources including the AZ Cactus Patch and the Australian magazine *Amateur Radio*.

2 Meters — The major news for the 144-MHz band this month has been the Perseids meteor shower. Since it is still in progress as this is being written, I have only verbal reports and my own observations to go on. But from these indications, it was a super shower. It's hard to beat six schedules for six QSOs, all in less than 20 minutes into each schedule, for six new states. That was the W3XO experience. Contacted within a 2-1/2-hour period Saturday morning, August 12, were WA4FBH GA, WBØWFY MO, WØTG KS, WA4CQG AL, WBØIUT NE and WAØZJJ ND, all on ssb. W3TMZ had similar results and both WB4EYP and WD4MUO, VA, also did well. The N9SS DX-pedition to ID was knocking off QSOs at a good clip, piling up a total of 60 QSOs in 17 states.

The week before, Sunday, August 6, EME was the star for K1WHS when Dave completed a contact with N9SS/7, WY, for state number 50. After he submits his cards, Dave should be the fifth to receive a 2-meter WAS award. And many said it could never be done. Working all states on 144 MHz is indeed a notable accomplishment and K1WHS along with KØMQS, NØJA, K9HMB and K5CM can be justifiably proud of their feat. Credit must also go to those who went to the effort to assemble stations so that they would have somebody to work, in particular, those who mounted complex EME DXpeditions to places where no activity existed. The N9SS team is one such example. The various jaunts of N6NB/K6YNB is another, and, of course, the W5MB trip to HI which put KH6HI on 2-meter moonbounce must also be included.

Tropo is, for many, the most enjoyable mode that vhf has to offer. Signals are relatively strong and steady, affording even low-power stations a chance to hold real QSOs over good distances. The evening of July 20 produced such conditions along the Eastern Seaboard. K4PKV, Mocksville, NC, reports working some 20 stations in NY, NJ, PA, MD and VA, many running 15 watts. In addition, Dick hooked up with several New England stations including WA4MMP/1 and WA1CSO, RI, for his 40th state on 2 meters. A monumental tropo opening on August 21-22 brought K1HTV a bevy of contacts: several in OH, IL and NC, then WA4YJX KY, the father-son team of WØRWG and WØRWH MO, NØDC MO, WBØUFQ MO, WBØZXU IA, WD4IIS GA, and, at 0640 UTC on the 22nd, K5ETU AR. All this was done from Rich's new location with a temporary antenna, 10 feet off the roof!

Following their success, reported in last month's column, in bridging the gap between PR and FL, KP4EOR and K4GFG have been holding daily schedules each morning at 1030 UTC on 144.180. On July 8 this sked produced an m.s. QSO for the two of them. Then in the evening of July 10 (11th UTC time), they worked again. This, like the first time, was via a somewhat strange residual signal mode. They repeated the feat on the 21st (22nd UTC time). K4GFG has the following comments on these contacts:

"The path is 1075 statute miles, mostly over water, with a bearing 118° from Ft. Lauderdale. In each of the three openings, the beams on this end peaked about 15° north of the great circle bearing. KP4EOR noted similar offset to north on his end. Signals were extremely stable, within a few dB, and only 5 dB out of the noise. They have had a characteristic flutter each time, like very rapid aircraft flutter, although it does not disrupt ssb like TE or aurora does. Signals start out 5 dB out of the noise and gradually decay over 1/2-hour down to the noise level. No deep fades like tropo or Es are noted. This path is definitely not on the same parallel of longitude, nor is it across the equator! Signals are not very strong. I have two KLM 14-element Yagis, and so far, only those stations with multiple antennas have made contact."

KP4EOR also notes an Es opening to FY7AS at 2220 UTC July 11. Both he and KP4AAN made 2-meter contacts with the French Guiana station about 1400 miles distant. Six meters was wide open at the time so there is little doubt that Es was responsible. This was the same day as the massive X-15+ solar flare. The connection is also not clear but both bands were open in the eastern U.S. that same evening. The aurora that everyone was waiting for a few days later never materialized, however, apparently because the solar erruption was so located on the sun's surface that the particles missed the Earth altogether.

The longest tropo path so far negotiated by amateurs is that between the CA coast and HI. The duct responsible for supporting vhf communication across more than 2500 miles of water forms quite frequently in late summer. It happened again during the evening of August 5. W6UZL, near San Diego, reports working 21 stations through the 22/82 HI repeater as well as making a marginal contact with KH6IAA on fm simplex. Walt also heard W6EFI/M at Palos Verdes, using 150 watts and a 5/8 wave whip on his car, work KH6IAA on 146.52 simplex. As of the deadline for this column, no reports have been received from the ssb/cw gang.

70 Cm — The idea of making Wednesday evenings "activity night" on 432 seems to be catching on in several areas of the country. This has been the custom in the Northeast for several years, with Monday nights devoted to 2 meters, Tuesday to 1-1/4 and Thursday to 23 cm. Wednesday has caught on as 70-cm night in TX, AR, LA also. Activity nights seem to be an idea whose time has come on a nationwide basis. There is a danger however. Some may conclude that it is worthwhile getting on the air only on the activity night for the band in question. If this becomes the general custom activity will actually diminish and the activity night concept will have been counterproductive. So use activity nights as guides when deciding which band to concentrate on for a particular evening but not as an excuse not to get on the air at all. To illustrate how productive activity nights can be, note the roster of 70-cm regulars compiled by W1JR. Joe lists W3OZ/W3TMZ, K3QCQ, VE2LI, K1LPS (VT), K1LOG, WA1OVT, K2UYH, WA1TZV, VE2SH, VE2YU, W1UHE, K1FO, K1PXE, K2RIW, K1SRZ, WA3ZHW and WA2FUZ.

For his moonbounce activities, W1JR cites recent contacts with KH6IHP, WAØCSL (the K2UYH DX-pedition to ND), and N4KT/7, ID. His state total now stands at 27. The new eight F9FT Yagi array seems to be working well. WA1TZV has a similar antenna system and should put NH on the 70-cm EME map soon. In other moonbounce news, KH6IHP worked YV5ZZ in June giving Ed WAC on 70 cm. In addition to QSOing W1JR, as noted above, Steve completed with W1XP and K3PGP. I learn via the K2UYH *432-EME Newsletter* that I8CVS hit the jackpot in late June making EME contacts with W4WD, I5MSH (on a CQ), JA6CZD, SM3AKW and ZE5JJ.

WD8POK notes that interest in ATV is picking up in the central MI area. Several are getting on 439.25, including John. Two ATV repeaters are planned, one a 70-cm in-band machine while the other will receive on 70 cm and output on 23 cm. It will feature color capability.

23 Cm and Down — N6CA writes that 23-cm activity is on the increase in southern CA. Chip says that there are about 10 stations on or building in the area between Santa Barbara and San Diego. In the June contest he operated from Mount Potosey, NV, near Las Vegas. Despite low power and a small antenna, 70 milliwatts and 18 dB, N6CA/7 was able to work several stations including K6ZMW, 218 miles away. On his end, K6ZMW pleads for higher power and better equipment in general on the part of 23-cm stations. Joe decries that fact that so many contesters consider the band as an afterthought. He points out that the new contest rules make 23-cm operation much more worthwhile. Joe also thinks that more and better hf and vhf liaison would pay off. With the antenna system shown in last month's column and 500 watts, K6ZMW hooked up with 11 stations in six sections in the contest. From the East Coast, *Northeast VHF News* reports that the Pack Rats' club station W3CCX had 17 contacts in 9 sections on 23 cm as well as 2 on 12 cm and 1 on 9 cm. The same publication states that WA4PGI, Norfolk, VA, is now operating an attended beacon on 1296.045 with an output power of 300 mW.

WA2RIU, West Caldwell, NJ, reports that he and three others are working with 3-cm Gunnplexers. Their original plan was to augment contest scores but they are having so much fun that they have decided to run some experiments with the units. Bill says that they will be glad to assist any interested hams in the area wishing to get on the band.

6-Meter Beacons Believed to Be Active Throughout the World

Call	Freq.	Mode	Location	Notes	Call	Freq.	Mode	Location
W1AW	50.08		Newington, CT		VK4RTL	52.440	fsk	Tounsville, Aus.
WA1EXN	50.018		ME	1,2	VK5VF	53.00		Mt. Lofty, Aus.
WA6MHZ	50.101		San Diego, CA	1,2	VK6RTT	52.900		Carnoran, Aus.
K7IHZ	50.100		Apache Jct., AZ	1	VK6RTU	52.350		Kalagoorlie, Aus.
W7KMA	50.095		Phoenix, AZ	1	VK6RTV	52.300		Perth, Aus.
WA9FEF	50.055		South Elgin, IL	1	VK6RTW	52.950		Albany, Aus.
KG6JDX	50.110		Guam	1,2	VK6VF	52.006		Perth, Aus.
KH6EQI	50.104	A1	Pearl Harbor, HI	1	VK7RNT	52.400		Launceston, Aus.
CHØTS	50.100		Easter Island	2	VK8VF	52.200	A1	Darwin, Aus.
FX3VHF	50.104		France	2	VK9GA	52.001		Goroka, N. Guinea
FO8DR	50.101		Tahiti		VKØGR	53.200		Casey, Ant.
JA2IGY	52.500	A1	Negoyo		VKØMA	53.100		Mawson, Ant.
JD1YAA	50.110	A1	Minami Torishima		VKØWI	52.160		Macquarie Islands
TI2NA	50.08	A1	San Jose, Costa Rica		ZB2VHF	50.035	A1	Gibraltar
					ZK1AA	50.1		Cook Islands
VE1SIX	50.088	A1	New Brunswick		ZL2VHF	52.500		Palmerstan N., NZ
VE6ARC			Alberta		ZS6PW	50.029		Pretoria, S. Africa
VE6NAB	50.050		Alberta		3D3AA	50.100		Fiji Islands
VK2WI	52.450		Sydney, Aus.		5B4CY	50.500		Cypress
					5W1AR	50.100		Western Samoa
					6Y5RC	50.025	fsk	Kingston, Jamaica

Notes: 1 — Attended. 2 — Present operational status unknown.

TV Sound Signals Within Band

VK2	51.740	Wagga, Aus.
VK3	51.760	Melbourne, Aus.
VK4	51.750	Brisbane, Aus.
ZL1	50.740	Auckland, NZ
ZL2	50.750	Kau Kapunake, NZ
ZL2	50.760	Waukapunake, NZ

Public Service

Conducted By Robert J. Halprin,* K1XA

Quite a REACTion

Dateline Buffalo, NY. Why Buffalo? Good question. Everyone has to be somewhere, right? And at times, you can't get here from there, "there" being Cleveland, with a stopover at Buffalo to change planes for Hartford. But the flight leaving Buffalo is delayed; the TV screen says "info by 9:45 pm," whatever that means. So while I'm waiting, might as well do something constructive, since already having devoured all the magazines and checked out the "interesting" passengers.

On August 10-13, 1978, REACT, Inc. held its third annual leadership conference at the beautiful campus of Baldwin-Wallace College in Berea, OH, just a flip-flop from Cleveland. A full agenda of activities and speakers was scheduled, ranging from FCC and National Weather Service, to Red Cross and ARRL. The REACT groups, teams, councils, etc., send delegates to this conference, which was masterfully conducted by REACT hq.'s managing director, Jerry Reese, and coordinated by the host group, Suburban REACT.

The League was there ostensibly to foster more local cooperation between the Amateur Radio Emergency Service and the Radio Emergency Associated Citizens Teams, which is the cream of the crop of all those in the Citizens Radio Service. Though emergency coordinators and radio clubs in some places already work with REACT, there is room for more expansion. I was also there to learn about REACT; to see what they're all about. And let me tell you, as a result of attending this event, I'm a believer. If there is another volunteer communications organization as sincerely devoted to emergency operations as they are, I sure would like to meet 'em.

Actually, cooperation between hams and REACT is a great untapped resource. Amateurs should at least *consider* an arrangement with their REACT counterparts. And there are many hams who are REACTers, including some on their Board of Directors.

What was news to me was the fact that the Class A Citizens Radio Service permits repeaters on 460 MHz. There were so many of these delegates walking around with Handie-Talkies that for a moment I thought I was at a ham convention. But no, the rigs were for Class A CB. With so much amateur emergency work being handled on 2-meter repeaters, the availability of the GMRS repeaters conjures up some interesting possibilities. Another thought; hams don't have a monopoly on non-commercial repeaters.

Following my usual less than awe-inspiring talk, I distributed our latest list of section emergency coordinators to the enthusiastic audience. Presumably, by now SECs and (through the chain of command) ECs have been contacted by REACT people in their locality who are interested in combining forces. Don't sell them short. They aren't the stereotypical, hairy, obese truck drivers with saliva dripping down their chins. They are friendly people, communicators like you and I who want to serve their community. And besides, with so many new hams joining us from the Citizens Service, this is a good way to get more recruits.

The REACTers have the numbers, enthusiasm and direct access to the public. The hams have more sophisticated techniques, operating skills and a tradition of discipline. The union of the two groups could be great. Why not give it a chance? If it doesn't work, get a divorce.

In certain areas, REACT is assisted by ham radio for communications between REACT groups in different counties or states in emergency situations. In other areas, ARRL emergency coordinators work with REACT during the Simulated Emergency Test, Field Day, public safety events and in real crises.

All we're suggesting is that you give it a try; not with the lawless segment of the 27-MHz crowd, but with the responsible Citizens Radio operators. Ah, the flight has finally been called, so have to go QRT. For information on what a successful arrangement between the two services is like, contact Margaret Williams, WA4FTJ, 965 Redwood Circle, Virginia Beach, VA 23642, or Maida Thompson, 283 S.W. Seminole Blvd., Melbourne, FL 32901.

PUBLIC SERVICE DIARY

☐ Pacific Ocean — June 26. A young girl aboard a vessel near Tahiti was in critical condition due to a bee sting. FO0PJM was also aboard and contacted WIBFA who relayed instructions from a local doctor on how to administer and conserve medications until the girl could be transported to a Tahitian hospital. (K5RP, W6NAZ and W9EWW)

☐ Fuerteventura, Canary Islands — July 1. In QSO with EA8QU (an official of Fuerteventura), WB2SHB, of the New York State Department of Conservation, learned that the island had a special pollution control problem: Solid wastes could no longer be dumped into the sea as it posed a threat to the economically important shellfish beds. "It would be best to recycle these wastes," EA8QU remarked, "but no systems are available for an island community of 10,000." Since SHB was involved with designing similar systems, he was granted permission as a public service to develop a suitable recycling system for the island. (WB2OGN)

☐ Grand Turk Island — July 7. Several stations on the Intercontinental Amateur Traffic Net reported hearing a distress call from the trawler *Crown Jewel*. The vessel was leaking badly and the Air Force and Coast Guard were called and pumps were transported to the scene. (WB5JMC, Mgr. ICN)

☐ Fort Collins, CO — July 14. While a patient in a hospital, WB0YSE monitored 2 meters and heard a request for assistance from a camp located on Commanche Peak. The camp counselors had taken 52 children on an ice field and some children had been injured and required rescue via helicopter. YSE was in continual contact and relayed information to the hospital staff in order that everything would be ready for the incoming patients. (J. R. Peterson, Administrator, Poudre Valley Memorial Hospital)

☐ Willard, OH — July 19. WD8AFD requested help in locating the parents of a three-year-old girl who had been attacked by a dog. Parents' permission was needed before medical treatment could be administered. After an extensive search the parents were found and the permission relayed via 2 meters. (WB8VZX)

☐ Santiago, Chile — July 30. An urgent call for life-saving medicine was made on the Inter-America Traffic Net by CE1BG/CE3. The medicine was needed for a woman who had suffered a severe heart attack. LU9DP, assisted by LU1EKM, located the medicine and shipped it to Santiago. (K4GOS)

☐ *Repeater Log.* According to reports received to date, repeaters and fm simplex frequencies were used in conjunction with 154 vehicular emergencies, 11 fires, seven searches and rescues, six medical emergencies, six tornado watches, five crime reports, two weather emergencies and 11 miscellaneous incidents. Repeaters involved were WR1s ABU ADP AFL AHG AHO, WR4s ACI ACY AFO AGA AMN APE ARI,

The ARRL Ham Radio Newsline: 203-667-0138

Our Public Information Office's 24-hour Newsline should be used to report items of interest to the general public, so that this information can be passed on to the news media. News dies a quick death, usually within hours, so please call before, during or immediately after the newsworthy event.

We suggest that you write down the essential details of the event before calling and when you do call, please follow the directions on the recorded message. Don't forget to supply your name, call, address and telephone number(s) where you can be reached. Names and phone numbers of other contacts in your area would also be appreciated. Remember, your story is for the public at large, which for the most part, is unfamiliar with Amateur Radio. So, for publicity purposes, names are more important than call signs.

Please note: In order to have *emergency communications reports* duly covered in the Public Service Diary or elsewhere in *QST*, follow up your phone call with a *complete written report*, directed to the Communications Department. — *K1XA*

*Asst. Communications Mgr., ARRL

WR5s ABA ABF ABY AEV AIB AMD APN, WR6s ABD ACF ACY ADM ADW AJL AWM AZO, WR7s AEL AKO, WR8s ABA ABC AGR, WR9s ABP ABQ ADU AGS, WRØs ACD AEV ARG, VE3WJN.

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Gainesville, FL — May 4. In the early morning a tornado devastated the area and hams came to the aid of local officials by assessing damage, providing backup communications and relaying priority messages. (K4PPQ, EC Levy Co.)

☐ St. Catharines, ON — June 7. Twelve amateurs worked with the Niagara Regional Police and the local REACT CB group during the search for a lost boy in this area. (VE3DVE, EC St. Catharines)

☐ Holden Village, WA — June 14. Via the Northwest Amateur Monitoring Service, WB7CVM sought aid for a woman who had suffered a heart attack. W7FS arranged for a helicopter to transport the victim from this remote area while doctor's instructions were relayed by W7ETO. (W7IEU, SCM WA and W7UU)

☐ Winnipeg, MB — June 19. A tornado swept through this area causing extensive damage. Local ECs were alerted and mobile operators were sent to the hard-hit areas to relay emergency information to the authorities. (VE4PG, SCM MB)

☐ Sheppard AFB, TX — June 26. Two small boys strayed from home and local hams volunteered to assist in the search. K5ZHP spotted the boys one hour after the search had commenced. (WA5UTA, EC Wichita Co.)

☐ Conyers, GA — July 10-11. Two hundred people were evacuated when a train transporting acetylene, alcohol and chlorine derailed. At the request of the Red Cross, local hams linked the scene of the accident with the evacuation center. (K4SWJ, SEC GA)

☐ Androscoggin River, ME — July 7. A seven-year-old girl was missing and presumed drowned and the Central Maine Emergency Net provided communications on land and aboard boats during the search in the Lewiston and Auburn areas. (WA1SMY, Mgr. CMEN)

☐ Jefferson County, PA — July 9. After a tornado struck and wiped out communications, local hams stepped in to assist authorities and relay health and welfare traffic. (WA3UFN, EC Clearfield Co.)

☐ Plattsburgh, NY — July 16. Following the capsizing of a sailboat carrying 11 persons on Lake Champlain, local amateurs were called to provide communications between the Clinton County Sheriff's Department marine units and the U.S. Coast Guard Auxiliary during the search and rescue operations. (WA2HSB, EC Clinton Co.)

☐ SEC Reports. For July 33 SEC reports were received denoting a total ARES membership of 16,815. This represents a 3 percent decrease in reports received one year ago (34), but a whopping 32 percent increase in ARES membership (12,763). Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, EBay, EMass, Ga, Ind, Iowa, Kans, Mar/Nfld, Mich, NLI, NC, NFla, NH, NTex, Ohio, Okla, Org, Oreg, SDgo, SFla, SJV, SCV, Sask, SNJ, Va, Wash, WVa, WMass.

NATIONAL TRAFFIC SYSTEM

W7VSE sent thank-you radiograms to each SCM in the seventh region because of an overall section attendance record of 99.7 percent on RN7-E. FB! WA7IHS is acting manager of RN7-D, following the resignation of VE7DKY. W2JJ postulates that 1RN-E forgot that NTS operates on weekends; 1RN was a no-show eight times on EAN in July. 2RN-D has its best month since W2RQ took over while 2RN-E had its worst under W2MTA.

July Reports

Area Nets

(evening sessions)
(daytime sessions)

	1	2	3	4	5	6	7
EAN	31	1376	44.3	1.037	94.1		
EAN	60	682	11.4	.580	90.6		
CAN	31	899	29.0	.752	98.4		
CAN	62	410	6.6	.266	94.6		
PAN							
PAN	28	407	14.5	.296	86.0		

Region Nets

1RN*	61	498	8.6	.498	97.7	86.0
2RN	122	755	6.2	.398	87.4	94.6
3RN	93	436	4.7	.461	98.9	95.7
4RN	124	902	7.3	.298	70.2	97.8
RN5	93	989	10.6	.345	88.2	98.9
RN6	93	783	8.4	.333	98.9	
RN7	123	593	4.8	.370	99.1	
8RN*	57	285	5.0	.288	88.2	94.6
9RN	124	549	4.4	.301	89.0	95.7
TEN	88	426	4.8	.234	59.7	92.5
ECN	59	184	3.1	.320	73.1	100.0
TWN	89	482	5.4	.330	79.4	

TCC

TCC Eastern	175'	709	
TCC Central	194'	699	
TCC Pacific	110'	639	
Sections	4651	17412	3.7
Summary	5989	30115	5.0
Record	5810	30696	15.2

*Incomplete report
'TCC functions not counted as net sessions.
Section and local nets reporting (141): MEPN MSTN (MB), APN (Mar/Nfld), CMN GBN GBSSN ODN OPN OSN (ON), WQV/UHF (PQ), SATN (SK), AENB AEND AENM AENS (AL), ASN (AK), ATEN SWN (AZ), ARN OZK (AR), HARC NCN (CA), CN CWN (CO/WY), CN CPN NVTN WESCON (CT), DEPN DTN (DE), FAST FMTN FPON FPTN GN NFPN PBTN PEN QFNS SPARC TPTN (FL), CGVHFN CVEN GARES GSN GSSBN GTN NGSN WGN (GA), IMN (ID/MT), ILN ICN ITN QIN (IN), ICN I75MN TLCN (IA), KPN KSBN (KS), KNTN (KY), LAN LTN (LA), CMEN PTN SGN (ME), MDCTN MDD (MD/DC), EMRIPN EMRISS HHTN NCNN RIEMTN (MA/RI), MACS MiTN (MI), MNN QMN MSN MSPN MSSN PAW (MN), MN MSBN MSN MTN (MS), NEMOE (MO), WNN (NE), MCN NJN NJPN (NJ), NMRRN (NM), NLI NLIPN NLIVHF NYS WDN (NY), NCSSBN SCSSBN THEN (NC/SC), ONN OSN (OH), OAN OLZ OPEN OTWN (OK), ARESTN JCARES OARES 16/76 OSN PAARES WCN (OR), EPA EPAEPTN PFN PTTN WPA WPAPTN (PA), SDEN SDMN SDN (SD), HCN TEX TTN (TX), BUN UCN (UT), SVSN VFN VN VNTN VSBN VSN (VA), NWSSBN WSN (WA), WVN WVNN WVPN (WV), BEN BWN WIN WNN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

W9JIJ did a terrific job holding things together while TCC-C(D) Director W9NXG was out of town. TCC-E(E) certificates to K1BA (third annual) and K4KNP (ninth annual).

	1	2	3	4	5
Eastern	188	93.1	1803	709	
Central	217	89.4	1307	699	
Pacific	124	88.7	1302	639	
Summary	529	90.4	4412	2047	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (July): Eastern Area (VE3SB/N2YL, Directors) — W1s KX NJM OD, WA1s UNC UWF VEI ZAZ, WB1AIU, K1s BA EIR GN PAD SSH XA, W2s CS FR GKZ MTA RQ, WA2s ERT/1 ICB SPL, K2NY, N2YL, W3s FAF PQ YQ, K3s KW NGN, N3HR, W4s MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9NXG, Directors) — AA4KB, W4ZJY, W5s GHP KLV RB, WA5s BHF INJ IQU RKU SDD, WB5s FDP NKC, WD5GNR, K5s GM MC, N5s TC TS YL YX/Ø, W9s CXY DND FC JIJ NXG, WØs AM HI, WAØTNM WBØZAL. Pacific Area (K5MAT, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA VZT, K6OE, N7AM, W7s DZX EP GHT VSE, K7s HLR IWD, WØs KON LQ, KØs BN CI DJ, WBØTAQ, VE7ZK.

Independent Nets (July)

	1	2	3	4
Amateur Radio Telegraph Society	31	443	105	
Central Gulf Coast Hurricane	31	225	1939	
Clearing House	31	350	612	
Empire Slow Speed	31	84	332	
Hit & Bounce Traffic	62	848	1151	
IMRA	26	443	851	
North American SSB Traffic	26	273	189	
North American Traffic and Awards	31	97	576	
Southwest Traffic	31	106	1163	
Washington Region PON	17	22	277	
20 Meter ISSB	26	496	541	
75 Meter ISSB	31	514	977	
7290 Traffic	40	490	2370	

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll July 1978

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 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. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

76
WA2JKG
72
W5KLV
69
W7VSE
63
WA1ZXB
AA2H
WA5RKU
61
K1BA
W2MTA
WA4CNY
N5ES
WA6UAZ
W7GHT
WB8MTD
W8SOP
WB8YDZ
WBØZAL
59
WA4JDH
K5TL
W8DIL
57
WB4PNY
WB5NKC
WB5SDD
WA7YCM
56
W1KX
W1TN
W3YQ
K4BKX
N4NK
WB4QBB
N4WA
W5GHP
WB5NKD
N5YL
W6OA
KØPIZ
VE3GT
55
K5OWK
WD4MBV
54
N4SS
WB1CPF
W1RWG
WD4COL
W4MEE
N5TC
52
WB6WTS
WØOTF
51
N8ABA
50
K3HI
49
WA3NAZ/4
W4SUS
WB4ZOJ
W5JOV
WB6PVH
K7GXZ
WA7MEL
WA8WPW
WAØTNM
VE1WF
VE3DPO
VE5AAE
48
WA9QCF
47
W2SQ
WB3PAV/3
WD5AHH
N8CW
WB9KPX
KØDJ
46
W2XD
K3JL
WD4LUG
W8YIQ
WB6FTY
KØPVI
45
W8VPW
44
WA1QFX
WA1VAB
W3PQ
W4ANK
WA4CCK
WB4DHC
K4JGW
WA4PFK
N4PO
WB4TEK
K4VHC
WA4UYD
W4ZJY
WD5AAT
WB5LAT
W5VMP
KB8BZ
WD8NKA
WD8NYN
W9NXG
VE1RO
VE1ST
VE3GOL
43
W1TM
W4FMN
W4JK
WA4OMQ
WB4OXT
K4SWJ
N7AM
42
WA1TBY
WB5LBR
WD8DIB
41
N2CR
WB2JAY/4
N2SU
W4LXB
WA4VLT
N6GW
W9HOT
WBØONK
40
W1BJ
WA1MJE
WB3DKT
N3EE
W4HON
W6JXK
27
W4MHO/T
22
WA1SMY/T
WD4BAJ/T
WA4MJT/T
WA4QGV/T
WA4VKD/N

Brass Pounders League July 1978

BPL Medallions (see December 1973 *QST*, page 59) have been awarded to the following amateurs since last month's listing: WA2SPL, K4KA, WB8KWD, W8SOP.

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	634	1333	1509	66	3542	
WØWYX	54	1103	532	571	2260	
WA4JDH	5	638	640	5	1288	
W3VR	369	210	427	9	1015	
WB5SDD	19	334	351	47	751	
K3NSN	510	185	180	5	880	
W9ZGQ		569		243	812	
W4MEE	3	351	339	6	699	
WA3WOP	102	236	336	4	678	
WB4PNY	4	329	293	8	634	
WA3ZRY	43	259	283	10	595	
K5OWK	232	81	245	22	580	
W9JIJ	52	251	241	10	554	
WAØHJZ	23	298	3	226	550	
W7DZX	21	254	265	3	543	
W7VSE	6	260	259	15	540	
WAØAUX	25	189	304	3	521	
W9JUJ	40	263	213	4	520	
W5KLV	2	283	214	17	516	
W4JK	7	243	261	2	513	
WN4KKN	10	257	218	17	502	
WAØHJZ (June)	27	296	2	233	558	

BPL for 100 or more originations-plus-deliveries

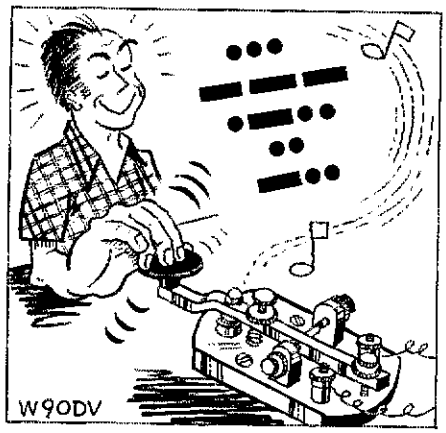
WA6BMH	305	WBØHOX	140
WA3ATQ	290	W7SQT	113
WBØQEU	201	W8CUP	113
W7TZK	191	WB4DBK	108
K7TNS	174	WD4COL	106
WDØAIT	170	KØZBK	100
WØFQB	170	W1TN (June)	104

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Straight-Key Night

SKN, where we ask that age-old question: Is brass pounding considered a contact sport?

By Bill Jennings,* K1WJ



"Besides *solid* copy, SKN was *solid* fun and satisfaction." Tnx to W9ODV. You'll remember Joe as W8LWD for his FB SKN cartoons.

"The reports of Straight-Key Night's demise are greatly exaggerated." The words (only slightly changed) are those used by Mark Twain in answer to an erroneous wire-service story that had Twain pushing up daisies well before his time had come. Like old Mark Twain at the time of his famous remark, Straight-Key Night is, indeed, alive and well and again scheduled for January 1.

Sagging participation had threatened to put an end to SKN, and although the 141 reports for this the latest running of SKN, held July 4, 1978, aren't an overwhelming number, they do represent a 26 percent increase over the January total of 112 reports received, and look like a landslide next to the 66 reports received for the July 4, 1977, SKN. Good show.

Stations from all the U.S. call areas all Canadian provinces, and 10 DXCC countries (including all continents except Africa) are among the 703 different stations reported worked during the latest SKN period. The second U.S. call area had the greatest number of different stations reported worked at 101, followed by the W4s with 93 and the W8s with 83 stations reportedly active during SKN.

W8GMH received four votes to lead the pack in the "best fist" competition. Right behind with 3 "best fist" votes each were W2LYH, W3ARK and W9TG. WB1GFK, WB2JAX, WA4IBI, W6IO, W7ITJ, WA7NXL, W8AQ and WD9ECT all wound up in a third-place tie with two votes each.

K3ORW and K6WL share "most interesting QSO" honors with three votes apiece, while W2AET, WB2JAX, WD6CKR, AB6D, W6HOZ and VE3KK all tallied two votes each in this category.

It is interesting to note that WB2JAX was the only station to get multiple votes in both categories.

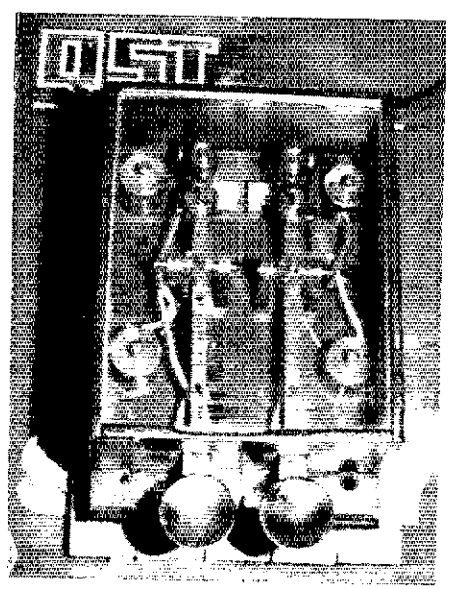
Next SKN? January 1. See December 1978 *QST*, "Operating Events" column, for details.

Sideswipes

I used the venerable ole J-38, which I bought new back in '57 when I first got on as a Novice. Somehow, I remember my fist as being much better back then than it was this past SKN . . . I've only been back on the air since last fall . . . reading about a previous SKN helped inspire me to get a ticket again . . . (WD9GXW) How about a straight-key net? (WB4ERM) Felt the urge to QSO Soupy, W5NW, whom I first QSO'd in 1926 . . . got him on the landline and he obligingly came on the air (he usually goes via ssb, but made an exception in this instance) and we had our second QSO with 52 years intervening . . . helped me to connect the ends together since I was only 18 years old in 1926. Hi! (K6WL) Luv is . . . beatin' brass on SKN. (W8GMH) SKN served as a celebration for me as I had been on the air as a ham for one year as of July 4. (WD9EKA) Heard one good-natured sorehead calling "CQ BBN." I asked him what that meant and was informed "Bad Bug Night." P.S. He'd have gotten that prize (Bad Bug) too! (WB8MTD) Interest in SKN must be growing, as two of the five stations that I worked in SKN purchased straight keys just for the event. (WB3IXF) Straight key is nothing new to me, have been using one since I was first licensed in 1920 and two years before that. (W2HWF) The most interesting QSO that I had was with W9YZE, who has been poundin' brass for 62 years. (K5XO) Many reports of dusty keys but the fists were certainly well oiled. (W2EFU) Heard a great deal of SKN activity on both 40 and 20. The article in *QST* about sagging SKN participation apparently did much to encourage participation. I, for one, would sure hate to see SKN become Silent-Key Night. (WB6DMM) . . . at five and a half hours into SKN, I worked WA2RXB, who said that I was his first contact. Said it took him that long to read the instructions and figure out how to operate the straight key . . . Hi! (AB6D) I decided that we amateurs who have never touched an electronic keyer should show our brass . . . here's a contest where everyone wins. (W8TM) What a joy to do more than pass reports, wx and rig info. (W6CYM) I am a 12-year-old YL and this was my first SKN . . . It was terrific! (WD4KFH)

"I saw her just this past July.
The glint came back into my eye
From memories of days gone by —
Oh Glory! How the time does fly.
She hadn't seemed to change a bit,
But my caress just wouldn't fit.
A keyer was my thing you see,
While she was still an old straight key."
— *W5JOV*

VE3KK uses his old Western Union Cable Key for SKN. M. S. has been using the key since 1927 when his call was CT2AA. This particular key saw service on the Horta-Hammel L.I.N.Y. 1HO permalloy cable — one of the original undersea cables.



*Communications Assistant, ARRL

45th ARRL November Sweepstakes Announcement

Cw, November 4-6 . . . phone, November 18-20.

An expanded affiliated-club-competition awards structure highlights the 1979 version of the November Sweepstakes. Be sure that your club and/or the appropriate club officers are aware of the conditions and requirements that must be met for entry into one of the three different levels of club competition. Complete requirements are listed in August 1978 *QST*, page 66.

Note: Logs *must* be postmarked by *December 11, 1978,* to be a valid entry.

Be sure to allow plenty of time to request the forms you will need to participate: One log sheet per 100 contacts and one each dupe sheet (Operating Aid 6) and summary sheet per mode operated (weekend). Send your request with an s.a.s.e. and affix one unit of first-class postage for each five sheets requested.

In order to minimize interference to noncontest stations, suggested frequency ranges are shown in Table 1.

Table 1

CW	*Phone*
3550-3650	3850-3950
7050-7100	7200-7250
14050-14100	14250-14300
21050-21100	21300-21400
28050-28100	28550-28650

Look for Novices and Technicians around 3710, 7110, 21110 and 28110.

After the SS, be sure to postmark your entry by December 11, 1978; send it first-class mail! If you want to make sure it arrived at Headquarters, enclose a self-addressed postcard which we will mail back to you. For a list of high claimed scores, enclose an s.a.s.e. with your entry. Club secretaries are requested to send a list of *call signs only* of all club members who were eligible to participate for the club in the SS. Good luck!

Rules

1) *Eligibility:* This contest is open to all radio amateurs in (or officially attached to) sections listed on page 8 of this issue of *QST*. U.S. possessions in the Pacific are part of the Pacific section. KP4, KV4/KP2 and KG4 are all part of the West Indies section.

2) *Object:* To exchange QSO information (as explained in section 5) with as many amateurs in (or officially attached to) ARRL sections.

3) *Conditions of Entry:* 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.

4) *Contest Period and Time:* All contacts must be made during the contest period indicated elsewhere in this announcement. Time spent listening counts as operating time. No more than 24 hours of operation are permitted during the

Contest Periods

Starts	*Ends*
CW	
Saturday, Nov. 4 2100 UTC	Monday, Nov. 6 0300 UTC
Phone	
Saturday, Nov. 18 2100 UTC	Monday, Nov. 20 0300 UTC

"What, me operate in Sweepstakes? You've got a case." Stan, K8MJZ, on the left, and Barry, WA8QEF, renewed their SS rivalry in the Michigan section in 1977 (See May 1978 *QST*, page 66). Barry nosed out Stan on cw, but Stan came out on top in the phone portion. Wonder which way that case of brew will be going this year?

Explanation of Exchange

	NR	Precedence	Call	Ck	Place
Exchanges	Consecutive serial number	Power input less than 200 watts dc	Send your station call	Ck (Last two digits of year first licensed	Your ARRL section
Sample	NR1	A	WA1QNF	72	CT

30-hour period. "Off" periods may not be less than 15 minutes at a time. Times on and off and QSO times must be entered in your log.

5) *Valid QSOs:* Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. Cw stations work only cw stations and phone stations only other phones. Valid points can be earned by contacting stations not working in the contest upon acceptance of your preamble and receipt of a preamble.

6) *Scoring:* Each station from which a preamble is received and to whom a preamble is sent and acknowledged, results in two points. Partial QSOs do not count for scoring purposes. No additional points can be earned by recontacting the same station, regardless of the frequency band (i.e., repeat QSOs, even if on different bands, are not allowed). The total number of ARRL sections (plus VE8/VY1) worked during the contest is the section multiplier — maximum possible total of 75.

The final score equals the total points times the section multiplier.

7) *Entry Classification:* Entries will be classified as single- or multiple-operator stations. Single-operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multiple-operator stations are those obtaining any form of assistance, such as from spotting or relief operators, or keeping the station log or records. The use of any type of "spotting" or "multiplier" net places the entry in the multiple-operator class.

8) *Reporting:* Contest forms (log sheets, summary sheets, Operating Aid 6) are available free from ARRL hq. or you may use forms of your own design provided they follow the indicated format. Every competing entry claiming 200 or more QSOs must have cross-checking sheets (Operating Aid 6 or similar) attached. *Any log omitting times on and off, or omitting QSO times, or omitting cross-check sheets (when required), or omitting a summary sheet or any information requested therein (see sample) will not be considered for competitive* QST *listings or awards.* Such logs will be classified as "check-logs" and will be processed accordingly. All entries become the property of ARRL and none can be returned. Although FCC rules no longer require most log-keeping, each competitive entry submitted must include date, QSO times, times on/off, exchange sent, exchange received, band and mode.

9) *Miscellaneous Rules:* A transmitter used to contact one or more stations may not be subsequently used under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).

Yukon-N.W.T. (VE8/VY1) counts as a separate multiplier, for a possible total of 75 multipliers.

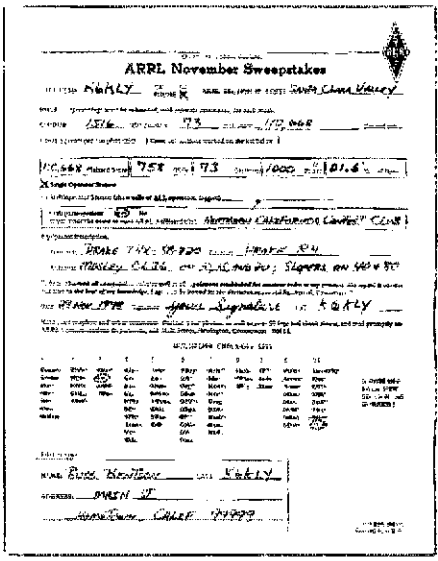
If your power is 200-watts dc or less, send "A" as your precedence; otherwise send "B."

The operation of two or more transmitters simultaneously is not allowed.

10) *Awards:* Certificates will be awarded in both the cw and phone contests to the highest scoring class "A" entrant and the highest scoring class "B" entrant in each section, provided that *either* (1) there are at least three single-operator competing entrants from that section in that power class, *or* (2) the top single-operator score from that section in that power class has 10,000 points or more.

Multiple-operator entries, regardless of license class of operators, are not eligible for certificate awards and will be listed separately in the final results in *QST.*

11) *Club Competition and Disqualifications:* See February 1978 *QST*, page 83 and August 1978, page 66.


ARRL November Sweepstakes

The Oklahoma section is the home of K5VRX. In the 1977 SS, Roger placed number five nationwide in the low-power phone category.


KØKX, number 10 nationally in the high-power cw category in the 1977 Sweepstakes.

ARRL Sweepstakes

CALL USED.. K6KLY.. ARRL SECTION.... SCV

C.W. ☐ PHONE ☒

Separate logs and summary sheets required for each mode.

	PREC	CALL	CK	SEC
	B	K6KLY	57	SCV

SENT — RECEIVED

HAND	DATE	TIME ON/OFF	TIME	NR	NR	PREC	STATION WORKED	CK	SECTION	POINTS
3.8	20mw.		0244	751	419	B	K1TO	72	CT - #72	2
			45	52	354	B	W7LRG	61	WASH	↓
			46	53	10	B	N6SF	58	SCV	↓
				54	112	A	WA1ZMM	63	CT	Dupe - Ø
			51	55	209	A	WB6BRM	70	SF	2
			53	56	453	B	K1ZE	62	CT	↓
			54	57	1338	B	WB7AEB	63	ARIZ - #75	↓
			55	758	301	B	N6TM	54	SV	↓
		OFF 0300	57	759	211	A	W6KPJ	60	S.Bar.	↓
				60						
				61						

Results, 1978 ARRL International DX Competition

Record participation, record scores, and records perhaps never to be broken.

By Tom Frenaye,* K1KI

The smoke has finally settled after the finish of the last two-weekend-per-mode ARRL DX Competitions. A record 3445 logs representing an overall increase of 13.5 percent contributed to the many new record scores.

The increase in sunspot numbers over last year's contest, especially on the phone weekends brought the multiplier and QSO totals way up. The change was most evident on 160 and 10 meters. On 10 meters this year W2PV squeezed out 117 countries on phone compared with the 48 the W5TMN group worked last year. On 10 cw the gang at W4BVV found 86 countries compared to the 40 found by W3TV in '77. On 160 meters the opposite was true with 14 multipliers on phone and 19 on cw this year compared with 22 and 29 last year.

Things were so good, in fact, that many people never did make it to the low bands since they could work 20 meters all night long and 15 long after sunset. The low bands weren't that much worse this year but seemed to be because so many did stay on the high bands. Top honors for W/VE high banders this year go to N2LT on phone and N2OO on cw with both averaging close to 50 QSOs per hour for the 96-hour period. On the low bands W1FC nosed out K3ZO on phone, but on cw K3ZO (now HS1ABD) edged out N4UM. Turns out Fred only decided to enter under the low-band category at the last minute after winter storms eliminated all-band possibilities.

From the DX end of the contest, high-band honors on phone went to HC1BU with an astounding 7400 QSOs and a score big enough to place third in the world for single-operator stations. On cw, K5PM, operating KP4USN, turned in the best high-band score. On low-band phone KP4WI took advantage of his proximity to the U.S. to best G4AMT. Low-band cw saw an absence of the usual Caribbean/South American activity and ØJX edged I2XXG for honors.

Single-operator scores were dominated by the giants on the East Coast. Only one score from west of the Mississippi made the top ten — WA1KKM operating N7XX on phone made up for the lack of European multipliers by an incredible number of JAs and placed number two. First place on phone was turned in by K1ZM operating W1ZM. Jeff's 11 multipliers on 160 were topped by only one station — W2PV. The third spot went to W9ZRX, back on the air after a few years of planning and construction.

On cw, W3LPL pulled it out over some heavy-duty competition, while W3RJ's effort netted him second place. Claimed scores made the final winner a toss-up, but in the end PVRC's premier cw single operator bested the one from the Frankford RC. It was about the only victory PVRC could claim this year, though. Four of the seven top-ten cw scores were from New England, with the YCCC taking advantage of the good conditions to increase their score. W3BGN was the only operator at his own station to place in the top ten on both modes, though K1ZM managed it from W1ZM. Doing it on both modes may be the toughest challenge the contest offered.

From the DX point of view, KH6IJ on phone and KP4EAJ on cw walked away with the honors, as they have done many times in the past. EL2T was number two on phone and the lone African entry in the top ten, either mode. Outstanding performances were also turned in by three Europeans who broke the top ten on phone this year. G3ZQW did an especially fine job with 2.5 million on the high bands only! On cw, N6CJ operating from XE1FX nosed out PJ2VD for the second position. ZL1ADI was the only station from the Southern Hemisphere to break through with a number seven finish and DK3GI rounded out the ten spots with the top European score. Both KH6IJ and PJ9JT (W1BIH) placed in the top ten on both modes, with PJ9JT's operation being only one weekend. Watch out next year!

Stations west of the Mississippi finally broke into the big time with some fine multi-single efforts. The top finishers were from the East (W1ZA, on phone and K4VX on cw) but six of the ten top multi-single scores on phone came from the West with K5JA leading the pack, followed closely by WA7NIN. On cw K4VX

Top Ten DX Single Operator

Phone		*CW*	
KH6IJ	5,702,052	KP4EAJ	6,110,235
EL2T	4,402,125	XE1FX	5,489,454
HC1BU	3,760,926*	PJ2VD	5,423,898
KH6WF	3,364,296	KH6IJ	4,266,585
OZ5KF	3,316,776	KH6NO	3,035,520
I3MAU	2,963,448	PJ9JT	2,628,417
FP8DX	2,860,260	ZL1ADI	2,591,820
PJ9JT	2,583,774	HC2SL	2,551,500
HI8CDS	2,517,000	JA1PIG/PZ	2,548,200
G3ZQW	2,516,976*	DK3GI	2,536,578

*High band only

Top Ten W/VE Single Operator

Phone		*CW*	
W1ZM	3,973,704	W3LPL	3,394,341
N7XX	3,392,280	W3RJ	3,362,820
W9ZRX	2,902,698	W1ZA	2,835,540
N4RV	2,874,690	N2LT	2,651,184
W3BGN	2,859,948	W1ZM	2,615,955
K9HMB	2,831,688	K1OX	2,405,325
N1GL	2,788,989	K1NA	2,349,468
K1BW	2,592,636	N9MM	2,319,678
W3LPL	2,546,412	W3BGN	2,240,835
W9RE	2,226,159	K9DX	2,211,978

*Assistant Communications Manager, ARRL

was closely challenged by N3RD, K1TO and W4NL/3, with three California stations breaking into the first ten. N3AD placed number five on cw with the assistance of the FRC spotting net, showing that a one-man show can be competitive in the multi-single category.

Multi-single overseas entries on phone stacked up to show KH6DL as the big one, nosing out several one-weekend efforts from the Caribbean. European multi-singles were led by I0RDJ, followed by EI9CB. The folks at JA3YKC led all Asian entries for the second year in a row. On cw, all of the big scores came from Europe, with DKØTU edging out OK1ALW and YU2ACD for the number one slot.

This year's contest provided two rather incredible multi-multi scores — those of W2PV on phone and W4BVV on cw. The table entitled "Multi-Multi Madness" will give you an idea of the magnitude of their top scores and a comparison of the two stations. The totals at the end of the first weekend are also very impressive — more on that later.

Multi-Multi entries from DX stations showed JA9YBA (phone) and JA7YAA (cw) to be the best, with JA7YAA a repeater from last year.

The club competition in 1978 was very spirited. The Frankford Radio Club, after being edged out last year, stormed back with 133 entries this year (averaging one million points each!) to pull far ahead of the second-place Potomac Valley Radio Club and third-place Yankee Clipper Contest Club. Club competition next year will be a bit different (as detailed in August *QST*) with three levels of competition. The Colorado Contest Conspiracy with a big effort at KØRF and the Indy DXers with the return of W9ZRX made big jumps in score this year to join the top ten.

One weekend DXpeditions went to all continents this year, with the Caribbean being the favorite spot. A very close race was produced on phone with PJ8CO, VP2MT and WØUO/6Y5, along with non-DXpeditioners KP4ENV all breaking the five-million-point mark in 48 hours. The PJ8CO group came out on top with 5.4 million points.

Now for some of the complaints. Looks like the 10-minute rule instituted this year helped to cut down on the abuses in the

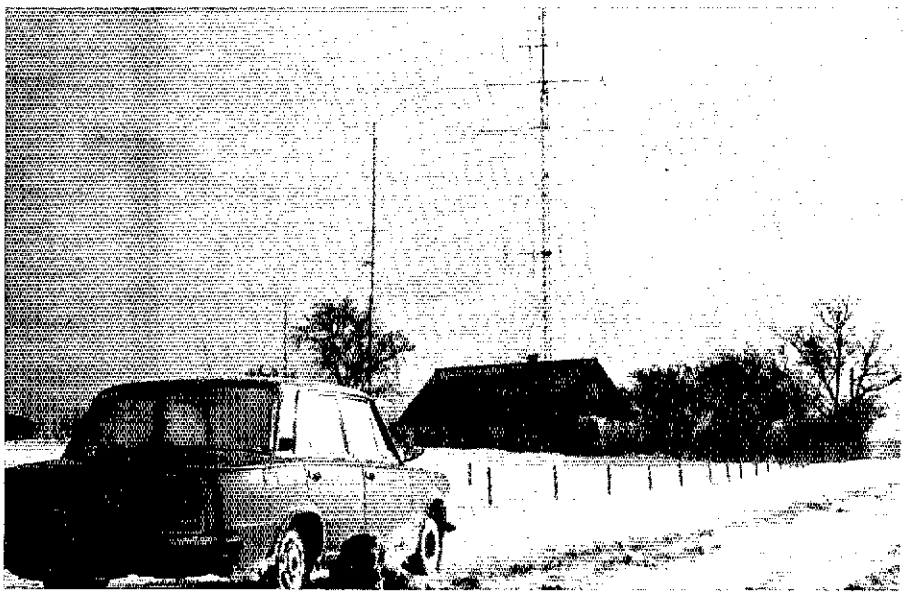
Division Leaders — Phone

All	*Low*	*High*	*Division*	*Multi-Single*	*Multi-Multi*
W3BGN	K3ZO	K3KG	Atlantic	N3RD	W3AU
W9ZRX	K9PPY	W9LF	Central	K9KA	—
WØUC	—	NØAT	Dakota	KØKX	—
K5UR	WA4MFS	W5AQ	Delta	W5RU	N5TV
WA4QMQ	W8TWA	W8FF	Great Lakes	N8JW	K8LX
W2RQ	WB2RTF	N2LT	Hudson	W2YV	W2PV
WØEJ	NØRF	KØLUZ	Midwest	WBØRET	—
W1ZM	W1FC	WA1UZH	New England	W1ZA	—
N7XX	W7LJ	W7WA	Northwestern	N7RO	—
WA6PGB	WA6DNM	WA6TKT	Pacific	WA7NIN	W6YX
N4RV	AA4VK	N4MM	Roanoke	K4VX	W4BVV
W5YZ	—	W5JW	Rocky Mountain	WBØLLR	KØRF
W4WKQ	N4WW	N4NX	Southeastern	N4KG	—
K6NA	WA6WZO	WA6EKL	Southwestern	N7DD	N6SV
K5DX	K5JZY	K5BZU	West Gulf	K5JA	K5TM
VE5RA	VE3BBN	WB2RLK/VE1	Canadian	VE6WQ	—

Division Leaders — CW

All	*Low*	*High*	*Division*	*Multi-Single*	*Multi-Multi*
W3LPL	K3ZO	N2OO	Atlantic	N3RD	W3AU
N9MM	K9JF	W9LT	Central	WB9CEJ	—
WØHP	KØKX	WØUO	Dakota	—	—
K4XU	N5DX	K5KLA	Delta	W4EAL	N5TV
N8ET	W8TWA	N8JW	Great Lakes	K8NZ	K8LX
N2LT	WB2RTF	W2IB	Hudson	WB2SJG	W2PV
WBØKWI	NØRF	KØMM	Midwest	KØAT	—
W1ZA	W1PL	K1DG	New England	K1TO	—
N7XX	K7UR	W7WA	Northwestern	K7TU	—
N6RO	N6BT	K7OX	Pacific	N6OP	W6YX
N4RV	W4UQ	W4HBK	Roanoke	K4VX	W4BVV
N7NG	WA5YTX	W5TVX	Rocky Mountain	KØFX	KØRF
N4WW	N4UM	N4NX	Southeastern	N4OL	—
N6AR	N6WO	N6CW	Southwestern	K6RR	—
N5TP	K5JZY	W5MYA	West Gulf	W5AC	K5RC
VE5DX	VE1AXT	VE6KW	Canadian	VE4OY	—

OZ5KF, his harmonics, his station and his antenna farm. Antennas are 4 over 4 element quads for 10, 15 and 20 meters at 145 and 70 feet, 3-element Yagi for 40 meters at 125 feet and a 2-element wire beam for 80 meters. The tower is 170 feet in height. OZ5KF is the single-operator phone European continental champ and number five single-operator phone, worldwide.



multioperator, single-transmitter category. A number of people were unhappy with it but on the whole it seems to be a welcome change. Duplicate contacts in the logs continue to be a major problem, but the number of dupes found in W/VE logs was down from last year. However, the number found in DX logs was considerable. Remember to take the time to prepare your entry before you send it in — duplicate QSOs, if left in the log, will get you a three-for-one penalty. If the total number of dupes is more than two percent, it means disqualification beginning in 1979.

The usual problem of stations not signing their call signs for every QSO and late logs are still with us. Please watch those deadlines!

Now for next year. The Contest Advisory Committee recommended to the ARRL Board of Directors in July that the DX Competition be reduced from two weekends per mode to one per mode. For 1979, this means that the phone weekend will be March 3 and 4 and the cw weekend will be March 17 and 18.

Instead of waiting until the last minute, how about sending away for entry forms today for the 1979 DX Competition? It never hurts to be early.

The scores were typed in a slightly different format this year, as we are trying to cut down on the space used, and make them more readable and useful for comparisons. The multi-multi scores are listed in order by score rather than by section or country because the competition in that category is not on the local level.

Now that you've seen it all, how would you do it? Are there any comparisons you'd like to see made? What could be added or deleted from the writeup? Remember that there is only so much space for contest writeups. On the other hand, the most important thing may have been left out. Want to change the rules? Make sure to write your CAC representative and let him know how you feel (W1NG, K2SX, W3HQT, K4PJ, W5MYA, N6NB, K7GM, K8IA, K9UIY, KØMM, VE7TT). Send the letter to Hq. and it'll be forwarded to all CAC members.

ARRL Affiliated Club Scores

Club Name	*Score*	*Entries*	*CW Winner*	*Phone Winner*
Frankford RC	133,888,530	133	W3RJ	W3BGN
Potomac Valley RC	102,332,480	101	W3LPL	N4RV
Yankee Clipper CC	81,061,450	81	W1ZA	W1ZM
Northern Cal. CC	24,044,093	38	N6RO	N6BV
Western Washington DXC	18,030,816	47	N7XX	N7XX
Northern California DXC	17,201,650	48	W6NKR	N6QR
Wireless Inst. of NE	15,839,853	36	N2NT	W2RQ
Murphy's Marauders	14,616,516	24	W1NG	K1BW
Colorado Contest Conspiracy	14,039,117	7		WØCP
Indy DXers	11,444,571	12	N9MM	W9ZRX
Texas DX Society	9,083,238	12	K5DX	K5DX
Southern California DXC	9,008,442	23	N6AR	K6RR
San Diego DXC	8,833,598	14	N6CW	K6NA
Mad River RC	8,436,910	16	N8ET	W9LT
Willamette Valley DXC	8,088,630	16	W7NI	W7EJ
North Texas CC	7,144,927	15	W5MYA	WD5EWP
Northern Illinois DX Assn.	6,982,730	16	K9DX	W9ZA
Gloucester County ARC	5,559,685	20	N2CQ	N2CQ
Twin City DX Assn.	5,379,834	5	WØHP	—
Ill-Wind Contesters	4,778,793	10	WA9PBK	K9HMB
Flyweight DX Group	4,637,945	20	N4DW	N4TN
Michigan DX Assn.	4,258,716	8	N8JW	W8LU
Eastern Iowa DX Assn.	4,174,488	21	WØVU	KØLUZ
Order of Boiled Owls of NY	4,162,772	8	K2LE/1	K2LE/1
Central Virginia CC	3,586,238	7	WB4BVY	W4XR
Central Arizona DX Assn.	3,446,574	3	—	—
Kansas City DXC	3,292,863	17	WBØKWI	WAØAGN
Richardson Wireless Klub	3,172,713	10	N5TP	K5NW
Southeastern DXC	3,057,741	19	N4NX	N4NX
Delta DX Assn.	2,896,044	7	—	W5OB
South Jersey RA	2,574,749	17	WA2YVA	WA2YVA
Alamo DX Amigos	2,438,592	22	W5JC	WB5HGS
Central Florida DX Assn.	2,375,988	4	—	—
Buffalo Area DXC	1,941,564	19	WB2ABD	WA2AOG
Southern California CC	1,912,857	3	—	—
Western Carolina ARS	1,734,489	5	—	N4AA
Toronto DX Assn.	1,577,922	4	—	VE3EUP
Old Barney ARC	1,533,657	9	K2TJ	N2CW
Southern Peninsula AR Klub	1,260,198	3	—	—
Amateur Radio Transmitting Soc.	1,232,127	4	N4XM	—
Ohio Valley ARA	1,164,729	9	W8RSW	W8HQK
Neenah-Menasha ARC	1,097,556	4	—	—
North Florida DX Assn.	1,042,152	4	—	W4ZTW
Brightleaf ARC	975,717	11	WA4DAN	WA4NHP
Winnipeg DXC	970,542	7	—	VE4EW
Memphis DX Assn.	950,745	5	—	WA4EAV
Greater Lansing DX Group	902,918	13	W8TJQ	WA8LTX
Blue Grass ARC	893,997	7	—	WA4PAR
Memphis DX Soc.	763,485	4	K5FC	
Mississippi Valley DX & CC	741,787	11	KØCD	KØCD
Columbus ARA	678,594	6	W8ZCQ	W8ZCQ
Virginia Century Club	664,363	5	—	W4IVU
Meriden ARC	503,412	9	W1KKF	W1KKF
Libertyville & Mundelien ARS	491,253	3	—	—
Charlotte ARC	434,484	5	—	—
Arinc RC	403,686	8	N3OS	W3PWO
Poughkeepsie ARC	395,736	3		
Greater Milwaukee DX Assn.	277,743	3	—	—
Lake Success RC	254,544	6	—	W2SGK
Four Lakes ARC	217,131	8	K9QXY	K9QXY
Greater South Bay ARC	193,920	8	K2TV	K2TV
Motor City RC	129,999	6	—	K8SIA
Overlook Mountain ARC	121,356	3		
Central Illinois DX & CC	75,570	3		
Saline County ARC	75,330	3		
Chicago Radio Traffic Assn.	33,261	4		
Saginaw Valley ARA	20,370	6	WA8ECH	WB8VBC
Larkfield ARC	10,980	3	—	W2GLE

Soapbox

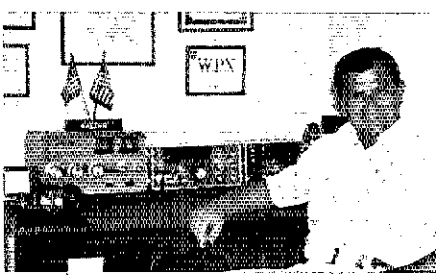
Happiness is working two stations on the same side of the checksheet! (W4BAA) This soapbox is correst and true. (N6DE/K5FC) [OK, Mojo, we get the picture. But you were only the second of two people to spot the spelling error on the DX Competition summary sheet. We promise to correst the error on the next printing. — BJ] I had four stations in I-land take time in the contest to tell me that DIO means God in Italian. (WA1DIO) Remembered to send the logs in because it is due the same day that income tax is due. Hi! (WB5TDO) Could have had about 20 perent more contacts, but U.S./VE stations tend to beam JA instead of VK when the bands are open. Heard *all* states/provinces on 20-15-10, but could not break through the JA pileups to get them. It might be a good idea for the U.S./VE stations to pause to listen for Pacific stations. You never know when a new multiplier will show up from this area. (VK4LX) How about each operator nominating a station that he considers to be "best op"? Might influence all operators to improve their techniques. (ZL1ADI) I think that several stations liked my call sign, because they worked me more than twice on one band. Hi! (DL7OK) I was very happy to help my friends out with a Portugal QSO. (CT1QZ) The timely arrival of the replacement 28-MHz oscillator coil sent by WD4BRE, made possible my 10-meter

Phone Multiplier Leaders

Band	160	80	40	20	15	10	Band	160	80	40	20	15	10	Band	160	80	40	20	15	10
Minimum	5	50	50	80	75	70	Minimum	5	50	50	80	75	70	Minimum	5	50	50	80	75	70
Single Operator																				
W1ZM	11	62	50	112	103	100	WA2AOG	—	7	15	75	71	74	W4DM	—	11	21	65	73	72
N1GL	6	72	55	101	99	82	W3BGN	—	55	47	92	84	86	W4DR	6	26	50	—	11	73
K1WB	—	8	33	90	75	78	N3BB	—	32	38	111	90	78	K5UR	—	46	44	88	86	89
W1NG	—	38	40	67	76	67	N3DA	—	34	28	103	89	84	K5KLA	4	32	26	86	74	83
W1YN	—	32	36	73	101	75	W3FV	—	27	36	75	84	85	K5NW	—	22	46	71	71	71
W1OO	4	35	32	84	80	86	W3AP	3	17	41	76	81	72	K5DX	7	30	31	81	76	68
K1RX	—	44	54	92	84	48	K3NZ	—	25	28	86	83	57	WA6PGB	4	23	36	79	76	81
W1UR	—	16	54	81	70	80	K3ZA	—	53	39	72	60	68	K6NA	2	35	53	80	67	66
K2LE/1	—	39	36	102	80	70	K3WOK	—	5	3	81	54	65	N6BV	—	16	36	87	72	60
K1BW	—	43	43	102	87	83	W3LPL	6	55	53	88	98	82	W7EJ	—	24	30	77	85	69
K2SD	—	21	24	81	63	64	N3UN	—	38	38	101	89	83	W8LU	—	—	3	12	67	70
WA2AUB	—	16	18	53	65	73	W3UJ	—	21	21	74	67	70	W8AH	—	—	20	99	—	—
WB2SJG	—	18	39	81	81	70	LU1BAR/W3	7	20	42	48	59	43	K9HMB	3	31	54	108	110	95
W2RQ	—	39	34	72	75	69	N3EC	—	16	26	85	50	47	W9ZRX	—	31	65	105	100	92
N2SS	—	26	25	100	87	95	WA4QMQ	—	5	7	66	68	73	W9RE	4	33	49	103	89	81
K2DY	—	46	28	88	56	50	WA4TLI	—	7	4	70	75	82	W9LT	—	31	45	101	69	89
N2MR	3	24	33	80	69	74	K4XU	—	25	34	74	73	74	KØSVX	—	3	13	63	52	76
W3HKK/2	—	3	—	89	58	64	N4RV	—	34	48	109	91	98	WØIUB	—	3	26	37	53	74
							N4RA	2	28	34	79	74	84	VE4XJ	—	7	9	100	32	—
High Band																				
K1TO				76	56	74	K3KG				59	114	81	WA7GVM				90		
K1WJ				47	54	74	K3KA				75	74	80	W8FF				94	74	72
WA1UZH				71	65	77	W3EWL				70	79	70	W8TA				80	71	68
WA1TAI				81	73	70	N3KK				72	84	54	WB8JBM				68	75	63
N2LT				102	91	85	W3YY/4				78	75	64	W9ZA				60	78	85
N2RM				53	82	74	N4NX				92	73	78	WA9IXF				67	78	60
N2OO				74	68	74	WA4DWN					80	53	WB9TIY				41	78	49
N2CW				54	63	90	W4PAK				75	78	50	W9OA				94	1	
WA2PCF				65	66	71	WA4NHP				77	65	74	W9LF				95	86	77
K5VNJ/2				83	69	62	N4MM				60	76	79	W9OBF				96	74	78
W2SUA				86	34	24	W4RW				86	57	37	K9CLO				83	50	39
WA2BYJ				45	73	80	W5JW				86	74	69	NØAT				44	77	52
K3ND				90	86	89	K5GL				51		74	WB2RLK/VE1				88	94	86
W3JO				64	71	71	K5BZU				98	71	67	VE3EUP				100	75	72
W3GRS				84	82	78	W7FP				92									
Low Band																				
WA1UAD	6	51	60				K5RR		32	58				K9PPY		37	56			
W1FC		84	53				K5JZY		34	53				NØRF		19	64			
W1BB/1	8						K6SE	11						VE3BBN	6	45				
WB2VFT		20	52				K8TR		22	54										
K3ZO	6	65	70				K8WW			56										
Multi-Single																				
K1XM		42	45	87	80	78	W4NL/3	5	61	57	126	105	91	W6QL	3	21	27	70	50	70
WA1SQB		4		71	66	83	K3RA	4	50	44	95	76	75	N6TU	2	33	48	79	78	71
W1ZA		59	57	110	97	92	N3RL		41	50	86	80	89	N7DD		35	40	94	80	82
W1RR		32	31	96	76	75	N4KG		34	51	106	92	91	WA7NIN	1	40	49	89	82	72
K1MM		36	1	85	75	64	N4BP		6	5	41	40	76	N8JW		28	51	107	89	82
WA1SSX		26	38	82	74	76	W4EAL		5		64	105	73	K9KA		30	33	98	72	75
K1IK	2	49	48	81	81	75	K4VX	10	54	64	115	112	94	K9XA		3	28	61	91	47
W2YV	8	72	56	111	96	91	N4HB	5	37	44	82	87	83	WBØLLR	4	32	43	89	92	73
K2UA		46		73	80	66	W4PRO	8	39	40	70	78	56	WBØRET		17	34	76	82	58
K2BU		35	36	80	70	66	N5DX	6	41	64	94	82	81	KØKX		22	60	107	88	71
N3RD		44	53	103	101	100	W5RU		48	56	99	78	94	VE5RG	2	13	43	87	76	62
N3ED		49	48	94	101	86	K5JA	7	53	61	109	99	96	VE6WQ		20	11	79	87	59
N3RG		30	45	92	81	82	WA6JUD	1	22	28	76	77	65							
Multi-Multi																				
W2PV	13	89	80	159	140	117	KØRF	11	53	64	110	111	93	K5TM		38	58	88	85	79
W3AU	9	71	78	142	130	108	K3WW	11	69	73	145	118	113	N3AD		42	49	107	98	96
W3MM		77	67	161	123	114	K8LX	2	44	62	118	121	85	W2GD		44	42	84	88	95
W4BVV	14	87	80	131	132	116	W3GM	7	66	69	129	117	101	N3LR		30	21	98	79	57
W3WJD		74	68	132	132	116	N6SV	1	36	55	112	80	82	W3DHM			46	96	99	94
W3FA	10	70	77	134	126	109	W7YX	1	20	36	84	73	67	W3KT			14	84	75	66

At left, N4KG, Tom was half of the N4KG/WN4KKN multiop effort on phone, and the single-operator section winner on cw in Georgia.

Northern New Jersey's WA2ZWH, right, bids a fond farewell to the power transformer in his SB-220 amplifier. 'ZWH went at it in the low-power category and came out of it with a third place finish in the high-band phone classification.



CW Multiplier Leaders

Band	160	80	40	20	15	10	Band	160	80	40	20	15	10	Band	160	80	40	20	15	10
Minimum	10	45	55	80	70	45	Minimum	10	45	55	80	70	45	Minimum	10	45	55	80	70	45
Single Operator																				
W1ZM	19	55	74	77	74	66	W3BGN	4	41	61	80	66	53	W4YE		39	51	78	64	57
W1NG		45	58	82	71	51	W3AP	8	34	62	84	71	47	N4DW		28	35	77	75	49
K1ZZ	13	40	43	67	52	52	K3II		42	61	74	64	41	W4KFC		33	36	67	57	45
W1ZA		57	63	89	75	70	W3FV		31	66	74	63	39	WB4BVY		23	43	74	63	56
K1NA	11	48	66	87	80	57	N3NA		38	49	80	55	39	KØCMF/4		20	30	61	60	48
W1DA		48	52	75	80	59	W3OV		31	37	69	49	48	W4DR	12	26			45	43
W1YN		36	59	76	82	33	N3BB		17	40	74	70	35	K5UR		39	49	79	71	63
W1LK		35	55	73	74	53	W3NZ	5	39	59	68	55	42	N5TP	3	25	57	78	72	66
W1KM		27	77	67	59	29	W3GK		19	32	61	63	45	K5NW		20	59	66	60	56
W1HZU		22	56	71	63	6	W3GRS		12	26	66	65	51	K5LP		11	19	50	43	47
W1OO	11	42	54	77	76	58	K3RA	5	46	55	79	63	53	K5ABV	1	31	53	57	45	48
K1OX	3	45	63	78	72	64	W3LPL	13	53	77	94	82	74	N6RO	3	28	73	71	72	45
K1RX		47	71	71	67	31	N3CW		48	75	73	67	50	N7XX	6	21	56	71	51	24
K2LE/1		44	61	83	68	52	K3NA	7	34	56	80	66	50	N7NG		21	59	71	58	34
K1BW		47	61	86	60	33	K3SA		15	54	82	71	65	K8GL		32	44	73	58	46
W2YV	14	42	50	75	61	53	W3AZ		9	42	64	68	47	N8ET		18	47	74	70	53
N2NT	1	45	57	82	73	58	N3RL		27	44	62	67	45	W8RSW		11	56	70	72	47
W2AEE		47	62	76	68	46	N4KG		50	62	81	79	71	W8AH			57	88		
K2PE		39	61	76	65	14	N4HI		21	39	61	70	48	K9DX	6	50	74	93	77	46
N2LT	6	50	75	81	71	59	N4XM		31	50	70	61	52	K9BGL	5	23	50	64	69	53
WB2FIT		43	65	91	77	51	N4AA		32	44	62	55	50	K9KM		29	52	82	67	40
N2WT		30	52	84	69	41	N4WX		27	54	77	61	54	N9MM		49	68	79	72	65
W2REH	12	53	60	91	85	55	N4WW	11	61	73	76	70	70	N9NS		31	49	70	68	46
K2FL		36	52	77	75	54	K4II	2	24	34	56	38	47	NØGA		21	39	56	52	48
N2MR	4	20	43	75	70	50	K4CL		29	31	68	50	49	WØUJ		17	27	47	39	45
W2PAU		32	35	50	42	50	K4XU		34	58	87	74	69	WØIUB		9	45	44	54	51
K2YV		40	60	72	67	42	W4XJ	2	40	58	72	65	63	WØHP	1	31	66	80	76	55
N2AU		31	56	74	71	44	N4TN		13	42	63	64	50	VE4XJ		10	14	83	43	6
W3RJ		63	75	113	93	69	N4RV		40	51	72	75	63							
High Band																				
K1RM				48	65	51	N4NX				81	59	63	W5AQ				52	59	46
K1DG				94	79	50	N4SV				50	56	47	W5MYA				71	76	68
W1PH				82	75	45	N4YM				69	27	49	W5FO				55	54	51
K1FWE				77	64	53	WB4TDH				72	66	57	W5JC				88	62	35
N1GL				58	76	47	W4BAA				62	52	47	W5GO				51	63	52
K2OB				81			W4NQI				53	49	45	N6CW				83	73	50
W2WD				69	64	57	WA4OML				30	88		N8JW				77	76	50
N2OO				107	79	48	N4UW				39	57	48	WA9PBK				85	67	29
W3JO				68	63	55	W4HBK				78	72	48	W9LT				79	70	50
K3ND				87	73	44	N4MM				73	70	50	K9DAF				63	65	50
W3GRF				77	72	63	K5KLA				71	64	64	KØMM				65	63	47
W3EWL				67	61	48	WA5NUK				70	53	46	WØUO				74	65	52
N3KK				81	65	38														
Low Band																				
WA1UAC		31	55				K3ZO	3	67	83				W8LRL	17	1				
W1PL	9	49	67				N4UM	13	63	75				WA9JCO		32	72			
K1VR		34	59				WA4MFS		29	58				N9TI		28	56			
W1BB/1	17						W4UQ		50	46				W9SFR		13	70			
W1UN		40	55				N5DX	5	41	67				K9JF		49	68			
K1TZQ		34	58				W5KLB			66				KØKX	1	13	67			
W2FVS		46	43				N6BT	3	22	76				NØRF		34	69			
WA2MBM		2	60				K7UR		26	72										
Multi-Single																				
K1TO		50	62	89	70	56	N3ED		59	62	90	79	54	W5AC		29	61	82	71	59
K1IU		40	62	89	79	58	N3RG		35	55	93	77	44	N6OP	4	26	64	73	70	37
WB2SJG		38	59	80	83	59	W4NL/3	12	52	70	91	81	59	N6IG	2	20	56	65	62	35
N2MM		44	54	79	71	36	N4OL				62	60	48	K6RR	1	23	49	65	70	36
K2UA		51		69	62	34	K4VX	4	54	78	91	83	68	K6DC		18	59	72	55	31
W3NX		17	41	77	73	43	N4RA	8	38	51	72	68	63	K8NZ		47	60	76	67	41
N3RD		58	83	88	86	66	K5JA			48	68	63	48	WB8JBM		31	56	65	57	51
N3AD		48	73	82	76	46														
Multi-Multi																				
W4BVV	17	80	95	119	105	86	W3MM		70	74	113	93	74	W2GD	12	40	64	76	76	58
W3AU	14	67	91	123	96	78	KØRF	9	49	75	101	90	59	K4CG		17	39	100	76	51
K5RC	8	61	89	113	99	82	N3RS		59	85	104	91	59	N3LR		33	57	76	70	40
K3WW	18	78	92	118	89	76	K8LX	6	57	85	111	88	58	N5TV		19	27	57	56	47
W2PV	16	72	93	115	99	80	W3GM		68	83	100	94	73	W3KT		15	29	90	69	35
W3FA	13	64	78	117	94	81	W6YX		14	57	82	69	34							

One-Weekend DXpeditions
(All Are Certificate Winners)

Phone	*CW*
CE3ZM (K1MM)	GD5CAA (K3RV)
FGØAYO (W2KN)	EP2EC (K5MM)
FGØGEX (K7GEX)	EP2LA
G5CFJ (K6PU)	KG6SW (K7JA)
GU3HFN (K5MM)	K7SS/KH6
K4II/KH6	WA2CMX/KP4
K7SS/KH6	JA7YOE (K7SS)
PJ8CO (K1CO, W1UA, K2WR)	PJ9AD (K1VR)
PJ9JT (W1BIH)	PJ9JT (W1BIH)
VP2LEU (K6SVL)	ZD8HR (N6HR)
VP2MT (N8BB, W8UVZ, WB8LDH, WB8OFG, WD8BYW)	ZF2AI (WØCW)
VP2SZ (WB8JEY)	ZF2AM (W8LUI)
ZB2G (K2FJ)	W6NV/3D6
ZB2DZ (K4YT)	W9WGQ/6Y5
ZF2AI (WØCW)	
ZF2AR (W9ABA)	
VE3EEW/ZK1	
WØUO/6Y5 (+ WA9FXJ, NØBG, NØNO, WAØRBW)	
9K2DR (K1VR)	

NØBG, NØNO and WAØRBW of the WØUO/6Y5 multi-single operation, that turned in a five million-plus point score in the hotly contested North America multi-single phone competition.

Low-Power Champs

Phone		*CW*	
WB2SJG	929,424	N4HI	713,132
WB7BNP	703,824*	K5ABV	533,685
KØLUZ	540,765*	K2MFY	520,059
N3KK	467,460	N3KK	506,736*
WØWP	342,000*	WØUC	473,499
W5YZ	326,652	K3KO	413,457
WØUC	313,560	WB2ABD	347,931
K2GXT	291,564	W2NJ	337,824
N2GC	259,875*	N2GC	280,245*
WA4RIJ/8	246,888*	W3ARK	271,188

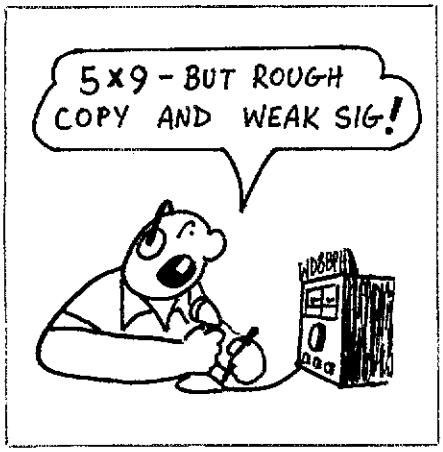
*High band only

Logs Received

	W/VE	*DX*	*Check*	*Total*
1976	1368	872	165	2405
1977	1631	1123	280	3034
1978	1842	1340	260	3445

WBØKWI, one of the ops at WBØRET, the top multi-single operation on phone in Kansas.

appearance. (EL3A) Why did K1VR, operating 9K2DR, torture us with 59-222? (NIEE/K1MM) The ARRL 'Test was the culmination of a three-week stay in the Cook Islands on a DX-vacation. It boggles the mind to find oneself on the receiving end of a pileup and I hope that we satisfied everyone's need for ZK1 in the contest. Now to get through the mass of QSLs that have been flowing in ever since. It's rather difficult to sit in the shack, when the outside temp is 85 degrees and the water temp is 75 degrees, so we did as much as *ham-anly* possible. (VE3EEW/ZK1 and VE3HFS/ZK1) One of the main stimulants over here is the competition with G3MXJ. Every year he says that I am getting too old and every year I try to prove him wrong. Based on our claimed scores for this year's contest, he is getting too close for comfort. (G3FXB) Why not consider single-band categories, 160-10 meters? (NØRF) Line noise hindered our operation during a great European opening on 20 meters. S9 noise left us in a cloud of smoke behind N6OP and K6XV . . . Perhaps we can go to solar power and bomb the power pole! (N6IG) My new AA6 prefix created some confusion as to whether I was DX or stateside (AA6EE) I did find that there was an increase in the number of U.S. stations sending "CQ Test" that generally tended to clutter up the bands with what seemed to accomplish little in the way of QSOs. . . . I guess that's the only thing to do after you have worked everybody that you can hear. (WØLP) Ten meters was hopping. The biggest surprise was working JAs and a UAØ on that band. Great conditions! (K4HWG/WB4NFS) Stations that don't frequently sign their call drive me up the wall. (VE4XJ) I was receiving stations on the East Coast on both Sunday mornings, but they all had their antennas pointed toward Europe . . . so you guys that needed Alaska and did not listen this way just missed out. (KL7IXZ) Stop using high band/low band. Single band is more feasible. Some overseas QTHs just aren't situated to work 160-80 or 15-10 except for a very few minutes/hours and it's a waste of their time as they have no way to compete with the rest of the world. Give them an opportunity too. (N7DC/YV5) I burned out the xformer and the 6146s in my rig. Motto: Never use too big a fuse in the primary! (N7CT) I still hate the boys with the *big* kilowatts, who haven't really heard you, but listen to those who are calling, sit on top of you and call, blotting out all else. Unfortunately, the best way to get rid of them is to work them, otherwise, they will not let you alone. Might is, unfortunately, right. (ZL1AFW) Operating both cw and phone, I dished out some 3800 QSOs so no one can complain anymore of a lack of activity from Vermont. I am simply *swamped* by QSL requests for VT by DX stations and still answering cards from the '77 DX Contest. The last load of cards received from the bureau weighed seven lbs. Be patient. . . . (K2LE/1) I've been in every one since 1939. In 1921, DX with my Ford spark coil was 76 miles. (W5RUH) Best thrill was hearing a UL7 call us on 10 m at 3 A.M. local time. (VE6WQ) Unfortunately, too many people have the latest toy, a speech processor, which they don't know how to use. (Some of them) have about as much need for one as a centipede has for another leg. (PJ9KW) Best ops: KØAX/DU2, HG5A, LU8DQ, all UAs and JAs. (K8GL) Missed the second weekend while in Taiwan — wish I could operate from there. (WA7YHP) Next year, I will mount a DXpedition to VO-land as that part of the country seems not to be inhabited. (W1DKB/OA4BZ) More weight should be given to multipliers — to make it more of a DX test again. I refuse



Multi-Multi Madness

	Band	Primary Operator	Total QSOs/Multipliers	First Weekend QSOs/Multipliers
W2PV	160	WB2GXW	15/13	11/10
Phone	80	K1XX	338/89	165/69
M-M	40	W3AZD	252/80	152/59
	20	K1AR	2212/159	1267/122
	15	K1DG	2671/140	1394/111
	10	K2XA	1360/117 (12.3M points)	532/85 (4.8M points)
W4BVV	160	WA3AMH	33/17	7/5
CW	80	W3ZZ/K1JX	432/80	301/61
M-M	40	K3NPV	1173/95	779/87
	20	K3KU	1401/119	863/93
	15	W3IUU	1438/105	841/87
	10	W3ZZ/K1JX	495/86 (7.5M points)	308/68 (3.7M points)

to sit there and run JAs — that's moron's work! (W6PM) Only took three hours and 40 minutes for WAS on 10 meters! (VP2LEU/K6SVL) Last year operating from home. (WB2SJG) Our school was locked, so we parked a car close to the shack and operated in the car. The result is not so good. (JA7YAF)

Feedback

In addition to the adjusted scores and club competition results listed on page 36 of June 1978 *QST*, the following mistakes crept into the listings: *CW* — W7JFG (now N7NG) was the Rocky Mountain Division leader. K7VPF was the operator of W7RM. HG5A was the top multi-single station in Europe. I3GNQ was the high-band winner, IK2FGP the all-band winner. SM3GSK's corrected score is 201,708-862-78-B, making SM3EVR the high-band winner. Central Virginia CC winners were W4XR on cw and W4QCW (WA8ZDT, op) on phone.

Phone — W2GXD's score should have been listed as 1,836,987-1817-337-C-87. WA2PCF was the Old Barney ARC club winner. W3BWZ's unlisted numbers were 2,081,583-1739-399-C-96. Add 100 QSOs to N5DX's score for 977,815-1105-301-C-96. W9CL was the Central Division leader with 2,233,032-2242-332-C-96. W4SME was in Northern Florida. VE7BGK should have been listed at 233,730-735-106-C. KP4EPN (K4WVT, op) was a one-weekend DXpedition. IK4BFY (+ I4s USC VEQ) (M-S) had 186,960-820-76-B-18. UK5IAZ (M-S) should have been at 154,326-578-89-B. And lastly, K9KDI/6Y5 was a one-weekend DXpedition with a score of 660,552-1619-136-A-10. Apologies for the errors.

Disqualifications

Phone: W1CF (K1OME, op), W7ISX (multiop), KH6DD. CW: None.

DX Continental Champs

Phone			*CW*	
Single Operator	*Multioperator*	*Continent*	*Single Operator*	*Multioperator*
EL2T	—	Africa	EL2T	—
JA1KSO	JA9YBA (M-M) *JA3YKC* (M-S)	Asia	JR1JFO	*JA7YAA* (M-M) JA3YKC (M-S)
OZ5KF	IØRDJ (M-S) SK6JA (M-M)	Europe	DK3GI	DKØTU (M-S)
FP8DX	*PJ8CO* (M-S)	North America	*KP4EAJ*	KG4OO (M-S)
KH6IJ	KH6DL (M-S)	Oceania	*KH6IJ*	—
HC1BU*	—	South America	*PJ2VD*	CP1AT (M-S)

Calls in italics are repeaters from 1976.
*High band only

PHONE

DX

Single Operator

Africa

C5ABC 50,274- 266- 63-A- 7
EL2T 4,402,125-5375-273-C-62
7X4MD 786,565-1587-165-B-

Asia

JA1KSO 2,067,048-3022-228-B
JE1SSE 1,548,420-2620-197-B-80
JA7DME 432,450- 930-155-C-
JA1ELY 411,411-1001-137-B-24
JA1PUK 337,623- 787-143-B-22
JA7HMZ 180,720-1004- 60-A-30
JA7KCD 155,184- 488-106-A-46
JA8SW 120,900- 403-100-C
JA6CNL 88,476- 404- 73-B-
JR1BGV 82,308- 361- 78-B-20
JR1GSF 51,224- 225- 76-B-18
JA4BKL 44,880- 187- 80-B-19
JH4EDC 35,280- 210- 56-C-24
JA9FMB 20,400- 136- 50-A
JA7JNF/1 18,408- 118- 52-A
JA7FFN/T 16,128- 96- 56-A-12
KA6DX(N1DX,opr) 12,075- 115- 35-C- 7
JA9JBK 6000- 80- 25-B-10
JA1JCA 2415- 35- 23-B
9K2DR(K1VR,opr) 38,976- 224- 58-B-12

Europe

CT1TM 137,940- 418-110-C-16
DT4RWL 3240- 40- 27-B
EA1PT 1,782,177-2617-227-B-43
EA3ADW 1,534,680-2436-210-C-55
F5BV 627- 19- 11-A
G2QT 1,019,466-1817-186-A-50
G4BWP 810,075-1543-175-C-63
G5CFJ(K6PU,opr) 4650- 62- 25-A
HB9BAM 1,529,910-2865-178-C-75
HB9LP 1,135,530-2442-155-B-56
I3MAU 2,963,448-4168-237-C-70
I4LX 2,307,015-3715-207-B-48
LA6HL 2,165,436-3966-182-B-62
OE5CWL 846,600-1660-170-B
OK1AGN 1,138,686-2194-173-B
ON4XG 224,910- 630-119-B-24
ON6AH 29,964- 227- 44-B
OZ5KF 3,816,776-4892-226-B
OZ5EV 879,264-1704-172-B-48
OZ5VT 1320- 36- 13-A
PA0YN 8448- 88- 32-B
SM2DMU 1,514,976-2936-172-B-57
SM7BUR 1638- 26- 21-B
SP3JOI 101,637- 491- 69-B
YU1GMN(YU1QEF,opr) 681,681-1589-143-C-30
ZB2DZ(K4YT,opr) 625,860-1220-171-B

North America

FG0AYO(W2KN,opr) 198,606- 838- 79-B-11
FP8DX 2,860,260-3860-247-B-62
HI8CDS 2,517,000-3356-250-C-22
HI8MOG 719,460-1713-140-C-10
KL7AF 1,460,238-2509-194-C-41
KP4DSD 1,061,928-2107-168-C-16
VP2SZ(WB8JEY,opr) 454,850-1233-150-C- 7
VP5DF 36,636- 172- 71-B- 5
ZF2AI(W0CW) 1,122,912-1671-224-A-17
ZF2AR(W9ABA,opr) 90,900- 300-101-A- 8

Oceania

KG6JIH 1,523,280-2308-220-C-28
KH6IJ 5,702,052-6764-281-C-74
KH6WF 3,364,296-4264-263-B-65
VK4VU 714,714-1309-182-B-34
VK3AKK 193,494- 542-119-B-20
VK3QI 36,960- 160- 77-B-10
ZL1AFW 583,905-1119-165-A-34
ZL1AGO 350,424- 744-157-B-

South America

CE3ZM(K1MM,opr) 1,460,592-2898-168-B-20
CP1AT 383,040- 840-152-B-12
LU2A 2,450,880-3404-240-C
OA8V 1,027,434-1571-218-A-35
PJ9JT(W1BIH,opr) 2,583,774-3634-237-C-26
PJ9KW(K7UNE,opr) 1,133,946-1909-198-C-
PY3CB 1,077,600-1796-200-C-25
JA1PIG/PZ 2,217,510-2865-258-B-40
N7DC/YV5 1,408,008-2023-232-B-33

High Band

Africa

C5AAF 64,656- 449- 48-A- 7
EA8LD 530,943-1351-131-B-15
EL3A 2,120,370-4390-161-C-50
ZS6FN 857,250-1905-150-B
ZS6RM 746,544-1648-151-B-32
ZS6ABO 728,622-2358-103-B-39
ZS6WW 113,490- 390- 97-A-12
3B8CV 737,793-1673-147-B-36
SZ4AA 24,012- 348- 69-B

Asia

CR9AJ 8658- 82- 23-A
HM2JN 4662- 74- 21-C
JA1CG 1,054,284-2156-163-B-52
JA1PCV 564,303-1373-137-B-50
JA7AMK 534,798-1221-146-C-80
JA7GAX 525,864-1234-142-C-37
JA7DAH 497,898-1194-139-C
JH1ACQ 479,415-1031-155-C
JA7PL 427,992-1049-136-B-34
JA7BSK 318,060- 930-114-B
JA1HVS 268,656- 772-116-C-29
JA2AYH 265,847- 679-131-B-23
JA7BJS 252,520- 614-110-C-35
JH6NAC 161,250- 625- 86-B-18
JA3XQG 150,450-1003- 50-B-15
JR3PJK 133,353- 449- 99-C-30
JF1SEK 102,684- 398- 86-B-25
JA2NNF 81,426- 331- 82-B-15
JA1IRQ 77,187- 299- 86-B-19
JF1IOH 58,374- 537- 54-B
JJ1JPL 52,206- 226- 77-B-24
JH3FWZ 51,957- 251- 69-B-26
JA9SV 51,516- 212- 81-B
JA6JRI 49,707- 263- 63-C-21
JA3XRC 46,980- 348- 45-B-12
JA4UQY 44,460- 228- 65-B-15
JA4GXS 39,000- 200- 65-B
JA5BLF 37,056- 193- 64-B
JA3BJQ 35,904- 176- 68-B-28
JA6WW 35,423- 213- 57-C- 8
JA5AYG 33,096- 197- 56-A-15
JF3KNQ 30,240- 168- 60-B-13
JH8KAN 30,240- 240- 42-B-15
JF1XRB 29,366- 242- 41-A-28
JH1UUT 27,960- 233- 40-A-25
JH4QHR 26,640- 222- 40-A-24
JA9VBJ 26,040- 217- 40-C-10
JH4EOX 20,148- 146- 46-B-20
JR3GVO 19,722- 173- 38-A
JA1AAT 17,472- 112- 52-B-
JA2ITH 16,074- 154- 35-A-
JA7CUK 14,668- 153- 32-A-
JF1TBK 13,260- 130- 34-A-21
JA6XX 11,772- 109- 36-B-15
JF3JMO 11,136- 116- 32-A-18
JE1RWX 8424- 108- 26-A-11
JJ1CRV 7383- 107- 23-A- 9
JH9HQP 6237- 97- 22-A
JA8VDN 6174- 98- 21-A- 8
JA7JGO 5616- 78- 24-A
JH3FHR 5616- 72- 26-A- 7
JH1MTR 4731- 83- 19-B- 6
JK1ACX 3618- 67- 18-A- 7
JH3ARL 2820- 47- 20-C- 3
JA1FO 2622- 46- 19-A
JA1ABV 2580- 60- 17-B- 5
JG1RJB 2208- 32- 23-A- 5
JF3LON 1722- 41- 14-A- 5
JA4UZY 1596- 38- 14-A- 9
JA7KXD 1170- 30- 13-B- 2
JF2AFJ 1122- 34- 11-A- 9
JA9SWA 648- 24- 9-A- 4
JJ1JXU 540- 20- 9-A
JA7HNV 459- 17- 9-A- 3
JG1RDV 459- 17- 9-B- 5
JH4UDG 360- 20- 6-A- 4
JH2WDT 357- 17- 7-A
JE2JML 264- 22- 4-A
JJ1GMA 252- 12- 7-A- 2
JA7BVO 54- 6- 3-A- 1
JA3MFE 45- 5- 3-A- 1
JA6PL 36- 4- 3-A
JK1LRH 30- 5- 2-B- 1
JH1OEL 12- 2- 2-A- 3

JT1AN 1254- 38- 11-B

UW0IX 709,988-1621-146-B
UA9CBO 201,600- 812- 84-B
UA9FU 160,506- 723- 74-B
UA0SAU 101,244- 649- 52-B
UA9DS 29,469- 209- 47-B
UA9CCW 15,048- 135- 38-A
UA9YE 11,664- 108- 36-B
UA9ABA 8670- 85- 34-B
UA0UBG 432- 18- 8-A

UD6DER 75,582- 323- 78-B

UL7QF 17,550- 150- 39-B
UL7NW 8728- 91- 36-A
UL7NAC 3722- 40- 23-B

Europe

CT1QZ 1,029,600-2145-160-C-24
CT1OY 654,420-1678-130-C-24
CT1DF 248,949-1791-139-B-
CT1LV 144,759- 661- 73-B-39

DJ3HJ 1,309,170-2890-151-B
DL7OK 825,507-2479-111-C-29
DJ5TH 758,112-1696-149-B
DK7ZT 567,405-1401-135-C-31
DL2HQ 152,487- 459-111-B
DL7XR 100,386- 338- 99-B
DL3RA 77,697- 291- 89-B
DL1CR 66,825- 495- 45-B
DF2KD 58,089- 289- 67-A
DJ7XR 41,814- 202- 69-B-18
DL1OY 34,515- 195- 59-B-10
DL1RO 15,480- 120- 43-B
DK5GX 10,530- 130- 27-A
DK8JK 10,290- 98- 35-B
DJ3BZ 4941- 61- 27-B
DA2JA 4836- 62- 26-A- 5
DF6QF 4752- 66- 24-B
DL8GZ 2820- 47- 20-C
DK4HD 1734- 34- 17-A
DA1NC 431- 12- 12-B- 2
DK8AX 270- 10- 9-B- 1

DM2CDL 114,957- 727- 53-B-
DM4PDR 62,370- 338- 66-B-
DM2BDG 49,984- 275- 64-B-
DM3WMJ 43,665- 205- 71-A-
DM3VUH 24,255- 177- 49-B-
DT3BE 21,684- 140- 52-A-
DT3RMD 18,612- 141- 44-B-
DM4ORA 16,992- 118- 48-B-
DM2ARA 14,355- 145- 33-B-
DM2BFK 11,340- 119- 35-B-
DM5VVL 6534- 66- 33-B-
DM4VCO 4425- 59- 25-B
DM3WB 3600- 60- 20-A
DM5XIG 3456- 48- 24-B
DM4VZA 3360- 40- 25-B
DM3TNA 3174- 49- 23-A
DM5UVL 2760- 40- 23-B-
DM4OLG 972- 36- 9-A-
DM3WYJ 792- 24- 12-A-
DM5FBN(DM3HN,opr)
621- 23- 9-B
DT2AJH 528- 16- 11-B
DM2FLN 180- 10- 6-A

EA4QB 1,018,248-2204-154-B-30
EA5AX 296,010- 759-130-C
EA3SA 184,680- 540-114-C-10
EA2IA 15,846- 139- 38-B- 1

EA6EU 299,628- 812-123-B-49

EI2BB 1,198,449-2611-153-A-32

F2RO 144,348- 523- 92-A
F2GL 110,664- 424- 87-B-
F6KFN 59,625- 265- 75-A-14
F6BVB 58,893- 293- 67-B-27
F6CLM 39,195- 195- 67-A-24
F6DRP 8370- 90- 31-A
F8ZF 6960- 145- 16-B- 3
F8WE 4158- 63- 22-A
F6API 3600- 48- 25-A
F6DMV 2508- 44- 19-A- 7
F6DLM 2280- 40- 19-A- 3
F5RC 648- 18- 12-A- 2
F6CMO 513- 19- 9-A
F6BRK 210- 10- 7-A

G3ZQW 2,516,976-4994-168-B-
G4CLK 462,090-1055-146-A-56
G4CVZ 412,125-1099-125-B-45
G3YAO 230,160- 685-112-B-34
G3CAZ 222,723- 657-113-A-34
G3YBH 172,232- 464- 88-B- 9
G5CP 64,500- 500- 47-B-24
G5CFS(K1FN,opr)
63,900- 300- 71-A
G3NT 33,075- 175- 63-B-20
G4FFY 28,710- 165- 58-B-14

GI4BBV 214,380- 794- 90-A-18

GU3HFN(K5MM,opr)
29,682- 194- 51-A-10

GW4BNJ 136,500- 650- 70-B-12

HA1ZD 79,704- 324- 82-A-37
HA0KLU(HA0MM,opr)
12,672- 96- 44-B-20
HA3GO 11,115- 96- 39-B-19
HA7KPL(HA7PL,opr)
8748- 81- 36-B- 4
HA7PQ 3135- 55- 19-B- 6
HA6KNP(HA6NN,opr)
2550- 50- 17-B
HA6NP 1512- 42- 12-A- 4

HB9T 426,195-1155-123-B-25
HB9DX 376,530-1141-110-B
HB9BLQ 20,304- 144- 47-B-
HB9AYZ 4617- 57- 27-B- 3

I8MPO 1,807,107-3607-167-B
I6NOA 1,418,670-2866-165-B-80
I1CRO 1,166,296-2476-157-B-54
I5DOG 676,350-1670-135-B-
I5VXS 523,056-1282-136-B-30
I0AMU 433,020-1031-140-B-18
I8ZLW 372,294- 982-129-B-19
I2MQP 133,227- 393-113-B-
I2LVN 3108- 37- 28-B- 4

IS0MVE 50,853- 253- 67-B- 8

LA1NG 282,762- 683-138-B-18
LA4HH 56,376- 261- 72-B-
LA2IJ 51,504- 232- 74-B-
LA9ZV 27,720- 140- 66-A- 6
LA7EO 18,126- 114- 53-A-
LA4PQ 6750- 75- 30-A-
LA9CQ 2337- 41- 19-B- 3
LA5KK 1800- 40- 15-B-
LA4EU 672- 28- 8-B

LZ1WJ 9216- 128- 24-A

OH6IW 1,067,904-2472-144-C-
OH1IG 880,593-2207-133-C-
OH1LW 79,794- 341- 78-C-
OH5LU 16,263- 139- 39-B-
OH6PA 14,637- 119- 41-C-
OH7NW 10,080- 84- 40-B-
OH5TZ 7260- 55- 44-C-
OH2BOI/3 4959- 57- 29-A-
OH7PQ 4602- 59- 26-B-
OH3JQ 1674- 31- 18-A-
OH3QL 1581- 31- 17-B-
OH2KP 840- 20- 14-B-

OH7TO 612- 17- 12-B-
OH1JW 330- 11- 10-B-

OK1TA 805,482-1839-146-B-28
OK2QX 250,470- 846- 89-C-
OK1AWZ/P
234,927- 693-113-B- 8
OK1DWA/P
218,766- 722-101-B-
OK3EA 136,770- 470- 97-B- 6
OK1KZ 69,915- 304- 79-B-
OK1ATE 59,615- 455- 51-B-
OK1AVE 58,275- 259- 75-A-24
OK3TAB 46,968- 206- 76-A-
OK1AHV 29,568- 234- 44-B-
OK1AMI 27,219- 211- 43-B-
OK1DKS 26,208- 168- 52-A-
OK3KFO 9471- 77- 41-A-
OK2KWI 9006- 79- 38-A-
OK2BSA 7626- 82- 31-A-
OK2PEQ 4500- 60- 25-A-
OK1JVT 2499- 49- 17-B-
OK2ABU 2442- 37- 22-A-
OK2BGN 2052- 36- 19-A-
OK2BPK 806- 21- 13-A- 3
OK1CIJ 432- 12- 12-A- 1

ON5RW 619,605-1405-147-B-23
ON5KP 445,656-1222-124-B-
ON8HF 61,488- 244- 84-B-

OZ6RT 571,428-1332-143-B-
OZ2BM 138,996- 468- 99-B-
OZ1BAN 17,250- 115- 50-A-
OZ1ZQ 10,500- 140- 25-A-
OZ1AP 7254- 93- 26-A-
OZ8T 7224- 86- 28-A-14
OZ7BW 1887- 37- 17-A-
OZ9OI 561- 17- 11-B- 1
OZ2NK 75- 5- 5-A- 1

PA2TMS 261,954- 891- 98-B-
PA0ATY 82,290- 422- 65-A-15
PA0LOU 62,484- 508- 41-A- 4
PA0SMS 31,785- 163- 65-A-23
PA0FIN/A 26,100- 145- 60-A-
PA0TUK 11,253- 121- 31-A-
PA0KDM 7326- 74- 33-B-
PA0VST 462- 14- 11-B- 8

SM3EVH 1,247,196-2809-148-B-
SM4DQE 572,520-1468-130-B-
SM5CAK 383,040-1140-112-B-
SM5CMP 323,760- 915-120-B-
SM5AQD 248,535- 789-105-B-
SM7DMN 119,856- 454- 88-B-
SM6AUW 116,025- 425- 91-B-10
SM0BDS 102,828- 418- 82-B-11
SM7HCW 85,779- 353- 81-B-
SK4DM(SM4CLR,opr)
53,265- 265- 67-B-
SM2HZQ 30,267- 171- 59-B- 8
SM3DXV 11,808- 123- 31-A-
SM5CSS 9282- 91- 34-B-
SM5DYC 7047- 87- 27-A-
SM7BBV 4896- 51- 32-B-
SM7FYM 4371- 47- 31-B-
SM6HPL 3480- 58- 20-B-
SM7HSP 3360- 70- 16-A-
SM5EMR 2970- 45- 22-B-
SM5EKC 2394- 38- 21-B-
SM6HIO 1581- 31- 17-B-
SM6ID 1386- 33- 14-B-
SM7GGK 1365- 35- 13-B-
SM5AHK 714- 17- 14-A-
SM7AAQ 90- 6- 5-B- 1

SP9PT 149,142- 469-106-B-19
SP5BT 53,580- 235- 76-B-
SP9PEZ 25,413- 197- 43-B-
SP9CTW 24,450- 163- 50-B-
SP9BDQ 5751- 71- 27-B-
SP1GHW 3795- 55- 23-A-
SP9FLZ 27- 3- 3-A- 1

TF3CW 21,168- 126- 56-A- 8

UV3CE 598,944-1468-136-B-
UA3PAZ 188,277- 647- 97-B-
UA1MU 106,590- 418- 85-B-
UA1CQ 76,650- 350- 73-B-
UA6JAD 58,212- 396- 49-B-
UA6JWW 50,127- 341- 49-B-
UA3TN 46,200- 200- 77-A-
UA3AEZ 16,560- 316- 60-B-
UA3DDF 12,600- 105- 40-B-
UW1AE 4446- 57- 26-B-
UA6ADC 4224- 44- 32-A-
UA3LCU 2025- 45- 15-A-
RA4HDE 1014- 26- 13-A-
DA3XP 105- 7- 5-A-
UA3TV 54- 6- 3-B-
UA2EC 46,020- 236- 65-A-
UA2WJ 14,157- 143- 33-B-

UC2AFA 79,278- 362- 73-B-
UC2WE 27,084- 244- 37-A-

UT5OV 6131- 73- 28-B-
UB5HDX 4950- 75- 22-B-
UB5VBY 231- 11- 7-A-
UB5VK 120- 8- 5-A-
UB5ABJ 48- 4- 4-A-

UP2PAQ 144,918- 498- 97-B-
UP2NV 44,472- 218- 68-B- 8
UP2BAO 4422- 49- 26-B-
UP2PAD 924- 28- 11-A-
UP2BAS 450- 15- 10-B-
UP2BCD 360- 20- 9-A-

UQ2GDQ 481,950-1275-126-B-

UR2DU 1050- 42- 16-A-

YO6KEI(YO6AWR,opr)
299,025-1329- 75-B-

YU1NYP 1,248,150-2650-157-C-60
YU1OFT 923,400-2052-150-C-
YU1OJT 2898- 46- 21-B- 4

North America

FG0GEX(K7GEX,opr)
593,020-1418-130-A-30

HI8SRH 571,428-1443-132-C-

KL7JFJ 997,407-2173-153-B-30
KL7IXZ 738,738-1599-154-B-46
KL7ITG 429,723-1077-133-A-60

KP4BKY 936- 26- 12-B- 2

OX3ZM 342,720- 960-119-A-35

VP2LEU(K6SVL,opr)
1,605,744-3186-168-C-29

VE3PE/VP9 6000- 100- 20-B- 9

6F8J(XE)
1,794,273-3539-169-B-47

ZF1AK 632,118-1538-137-A-20

Oceania

FK8AH 2700- 45- 20-A- 2

KH6IJA 743,736-1631-152-B-19
KH6JHS 19,458- 141- 46-A-27
K7SS/KH6 312- 13- 8-A-
K4II/KH6 75- 5- 5-C- 1

VK8OB 355,416-1004-118-C-26
VK4AK 171,765-1041- 55-A-
VK3OT 144,144- 858- 56-B-
VK2XT 3363- 59- 19-B-
VK3NHL 2652- 52- 17-A-

YB0ACT 496,488-1208-137-B-22
YB0ACH 975- 25- 13-A-

ZL3BK 353,506-1078-109-B-30
ZL4IJ 5220- 60- 29-A-

South America

N4VV/CE3
129,624- 491- 88-B- 4

WA2WYR/CX
12,636- 117- 36-C-

HC1BU 3,760,926-7418-169-B-50
WA4UAZ/HC1
815,190-1874-145-C-14

LU1HE 600,642-1362-147-B-82

OA4BZ 1,814,988-3689-164-C-74

PY2BBD 867,582-1953-157-C-39
PT7DCP 370,305-1055-117-B-20
PY1ZDK 348,831-1029-113-B-12
PY2BGO 143,910- 615- 78-C-12
PY2GWF 90,783- 393- 77-B-20
PT2TF 70,713- 291- 81-C-23
PY1ZBJ/8 8004- 92- 29-B-
PY1BKA 5175- 69- 25-B-
PY5VJ 3672- 51- 24-B- 4
PY1VT 3- 1- 1-B-

YV5EED 719,796-1558-154-A-
YV5FOI 309,372- 812-127-B-
YV5DDY 108,540- 402- 90-C-

Low Band

Africa

EL2ET 4968- 69- 24-C- 2

ZS6DW 83,520- 348- 80-B-12

Asia

JA2BAY 67,230- 498- 45-C-29
JA9UX 13,806- 177- 26-B-
JE1PFD 864- 32- 9-A-18
JA1SVF 630- 30- 7-A-22
JA1ZSX 36- 4- 3-B- 1

Europe

DK3FB 79,152- 388- 68-C-23
DL8PC 46,980- 261- 60-B-23

DM4XUJ 252- 12- 7-A-

EA3VM 69,174- 366- 63-B-35

G4AMT 92,322- 446- 69-B-14

GI3IVJ 42,408- 248- 57-B-10

GM5AXY 162- 9- 6-B- 1

OH1IJ 4830- 70- 23-B-

OK1XN 4350- 58- 25-B-

UV3FD 297- 11- 9-B-

UB5WE 8382- 127- 22-B-

YO3JW 9216- 98- 32-B-

ZB2G(K2FJ,opr)
6210- 90- 23-B- 2

North America

HI8JAG 72,285- 305- 79-C-

KP4WI 154,560- 560- 92-C- 7

Oceania

VK2WC 6162- 158- 39-C-23

Multi-Single

Asia

EP2RL(Multiop)
421,410-1277-110-

JA3YKC(JA3s ODC REU UPK,JH3s HBF JRB PKS PRR,JR3KEG, JE3MXQ,JA5TDU,oprs)
590,720-1720-192-C-96
JA1YAC(JA5RZV + JA9JTS, oprs) 826,884-1338-206-C-88
JA8YAU(JA8s FPX UXL,oprs)
462,462-1078-143-C-90
JA2YKA(JA2XHK,JH2QXG, JR2PZX,JA4UDP,oprs)
310,845- 901-115-B-
JA7YCQ(JA7QNL,JA8NNT, JA9SLY,JH7s CUU IMX ROP, JI1s FLB OFP,oprs)
143,388- 569- 84-C-50
JA7YFD(JA7s ARW KHG KIE KW,oprs) 101,292- 367- 92-A-10
JA7YAF(JA7RH,JH7s CSU SJH, oprs) 55,020- 262- 70-B-15

UK0AAB(RA0s AAN ABJ,UA0AFA oprs) 379,290-1345- 94-B-
UK0LBA(Multiop)
8910- 110- 27-A-

Europe

DA2AY 1,133,280-2361-160-B-
DF3NZ 849,450-1618-175-C-
OK0SU(DF7SN,DK3SI,DK5TL, DK8FZ,oprs)
348,552- 824-141-B-29

EI9CB(+EI4DA)
3,770,640-5237-240-B-83

F5KAR(F6s DEX ESS,oprs)
2691- 39- 23-A-

G4ANT(G3s JOC LDI MPN VZT XXL,oprs)
2,411,808-3589-224-A-80
G3OUR(G3s WOG YGF,G4s BBU BUO CNV DXQ EHL EWJ EZN GFX,G5BYS,G8s HDR LYB,oprs)
2,057,475-3919-175-B-96

HA9KOB(HA9s PV RB RU SB, oprs) 1,441,158-2470-199-B-96
HA5KKC/2(HA5s LV MA MD MO, oprs) 477,819-1041-153-A-
HA5KDQ(HA5s FM FN GF HO, oprs) 377,160- 898-140-B-
HA4KYH(HA4s YO YQ,oprs)
247,566- 693-121-B-
HA7KLG(Multiop)
238,095- 717-111-B-42

HA3KNA(Multiop)
87,204- 355- 86-B-
HA5KKN(HA5s DW KN,oprs)
51,984- 241- 76-B-
HA4KYN(Multiop)
44,496- 217- 72-B-24
HA7KSV(HA7s PQ SH TQ UF, oprs) 16,215- 117- 47-B-31

HB9AUS(+HB9NH)
1,757,640-3020-194-C-75

I0RDJ(+I6FLD,I0s IJ JX MGM)
4,979,712-6484-256-B-96
I1XXM(+I1s HAG PHX ZEU)
1,471,884-2836-173-B-
I1DFS(I1s EVJ FNX KN,W3US,oprs)
1,316,715-2141-205-B-89

LA1K(LA2PV,LA3s BO WU, LA4RT,LA5SKO,LA6s ES MP, LA8BU,oprs)
1,492,731-2719-183-C-48

OH1AA(OH1s LW NH,OH3ZE, oprs) 1,085,748-2161-173-C
OH4RH(+OH4s OO RO,oprs)
543,060-1293-140-B-48
OH3AA(OH3s JR TQ WS XT XZ, oprs) 417,000-1000-139-C
OH2AA(OH2s BNP BQS BZW, oprs) 400,158-1034-129-C

OK1KPU(Multiop)
692,160-1815-140-B-
OK3VSZ(Multiop)
309,270- 845-122-B-
OK1KKH(OK1s MDK VB,oprs)
16,002- 147- 22-A-
OK1KYS(OK1s FRF FVA,oprs)
11,970- 95- 42-B-
OK2KMP(Multiop)
8118- 82- 33-A-
OK1KIR(Multiop)
2520- 35- 24-A-

PA0GN(PA3s ADC,PA0s BRO ERA GIN ODM OOS,oprs)
1,471,305-2651-185-B-45
PI1ARS(PA0HTR + SWL)
345,321-1037-111-B-

SP6PZB(SP6s FAF FIH, oprs) 1,133,148-2130-178-B-96
SP9KRT(SP9s FKQ HMF,oprs)
718,830-1630-147-B-
SP5PTR(Multiop)
2775- 37- 25-B-

UK3ABO(Multiop)
692,514-1461-158-B-60
UK3AAC(UA3AGX,RA3ACE,oprs)
257,346- 841-102-B-
UK4FAV(UA4s FBL FCR,oprs)
30,750- 250- 41-A-
UK3DAU(UA3s DKF DKU,oprs)
3672- 51- 24-A-
UK3TBF(Multiop)
2460- 41- 20-B-
UK3DBV(Multiop)
1575- 35- 15-A-
UK2FAD(Multiop)
19,872- 138- 48-B-

UK5MAF(UB5MDC,UY5LK,oprs)
570,180-1462-130-B-
UK5EAQ(Multiop)
184,245- 865- 71-B-
UK5IAZ(Multiop)
63,549- 309- 69-B-
UK2AAX(Multiop)
210- 10- 7-A- 1
UK2BAS(Multiop)
869,460-1685-172-B-25
UK2GKW(Multiop)
1,415,040-2680-176-B-

North America

PJ8CO(K1CO,W1UA,K2WR,oprs)
5,442,672-6088-298-C-48

VP2MT(N8BB,W8UVZ,WB8s LDH OFG,WD8BYW,oprs)
5,322,195-5855-303-C-48

KP4ENV(+KP4s EHO EHP EQF)
5,149,560-6602-260-B-48

W0UO/6Y5(+WA9FXJ,N0s BG NO, WA0RBW)
5,066,928-5706-296-B-48

Oceania

KH6DL(+WB4OGP,K7SS,KH6s LW XX) 6,012,645-6935-289-C-90
KM6FC(WD8KLN,KM6FD,KM6EL, oprs)
3,166,020-4290-246-B-65

VE3EEW/7KI(+VE3HFS)
507,870-1254-135-B-23

ZL2AH(Multiop)
375,060- 893-140-A-

Multi-Multi

Asia

JA9YBA(JH1s GUO VAX,JH2s FKX SGU,JA3PYC,JA9s DZS, GLL LWB,oprs)
1,166,022-1963-198-C-
JA7YAA(JA7s HKB IBJ JQG JRV KPK LMU NRQ NSH UQA WBW, JH7s LIS SFY WHM WTC, JE7SRK,JR7BRL,JA8FTW,JA9DTO oprs) 1,152,606-2111-182-C-69

Europe

5K6JA(SM6s AQU APQ CKU DER DHU EOG EQH FPG GBM FYJ, oprs) 4,095,792-5988-228-B-96
UK6LEZ(Multiop)
338,520- 910-124-B-

W/VE

Single Operator

1

Connecticut

W1ZM(K1ZM,opr)
3,973,704-3052-434-C-96
N1GL 2,788,989-2251-413-C-90
K1WB 1,312,932-1541-284-C-63

W1NG 957,312-1108-288-C-61
W1VV 108,360- 301-120-C-13
W1XK 79,200- 240-110-B-
K1ZZ 44,064- 202- 72-C- 6
N1JW 21,600- 90- 80-B- 5
K1DD 21,018- 113- 62-A-10
W1FTX 14,652- 74- 62-C- 9
W1XX 1638- 26- 21-A- 1

Eastern Massachusetts

W1YN 2,009,463-2113-317-C-76
W1FJ 596,060- 644-205-C-30
W1DYH 389,241- 709-183-C-57
N1AU 301,896- 599-168-B-
W1MR 260,019- 501-173-C-42
W1RQ 166,800- 400-139-C-
W1KM 48,804- 166- 98-C-20
W1HX 31,773- 119- 89-C-24

Maine

W1OO 1,461,834-1518-321-C-63
W1SD 58,968- 182-108-C-

New Hampshire

K1RX 1,727,208-1788-322-C-75
W1UR 1,489,047-1649-301-C-
W1LQQ 157,410- 330-159-C-35

Rhode Island

K1HMO 549,120- 832-220-C-50
WA1TFF 225,000- 600-125-B-30
K1BV 56,610- 255- 74-C-16
N1RI 4830- 46- 35-B-

Vermont

K2LE/1 1,923,726-1967-326-C-65

Western Massachusetts

K1BW 2,592,636-2414-358-C-71
W1GD 65,208- 209-104-C-26

2

Eastern New York

K2SD 824,040-1090-252-C-32
WA2AUB 522,450- 774-225-B-55
WA2AZO 371,070- 589-210-C-33
WB2EOO 230,736- 418-184-A-40
WA2JTX 714- 17- 14-B- 8

N.Y.C. - L.I.

WB2SJG 929,424-1072-289-A-55
W2LEJ 280,371- 553-169-B-55
W2GKZ 259,548- 503-172-C-16
W2SGK 144,126- 306-157-C-30
K2PE 135,783- 321-141-C-19
K2TV 77,568- 256-101-C-23
W2EUO 20,196- 102- 66-B-
W2FVS 6804- 54- 42-C-

Northern New Jersey

W2RQ 1,012,608-1172-289-C-
W2ZZ 319,731- 541-197-C-38
WB2FII 200,220- 470-142-C-14
W2HN 59,220- 210- 94-C-23
W2IFK 17,172- 108- 53-C-15
K2PF 13,923- 91- 51-B-11
WA2EPK 12,550- 72- 50-A- 9
K2DM 8448- 64- 44-A-10

Southern New Jersey

N2SS 1,559,439-1561-333-C-64
K2DY 970,428-1207-268-C-72
N2MR 911,826-1074-283-C-60
WA2VYA 616,320-1070-192-C-43
W2REH 543,225- 813-223-C-20
N2CQ 530,136- 796-222-C-50
WB2OSQ 487,806- 778-209-C-43
W2KI 477,240- 776-205-C-40
N2VW 389,880- 570-228-C-59
WB2BVV 234,684- 492-159-C-79
W2PAU 202,032- 366-184-C-41
K2TJ 130,626- 354-123-C-30
W2FGY 92,250- 250-123-B-32
W2FHY 71,604- 234-102-C-31
WB2FJE 38,544- 146- 88-C- 9
W2XN 26,061- 119- 73-C-
WA2UMY 20,328- 121- 56-C- 9
K2KA 3240- 36- 30-C-

Western New York

W3HKK/2 693,360-1080-214-B-48
WA2AOG 528,528- 728-242-C-30
K2GXT(WA1QGC,opr)
291,564- 546-178-A-75

3

Delaware

W3WD 141,540- 337-140-C-39
WB3ENF 330- 11- 10-B- 3

Eastern Pennsylvania

W3BGN 2,859,948-2619-364-C-76
N3BB 2,215,452-2116-349-C-82
N3DA 2,116,218-2087-338-C-78
W3FV 1,296,768-1408-307-C-74
W3AP 1,080,950-1185-290-C-60
K3NZ 1,007,748-1204-279-C-66
K3ZA 861,984- 984-292-C-72
K3II 467,775- 693-225-C-40
K3MWV 401,265- 555-241-C-35
W3HYJ 395,640- 628-210-C-45
K3WOK 380,016- 609-208-C-66
W3YEV 315,185- 622-169-C-80
K3OX 291,221- 469-207-C-34
N3NA 277,146- 519-178-C-
W3EVW 269,748- 508-177-C-36
K3CY 180,648- 386-156-C-20
WB3IXG 157,878- 408-129-B-32
WA3YOB 136,197- 409-111-C-36
K3NL 93,654- 258-121-C-
W3OV 85,767- 253-115-C-16
W3JET 49,446- 207- 82-C-54
WB3EAG 49,335- 143-115-C-14
WA3ATP 31,500- 150- 70-C-
K3JHL 12,960- 80- 54-B-10
K3FO 12,402- 78- 53-C-13
WA3NNA 918- 18- 17-C- 2

Maryland - D.C.

W3LPL(K3NA,opr)
2,546,412-2222-382-C-40
N3UN 1,457,424-1392-349-C-71
W3UJ 758,241- 999-253-C-34

W3GRF 384,462- 689-186-C-35
LU1BAR/W3 354,123- 539-219-C-
N3EC 352,800- 525-224-C-40
W3AZ 317,856- 602-176-C-44
K2ITG/3 276,129- 487-189-B-60
N3II 246,078- 434-189-A-30
W3MR 111,339- 267-139-C-12
WA3RSK 100,962- 237-142-C- 9
K3AV 93,330- 255-122-B-20
WA3EKL 68,244- 242- 94-C-18

4

Georgia

W4UYC 31,590- 130- 81-C-16
WB4EGX 16,931- 79- 63-A-15
K4BAM 6300- 60- 35-B- 6
W4GKI 432- 12- 12-A- 9

Kentucky

WA4QMQ 485,523- 739-219-C-66

North Carolina

WA4ILI 677,586- 949-238-C-70
N4AA 456,210- 685-222-C-31
K4GFH 168,720- 370-152-C-21
W4OMW 44,921- 156- 96-C-20
WB4KZG 3744- 39- 32-B- 5
W4AMC(W4)MW,opr) 1020- 20- 17-C- 3

Northern Florida

W4WKQ 309,636- 564-183-C-43
WB4OKY 71,997- 233-103-B-45

South Carolina

N4LL 213,993- 403-177-C-36

Southern Florida

K4CL 270,000- 500-180-C-45
W4HVU 21,243- 97- 73-C-19

Tennessee

K4XU 688,800- 820-280-C-40
WD4EAV 407,421- 609-223-C-90
N4IN 364,170- 610-199-C-36
WA4HHW/AA4VZ 308,112- 524-196-C-65
K4XO 15,600- 104- 50-C-
N4OI 4770- 53- 30-C- 8

Virginia

N4RV 2,874,690-2535-378-C-80
N4RA 1,211,826-1342-301-C-56
W4DM 603,406- 841-242-C-60
W4QAW 519,108- 724-239-C-47
W4EI 306,936- 588-174-C-
W4EZ 245,952- 448-183-C-28
W4XR 232,545- 419-185-C-30
W4DR 228,582- 459-166-C-
N4DW 140,748- 317-148-B-38
W4KMS 58,764- 166-118-C-20
WB4BZR 47,430- 155-102-C-26
K1FR/4 34,452- 133- 87-B-17
W4KOQ 10,812- 68- 53-C- 9

5

Arkansas

K5UR 1,751,586-1654-353-C-81
WA5HNN 462- 14- 11-C- 3

Louisiana

K5KLA 1,332,240-1456-305-C-71
W5OB 91,476- 242-126-C-37
K5UA 84,840- 280-101-C-
K5KX 43,524- 156- 93-B-12

Mississippi

W5MUB 263,934- 473-186-C-35

New Mexico

W5YZ 326,652- 668-163-A-64
K5JW 272,412- 483-188-C-62

Northern Texas

K5NW 740,154- 878-281-B-75
WB5UKI 89,700- 230-130-C-24
WB5TDO 76,260- 205-124-A-60
W5SOD 19,926- 123- 54-B-40
N5FL 12,000- 80- 50-A-12
N5AW 8832- 64- 46-A-12

Oklahoma

W5JME 189,819- 393-161-C-60
K5DEC 23,868- 117- 68-B-31

Southern Texas

K5DX 971,295-1105-293-C-80
K5DB 291,276- 558-174-C-60
W5TSF 153,594- 371-138-B-76
N5WW 146,520- 330-148-C-20
W5LUU 129,504- 304-142-C-32
K5RF 103,776- 376- 92-C-48
WA5IYX 93,912- 301-104-B-80
K5TSQ 92,400- 220-140-C-39
K5MA 59,682- 203- 98-C-10
W5DUI 32,760- 130- 84-C-26
K5GE 12,702- 73- 58-C- 8
WB5PDQ 7224- 56- 43-B-18
K5WA 840- 20- 14-C- 3

6

East Bay

K5GOE/6 9120- 80- 38-A-15
N6NE 8448- 64- 44-A-15

Los Angeles

N6AR 451,560- 710-212-C-34
W6OK 37,422- 198- 63-C-36
K6OC 24,480- 120- 68-C-
W6NUL 6105- 55- 37-B-15

Orange

K6RR(N6IN,opr) 1,605,000-2140-250-C-81
W6BA 267,534- 534-167-C-
W6TDO 1116- 31- 12-B- 7

Santa Barbara

W7CB/6 345,582- 789-146-C-27
W6SWM 176,022- 462-127-C-52
K6DZT 113,400- 350-108-C-64
N6VR 10,080- 80- 42-C-10

Santa Clara Valley

WA6PGB 1,960,078-2174-299-C-85
N6QR 1,478,532-1948-253-C-66
K6HNZ 580,113-1499-129-C-59
W6VG 198,009- 449-147-C-27
W6BJB 77,400- 300- 86-C-35
W6YVK 61,716- 278- 74-B-19
WB6JAX 54,282- 218- 83-C-36
N6HR 27,105- 139- 65-C-10
K6ITL 21,504- 128- 56-C-15
W6QDE 17,967- 113- 53-C-17
W6SC 14,112- 96- 49-C-25
W6SZN 4959- 87- 19-A-12

San Diego

K6NA 1,869,813-2057-303-C-67
W6ABT 119,784- 322-124-C-25
K6XT 84,132- 369- 76-C-11
W6UQF 13,950- 93- 50-A- 9

San Francisco

N6RV 1,598,358-1966-271-C-74
W6PM 155,628- 396-131-C-29

San Joaquin Valley

K6YK 388,341- 757-171-C-38
W6BVM 8988- 107- 28-C- 8
W6RLG 924- 28- 11-A- 8

Sacramento Valley

K6DR 324,576- 662-161-C-75
K6SG 187,068- 476-131-C-26

7

Arizona

K4NN 1,164,030-1610-241-C-60
K7JVR 48,504- 188- 86-A-27
W7ZMD 37,170- 177- 70-B-40

Montana

W7JYW 255,420- 777-110-C-41

Oregon

W7EJ 2,120,400-2480-285-C-92
W7NI 2,022,189-2729-247-C-81
W7ZR 448,884-1011-148-C-37
WA7IHN 151,848- 684- 74-C-28
W7XN 81,270- 258-105-C-21
W7QK 19,215- 105- 61-C-15

Utah

W7HS 246,126- 646-127-C-58
K7JL 221,559- 437-169-C-34

Washington

N7XX(WA1KKM,opr) 3,392,280-4188-270-C-81
K7ZA 361,401- 673-179-C-35
N7AM 120,582- 462- 87-C-35
K7UU 118,530- 439- 90-C-24
K7UR 65,280- 256- 85-C-19
K7WQD 42,450- 283- 50-B-44

8

Michigan

W8LU 282,720- 620-152-C-30
K8PAO 238,986- 426-187-C-46
W8QGP 67,221- 231- 97-C-23
K8GB 5508- 54- 34-C-11
W8GLC 2496- 32- 26-C- 6

Ohio

K8MN 370,821- 661-187-C-
K8EF 263,025- 501-175-C-39
K8US 212,625- 405-175-C-20
W8NXF 123,552- 288-143-A-31
WD8CJQ 116,220- 298-130-A-51
W8YGR 88,200- 210-140-A-21
W8NPF 57,240- 180-106-C-45
N8ET 46,215- 195- 79-C-
WB8WKP 43,200- 180- 80-C-12
N8LM 39,060- 155- 84-C-19
W8LHV 26,733- 133- 67-C-
W8OWP 24,663- 119- 69-B-27
WB8HLI 5832- 54- 36-C- 6
K8BA 3564- 36- 33-B-16

West Virginia

W8AH 129,918- 367-118-C-26
K8HUH 61,446- 209- 98-C-26

9

Illinois

K9HMB(WA9PBK,opr) 2,831,688-2348-402-C-74
K9DR 206,562- 398-173-C-47
W9TA 176,235- 379-155-C-24
K9RS 140,070- 322-145-A-
K9BQL 45,105- 155- 97-C-10
K9HDE 10,296- 66- 52-B-14
W9AZP 2856- 34- 28-C-12

Indiana

W9ZRX 2,902,698-2462-393-C-92
W9RE 2,226,159-2067-359-C-78
W9LT 1,859,250-1850-335-C-80
N9NS 72,252- 223-108-C-16
N9RC 20,907- 101- 69-C-24

Wisconsin

W9OP 427,770- 679-210-C-50
K9QXY 97,857- 249-131-C-28

Ø

Colorado

WØCP 56,936- 194- 98-C-14

Iowa

WØEJ 488,265- 757-215-C-41
KØSVX 391,851- 631-207-C-66
NØGA 280,188- 516-181-C-31

Kansas

WØIUB 478,833- 827-193-C-47
WØRT 285,156- 534-178-C-30

Minnesota

WØUC 313,560- 536-195-A-45
WØJX 242,004- 469-172-C-45
WØJIE 7254- 62- 39-C-20

Missouri

WØGNX 208,572- 382-182-B-39
WØIU 119,340- 340-117-C-30
KØKL 117,384- 273-136-C-36
WBØEZQ 41,583- 167- 83-C-17
WBØMPH 30,099- 127- 79-B-15
WØQWS 29,388- 124- 79-A-
WØQYG 12,300- 100- 41-C-31
WØFF 4176- 48- 29-A- 8
WDØCTV 429- 13- 11-A- 7

VE

Maritime-Newfoundland

VE1AIH 28,140- 134- 70-B-12
VE1EP 147- 7- 7-C-

Quebec

VE2WA 150,768- 349-144-C-22

Ontario

VE3DFH 384,600- 641-200-C-85

Manitoba

VE4KE 432,960- 902-160-C-56
VE4RP 236,016- 596-132-C-
VE4XJ 221,556- 499-148-C-53

Saskatchewan

VE5RA 1,360,056-1858-244-C-80
VE5QM 344,850- 605-190-C-

Alberta

VE6LU 649,518-1051-206-C-56
VE6MP 144,000- 500- 96-B-21

British Columbia

VE7VP 147,696- 362-136-C-53

High Band

1

Connecticut

W1GSH 737,730-1171-210-C-64
K1TO 640,866-1037-206-C-40
K1WJ 334,950- 638-175-C-36
W1YG 203,346- 429-158-C-
W1KKF 107,730- 285-126-C-26
K1WJL 48,600- 225- 72-B-22
K1YXG/1 40,836- 166- 82-B-
WA1ZVS 35,700- 175- 68-B-
WA1ZOW 33,174- 194- 57-A-22
K1TN 32,163- 151- 71-A-10
W1DO 30,000- 100-100-C-16
K1WA 28,548- 122- 78-A-20
W1SE 28,416- 128- 74-B-14
W1HB 27,594- 146- 63-A-20
N1AN 27,258- 154- 59-C-13
W1BWS 14,508- 93- 52-C-16

Eastern Massachusetts

WA1UZH 756,576-1184-213-C-67
W1ABJ 111,834- 342-109-C-23
N1AS 109,242- 306-119-C-28
WB1AEL 68,094- 291- 78-C-36
K1RB 6195- 59- 35-A-21
W1CRL 3870- 43- 30-A- 6
W1PLJ 2538- 47- 18-C-21

Maine

WA1DIO 161,664- 421-128-A-52
WA1DXS 32,361- 161- 67-C-
W1OTQ 28,329- 133- 71-B-22

New Hampshire

W6ZBS/1 9768- 74- 44-B- 8

Rhode Island

K1JA 72,072- 231-104-B-32

Western Massachusetts

WA1TAI 631,680- 940-224-C-
W1GG 312,120- 578-180-C-58
K1SF 289,395- 545-177-C-68
K1FIR 45,120- 188- 80-C-16
W1AUT 25,800- 172- 50-C-21

2

Eastern New York

WB2QOH 125,307- 351-119-B-40
WA2LJM 112,893- 311-121-C-69
K2MN 50,112- 192- 87-B-
N2WR 23,715- 155- 51-A-26
N2FS 15,552- 108- 48-C-19
WA2ISH 351- 13- 9-B- 4

N.Y.C. L.I.

N2GC 259,875- 495-175-A-57
W2MOY 191,250- 375-170-C-37
K2MFY 137,940- 380-121-A-30
W2IRV 119,298- 337-118-C-22
W2GC 44,073- 177- 83-C-
W2AYJ 36,450- 150- 81-C-11
K2TY 27,633- 151- 61-C-14
WB2TSB 27,000- 120- 75-C-20
K2OVS 13,068- 66- 66-A-11
WB2PXA 9522- 69- 46-C-18
W2GLE 8436- 74- 38-B- 6
W2TE 5841- 59- 33-C- 4
WA2OVG 4440- 40- 37-C-10
W2NBI 2898- 42- 23-C- 6
WB2GUB 1725- 25- 23-C- 3
WA2TSF 819- 21- 13-C- 9
WB2DWP 663- 17- 13-B- 4
WA2DZD 504- 14- 12-B- 5
W2QAN 216- 9- 8-B- 6
WB2RNT 12- 2- 2-A- 1

Northern New Jersey

N2LT 2,093,340-2510-278-C-77
N2OL 678,810-1210-187-C-80
WA2ZWH 208,065- 485-143-A-57
K2AZ 33,069- 151- 73-A-33
WB2HJW 20,250- 150- 45-C- 9
W2KXD 20,223- 107- 63-C-13
WA2YLY 13,029- 101- 43-A-
K2PH 2039- 31- 23-A- 4
W2UL 1920- 32- 20-C- 8

Southern New Jersey

N2RM 890,340-1420-209-C-58
N2OO 683,640-1055-216-C-35
N2CW 647,082-1042-207-C-45
WA2PCF 541,764- 894-202-C-60
K5VNJ/2 478,932- 746-214-C-44
K2SNK 259,920- 570-152-C-32
W2SUA 225,936- 523-144-C-51
K2FT 149,520- 356-140-C-35
N2SI 115,692- 311-124-C-32
WA2NBM 85,668- 23?-121-C-35
WB2SST 39,780- 156- 85-B-
N2CM 35,700- 140- 85-B-43
W2PFQ 33,306- 182- 61-B-33
WB2IMU 26,838- 126- 71-C-
WA2KNZ 18,228- 98- 62-C-18
W2HAZ 18,054- 102- 59-B- 8
WA2VKG 15,408- 107- 48-B-
W2SDO 6669- 57- 39-C-15
K2JF 2232- 31- 24-C-12
WB2ZEU 1482- 26- 19-B- 4
N2SL 1130- 25- 16-C- 3
W2FDE 780- 20- 13-C- 2
K2HPV 702- 18- 13-A- 4
WA2PFC 162- 3- 6-B-
W2GND 147- 7- 7-A- 1

Western New York

WA2BYJ 1,050,192-1768-198-C-60
K2IGW 272,850- 535-170-C-27
WB2LOF 230,319- 489-157-C-29
N2HR 182,895- 445-137-C-40
W2KIM 156,264- 383-136-C-37
W2WZO 145,800- 360-135-C-41
WB2AIO 131,652- 318-138-A-10
WB2ABO 69,936- 248- 94-A-18
K2JZT 50,112- 192- 87-B-17
WA2ECA 36,849- 173- 71-A- 8
W2FUI 21,948- 118- 62-B-46
WA2MAF 19,800- 110- 60-B-17
WA2SON 17,013- 107- 53-C- 5
WB2GTB 7182- 63- 38-C- 4
WB2EZU 4056- 52 26-B- 6
WA2GNE 2856- 34- 28-B- 7
W2FTY 1380- 23- 20-A-16
WA2LCC 189- 9- 7-A- 1

3

Eastern Pennsylvania

K3ND 836,340-1052-265-C-
W3JO 559,908- 906-206-C-45
W3GRS 428,220- 585-244-C-23
W3GK 424,242- 777-182-C-53
W3KV 287,040- 520-184-C-30
W3GRW 285,558- 523-182-C-32
W3BI 127,734- 349-122-C-29
WA3WRD 118,104- 296-133-C-18
W3ETB 59,850- 210- 95-B-
W3CGS 47,478- 193- 82-C-24
W3BB 32,064- 167- 64-C-17
WA3BRW 26,112- 128- 68-C-13
K3RL 18,711- 99- 63-C- 8
WB3IKP 15,561- 91- 57-B-45
WA3MIB 10,692- 81- 44-A-13
G3HLW/W3 1224- 24- 17-A- 3

Maryland - D.C.

K3KG 1,131,681-1619-233-C-70
K3KA 762,570-1110-229-C-56
W3EWL 687,879-1047-219-C-72
N3KK 467,460- 742-210-A-42
W3JPT 232,794- 479-162-B-32
K3SA 218,736- 434-168-C-30
W3HVM 177,984- 412-144-C-30
WB3CFD 151,710- 389-130-B-55
WA3EEE 137,670- 353-130-C-40
W3PWO 110,124- 276-133-C-29
K2SCU/3 80,250- 250-107-C-17
WA3UUO 6156- 57- 36-A- 8
N3AM 4590- 51- 30-A- 4
W3ZH(WA3UUO,opr) 4092- 62- 22-C- 3
K3WS 2430- 30- 27-C- 1
W3TUX 1701- 27- 21-B- 6
W3ML 1104- 23- 16-B- 2
N3CW 720- 16- 15-C- 2
K3DQ 462- 14- 11-B- 3

Western Pennsylvania

W3PIX 94,875- 275-115-B-30
W3KHQ 54,834- 247- 74-C-32
W3UDX(WB3CDA,opr) 1716- 26- 22-B-19

4

Alabama

WA4MIT 91,233- 327 93-C-30
WN4KKN 9578- 68- 47-C- 6
WA4HOQ 7410- 65- 38-A-16

Georgia

N4NX 601,425- 825-243-C-59
W4DXI 283,464- 508-186-C-65
WB4HNC 220,473- 393-187-C-35
AA4GA 184,800- 385-160-A-30
WA4DWN 178,353- 447-133-B-53
WB4PRM 148,863- 347-143-C-41
K4EZ 107,730- 285-126-C-
WB4YBE 79,530- 241-110-C-35
WA4OPV 10,098- 66- 51-C-19

Kentucky

W4PAK 529,830- 870-203-C-55
N4XM 466,257- 781-199-C-39
WA4PAB 234,720- 480-163-C-
WB4TPU 223,725- 475-157-C-26
WA4UBM 186,186- 403-154-B-50
WB4PRU 96,465- 295-109-C-34
N4BS 83,490- 242-115-C-37
AA4RR 38,979- 183- 71-B-23

North Carolina

WA4NHP 491,184- 758-216-B-61
WD4JRS 383,292- 756-169-C-75
N4WX 260,925- 497-175-C-32
WD4AAM 172,215- 445-129-C-46
WA4UNZ 123,786- 299-138-C-37
K4UWH 118,608- 353-112-B-12
WA4DAN 112,320- 312-120-B-49
WA4MOK 47,196- 171- 92-A-20
K4WKS 34,719- 163- 71-B-40
WB4TFY 6930- 66- 35-B- 9
WA4VMZ 4320- 48- 30-B- 7
WA4LWO 990- 22- 15-A- 3
N4UH 243- 9- 9-A- 1

Northern Florida

W4ZTW 215,760- 464-155-C-35
W4WEG 98,500- 250-118-B-41
W4VQ 19,596- 92- 71-C- 5
W4LEU 2100- 28- 25-A-20

South Carolina

WB4QWM 381,186- 702-181-B-33
K4WJR 13,860- 110- 42-B-12
K4II 390- 13- 10-C- 2

Southern Florida

W4BAA 139,425- 325-143-C-27
W4LCL 134,937- 319-141-C-37
N4CU 19,530- 105- 62-C-15
WA4BWI 4830- 46- 35-B- 6
W4NOO 4680- 40- 39-A- 6
WA4FYZ 3024- 36- 28-B- 5
W4YN 2520- 40- 21-B- 8
WA2BCK/4 918- 18- 17-A- 1

Tennessee

WB4RRJ 181,548- 369-164-C-46
W4JD 177,915- 409-145-C-30
WA4ZAL 162,943- 367-148-C-70
N4UW 157,791- 353-149-A-31
K4CXY 129,096- 326-132-C-44
AA4KT 108,420- 260-139-C-30
WA4NWX 71,595- 215-111-B-30
N4IR 37,422- 162- 77-C-20
W4ZWZ 35,340- 190- 62-C-33
WD4CZM 8610- 82- 35-B-15
WA4BTG 6966- 54- 43-C-22
W4OGG 2112- 32- 22-A- 5
WØRIB/4 990- 22- 15-B- 2
K4JEZ 585- 15- 13-B- 3
WB4WHE 90- 6- 5-B-

Virginia

N4MM 563,730- 874-215-C-20
W3YY/4 529,914- 814-217-C-47
K4HWG(WB4NFS,opr) 343,728- 616-186-C-59
W4RW 310,500- 575-180-C-64
W4JVU 276,945- 499-185-C-38
W5ILR/4 181,542- 383-158-C-60
K4GKD 125,568- 436- 96-C-25
WB4FIH 82,113- 271-101-B-35
K4IIA 60,939- 183-111-B-
K4ZVS 56,070- 178-105-C-24
K5KT/4 51,840- 192- 90-C-10
W4YE 47,700- 212- 75-C-11
W4EEU 40,317- 151- 89-B-18
WD4LCO 34,932- 142- 82-B-16
W4JAT 34,569- 167- 69-C-14
K4OAQ 28,350- 126- 75-A-16
N4YJ 23,517- 117- 67-A-13

5

Arkansas

W5NF 164,736- 352-156-C-52
W5FFY 18,126- 106- 57-B-23
WA5SOG 1953- 31- 21-B- 7
W5EIJ 660- 20- 11-B- 3

Louisiana

W5HEZ 151,590- 326-155-C-50
W5WG 121,584- 298-136-C-48
K5GUU 66,708- 204-109-C-35
W5SNU 84,816- 248-114-C-32
WA5YFQ 40,572- 147- 92-C-33
WD5DUD 18,090- 90- 67-C-39
K5LVZ 14,916- 113- 44-C-20
WB5UQW 2070- 30- 23-B-27
N5JW 1530- 30- 17-A- 4

Mississippi

W5AQ 182,376- 408-149-B-32
WB5VFE 97,416- 328- 99-C-49
N5FG 90,978- 257-118-C-
K5YPV 7749- 63- 41-A-17
WA4WXT/5 2325- 31- 25-A-
WA5DYH 1104- 23- 16-B- 3

New Mexico

W5JW 1,183,701-1723-229-C-66
WB5WRY 57,528- 204- 94-C-33
K5MZ 12,495- 85- 49-B-25
WA5YTX 8775- 75- 39-C- 7

Northern Texas

W5FL 254,985- 445-191-C-41
WD5EWP 119,691- 279-143-C-51
W5FO 74,358- 243-102-C-13
W5LKP 39,732- 154- 86-C-48
WB5PIL 36,735- 155- 79-B-60
WB5LWB 22,230- 114- 65-C-21
WB5JBP 15,048- 88- 57-C-13
WB5OON 3690- 41- 30-A- 8
WB5LXH 1980- 30- 22-A- 6
WB5RPU 960- 20- 16-B- 5

Oklahoma

K5GL 328,125- 875-125-C-47

Southern Texas

K5BZU 562,860- 795-236-C-64
WB5HGS 320,751- 681-157-C-45
WB5FND 283,008- 536-176-C-60
WA5DXI 207,711- 441-157-C-40
WB5QBV 147,900- 340-145-C-60
W5OSH 103,356- 297-116-C-50
W5JC 81,774- 231-118-C-17
W5RRR(W5LSZ,opr) 67,032- 196-114-C-18
W5OSJ 41,175- 183- 75-C-13
W5BE 34,398- 147- 78-C-16
W5LJT 12,084- 76- 53-C- 6
W5YB 3762- 38- 33-A- 7
K5RVF 2625- 35- 25-C-10
WA5AFG 1764- 28- 21-A-

6

East Bay

K6ATV 104,178- 388- 97-B-20
K6UGS 2475- 33- 25-C- 7

Los Angeles

WA6EKL 1,244,184-2206-188-C-38
W6AQ 458,055-1053-145-C-45
W6CN 103,140- 382- 90-B-54
N6HE 22,098- 127- 58-C-12
WB6RXW 15,444- 132- 39-A-35
W6TGL 3168- 48- 22-B-22
WA6BIE 1836- 36- 17-A-11

Orange

K6TXA 260,967- 731-119-C-24
WA6LFF 193,752- 598-108-B-37

Santa Barbara

N6MB 494,748-1018-162-C-
WA6KTZ 311,190- 943-110-C-58

Santa Clara Valley

WA6TKT 305,283- 841-121-C-72
W6QKK 176,157- 529-111-C-87
W6HXW 174,084- 456-163-C-38
N6AN 143,592- 386-124-C-17
W6FQE 71,364- 313- 76-C-17
WB6EXW 42,750- 155- 92-C-10
N6NF 36,249- 281- 43-C-17
N6JM 32,928- 224- 49-B- 9
N6UW 27,885- 169- 55-C-32
W6SUJ 26,988- 173- 52-C-15
K6MA 2553- 37- 23-C- 3
N6QW 2331- 37- 21-A-10
W6ZBS 1215- 27- 15-C- 2

San Diego

K6PO 427,584-1088-131-C-48
WB6BZE 85,800- 260-110-C-60
W6IA 42,660- 180- 74-C-23
W6FF 17,334- 107- 54-C- 7

San Francisco

WB6ZHD 78,666- 102- 61-C-10
WA6WYZ 3243- 47- 23-B-14

San Joaquin Valley

N6LK 298,890- 810-123-C-34
W6DPD 36,504- 169- 72-C-17

Sacramento Valley

WA6ZDZ 4680- 78- 20-B-12

7

Arizona

WTAYY 278,253- 719-129-B-40
WA7WPM 34,404- 188- 61-B-17

Idaho

WB7ETJ 206,346- 578-119-C-51
W7IY 2904- 44- 22-A-

Montana

K7ABV 154,611- 419-123-C-30

Nevada

W7JUD 42,075- 166- 85-C-31
W7JKA 8181- 101- 27-B-25

Oregon

K7VIC 835,083-1773-157-C-56
W5XZ/7 569,943-1111-171-C-32
W7GOV 518,832-1201-144-C-75
W7WHB 359,733- 991-121-C-65
WA7GZA 358,200- 796-150-C-54
W7FP 140,484- 509- 92-C-45
W7GUR 114,111- 409- 93-C-41
W7MLJ 61,992- 287- 72-B-36

Utah

WB7SVQ 3168- 44- 24-B-14

Washington

W7WA 1,788,957-3027-197-C-74
WA7UWE 1,764,882-2842-207-C-
N7ZF 911,436-2012-151-C-37
WB7BNP 793,824-1364-172-A-76
WA7SCN 487,080-1230-132-C-51
K7NF 378,594-1107-114-C-57
K7GEX 171,072- 576- 99-C-30
K7JB 138,861- 417-111-C-25
WA7GVM 135,870- 501- 90-C-36
W7BUN 66,432- 346- 64-C-12
K7LAY 34,188- 148- 77-C-25
WB7DHC 32,763- 163- 67-B-26
K7CVL 29,835- 196- 51-A-18
W7FEO 27,540- 153- 60-A-34
W7RVQ 26,448- 152- 58-C- 9
W7BQG 10,800- 100- 36-B-
WA7RDJ 6786- 58- 39-C-15
K7WA 3744- 48- 26-A- 9
N7CT 1176- 28- 14-B- 5
N7DX 300- 10- 10-C- 1
K7RS 192- 16- 4-A- 1

Wyoming

WB7EUT 345,546- 711-162-B-18
W7PSO 69,615- 255- 91-C-25
K7ORN 55,002- 203- 89-C-

8

Michigan

W8FF 1,040,640-1862-240-C-64
W8TA(11MOL,opr)
858,699-1307-219-C-50
W8NWO 362,454- 626-193-C-65
WD8BPH 276,888- 566-166-C-43
WA8LTX 79,380- 252-105-C-19
K8FV 67,803- 233- 97-C-42
K8SIA 66,300- 221-100-B-20
W8LS 64,224- 223- 96-C-20
WA8AEE 45,000- 150-100-B-35
W8QQL 40,590- 165- 82-C-
WB8AAX 38,942- 146- 89-B-20
WB8IGU 35,112- 152- 77-B- 5
WA2LOI/8 23,718- 118- 67-C-12
W8LCU 8820- 60- 49-A-13
WB8UIA 6498- 57- 38-C- 6
WB8VBC 2997- 37- 27-C- 4
WA8ECH 1380- 23- 20-A- 4
WD8DOX 1224- 24- 17-B-11
K8CH 756- 18- 14-A- 2
WD8APM 660- 22- 10-A- 5
K8DAC 192- 8- 8-A- 2
WA8LSS 189- 9- 7-A- 4

Ohio

WB8JBM(WB8DQP,opr)
763,830-1242-205-C-51
K8DJC 249,879- 513-163-C-54
K8FO 249,150- 550-151-C-21
WA4RIJ/8 246,888- 508-162-A-38
W8KKF 155,238- 395-131-C-35
K8MR 131,334- 371-118-B-13
W8CBR 127,530- 327-130-C-
W8ZCQ 124,614- 301-138-C-30
W8CBA 119,262- 278-143-C-40
W8HQK 47,259- 177- 89-C-17
W8RSW 33,180- 140- 79-C-10
W8HQN 17,088- 89- 64-A-24
WA8OYR 8190- 65- 42-C-11
WD8LRV 5445- 55- 33-B-11
N8FIJ 3825- 51- 25-C- 3
W8IMF 1296- 24- 18-C- 7

West Virginia

WA8VZO 17,094- 154- 37-B-19
WB8TGS 12,900- 86- 50-A-14

9

Illinois

W9ZA 770,014-1151-223-C-61
WA9IXF 567,030- 922-205-C-43
K9KD 503,868- 796-211-C-54
K9AB 309,220- 589-175-C-40
WB9TIY 294,840- 585-168-C-64
N9LE 185,757- 433-143-C-40
W9UVM 177,459- 397-149-C-63
K9IL 145,728- 368-132-C-34
K9MNT 134,874- 354-127-C-40
K9GSG 103,320- 280-123-C-26
K9KM 98,532- 322-102-C-15
W9OA 97,470- 342- 95-C-
W9TNZ 48,000- 160-100-A-39
K9HWU 46,920- 170- 92-C-25
W9PNE 25,092- 123- 68-C-23
WB9NEH 20,625- 125- 55-B- 8
N9UN 18,711- 99- 63-C- 8
WB9YEB 11,322- 74- 51-B-24
K9KWL 11,016- 72- 51-C-19
K9BK 10,890- 66- 55-C- 9
K9BJM 7236- 67- 36-B-10
WB9EBO 6432- 67- 32-C- 6
W9REC 2808- 36- 26-B-15
W9HPG 147- 7- 7-B- 5
WB9DVQ 108- 6- 6-B- 1

Indiana

W9LF 874,620-1130-258-C-60
W9OBF 816,912-1098-248-C-72
W9NKI 679,224-1244-182-C-54
N9MM 401,880- 680-197-C-28
K9CLO 261,612- 507-172-C-57
WB9UKE 67,338- 261- 86-A-30
K9VQK 53,556- 170-105-C-29
W9ET 48,198- 162- 99-C-16
W9LKI 43,344- 168- 86-B-20
WB9ZQJ 42,273- 183- 77-C-38
K9ODF 11,781- 77- 51-C- 8
K9IAP 768- 16- 16-B-10

Wisconsin

W9AMM 120,060- 290-138-C-20
W9EZD 89,332- 184- 91-C-30
K9LWT 40,800- 160- 85-C-19
WB9MPF 16,200- 100- 54-B-13
W9LA 10,296- 66- 52-C-23
WA9EKQ 8976- 68- 44-C-11
WB9NOV 6396- 52- 41-C-16
WD9CPX 2376- 33- 24-B- 8
WB9RNF 1140- 20- 19-C- 1

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Colorado

W0PEL 121,518- 314-129-C-38
WA0TAM 93,000- 250-124-C-50
W0YK 39,060- 217- 60-C-15
WB0WJ 12,699- 83- 61-C- 8
K0ZFL 5814- 67- 34-B- 8

Iowa

K0LUZ 540,765- 918-197-A-61
W0WP 342,000- 600-190-A-53
WØMJN 270,165- 581-155-C-32
K0AT 266,562- 502-177-C-49
W0FO 146,550- 354-138-C-26
W0HJ 113,391- 293-129-C-32
WØGJ 95,976- 248-129-C-42
KØMM 89,485- 295-101-C- 9
W0VX 88,479- 261-113-C-14
WH0LNF 61,206- 202-101-B-18
WØSML 60,264- 186-108-C-31
W0IZ 52,416- 168-104-A-61
WA0DCB 23,115- 115- 67-C-22
W0VJ 17,670- 98- 62-C-10
WO0HGB 10,125- 75- 45-C- 9
K0ELVC 3780- 45- 28-B-20

Kansas

WA0AGN 288,288- 546-176-C-60
K0VGB 198,256- 346-191-B-50
WB0ISW 64,680- 220- 98-C-29
K0LD 26,544- 112- 79-C-41
WB0GBMB 19,440- 120- 54-B-23

Minnesota

N0AT 360,705- 695-173-C-65
WBØMAE 335,580- 658-170-C-54
WB0PIB 154,125- 411-125-C-40
W0LP 50,232- 182- 92-C-30
WA0YJB 45,924- 178- 86-A-42
WD0APT 17,856- 93- 63-A-45

Missouri

K0CD 245,952- 429-192-C-33
WB0QGK 193,404- 454-142-C-45
W0CDC 100,620- 258-130-C-49
WØPKO 39,858- 146- 91-C-25
W0DHN 39,591- 159- 83-C-41
N0OX 34,840- 191- 67-C-12
W0ZH 32,832- 144- 76-C-16
KØGSV 27,156- 124- 73-C-18
WB0WCN 21,909- 109- 67-A-16

Nebraska

KØCQB 51,264- 192- 89-B-37
WBØGOB 46,125- 205- 75-A-34

North Dakota

WØJWL 113,904- 336-113-B-50
WB0EHC 4176- 48- 29-B- 4

South Dakota

WØWUU 28,251- 129- 73-C-
WB0STR 3860- 44- 30-B- 4

VE

Maritime - Newfoundland

WB2RLK/VE1
1,840,356-2289-268-C-52
VO1AW 87,957- 337- 87-C-17

Ontario

VE3EUP 1,033,938-1401-246-C-38
VE3KZ 421,308- 747-189-C-25
VE3DLR 395,325- 753-175-C-79
VE3IKN 224,256- 512-146-C-65
VE3DUS 189,588- 427-148-C-34
VE3GCE 183,816- 444-138-C-39
VE3CMV 24,675- 175- 47-C-18
VE3MV 15,750- 105- 50-C- 9

Manitoba

VE4EW 239,850- 615-130-C-48
VE4SK 2961- 47- 21-A- 6

Saskatchewan

VE5YA 357,696- 828-144-C-50
VE5FK 1482- 26- 18-B- 9

Alberta

VE6JA 781,011-1771-147-C-68
VE6CGY 1653- 29- 19-B- 5

British Columbia

VE7ARQ 119,070- 405- 98-B-21
VE7AV 58,164- 262- 74-B-20

Yukon - N.W.T.

VE8CM 114,390- 465- 82-C-

Low Band

1

Connecticut

WA1UAD 90,909- 259-117-C-36

Eastern Massachusetts

W1FC 193,392- 474-136-C-52
W1BB/1 192- 8- 8-A- 3

2

New York City - L.I.

WB2AMU 882- 21- 14-B- 8

Northern New Jersey

WB2RTF 31,872- 128- 83-B-28
WA2IFS 7872- 64- 41-A-23
K2ROP 1320- 22- 20-B- 7

Southern New Jersey

WB2VFT 30,456- 141- 72-A-24

Western New York

K2VV 663- 17- 13-C- 1

3

Eastern Pennsylvania

W3PC 1392- 19- 16-B-10

Maryland - D.C.

K3ZO 190,350- 450-141-C-48
WB3AVN 5994- 54- 37-C-10
K3ZZ 1386- 22- 21-C- 5

Western Pennsylvania

K3UA 37,584- 144- 87-C-10

4

Georgia

W4LVM 9781- 47- 41-C-
K4PI 3393- 39- 29-C- 9

North Carolina

AA4VK 16,254- 86- 63-B-18
N3RB/4 10,320- 80- 43-C-11
W4UW 3588- 46- 26-C-11

Northern Florida

N4WW 65,832- 211-104-C-21

Tennessee

WA4MFS 29,082- 131- 74-C-65

Virginia

W4NH 7350- 70- 35-C-15

5

Northern Texas

K5RR 44,280- 164- 90-C-29

Oklahoma

WB5MSU 75- 5- 5-B-23

Southern Texas

K5JZY 59,670- 234- 85-C-35

6

Los Angeles

K6SE 495- 15- 11-B- 8

Orange

WA6WZO 13,818- 94- 49-C-

San Francisco

WA6DNM 8160- 68- 40-C- 9

7

Oregon

W7LJ 2112- 32- 22-C- 8

8

Michigan

W8TWA 23,710- 155- 94-C-64
K8TR 32,604- 143- 76-C-20

Ohio

K8WW 19,152- 114- 56-B-20

9

Illinois

K9PPV 46,872- 168- 93-C-28
W9RW 7200- 60- 40-C-10

Wisconsin

W9RN 18,492- 92- 67-C-22
K9RR 2850- 38- 25-C-10

Ø

Iowa

WØSR 3264- 34- 32-C- 7

Missouri

NØRF 44,820- 180- 83-C-41

VE

Quebec

VE3BBN 13,770- 90- 51-B-

Manitoba

VE4SL 8004- 58- 46-C-16

Multi-Single

1

Connecticut

K1XM(+K1PR,N1MM,WA1MAU)
2,206,140-2215-332-C-90
WA1SQB(+K1TN,N1MM,WB2BSV,
WB8PBC,KH6HQG)
898,464-1337-224-C-47

Eastern Massachusetts

W1ZA(+K1sEA IR UA)
4,083,696-3288-414-C-96
W1RR(+K1VR,N1EE)
1,366,170-1469-310-C-75
K1MM(+K1VR,N1EE)
1,359,288-1736-261-C-78
WA1SSX(+K1ST)
1,348,872-1519-296-C-81
W1BK(+N1CW,WA1UAR)
50,945- 239- 85-C-29

Maine

K1SA(+WA1DXS,WB1CTV)
156,768- 368-142-C-

Vermont

K1IK(+K1RQ,W1IUU)
1,454,235-1447-335-C-81

Western Massachusetts

W1YK(Multiop)
156,738- 346-151-C-22

2

Eastern New York

W2YV(+N2NT,W2YX,WB2YQU)
3,253,995-2605-433-C-96
W2XL(+W2IB,WA2MBB)
767,232- 999-256-C-75
WB2YIH(+W2JS)
70,131- 241- 97-C-30

N.Y.C. - L.I.

WA2LQO(K2UAT,W2DKM,
WA2ITA,W7OVS,oprs)
531,036- 844-198-C-48
W2AEE(WA2ZKY,WB4UTZ,
WD9EAV,oprs)
445,260- 905-164-C-
WB2EEE(+WB2GLW)
4901- 69- 43-B-

Northern New Jersey

K2OP(+WA2EPK,WB2DMB)
17,490- 106- 55-B-20

Southern New Jersey

K2UA(Multiop)
1,140,825-1435-265-C-80
K2BU(+N3AW)
1,077,972-1252-287-C-48
N2MM(Multiop)
1,000,692-1254-266-C-68

Western New York

K2JPM(+K2QQN,WB2JAB)
204,633- 477-143-C-45
W2PE(WA2SOJZ ORS,WB2SOJV
OXG,oprs) 3567- 41- 29-B-20

3

Delaware

W3HB(+W3NX)
987,552-1143-288-C-96
W3SL/3(Multiop)
54,285- 235- 77-C-16

Eastern Pennsylvania

N3RD 2,969,004-2468-401-C-96
N3ED(+Net)
1,598,940-1410-378-C-68
N3RG(K3s KNH SME,N3DG,
WA3FZO,oprs)
1,401,840-1416-330-C-96
W3GU(+Net)
496,552- 776-209-C-24
W3KHB(+Net)
268,992- 467-192-C-66
W3KFQ(+Net)
157,437- 343-153-C-30

Maryland - D.C.

W4NL/3(+K3AO,K4FJ,N4TX)
2,388,315-1789-445-C-96
K3RA(+KJ3XD,NJ3I,WA3VUQ)
1,543,974-1593-344-C-94
N3RL(+K3TA,N3TR)
1,403,376-1352-346-C-96
W3UO(+W3IKA)
473,565- 665-241-C-68
WA3ZJT(+Net)
377,533- 841-171-C-54
W3GNQ(+Net)
264,000- 550-160-C-32

Western Pennsylvania

W3YT(Multiop)
132,822- 314-141-C-40
W3IW(+WN3KER)
90,288- 264-114-C-18

4

Alabama

N4KG(+WN4KKN)
1,669,536-1488-374-C-68

Georgia

WA4PUJ(Multiop)
450,984- 817-184-C-80

Northern Florida

N4UF(+WA4PVT,WB4YEV)
643,032- 916-234-C-37

Southern Florida

WA4LZR(K4sGFW XF,N4RU,
WA4LOZ,WB4sEJC RRC,
WB8TGA,WB9OBA,oprs)
574,992- 792-242-B-90
N4BP(+K4GNP,N8RC)
481,824- 956-168-B-37

Tennessee

K4TTA(+WA4CTA,WB4PRX)
449,820- 612-245-C-50
WA4EAL(N4VI,WA4ZZU,WB4UXU,
oprs) 83,743- 247-113-C-

Virginia

K4VX(+K4YEP,K9CMF)
1,908,994-2402-449-C-96
N4HB(+WA4KNP,WB4BVY)
1,477,558-1457-338-C-83
W4PRO(+N4DJ,W4HBK,WA4QIT,
N5BA) 1,154,106-1322-291-C-96
W4JVN(Multiop)
248,422- 503-158-C-43
K4JNM(+Net)
100,620- 260-129-C-22
WA4AXT(+WA4WKY)
52,916- 267-116-B-44
N4XG(+WA4CIHX)
88,920- 260-114-C-22

5

Arkansas

N5DX(+K5GO,K8CC)
1,718,928-1557-468-C-96

Louisiana

W5RU(K5s GET LM QA WF,W5s
CB NO SNL UP WQI WA5KND,
oprs) 2,306,250-2050-375-C-96

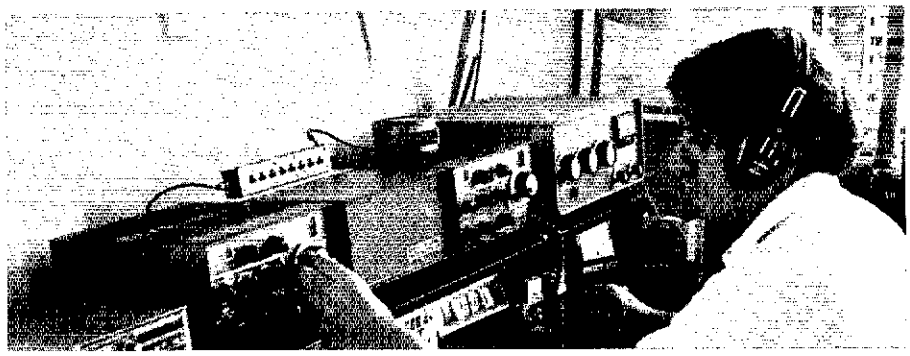
Northern Texas

K5IA(+K5s MR RX SR XR,N5s AU
MP,WB5PIP)
3,490,950-2738-425-C-96
K5FUV(+WA5HXD,WB5s TAP
TXK) 448,731- 683-219-B-96

Southern Texas

W5AC(K5GN,WB5s LEU YDT,
opns) 814,176-1056-257-C-70
K5KG(+WD5AFG)
709,456- 984-228-C-50

N6CW, the top single-operator (high band) codeman from W6 land.



Number one single operator on cw for South America, PJ2VD. After many fine years of participation in the DX Competition, Joeke will be leaving PJ2 for The Netherlands, where he will be PAØVDV. Good luck.

6

East Bay

WA6JUD(+K6XO,WA6s DGX,DIL) 2,121,603-3629-269-C-94
K6XV(+K6PJV,N6s FJ VV) 1,791,736-2448-244-C-81
W6QL(+W6KG) 1,184,274-1638-241-C-92

Los Angeles

K6YRA(+WA9IBT) 305,118- 737-138-C-35
K6ELX(Multiop) 96,960- 404- 80-C-26

Santa Clara Valley

N6TU(+K6RM,N6s KT LC,W1ARR WA6VEF,WB6SHD) 2,480,847-2659-311-C-96
W6YL(WA6HCI,WB6YJC,WD6s CHF DBM,oprs) 860,640-1760-163-C-70
K6SMH(+Net) 107,256- 328-109-B-35
N6RZ(+WA6OCV,WB6CJE) 27,939- 139- 67-C-
N6GG(+Net) 5217- 47- 37-C- 7

San Francisco

W6BIP(Multiop) 296,070- 710-139-C-35

San Joaquin Valley

K6AYA(+WA6OEC) 555,894-1041-178-C-55

7

Arizona

N7DD(+N6DT) 3,298,746-3322-331-C-

Nevada

WA7NIN(+K7OX,N6s BT RO SF TV,WB6DSV) 3,476,520-3480-333-C-96

Oregon

W7IVX(+K7WPL,W7WHY, WB7PQU) 762,888-1673-152-C-90

Washington

N7RO(+W7s DQM EKM,WA7s ZWG,WB7DYB) 2,078,142-2738-253-C-96

8

Michigan

N8JW(+K8NA) 2,108,799-1969-357-C-96
K8MJZ(+K8s LF TK) 559,728-1014-184-C-52
WB8JDA(+W8TJQ) 429,408- 672-213-C-71

9

Illinois

K9KA(+K9RS,W9NB,WA9JCO, WB9EBP) 1,057,056-1144-308-C-92

Indiana

K9XA(+N9s NB NC,WD9AHQ) 835,590-1211-230-C-80

Wisconsin

WB9TXJ(+WD9DIA) 32,025- 175- 80-C-52

Ø

Colorado

WBØLLR(+KØKE,WBØs IKN NYY) 3,283,812-3297-332-C-94
WØMYN(+WBØCMM) 1,321,920-1632-270-C-80
WBØWML(+WBØRYY) 76,140- 282- 90-C-40

Kansas

WBØRET(+KØVBU,WØs SEM YR, WBØs EZQ KWI) 1,002,051-1251-267-C-92

WBØDRL(+WAØTKJ) 398,412- 714-186-C-83

Minnesota

KØKX(+KØWWX) 2,629,836-2519-348-C-92

Missouri

KØAZV(Multiop) 8316- 63- 44-C-23

Nebraska

WAØYPY(+KØGND,WØMYT, WAØASM,WBØJIM,WDØFGV) 206,847- 489-141-C-65
WAØZPM(+WBØPZH) 26,272- 124- 76-C-25

VE

Maritime - Newfoundland

VE1UNB(VE1s BCZ BEC BHA BJC QT,oprs) 1,210,482-1478-273-C-96

Saskatchewan

VE5RG(+VE5DX) 1,758,279-2071-283-C-85

Alberta

VE6WQ(+VE6KW) 1,929,216-2512-256-C-87

Multi-Multi

W2PV(+K1s AR OG GQ XX, W1RR,K2s TR VV XA,,WB2GXW, W3AZO) 12,285,312-6848-598-C-96
W3AU(+CX1EK,DK5AD,WA1FEO K3EST,WA3TAI) 8,983,524-5566-538-C-96
W3MM(Multiop) 8,629,182-5307-542-C-96
W4BVV(+K2OII,K3s KU RT,W3s IUU ZZ,WA3AMH) 8,356,320-4974-560-C-96
W3WJD(+WA3s LRO NNA) 7,667,136-4896-522-C-96
W3EA(+N3s GB HS,W3XY,WA3s KCY ZAS,,NRII) 7,176,166-4547-526-C-96
KØRF(+KØGU,WØs UA UN YK ZV,WBØIKN,WDØDSU,JA7KAC) 6,245,460-4710-442-C-96
K3WW(+K3VW,K3WJV,WA3RID) 6,144,864-3872-529-C-96
K8LX(+K8s GM MD,N8EA,W8WD, WA8ZDT,WB8ALP) 4,446,576-3431-432-C-
W3GM(+K3s GQJ JLT OA RL, WA3VPQ,KØVCK) 4,040,118-2754-489-C-96
N6SV(+K6s NA XT,N6s ND RJ, W6YA) 3,648,654-3323-366-C-96
W6YX(W2JU,W6TPH,WA6ITV, N7MH,WA7USX,W8ZI,+ Net, oprs) 2,504,553-2971-281-C-96
K5TM(+KbZD,WD5EHB) 2,130,804-2041-348-C-96
N3AD(+Net) 2,117,976-1801-392-C-
W2GD(+Net) 1,885,020-1780-353-C-64
N3LR(+WB3HEQ) 1,325,250-1550-285-C-96
W3DHM(+W3MA) 1,224,090-1218-335-C-
K2TD(+N2ME) 563,340- 820-229-C-58
N5TV(+WB5VAN,WD5s DFB GKP) 541,338- 755-239-C-96
W3KT(Multiop) 482,541- 673-239-C-
WD4JMT(+W4VGL,WA4s GFL OIP,WB4EUP,oprs) 37,440- 160- 78-C-15

CW

DX

Single Operator

Africa

EA8IR 214,200- 525-136-B-27
EA8LK 29,028- 164- 59-A- 5

EL2T 2,369,970-3098-255-C-60

ZD8HR(N6HR,opr) 1,373,945-1949-235-B-

ZS6WW 96,612- 332- 97-A-12

W6NV/3D6 192,930- 545-118-A-20

5T5CJ 2,162,028-2978-242-C-61

Asia

HZ1HZ 540,864-1252-144-A-55

JR1JFO 1,537,848-2418-212-B-
JA1IBX 1,287,264-2024-212-B-56
JE1LSD 898,092-1482-202-B-56
JA1BWA 875,892-1553-188-B-50
JE1SSE 795,018-1646-161-B-70
JA2AXB 717,912-1534-156-B-40
JA7DAH 653,226-1442-151-C-
JA2EKR/3 412,965-1035-133-A-50
JA5FDJ 372,321-1009-123-C-60
JG1BUB 364,524- 821-148-B-41
JA3VKH 340,368-1013-112-A-24
JA8SW 253,824- 661-128-C-
JA6CNL 198,666- 566-117-B-
JA1ZXX 168,732- 516-109-A-38
JA2PFD 147,258- 486-101-B-50
JA2AJA 121,230- 449- 90-C-35
JA6AKW 110,208- 448- 82-A-
JA3XIS 91,854- 378- 81-B-38
JR1IOS 83,200- 274-100-A-19
JA1AYC 80,388- 348- 77-A-18
JA2AYH 73,080- 290- 84-B-24
JH6NAC 71,040- 320- 74-B-21
JA9JBK 71,040- 320- 74-B-16
KA6DX(N1DX,opr) 70,602- 287- 82-C-14
JA7FS 69,222- 278- 83-C-
JA1JCA 64,602- 291- 74-B-
JA7PFN/1 60,000- 250- 80-A-54
JA9LX 46,314- 249- 62-B-
JR2AGL 45,828- 268- 57-A-30
JA1CID 44,544- 232- 64-A-19
JA3BQU 42,120- 234- 60-B-
JH2JEV 34,344- 216- 53-A-26
JA1NLX 34,338- 194- 59-A-12
JA3ARM 27,750- 185- 50-C-
JF1UVJ 26,052- 167- 52-B- 8
JA7AEM 24,108- 164- 49-C-10
JF3CCN 23,103- 151- 51-B-
JA5IU 21,114- 138- 51-C-
JA1DFQ 19,872- 138- 48-A-
JA1PS 18,480- 140- 44-A-13
JH4HVI 17,901- 153- 39-B-
JA3JF 15,210- 130- 39-A- 8
JH3ARL 14,391- 123- 39-C- 8
JA1HYH 13,764- 131- 37-A-
JA1KXT 13,566- 119- 38-A-20
JA2YFM 11,235- 107- 35-A-
JA9SOT 10,605- 101- 35-A-10
JA3HUL 6570- 73- 30-B-
JR2PMQ 6084- 78- 26-B-11
JR3HII 5451- 79- 23-B-
JA0COR 4320- 72- 20-B-10
JA5NAF 3960- 55- 24-A- 7
JH8KAN 3762- 57- 22-A- 5
JA1UBH 1056- 32- 11-A-
JA4REH 870- 29- 10-A- 9

UA9OBQ 1296- 24- 18-B-

UF6CX 33,150- 221- 60-A-

UL7QH 232,895- 687-113-B-
UL7NAF 38,880- 216- 60-B

YM1ZB(TA) 91,656- 402- 76-B-36

4Z4MB 424,620-1011-140-B-30

Europe

DK3GI 2,536,578-3342-253-C-
DK8AX 203,562- 526-129-B-
DK8KC 108,000- 400- 90-B-40
DJ5GW 92,484- 367- 84-B-
DL1OO 83,334- 323- 86-B-
DL7BQ 81,918- 333- 82-C-14
DL3IA 63,210- 301- 70-A-
DK7ZT 48,375- 215- 75-C-10
DL1KS 27,528- 124- 74-C-16
DF2CH 2583- 41- 21-B-
DA2JA(N6PA,opr) 1377- 27- 17-A- 4

DM45DA 107,856- 428- 84-A-
DT3NKF 80,676- 332- 81-A-
DM2DCN 40,890- 235- 58-A-
DM4ZBK 32,763- 163- 67-A-
DM2FCL 16,188- 142- 38-A-
DM3VTL 14,112- 98- 48-A-
DM2CZJ 10,791- 109- 33-A-
DM2GHL 8316- 99- 28-A-
DT2BPF 7830- 87- 30-A-
DM6AF/DM5WGL 4275- 75- 19-A-
DM4NJJ 3960- 55- 24-B-
DM2CWB 3717- 59- 21-A-
DM2FTL 3432- 53- 22-A-
DT4RWL 1392- 29- 16-B-
DM2AXB 936- 26- 12-A-

EA3AIR 176,814- 517-114-B-39
EA2HW 100,188- 363- 92-A-
EA4PB 57,708- 229- 84-A-
EA5QR 34,209- 181- 63-A-11
EA3PI 30,744- 183- 56-B-20

EI9J 953,064-1708-186-A-39

F8VJ 1,313,760-1955-224-A-51
F6EID 857,820-1682-170-B-54
F9IQ 647,484-1366-158-A-51
F6CZU 620,748-1203-172-B-
F3AT 148,086- 433-114-A-10
F6APJ 70,227- 289- 81-A-
F6BHX 48,312- 244- 66-A-
F6EQV 40,548- 218- 62-B-31
F9BB 35,604- 172- 69-B-
F8TM 31,110- 170- 61-A-36
F6CCI 16,383- 127- 43-A-13

G3FXB 2,425,116-3313-244-A-84
G3MXJ 2,369,664-3264-242-A-78
G2QT 1,048,944-1681-208-A-62
G3ESF 457,410- 965-158-A-72
G3APN 58,776- 248- 79-A-32
G2AJB 48,180- 220- 73-A-19
G5CFJ(K6PU,opr) 30,267- 177- 57-A-

GD5CAA(K3RV,opr) 1,591,968-2369-224-A-40

HB9KC 465,630- 935-166-B-25
HB9AYZ 1716- 26- 22-B-

I1FGP 1,255,104-2179-192-B-42
I5YZ 55,350- 225- 82-A-21

LZ1KOZ 35,148- 202- 58-B-
LZ1BY 6786- 87- 26-B-

OE5CWL 668,733-1319-169-B-
OE6HZG 451,008-1044-144-B-40
OE1TKW 63,987- 277- 77-B-24

OH6DX 944,649-1779-177-C-60
OH7NW 24,180- 124- 65-B-
OH1FM 19,344- 125- 52-A-

OK3CEE 210,180- 571-124-B-
OK1AFN 180,360- 501-120-A-
OK1KZ 141,198- 466-101-B-
OK2BWI 128,304- 432- 99-A-
OK3FH 84,084- 364- 77-B-
OK2SGW 81,048- 307- 88-A-
OK2TBC 76,440- 364- 70-A-
OK2BKR 59,511- 239- 83-A-11
OK2BEC 56,638- 337- 68-B-
OK2PDD 33,840- 235- 48-A-
OK2ABU 25,136- 266- 32-A-
OK3VCA 25,272- 216- 39-A-
OK1KPR 6195- 59- 35-A-
OK2BFK 4698- 54- 29-A-
OK1MWN 627- 19- 11-A-

ON4XG 556,416-1152-161-B-38
ON4FD 206,640- 574-120-B-
ON8XT 23,460- 171- 46-A-

OX3OA 1,518,783-2333-217-B-
OX3AB 1,312,179-2339-187-B-64
OX3RA 510,931-1057-161-A-30

OZ1LO 1,743,021-2653-219-B-82
OZ1W 220,896- 624-118-A-
OZ7BW 161,640- 449-120-A-
OZ1AIK 161,214- 554- 97-A-
OZ1EE 149,112- 456-109-B-
OZ5WQ 106,959- 353-101-A-

PAØLOU 440,979- 913-161-A-22
PAØTA 165,672- 472-117-A-50
PAØVB 44,415- 235- 63-A-30
PAØWRS 32,412- 148- 73-A-
PAØFIN/A 10,980- 61- 60-A-
PAØNYM/A(PA3AGA,opr) 5766- 62- 31-A- 5

SM6DHU 881,280-1632-180-B-60
SM3GSK 329,040- 914-120-B-40
SM6BZE 262,104- 652-134-B-
SM6VBD5 158,595- 486-109-B-28
SM6AYM 138,012- 434-106-B-40
SMØCCM 92,097- 379- 81-A-
SMØBYD 68,388- 278- 82-B-
SMØGMG 66,834- 282- 79-B-
SMØDJZ 60,984- 242- 78-B-17
SMØGNU 55,350- 225- 82-B-
SM7MBH 34,884- 171- 68-A-
SMØCGO 25,200- 150- 56-A-
SMØDZH 11,400- 100- 38-B-
SM5AHK 3528- 42- 28-A-

SP8ECV 878,964-1646-178-B-
SP6ASD/6 192,930- 545-118-B-
SP7DTP 51,903- 237- 73-A-33
SP9AKD 35,577- 201- 59-A-
SP2AYC 19,800- 165- 40-A-
SP4INT 14,763- 133- 37-A-
SP3DLY/9 10,530- 135- 26-A-
SP9HWN 7704- 107- 24-A-
SP4BMO 7107- 103- 23-A-
SP7ILH 6210- 69- 30-A-
SP6EIY 5016- 76- 22-A-
SP3CQP 3600- 50- 24-A-
SP6EIY 720- 24- 10-A-
SP4EKY 273- 13- 7-B

UA3QAQ 100,392- 376- 89-B-
UW6DE 55,755- 295- 63-A-
UA6LFQ 39,240- 218- 60-A-
UA1AWO 37,701- 213- 59-A-
UA3DLN 30,135- 205- 49-A-
UA6APP 27,048- 184- 49-B-
UA6PBA 15,732- 138- 38-B-
UA1AFM 11,016- 108- 34-A-

UK5QBE 70,560- 420- 56-B-
UK5JAD 38,454- 221- 58-A-
UB5VYY 14,985- 111- 45-B-
UB5AAQ 6816- 71- 32-B-
UB5JFP 3630- 55- 22-A-

UC2ACA 3900- 50- 26-B-

UP2NV 854,304-1618-176-B-
UP2BAO 46,964- 206- 76-B-
UP2BAS 41,856- 218- 64-B-
UP2BAW 13,653- 111- 41-B-

YO3AC 110,970- 411- 90-B-
YO3CR 49,266- 238- 69-B-
YO5LP 30,030- 182- 55-A-
YO3AQJ 17,446- 153- 38-A-
YO9HP 4131- 51- 27-A-

YU3EY 2,278,380-2990-254-C-85
YU1PCF 1,669,662-2507-222-C-70
YU2RRL 433,290-1010-143-A-60
YU1OGP 9240- 140- 22-A-
YU1OQA 9090- 101- 30-A- 7

North America

HI8MOG 1,584,081-2479-213-C-38

HP1AC 43,947- 257- 57-A-

KL7RW 3,087,576-4514-228-C-80
KL7AF 1,101,492-1692-217-C-
KL7GN 10,350- 75- 46-B- 3

KP4EAJ 6,110,235-6345-321-C-76
WA2CMX/KP4 188,496- 714- 88-A-12

PJ7CL 352,434- 778-151-A-

XE1FX(N6CJ,opr) 5,489,454-6059-302-C-72

ZF2AI(WØCW,opr) 653,793-1141-191-A-15
ZF2AM(W8LUI,opr) 115,140- 380-101-A-14

W9WGQ/6Y5 392,345- 969-135-A-

Oceania

KG6JIH(N6AJ,opr) 1,470,867-2141-229-C-36

KG6SW(K7JA,opr) 331,423- 778-142-C-10

KH6IJ 4,266,585-4821-295-C-75
KH6NO 3,035,520-3720-272-C-73
KH6IRJ 88,236- 342- 86-A-20
KH6JHT 8184- 88- 31-B-20
K7SS/KH6 6156- 76- 27-A-

VK2GW 562,320-1136-165-A-
VK4LX 498,576- 799-208-A-
VK3QI 48,705- 191- 85-B-10

ZL1ADI 2,591,820-3388-255-A-
ZL3BK 1,258,389-1881-223-A-60
ZL2TX 146,718- 418-117-A-

South America

N4VV/CE3 877,464-1741-168-B-22

HC2SL 2,551,500-3402-250-C-53
WA4UAZ/HC1 827,391-1429-193-B-18

HK1AMW 577,917-1227-157-A-32

OA8V 254,910- 586-145-A-15

PJ2VD 5,423,898-6067-298-C-72
PJ9JT(W1BIH,opr) 2,628,417-3463-253-C-33

PY5AHR 138,123- 447-103-B-40

JA1PIG/PZ 2,548,200-3100-274-B-59

YV1NX 1,969,500-2626-250-A-44
N7DC/YV5 840,294-1482-189-B-45

High Band

Africa

EA8URE 109,440- 480- 76-A-19

Asia

EP2IA 99,387- 409- 81-A-
EP2EC(K5MM,opr) 7980- 95- 28-A- 4
EP2LA 5816- 71- 32-A-

HM2JN 8091- 93- 29-C- 5

JA2NDQ 685,665-1693-135-C-40
JA7GAX 561,750-1498-125-C-34

JR1IMV 509,679-1317-129-B-40
JA7AMK 490,194-1446-113-C-80
JH1ACQ 345,125-1187-125-C-
JA1JKG 423,864-1218-116-B-
JA2AIR 351,792-1047-112-C-42
JH3CXL 335,124-1044-107-C-35
JA1WAE 200,304- 642-104-B-55
JA2XMP 166,176- 577- 96-C-26
JA2IU 149,760- 520- 96-A-42
JE1FZF 137,046- 502- 91-B-24
JA0SC 132,855- 521- 85-C-
JA4PHT/1 112,746- 437- 86-A-32
JA1GLT 106,638- 411- 86-B-32
JF1SEK 80,817- 341- 79-B-22
JA1CSB 78,000- 520- 50-C-22
JJ1BBQ 76,440- 490- 52-B-14
JA1OP 70,632- 327- 72-B-36
JI1KUV 66,528- 396- 56-A-
JA8FBM 59,664- 226- 88-B-
JR3COZ 59,430- 283- 70-A-
JA4GXS 58,140- 285- 68-B-13
JG1EEE 57,564- 369- 52-B-21
JR3XEX 49,770- 237- 70-A-
JA9SV 44,019- 219- 67-B-
JK1DLQ 41,952- 222- 63-A-19
JA7KXD 40,887- 231- 59-B-14
JA5XFS 40,656- 242- 56-A-24
JG1LEB 36,456- 196- 62-B-15
JA0VRJ 34,584- 262- 44-C- 9
JH1MTR 34,344- 216- 53-B-
JA7EIV 27,612- 236- 39-B-19
JE2KPM 26,085- 185- 47-A-11
JH2LES 25,920- 192- 45-C-16
JH4HLN 25,872- 176- 49-A-17
JH1WPB 25,596- 158- 54-A-16
JF1MYI 25,272- 218- 39-B-30
JA3CS 21,600- 150- 48-B-
JA2ITH 20,787- 169- 41-A-
JA3MFE 17,280- 160- 36-A-
JG1RJB 16,008- 116- 46-A-10
JA2CGB 12,096- 144- 28-B-
JA2HJC 11,970- 95- 42-B-
JA0COR 11,931- 97- 41-B-14
JA1AVI 11,280- 94- 40-B-15
JA2GXD 10,440- 120- 29-A-
JH3FWZ 9000- 100- 30-B-18
JH4NCR 7956- 102- 26-A-22
JA9FT 4899- 71- 23-B- 2
JA1GZM 4896- 68- 24-A-
JA47P 4380- 73- 20-B-
JK1LUY 4347- 63- 23-B-
JH1OEL 4095- 65- 21-A- 4
JG1GJB 3828- 58- 22-A- 4
JE2GHO 2301- 59- 13-A- 8
JR6LP 1710- 30- 19-A-11
JA7BAL 1680- 28- 20-C-
JA3ELU 1395- 31- 15-A- 5
JR6CF 882- 21- 14-A-
JA7JT 765- 17- 15-A-
JA1PAQ 651- 31- 7-A-
JA1AAT 396- 22- 6-A-
JA1BOK 360- 20- 6-A- 2
JH7BDS 360- 12- 10-C-
JA1YOE(K7JA,opr)
90- 10- 3-A-
JA0GZ 84- 14- 2-A-
JA0ZG/1 18- 3- 2-A-

JT1AN 25,530- 230- 37-B-

UW0IX 451,008-1392-108-B-
UA0SAU 153,285- 929- 55-B-
UA0QWB 45,684- 324- 47-B-
UA0ACM 36,180- 268- 45-A-
UA9ABA 34,506- 214- 54-B-
UA9OFE 23,364- 177- 44-A-
UA9UOZ 22,950- 170- 45-A-
UA9XSQ 18,612- 188- 33-A-
UA9QAQ 15,651- 141- 37-B-
UA9AAP 12,960- 108- 40-B-
UV9DO 11,346- 122- 31-A-
UA9AAB 6018- 59- 34-B-
UV9DU 3312- 48- 23-A-
UA9LBM 1800- 40- 15-B-
UA9QE 1296- 36- 12-B-
UA0LJ 1215- 27- 15-B-
UA9CAL 945- 21- 15-B-
UA9MY 288- 12- 8-A-
UA9OCI 180- 10- 6-B-

UD6BW 483- 23- 7-B-
UD6DKW 456- 19- 8-A-

UF6BN 7056- 84- 28-B-

UH8DC 14,364- 126- 38-B-

UJ8JCL 210- 10- 7-B-

UL7PBI 8262- 81- 34-A-
UL7LBM 7200- 80- 30-A-
UL7PBY 5175- 70- 25-A-

UM8NNN 168- 14- 4-B-

4Z4UX 60,480- 280- 72-A
4Z4TA 2652- 68- 13-A-

Europe

DK6IS 805,566-1891-142-C-35
DK5PD 707,118-1759-134-C-60
DJ9ON 556,920-1365-136-B-49
DL8FR 413,280-1148-120-B-35
DL7AA 395,127-1021-129-C-
DJ0XT 307,200- 800-128-A-
DJ0VO 104,424- 458- 76-B-32
DK6BI 99,330- 430- 77-B-
DL1CR 77,376- 496- 52-B-
DK9NHA 68,040- 315- 72-C-
DF4QW 48,951- 259- 63-B-
DJ7JJ 42,595- 205- 63-B-
DK9MB 28,500- 250- 38-A-
DF3QN 24,300- 180- 45-B-
DL1RB 24,102- 206- 39-B-
DK4HD 11,136- 116- 32-B-
DJ4OE 9216- 96- 32-B-
DL1BV 5022- 62- 27-B-
DF9EM 3660- 61- 20-B-
DL3CW 1938- 38- 17-B-

DM3YOE 206,721- 669-103-A-
DM3XSO 176,040- 652- 90-B-
DT7FIL 73,320- 376- 65-A-24
DM4NEE 66,447- 321- 69-B-
DM3VBF 43,674- 251- 58-A-
DM2CKD 31,660- 192- 55-A-
DT2FWL 27,120- 226- 40-A-
DT3VAA 22,752- 158- 48-B-
DT3BF 22,650- 151- 50-A-
DT2BUB 22,274- 159- 49-A-
DM3MSB 19,620- 218- 30-A-
DM4ONL 16,605- 123- 45-B-
DM2FFL 14,628- 106- 46-B-
DM2CLM 13,668- 134- 34-A-
DM5YVL 8532- 79- 36-B-
DM2CYF 6804- 81- 28-A-
DT2CCM 6138- 62- 33-A-
DM2DRN 5214- 79- 22-A-
DM2FBM 5103- 81- 21-B-
DT2DYH 3645- 81- 15-B-
DM2AGF 1530- 30- 17-A-
DM2ARD 1470- 35- 14-B-
DM5XIG 1200- 25- 16-B-
DT2ACL 936- 24- 13-A-
DM4VNJ 858- 22- 13-A-
DT2BCF 315- 15- 7-A-
DT2AJH 36- 4- 3-A-

EA2OP 210,540- 605-116-A-17
EA4BV 41,400- 230- 60-A-

EI2BB 458,832-1264-121-A-27
EI4CP 6300- 100- 21-A- 9

F8TQ 253,752- 776-109-A-
F6DNR 115,632- 438- 88-A-35
F6ENN 87,600- 400- 73-B-
F6ERZ 56,316- 247- 76-A-
F2PC 7392- 77 32-A-
F3DA 6048- 96- 21-A-
F8NS 150- 10- 5-A- 3

G3MZV 333,060- 910-122-A-24
G5CES(K1FN,opr)
243,960- 760-107-A-13
G5CEY(K9NB,opr)
198,162- 654-101-A-16
G3NKS 70,917- 307- 77-A-15
G3FAS 46,431- 231- 67-A-
G6NK 35,712- 248- 48-A-30
G3YBH 25,596- 158- 54-A- 4
G8DI 5925- 79- 25-A-13
G3IRM 480- 16- 10-A-

GI4BBV 249,630- 785-106-A-25

GM3LYY 112,200- 440- 85-A-37
GM4CXM 58,656- 416- 47-A-23

HA5JK 16,335- 165- 33-A-13

HB9DX 307,740- 892-115-B-
HB9BLQ 117,288- 543- 72-B-
HB9AGH 81,786- 317- 86-A-
HB9BOW 25,410- 154- 55-A-

HB0AQN/M 27- 3- 3-B- 1

I0MGM 1,276,506-2763-154-B-51
I1FOX 904,425-1945-155-B-55
I6POY 510,507-1299-131-B-56
I4KRF 498,771-1421-117-B-63
I7EIU 16,380- 130- 42-B-

IS0MWE 104,517- 441- 79-A-27

LA5SH 105,378- 386- 91-A-22
LA1ML 13,080- 109- 40-A-
LA7EQ 11,232- 96- 39-A-
LA4HI 10,152- 94- 36-B-
LA4PQ 1920- 32- 20-A-
LA3VU 273- 13- 7-B- 2

LX1ML 8325- 111- 25-A- 8

LZ1AU 31,845- 193- 55-B-
LZ2GS 30,456- 188- 54-B-
LZ1EP 3306- 58- 19-A-

OH6IQ(OH6WZ,opr)
208,530- 662-105-C-
OH2BJH 169,011- 633- 89-C-40
OH2BAH 126,072- 408-103-C-
OH6ZAB 87,840- 366- 80-B-
OH5LU 57,889- 301- 63-B-
OH5SS 20,955- 127- 55-A-
OH6RC 8880- 80- 37-B-
OH2JQ 7227- 73- 33-B-
OH5ZM 7128- 72- 33-B-
OH1MQ 6399- 79- 27-B-
OH9TD 3960- 44- 30-A-
OH5AO 3132- 87- 36-A-
OH6VV 897- 23- 13-A-

OK2QX 368,868-1042-118-C-
OK1KUO/P
360,018-1062-113-A-
OK2BSG 106,938- 457- 78-A-
OK3IF 103,420- 410- 84-B-
OK1JHR 94,702- 382- 82-B-
OK3BA 79,787- 367- 87-A-
OK2KRT 89,262- 513- 58-A-
OK3EA 76,816- 312- 81-B-
OK2KWI 62,244- 266- 78-A-
OK3FON 52,608- 274 64-B-
OK1DKW 45,738- 242- 63-A-16
OK1LCA 33,936- 202- 56-A-
OK1DKR 17,250- 125- 46-A-
OK1AOV 15,840- 120- 44-A-
OK2PBG 15,330- 146- 35-B-
OK1AMW 10,989- 111- 33-B-
OK2SMO 8748- 108- 27-A-
OK1ATB 7968- 83- 32-A-
OK1MWN 5226- 76- 23-A-
OK1MHM 4617- 81- 19-A-
OK3CAU 4185- 93- 15-A-
OK1KUF 3591- 63- 19-A-
OK1CIJ 3354- 43- 26-A-
OK1DLA 2610- 58- 15-A-
OK2BHX 1344- 32- 14-A-
OK1KRY 792- 24- 11-A-
OK2KOO 648- 18- 12-B-
OK1MSO 180- 10- 6-A-

ON6ZW 229,320- 735-104-B-
ON8HF 16,665- 101- 55-B-

OZ1VY 356,103- 981-121-B-50
OZ7YL 228,600- 600-127-B-
OZ6XR 92,928- 484- 64-A-
OZ8ND 38,610- 195- 66-A-
OZ1DQX 30,720- 256- 40-A-
OZ1BII 15,120- 120- 42-A-
OZ1DYU 14,514- 82- 59-A-
OZ8E 5346- 81- 22-B-
OZ5DP 2970- 45- 22-A-
OZ9OI 528- 22- 8-A-

PI1PT 241,560- 915- 88-A-30
PA0UV 129,735- 465- 93-A-
PA0ATY 73,062- 297- 82-A-13
PA0GT 23,829- 169- 47-A-
PA0PT 14,508- 113- 39-A-20
PA0PRC 6435- 65- 33-A- 7
PA3ABA 1782- 33- 18-A- 6
PA0ANK 1080- 24- 15-A-
PA0DIN 630- 15- 14-A- 1

SM3EVR 521,088-1357-128-B-
SK0HB(SM0GMZ,opr)
384,087-1133-113-A-
SM5CMP 100,584- 381- 88-B-
SM7CKZ 78,366- 353- 74-B-10
SM5XX 75,768- 328- 77-C-16
SM5AKT 38,793- 193- 67-B-
SM5CAK 31,146- 179- 58-B-
SM7BVD 24,072- 236- 34-B-
SM7BBV 21,708- 134- 54-B-
SM7INN 20,094- 197- 34-A-
SM6EKF 18,360- 136- 45-B-
SM7AAQ 15,750- 125- 42-A-
SM5BOE 14,946- 106- 47-B-
SM6ID 14,448- 112- 43-A-
SM5RE 12,096- 144- 28-B-
SM0XG 10,296- 78- 44-A-21
SM5DYC 10,146- 89- 38-A-
SM5CXO 8880- 80- 37-B-
SM2H7Q 6840- 76- 30-B- 3
SM7CZC 6834- 67- 34-A-
SM6CPO 6831- 69- 33-B-
SM6BGA 6720- 80- 28-A-
SM3BP 3174- 46- 23-A-
SM6IY 3036- 44- 23-B-
SM5CSS 1836- 36- 17-B-
SM6BBX 3- 1- 1-A-

SP6AEG 153,468- 520- 98-B-
SP9CTW 59,202- 253- 78-B-
SP4GHI 49,400- 245- 40-B-15
SP3JDZ 27,324- 198- 46-A-
SP9BBH 15,550- 130- 35-A-
SP6DMJ 11,865- 113- 35-B- 6
SP2HMT 10,947- 89- 41-A-
SP5IFU 9588- 94- 34-A-
SP7CKF 9312- 97- 32-A-
SP3EQE 8184- 124- 22-B-
SP5GRU 6426- 102- 21-A-
SP2JKC 5544- 84- 22-A-
SP9IGY 4104- 76- 18-A-
SP6FER 3819- 67- 19-A-
SP9ERC 3306- 58- 19-A-
SP9ADU 3132- 58- 18-A-
SP9ZO 2376- 44- 18-A-
SP9AGS 2058- 49- 14-A-
SP8KAF 1440- 32- 15-B-
SP9GSC 1395- 31- 15-A-
SP2HMT 924- 28- 11-A-
SP3HC 990- 33- 10-B-
SP6ATG 486- 18- 9-A-
SP1IXG 384- 16- 8-A-
SP9JBE 351- 13- 9-A-

UA4HDZ 47,082- 266- 59-B-
UA3ST 26,676- 234- 38-B-
UZ3ER 20,868- 188- 37-B-
UA6LXI 11,250- 125- 30-A-
UA3MBD 10,545- 95- 37-A-
UA3TR 9135- 105- 29-B-
UA6LLI 4284- 68- 21-A-
UA3TA 3036- 44- 23-B-
UA3AFQ 1632- 32- 17-A-
UA3GU 1152- 24- 16-A-
UK3TBI 960- 20- 16-B-
UA1ARH 864- 24- 12-A-
UA4CDC 759- 23- 11-A-
UA4CK 459- 17 9-A-

UA2EC 107,460- 398- 90-A-

UB5UAT 102,102- 374- 91-B-
UY5UI 31,428- 194- 54-A-
UB5DW 30,420- 169- 60-B-
UB5KAM 22,866- 206- 37-B-
UB5MBN 9090- 101- 30-A-
UB5ZEL 8832- 92- 32-B-
UB5VK 5688- 79- 24-A-
UB5AAL 2967- 43- 23-A-
UB5JFX 1560- 40- 13-A-

UC2WBI 5508- 102- 18-A-
UC2WAS 336- 14- 8-A-

UO5AP 11,760- 112- 35-A-
UO5OBD 4140- 69- 20-B-

UP2BV 36,828- 279- 44-B-
UP2BCD 1728- 36- 16-A-

UQ2PP 15,912- 136- 39-B-

UR2QD 65,928- 328- 67-B-
UR2RWA 3828- 58- 22-A-

YO6AWR 92,484- 371- 84-A-
YO2BEO 21,924- 203- 36-A-
YO6KEI 21,756- 151- 49-A-
YO2RA 240- 10- 8-A-

YU4FS 1,011,600-2248-150-C-
YU3TJN 304,875- 813-125-B-35
YU1NGO 181,500- 550-110-B-
YU1SF 193,465- 465- 67-A-41

North America

HH2MC(HH2TD,opr)
1,531,872-3152-162-A-
HI8EDS 6162- 79- 26-C- 3
KL7JGU 3- 1- 1-B- 1
KP4USN(K5PM,opr)
1,890,504-3751-168-C-46
KP4BKY 40,680- 339- 40-B-14
TF3CW 196,695- 705- 93-B-60

Oceania

N7ET/DU6 45- 5- 3-A- 5
FK8CL 55,800- 300- 62-A-
KG6JHW(N3OO,opr)
39,474- 258- 51-A-16
KH6JBU 660,150-1467-150-C-28
KH6JFI 274,596- 934- 98-C-19
KH6JHS 140,940- 435-108-A-26
VK5SW 31,824- 272- 39-B-
YB0ACT 562,380-1339-140-B-27
ZL2MM 45,045- 273- 55-A-

South America

CP5NK 214,200- 600-119-A-15
LU5DVO 570,141-1329-143-B-33
PJ9AD(K1VR,opr)
8022 191- 42-C- 2
PY1ZDK 1,011,516-2134-158-B-26
PY1BOA 747,006-1586-157-B-36
PY2GVA 472,434-1109-142-A-12
PY1DHG 182,952- 693- 88-B-26
PT7AW 171,369- 577 99-B-
PY1VT 40,365- 299- 45-B-15
PY2GWF 38,613- 211- 61-B-10
PY2BTR 21,855- 155- 47-A-
YV5AAZ 1,018,314-2442-139-A-58

Low Band

Africa

EL2ET 178,782- 718- 83-C-15

Asia

JH1RFM 71,478- 418- 57-B-26
JR1BRV 27,936- 194- 48-B-15
JH1APZ 13,266- 134- 33-B-28
JE1XUM 10,668- 127- 28-C-16
JH0EBA 2457- 63- 13-A-
JH2WLA 2352- 56- 14-B- 9
JA4GWG/1 1452- 44- 11-A-
JA9CWJ 1287- 39- 11-C-
JA3BCT 594- 33- 6-B-
JA7EWS 285- 19- 5-A-
JH1CNN 132- 11- 4-A- 2
JR2AUP 90- 10- 3-A-

UL7CAD 1386- 33- 14-A-

Europe

DJ9MH 205,146- 786- 87-B-39
DJ6RX 195,465- 785- 83-C-
UK9PY 98,940- 485- 68-B-
DK3AD 61,803- 327- 63-C-
DJ6OZ 33,240- 277- 40-B-16
DK3FB 26,568- 164- 54-C-18
DF7EH 11,781- 119- 33-C-
DK6PY 9690- 95- 34-C- 6
DA2LJ(W4NTI,opr)
9300- 100- 31-C- 4

DM4VUG 85,680- 408- 70-B-
DM3WMJ 46,488- 298- 52-A
DT4XM 35,640- 220- 54-B-
DM2CUJ 34,398- 294- 39-B-
DM3BF 28,944- 201- 48-A-
DM4UJ 20,856- 158- 44-A-
DT2FUM 12,036- 118- 34-B-
DT2GIL 5112- 71- 24-B-
DM2DEO 3300- 55- 20-A-
DM4NQV 3120- 52- 20-A-
DT2BDN 2400- 50- 16-B-
DM5ODL 1800- 40- 15-A-
DM4WJG 180- 10- 6-A-

EA2IA 194,376- 728- 89-B-

F6ZF 79,794- 429- 62-B-26

G4AMT 55,698- 414- 69-A-14
G3TXF 70,380- 340- 69-A-

GI3IVJ 223,626- 793- 94-A-35

GM6RV 46,458- 267- 58-A-

I0JX 401,568-1424- 94-B-33
I2XXG 340,431-1247- 91-B-

LZ2JF 87,360- 455- 64-B-24

OE5KE 246,906- 946- 87-B-

OH3PF 23,970- 170- 47-C-50
OH1IJ 9408- 98- 32-B-

OK2PGG 21,318- 209- 34-A-
OK1DOK 20,880- 240- 29-B-
OK3CJK 18,960- 57- 16-A-
OK2AWZ 15,960- 152- 35-B-
OK2HI 2736- 57- 16-A-
OK3TDO 1350- 45- 10-A-
OL4ATY 351- 13- 9-A-
OK3CKH 306- 17- 6-A-
OK1DCF 36- 4- 3-A-

ON4SG 2109- 37- 19-B-

OZ6DT 10,800- 90- 40-B-

PA0RRS 357- 17 17-A-

SM7GGK 486- 18- 9-B-

SP5GH 40,500- 250- 54-B-27
SP8MJ 4800- 80- 20-B-19
SP7EJS 1122- 34- 11-B-

UA3EAL 9990- 111- 30-A-

UA2FCW 2805- 55- 17-A-

UB5ZAT 51,888- 368- 47-B-
UB5AC 25,515- 243- 35-B-
UB5QEO 19,110- 182- 35-A-
UB5FAP 17,100- 150- 38-B-
UB5KBF 11,232- 117- 32-A-
UB5EDJ 5148- 66- 26-A-
UT5LF 2562- 61- 14-B-
UB5OFS 2352- 49- 16-A-
UB5QDI 384- 16- 8-A-

UC2LBE 5850- 75- 26-B-
UC2OAI 408- 17- 8-A-
UC2WAZ 360- 15- 8-A-

UO5ODA 1290- 43- 10-A-

UP2PBW 357- 17- 7-A-

UQ2GEC 1053- 27- 13-A-

UR2RHF 1581- 31- 17-A-

YO3BEJ 34,776- 322- 36-A-
YO5AVN/3 6708- 86- 26-A-
YO3KSC 2025- 45- 15-A-
YO3JG 1590- 53- 10-A-
YO3JX 969- 51- 19-A-
YO9AMM 336- 28- 18-A-
YO3JW 108- 6- 6-B- 1

YU2CDS(YU2RQX,opr)
213,120- 960- 74-C-

Multi-Single

JA3YKC(JR2SQU,JA3s ODC REU UPK,JE3MXQ,JH3s HBF PKS PRR,JR3KEG,oprs)
900,549-1677-179-C-96
JA1YFL(JR2BNF,JA0JCJ,oprs)
735,870-1291-190-C-
JA7YDX(JH7s BMB CUO DAG GPW LDN OSI UJN,oprs)
658,410-1291-170-C-64
JA7YAF(+JA7s RHJ UES UIH VFN,JH7s CSU SJH WKQ,oprs)
371,872- 708-128-B-
JA7YCQ(Multiop)
123,165- 391-105-C-24
JE1YTF(JH6FYQ,JA0SWI,oprs)
3672- 58- 28-B- 6

UK0ZAB(UA0s ZBF ZBK ZBW ZCG,oprs) 274,594-1453-166-B-
UK0AABI(Multiop)
155,856- 764- 68-B-
UK0QAH(UA0s QWN,RP,oprs)
70,824- 454- 52-B-
UK9CBD(UA9CBM,UW9OW,oprs)
37,620- 228- 55-B-
UK9OAD(Multiop)
34,560- 240- 48-B-
UK0LAD(Multiop)
32,340- 245- 44-A-

UK6FAA(Multiop)
1305- 29- 15-B-

UK7CAI(Multiop)
27,270- 202- 45-A-

Europe

DK0TU(DK1PD,DK2VG,DK5GB, DK6QI,DL7s LH WC 7N, DJ9NX,oprs)
2,048,634-2982-229-C-96

DM3QO(DM2CMF,DM3s PQO YQO,oprs) 723,690-1290-187-B-

G3OUR(G3s XSC,YGF,G4s BBU BUO CNV EWJ EZN GFX,oprs)
1,084,194-1798-201-A-78

GU3HFN(GU3MBS,GU4s CHY EON,K5MM,oprs)
400,500- 890-150-A-43

LZ2KIM(Multiop)
786,861-1359-193-B-
LZ2KSU(Multiop)
346,473- 843-137-B-
LZ1KKZ(Multiop)
338,432- 952-122-B-

OH3AA(OH3s TQ WS XT XZ, oprs) 99,360- 345- 96-C-30

OK1ALW(+OK1DWA)
1,831,218-2554-239-B-
OK1KSO(OK1s AAU AEZ AMF SF TS WT,oprs)
1,773,680-2520-228-B-96
OK1KTL(Multiop)
795,582-1637-162-C-
OK3KFF(Multiop)
577,320-1132-170-B-
OK1KPU(Multiop)
372,296- 937-136-B-
OK3VSZ(OK3s FON ZAF,oprs)
299,474- 658-101-B-
OK1KKH(OK1s FAO FIM GA MDK VB,oprs)
146,718- 429-114-A-
OK3RKA(Multiop)
82,320- 343- 80-A-
OK1KOK/P(Multiop)
45,990- 219- 70-B-
OK1KCI(Multiop)
32,436- 204- 53-B-
OK1KYS(Multiop)
22,572- 132- 57-B-
OK1OXP(Multiop)
21,285- 165- 43-A-
OK1OFK(Multiop)
17,010- 126- 45-A-
OK1KCF(Multiop)
2754- 51- 18-B-

PA0GN(PA3ADC,PA0s HRO ERA GIN OOS,oprs)
1,113,000-1855-200-A-75
PI2MHN(+PA3ABA)
34,596- 186- 62-B-11

SK7CE(SM7s BGK DXX EBC FCM FOL FJE FUE GVI RN,oprs)
1,065,939-1841-193-B-

SP9KBY(SP5GRM,SP9s ENH ICA oprs) 768,060-1506-170-B-47
SP6PZV(SP6s ANY ATG,oprs)
99,118- 843-142-B-
SP9KRT(Multiop)
262,860- 674-130-B-
SP6PAZ(Multiop)
86,265- 355- 81-B-
SP9PDJ(SP9s FLY HWS JBE JUX, oprs) 9858- 106- 31-B-

UK3AAC(UA3s AGX AGZ,oprs)
327,360- 880-124-B-
UK6LEZ(Multiop)
206,112- 608-113-B-
UK3DAH(Multiop)
168,498- 506-111-B-
UK3ACW(Multiop)
158,202- 517-100-B-
UK1NAA(Multiop)
84,807- 349- 81-B-
UK6ARA(UA6s APH APL,oprs)
68,940- 383- 60-A-
UK1AAA(Multiop)
62,634- 286- 73-B-
UK1ZAO(Multiop)
61,506- 402- 51-A-
UK4PAA(Multiop)
38,352- 272- 47-B-
UK3XAM(Multiop)
2232- 31- 24-A-
UK4FAV(Multiop)
273- 13- 7-A-

UK5WAZ(Multiop)
268,812- 786-114-B-
UK5MAI(UB5MDC,UY5LK,oprs)
245,775- 725-113-B-
UK5XBA(Multiop)
184,275- 675- 91-A-
UK5JAO(Multiop)
163,098- 697- 78-B-
UK5QAV(Multiop)
147,906- 594- 83-A-
UK5QBE(Multiop)
96,126- 433- 74-B-
UK5QAC(UB5s QA QDU,oprs)
44,544- 301- 48-B-
UK5UBR(Multiop)
42,642- 206- 69-A-
UK5JCN(Multiop)
14,706- 114- 43-A-
UK5UBF(Multiop)
11,320- 115- 34-A-
UK5HAZ(Multiop)
780- 20- 13-A-

UK2ABC(Multiop)
98,208- 377- 88-B-

UK2BAS(UP2s GF PA,oprs)
1,160,898-2026-191-B-65
UK2PAO(Multiop)
138,300- 461-100-B-
UK2PBP(UP2s BEB BFE TD,oprs)
37,962- 222- 57-A-

UK2GKW(Multiop)
1,024,164-2003-174-B-
UK2GAC(UQ2s GDX GGM GIN, oprs) 600,780-1324-155-B-
UK2GCB(UQ2s GUL GIG,oprs)
163,371- 767- 71-A-
UK2GAY(Multiop)
8610- 82- 35-B-

YO8KAN(YO8s ME QH,oprs)
729- 27- 9-B-

YU2ACD(YU2s RFK RNT RQZ RSE,YU4VGS,oprs)
1,793,475-2657-225-B-
YU4VGS,oprs)
1,793,475-2657-225-B-
YU1GMN(YU1s QEF QEH,oprs)
1,342,432-2155-208-C-96
YU1JDE(Multiop)
381,510- 947-135-B-
YU2CCJ(Multiop)
79,389- 335- 79-A-
YU1BCF(Multiop)
76,146- 343- 74-B-29
YU1AEP(Multiop)
24,675- 175- 47-B-

North America

KG4OO(+WG4BL)
900,592-1929-238-B-

South America

CP1AT(+WA2HYF)
413,172- 998-138-B-15

The view from the other side

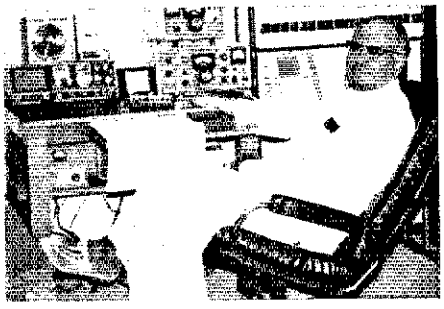
JK1DLQ

I2FGP

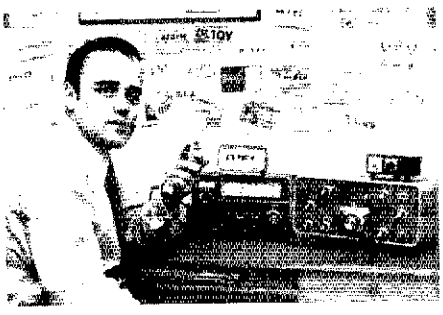
G3FXB

EL2ET

LX1ML



HZ1HZ



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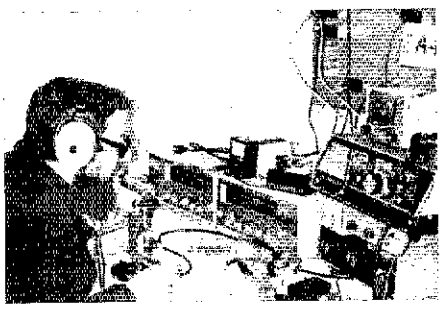
HB9KC

SP9FLY



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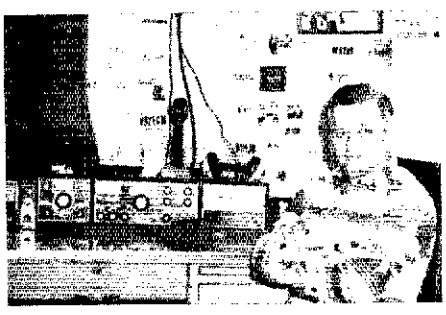
JA1IBX



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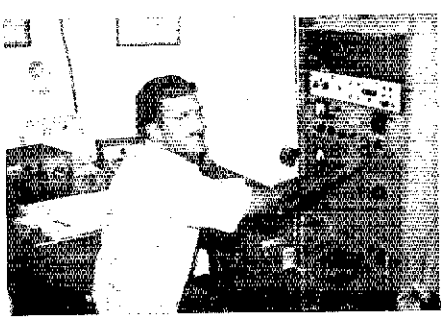

KJ6DL

EA5AX

LU1HE

Multi-Multi

Asia

JA7YAA(JE1SRK,JA7s HKR IBJ JQG JRV KPK LMU NSH UQA WBW,JH7s LIS SFY WHM WTC, JR7BRD,JA8FTW,JA9DTD,oprs) 1,381,680-2280-200-C-80
JA9YBA(JA9s DZS GLL LWB, JH2VAX,JH2s FKX SGU,oprs) 1,300,137-2269-191-A-
JH2ZKT(JA2s ANA APV BJC FKV GWF QWB SBE VUL,JH2GZY,oprs) 687,744-1592-144-B-61
JA2YAQ(Multi op) 55,944- 252- 74-B-25

W/VE

Single Operator

1

Connecticut

W1ZM(K1ZM,opr) 2,615,955-2389-365-C-96
W1NG 1,475,442-1602-307-C-81
K1ZZ 987,633-1233-267-C-37
K1WB 971,490-1378-235-C-61
W1GNR 354,600- 591-200-C-70
W1KKF 198,924- 484-137-C-28
K1CO 155,961- 403-129-C-22
W1CNU 139,494- 347-134-B-41
W1BL 128,436- 278-154-C-
W1VH 106,932- 266-134-C-32
WB1DAO 73,629- 243-101-A-34
W1BWS 59,187- 181-109-C-31
W1BIH 41,529- 127-109-C-
K1DD 37,156- 165- 69-A-19
N1JW 33,516- 147- 76-B-10
W1YG 31,755- 145- 73-C-
W1VV 30,240- 168- 60-C- 7
N1AN 26,064- 181- 48-C- 8
W9KDR/1 4230- 47- 30-A- 8
WA1YFW 2340- 30- 26-B-10
WB1FKO 840- 20- 14-A- 3

Eastern Massachusetts

W1ZA(K1EA,opr) 2,835,540-2670-354-C-82
K1NA 2,349,468-2244-349-C-70
W1DA 1,869,870-1985-314-C-73
W1YN 1,417,416-1652-286-C-72
W1LK 1,360,680-1564-290-C-71
W1KM 961,926-1238-259-C-60
W1FJ 741,972-1022-242-C-45
W1RZU 579,444- 886-218-C-68
W1OU 253,344- 464-182-C-45
W1UU 92,232- 252-122-C-30
W1HX 87,360- 208-140-C-55

Maine

W1OO 1,392,840-1460-318-C-65
W1SD 101,943- 241-141-C-

New Hampshire

K1OX(K1UA,opr) 2,405,325-2467-325-C-77
K1RX 1,893,339-2199-287-C-75
W1LQQ 114,210- 282-135-C-27
W1JSM 51,678- 198- 87-B-19
K1NH 12,600- 100- 42-A- 9

Rhode Island

K1AO 514,155- 755-227-C-60
K1IA 297,540- 570-174-B-70
K1BV 111,972- 434- 86-C-19
N1RI 34,263- 141- 81-B-

Vermont

K2LE/1 1,552,320-1680-308-C-66

Western Massachusetts

K1BW 1,425,816-1656-287-C-50
K1FIR 292,194- 773-126-C-
K1AU 3720- 40- 31-A- 6

2

Eastern New York

W2YV 1,430,160-1616-295-C-60
W2XL 564,927- 901-209-C-61
W2AZO 558,900- 828-225-C-46
WA2AUB 239,994- 402-199-C-40
WB2YIP 56,028- 203- 92-B-18
WA2OTC 13,824- 96- 48-A-22
W2OW 8640- 90- 32-C- 3

N.Y.C. - L.I.

N2NT 2,093,184-2208-316-C-73
W2AEE(WA2ZKY,opr) 1,500,631-1673-299-C-
K2PF 1,002,915-1311-255-C-61
K2MFY 520,059- 757-229-A-66
K2YGM 370,818- 654-189-C-39
W2GKZ 352,512- 612-192-C-31
W2EUO 274,407- 511-179-B-
N2MA 115,200- 300-128-A-22
W2SGK 106,449- 259-137-C-20
N2EM 101,928- 274-129-A-44
K2TV 99,528- 286-116-B-29
WA2CIO 80,520- 244-110-A-28
WB2UAY(WB2GLW,opr) 108- 6- 6-B-
WB2INI 12- 2- 2-B- 3

Northern New Jersey

N2LT 2,651,184-2584-342-C-81
WB2FIT 1,725,579-1759-327-C-84
N2WT 991,116-1197-276-C-64
W2RQ 796,770-1170-227-C-50
W2NJ 337,824- 612-184-A-61
K2QQ 257,784- 467-184-C-
K2DM 194,964- 422-154-A-48
W2ZZ 188,352- 436-144-C-30
WB2QPL 171,825- 395-145-A-68
W2HUG 160,776- 348-154-A-34
W2HN 147,852- 333-148-C-35
K2AZ 85,800- 260-110-A-
W2IFK 72,630- 269- 90-C-34
K2PF 64,311- 221- 97-B- 9
W2IY 8142- 59- 46-A-20

Southern New Jersey

W2REH 2,163,768-2026-356-C-54

N2CQ 990,600-1270-260-C-59
K2FL 837,900- 950-294-C-69
N2MR 793,074-1009-262-C-80
W2KI 739,848-1063-232-C-49
W2SUA(WB2SOQ,opr) 703,560-1140-205-C-59
WA2VYA 681,813-1067-213-C-55
W2YC 500,256- 772-216-C-65
K2TD 468,504- 723-216-C-54
WB2BVV 302,358- 626-161-C-41
W2PAU 266,475- 425-209-C-38
W2XN 96,900- 340- 95-C-
K2TJ 88,818- 262-113-C-30
W2EA 87,462- 258-113-B-20
WA2VCZ 79,560- 312- 85-C-22
K2HPV 50,310- 195- 86-A-40
K2JF 44,322- 166- 89-C-40
K2DY 35,820- 199- 60-C-10
N2CW 20,580- 98- 70-C-10
K2KA 17,934- 98- 61-C-
K2KU 7308- 58- 42-C-11
WA2YSA 3330- 37- 30-B-11

Western New York

K2VV 1,556,178-1846-281-C-71
N2AU 771,696- 932-276-C-60
WB2ABD 347,931- 577-201-A-49
N2CU 215,307- 509-141-A-37
WA2AOG 147,000- 350-140-C-14
W2FUI 81,510- 247-110-B-59
W2RQH 57,570- 190-101-C-13
K2IGW 39,114- 159- 82-A- 8
WA2EYA 22,509- 183- 41-B-22
K2JZT 2886- 37- 26-B- 6
WA2LCC 1872- 26- 24-C- 4

3

Delaware

W3GL 175,446- 342-171-C-23

Eastern Pennsylvania

W3RJ 3,362,800-2734-410-C-77
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W3AP 2,050,812-2234-306-C-70
K3II 1,079,496-1276-282-C-67
W3FV 1,052,415-1285-273-C-86
N3NA 988,146-1262-261-C-74
W3OV 907,686-1293-234-C-56
N3BB 807,828-1141-236-C-39
K3NZ 806,652-1164-231-C-92
W3NZ 750,132- 933-268-C-69
N3AW 729,000-1215-200-C-65
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K3CY 515,070- 885-194-C-22
K3NL 436,308- 706-206-C-65
W3KV 420,858- 681-206-C-40
W3GRS 402,600- 610-220-C-22
W3KFQ 401,676- 716-187-C-
W3ARK 271,188- 558-162-A-46
W3YFV 181,251- 441-137-C-84
K3OX 113,883- 319-119-B-17
WA3WRD 82,296- 254-108-C-13
W3CGS 67,320- 220-102-C-24
WA3NNA 23,187- 131- 59-C- 7
WA3VQK 9954- 79- 42-A-10
W3KHB 3999- 43- 31-A-10

Maryland - D.C.

W3LPL 3,394,341-2879-393-C-86
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N3CW 1,827,294-1946-313-C-93
K3NA 1,521,549-1731-293-C-81
K3SA 1,033,032-1204-286-C-87
W3AZ 708,630-1027-230-C-60
K3AV 682,752- 896-254-C-60
N3RL 565,215- 769-245-C-60
N3UN 542,913- 721-251-C-62
W3UJ 493,920- 735-224-C-64
K3TM 457,239- 881-173-C-30
N3II 380,352- 566-224-B-43
N3OS 235,404- 503-156-B-47
N3AM 190,854- 461-138-A-33
W3MR 114,375- 305-125-C-19
WA3RSK 85,224- 268-106-C-13
W3HVQ 78,570- 270- 97-C-28
N3EC 74,088- 252- 98-C-20
K2SCU/3 72,171- 243- 99-C-22
K3NS 68,904- 198-116-A-18
K3ZZ 43,941- 151- 97-C-26
K3APM 39,738- 179- 74-B-28
W3ML 31,326- 137- 76-B-12
W3EE 26,784- 124- 72-B-30
N3AX 12,432- 74- 56-A-

Western Pennsylvania

K3MD 707,490-1123-210-C-61
K3KO 413,457- 737-187-A-60
W3HDH 153,765- 336-153-C-18

4

Alabama

N4KG 1,776,054-1726-343-C-73

Georgia

N4HI 714,132- 996-239-A-77
K4BAM 30,660- 140- 73-B-12
WB4HNC 19,656- 117- 56-C-17
WB4WRM 3219- 37- 29-B-20

Kentucky

N4XM 765,864- 967-264-C-71
K4HFD 55,242- 186- 99-C-22

North Carolina

N4AA 917,082-1258-243-C-46
N4WX 866,502-1058-273-C-56
K4UWH 252,774- 558-151-C-25
WA4LWO 184,992- 376-164-C-45
K4GFH 124,932- 359-116-C-31
N4UH 10,557- 69- 51-A- 6
W4OMW 5247- 53- 33-C- 5

Northern Florida

N4WW 2,157,336-1992-361-C-69
W4WKQ 127,002- 347-122-C-24
WD4AAL 14,280- 85- 56-A-30
N4KF 2024- 24- 22-A-10

South Carolina

K4II 373,257- 619-201-C-37
K4WJR 98,754- 302-109-B-45
WB4NRI 26,730- 110- 81-C-48
W4LS 23,730- 113- 70-C-20
G8NF/W4 3510- 39- 30-B- 3

Southern Florida

K4CL 685,086-1006-227-C-70

W4BV 213,156- 382-186-C-33
K4JRF 174,906- 369-158-C-48
K4PB 69,984- 243- 96-C-16
W4LOO 54,600- 200- 91-A-19
N4XR 26,760- 223-120-B-19
WA4FYZ 12,528- 87- 48-B-15

Tennessee

K4XU 1,352,400-1400-322-C-65
W4XJ 1,176,300-1307-300-C-70
N4TN 721,056-1036-232-C-52
AA4VZ 590,175- 915-215-C-76
N4IR 113,373- 323-117-C-25
N4OI 35,235- 135- 87-C-22
K4XO 2835- 35- 27-C- 2
K4HPP 840- 20- 14-B- 2

Virginia

N4RV 1,433,061-1587-301-C-68
W4YE 1,089,819-1257-289-C-53
N4DW 1,003,464-1267-264-C-71
WB4BVY 951,048-1224-259-C-76
W4EI 609,288- 958-212-C-
W4KFC 596,190- 835-238-C-82
W4DM 519,480- 780-222-C-60
W4XR 512,325- 825-207-C-35
W4NH 463,200- 800-193-C-50
K0CMF/4 439,533- 669-219-C-60
W4RW 295,692- 601-164-C-59
K4OAQ 262,845- 495-177-A-46
W4EZ 261,096- 506-172-C-25
N4QS 192,192- 416-154-B-40
K4JM 186,060- 443-140-B-20
K4KA 176,400- 350-163-A-33
W4GF 131,454- 327-134-C-17
K4ZVS 115,968- 302-128-C-26
K4OD 112,194- 271-138-C-22
W4DR 98,280- 260-126-C-
K1FR/4 75,555- 219-115-B-15
W4KMS 63,168- 188-112-C-25
K8SYH/4 47,700- 159-100-B-41
K4IYD 18,816- 112- 56-C-18
WB4BZR 12,243- 77- 53-B-13
K4EJG 9372- 71- 44-B-19
K5KT/4 576- 16- 12-A- 1

5

Arkansas

K5UR 997,815-1105-301-C-42
WA5HNN 73,899- 207-119-C-20
W5RUH 53,712- 191- 94-A-35

Louisiana

W5OB 327,876- 614-178-C-70
K5UA 81,498- 289- 94-C-48

Mississippi

K5FC(N6DE,opr) 730,728-1194-204-C-56
W5XX 328,515- 605-181-C-37
WA5DYH 92,700- 309-100-B-49

New Mexico

W5YZ 200,832- 523-128-B-38

Northern Texas

N5TP 996,912-1104-301-C-60
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K5LP 466,140- 914-170-C-63
W5VGX 259,038- 533-162-B-70
K5BJ 104,190- 302-115-B-42
W5SOD 57,270- 230- 83-B-60
N5AU 49,932- 219- 76-C- 8
K5GM 43,740- 180- 81-B-21

Oklahoma

WB5WFB 30,690- 155- 66-B-30

Southern Texas

K5ABV 533,685- 757-235-A-64
WB5FND(WA3OVC,opr) 317,736- 632-166-C-68
K5DB 263,526- 526-167-C-47
K5TSQ 220,284- 422-174-C-58
W5PF 147,960- 411-120-A-55
W5DUI 64,764- 257- 84-C-22
W5LUU 61,056- 212- 96-C-22
K5DX 30,690- 155- 66-C-12
W5BE 28,980- 161- 60-C-16
K5RF 25,893- 137- 63-B-36
W5NR 14,040- 104- 45-B-12

6

East Bay

K6CSL 19,380- 170- 38-A-42
N6NE 1824- 38- 16-A-20
W6EJA 306- 17- 6-B- 2

Los Angeles

N6AR 712,050-1010-235-C-49
WA6TLA 296,670- 682-145-C-43
WB6RSE 109,647- 393- 93-C-25
K6OC 92,082- 298-103-C-
WA6AWF 3330- 37- 30-B- 5
W6VAQ 3168- 44- 24-A-40
N6OB 2673- 81- 33-B-24
W6PYV 1782- 27- 22-A- 5
N6HE 1023- 31- 11-C- 3

Orange

K6OS 456,600- 761-200-C-
W6TDO 7290- 135- 18-B-19

Santa Barbara

N6VR 254,064- 632-134-C-32
K6DZT 88,725- 325- 91-C-

Santa Clara Valley

N6RO 2,119,044-2419-292-C-90
W6VG 228,690- 605-126-C-64
N6OM 186,456- 457-136-C-45
N6IQ 146,370- 410-119-C-21
W6SUJ 87,150- 350- 83-C-38
N6NF 75,780- 421- 60-C-24
K6MA 50,895- 261- 65-C-12
W6SC 50,820- 242- 70-C-25
W6SZN 9639- 153- 21-A-21

San Diego

N6ND 504,474-1013-166-C-59
W6ABT 158,340- 406-130-C-25
W6UQF 126,585- 485- 87-A-25
W6BS 80,640- 256-105-C-16

W6IA 33,522- 151- 74-C-24
W6FF 24,708- 142- 58-C-25
K6NA 5358- 47- 38-C- 2
AA6EE 252- 14- 6-A- 3

San Francisco

W6WB 339,405- 605-187-C-59
WB6ZHD 101,736- 314-108-C-40
K6LBN 10,200- 100- 34-B-

San Joaquin Valley

W6BVM 141,840- 394-120-C-31
W6BYH 90,597- 299-101-C-

Sacramento Valley

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K6SG 552,978- 991-186-C-70
W6NKR 387,390- 698-185-C-54
W6PM 386,022- 637-202-C-32
K6DR 332,514- 754-147-C-80

7

Arizona

K7NO 686,817-1139-201-C-72
K7NN 482,448-1058-152-C-58
W2GGL/7 160,680- 412-130-A-63
W7ZMD 126,009- 359-117-B-50
W7YS 55,845- 255- 73-B-19

Montana

K7CTI 651,924-1092-199-C-48
W7JYW 92,898- 397- 78-C-23

Nevada

W7JKA 19,950- 133- 50-B-26

Oregon

W7NI 1,347,255-1833-245-C-82
W7XN 126,960- 368-115-C-29
W7TWL 5037- 73- 23-B-18
W7LT 4888- 81- 16-B-26
W7ZR 2436- 29- 28-C- 2

Utah

W7HS 295,596- 644-153-C-61

Washington

N7XX(WA1KKM,opr) 1,695,516-2468-229-C-83
K7ZA 709,080-1244-190-C-52
N7AM 272,376- 776-117-C-49
K7WA 132,300- 441-100-A-55
WB7FFF 118,680- 460- 86-B-60
W7IIT 82,800- 345- 80-C-46
K7UU 35,787- 151- 79-C-10
K7WQD 35,568- 228- 52-B-36
K7EFB 21,600- 150- 48-A-30
W7FEO 17,199- 117- 49-A-30

Wyoming

N7NG 992,898-1362-243-C-87
W7LE 5148- 52- 33-A- 4

8

Michigan

K8GL 766,590-1010-253-C-66
W8VPC 85,764- 262-108-C-27
K8SIA 57,330- 182-105-B-25
K8CV 24,759- 131- 63-C-33
W8WVU 16,362- 101- 54-A- 8
WA8ECH 8601- 61- 47-B-12
K8GB 12- 2- 2-B- 1

Ohio

N8ET 1,060,314-1349-262-C-72
W8RSW 856,548-1133-252-C-64
W8ZCQ 337,077- 559-201-C-58
N8LM 243,048- 533-152-C-31
W8GOC 185,505- 415-149-A-
K8MN 143,616- 352-136-C-
K8VM 115,551- 347-111-B-35
W8NPF 79,704- 216-123-C-35
N8BC 76,110- 295- 86-C-39
W8DWP 55,296- 192- 96-C-33
W8YGR 45,156- 142-106-B-17
W8LHV 40,455- 155- 87-C-21
WA8RCN 30,240- 144- 70-C- 6
K8BA 12,546- 82- 51-B-27
N8FU 6552- 56- 39-B-

West Virginia

W8AH 256,215- 589-145-C-25

9

Illinois

K9DX 2,211,978-2131-346-C-94
K9BGL 1,072,368-1354-264-C-81
K9KM 792,990- 979-270-C-67
K9AB 593,610- 842-235-C-60
K9DR 415,380- 602-230-C-63
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W9RW 319,590- 530-201-C-33
W9JUV 315,180- 510-206-C-50
K9IL 245,073- 541-151-C-42
K9UIY 167,076- 364-153-A-37
W9PNE 133,152- 304-146-C-40
W9DWQ 129,930- 305-142-C-
W9AG 96,676- 233-124-C-18
W9ZA 56,133- 189- 99-C-18
K9BK 44,055- 165- 89-C-
W9REC 18,180- 101- 60-B-25
WB9TIY 10,656- 74- 48-C-12
W9NU 9261- 63- 49-C-22
W9AZP 6885- 51- 45-C-12
K9GS 5184- 48- 36-B-15
WB9DVQ 4386- 43- 34-B-12

Indiana

N9MM 2,319,678-2322-333-C-93
N9NS 913,968-1154-264-C-85
W9CL 159,390- 345-154-C-29
K9VQK 41,538- 161- 86-C-26
N9RC 4800- 50- 32-C-15

Wisconsin

W9OP 364,353- 671-181-C-60
W9EA 350,811- 639-183-C-61
K9EYA 110,898- 303-303-C-27

W9BG 25,308- 111- 76-C-
W9WI 20,280- 104- 65-C-

Ø

Colorado

WØCP 67,650- 275- 82-C-18
WØNER 65,048- 256- 86-A-50

Iowa

NØGA 627,808-1046-216-C-52
WØVU 479,115- 845-189-C-64
WØUI 455,700- 868-175-C-43
KØSVX 34,830- 129- 90-C-31

Kansas

WBØKWI 815,661-1177-231-C-75
WØIUB 502,425- 825-203-C-49
WØRT 87,792- 236-124-C-13
WØWPL 28,677- 121- 79-B-18
KØBJ 3588- 52- 23-A- 4
WBØDRL 2442- 37- 22-C- 7

Minnesota

WØHP 1,458,171-1573-309-C-72
WØYCR 542,136- 922-196-C-77
WØUC 473,499- 741-213-A-60
WØJX 113,373- 323-117-C-37

Missouri

WØPM 257,922- 483-178-C-49
WØJU 175,980- 419-140-C-30
WØQWS 135,786- 371-122-B-
WAØYEF 94,815- 245-129-C-
WAØFBQ 79,287- 247-107-C-17
KØODB 76,518- 218-117-C-25
KØKL 68,040- 216-105-C-22
WBØEZQ 66,126- 214-103-C-28
KØGSV 31,920- 133- 80-C-17
WØFF 1596- 28- 19-A- 4

Nebraska

WB6FHK/Ø 46,206- 151-102-C-47

VE

Maritime - Newfoundland

VO1AW 627,642-1062-197-C-60
VE1AIH 496,716- 781-212-B-53
VE1BCZ 131,400- 300-146-A-23
VE1EP 1296- 27- 16-C-

Quebec

VE2WA 438,804- 717-204-C-41

Ontario

VE3GCE 301,806- 621-162-C-45
VE3WW 34,170- 170- 67-A-28

Manitoba

VE4XJ 260,676- 557-156-C-50
VE4BJ 1479- 29- 17-C-13

Saskatchewan

VE5DX 839,007-1313-213-C-86
VE5RA 449,880- 815-184-C-50

Alberta

VE6LU 437,541- 863-169-C-55
VE5MP 23,428- 178- 42-B-12

British Columbia

VE7FE 36,192- 208- 58-A-40
VE7CMF 31,590- 351- 30-A-28
VE7AZG 4209- 61- 23-C-10

High Band

1

Connecticut

K1RM 395,444-1007-164-C-28
N1GL 266,739- 649-137-C-20
N1MM 182,448- 543-112-C-20
WA1CCR 104,310- 305-114-B-24
K1WJ 61,710- 242- 85-C-10
K1WJL 30,090- 170- 59-B-30
K1VDF 29,184- 152- 64-C-13
K1WA 25,110- 135- 62-A-11
K1TN 21,948- 118- 62-B- 6
WA1FCN 16,677- 109- 51-A-
W1XK 15,390- 114- 45-B-
W1FD 7968- 83- 32-C- 9
W1XX 4557- 49- 31-A- 2
W1SE 4284- 51- 28-B- 6
N1CC 2496- 32- 26-A- 4

Eastern Massachusetts

K1DG 1,232,298-1842-223-C-67
W1CNU 217,080- 536-135-C-39
N1NN 103,950- 330-105-A-35
W1YS 36,594- 214- 57-B-18
WA1UZH 29,952- 156- 64-B-14
W1OPJ 26,112- 136- 64-A-14
K1MC 18,630- 115- 54-B-30
WB1CNM 5565- 56- 35-B-30
W1PLJ 3888- 54- 24-C-22
WA2EHV/1 540- 15- 12-A- 2

Maine

W1ERW 17,220- 82- 70-B-40

New Hampshire

W1PH 801,600-1336-200-C-51
K1FWE 698,400-1200-194-C-

Rhode Island

W1GL 429,513- 791-181-C-47
W1YNE 9660- 70- 46-C- 6

Western Massachusetts

K1DKX 460,872-1038-148-C-60
WA1TAI 317,952- 736-144-C-
W1GG 246,228- 578-142-C-60
W1AUT 67,791- 383- 59-C-46
K1UR 13,200- 100- 44-C- 6
K1SF 5775- 55- 35-B- 6

2

Eastern New York

W2IB	455,787-	993-153-C-29
WA2LJM	157,530-	445-118-C-40
K2MN	55,692-	238- 78-B-
W2LMO	55,404-	228- 81-B-44
N2WR	14,859-	127- 39-A-20
W2NRD	1122-	22- 17-A-10

N.Y.C. - L.I.

W2AYJ	386,289-	753-171-C-40
N2GC	280,245-	595-157-A-39
K2OB	103,275-	425- 81-C-36
W2IRV	88,290-	270-109-C-14
W2AFM	41,580-	180- 77-B-55
W2GC	39,346-	134- 73-C-
WB2HIQ	17,172-	106- 54-B-14
WB2QNF	15,576-	88- 59-C-13
W2GNN	5301-	57- 31-B-12
W2ILL	4131-	51- 27-A- 2
K2TY	3480-	40- 29-C-
W2TE	1425-	25- 19-C- 2
WB2RNT	12-	2- 2-A- 1

Northern New Jersey

W2WD	388,170-	681-190-C-45
WA2ZWH	207,111-	527-131-A-59
W2LKH	26,544-	112- 79-A-13
WA2YLY	17,136-	136- 42-A-
K2PH	12,243-	77- 53-A- 8
W2GND	8526-	68- 49-A- 9
W1GD/2	6825-	65- 35-C- 5
N2IN	1188-	22- 18-A- 4
WA2PQU	684-	12- 12-A- 3
W2UL	360-	12- 10-C- 5
WA2EPK	126-	7- 6-A- 1

Southern New Jersey

N2OO	1,614,600-	2300-234-C-81
N2RM	243,390-	610-133-C-26
N2IT	174,750-	466-125-B-34
N2CM	122,610-	338-122-A-45
WB2GFE	101,952-	354- 96-C-26
WB2SST	40,950-	175- 78-B-
W2IFE	38,010-	181- 70-B-30
WA2PCK	13,197-	83- 53-C-17
WB2ZLU	10,080-	80- 42-C-16
W2FGY	3150-	35- 30-B- 6

Western New York

W2ABM	122,223-	311-131-C-40
W2FTY	75,570-	229-110-A-50
WA2LOG	67,077-	257- 87-C-39
W2SEC	58,308-	226- 86-B-20
WA2SON	47,304-	216- 73-B-13
WA2MYU	23,040-	128- 60-B-24
WA2ECA	20,349-	119- 57-A- 8
WB2AIO	9324-	74- 42-A- 5
WB2YGH	7350-	70- 35-A- 5

3

Delaware

WA3WPY	1125-	25- 15-C- 3

Eastern Pennsylvania

W3IO	559,674-	1003-186-C-41
K3OO	485,100-	980-165-C-50
K3ND	438,192-	716-204-C-
W3BB	170,658-	499-114-C-39
WA3SZV	33,228-	213- 52-C-22
G3HLW/W3	19,584-	108- 64-A- 8
K3JGJ	17,792-	104- 41-C-
WB3IXG	4324-	61- 23-B-12
K3WOK	2112-	32- 22-C-16

Maryland - D.C.

W3GRF	938,736-	1476-212-C-50
W3EWL	523,776-	992-176-C-72
N3KK	506,736-	918-184-A-38
W3HVM	98,088-	268-122-C-20
K3NR	88,692-	389- 76-C-
W3DOS(N4ZR,opr)	86,292-	282-102-C-14
WA3EEE	82,830-	251-110-C-33
K3DQ	7308-	58- 42-B-10
W3TUX	882-	21- 14-B-13

Western Pennsylvania

K3QV	22,446-	129- 58-C-16
WB3DKT	2700-	35- 20-B- 6
WB3HLG	528-	16- 11-A- 8

4

Alabama

WN4KKN	136,740-	430-106-C-27
W4RAL	60,180-	236- 85-A-21
WA4HOQ	5565-	53- 39-A-20

Georgia

N4NX	515,823-	847-203-C-53
N4SV	386,019-	841-183-B-65
W4IXI	277,884-	558-166-C-58
WA4GQJ	11,772-	109- 36-C-18

Kentucky

WB4PRU	155,610-	455-114-C-34
WA4QMQ	113,226-	334-113-B-56
AA4RR	61,008-	248- 82-B-16
W4JKC	2208-	32- 23-A-
WA4UBM	648-	18- 12-B- 1
K4IXJ	3-	1- 1-B- 1
WB4ZRQ	3-	1- 1-C- 1

North Carolina

N4YM	250,560-	576-145-C-27
WA4DAN	222,504-	508-146-B-30
WA4VMZ	29,406-	169- 58-B-22
W4AMC(W4OMW,opr)	7938-	63- 42-C- 4

Northern Florida

W4EEO	648-	18- 12-A-10

South Carolina

WB4TDH	601,380-	1028-195-B-57
N4LL	207,438-	449-154-C-48
WA4TNI	105-	7- 5-A- 4

Southern Florida

W4BAA	312,018-	646-161-C-46
W4NQI	204,624-	464-147-C-38
N4BP	123,090-	373-110-C-13
WA4QML	90,270-	255-118-C-42
K2OE/4	42,960-	179- 80-C-12
WD4CWL	23,088-	122- 63-B-29
N4CU	4350-	58- 25-B- 7
WA2BCK/4	3690-	41- 30-A- 3

Tennessee

W4JD	269,928-	652-138-C-29
N4UW	207,792-	481-144-A-39
WA4ZAL	32,184-	149- 72-C-15
WB4RRJ	16,692-	107- 52-B-38
W4RIB/4	4725-	45- 35-B- 8
K4JEZ	810-	18- 15-B-
W4OGG	684-	19- 12-A- 1

Virginia

W4HBK	788,238-	1327-198-C-62
N4MM	497,361-	859-193-C-25
K4GKD	289,467-	639-151-C-36
W3YY/4	100,035-	351- 95-C-18
N4YJ	32,028-	157- 68-A-15
WB4DNL	3612-	43- 28-A-25

5

Arkansas

WA5SOG	32,571-	139- 63-B-17
W5EIJ	969-	19- 17-B- 3

Louisiana

K5KLA	621,918-	1047-198-C-57
WA5NUK	349,323-	689-169-C-42
W5WG	106,470-	338-105-C-49
K5BLV	29,736-	177- 56-B-
WB5UQW	7347-	79- 31-C-24

Mississippi

W5AQ	281,658-	598-157-B-60
W5RRR(W5LSZ,opr)	61,182-	206- 99-C-30
W5MUG	26,880-	128- 70-C-20
K5YPV	4059-	41- 33-A-14

New Mexico

W5TVX	26,334-	231- 38-B-48
K5OGX	19,488-	232- 28-B-18

Northern Texas

W5MYA(N5CR,opr)	1,120,365-	1737-215-C-74
W5FO	394,560-	822-160-C-32
K5KJ	252,160-	620-136-B-24
W5FL	143,712-	499- 96-C-23
K5BDX	71,820-	285- 84-A-39
W5QF	19,698-	134- 49-B-18
WB5QUN	14,076-	102- 46-A-12
W5VCS	8760-	73- 40-C-27
K5FUV	7128-	88- 27-C-18
WB5RPU	5184-	54- 32-B-12
WB5TDO	1176-	28- 14-A-10

Southern Texas

W5JC	342,435-	617-185-C-64
W5GO	326,190-	655-166-C-63
WA5DXI	122,892-	418- 98-C-38
N5BR	81,585-	245-111-C-26
W5OSJ	42,174-	198- 71-C-14
WB5JID	36,900-	150- 82-C-30
W5LJT	36,504-	169- 72-C-12
K5GSB	22,275-	185- 46-B-10
WB5UWF	11,016-	68- 54-C-30
W5YB	5076-	47- 36-A- 8
N5WW	4464-	93- 16-C-
WA5IYX	324-	12- 9-B- 8

6

East Bay

K6ATV	181,800-	606-100-A-33
K6JB	38,874-	209- 62-C-16

Los Angeles

N6ZZ	283,200-	800-118-C-38
K6ELX	115,368-	506- 76-C-39
N6GL	35,340-	190- 62-B-20
W6TGL	11,232-	104- 36-B-24

Orange

W6HJ	60,160-	271- 74-C-36
N6UC	24,108-	164- 49-C- 8
K6TXA	19,470-	110- 59-C- 6

Santa Barbara

K6OW	111,873-	419- 89-C-52

Sacramento Valley

N6JM	31,020-	220- 47-A- 8

Santa Clara Valley

N6RZ	706,744-	1508-156-C-69
WB6DSV	519,588-	1132-153-C-48
N6AN	501,060-	1193-140-C-44
WD6AGJ	165,888-	768- 72-A-34
WB6ZHH	160,458-	569- 94-C-53
WA6TKT	126,578-	474- 89-C-57
N6UW	82,902-	337- 82-C-45
N6QW	64,056-	314- 68-A-40
W6OKK	47,637-	237- 67-C-15

San Diego

N6CW	1,189,032-	1924-206-C-
K6XT	541,017-	1279-141-C-46
W6BZE	83,280-	347- 80-C-50
N6PF	29,187-	207- 47-C-30

San Francisco

W1ARR/6	694,110-	1361-170-C-65

San Joaquin Valley

K6AO	114,840-	435- 88-C-18

7

Arizona

W7AYY	235,320-	740-106-C-42
N7MW	99,324-	372- 89-A-29
N7IR	75,840-	316- 80-B-32
W7KPL	10,530-	117- 30-B-23

Nevada

K7OX	734,019-	1711-143-C-
WA7YHP	104,232-	404- 86-C-29

Oregon

W7GUR	82,170-	330- 83-C-39
WA7GZA	25,155-	195- 43-B-20

Washington

W7WA	555,255-	1371-135-C-59
K7NF	315,489-	1021-103-C-41
W7WMO	117,189-	449- 87-B-37
W7BUN	95,700-	580- 55-C-23
K7RA	65,475-	291- 75-C-11
W7BYK	59,295-	295- 67-B-23
N7CT	13,530-	110- 41-B- 9
W7AGE	10,710-	70- 51-A-26
N7DX	6885-	153- 15-B- 5
K7XX	6384-	168- 38-C- 8

8

Michigan

N8JW	832,644-	1374-202-C-26
W8FF	263,376-	634-139-C-41
W8TJQ	200,100-	460-145-B-49
K8SY	185,712-	584-106-C-39
W8UD	162,513-	463-117-A-36
K8RCT	47,970-	195- 82-B-15
K8LJG	42,354-	181- 78-B-
WB8AAX	30,885-	145- 71-B-19
K8CH	23,718-	118- 67-A-10
W8TW	15,288-	98- 52-B-14
K8QWG	8040-	67- 40-B-11
WA8LTZ	5751-	71- 27-C- 8
K8DAC	4554-	46- 33-A-12
W8LCU	2961-	47- 21-A-
WB8VBC	2640-	40- 22-C- 3

Ohio

WA4RIJ/8	167,832-	444-126-C-34
K8MR	111,825-	355-105-C-12
K8QXB	104,535-	303-115-B-32
N8TM	15,750-	105- 50-C- 6
K8AAZ	4998-	49- 34-A-14
W8PN	4185-	45- 31-A- 9

West Virginia

W8CDV	14,850-	110- 45-C-18
W8JWX	2304-	32- 24-A-

9

Illinois

WA9PBK	704,614-	1298-181-C-38
K9BG	271,890-	530-171-C-40
W9CH	194,337-	453-143-A-39
K9BB	161,820-	435-124-C-40
W9TNZ	17,955-	105- 57-A-27
K9UQN	15,930-	118- 45-C- 6
W9HPG	11,934-	78- 51-B-21
WA9REN	10,956-	83- 44-A-21
W9SYEB	6156-	84- 38-B-16
W9WR	3000-	40- 25-B- 7
K9BQL	1140-	20- 19-A- 3
WB9SMU	741-	19- 13-A-11

Indiana

W9LT	827,666-	1378-199-C-67
W9LP	371,427-	769-161-C-41
K9CLO	49,275-	219- 75-C-16
WA9FFZ	24,603-	139- 59-A-35
W9LKI	15,741-	99- 53-B-

Wisconsin

K9DAF	273,408-	512-178-C-
WB9BJO	138,510-	405-114-B-
K9BN	74,256-	238-104-B-
W9GIL	73,728-	256- 96-C-
K9QXY	57,474-	206- 93-C-39
W9KB	16,284-	92- 59-A-35

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Colorado

KØFL	11,070-	90- 41-B- 9
WØGUY	9326-	80- 37-B-22
WØYK	4128-	43- 32-C-10

Iowa

KØMM	525,000-	1000-175-C-36
WØSI	435,912-	886-164-C-68
WØVX	263,238-	601-146-C-30
KØUTZ	187,827-	457-137-A-28
WØIZ	155,067-	407-127-A-62
WØFO	120,600-	402-100-C-26
WØUZ	83,190-	235-118-C-46
WDØAQD	69,651-	213-109-B-42
WØMJN	6834-	67- 34-C-14

Kansas

KØVGB	92,391-	299-103-B-44
WAØAGN	61,491-	199-103-C-15
KØFPC	14,229-	93- 51-B-23
KØLO	2325-	31- 25-C-20

Minnesota

WØUO	691,611-	1207-191-C-67
KØIR	193,152-	503-128-C-49
WØLP	53,544-	194- 92-C-28
KØIHG	38,592-	201- 64-B-
NØAT	4524-	58- 26-C- 5

Missouri

NØTT	413,424-	957-144-C-55
WØOQK	115,500-	350-110-C-35
KØCD	113,100-	290-130-C-
WØPKO	43,197-	187- 77-C-38
NØJC	4998-	49- 34-C-10

Nebraska

WBØGOB	85,488-	274-104-A-51

North Dakota

WBØEHC	20,178-	118- 57-B-10
WØJWL	252-	12- 7-B- 3

South Dakota

WBØZEB	69,384-	236- 98-A-70

VE

Ontario

VE3DUS	338,649-	719-157-C-48
VE3DAP	103,230-	310-111-A-36
VE3DCI	76,799-	237-109-C-32
VE2AEJ/3	21,924-	116- 63-B-

Alberta

VE6KW	369,369-	1001-123-C-56

British Columbia

VE7DTA	62,514-	302- 69-B-47
VE7AV	43,605-	285- 51-C-

Low Band

1

Connecticut

WA1UAC	98,040-	380- 86-C-39

Eastern Massachusetts

W1PL	205,875-	549-125-C-48
K1VR	122,760-	440- 93-B-25
W1BB/1	1887-	37- 17-A- 8

New Hampshire

W1UN	105,165-	369- 95-C-24

Rhode Island

K1TZQ	134,412-	487- 92-C-40

2

Eastern New York

WA2CSD	2052-	36- 19-A- 6

N.Y.C. - L.I.

W2FVS	53,133-	198- 89-C-
WB2AMU	12,834-	93- 46-B-20

Northern New Jersey

WB2RTF	67,500-	250- 90-C-23

Southern New Jersey

WB2VFT	42,180-	185- 76-A-30
W2ESX	2457-	39- 21-B- 6

Western New York

WA2MBM	37,758-	203- 62-C-31
K2VAH	3000-	40- 25-C-13

3

Eastern Pennsylvania

W3PC	10,578-	82- 43-B-20
W3HEZ	975-	25- 13-A-19

Maryland - D.C.

K3ZO	525,555-	1145-153-C-69
WB3AVN	66,816-	256- 87-C-17

Western Pennsylvania

W3TV	42,636-	187- 76-C-32

4

Georgia

K4PI	15,180-	111- 46-C-11
W4LVM	7938-	63- 42-C-
WB4RUA	7260-	66- 55-C- 6

Kentucky

WA4DCP	1050-	25- 14-C-

North Carolina

N3RB/4	21,267-	139- 51-C-12

Northern Florida

W4VQ	133,224-	427-104-A-19

Southern Florida

N4UM	420,384-	928-151-C-50

Tennessee

WA4MFS	64,728-	248- 87-C-35

Virginia

W4UQ	56,160-	195- 96-B-27

5

Arkansas

N5DX	227,808-	672-113-C-55

New Mexico

WA5YTX	23,808-	128- 62-C-17

Northern Texas

W5KLB	47,520-	240- 66-C-55

Southern Texas

K5JY	91,290-	358- 85-C-40

6

Los Angeles

N6WO	101,472-	604- 56-C-32
K6SE	47,658-	338- 47-C-12

Santa Clara Valley

N6BT	138,451-	1117-101-C-70

San Francisco

WA6DNM	26,019-	177- 49-C-11

Sacramento Valley

N6DM	51,597-	273- 63-C-

7

Washington

K7UR	224,616-	764- 98-C-63
W7EKM	9600-	80- 40-C-17

Wyoming

W7PSO	1404-	26- 18-C- 4

8

Michigan

W8TWA	57,195-	205- 93-C-53

Ohio

N8SG	16,224-	104- 52-C-27
K8WW	14,688-	102- 48-C-14

West Virginia

W8LRL	2214-	41- 18-B-30

9

Illinois

WA9JCO	104,832-	336-104-C-30
N9TI	59,472-	236- 84-C-24

Indiana

W9SFR	74,700-	300- 83-C-37
N9DX	40,356-	177- 76-C-18

Wisconsin

K9JF	116,883-	433-117-C-34
W9HE	17,416-	111- 52-C-18
K9RR	1425-	25- 19-C-10

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Iowa

WØSR	16,284-	92- 59-C-

Minnesota

KØKX	58,080-	242- 80-C-

Missouri

NØRF	99,189-	321-103-C-40

VE

Maritime - Newfoundland

VE1AXT	5712-	56- 34-B- 8

Ontario

VE3DZV	2664-	37- 24-C- 7
VE3IPR	1560-	26- 20-C- 9

Multi-Single

1

Connecticut

K1TO(+K1s PR RT XA XM)
2,416,203-2463-327-C-96

Eastern Massachusetts

K1IU(+W1RR)
1,818,432-1648-328-C-
WA1JUY(+K1LL,N2FB)
1,051,974-1386-253-C-77
N1AU(+WA1YLU)
145,080- 403-120-C-

Maine

K1SA(+K1QT)
726,600-1400-173-C-

Vermont

K1IK(+K1RQ)
984,480-1465-224-C-62

2

Eastern New York

K2SD(Multiop)
211,497- 493-143-C-15

N.Y.C. - L.I.

WB2SJG 1,472,823-1539-319-A-86
WA2LQO(K2UAT,W2s DKM GGE, WB2TZW,oprs)
192,510- 465-138-C-28
WA2HLP(+WA2CFL)
56,160- 195- 96-A-42

Southern New Jersey

N2MM(+N2ME,WA2HQM)
1,377,927-1623-283-C-95
K2UA(Multiop)
979,776-1512-216-C-80

W2UI(+N3KR)
531,828- 869-204-C-47
N2UT(+WA2HXG)
349,662- 577-202-B-70
K2AA(K2s FT TN,W2NEA,oprs)
324,480- 640-169-C-31

Western New York

WB2LOF(+WA2VUR)
2420- 35- 22-C- 2
W2PE(K2ZR,WA2s OJV ORS, WB2OJV,oprs) 864- 18- 16-B-10
K2KSJ(Multiop)
108- 6- 6-A- 6

3

Delaware

W3NX(+W3HB)
908,871-1207-251-C-85

Eastern Pennsylvania

N3RD(Multiop)
2,931,033-2565-381-C-90
N3AD(+Net)
2,144,025-2199-325-C-
N3ED(+Net)
1,669,776-1618-344-C-75
N3RG(+K3s KNH SME,WA3FZO)
1,475,516-1618-304-C-96
W3GU(+Net)
685,719- 981-233-C-24
W3EVW(+Net)
362,850- 590-205-C-40
K3RL(+Net)
100,572- 289-116-C-18
K3IK(+Net) 5508- 51- 36-B- 8

Maryland - D.C.

W4NL/3(+K3AO,K4FJ,N4TX)
2,151,675-1965-365-C-96
W3YXM(K3WE,N3RR,W83AUO, oprs) 593,061- 911-217-C-68
W3UO(+W3IKA)
527,460- 745-236-C-81
K3KA(+Net)
303,810- 533-190-C-40
W3GNQ(+Net)
239,112- 486-164-C-35

Western Pennsylvania

W3YQ(+N3EE,K3s TP VCH VX)
745,680- 956-280-C-96
W3YI(+WA3VJL)
328,511- 327-131-C-39

4

Alabama

N4AU(+K4IZN)
190,095- 437-145-B-61

Georgia

N4OL(+Net)
450,330- 883-170-C-49

North Carolina

W4CQ(G8NF,WB4ETF,oprs)
13,536- 96- 47-C- 9

Northern Florida

N4UF(+WB4YEY)
94,860- 310-102-C-

Southern Florida

N2CR/4(+WA2TKQ,WD9HAX)
3- 1- 1-A- 1

Tennessee

W4EAL(WB4MYZ,N4VI,oprs)
110,040- 280-131-B-32

Virginia

K4VX(+K4s PQL, YEP)
3,043,656-2684-378-C-96
N4RA(+K4AW)
1,129,500-1255-300-C-85
WA4FFK(+W3DJI)
90,396- 324- 93-A-24
WA4AXT(+WA4WKY)
45,507- 197- 77-B-38
N4XG(+WA4OHX)
17,172- 106- 54-A- 7

5

Northern Texas

K5JA(+N5AU,K5MR,WB5PIP)
1,003,794-1474-227-C-56
WB5PIL(+WB5MTN)
91,001- 303-101-B-76

Southern Texas

W5AC(K5GN,N5TC,WB5YOT, oprs) 1,501,242-1657-303-C-96
K5NA(+K5MA,Net)
271,362- 497-182-C-22
K5MA(+Net)
166,014- 401-138-A-14

6

East Bay

N6OP(Multiop)
1,926,768-2344-274-C-96
K6XV(+N6s FJ VV K6PJY)
1,723,185-2235-257-C-95
N6IG(+AA6UO,N6s DA NE, WB6QFQ,Net)
1,593,360-2213-240-C-92
W6QL(+W6KG)
1,030,824-1668-206-C-94

Los Angeles

W6VIO(N6s BF MP NO WU, W6ABW,WA6MYJ,WD6BWP,oprs)
107,100- 357-100-B-38

Orange

K6RR(+AA6RX,K6OZL,N6IN, WA6OTU)
1,748,748-2389-244-C-96
W6BA(+N6AV)
725,748-1228-197-C-76

Santa Clara Valley

K6RU(+K6XO)
1,505,916-2127-236-C-96
K6DC(+W6BJH)
1,209,780-1716-235-C-83
K6SMH(+Net)
25,608- 194- 44-B-16
N6GG(+Net)
12,243- 77- 53-C- 7

San Francisco

W6BIP(+WA6DJI)
89,133- 407- 73-C-34

San Joaquin Valley

K6AYA(+W6OKK,WA6QEC)
783,006-1267-206-C-71
K6YK(Multiop)
21,777- 119- 61-C- 8

7

Oregon

W7IVX(+K7WPC,W7WHY,WB7s OQD OZN PGU)
524,718- 407-158-C-90

Washington

K7TU(+K7SS,WA7ZLC)
702,960-1160-202-C-58

8

Michigan

W8GLC(+VE3s DFH JFG, WA8TOF) 238,320- 420-182-C-75
WD8DPB(+WD8AHR)
152,549- 454-112-C-67
K8AQM(+WA8ARS)
89,658- 293-102-C-72

Ohio

K8NZ(+K3LR,K8s AZ MR)
1,452,672-1664-291-C-92
WB8JBM(WB8s DQP LSN,WD8s LEN LRV,oprs)
1,186,380-1521-260-C-86

9

Illinois

WB9CEJ(+WB9BCR)
67,374- 197-114-A-60

Ø

Colorado

KØFX(WAØYFU,WBØNYY,oprs)
589,698-1086-181-C-86

Iowa

KØAT(+WØs UZ WP)
697,818-1067-218-C-86

Nebraska

KØDI(+KØNB)
20,988- 132- 53-C-25

VE

Manitoba

VE4OY(+VE4s UO VY)
281,180- 586-160-B-54

Multi-Multi

W4BVV(+K1JX,K3s KU NPV,W3s IUU ZZ,WA3AMH,N4ZR)
7,487,832-4972-502-C-96
W2PV(+K1s AR GQ OME XX,K2s AV TR UF ZA,N2FB,W2UP, WA2SPL,oprs)
7,090,800-4976-475-C-96
W3AU(+CX1EK,DK5AD,K3s EST TA TW,N3TR,N4RP)
6,662,145-4735-469-C-96
K5RC(+K5s GA KG LZO NU TM WA ZD,N5s AM DU JJ WW,W5s VAH VQ WMU)
6,447,780-4755-452-C-96
K3WW(+K3s VA VW WJV)
6,169,158-4366-471-C-96
W3FA(+N3GB,W3s ABC XY,WA3s KGY ZAS,WB4SGV,N8II)
6,153,463-3843-447-C-96
W3MM(Multiop)
4,758,824-3742-424-C-96
KØRF(+KØs GU SA,NØRR,WØs UA UN YK ZV,WD9DSU)
4,342,071-3779-383-C-96
N3RS(+K3FD,WA3s LRO NNA)
4,223,178-3537-398-C-78
K8LX(+N8EA,K8GM,W8s KPL WA WA8ZDT)
3,864,915-3181-405-C-96
W3GM(+K3s GQJ JLT LZ OA RL)
3,615,282-2883-418-C-90
W6YX(W2JU,WA6ITV,N7MH, WA7USX,oprs)
1,864,704-2428-256-C-96
W2GD(+Net)
1,765,725-1811-323-C-62
K4CG(K3WW,WA3ZAS,N4MO, W4ZMQ,WB4BQX,oprs)
1,742,997-2053-283-C-85
N3LR(W3BI,WB3HEQ,oprs)
1,347,156-1627-276-C-96
N5TV(+W5MH,W85s VAN VJ7)
787,332-1274-206-C-96
W3TV(+K3GL,W3s AOH VW)
586,932- 829-236-C-25
W3KT(Multiop)
584,766- 819-238-C-
W3IW(+KJ8SY,WN3KER)
492,360- 746-220-C-49
WB3KCW(K3SEW,WA3s ZKL ZZV, oprs) 295,812- 544-166-C-96
WA3LRO(+W3WJD)
76,896- 288- 89-C-
W3SL(Multiop)
21,390- 155- 46-C-14

Check Logs

CT1EU,OJ3CO,OK3OI,OK5OS, DL9HP,DL9CS,DM2ABL, DM2AOM/A,DM2BHK,DM2BJD, DM2BTL,DM2CEE,DM2CJJ, DM2CWJ,DM2DWH,DM2FQN, DM2FUL,DM3VUH, DM3MO/DM5YG,DM3UFJ, DM3ZEN,DM4FF,DM4VZA, DM4WPF,DM4ZFM,DM5QG, DM5YVL,DM6DAJ,DM9LMM, DT2ADC,DT2AYO/DM4UHO, DT2BPT,DT4FA,EA5ADB, F6DMV,G4DV,HA3MB,HI3XEA HZ1AB,I0MC,JA2RGR,KJ8UR, K6FM,K8CFU,K9ZO,KH6FX, LA7ZN,LA8LA,LY1G,LU7AOK LZ1AD,LZ1CJ,LZ1CW,LZ1KCM LZ1KDF,LZ2BR,LZ2KBA,N2RT N6PF,OE5KE,OH1MQ,OH1XX, OH2AA,OH2BAQ,OH2BSS,OH5 OH6JW,OH6MO,OK1DMJ,OK1I OK1KTW,OK2BBJ,OK2BCJ, OK2BPL,OK2PEG,OK2XA, OK3CAW,OK3EQ,OK3IR,OK3K OK3YCV,OZ4VK,PA0LEG, PA0NRD,PA0PLM,PA0RWS, PA0TV,PA0WAC,PY1DHN, PY1SJ,PY2YP,SK1AO,SM2DMU SM3CJA,SM3CJC/5,SM4AZD, SM4CLR,SM5APS,SM5AQD, SM5BFJ,SM5CLE,SM5FXI SM5IKQ,SM6AYM,SM6DOK, SM6HIO,SM7ONG,SM7BYP, SM7FH,SM7FSV,SM7RS,SM7TV SM8GMH,SN1DPA/2,SP1PTT, SP3BAW,SP3DAH,SP3GEN, SP4PBI,SP5ALV,SP6BFK,SP7AS SP8ARY,SP8BAB,SP9CAV/9, SP9FWX,SP9GUV,UA1AWO, UA2FCB,UA3IFK,UA3DFV, UA3IJN,UA3EAT,UA3PAZ, UA3TAG,UA3TDX,UA3VCP, UA4AW,UA4BIU,UA4CAB,UA4Q UA6AKT,UA6APP,UA6AVD, UA6AVI,UA6AWE,UA9AYR, UA9LWI,UA9LXC,UA9PAA, UA9CKS,UA9MAX,UA9MK, UA9NN,UA9NW,UA9UOB, UA9UOZ,UA9WDD,UA9WBR, UA9XDD,UB5EES,UB5GDL, UB5HBT,UB5IDZ,UB5LAY, UB5ML,UB5TAG,UB5UBU, UB5UBY,UB5UDG,UB5ZDF, UC2ACA,UC2CBA,UD6DJX, UK2BAG,UK2BBK,UK2BCC, UK2FCR,UK3AAU,UK3ABB, UK3DBG,UK3DCF,UK3DDD, UK4PAA,UK4WAB,UK5EDX, UK5HAB,UK5UAC,UK5WAG, UK5WBG,UK5ZAC,UK5ZBQ, UK9OAW,UKØAAC,UKØZAF UL7TAK,UL7YR,UO5AP,UO58 UP2BBF,UP2CY,UQ2GCN, UQ2PJ,UR2GU,UT5BN,UT5IK UV3DN,UV3GZ,UW3HV,UW6CV UW6FC,UW9PT,UW9VH,UY5NV UY5UG,UY5YB,VE3FHX, VE3JHU,VE3JKZ,VE4AAU, VE6XD,VE7AS,VF8AM,W1PWK W5WDI,W6HPD,W6KPJ,W6BYB W8EV,W8KPI,W8IGK,W9VCV, W9YBV,WA1DRP,WA2CSD, WA2TJF,WA2WRE,WA9GFR, WB2GFE,WB3KDQ,WB5YLT, YO4BZC,YO8MH,YO9HP,YU3A DL-Z37/12237

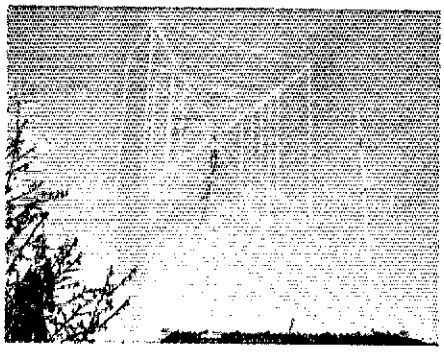
Tower Power

W2PV

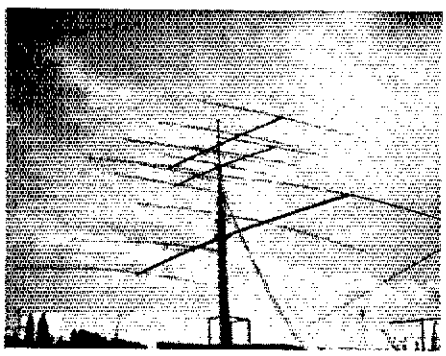
160	Inverted V @ 160' Beverages
80	2-el Delta loop @ 160' (top) Dipole @ 150' Sloper Beverages
40	3/3 @ 170' (top) 85' (bottom) 3-el @85'
20	7/5/5 @ 150' (top) 100' (middle) 50' (bottom) 6/6 @ 105' (top) 42' (bottom)
15	8/8 @ 91' (top) 46' (bottom) 4-el fixed arrays
10	10/10 @ 92' (top) 53' (bottom) 4/4 fixed arrays

W4BVV

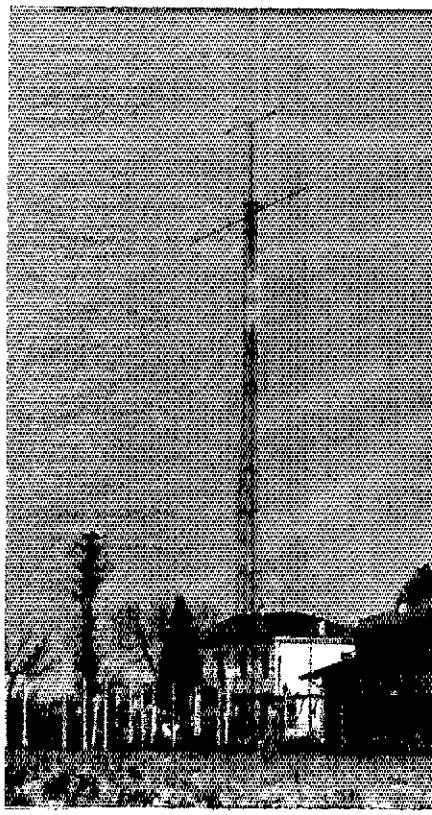
160	Groundplane @ 65' (base) Sloper Beverages
80	Phased groundplanes @ 35' (bases) Dipole @ 180' Beverages
40	3/3 @ 190' (top) 90' (bottom)
20	5-el @ 140' 4/4 @ 100' (top) 50' (bottom) 4-el @ 120'
15	7-el @ 120' 4/4 @ 90' (top) 45' (bottom)
10	6-el @ 70' 4-el @ 40'



The quad at HB9KC (built by HB9MB) stands out with a coating of frost.



I5VXG's 4 elements on 20 and 15, and 5-el on 10.



I3MAU's big signal comes from a 2-el quad on 40-10 M plus a 4-el 80-M loop.

Operating News

Conducted By George Hart,* W1NJM

Bad Talk

In November 1977 *QST*, the title of this column was "Observer Topics," but the subject was the use of language and the selection of topics on the air which would make a bad impression on the general public.

Apparently not many read this column, because since that time we have continued to receive letters and telephone calls on the same subject, with very strong implications that we at Headquarters should be doing something about it. Apparently directors have been receiving such letters and complaints, too, because the Board at its July meeting saw fit to put its consideration on record, in the following terms:

" . . . unanimously VOTED that the Board expresses its continuing concern over harmful operating tactics and procedures and improper language being heard with disturbing frequency on the amateur bands . . . and directs the General Manager to undertake suitable educational programs through channels available to the League so that the international image of Amateur Radio is not tarnished and so that our stature at international radio conferences will be enhanced."

Let's not try to explore the intent or scope of the motion right now (this will be done in depth by whomever the GM selects to conduct the indicated educational programs), but let's look into the subject briefly in keynote aspect so that we will have some idea what we are up against and the options available to us.

To begin with, we assume that about 99 percent of all amateurs are interested in maintaining a favorable image of Amateur Radio. It is that other one percent that is troublesome. It can make a lot of noise and create a bad impression far above its proportion. What can we do about it?

Although not quite the same problem, back in the twenties and earlier The Old Man had a solution. He recruited a gang of "plug uglies" who called on "Junior" and took him for a ride. They made him call CQ for hours on the Uggerumf, then Rettysnitched him, Wouff Honged him and finally boiled him in transformer oil. There are those who favor the same type of approach to our present problem, with certain modernizations. But this is certainly not the answer, except in a figurative sense.

There are several reasons why people use foul language, whether on the air or otherwise in public. One is that they know no other way to express themselves in emphatic overtones. For these, an educational program may indeed be beneficial. The vocabulary of obscenities is very limited, whereas the English language is full of words that will lend emphasis or strong emotion so much more effectively.

But perhaps the largest segment of users of filthy language is merely trying to attract attention to itself. Defiance and flouting of commonly accepted mores is one way to do this; a juvenile way, to be sure, but then this type is obviously lacking in mental maturity. A few of these attention-seekers may be deterred by tongue lashings from their "elders," but most of them would simply be realizing their objective in having this much attention paid to them. In short, it would make them worse.

So instead of applying the Rettysnitch and Wouff Hong in traditional fashion, perhaps after all the most effective instrument to use is the "ostracizer." That's right, the "silent treatment." This can be applied following the first obscene word uttered by your contact. No expression of abhorrence, no lecture, no reply in kind. Just silence, complete, absolute, significant. The amateur with an established reputation for using bad language on the air can be ostracized by avoiding contact with him altogether, by not answering his calls, by ignoring him. Others who let loose with this sort of thing can be given the ostracizer in the middle of a contact.

It should be quite effective, if we can pull it off. We want our amateur bands to be fraternal and jovial; we *don't* want them populated by "stuffed shirts" talking exclusively in words of three and four syllables, or on subjects over the heads of the majority. But we do want to be proud of what we do, what we are, what we say, and not have to make apologies for it to casual listeners. We want to enjoy ourselves, but without polluting the air waves with language and obscene references considered objectionable by the majority.

*Communications Manager, ARRL

W1AW Operating Schedule (April 30, 1978-October 29, 1978)

PDST	CDST	EDST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1300 *	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7	9	10	1400 *	←		Cw Bulletins[3]		→		
8	10	11	1500 *	←		RTTY Bulletins[4]		→		
1 P.M.	3 P.M.	4 P.M.	2000 *	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2	4	5	2100	←		Cw Bulletins[3]				→
3	5	6	2200	←		RTTY Bulletins[4]				→
4	6	7	2300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5	7	8	0000	←		Cw Bulletins[3]				→
6	8	9	0100	←		RTTY Bulletins[4]				→
6:30	8:30	9:30	0130	←		Phone Bulletins[5]				—
7	9	10	0200	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8	10	11	0300	←		Cw Bulletins[3]				→
9	11	12	0400	←		RTTY Bulletins[4]				→
9:30 P.M.	11:30 P.M.	12:30 A.M.	0430	←		Phone Bulletins[5]				→

[1]Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2]Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3]Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
[4]RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
[5]Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.
Please note that all footnoted frequencies are approximate.

Normal W1AW visiting hours are 3:30 P.M. to 1 A.M. seven days a week (local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about seven miles south of Hartford). Note: ARRL office-visiting hours are 8 A.M. to 5 P.M. Monday through Friday. Maps with local street detail are available upon request. If you wish to operate when visiting, you must have your original operator's license with you. The best time for visitors to operate is on weekdays between 1 and 4 P.M. local time. (Schedules can also be arranged to work W1AW.) *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH.

In a communications emergency monitor W1AW for special bulletins as follows: *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0200 practice from the issue of *QST* two calendar months past: October 2, It Seems to Us; October 10, World Above; October 13, League Lines; October 19, Public Service; October 25, Happenings; October 30, Operating News.

MARS

As this is being written, your column conductor is about to undertake a trip, the underlying purpose of which is to make contact with officials of the Military Affiliate Radio System, commonly known as MARS. Actually, we have never *lost* contact with MARS, but personnel changeover in the MARS chiefdoms has been so rapid that at present all three are less than a year on their prospective jobs.

ARRL and the military have been friends for a great many years, starting back in the '20s when the Army Amateur Radio System was started by the Signal Corps and the Volunteer Communications Reserve by the Navy. The friendship has paid off, in many mutual ways. Following World War II, with the establishment of MARS to replace the prewar and largely unofficial AARS, ARRL and Headquarters were very much involved and have continued to be.

MARS is not strictly an amateur service, but it consists largely of hams (of which probably a great majority are ARRL members) and has a lot of ham spirit. Through the years, its chiefs have mostly been amateurs. Personal contact with the three MARS chiefs requires a lot of traveling. We started out with AF MARS at Scott Air Force Base in Illinois, the headquarters of the Air Force Communications Service (AFCS), thence to Fort Huachuca, AZ, to spend a day with the Army MARS chief and inspection of the Army's Communications Command; and finally (but not leastly), to Washington, DC, for a visit with the Navy-Marine Corps MARS chief at the U.S. Naval Communications Center.

This represents a renewed effort on the part of your Headquarters to maintain cordial relations with our military cousins. More in future issues of *QST*.

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 Street, 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 . . .)

SCM candidates 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, December 11, 1978.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on January 2, 1979, returns counted February 20, 1979, and SCMs elected as a result of the above procedures will take office April 1, 1979.

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, 1979.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April 1979 *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.

George Hart, W1NJM
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the North Dakota section as a result of notices in April and May 1978 *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate. QST

OSCAR 7 **OSCAR 8**

Ref. Orbit	Date (UTC)	Time (UTC)	Long. W.	Ref. Orbit	Date (UTC)	Time (UTC)	Long. W.
17731B	1 Oct.	0031	67.2	2920J	1 Oct.	0110	58.5
17744B	2 Oct.	0125	80.8	2934A	2 Oct.	0116	59.8
17756A	3 Oct.	0025	65.6	2948A	3 Oct.	0120	61.1
17769B	4 Oct.	0119	79.2	2962X	4 Oct.	0125	62.5
17781B	5 Oct.	0018	64.1	2976A	5 Oct.	0131	63.8
17794A	6 Oct.	0113	77.7	2990A	6 Oct.	0137	65.1
17806B	7 Oct.	0012	62.5	3004J	7 Oct.	0142	66.4
17819B	8 Oct.	0106	76.1	3017J	8 Oct.	0004	42.0
17831A	9 Oct.	0006	61.0	3031A	9 Oct.	0008	43.2
17844B	10 Oct.	0100	74.5	3045A	10 Oct.	0013	44.6
17857B	11 Oct.	0154	88.1	3059X	11 Oct.	0019	45.9
17869A	12 Oct.	0054	73.0	3073A	12 Oct.	0025	47.2
17882B	13 Oct.	0148	86.6	3087A	13 Oct.	0029	48.5
17894B	14 Oct.	0047	71.4	3101J	14 Oct.	0034	49.9
17907A	15 Oct.	0141	85.0	3115J	15 Oct.	0040	51.2
17919B	16 Oct.	0041	69.9	3129A	16 Oct.	0046	52.5
17932B	17 Oct.	0135	83.5	3143A	17 Oct.	0051	53.8
17944A	18 Oct.	0034	68.3	3157X	18 Oct.	0055	55.1
17957B	19 Oct.	0129	81.9	3171A	19 Oct.	0100	56.5
17969B	20 Oct.	0028	66.7	3185A	20 Oct.	0106	57.8
17982A	21 Oct.	0122	80 3	3199J	21 Oct.	0112	59.1
17994B	22 Oct.	0022	65.2	3213J	22 Oct.	0116	60.4
18007B	23 Oct.	0116	78.8	3227A	23 Oct.	0121	61.7
18019A	24 Oct.	0015	63.6	3241A	24 Oct.	0126	63.1
18032B	25 Oct.	0110	77.2	3255X	25 Oct.	0133	64.4
18044B	26 Oct.	0009	62.1	3269A	26 Oct.	0138	65.7
18057A	27 Oct.	0103	75.7	3283A	27 Oct.	0142	67.0
18069B	28 Oct.	0003	60.5	3296J	28 Oct.	0004	42.5
18082B	29 Oct.	0057	74.1	3310J	29 Oct.	0009	43.9
18095A	30 Oct.	0151	87.7	3324A	30 Oct.	0015	45.2
18107B	31 Oct.	0050	72.5	3338A	31 Oct.	0021	46.5
18120B	1 Nov.	0145	86.1	3352X	1 Nov.	0025	47.8
18132A	2 Nov.	0044	71.0	3366A	2 Nov.	0030	49.1
18145B	3 Nov.	0138	84.6	3380A	3 Nov.	0035	50.5
18157B	4 Nov.	0038	69.4	3394J	4 Nov.	0042	51.8
18170A	5 Nov.	0132	83.0	3408J	5 Nov.	0047	53.1
18182B	6 Nov.	0031	67.9	3422A	6 Nov.	0051	54.4
18195B	7 Nov.	0126	81.4	3436A	7 Nov.	0056	55.7

Have you listened to OSCAR 8 yet? This newest of amateur satellites is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during O 7 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).

Notes

1) All time and date references are in UTC.
2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
3) O 7 will operate Mode A only on days of the *year* fully divisible by three (October 3 is day number 276, for example), and the other two days in between will be Mode B.
4) *All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL.*
5) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
6) O 7 progresses an average of 28.737586 degrees west per orbit in a period of 114.945238 minutes. O 8 progresses 25.807979 west in a period of 103.228194 minutes.
7) O 8 modes of operation are Monday, Tuesday, Thursday and Friday — Mode A. Saturday and Sunday — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

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

This schedule of orbits for OSCAR 7 and OSCAR 8 is a regular feature of *QST*. Tune in W1AW bulletins for updated reference orbit data. Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. Also, the popular and informative series of *QST* articles for the beginner has been reprinted in book form. *Getting to Know OSCAR — from the Ground Up* covers OSCAR 6, OSCAR 7, the newest satellite, OSCAR 8, launched in early March, and the exciting Phase III program scheduled for late 1979. It includes the OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for $3 postpaid ($3.50 outside the U.S.), from the ARRL.

Operating Events

OCTOBER

5: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC with Z shown as a time designator). The run will take place at 9 P.M. PDST local clock time the night of October 4. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, stamped, self-addressed envelope will help to expedite your award/endorsements.

7-8: VK/ZL/Oceania DX Contest phone and RTTY, **QRP QSO Party, California QSO Party;** September, page 75.

11-12: YL Aniversary Party, September, page 75.

14-15: CD Party cw, **RSGB 21/28-MHz Telephony Contest, VK/ZL/Oceania DX Contest,** cw, **Manitoba QSO Party, 9-Land QSO Party;** September, page 75.

18: W1AW Qualifying Run, 10-35 wpm at 0200Z. This is 2200 EDST (10 P.M. local Eastern time) on the 17th. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL per the instructions under the October 5 listing.

21-22: CD Party phone, **RSGB 7-MHz DX Contest** phone, **WADM Contest;** September, page 75. **Canadian Amateur Radio Teletype Group (CARTG, VE3RTT) 18th annual RTTY DX Sweepstakes,** 0200Z Oct. 21 to 0200Z Oct. 23. No more than 30 hours of operation is permitted. Nonoperating periods can be taken at any time during the contest (indicate "off times" in the log). All amateur bands authorized for F1 emission. Countries per ARRL Countries List with KL7/KH6/VO to the considered as separate countries. Classifications are single operator (single transmitter), multioperator (one transmitter), SWL printer. Messages to include message no., time in UTC and zone (see chart, September 1974 *QST*, page 52). All complete contacts with one's own zone count 2 points, all others will receive points listed in the zone chart. Additional contacts permitted on different bands. Each country contacted (including your own) on each band counts as a multiplier. Each U.S. and VE district counts as a separate multiplier. Final score: Total exchange points times number of multipliers times number of continents (maximum of six). Add 100 bonus points for each VE/VO contact on all bands. Separate logs for each band. (Note, logs and zone charts available from the CARTG for an s.a.s.e.) Logs must be received before December 31. Plaques, medallions, certificates. Mail entries to Canadian Amateur Radio Teletype Group, 85 Fifeshire Road, Willowdale, ON M2L 2G9, Canada. **Jamboree-On-The-Air (JOTA)** from 0001 *local* time for 48 hours starting on October 21. Amateurs invite local Boy Scouts and leaders to see demonstration of Amateur Radio; amateurs who are scouters/scouts contact other scouts. Suggested frequencies: 3940 7290 14290 21360 28990 on phone and 3590 7030 14070 21140 28190 on cw. Amateurs who participate please send reports for consolidation with pictures if possible to Harry Harchar, W2GND, SUM-0101, North Brunswick, NJ 08902. Special QSL cards sent by BSA to scouts who participate.

22: W1AW Qualifying Run, 10-35 wpm at 2300Z. This is 1900 EDST (7 P.M. local Eastern time) on the 22nd. All other details per the September 12 listing.

28-29: CQ-WE Contest; Bell Lab's Wekearny RC is host. Western Electric, Bell Labs, AT&T, AT&T Long Lines and Teletype Corp. employees/retirees. For rules send s.a.s.e. to W2JVJ. Session 1 on October 28 1700-2200Z hf/vhf phone; session 2, October 28, 2300Z through October 29 0400Z hf/vhf/RTTY; session 3, October 29 1700-2200Z hf/vhf cw/RTTY; session 4, October 29 2300Z through October 30 0400Z hf/vhf phone. Info submitted by John Markunas, W2JVJ, Coordinator, WE, 100 Central Ave., Kearny, NJ 07032. **CQWW Contest,** phone, full period UTC, 160 through 10 meters. Single op both single band and multiband, multiop (all-band operation only) with single transmitter and multitransmitter. 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 Countries List, WAE country list and IARU WAC boundaries are standards. Contacts between stations on different continents are worth 3 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. Awards. Usual log format and summary with all info and signed declaration. 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. Postmark entries no later than December 1 for the phone section and January 15, 1979, for the cw section (cw event scheduled for November 25-26). Logs go to CQWW Contest Committee, 14 Vanderventer Ave., Port Washington, LI, NY 11050.

NOVEMBER

1-2: YL Anniversary Party, phone September, page 75 (11-12 listing).

3-4: Trilliums QSO Party, 0030Z November 4 through 0030Z November 5, open to all, sponsored by the Ontario Trilliums Ladies Amateur Radio Club. Each Trillium station may be contacted twice (once on each mode or once each on two different bands, mode same). Trilliums will call CQ TW, all others will call CQ TOT. Exchange RS(T), name, QTH. Trilliums will also transmit their club numbers. Log date, time (Z), RS(T), band, mode, TOT number, as well as name, address and claimed score. All logs must be signed by the operator. Cw and phone contacts will each earn 5 points, with a low-power multiplier of 1.25 for all transmitters running 150 watts dc input or less. A bonus of 100 points will be added for working 10 members of the Ontario Trilliums, and an additional 100 points for working 20 members, and so on. Logs must be postmarked not later than December 31, 1978 and received by January 15, 1979. Send to Eva Colleck, VE3EVA, 155 Midland Ave., Scarborough, ON M1N 3Z8, Canada. Awards. Suggested frequencies: 3770 3855 7103 7240 14035 14140 14280 kHz.

4: Frequency Measuring Test, open to all, begins with a callup at 0300Z and 0600Z, November 4. Remember, this is the evening before, November 3, by local time. The first periods of measurement start at 0307 (20 meters), 0315 (40 meters), and 0323 (80 meters); for the late run, 0607, 0615 and 0623, respectively. Each measuring period lasts five minutes. Submit your averages for each five-minute period, which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,135 7082 and 3545 kHz; late-run frequencies at 14,078, 7074 and 3550 kHz. Your report must be received by November 16 to qualify for listing in the *QST* report of the competition. W1AW will begin transmitting the official results in a special bulletin November 15.

4-5: Sweepstakes, cw, this issue. **RSGB 7-MHz** cw, September, page 75 (14-15 listing).

8: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run will take place at 9 P.M. PST local clock time the night of November 7. Other details under the October 5 listing.

11-12: IPA Contest, The International Police Association Radio Club, German Section (IPARC) sponsors this event, which leads toward the Sherlock Holmes Award. Open to all amateurs and SWLs. From 0800-1000Z, 1400-1700Z, and 1800-2000Z on November 11 and 12. Stations call CQ IPA, members contact members and nonmembers on cw and ssb, crossmode/crossband not permitted. Exchange nonmembers send RS(T) and serial number, members prefix same exchange with IPA. QSOs on 80/40 are worth 2 points and 20/15/10 4 points. Scoring: QSO points times IPA countries per band. Suggested frequencies: 3575 7025 14075 21075 28075 on cw and 3650 7075 14295 21295 and 28650 kHz on ssb. Logs show UTC date, time, band, call sign, number sent and received, countries. Mail to Adolf Vogel, DL3SZ, Ritter-von-Eyb-Str. 2, D-8800 Ansbach, Federal Republic of Germany, postmarked not later than December 31. W/VEs can receive membership lists and other operating aids for this event from Vincent Gambino, WB4QJO, 7606 Kingsbury Rd., Alexandria, VA 22310, for a stamped addressed envelope. **WAE RTTY** (European RTTY DX Contest) sponsored by the Deutscher Amateur Radio Club (DARC), the full 48-hour period. See July 1977 *QST*, page 98, for details. **Delaware QSO Party** from 1600-0600Z both dates. Sponsored by the Delaware Amateur Radio Club (DARC), open to all. Delaware stations send QSO number RS(T) and county. Non-Delaware stations send QSO number, RS(T) and QTH (ARRL Section or Country) DE stations score 1 point phone, 2 points for cw, multiply total by sum of ARRL sections and countries. Non-DE stations work only DE stations, score 5 points per contact, multiplied by the total sum of counties (New Castle, Kent and Sussex) worked on all bands and each mode. Suggested frequencies: 3560 7060 14060 21060 and 28160 cw; 3710 7120 and 21120 Novice; 3900 7275 14325 21425 and 28650 phone. Awards. Mail by December 15 to Sandy Cuccia, WB3ENF, 7 Sorrel Dr., Wilmington, DE 19803. If you work all three DE counties and wish to receive the W-DEL award please include a stamped addressed envelope. **Missouri QSO Party,** from 1800Z November 11 through 2300Z November 12. MO stations contact all others, others contact MO stations. The same station may be worked once each band/mode from each different MO county. MO mobiles count separate from counties. Exchange QSO number, RS(T) and QTH (county for MO, state, province or country for others). Scoring one point per QSO, multiply by number of counties (115 maximum) worked for non-MO and MO stations use states, provinces and countries. Suggested frequencies: 3540 7090 14040 21110 28110 cw; 3910 7240 14270 21360 28600 and 50.0 to 50.5 MHz phone. Awards. Mail deadline December 15 to the St. Louis ARC, K0LIR, 842 Tuxedo Blvd., Webster Groves, MO 63119. Self-addressed, stamped envelope for results.

12: OK DX Contest, from 0000 to 2359Z sponsored by the Central Radio Club of Czechoslovakia. Open to all. 1.8-28 MHz cw and ssb (crossband/mode not permitted). Exchange RS(T) plus the ITU Zone number (see May *QST*, page 75). Scoring contacts with non-OK stations count 1 point, QSO with an OK counts 3 points. Multiply times the sum of the ITU zones from all bands. Categories of single operator-all band, single operator-single band, and multioperator-all bands. Awards. Logs must be mailed by December 31 to The Central Radio Club, P. O. Box 69, 11327 Praha 1, Czechoslovakia.

16: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST (local Eastern time) on the 15th. All other details per the October 18 listing.

18-19: Sweepstakes, phone, elsewhere this issue. **WARS QSO Party,** sponsored by the Wellesley Amateur Radio Society for the 27th anniversary of the event. Special events station W1TKZ will operate on the following frequencies: 3720 7120 21120 28120 on cw; 3950 7250 14310 21400 28600 kHz and 146.52 MHz phone. Award for contacting station. Submit QSL and large, long, stamped, addressed envelope prior to December 31 to WARS, 324 Washington St., Wellesley Hills, MA 02181.

20: W1AW Qualifying Run, 10-35 wpm at 2100Z. This is 4 P.M. EST on November 20. All other details per the October 18 listing.

25-26: CQ WW cw, see October 28-29 listing. QST

DECEMBER

2-3: 160 Meter Contest, EA Contest, phone, Telephone Pioneers QSO Party
7: West Coast Qualifying Run (0500Z)
9-10: 10 Meter Contest, EA Contest, cw, HA-DX
15: W1AW Qualifying Run (0300)
16-17: SOWP Contest, cw
24: HA5-WW
27: W1AW Qualifying Run (1400)

JANUARY

1: SKN
6-7: CD Party phone
13-14: CD Party cw, VHF SS
27-28: Simulated Emergency Test (SET)

QST Abbreviations

Are you elated or disappointed at AOS? Is a PRA an LO? How advantageous is your repeater's HAAT? All the answers, and more, are in this list of abbreviations and symbols found in QST and all League publications.

A — ampere
ac — alternating current
A/D — analog-to-digital
af — audio frequency
afc — automatic frequency control
afsk — audio frequency-shift keying
agc — automatic gain control
alc — automatic load (or level) control
a-m — amplitude modulation
A.M. — morning
AMSAT — Radio Amateur Satellite Corporation
anl — automatic noise limiter
AOS — acquisition of signal
ARC — amateur radio club
ARES — Amateur Radio Emergency Service
ARPSC — Amateur Radio Public Service Corps
a.s.a.p. — as soon as possible
ANSCII — American National Standard Code for Information Interchange (sometimes appears as ASCII)
ASSC — Amateur Satellite Service Council
ATV — amateur television
avc — automatic volume control
AWG — American wire gauge
az-el — azimuth-elevation

b — byte; a group of bits or binary digits, usually eight
bc — broadcast
BCD — binary-coded decimal
bci — broadcast interference
bcl — broadcast listener
BFO — beat-frequency oscillator
BPL — Brass Pounders League

CAC — Contest Advisory Committee
CB — citizens band
CCIR — International Radio Consultative Committee
ccw — counterclockwise
c.d. — civil defense
CD — Communications Department (ARRL)
CMOS or COSMOS — complimentary-symmetry metal-oxide semiconductor
coax — coaxial cable or connector
COR — carrier-operated relay
CP — code proficiency (award)
CRT — cathode-ray tube
ct — center tap
cw — continuous wave (code); clockwise

D/A — digital-to-analog
dB — decibel
dBd — antenna gain referenced to a dipole
dBi — antenna gain referenced to isotropic; a dipole has a gain of 2.14 dBi
dBm — decibel referred to 1 milliwatt
dc — direct current
DF — direction finder
DIP — dual in-line package, 14 or 16 pins
DOC — Department of Communications (Canadian)
dpdt — double-pole double-throw
dpst — double-pole single-throw
dsb — double sideband
DVM — digital voltmeter
DX — long distance
DXAC — DX Advisory Committee
DXCC — DX Century Club

EC — emergency coordinator
ECAC — Emergency Communications Advisory Committee
ECL — emitter-coupled logic
ECO — electron-coupled oscillator
EME — earth-moon-earth (moonbounce)
emf — electromotive force (voltage)
EMP — electromagnetic pulse
EQX — equator crossing
erp — effective radiated power

f — frequency
F — farad
FAX — facsimile
FCC — Federal Communications Commission
FD — Field Day
FET — field-effect transistor
FF — flip-flop
fm — frequency modulation
FMT — frequency measuring test
fot — optimum working frequency
fsk — frequency-shift keying

GDO — grip-dip or gate-dip oscillator
GHz — gigahertz
gnd — ground

H — henry
HAAT — height above average terrain
hf — high frequency
HFO — heterodyne frequency oscillator
hpf — highest possible frequency
Hz — hertz

IARU — International Amateur Radio Union
IC — integrated circuit
i-d — identification, identifier
ID — inside diameter
i-f — intermediate frequency
in./s — inches per second
IRC — international reply coupon
ITU — International Telecommunication Union
IW — Intruder Watch

j — indicator for reactive component of an impedance (+j inductive; −j capacitive)
JFET — junction field-effect transistor

k — kilo, 1000; sometimes used alone in place of kb (kilobyte)
kHz — kilohertz
km/h — kilometers per hour

kW — kilowatt

LCD — liquid crystal display
LED — light-emitting diode
lf — low frequency
LMO — linear master oscillator
LO — local oscillator
LO — League Official
loran — long-range navigation
LOS — loss of signal
lp — log periodic
lsb — lower sideband
LSB — least significant bit
LSI — large-scale integration
luf — lowest usable frequency

m — meter (distance or band)
mA — milliampere
MARS — Military Affiliate Radio System
mf — medium frequency
mH — millihenry
MHz — megahertz
mic — microphone
mini-DIP — dual in-line package, 8 pins
mi/h — miles per hour
mi/s — miles per second
mix — mixer
mm — millimeter
MO — master oscillator
MOSFET — metal-oxide semiconductor field-effect transistor
ms — millisecond
m.s. — meteor scatter
m/s — meters per second
MSB — most significant bit
MSI — medium-scale integration
MSTV — medium-scan TV
muf — maximum usable frequency
MUX — multiplex; multiplexer
mV — millivolt
mW — milliwatt

nbfm — narrow-band frequency modulation
nbvm — narrow-band voice modulation
n.c. — no connection
NC — normally closed
NCS — net control station
NF — noise figure
NM — net manager
NO — normally open
NOI — Notice of Inquiry
npn — negative-positive-negative
NPRM — Notice of Proposed Rule Making
ns — nanosecond
NTS — National Traffic System (ARRL)

O 7 — OSCAR 7
O 8 — OSCAR 8
OBS — official bulletin station
OD — outside diameter
OES — official emergency station
OO — official observer
op amp — operational amplifier
osc — oscillator
OSCAR — Orbiting Satellite Carrying Amateur Radio
OTS — official traffic station
OVS — official vhf station
oz — ounce

PA — power amplifier
pc — printed or etched circuit
PEP — peak-envelope power
PEV — peak-envelope voltage
pF — picofarad
PIV — peak-inverse voltage
pk — peak
pk-pk — peak-to-peak
PL — private line
PLL — phase-locked loop
pm — phase modulation
P.M. — afternoon/night
pnp — positive-negative-positive
pot — potentiometer
ppd. — postpaid
PRA — public relations assistant
PRV — peak-reverse-voltage
PSHR — Public Service Honor Roll
PTO — permeability-tuned oscillator
PTT — push-to-talk

QRP — low power

RACES — Radio Amateur Civil Emergency Service
R/C — radio control
RCC — Rag Chewers Club
rcvr — receiver
rf — radio frequency
rfc — radio-frequency choke
RFI — radio-frequency interference
RM — route manager
RM-(number) — FCC rulemaking
rms — root-mean-square
RO — radio officer (c.d.)
RST — readability-strength-tone
RTL — resistor-transistor logic
RTTY — radioteletype

s — second
s.a.e. — self-addressed envelope
s.a.s.e. — stamped s.a.e.
SCM — section communications manager
SCR — silicon-controlled rectifier
SEC — section emergency coordinator
SET — simulated emergency test
S.M. — silver mica (capacitor)
SNR — signal-to-noise ratio
spdt — single-pole double-throw
spst — single-pole single-throw
SS — Sweepstakes (contest)
ssb — single sideband
SSTV — slow-scan TV
STM — section traffic manager
SWL — shortwave listener
SWR — standing-wave ratio
sync — synchronous, synchronizing
SYNCART — synchronous amateur radio transponder

TA — technical advisor
TCA — time of closest approach
TCC — Transcontinental Corps
TD — transmitting distributor
TE — transequatorial (propagation)
tfc — traffic
tpi — turns per inch
T-R — transmit-receive
T-T — Touch-Tone, trademark of Bell Telephone Co.
TTL or T^2L — transistor-transistor logic
TTY — teletypewriter (from Teletype, trade name of Teletype Corp.)
TV — television
TVI — television interference

uhf — ultra-high frequency
UJT — unijunction transistor
usb — upper sideband
UTC — universal coordinated time

V — volt; voltage
VCO — voltage-controlled oscillator
VCXO — voltage-controlled crystal oscillator
VFO — variable frequency oscillator
vhf — very high frequency
vlf — very low frequency
VOM — volt-ohm-milliammeter
VOX — voice-operated break-in
VR — voltage regulator
VRAC — VHF Repeater Advisory Committee
VTVM — vacuum-tube voltmeter
VUAC — VHF-UHF Advisory Committee
VXO — variable crystal oscillator

W — watt
WAC — worked all continents
WARC — World Administrative Radio Conference
WAS — worked all states
wbfm — wide-band fm
wpm — words per minute
ww — wire wound

xcvr — transceiver
xmtr — transmitter
xtal — crystal

Z — see UTC
°C — degrees Celsius
°F — degrees Fahrenheit
°K — degrees Kelvin
α — alpha; angles; common-base forward current-transfer ratio of a bipolar transistor
β — beta; angles; current gain of common-emitter transistor amplifiers
γ — gamma; angles
Δ — delta; increments
δ — delta; angles
ε — epsilon; base of natural logarithms
Z — zeta; impedance
θ — theta; angles
λ — wavelength; latitude
μ — mu; micro (10^{-6}); amplification factor; permeability
μP — microprocessor
π — pi; 3.1416
Σ — sigma; summation
Υ — tau; time constant; time phase displacement
ϕ — phi; angles; longitude
ψ — psi; angles
Ω — omega; resistance in ohms
ω — omega; angular velocity

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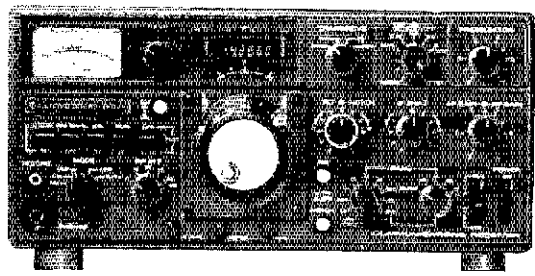

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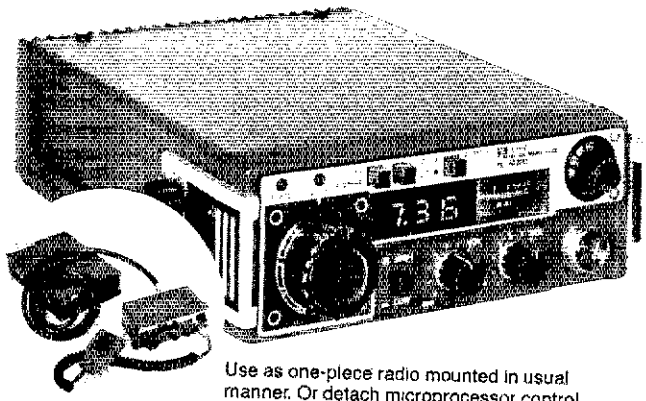

Use as one-piece radio mounted in usual manner. Or detach microprocessor control head and mount by optional bracket. Tuck main body neatly away out of sight!

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Get choice of these free

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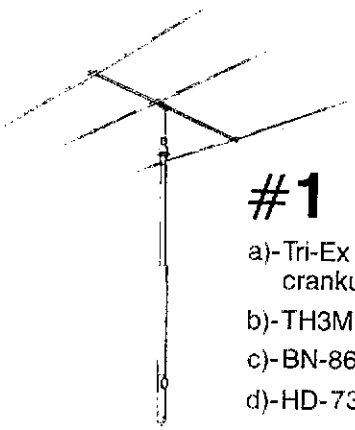

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#1

FREE FREIGHT IN CONTINENTAL U.S.A. (our choice)

a)-Tri-Ex SM-40, 40' tubular crankup mast w/wall bracket.

b)-TH3MK3 Hy-Gain Tri-bander.

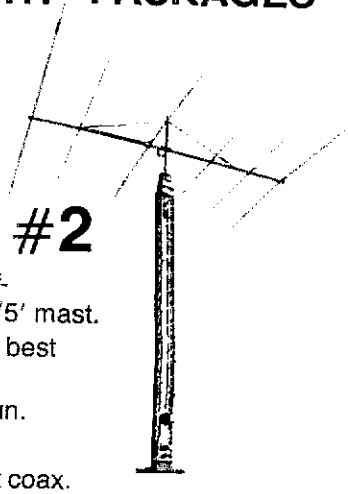
c)-BN-86 Hy-Gain balun.

d)-HD-73 Alliance heavy-duty rotor.

e)-100' RG-8 superflex coax.

f)- 100' rotor cable.

Regular 1400.00 value **1079.00!**



#2

a)-Tri-Ex W-51, 51' self-supporting tower w/5' mast.

b)-TH6DXX, Hy-Gains best Tri-bander.

c)- Hy-Gain BN-86 balun.

d)-CDE HAM III rotor.

e)-100' RG-8 superflex coax.

f)- 100' rotor cable.

IMPROVED CW FILTER FOR TS-820

Same price but improved characteristics as Kenwood filter which specs at 6db @ 500Hz and has shape factor of 3.27. This filter, manufactured exclusively for Ham Radio Outlet, specs at 6db @ 500Hz, 60db @ 1400Hz and has shape factor of 2.54.

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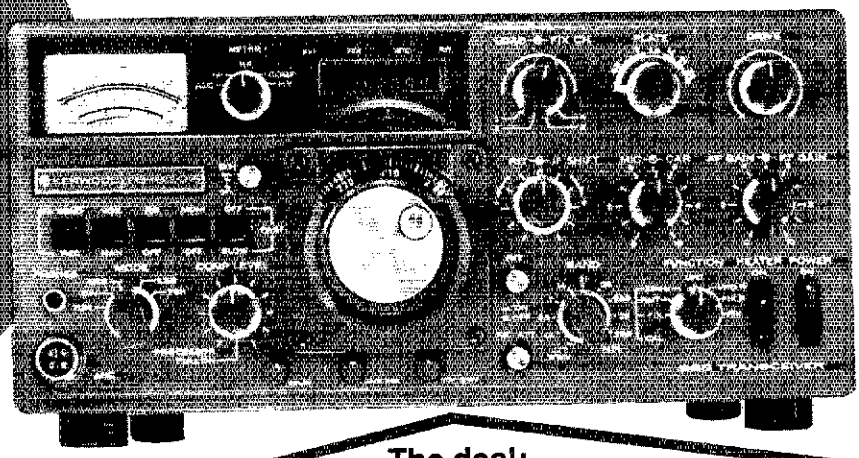

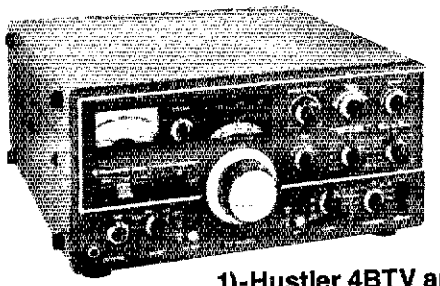

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2)-Hy-Gain 18AVT antenna (Reg. 97.00) **or . . .**
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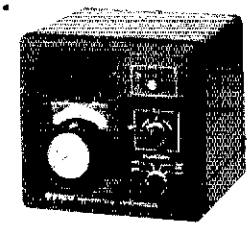

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Astron 12A, 12VDC/115VAC supply (Reg. 59.95)

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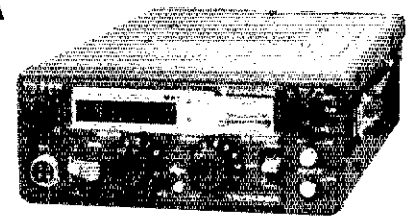

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Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤

CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Mgr.: VE6AFO. The Border Amateur Radio Club provided communications for the Foremost Mardi Gras recently. Our EC in Nanton recently reports what could have been a very dangerous situation when he discovered a high voltage line across a road near Claresholm. With the assistance of VE6CHM VE6CLG they manned a road block until the power company were able to rectify the problem. The Northern Alberta Radio Club station CG6A is active during the Commonwealth Games in Edmonton. Traffic: VE6BBL 17, VE6AFJ 6, VE6ABC 4, VE6CJT 4, VE6MJ 2.

MANITOBA: SCM, Peter Guenther, VE4PG — SEC: VE4TR. NMs: VE4JP VE4TE VE4GJ VE4VJ VE4ADS. All nets still operating despite poor band conditions, as well as other summer activity. The Winnipeg repeater VE4WPG is now on autopatch with a number of stations utilizing this new mode. VE4AP is the latest EC to be added to the growing roster. MEPN QNI 807, QTC 24, 31 sess. MMN QNI 385, QTC 11, 31 sess. WRIN QNI 70, QTC nil, 5 sess. MTN QNI 88, QTC 32, 17 sess. MSTN QNI 35, QTC 10, 12 sess. Traffic: VE4PG 74, VE4IZ 37, VE4JA 14, VE4CR 8, VE4LB 5, VE4QJ 5, VE4QU 4, VE4AED 3, VE4IM 3, VE4DS 2, VE4FK 2, VE4GB 2, VE4NM 2, VE4JP 1.

MARITIME-NEWFOUNDLAND: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: VO1FG. SEC: VE1DI. PAM: VO1JN. APN Mgr. VE1WF. Numerous visiting amateurs operating P/Mobile. VE1DD awarded Cert. of Merit for public relations. WB1DLE/VE1 & VE1YO hospitalized injured tourist. VE1AMC reports HARC FD score as 5810. Congrats. VE1AJZ & 18 amateurs provided comm. Highlands Rally. VE1BJF Adv. paraplegic operator sponsored by KARC. IRG ex. K1HHC, pres.; VE1WB, WA1JOW, vice-pres.; VE1DQ, treas.; VE1LW, secy. Large group of NB amateurs attended Rochester Conv. VE1FIX 6 Meter Beacon St. John, NB on 50.088 MHz. VO1CM new Asst. Director for Nfld.-Labrador. VO1KM awarded Cert. of merit FB job QSL Mgr. VO1OA and VO1OF new ECs Corner Brook, Nfld. APN sess. 31, QNI 79, QTC 75/64. Traffic: VE1ASW 94, VE1WF 70, VE1ST 42, VE1RO/LCR 41, VE1AMR 25, VE1HJ 11, VE1ABG 6.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: VE3GOL. In consultationn with Section Net Managers at a meeting in Thornhill, the following course of action was adopted for Ontario's Section Nets, in order to provide formal training to up-grade and prepare more operators for Region and Area level net operation and, at the same time, create and promote an interest for new comers to traffic handling, training sessions will be conducted on Section nets, after closure, several evenings a week. These sessions will commence in mid-Oct. A specially prepared traffic instruction manual will be available from your SCM, A/SCM and MNs to assist those who are keenly interested in participating and learning basic traffic handling procedures and net "savvy" used by experienced operators. Please contact these officials via the NTS, on the air, or through the mail for a copy. It is hoped that this avenue will increase the number of qualified traffic handlers in our Section. The following are traffic nets in our Section:

Net	Freq.	Time/Day	Mgr.
ODN	3.645	2000 Dy	VE3GJG
GBSSN	3.645	2215 Dy	VE3DPO
GBN*	3.645	2230/0200 Dy	VE3DPO
OLN	46/.06	2230 Dy	VE3GFN
LN*	3.755	2245 Dy	VE3FGT
CMN	46/.06	2250 Dy	VE3AJN
OPN*	3.770	2300 Dy	VE3EWD
OSN*	3.667	2300 Dy	VE3ISW

*Denotes Section net, all times in UTC and subject to change in the fall with standard time. Your participation in these nets will be both welcome and encouraged. Traffic: (July) VE3GOL/3 198, VE3JIR 159, VE3SB 158, VE3HGJ 128, VE3KK 126, VE3ISW 125, VE3GT 84, VE3DPO 80, VE3IMR 80, VE3GJG 72, VE3GNW 57, VE3EWD 52, VE3DVE 46, VE3AWE 41, VE3GYD 29, VE3ATR 27, VE3FZG 27, VE3FHZ 26, VE3JRT/3 23, VE3IFP 16, VE3EHL 12, VE3HCS 11. (June) VE3IMR 16, VE3FHO 6.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — VE5BO has moved to Creighton where he is now using his former skills in Electronics, all the best Barry. Since the Sask Power Corp have unloaded most of their old 32 MHz gear to the ham clubs we shall probably see some six meter operation which has been unheard of in these parts. Anyone wishing one of the rigs give me a call. Traffic: VE5AE 98, VE5WM 34, VE5HG 31, VE5OL 18, VE5ABN 16, VE5QY 16, VE5ABK 11, VE5NJ 6, VE5RP 6, VE5BO 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STMs: W3QQ W3WD. July PSHR K3JL 46, W3PQ 44. Delaware Amateurs upgrading include WB3KDN to Extra; WA3HDS WA3TNP and WA3UHV to Advanced. New appointment N3ND to OTS. ND also just received his 35 wpm CW ARRL Proficiency Award and a 100 ft. longwire in his apartment has him on 80/75 meters. New Castle Co. Amateurs are going to miss the leadership and help of K3JL as he moves to Georgetown, but Sussex Co. will gain from our loss. Del. Nets came through 59 while I was mobile in Western and Central PA. DTN QNI 301, QTC 63. DEPN QNI 30, QTC 4. Traffic: W3PQ 212, WB3KPX 63, N3ND 44, W3QQ 39, W3DKX 31, K3JL 24, WB3DUG 18, W3WD 17, WA3WIY 15, WB3FUP 9.

EASTERN PENNSYLVANIA: SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3KW K3NGN W3VA W3IAZ. Net rpts.: PFN QNI 342, QTC 669; EPA QNI 609, QTC 269; PTTN QNI 318, QTC 124; EPAEP&TN QNI 377, QTC 136; AREC (2) QNI 16. OO reports: W3NNC WA3RPG K3NSN W3KEK OBS reports: W3VA W3ID W3CL WA3YJZ WA3CPZ K3NSN WA3RPG K3EBZ. OVS reports: W3GOA WA3BJQ W3CL WB3CTU. BPL: W3CUL W3VR K3NSN WA3WOP WA3ZRY WA3ATQ. PSHR: K3NGN W3BI WB3JGP W3DP WA3YJZ WA3RPG. W3CUL says band condx been punk! W3VR adding house remodeling to his chores. WA3WQP thankful band condx are improving. WA3ATQ reports its now fall in Poconos! NCSs are reminded to get their reports in to NMs on time. New keyer is training W3VA! WB3GRV has to wait two years for his drivers license before he can go mobile! North Schuylkill HS is KA3ANJ. WA3RPG ham op at summer camp introduced many boys to ham radio. Anyone going to Alaska make a sked with WA3YJZ he needs it for WAS! Would you believe the Pack Rats are already planning for next Jan. VHF contest. W3WRE getting out better on audio freq than RF! W3GMK tuned in on 2 meters for first time and almost fainted at the activity! W3WRE found 4 new rare keys to add to her collection. K3QQ made WAS QRP 3 watts! PTTN welcomes WB3GZV. Don't forget you ORSs are now OTSs and the RMs are NMs. Pretty soon the club papers will be as good as QST! W3EU reports the ant rope broke (again?). The other day I asked a new ham if he wanted to swap QSLs. He said whats that? Have things changed that much? Traffic: (July) W3CUL 3542, W3VR 1015, K3NSN 880, WA3WQP 678, WA3ZRY 595, WA3ATQ 412, K3KW 410, K3NGN 279, WA3THT 240, W3FAF 134, W3BI 133, W3IPX 124, WB3JGP 109, K3YL 85, W3VA 79, W3DP 72, WB3BKV 44, WB3CPZ 29, WB3GRV 29, AA3B 28, WA3RPG 22, N3GP 18, WA3YJZ 18, W3ID 16, WA3YDC 14, N3CD 13, K3NB 10, W3CL 9, WA3YOE 8, K3EBZ 7, WB3HPV 6, W3HK 4, W3KEK 4, WA3BJQ 3, W3PYY 2, N3AI 1, W3EU 1, W3GMK 1, W3GOA 1, WA3VDQ 1 W3WRE 1. (June) K3YL 71, W3WRE 1.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Welcome to new club affiliates, the Carroll County ARC, and the Green Mountain Repeater Assn. Thanks to you clubs and individuals for taking care of prospective hams referred to you. The Mt. ARC manned a station at the Cumberland Fair. WA3EOP and K3TNM showed real activity a new daughter and son respectively. Moms and kids okay. OO reports from W3MR and WA3RSK. W3HJH opines it goes out from St Marys but not in! WB3FIX/3 is filling the voids around Annapolis. W3ZNW is looking for 2 mtr RTTY activity. W3MSN covers 1.8 through 450 MHz. N3IT sez not much this hot July. N3RL had a ball in ME completing WAS for many others. WB3CGG among the 100 at the MARC picnic. K3IS may become a gymnast. W3WBY finds a few openings on 2 and 6 and lots on 15 mtrs. W3EOV ordered a new transceiver. W3CDQ helped compile the FD logs for Rock Creek. Congrats to WA3HEK a new General, and to K3ON's XYL KA3AZS a new ham. Rumor WB3AOB is about to become N3ST. WA3EHK says vacations do not make big traffic totals. WB3CES makes deliveries on 2 meters. K3CRW missed PSHR by 1 CW point. W3FZV was impressed by ARRL HQ and W1AW. AA3S used to be WA3PRW. W3BHE W3DFW and W3OYY report from the Cumberland area. N3QA is stymied by summer chores. With the nets. Mgr/Net Sessions/Tfc/QNI avg. W3OYY/MDC PON 4/12/21 5. AA3S/MEPN 21/75/20 9. On the others list W3ADQ W3HWZ and K3RIJ. W3DFW/WR PON 17/22/16.3 K3ORW/MDCTN 18/46/15.4. Top honors to WA3ZRY K3ORW, W3FA and WB3CES. Tnx to early reports permits W3FA to visit W6-Land. Traffic: W3FA 110, K3IS 50, N3QA 45, AA3S 26, K3ORW 24, W3FZV 22, W3EOV 20, WB5FIX/3 13, N3IT 10, WB3CES 8, WA3EHK 8, WB3CGG 7, N3RL 6, W3HJH 4, W3WBY 4, W3ZNW 2.

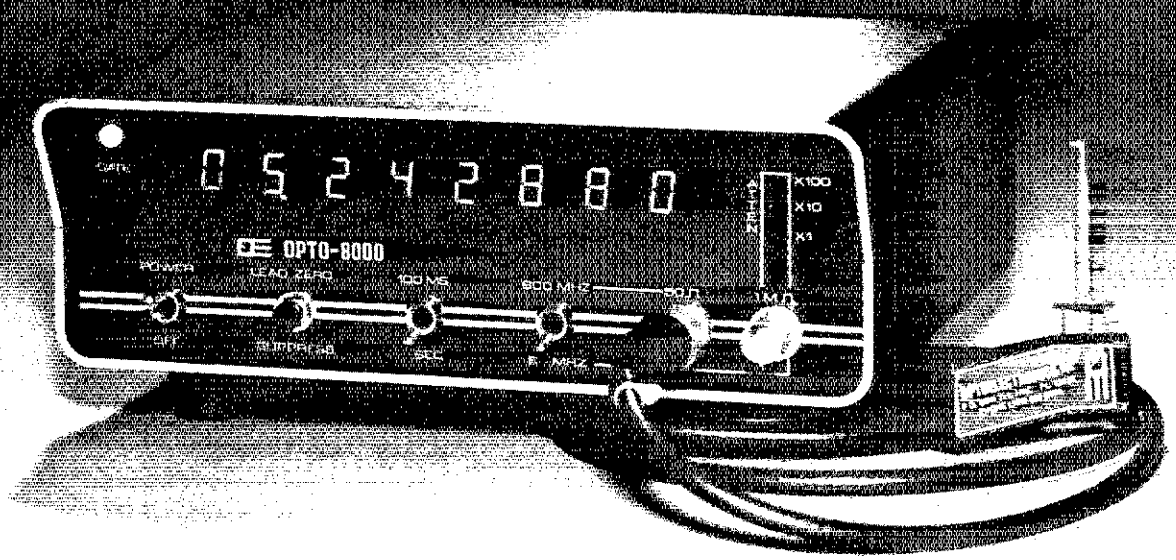
SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — Red Cross sponsored a cancer fund raising 60 mile Bike-A-Thon between Phila and Atlantic City. 300 bikes entered the race aided by 2mtr mobile hams WA2s USI IZB LUB; WB2s VVJ VEE GEK JMK OCR RRJ TDI SOI LNR FJE; K2JF. Old W2CGB plans to be relicensed. W2FWX nw K2TV. W2JI enjoyed the NJN picnic. K2RXB nw Advanced. K2BR ready for Miss America Contest. WB2PKG sponsors 450 MH rig. N2UT moves to Mexico. W3ZLP/2 has 30 wpm certificate. WJRA's WB2LCC sez 4 TX. 1128 contacts on FD. WA2TRJ sez WA2s TRJ DQK VVJ. N2ME, WB2KKS WB2JMU invaded CB Jamboree at Willingvoro and gave Ham Radio Demo. New ticket KA2BBW. New Tech KA2BQF. K2QIN Silent Key. W2IL licensed since 1912 Silent Key. Delaware Valley RA to sponsor new Novice code-theory and General class at the Hopewell Valley Adult School. KA2BEW 11 years old. WA2NBM has 156 countries. SIRA to sponsor new fall classes. W2AWW wkd W1AWW. K2NE has new job. WA2RSQ new rig. WB2SBJ remembers TX repair. NJN — W2XD, early 31 sess., 467 QNI, 205 QTC, 616 Mins. late 31 sess., 285 QNI, 160 QTC, 607 Mins. NJPN — WB2LCC, eve. 31 sess., 579 QNI, 244 QTC, 608 Mins., Su. 4 sess., 71 QNI, 188 QTC 86. Mins. Traffic: AA2H 226, WB2LCC 42, W2JI 13, WA3YGZ/2 10. N2SC 6, W2YU 6.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YA — RaRa had a nice Amateur Radio demonstration at the Monroe County Fair and signed up many for their fall licensing classes. K2RI, coordinated the demo. W2RUF was selected to receive the WB2VEJ memorial award. Congratulations! W2AET has his Oscar station going. K2DUR is putting a new Oswego County repeater on 147.75/147.15. It's primary purpose will be Civil Defense work but it will be an open repeater for general use. WB2ELB wonders if he is the youngest OVS at age 17? WA2ZJP has a new QTH on a hilltop in Harpursville. The Antique Wireless Assn. will hold its National Conference at the Sheraton Inn in Canandaigua on Sept. 28, 29, 30 and Oct. 1. Details from D. Deeley, 8 Briar Circle, Rochester, NY 14618. This is my last column as SCM. Would again like to thank all for their interest and support and wish new SCM WA2AOG luck and success. Traffic: (July) W2OE 275, WA2ELD 242, WA2HSB 240, W2MTA 162, W2RUF 93, K2GWN 68, W2PZL 62, W2FR 52, WA2MFV 33, W2TZ 27, WB2WCE 27, WA2ZJP 26, WA2AIV 11, W2AET 4, WB2ELB 4, WA2UAR 4, WA2DRC 1. (June) WA2HSB 215, K2GWN 106, W2MTA 85, W2RUF 78, W2FR 48, W2PZL 47, WB2FXG 40, W2ROF 37, WB2WCE 26, KN2MDQ 24, WA2ZJP 22, WA2ELD 20, W2ZOJ 18, WA2UAR 17, K2VR 14, WB2KQS 12, WB2FPI 6, WA2AIV 4.

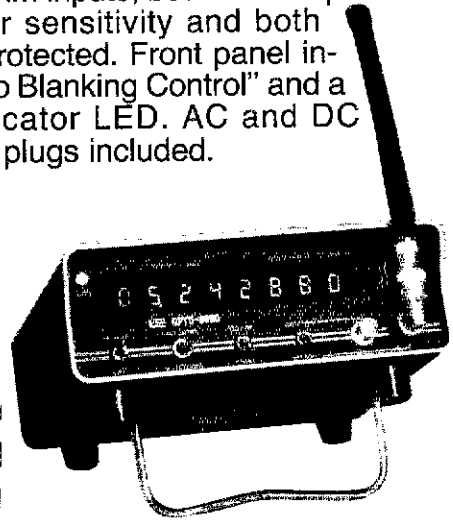
WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — SEC: W3VUP. Asst. SEC: WA3LJW. NMs:

600 MHZ. FREQUENCY COUNTER
±0.1 PPM TCXO

OPTO-8000.1



This new instrument has taken a giant step in front of the multitude of counters now available. The Opto-8000.1 boasts a combination of features and specifications not found in units costing several times its price. Accuracy of ±0.1 PPM or better — *Guaranteed* — with a factory-adjusted, sealed TCXO (Temperature Compensated Xtal Oscillator). **Even kits require no adjustment for guaranteed accuracy!** Built-in, selectable-step attenuator, rugged and attractive, black anodized aluminum case (.090" thick aluminum) with tilt bail. 50 Ohm and 1 Megohm inputs, both with amplifier circuits for super sensitivity and both diode/overload protected. Front panel includes "Lead Zero Blanking Control" and a gate period indicator LED. AC and DC power cords with plugs included.



SPECIFICATIONS:
Time Base—TCXO ±0.1 PPM GUARANTEED!
Frequency Range—10 Hz to 600 MHz
Resolution—1 Hz to 60 MHz; 10 Hz to 600 MHz
Decimal Point—Automatic
All IC's socketed (kits and factory-wired)
Display—8 digit LED
Gate Times—1 second and 1/10 second
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Approximate Size—3"h x 7½"w x 6½"d
Approximate Weight—2½ pounds
Cabinet—black anodized aluminum (.090" thickness)
Input Power—9-15 VDC, 115 VAC 50/60 Hz
or internal batteries

OPTO-8000.1 Factory Wired	**$299.95**
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FC-50 — Opto-8000 Conversion Kits:
Owners of FC-50 counters with #PSL-650 Prescaler can use this kit to convert their units to the Opto-8000 style case, including most of the features.

FC-50 — Opto-8000	**Kit $59.95**
*FC-50 — Opto-8000F	**Factory Update $99.95**
FC-50 — Opto-8000.1 (w/TCXO)	**Kit $109.95**
*FC-50 — Opto-8000.1F	**Factory Update $149.95**

*Units returned for factory update must be completely assembled and operational

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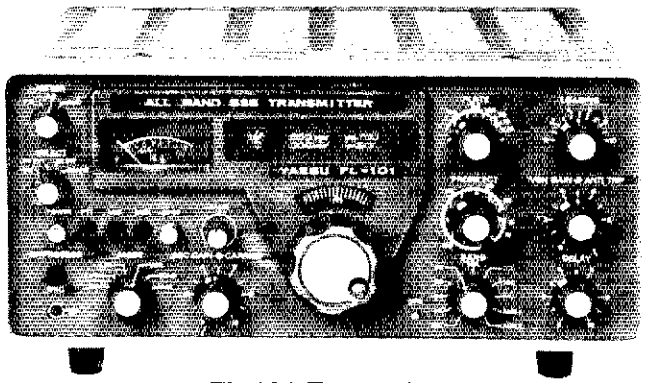
YAESU Deluxe "101" Series
The Ultimate Station Combination



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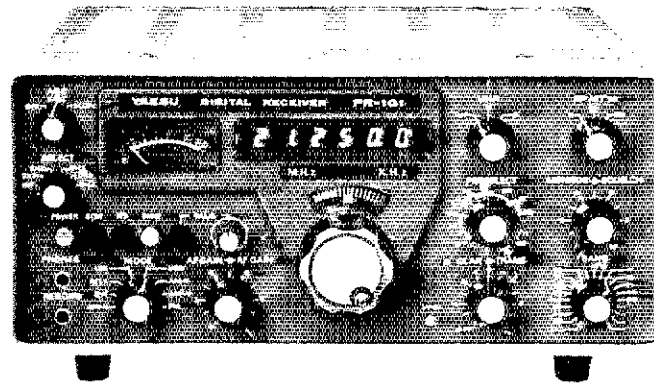
■ 160 thru 10 Meter coverage with two auxiliary bands ■ All mode operation: SSB, CW, AM, and FSK ■ 240 Watts PEP ■ Reliable, plug-in circuit boards ■ Built-in AC supply ■ Built-in, fully adjustable VOX ■ Automatic break-in CW operation with sidetone ■ Indicator light for internal VFO operation ■ Provision for optional RF speech processor ■ Built-in final cooling fan



FR-101 Digital Readout Receiver

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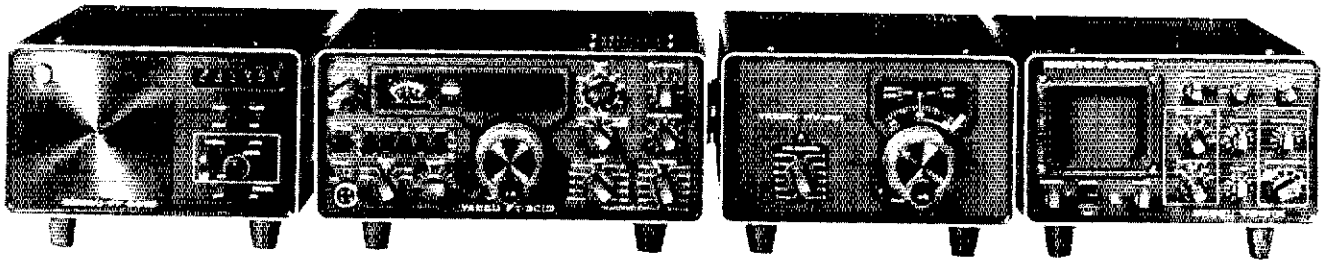

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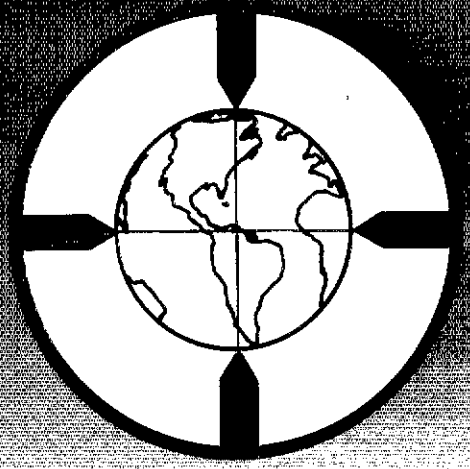

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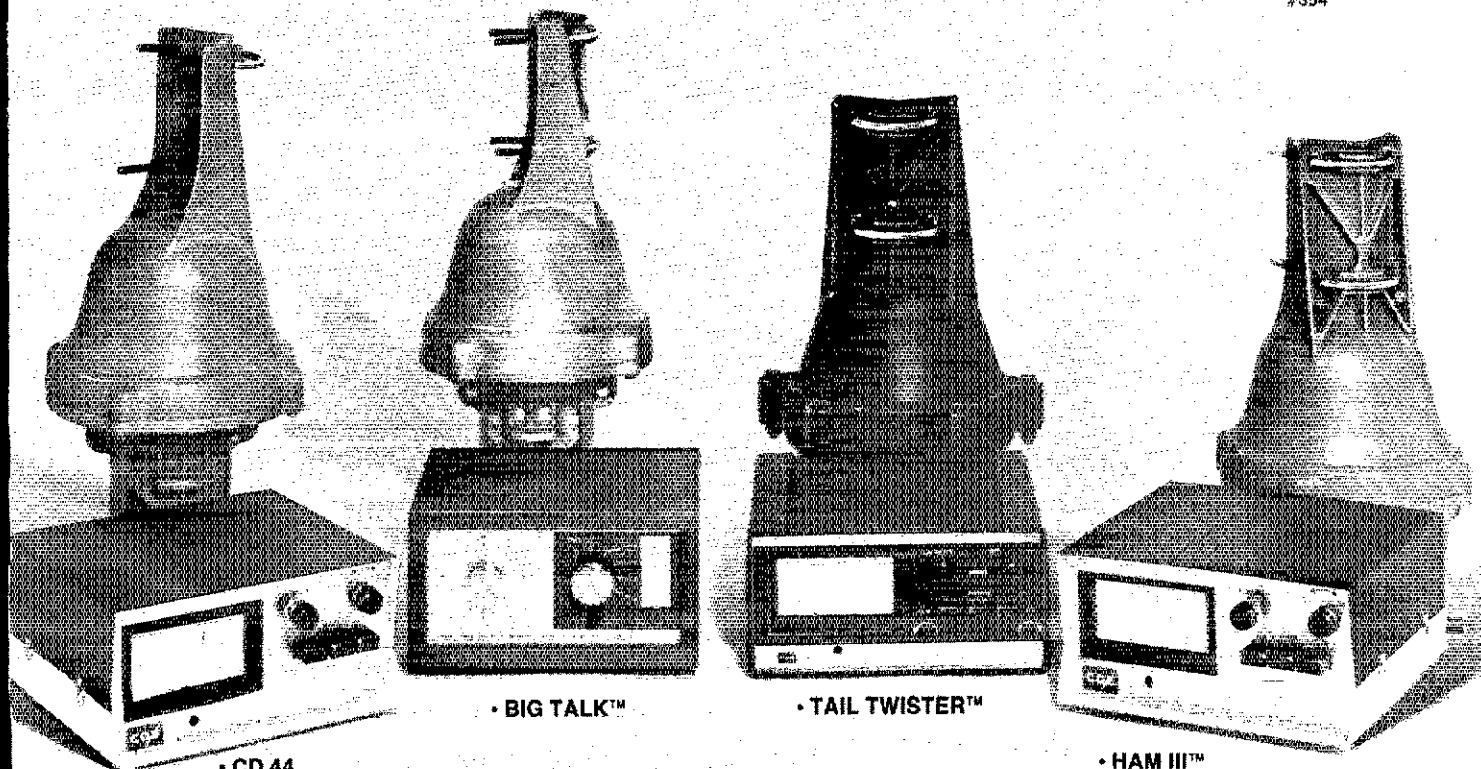

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W3YQ K3LL W3NEM W3KUN and W3MML.

Net	kHz	Time/Day
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
PA Traffic & Training	3810.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

New appointments: W3YQ NM WPA CW Net, K3LL NM WPAPTN, W3MML NM WPA two meter Net (Pgh area) N4DR/3 and W3SMV as OTS. Upgrading, WA3YEQ now AC3N and K3KAP now AB3X, to Extra. N3AEP KA3BBD new Tech's, KA3AZR and KA3BCM new Novices. Congratulations and good luck to all of the above. Get well wishes to WA3MWH and WB3FXP. W3LFQ is critically ill at this time and all of our thoughts are with him. K3AN is a Silent Key, our condolences to his family. WA3ENU and XYL WA3ZXP have moved to New Hampshire to new positions there. W3IBW and XYL WB3ATC have moved to Albuquerque, NM. to a new work location. The Breezeshooters new officers for 1978-79 term are WA3LUM, pres.; N3MB, checker; W3ZCO, treas.; WA3PHY K3GP WA3EQU WB3JGQ and W3GVI dir. I would like to have monthly reports from all section appointees in order to know who is active and who is not. The WPA CW Net had 31 sess., QNI 390, QTC 168. WPAPTN 31 sess., QNI 351, QTC 84. The WPA Two Mtr net had 31 sess., QNI 557, QTC 79. PSHR: W3YQ 56, K3HI 50, WB3PAV/3 47, N3EE 40, WB3DKT 40, WB3EML 32,, WB3HGL 21, W3SMV 10. WA3YEQ (June)53. Traffic: (July) W3EGJ 123, N3FM 121, K3HI 102, WB3HGL 80, W3SMV 72, W3YQ 64, WB3DKT 48, WB8PAV/3 44, WB3EML 39, WA3UNT 39, K3SMB 34, N3EE 26, K3LL 24, N3WS 24, WA3ONT 22, W3UT 18, W3SN 17, W3KUN 17, K3HCT 17, W3RUL 16, AC3N 14, W3ATO 13, N4DR/3 8, AB3X 4, K3UA 2. (June) AC3N/WA3YEQ 49.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

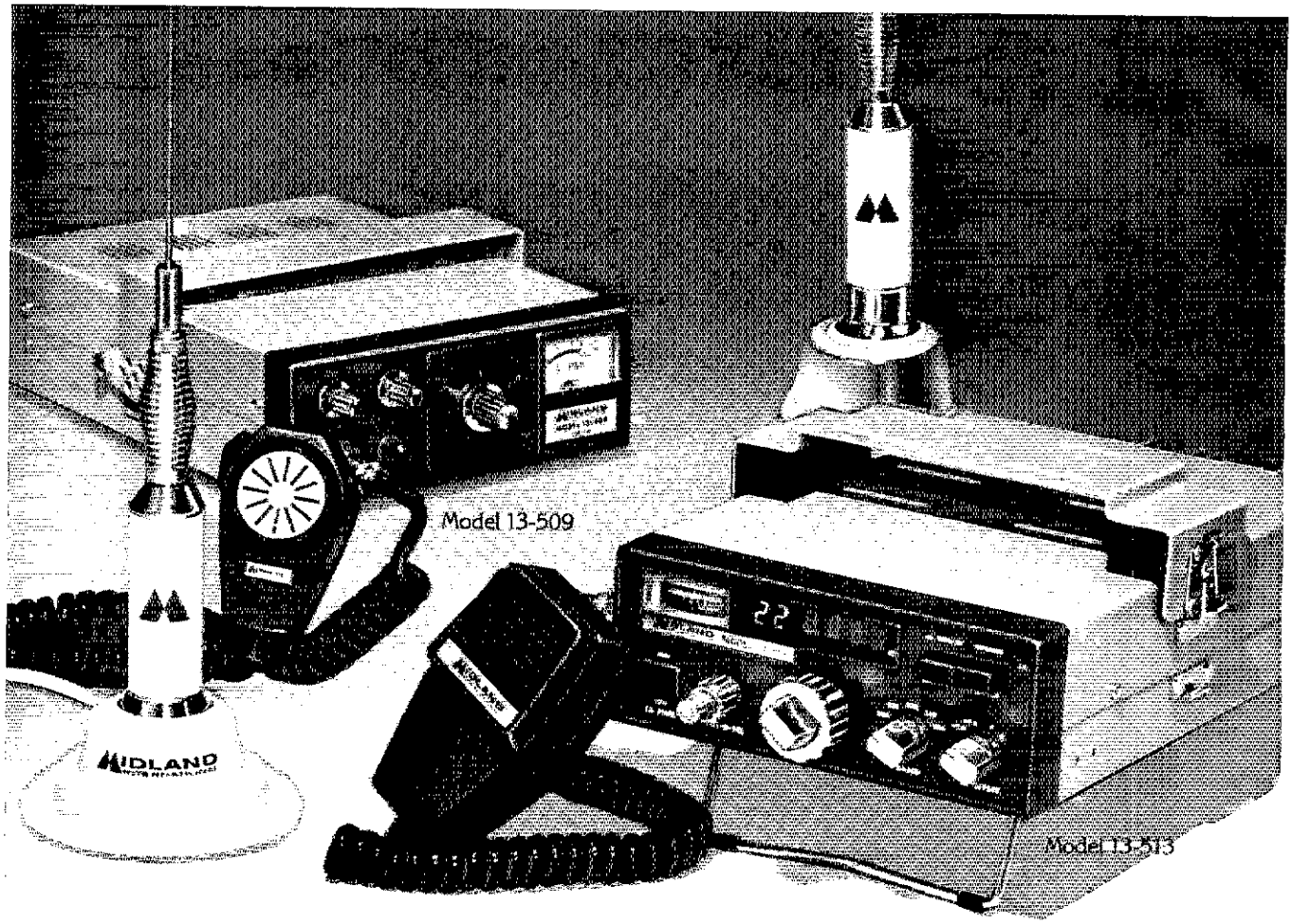
Net	Freq.	Times(Z)/Days	Tfc	Sess.
ILN	3690	2330/0300 Dy	250	62
Ill Phone	3915	2245 Dy	no	report
NCPN	3915	1200/1700 M-S	176	52
IEN	3940	1400 Su	No	report

The W9VEY memorial station had a traffic count of 8 for the month. WD9GGY upgraded to General with the help of his father, WD9BAK. N9TN's XYL, WB9QDX passed her General. WB9NEH's new call is AB9M. WR9AKL now W9GDF/R. New call in the Galesburg area is KA9BER. WD9DAZ and WD9HQV have recently upgraded. W9FL recovering from heart surgery. The Rockford Amateur Radio Assn. provided communications for the July 4th Marathon and got good press coverage. WA9VLK has been promoted to Senior Pilot at Aviation Training Enterprises at Midway Airport, Chicago. Other ATE pilot hams there are WA9WMP WA9EKV. W9HOT reports the Ninth region Daytime Net had 122 message count during 62 sessions. Ill. participation was 94 percent with Ill. stations W9JIJ W9NXG and W9HOT checking in. The Wheaton Community Amateurs helpd with the Wheaton (Ill.) 4th of July parade. WA4WME will present a slide presentation of the Clipperton Island DXpedition at the Sangamon Valley Radio Club Hamfest. WB9WUR and his XYL WB9WUQ were recently reassigned to Washington, DC. New Novice heard was KA9BPP. Now is the time to make preparations for your club's Fall and Winter code and theory classes. Please drop a line to League hqtrs. and inform of the time and place of the classes. WA9YFA and XYL WD9HBV's code class graduates were KA9BDM, (OM) KA9BDQ, (XYL) and KA9BDN (10 year old YL). K9EUI spent several days in Maine and his gang back home kept in touch with him, many contacts. The annual ILN meeting will be held at the Peoria Hamfest. WA9GOB & XYL have a new baby daughter, Ashlee. Plans are under way for a new Amateur Radio organization for McHenry Co. Please contact K9XI for more information. Many an eyeball QSO was held at the annual Breakfast Club weekend at Terry park on July 15 and 16. Weather was perfect reports K9TFB. Former director Phil Haller, W9HPG is now an Extra Class. WD9FUM a Tech. WB9TZE passed his General. WB9WDN has a new antenna array tribander, 6-meter vagi and a two-meter FM yagi, 108 ft in height. WB9WDN WB9YXL and WA9VIR helped in the installation of the self-supporting tower. Ex-N9ACW/N9ACW/CG now KB9BY. The Sterling-Rock Falls ARC are sporting new jackets. W5KLV reports that the CAND for July had 410 messages in 62 sess. and the 9RND representation was 95.2 percent. W9JIJ the only BPL recipient for this month. Traffic: W9JIJ 554, W9NXG 290, WA9KFK 153, K9PNG 133, W9OK 121, W9KR 119, WD9DMV 114, N9TN 106, WB9JSR 75. WB9ZED 69, K9BVE 66, W9HOT 61, K9EEA 43, N9DR 42, WA9AQN 41, W9ORS 33, W9HBI 28, W9PRN 28, W9LNQ 26, W9OYL 20, K9SW 16, WA9VLK 8.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. NMs: K9CGS (ITN), W9JUJ (QIN) W9PMT (VHF), WB9YXN (ICN). Net times are UTC and freq. in kHz.

Net	Freq.	Time/Day	QNI	QTC	Sess.
ITN	3910	1330/2130/2300 Dy	3182	314	91
IPON	3910	1300 Su	120	2	5
QIN	3656	0000/0300 Dy	715	339	62
ICN	3737	2315 Dy	124	22	30

K9CGS has been appointed new net mgr. for ITN. Please support him in this endeavor. W9VP has been appointed EC for Carroll Co. W9UMH has been appointed EC for Marion Co. WB9YXN has taken over as mgr. of ICN. Purdue ARC officers 78-79: WD9ERI, pres.; WB9PUM, vice-pres.; WB9VXY, secy.; WB9UKM, treas. IRCC meeting is Oct. 1 at the Red Cross building in Indianapolis. Spring Mill/Bedford Hamfest is Sun. Oct. 8. The state RACES net now meets on 3910 kHz each Wed. at 7:10 PM. Indiana State Police have a new program called INCERT which is designed to coordinate the services of all the various volunteer groups during emergencies. This program developed as a result of the work done by Amateurs, CBers, 4 Wheel drive clubs and others in the Blizzard of 78. INCERT or Indiana Council of Emergency Response Teams is designed to work with existing clubs and organizations to coordinate efforts between them and help expand their work into new areas. Amateur contact will be through the EC or existing local clubs. I feel it is a good program and encourage your participation. W9YJG became a Silent Key on July 21, 1978. Hoosier VHF Net report for June QNI 395, QTC 1. Traffic: (July) W9JIJ 520, W9FC 341, W9EI 107, W9ZW 58, WD9GXW 57, WA9QCF 57, K9FZX 51, W9IOH 50, W9QLW 50, WB9UYU 40, W9DZC 36, W9DLF 35, K9FG 27, K9TKE 26, W9DKP 20, W9RTH 20, W9HUF 16, WD9EWM 14, K9CGS 12, K9HI 10, W9UEM 10, W9XD 10, WA9IJS 7, W9BDP 5. (June) W9TG 81, WD9ELU 26,



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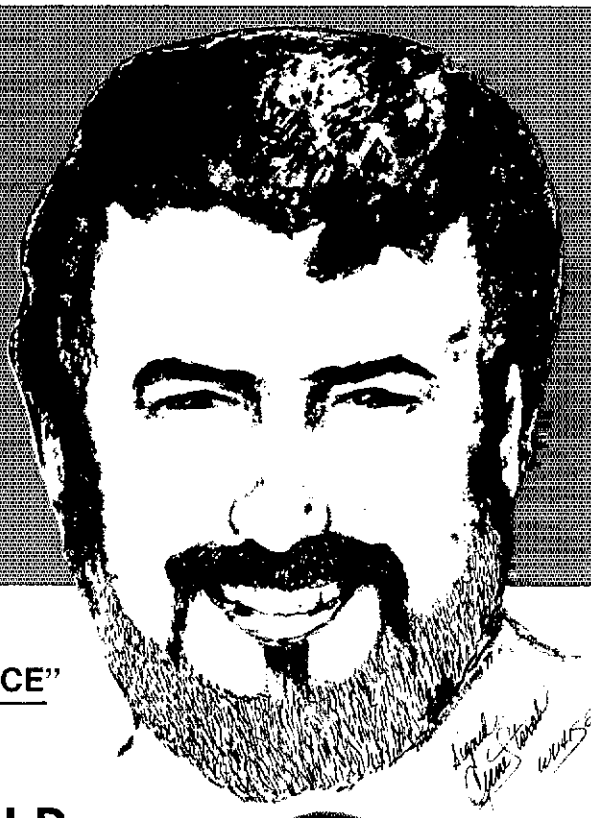

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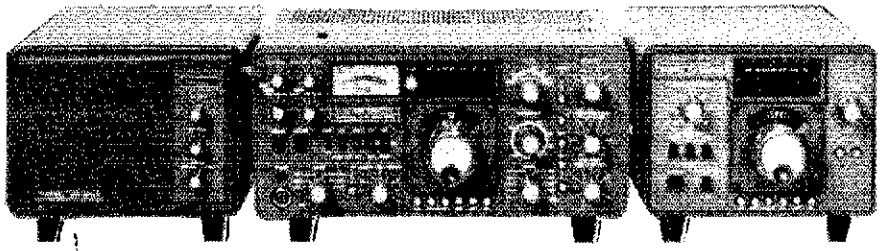

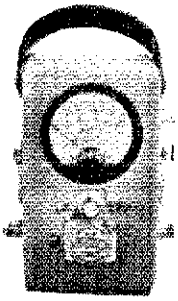

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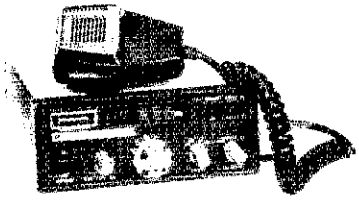

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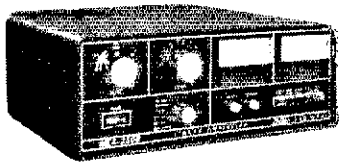

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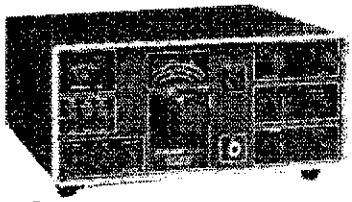

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W9PMT 26, WA9TJS 15, K9EQT 14, WB9ANV 9, AA9S 9.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FZC. NMs: W9AYK K9UTQ W9IEM WB9ICH K9KSA WB9KPX K9LGU K9EN. Nets, Freq., Time, QNI, QTC, Mgr.: BWN, 3985, 1145Z M-Sa, 720, 613, W9AYK. BEN, 3985, 1700Z Dy, 767, 131, W9IEM. WSBN, 3985, 2230Z Dy, 1073, 213, K9UTQ. WNN, 3725, 2215Z Dy, 29, 2, WB9ICH. WSSN, 3662, Summer Vac., K9KSA. WIN-E, 3662, 0000Z Dy, 34, 106, WB9KPX. WIN-L, 3662, 0300Z Dy, 216, 73, K9LGU. WRN, 3662, 0030Z S, K9EN. Wi ExPO, 3925, 1701Z M-F, 507, 30, WA9NIX. W9ULK has TR 7400A. OTS to W9VBQ. WSBN certificate to WA9KMB WD9DTT. The following of BWN were in attendance at WB9YPY and WB9YPZ QTH in Rhinelander Sun, July 23, K9FHI KA9BAC WB9ULB WB9WUN W9YZS W9IHW W9YYL K9JPS W9MUI WB9TQC WB9TOD W9IWM W9RHT WA9LLY K9BLT W9SOJ W9OAX W9NME W9ZGQ WB9SMO W9ZBD K9VSY K9AQ W9ZZZ WB9SKM WB9NON. WNA picnic was a big success, thanks to all who came and special thanks to the Oshkosh ARC. WB9TFJ now General. The .04 .64 repeater in Wausau was taken over by WVARC. Win-L certificates to W9YCV K9UU N9XX WB9ULC W9MTL W9DM W9ZGQ made BPL. K9EYA now Extra Class. Don't forget the ARES conference Oct. 14 at the Mead INN in Wisconsin Rapids. Traffic: (July) W9ZGQ 812, W9IEM 240, W9CXY 151, WD9COC 129, W9DND 108, WB9KPX 83, K9FHI 75, K9LGU 75, W9SFL 66, WD9EAQ 55, W9IHW 53, W9FDY 42, WB9YPY 42, W9AYK 37, WB9RRU 36, N9JW 36, WB9ICH 35, K9UTO 32, K9AKG 30, WA9LWJ 30, W9SOJ 29, WB9BRE 25, WB9MPF 23, K9ANV 22, WB9ZRE 22, K9JPS 18, WD9ATX 17, W9UW 17, N9CP 15, K9CPM 13, WD9AJA 11, WB9YPZ 8, WA9DOT 4, W9UT 4, K9EYA 2. (June) K9ASC 2.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WØSA. Minn. Nets.

Net	Freq.	Time/Day	QNI	QTC	Manager
MSN 1	3685	6:30 P	259	112	NØHY
MSN 2	3885	10:00 P	92	34	KØPIZ
MSPN N	3945	12:05 P			WBØJYT
MSPN E -	3929	5:45 P	609	189	WØDUW
PAW	3925	9-12/1-5	2948	298	WAØYVT
MSSN	3710	5:15 P	240	50	WBØZAL

Congratulations and best wishes to the new calls and upgrades: Novices KAØAJD KAØAJE KAØAJF. General to Advanced: WDØABD WBØYNW WBØROJ WDØOYY. Advanced to Extra: WBØQOB and Tech to General WDØCBH. New calls WDØABD is now KBØBI, WBØROL is now ACØP and WBØQOB is now KØEL. Thanks to all who have applied for EC appointments. We still have some counties that are in need of an EC. We need you help. Would appreciate hearing from all Emergency Net. mgrs. with any and all information that they may have. On behalf of the MN SCM and SEC we would like to extend our sincere thanks to everyone who helped in so many ways during the numerous storms and floods which hit MN in July. Traffic: WBØHOX 450, WBØZAL 340, WBØQUE 243, KØZBK 200, WAØTFC 165, WAØYVT 150, WBØONK 96, WØQIT 87, KØPIZ 80, KØBK 54, NØHY 50, WØRIQ 50, WØHKF 49, WØRQJ 42, WDØFGA 37, NØZO 35, WØHZU 31, WBØSYT 31, WBØNZB 30, KØZBI 27, K6EA/Ø 22, KØJCW 18, WDØFSL 16, WØOPX 15, NØJP 8, WBØUKI 6, WØUMX 3, WBØZBJ 2.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB. SEC/RM: WAØTNM. Net Mgrs are WØHOJ WØMZI KØTVJ WAØVRE WAØUEN. Congrats to: WAØDEM Extra Cl; KØAS and WAØTNM on CW Speed, accurate copy at the S. D. annual contest; Novice KAØBBU; WBØZEB who placed 1st in CD party; KØJV received DXCC mixed and Phone certificates. TNM made PSHR with 49 pts. Hot Springs ARC will start classes in newly constructed Clubhouse, contact WØHOJ. Partial list of QCWA via WØIG are WØs CLS OEK GFS MUU RWE TRZ WLQ YMU ZRY and KØMOA. If you qualify contact WØOEL. All SD ARC officers: How about publicity for your club? Nets: SDN 26 sess.; QTC 36, QNS 56; NJO 31 sess.; QTC 48, QNS 639; EVE 31 sess.; QTC 62, QNS 962; MNG 26 sess.; QTC 38, QNS 288. Traffic: (July) WAØVRE 184, WAØTNM 131, WØHOJ 99, WØDVB 73, KØFRE 58, WAØAR7 48, WØKJZ 30, WBØEVQ 12, WØIG 6, NØABE 4. (June) WAØVRE 126.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. NMs: K5MEA W5MYZ W5POH WA5ZWZ. Nets, kHz, Time/Day, QNI, QTC, Mgr.: OZK, 3760, 0000/Dy, 143, 18, W5MYZ. APN, 3937, 1100/M-S, 802, 42, W5POH. M-Bird, 3928, 2130/M-F, 472, 17, WA5ZWZ. ARN, 3995, 2330/Dy, 718, 76, K5MEA. WB5PSD now Extra with AC5W. W5KL has new TS520S & 740DA. WB5DYH new self supporting tower. WD5IZO new YL with TS88. WD5-JDL reports ICWN on 21.120 MHz at 0100 GMT. All RM & PAM have been cancelled and new NM cert issued to K5MEA WbMYZ W5POH WA5ZWZ. All ORS & OPS have been cancelled and new OTS cert issued to W5RFD WB5BLF W6DRW W5EIJ WB5GQH WB5GZR WA5HNN W5KL W5MYZ K5RO W5UAU WA5VDH. New OTS to K5MEA W5MYZ W5POH WA5ZWZ. If you haven't received a new OTS cert or would like appt. as OTS make your request known thru your NM and he will send it to me. PSHR: W5POH 39, WA5HNN 25. Traffic: K5MEA 52, W5UAU 26, W5POH 22, W5KL 4, WB5GQH 1.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM: K5DPG. SEC: WB5IYH. Net Mgrs.: N5TS N5ES N5RB N5IB. WB5IQE advises that the MTA ARC of New Orleans is active in emergency communications with Civil Defense. WB5THZ active on CAND. K5BLV WB5CDX WA5TQA WB5LBR and K5TL all active on DRN5. W5VII became a Silent Key on July 10th. Our deepest sympathy to his family. Congrats to WD5KBA on public service activity. WD5DUD now full member of the DDXA. WB5LBR winner of Traffic Award for 1977. FB! Kenner ARC conducted FD out of a van visiting other clubs in the area. Those wishing to help with the National ARRL Convention in Baton Rouge next year should contact Bill Mixon, K5SVD, at P. O. Box 891, Baton Rouge LA 70821. W5VYP and WB5ZNC now Extra Class, WD5EUJ WB5FZT N5AFN and WD5FQG General Class. WB5IKT still recovering from knee operation. K5SL working on drilling rig during summer. K5OB and WB5KFY won outstanding Amateur Awards at Shreveport ARC Hamfest. K5DPG appointed General Hamfest Chmn. for Lafayette ARC for 1979.

Net	Freq.	Time/PM/Days	QNI	QTC	Mgr.
LAN	3615	7&10 Dy	400	205	N5TS
LTN	3910	6:30 Dy	544	91	N5ES
LSN	3703	7:30 M-F	59	12	N5IB
LRN	3587.5	6:30 Su-W	?	10	N5RB

Traffic: (July) W5GHP 212, WA5IQU 181, N5YL 166, N5ES

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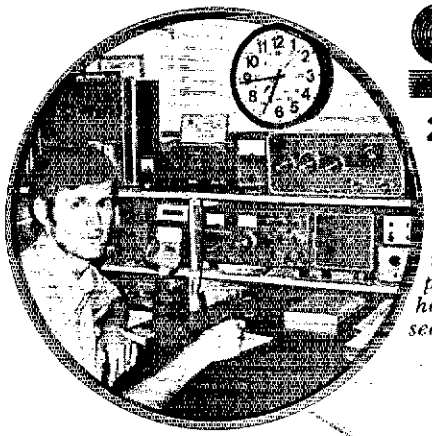

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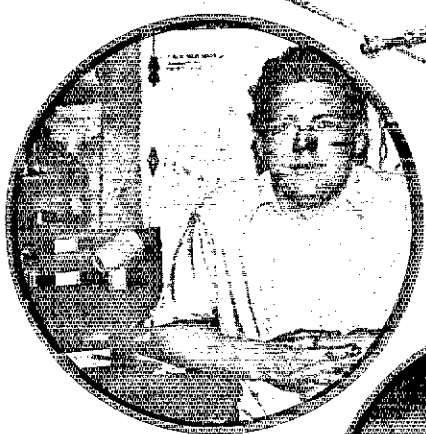

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. . . RICK–WB9AZN
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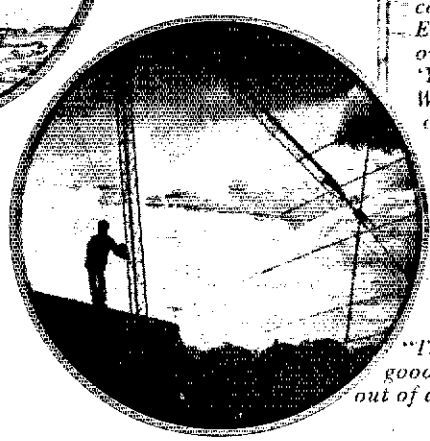

"After using the System One to contact DX stations throughout the world, I am convinced that it would take a much larger antenna to make any significant difference at either end. A frequent comment from European stations on 15 meters was, 'You are the only West Coast Station coming through'. On 10 meters I worked all continents in less than 3 hours."

. . . AL–K7ICW
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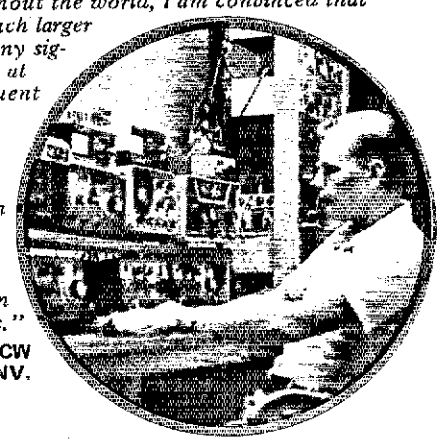

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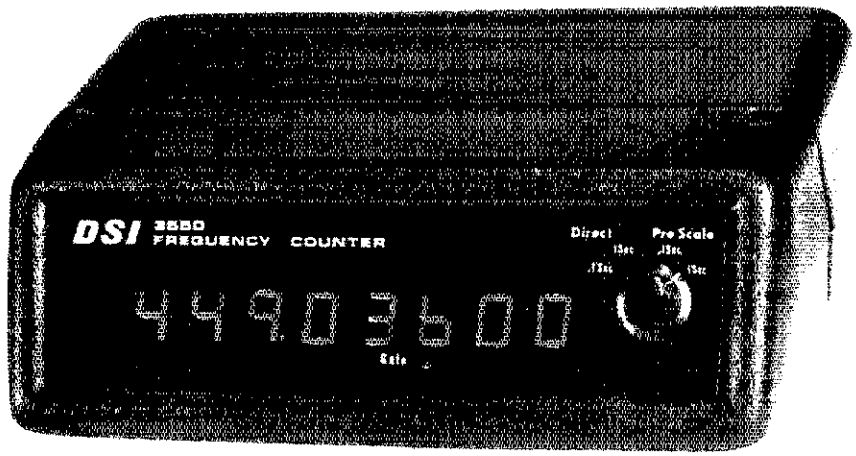

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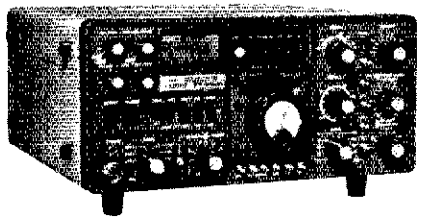

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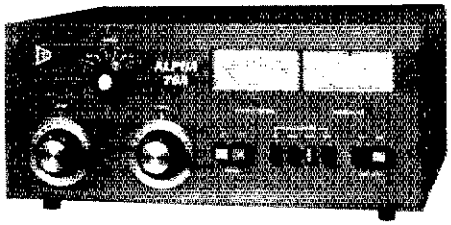

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101, K5BLV 65, WB5EMU 46, K5TL 32, WB5LBR 30, WB5USS 16, W5YN 8, N5OP 2, WD5GJB 2. (June) WA5IQU 268.

MISSISSIPPI: SCM, E. Ed Robinson, III, W5XT — SEC: WD5FXA. A quick review of our state (section) reveals good activity in most areas of Ham activity. SET and FD brought out the OT's as well as new faces and calls and improved activity. Ms. SEC WB5FXA has increasing EC activity with especially good activity in the Jackson area pushed by K5QNE. New calls appearing on the bands. Congrats to KB5BQ (ex-W5ROC) KA5BUR (ex-WB0NLX) also WD5DOT and WD5CYJ upgrading to Tech. MSN certs. to WD5GCW. CAND-W5KLV-sess. 62, QTC 410. DRNS Rep. 100 percent by WD5GNR. DRNS-WB5CDU-sess. 31 Ms. Rep. 82 percent by W5EDT WD5GNR WB5KZX WB5YGK. CGCHN WD5BDC-sess. 31, QNI 1939, QTC 225. MSBN-K5QNE sess. 31, QNI 1912, QTC 49. MTN-K5OAF-sess. 31, QNI 131, QTC 61. MSN-WA5IDF-sess. 12, QNI 45, QTC 4. MN-WD5CSU-sess. 28, QNI 253, QTC 15. Capital Area E.N. K5QNE-sess. 6 (with 1 emerg. sess.)-QNI 93. Traffic: W5EDT 130, K5OAF 73, K5AKM 36, WB5SNB 33, W5WZ 24, W5XT 22, WB5YGO 14, WA5OKJ 11, W5XX 3, WD5CSU 2, K5MK 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM: WB4PRF. SEC: WB4DYJ. The White's, Bob & Ellen, presence added much toward the success of the Crossville Hamfest, it was a success as usual. Congratulations to WA4CNY on beinng chosen the Tenn. Amateur-of-the-Year and who also won the Tenn. SCM Traffic Award for 1978; she is the first YL to win either award. The Tenn. Council of Radio Clubs elected the following officers for 1979: W4CYL, chmn.; W4QD, vice-chmn.; W4HPG, secy-treas. The Council Net meets at 0300Z Mon. on 3980 kHz. The radio clubs need to join or renew their membership in the Council, both need each other. Remember Memfest '78 on the 14th & 15th. The following actions for appointees have been taken: EC: WA4MIU WB4CQC K4FB K4RUC WB4HCH WA4TPA have been canceled; WB4OBE WA4DFS K4TKQ K4QZF have been appointed. ORS: K4YFC WA4IDN WB4NIR N4RG WB4FGT WA4CRT canceled; OPS: WA4YSJ WA4BOS WA4TWL WA4WXT WA4JNW canceled OBS: N4WF canceled. OVS: N4WF canceled. OO: W4IYU WB4MNW & K4VM canceled. AA4KB appointed. The following appointments have been made: AF4T, NM of TN; WA4BOC, NM of TCDARCN; WA4VVX, NM of WTWN; WB4DZG, NM of 2-M ETVHFN; OTS are: K4VM WA4CGK N4ZZ WA4WVW W4TYV K4UMW W4PSN W4OGG WB4ZSZ W4VJW WB4DYJ W4ZJY WB4DJU K4JSF W4QD K4AMC & K4QKW. These stations have been given the Certificate of Merit for their work with the Coordinated Hospital Services of East Tenn.: K4TKQ WA4WOW WB4MTF K4RHA WA4USW WA4TUR WA4YKN W4SGI WB4UUG W4KMH WA4KJU WB4RZP WA4IRG WB4WQT & WA4AHB. Traffic: WA4CNY 258, K4CNY 149, WB4PRF 108, WA4NIF 87, W4ZJY 86, AF4T 78, K4JGW 76, WB4BKF 61, WA4GLS 42, WB4ZSZ 42, N4UC 41, WB4GWA 36, K4XF 23, WB4YPO 22, W4TYV 21, K4WOP 19, W4PFP 19, W4TZG 17, WB4DJU 12, K4QG 8, WA4WVW 7, W4VJW 7, K4FSK 5, W4EWR 4, W4PSN 4, WA4CGK 3, W4QD 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted H. Huddle, W4CID — SEC: WB4ZML. New appointments: W4OJN as OBS. July Nets:

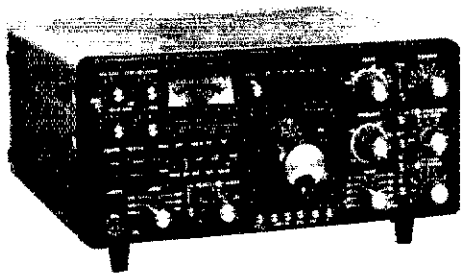
Net	QNI	QTC	Net	QNI	QTC
KRN	345	26	KPON	57	2
MKPN	872	66	5DARES	41	1
KTN	1059	133	6DARES	81	7

KA4BBP is a new 60-yr old Novice in Island, KY! 6th District has organized a weather watch on their 2m net. Activation occurs when NOA wx radio alerts. Owensboro group again took top honors with their handling of the big hydroplane boat races. Ashland hams got their feet wet in boat racing with 14 amateurs assisting in the Valvoline Cup Speedboat Races. Both groups are to be commended for splendid public service work. Traffic: WA4AVV 105, WB4NPD 86, K4HOE 46, WD4ITJ 39, W4CID 36, WD4CQF 35, WB4RIT 30, K4UMN 18, WB4AUN 15, WA4FAF 14, WA4GAL 8, WA4AGH 8, W4YOK 7, WA4YPQ 4.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: KB8AI K8KMQ K8LNE K8RV WA8WVV WB8YDZ WB8ZNS.

Net	Freq.	Time/Days*	QNI	QTC	Sess.
MACS	3953	1500 Dy	998	372	31
MiTN	3953	2230 Dy	677	363	31
OMN	3663	2200/0200 Dy	705	211	62
GLEN	3932	0130 Dy	887	147	31
MNN	3722	2130 Dy	254	72	31
UPNET	3922	2100 Dy	730	85	36
WSSBN	3935	2300 Dy	771	55	31
8R NET	3930	2130 M-S	556	43	26
SEMTN	146.69	0215 Dy	142	39	34
MEN	3930	1300 Su	180	3	5
MI6M	50.7	2300 Dy	36	0	5
VHF PAM Report 7 reports			658.	14.	30

*UTC Summer Schedule. W8CUP earned a BPL award by operating his station for two weeks aboard the YP587 — The Sea Cadet on its training cruise from Mt. Clemens to Mackinaw Island and back with 15 Cadets. He passed a large number of messages for the Cadets to their parents back home. Field Appointments: Asst. SCM: W8SOP. Net MGrs.: K8BAI for MiTN, WB8ZNS for Mich. Novice Net. STM: WB8MTD. OTSs: W8CAM WA8CXF W8FSZ W8GZF K8MJK WD8NYN WB8OYU WB8SUR WB8UZM W8VIZ WB8VOM WB8VPM WB8VVF WB8YIG. OO: K8RGT, W3GQJ/8. OVS: W8LRM. I am sorry to report the following Silent Keys: W8EFF W8IFF WN8NQT W9ODG (ex-W8ZKT) WA8POB. OO reports from K8AIT WB8IKJ K8JH. OBS reports: N8AG WD8DIB WB8DJS K8NKB WD8POK W8SOP WB8VPM. OVS reports: WD8POK WB8RNY. Outstanding 2-meter band opening reported on July 25 by K8AIT and WD8JHR. Stations worked as far as Colorado. New Affiliated Clubs: Eastern Mich. ARC of Marysville and Mich. Eastern Thumb Amateur League at Harbor Beach. K8CZO married W8AT; Congratulations! Upgrades, Extra: WD8IBW to K8XE. WB8JIX to AC8F. WA8TMP to K8PD. Adv: WA8FXQ WD8MDM WD8NBV WD8NIZ. Traffic: (July) K8LNE 275, W8CUP 232, WB8YDZ 218, WB8MTD 179, W8MPD 134, N8ABA 117, WD8NYN 110, WA8DHB 108, K8KMQ 108, K8BAI 98, WB8POL 81, WD8NKA 78, WD8IEW 73, W8VPW 72, WA8OAF 71, WD8DIB 65, K8KC 65, WB8ZNS 65, K8DTG 62, W8SOP 61, WD8LSV 57, KB8BZ 55, WD8CSA 54, K8DD 54, WB8OYU 53, K8RV 50, WB8ITT 46, W8YIQ 46, W8IHX 43, W8GZF 42, WB8YWO 41, WA8WZF 37, K8JED 34, W8NOH 30, WB8TTA 28, K8DYI 25, WD8MCN 22, K8UPE 22, WD8BSE 19, K8ZJU



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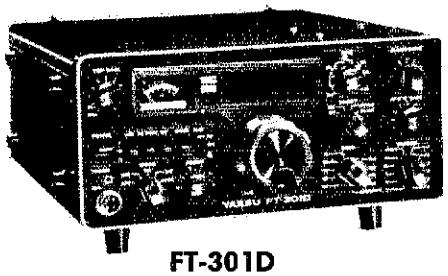

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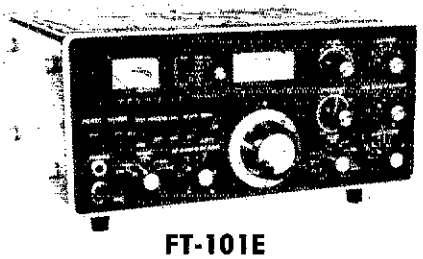

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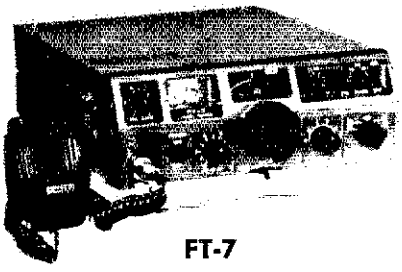

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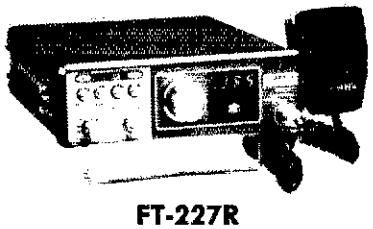

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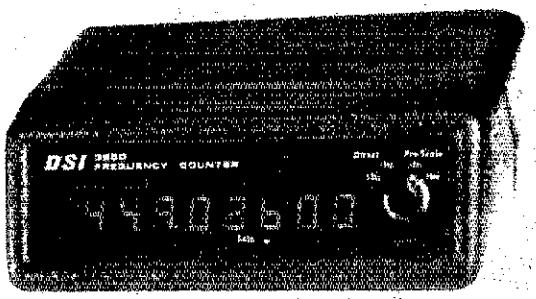

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Model	Frequency Range	Accuracy Over Temperature	@150MHZ	@250MHZ	@500MHZ	Number Of Readouts	Size Of Readouts	Power Requirements	Size
3600A	50HZ-600MHZ	OVEN .5PPM 50° to 100°F	10MV	10MV	50MV	8	.5 inch	115VAC or 8.2-14.5VDC	2¾"H x 8"W x 5"D
3550W	50HZ-550MHZ	TCXO 1PPM 65° to 85°F	25MV	25MV	75MV	8	.5 inch	115VAC or 8.2-14.5VDC	2¾"H x 8"W x 5"D
3240HH	2MHZ-250MHZ	3PPM 65° to 85°F	100MV	100MV	NA	7	.4 inch	4AA Batt.	5"H x 3"W x 2"D

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OHIO: SCM, Hank Greeb, W8CHT/N8XX — Asst. SCMs: W8FU WA8MCR W8TP N4VY. SEC: K8AN. STM: WB8JGW. NM: N8CW W8DIL WB8KWD K8OZ WA8SSI WB8WTS. Net reports (July)

Net	QNI	QTC	Sess.	Time(Z)	Freq.
OSN	169	75	31	2210	3.577
OSSBN	2432	663	93	1430/2000/2245	3.9725
BNR	101	73	31	2200	3.605
BN	519	235	60	0200/2245	3.577
06mN	289	28	29	0100	50.160
ONN	189	88	31	2230	3.708

Four years ago, when W8CHT was elected SCM, big tornadoes had just hit in spots from Cincinnati thru Xenia. Most recently, some 2500 plus hams aided in relief of the "Blizzard of 1978." These, plus countless other disaster relief efforts, stress the importance of Public Service and emergency preparedness on the part of Amateurs. Your Section Emergency Coordinator K8AN continues to seek the best qualified candidate for each county for EC. The job of EC is to work with the amateur community to maintain viable emergency response capabilities and to promote public service activities. He/she works with governmental and privte public service groups to determine how amateurs can best aid their community, and coordinates and reports the efforts of individuals and groups so that Amateur Radio receives the maximum benefit. ARES builds on individual and group efforts, and does not detract from any such effort. Does YOUR community have an active public service effort? Do YOU support this effort with your organiational and operating abilities? Join up NOW, and help amateur radio fulfill its public service mission. If you don't know your EC, drop a radiogram or note to K8AN or WB8JGW. Let's keep public service No. 1 in OH! Traffic: WD8CGR 301, WB8WTS 241, WA8HGH 190, WB8KWD 183, K8BYR 151, W8DIL 146, W8ENI 139, K8AAZ 133, WB8KKI 126, W8PMJ 119, W8OZK 95, WB8SCR 80, N8TM 80, W8TP 67, WB8JGW 66, N8CW 56, WB8VWM 56, WB8OMQ 53, WB8SIQ 50, WB8VLR 48, WA8VWH 47, WA8SSI 41, WD8DDJ 40, WD8MLN 40, WB8QHV 38, WB8TRK 38, W8GRT 37, W8CXM 34, W8RG 33, WB8UBR 32, WA8GMT 31, WB8CJU 29, WB8UFB 28, K8AN 27, K8KWO 27, K8OZ 26, N4VY 26, K8DL 25, AB8P 25, WB8MRL 24, WD8DIP 23, W8UQY 20, WD8DTG 19, W8FU 19, WB8PIY 18, W8WEG 18, WD8LIU 17, WB8WNH 17, N8XX 16, WB8VZX 15, K8IKD 13, K8IOW 12, WD8JTT 12, WD8CDA 11, WB8SEB 11, WD8CMK 10, WD8NJO 10, WD8BBN 9, K3RC 8, WB8TCZ 8, WA8TSX 8, K8CKY 7, N8JH 6, W8ZM 6, K8ONA 5, W8LZE 4, W8MGA 4.

HUDSON DIVISION

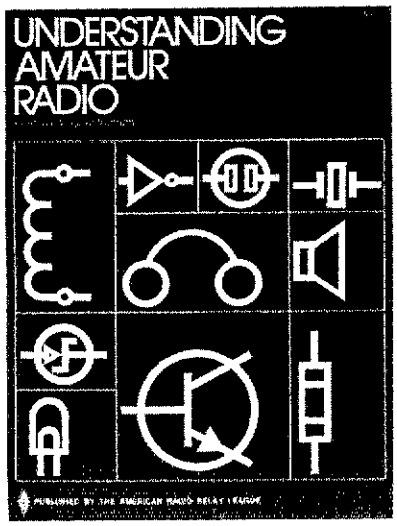
EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC/ASCM: WB2VUK. ASEC: K2AYQ. STM: WA2SPL. NMs: W2CS W2WSS. Nets: NYPON 5PM 3913, ESS (slow) 6PM 3590, NYSPTEN 6PM 3925, NYS 7/10 PM 3677. Congrats to N2IC, on his marriage. WA2EQW was best man & guest list sounds like field day roster. WA2EQW finally put up the TH6DXX. It started to sprout roots & Armand got worried. Nice public service article in Albany Times-Union by columnist John Maguire. Plaudits to PRA W2OOJ for getting the facts to Mr. Maguire. W2OOJ used to be a reporter on the Times-Union. WA2OTC has a new Century 21 & OSK. Thanks and a tip of the hat to W2IT on his abundant assistance in shaping up the Preparedness Duel. Jay spent many hours on the paperwork. Yours truly finally on 2M FM with a Heath 2035A. Being longwinded as I am, don't cotton to only talking two minutes. Getting a reputation for kerchunk & timing out. Note that certain folks in Westchester have a Golden Bagel Award for that sorta thing. Enjoyed meeting all the crew at the annual NYS dig at W2MTA. Ask WB2PJU or N2EF how we got the flies outa the bus on the way home. July PSHR: WB2KDC WA2MKQ WA2SPL W2CS WB2PJU. Traffic: WA2SPL 846, W2CS 140, WB2KDC 125, WB2PJU 118, W2YJR 114, W2BIW 80, WA2OTC 74, WA2EQW 56, WB2EAG 51, K2AV 48, N2EF 27, WA2MKQ 26, WB2TGL 16, WA2CJY 16, K2RRR 14, WB2ZCM 9, W2FFU 7.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: K2HTX. RM: WB2EUF. PAM: WA2UWA. The following are traffic nets in and around the section:

Net	kHz	Time/Day	Mgr.
NLI*	3630	1900/2200 Dy	WB2EUF
NLI Phone*	3928	1730 Dy	WA2YEI
NLS*	3725	1745 Dy	WB2JAY
ESS	3590	1800 Dy	W2WSS
NYSTPEN	3925	1800 Dy	WA2RSP

*Denotes Section Net, all times are local, please try to help out by checking in, all parts of the section need check-ins. Here it is, Oct. already, the Hudson Div. Convention is next month. If you haven't made your plans and reservations you'd better hurry before it's too late. The dates to remember are Nov. 10-12, at the Playboy Resort and Country Club at Great Gorge, NJ. Welcome to new Novice in Central Islip KB2BPR. WA2YEI reports activity increasing on 6 and 2 in the NYC area. W2AIR has a new twenty-element 2M beam up and many newly licensed ops waiting to get on the air. Shelter Island ARC going skyward with four new towers and tribanders WB2FHN WA2LQS WA2LBJ and WA2EUP. Congrats to WB2JWR upgrading to General and WB2JBO to Tech. The Citibank ARC has purchased a TR33C. Congrats to WB2LJH on getting his Extra. He also has a new tower and beam. The Great South Bay ARC has topped the one hundred membership mark. The Suffolk County ARC held its annual clam bake for its Aug. meeting. Congratulations to new Novice KA2BYT, the 11 year old son of WA2BLO, both are members of the Kings County Radio Club of Brooklyn. Lots of clubs in the Section are starting Novice classes this fall, why not try to help out as an instructor, or in any other way. Wantagh ARC reports the Nassau County RACES Ten Meter Net has a new home in Westbury, which is located in the geographical center of the county giving better coverage. Anyone having TVI trouble when using six meters might want to see the article on "TVI Complaint Cured" by W2EIF. Plese try to check in to the traffic nets, stations from all parts of the section are needed to handle traffic and help with the skeds. Traffic (July) WA2JKG 119, K2GCE 78, W2MLC 37, WB2EUF 27, WA2YEI 18, W2DBQ 15, K2CRT 10, K2IZ 4.

NORTHERN NEW JERSEY: SCM, Bob Neukomm,



Just the book for the beginner! *Understanding Amateur Radio* has long been considered invaluable for the beginner and Novice who are exploring the fundamentals of radio circuitry. Besides being packed with basic electronic theory written in a leisurely easy-to-understand style, the book covers everything about simple transmitters, receivers, and antennas. This new 3rd edition is printed in the popular large QST-style format. You'll want to pick up a copy today at your radio store or order direct from ARRL. *Get Understanding!* $5.00 U.S. and Possessions, $5.50 elsewhere.

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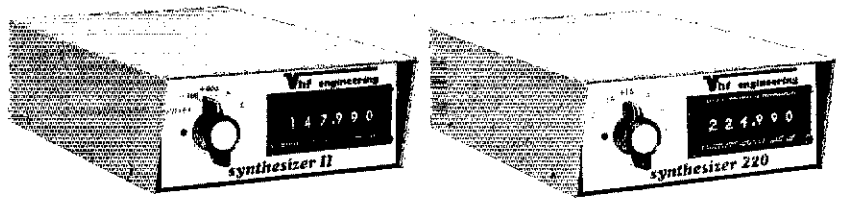

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- T^2L Logic
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- Frequency: 140.000 — 149.995 MHz
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- Output: 3 volts to a 50 load
- Input voltage: 11 — 18VDC at .900 amps
- Size: 8" long x 5½" wide x 2¼" high 20.32CM x 13.97CM x 5.715CM
- Complete kit including all electronics, crystal, thumb wheel switch, cabinet, etc.

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- Output: 3 volts to a 50 load.
- Input voltage: 11 — 18 VDC at .900 amps
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- Complete kit including all electronics, crystal, thumb wheel switch, cabinet, etc.

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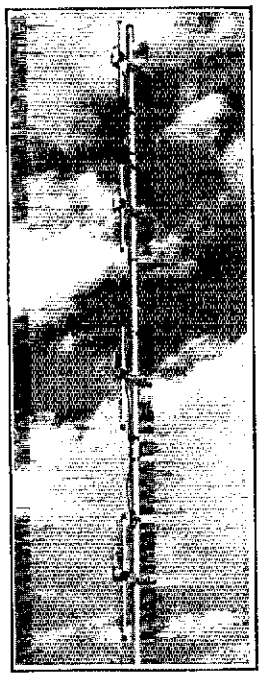
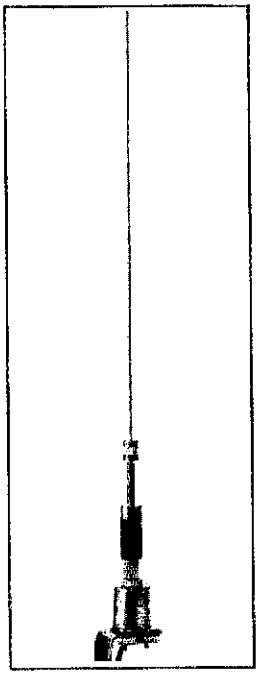
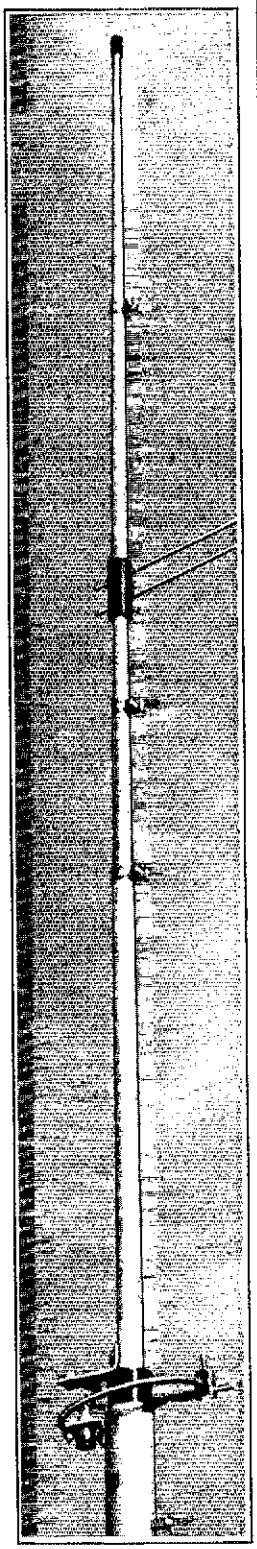


Four Pole Collinear



5/8 wave Mobile



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Dear Mr. Burchfield:

As you can see from my stationery I am a very loyal TEN-TEC customer . . . It began with a PM-2B — PM-3A, then to Argonaut and 405, then to a Triton I — all of which are still in operation. I especially enjoy "snagging" CW contacts on 40 and 20 and telling them I am working QRP 5 watts!

I have now purchased a Model 544 and find it very enjoyable operating both SSB and especially CW. I chose Triton IV basically because of your clean solid state design — clean, contemporary appearance — ease of band switching and tuning - excellent (only one of its kind) break-in CW — clean quality audio reproduction and because of excellent past service on Argonaut and Triton I. (Many thanks to Larry here!!)

Keep up your fine tradition — thanks for good gear!

73,

Ned B. Newlin, W8VFM

Dear Mr. Burchfield:

Because I am the very proud owner of a Ten-Tec Century/21 Transceiver and am in love with it, I feel qualified to make a complaint: namely, your company does not tell the world about your marvelous product!

In the five months I've had my Century/21, I've had no trouble of any kind, have worked all states and 20 countries. The problem is that some of my valuable DX time is taken up answering excited operators from Tasmania to Odessa, Tex., to Leningrad, who want to know details about the Century. Stations find it incredible that such an FB signal comes from a QRP rig with full break-in, off-set tuning, 0.5 kHz selectivity, built-in power supply and, well — you're the guys to do the shouting.

Hearty congratulations to all of you at Ten-Tec for the finest low power CW rig going. And that's going some! 73,

Tom Mosby, W4VBW

Number 10 of a Series

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WA2MVQ — SEC: WB2VUF. RM: W2XD. PAM: WB2LCC WA2OPY (VHF). RM RTTY: W2PSU. RM NJSN: N2MW. RM NJNYN: WA2LHV.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	W2XD	3695	7:00 P Dy	31	462	146
NJN	W2XD	3695	10:00 P Dy	31	285	94
NJSN	N2MW	3730	8:15 P Dy	31		
NJPN	WB2LCC	3950	6:00 P Dy	31	579	188
NJPN	WB2LCC	3950	9:00 A Su	5	71	13
RTTY	W2PSU	147.51	7:00 P Dy			
NJ2MTR	WA2OPY	145.5	8:30 P Dy			
Tfc.						
NJNYN	WA2LHV	3735	8:00 P			

W2CQB now mobile on 40 & 75 SSB. WA2KLF has WAS all on CW. The Sussex County repeater (147.90/30) group raised a 73 foot tower on July 30th. The Sussex County meets every 3rd Thur. at 8:00 PM at the CD Center. All hams in region are welcome. W2LTP and WB2MSO from the NJPN are now Extra Class. Warren County CD reports activity on 3.950 and 2 meters linked via 146.265. UCETN via WR2AIX (146.085/.685) is operational throughout the summer. N2NS & W2AEL are working out formal agreements between ARES and eastern Union County/Cranford Chapters of American National Red Cross. WA2MVQ vacationing in Germany and Switzerland in Aug. and worked from 4U1ITU. N2NS will be portable VE2 for six months from Magdalen Island, Quebec. During the next few months the NNJ gang should monitor the "RAVEN" net at 146.55 Mon. at 9 PM to get the "hang" of RAVEN's operations during flooding conditions in the area. K2GVC reports that the Bloomfield Civil Defense group helped out during the 6-1/2 mile "Runathon" held the 4th of July. WB2RTG reports that the first Oakland CD drill will be Aug. 21 at 8PM on 145.62. I regret to advise WB2NIH is now a Silent Key. Frank was very active on Navy MARS. He also was very active in the late 60's as N0FDV. WA2OVE has a new SB200. N2MW has been accepted to M.I.T. Don't forget to get your registrations in for the Hudson Division Meeting at Great Gorge, New Jersey for the Nov. meeting — see previous issues for details. Novices and Technicians check into the "slow nets" and get your speed up so that you can easily upgrade! Traffic: (July) WB2MSO 175, K2VX 137, K2OP/3 127, WA2RMI 121, W2CQB 119, WA2MVQ 105, WA2LHV 95, WA2PIP 71, W2XD 70, WB2DMB/3 57, N2CR 55, W2SO 53, K2BHL 44, W2ZEP 42, K2SE 32, WB2HSG 30, W2LTP 29, WA2JTA 26, N2SU 25, W2SWE 25, W2ONL 24, WA2KLS 23, WA2WXN 18, WA2OVE 15, W2UH 14, WA2CQJ 12, N2GJ 11, W2CC 10, WB2KAK 10, WB2KLF 8, WA2EPK 7, N2TM 7, N2NS 6, WA2DLZ 5, WB2CNF 3. (June) K2SE 23.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — The new Frequency Coordinator for Iowa Repeater Council is WA0FYG. Bi-State VHF Teleprinter Soc. has 46 active members. Ft. Dodge ARC officers: WB0OJT, pres.; WB0CAD VP; WB0YKJ, secy.; WD0GEM, treas.; WB0NMW, rpt chmn.; WB0GKY, rpt secy.; K0OFI, rpt treas. New equipment: WB0RMT has TS-700SP, W0ZN has Yaesu 901DM, W0BQJ has Yaesu 227R. Congrats on upgrades to: WD0EDD WD0EDC WD0GAO WD0FLO WD0BRA WD0DCF and W0GNJ. WB0YUI has 169 countries confirmed since 9/77. Ft. Dodge, Humbolt and Lowden getting new repeaters. WA0EFN now AA0J and WB0SSV is AD0M. W0RCW moved to Duncombe. RAGBRAI X-State Bike Ride received assist from 10 amateurs at Storm lake, 25 at Humbolt and 2 at mt. Vernon. WD0EIF on 2M SSB and W0PJ can be heard on 2M. W0SWY wants a contact with a hot-air mobil. K0LGI won the tox hunt at Cedar Rapids, and WD0EKP hagged the fox in Iowa City. W0EIT building 2M monitor with time delayed tone decoder. IA has made 97 percent on NTS-TEN past two months via W0SS N5YX/0 W0YLS N0SM WD0FCI K0FLY WB0RWN WB0YRH K0GP and WD0GDL. WA0AUX all alone gave IA 88 percent on DTRN. Nets: Iowa 75M, 3970 M-S, 1730Z, WA0VZH Mgr., QNI 1304, QTC 68, sess. 26, 2300Z, W0YLS Mgr., QNI 810, QTC 93, sess. 26. Tall Corn (TLCN), 3560, 2330/0300 Dy. W0YLS Mgr., QNI 352, QTC 118, sess. 62. Iowa Code (ICN), 3713, 0000 T-T-S. WB0YRH Mgr., June QNI 33, QTC 2, sess. 10., July QNI 14, QTC 2, Sess. 6. Traffic: (July) WA0AUX 521, W0SS 224, K0GP 170, WB0KHO 128, W0YLS 115, WB0AVW 90, W0LFF 84, N5YX/0 81, WD0FCI 48, WB0NSS 36, K0EVC 30, WA0WNT 28, WD0GDL 18, K0OFI 11, WB0PYD 10, W0BQJ 6, WA0IOA 4. (June) WB0PYD 7.

KANSAS: SCM, Robert M. Summers, K0BXF — SEC: W0KL. Net Mgrs.: W0FT W0OYH WB0SZS. Many thanks to the list of calls that head this listing. Without them I am sure we would have a big void hard to fill. I miss the routine of QNI the nets, as I am sure some of you do when you have problems that keep you away for a while. It has now been close to 4 months now that my rig has been down and in the hands of several trying for repairs. I hope to be on the air again (voice) by the end of Aug. at least. Guess that's what I get for keeping antique gear too long. Looks like the month of July has been very busy, not too many comments in the comment columns. Net reports for July QKS QNI 427, QTC 128. Mid States Tfc 4 serving 11 mobiles and having 143 QNI. Got a free minute or two in the eve?? Check into the MMM 3920 kHz after 7 each evening and lend a hand. Some of the net controls on our nets need additional support during the bad band condition sessions, be ALERT, help when you can. Central States Tfc Net QNI 1005, QTC 79. KPN QNI 266, QTC 16. KSBN QNI 946, QTC 138. KWN QNI 644, QTC 316. The Raymond E. Baker, Kansas Amateur Award of the Year was presented to W0CY at the recent hamfest in Concordia. Start now, each club in the state should have someone in mind for the award next year. Traffic: WB0OBH 219, W0FIR 177, W0OYH 158, W0CHJ 119, W0AM 72, W0HI 72, WA0LBB 70, K0EZ 50, W0IX 48, W0FT 45, K0BXF 24, W0FDJ 24, K0FPC 23, N0IN 21, WA0OWH 21, W0PB 19, N0SN 19, WD0FBP 17, W0PCW 17, W0ZUX 17, W0ERQ 11, WB0SZS 11, WB0KDE 10, W0RT 8, W0KL 5, W0NYG 2, WA0WJX 2.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM, W0OTF. SEC: WB0FKY. Welcome home to WA0HHB who just returned from a year in Turkey. At least two of the Kansas City areas larger clubs received television coverage during the recent FD. A big thank you goes out to WB0EJJ for his efforts in providing emergency communications for the rescue teams during the recent boating disaster at Lake Pomona. Congrats to K0ONK on her recent appointment to Asst. Director, U.S. Short Wave Radio Handicapped Aid Program; to W0HBH on winning the certificate for 1st Place in MO in the 1977 Sweepstakes and to W0QIZ on his recent victory in the city primary election. WA0FKD has a new address: 305 Taven Apts, Caruthersville, MO 63830.

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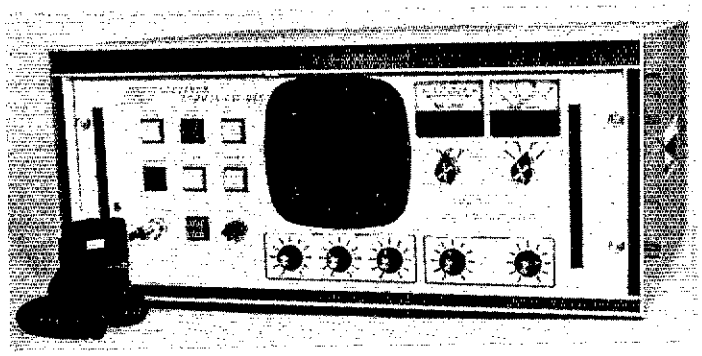

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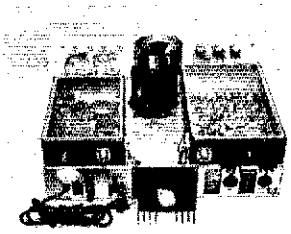

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RF Output . . . . . 30 Watts typ.
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Spurious Response . . 70dB min.

FEATURES

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- **SCR 100 Receiver Assembly.** SCR100 mounted in shielded housing $195.00
- **SCT110 Xmtr./Exciter Bd.** 7 or 10 Wt. bd. $135.00 w/xtal. BA-10 30 Wt. Amp. bd. & Ht. Sink $51.95
- **SCT110 Transmitter Assembly.** SCT110 mounted in shielded housing . . . . . $199.95 (30 Wt. Amp. + $65.00)
- **CTC100 COR/Timer/Control Bd.** $35.00
- **ID250 CW ID/AF Mixer Bd.** Programmed $65.00
- **SCAP Autopatch Bd.** $225.00
- **RPCM "Reverse Patch" & control bd.** $79.95
- **TTC100 Touch Tone Control bd.** 3 digit ON, 3 digit OFF $85.00
- **TRA-1 Timer Reset Tone Annunciator Bd.** $20.95
- **WP641 Duplexer** $495.00

Commercial prices somewhat higher.

(Add $3.75 ship/handling. PA residents add 6% tax.)

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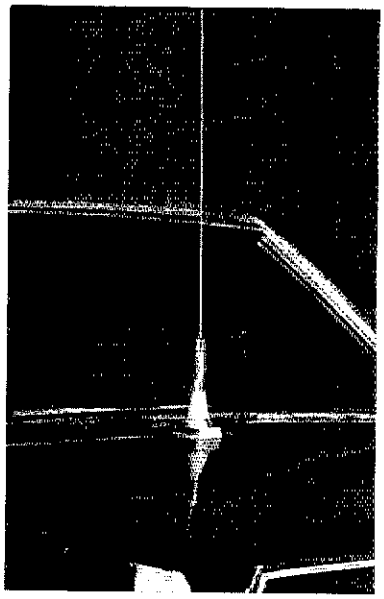
Decibel offers more in the Amateur bands!

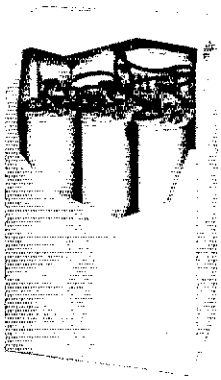
- 144 to 148 MHz
- 220 to 225 MHz
- 442 to 449 MHz

Whichever band you're operating in, depend on Decibel to provide your best combination of quality and performance. We supply mobile and base station antennas and duplexers in the frequencies where you need them. Any repeater's operation and performance will be improved by upgrading to Decibel's 30-year tradition of quality.



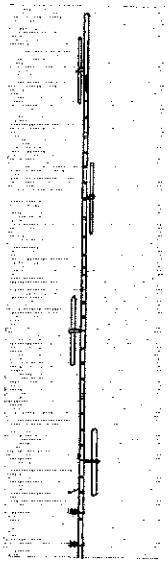
MOBILE GAIN ANTENNAS

Decibel offers two outstanding series of mobile antennas designed to provide the utmost in performance, reliability and durability. The Decision series, illustrated, features space-age styling plus traditional quality for roof or trunk attachment. Standard, no-hole or magnetic mounting is offered with or without springs. The Classic series, proven over the years, continues a tradition of quality and performance.



BROAD BAND GAIN ANTENNAS

Decibel's base station antennas are rugged and include built-in protection against lightning damage. For extreme resistance to environmental factors, they're constructed using our exclusive Vapor-Bloc® weather resistant cable. They feature high gain and are factory adjusted for minimum VSWR over a wide frequency range. Easy to install . . . and easy to buy . . . from Decibel.



DUPLEXERS

Duplexers from Decibel are available in 4- or 6-cavity models, with the enclosure offered optionally. We offer industry's broadest choice of models.

WHATEVER YOUR REQUIREMENTS FROM 30 TO 960 MHz, DECIBEL'S GOT YOU COVERED.

Decibel offers multiple products that have made us leaders in the commercial RF market.

- Base station antennas
- Cavities and filters
- Duplexers
- Mobile antennas
- Isolators and circulators
- Hybrid couplers
- Dummy loads
- Transmitter combiners — both hybrid and low loss types
- Receiver multicouplers

Write *today* for more information.

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But how about your wife, son, daughter, grandson, granddaughter, nephew, niece, neighbor, friend?

Shouldn't they have the Amateur Radio opportunity too?

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A GREAT GIFT

TAKE THE WORLD IN YOUR HANDS

The whole world — that big world out there — is at your fingertips! Literally. Amateur radio brings you Nairobi, Singapore, Tel Aviv, London, Springfield, all at the flick of a switch, a twist of a dial. Nothing is quite like being a ham radio operator. It's easy and it's fun. TUNE IN THE WORLD WITH HAM RADIO has everything you need to get your Novice license. Fascinating illustrated text, study guide, sample FCC exam and a start-from-scratch Morse code cassette. Thousands of new hams, of all ages, have used this package to get their licenses. It's at your radio-electronics dealer now! Ask him to show it to you.

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The National Association of Radio Amateurs

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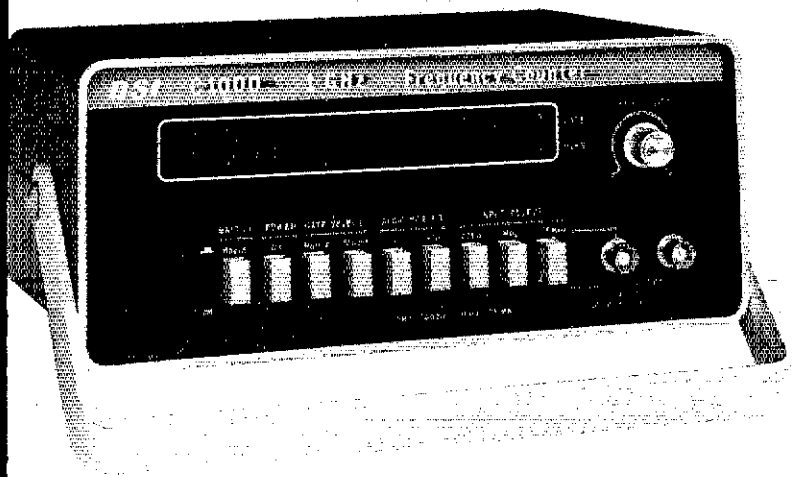
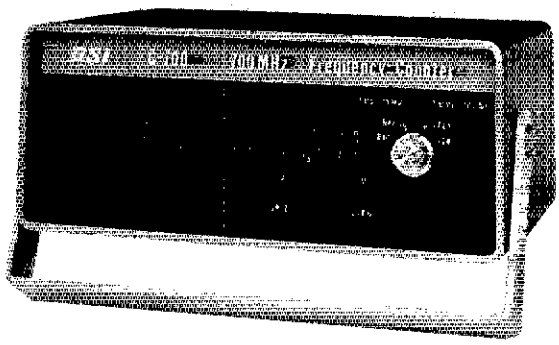
DSI COMMUNICATIONS SERIES

1.3GHz — 1GHz — 700MHz





MODEL C1000 10Hz to 1GHz

$399.95

- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**

Accuracy . . . that's the operational key to this rugged advanced design Model C1000 1GHz frequency counter . . . a significant achievement from DSI. That's because you get . . . **.1 PPM** 0° to 40°C proportional oven time base . . . Built in 25DB preamplifier with a 60DB adjustable attenuator . . . x10 & x100 audio scaler which yields .01 Hz resolution from 10Hz to 10KHz equivalent to 10 sec. & 100 sec.Gate Time . . . Selectable .1 & 1 sec. time base and 50 ohms or 1 meg ohm input impedance . . . Built-in battery charging circuit with a Rapid or Trickle Charge Selector . . . Color keyed high quality push button operation . . . All combined in a rugged black anodized (.125" thick) aluminum cabinet. The model C-1000 reflects DSI's on going dedication to excellence in instrumentation for the professional service technician, engineer, or the communication industry.

MODEL C700 50Hz to 700MHz

$299.95

- **AUTO ZERO BLANKING**
- **AUTO DECIMAL POINT**

ALL NEW! All UNPARALLELED DSI QUALITY! The model C 700 700 MHz frequency counter features . . . **.2 PPM** 0° to 40° C proportional oven time base . . . 25db preamplifier with a 60db adjustable attenuator. Built in battery charger with a rapid or trickle charge selector . . . Combined in a rugged (.125" thick) aluminum cabinet makes the C700 ideal for the communication industry and professional service technician.

3600A OWNERS: Up date your 3600A frequency counter to a C 700 includes, new back board, **.2PPM** proportional oven, 25db preamplifier, rugged .125" thick aluminum cabinet, order 3600A-700. Unit must be returned to DSI factory for modification.

DSI — GUARANTEED SPECIFICATIONS — FACTORY ASSEMBLED — MADE IN USA

Model	Frequency Range	Proportional Oven Accuracy Over Temperature	50Hz To 75MHz	75MHz To 500MHz	500MHz To 1GHz	Number Of Digits	Size Of Digits	Power Requirements	Size
C700	50Hz to 700MHz	.2PPM 0° to 40°C	50MV	10MV	NA	8	.5 Inch	115 VAC-BATT 8 to 15VDC	3"H x 8"W x 6"D
C1000	10Hz to 1GHz	.1PPM 0° to 40°C	20MV	1MV	>50MV	9	.5 Inch	115VAC-BATT 8 to 15VDC	4"H x 10"W x 7½"D

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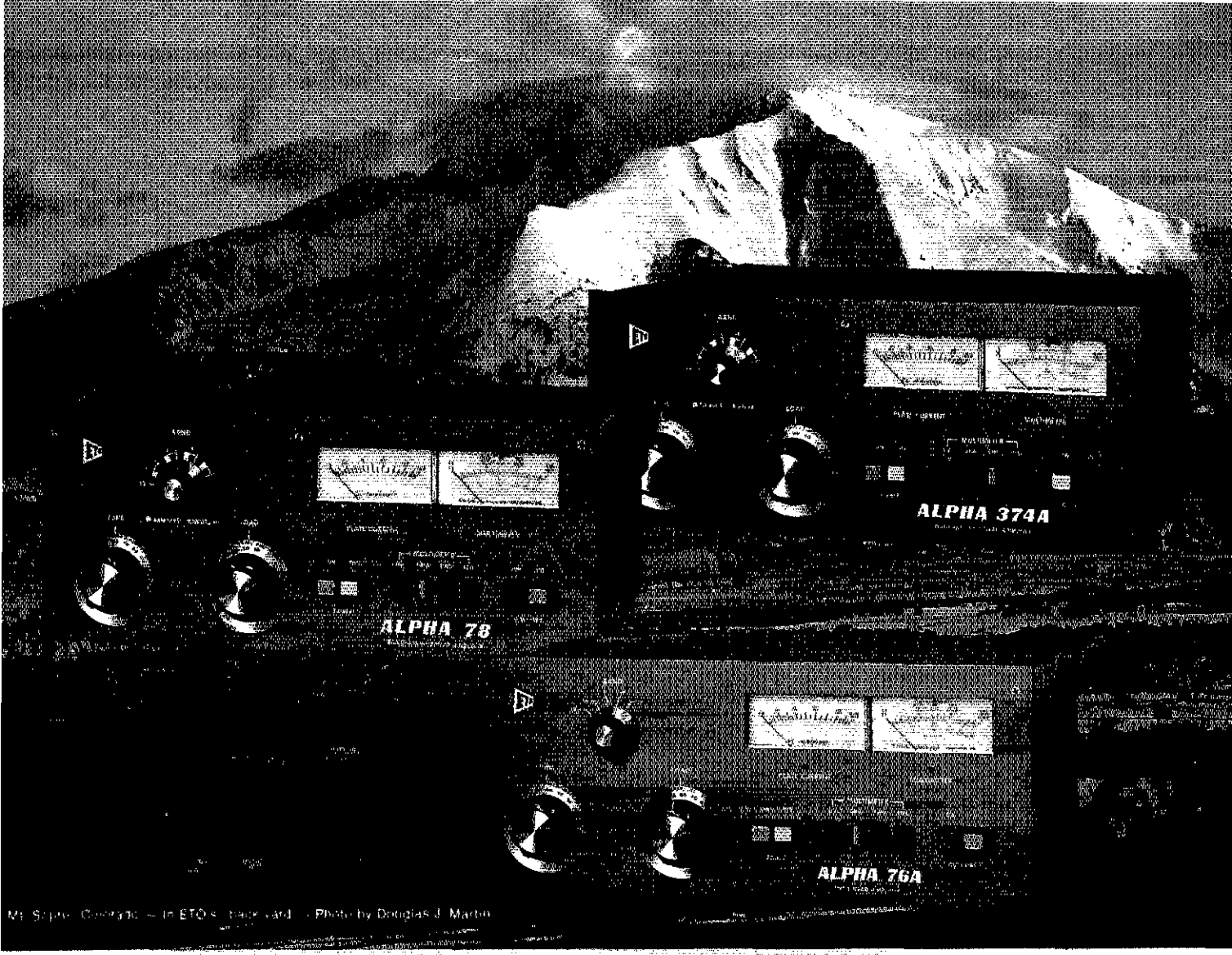
Model C 700	**$299.95**
3600A-700 Factory update (3600A only) Includes Labor & Re-Calibration	**$124.95**
Model C 1000	**$399.95**
Opt. 01 1.3 GHZ (C1000 only)	**$ 99.95**
Opt. 02 .05 PPM 10MHz Double Oven o° to 50°C Time Base (C1000 only)	**$129.95**
Opt. 03 20 Hr. rechargeable Battery Pack	**$ 29.95**
Ant. 210 Telescopic Ant./BNC Adapter	**$ 9.95**



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When you buy an ALPHA linear amplifier you make a long term investment in dependable power and operating pleasure.

You can take your ALPHA for granted — it will go on delivering that big, clean, maximum-legal-power signal no matter how tough the contest or how long the SSTV or RTTY QSO's.

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DURABILITY? You get TWO YEARS of factory warranty protection with your new ALPHA . . . other manufacturers give you 90 days.

CONVENIENCE? Every ALPHA is self-contained, compact, and smooth-tuning. All 76A - 374A - 78 models can be shipped via economical, door-to-door UPS.

VERSATILITY? The new ALPHA 374A delivers full legal power (in any mode) on all amateur HF bands WITHOUT TUNE-UP and with excellent efficiency. (On 160M you peak the output manually; new FCC rules permit easy owner modification to restore full 10M capability, too.)

The ALPHA 78 combines the best of everything: full instant CW break-in (QSK) and NO-TUNE-UP bandchange! And of course all ALPHAs substantially exceed every applicable FCC requirement.

For detailed literature and fast delivery of your new ALPHA, contact your dealer or ETO direct. While you're at it, ask for a free copy of our brief guide, *"Everything You Always Wanted to Know About (Comparing) Linears . . . But Didn't Know Whom to Ask."*

ALPHA — Sure you can buy a cheaper linear . . . But is that <u>really</u> what you want?

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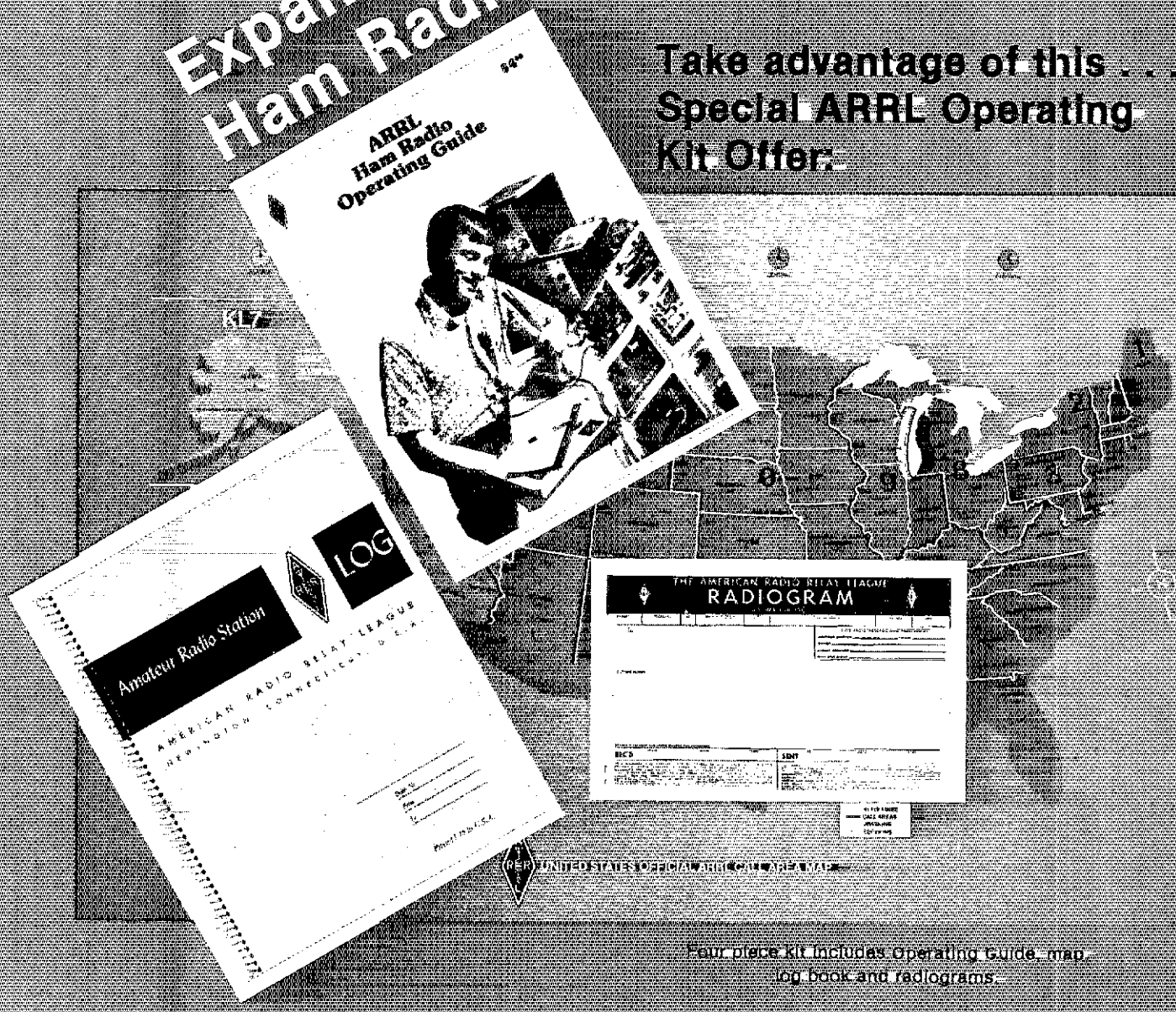
Take advantage of this . . . Special ARRL Operating Kit Offer:



Four piece kit includes Operating Guide, map, log book and radiograms.

***ARRL HAM RADIO OPERATING GUIDE**

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***U.S. CALL AREA MAP**

All 50 states are shown in this 37" × 24", full color map. Perfect for your shack wall. Also includes a Worked All States check-list.

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Record keeping can often be very tedious. But not with the ARRL Log Book. Fully ruled with legible headings and in the horizontal style format.

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First impressions are important. Whether you handle ten or a hundred messages, you want to present the addressee with a neat looking radiogram . . . and you can do this with the ARRL Radiogram. 70 message blanks per pad.

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The Head of the Class

Our top-of-the-line Heathkit SB-104A is the culmination of Heath's engineering excellence and expertise in Amateur Radio design. It's the transceiver the serious Radio Amateur aspires to – totally broadbanded, fully solid-state, true digital readout and much more – a truly superior performer that should be the "heart" of any first-class operating station.

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So whether you intend to work the world on a couple of watts CW, or "go-the-limit" with state-of-the-art SSB, you'll find Heath is the place with quality good enough to measure up... to you!

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there's a world of difference in TEN-TEC's *all-new* hf transceiver—

OMNI

OMNI—THE *ALL-INCLUSIVE.* Because OMNI has it *all*. Designed to give you every advantage, every capability, whatever your operating specialty. Designed to give you new conveniences and new levels of performance. Designed to give you the world of Amateur Radio with a world of difference—the OMNI world of unique features. An unusual combination not found in any other.

FUNCTIONAL STYLING. The "look" you requested. "Clamshell" aluminum case clad in textured black vinyl. Complementary nonreflective warm dark metal front panel. Extruded satin aluminum trim bezel and tilt bail. Convenient controls. Fully shielded. And everything in a larger, easier-to-use size: 5¾"h × 14¼"w ×14"d.

TOTALLY SOLID-STATE. Sharing the TEN-TEC heritage of solid-state design leadership with its companion transceivers, the highly successful 540/544, OMNI has all the advantages of proven solid-state technology—reliability, long life, cool performance, better stability.

8-BANDS. The world now and in the future. OMNI covers 160, 80, 40, 20, 15, and 10 meters now (crystals included for all present Amateur bands, 1.8-30 MHz). And it has convertible 10 MHz and "AUX" band positions for the future.

BROADBAND DESIGN. Permits changing bands without tune-up, without danger of out-of-resonance damage to the final stage.

ANALOG OR DIGITAL READOUTS. OMNI-A features an analog dial with 1 kHz dial markings. OMNI-D has 0.43" LED readouts with the 5 most significant in red and the 6th in green to show 100 Hz increments.

BUILT-IN VOX AND PTT. Smooth VOX action with 3 easy-to-adjust front panel controls. PTT control is available at both front and rear panel jacks; an external microphone switch may be used.

BUILT-IN SQUELCH. Unusual in an hf rig, but handy for tuning or monitoring for a net or sked.

BUILT-IN 4-POSITION CW/SSB FILTER. 150 Hz bandwidth with 3 selectable skirt contours for optimum CW reception.

8-POLE CRYSTAL FILTER. 2.4 kHz bandwidth, 1.8 shape factor.

SEPARATE MODE SWITCH. Permits using *all* filters in *any* mode.

2-SPEED BREAK-IN. Switch to "fast" or "slow" receiver muting to accomodate any band condition or mobile operating.

2-RANGE OFFSET TUNING. Switch-select the ±5 kHz range for off-frequency DX work or the ±0.5 kHz range for fine tuning.

OPTIMIZED RECEIVER SENSITIVITY. Ranges from 2 uV on 160 m to 0.3 uV on 10 m (10 dB S+N/N) to achieve ideal balance between dynamic range and sensitivity.

GREATER DYNAMIC RANGE. Typically exceeds 90 dB to reduce possible overload from nearby stations. Also includes switchable 18 dB PIN diode attenuator for additional overload prevention.

WWV RECEPTION. On the 10 MHz band switch position.

FRONT PANEL CONTROL OF LINEAR/ANTENNA BAND-SWITCHING. Auxiliary bandswitch terminals on back panel for simultaneous control of external relays or circuits with the OMNI bandswitch.

BUILT-IN PHONE PATCH JACKS. Provide interface to speaker and microphone audio signals for phone patch connection.

BUILT-IN "TIMED" CRYSTAL CALIBRATOR. In the OMNI-A a pulsed 25 kHz calibrator desensitizes the receiver and provides an automatic 5 to 10 second "on" time for easy two-hand dial skirt adjustment.

BUILT-IN ZERO BEAT SWITCH. Permits placing your transmitted signal exactly on the listening frequencies of CW stations.

BUILT-IN SWR BRIDGE. The "S" meter electronically switches to read SWR every time you transmit to provide a continuous antenna check.

FRONT PANEL MICROPHONE AND PHONE JACKS.

ADJUSTABLE AUTOMATIC LEVEL CONTROL. For setting output power level from low power to full output, for retaining low distortion at desired drive power to linear amplifier.

SEPARATE RECEIVING ANTENNA CAPABILITY. Rear panel switch and jack connect receiving section to common antenna or separate receiving antenna. Also acts as receiving antenna by-pass when used with instant break-in linear amplifiers.

BUILT-IN ADJUSTABLE SIDETONE. Variable pitch and volume.

DUAL COMPRESSION-LOADED SPEAKERS. Larger sound output, lower distortion, no external speaker needed.

POWER INPUT. 200 watts when used with 50 ohm load. Proven, conservatively-rated, solid-state final amplifier design with full warranty for first year and pro-rata warranty for 5 additional years.

100% DUTY CYCLE. Ideal for RTTY, SSTV, or sustained hard usage.

PLUG-IN CIRCUIT BOARDS. For fast, easy field service.

POWER. Basic 12 VDC operation for convenient mobile use; external supply required for 117 VAC operation.

OPTIONAL ACCESSORIES. As all-inclusive as OMNI is, there are a few options: Model 645 Keyer, 243 Remote VFO, 248 Noise Blanker, 252M Power Supply.

Model 545 OMNI-A $899 Model 546 OMNI-D $1069

Experience the world of difference of OMNI, see your TEN-TEC dealer or write for details.

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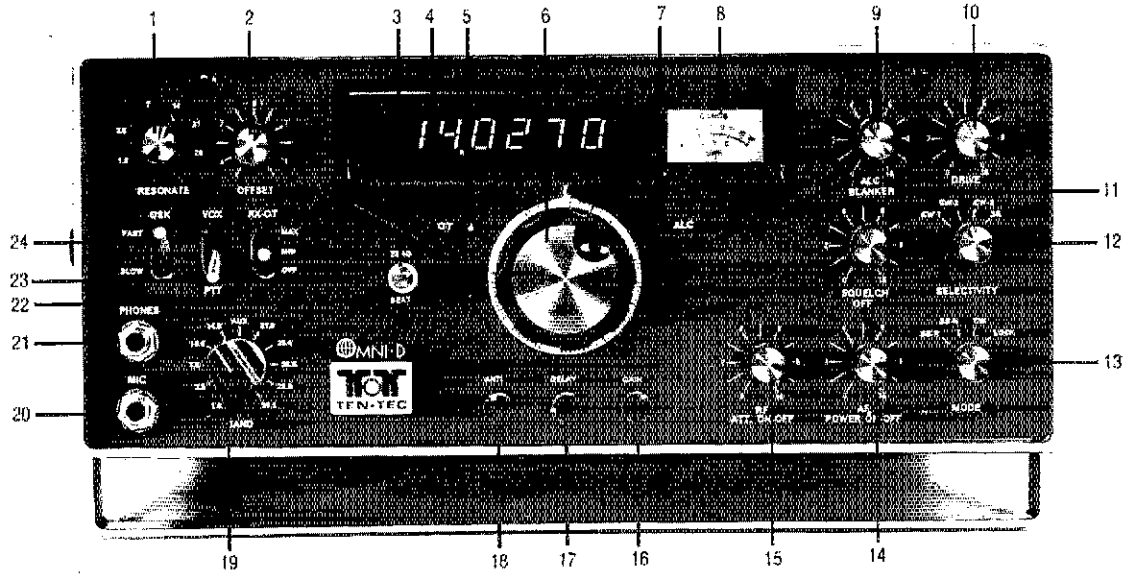
TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862



1 Receiver RESONATE control for peak sensitivity.
2 Receiver Dual Range OFFSET TUNING control for off-frequency work.
3 ZERO BEAT switch; spring-loaded, momentary contact.
4 6-Digit LED FREQUENCY READOUT for 100 Hz accuracy.
5 OFFSET TUNING LED indicates OT switch is "on."
6 MAIN TUNING KNOB; big, easy-to-grip with integral spinner.
7 AUTOMATIC LEVEL CONTROL LED indicates ALC-region operation.
8 Combination "S" and SWR METER; switches automatically.
9 Combination ALC control and NOISE BLANKER on/off switch.
10 DRIVE control for final stage.
11 SQUELCH combination on/off switch and control.
12 4-Position SELECTIVITY switch for SSB and CW.
13 4-Position MODE switch; automatic SSB Normal, Reverse, CW, andd Lock (key down).
14 Combination push-pull POWER switch and AUDIO LEVEL control.
15 Combination RF ATTENUATOR on/off switch and control.
16 VOX GAIN control.
17 VOX DELAY control.
18 VOX ANTI-TRIP control.
19 11-Position BAND SWITCH.
20 MICROPHONE jack; hi-z input.
21 HEADPHONES jack.
22 RECEIVER OFF-SET TUNING SWITCH; 3-position: Max-Min-Off.
23 VOX-PTT SWITCH.
24 QSK (full break-in) SWITCH; 2-position: Fast-Slow.

Net	QNI	QTC	Net	QNI	QTC
HBN	228	18	MEOW	227	38
NEMOE	95	0			

To date have not received reports from PHD, MON and MOSSBN. WBØVHN sporting a new KDK 2016 and a model 15 RATT. WBØZSS and wife WDØARX are reaping the benefits of a "homebrew" tri-band quad. WØHH really working on RACES. For info contact him or WBØFKY. WBØTNX in conjunction with the U.S. Weather Service presented a program to the Ozark Amateur Radio Society concerning weather identification. The Ozark ARS presented a public demonstration in the communications van during the Lawrence Co. Civil Defense Day. Congrats to the following new licensees: Novice KAØs AAC AAO AAP AAR AAZ ABB ABJ ABS ABT, ACA through ACK, ACM ACP ACQ ACU ACV AEF AEH AEI AEP AFQ AGB; AGH through AGK, AGM AGN AGS; AGU through AGX, AHC AHH; AHK through AHM, AHT AHU AHV AHX AID; AIF through AIH, AIR AIW AIX AJB AJG AJH AJJ AJV AKA ALD ALE ALH ALW AIX AMC AMK AMP AMT; AOC through AOE, ADK AQO through AQQ, AOS through AOW, APH APO APZ AQP through AQU, AQZ ARA ARG through ARI, ARW ARX ASP ASV ATH ATS ATV AUH; AUS through AUW, AVC through AVP, AVT through AVZ, AWA through AWC, AWE AWG AWI AWJ AWN through AWP, AWS AWU AWV AWX AWY AKI AXJ AXL AXN AXQ AXT AXU AXX AYA AYB AYE AYG AYI AYJ AYM AYO AYX AZG AZO AZV AZY BAI BAJ BAR BAU BAX BBA BBK BBL BBR BBZ BCA BCF and BCT. Tech: WBØs YBA YBX YSE. KAØABY, NØs AAC through AAE, AAH AAO AAT AAY ABC. General: WAØEEU WBØEJJ, WDØs BWZ BZU CFJ CSL GNX GNZ. NØs AAP AAV AAW ABA. Advance: WBØJXZ and WBØPZP. Traffic: (July) WØBMA 260, KØONK 221, WØHH 218, WØOTF 79, KØSI 65, WØOUD 51, KØSSN 30, WØBVL 27, WBØVHN 25, WØQAU 17, WAØFKD 7, KØRWL 5. (June) WØBV 95, WBØVHN 89, KØSSN 39, WØBVL 26, WAØFKD 10.

NEBRASKA: SCM, Ed O'Donnell, WBØGWR — The Victoria Springs Hamfest and Steak Fry, sponsored by the Central Nebr. Amateur Radio Club, was a great success. Over 200 Hams were registered with a total of over 400 people attending, many coming from surrounding states. The Lincoln Radio Club provided communications for the National Junior Olympics held in Lincoln during Aug. Net Reports: Neb. Cornhusker Net, QNI 832, QTC 54; Neb. Morning Phone Net, QNI 1048, QTC 44; Neb. ARES 75 Mtr Net, QNI 181, QTC 1; Neb. Storm Net, QNI 1012, QTC 78; Pawnee ARC 2Mtr NEt, QNI 138, QTC 0; QCWA, QNI 66, QTC 0; Western Neb. Net, QNI 364, QTC 37. Traffic: WØFOB 340, WØVEA 70, WØEUT 44, WØHOP 33, WØVYX 20, WØZNI 18, WBØROG 13, WAØQEX 9, WAØDXY 8, WBØGWR 8, WAØPCC 8, WBØNFG 6, WØNIK 5, WBØAHV 4, WBØGMQ 4, WØOMN 4, WØOOX 4, WØATU 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1XX. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	62	367	154
CPN	3965	1800 M-S 1000 Su	31	480	142
VHF-2	28/88	2130 Dy	30	248	66
WESCON	78/18	2030 Dy	31	469	80

High QNI: CN W1KV WB1CPF K1EIR, CPN W1NQO WB1DWY W1HMJ. VHF-2 High QTC: K1DFS. SEC W1XX requests ECs establish contact with local Red Cross Chapter — see Pg. 63 Aug. QST. Director W1HHR thanks the many operators who handle his "Welcome" messages to Novice Class. N.E. Div. Convention Oct. 14-15 in Boxboro, Mass. — hope you can make it! Conn. Sec. declined in amount of traffic for 1977. Please send report each month. See Aug. ARPSC-LO Bulletin for getting more traffic. Southington ARA Newsletter has membership roster. W1EFW wants exchange of all Club Bulletins. Conn. Comm. Gazette needs Conn. Sec. input, send to K1OQC. Contact on CN or CPN. Greater Fairfield ARA provided communications for Little Americas Cup Race off Norwalk. Tri-City ARC established budget for '79. Stamford ARA will hold Flea Market. Congratulations to: W1QV re-elected Pres. ARRL Foundation; K1CJJ Shoreline "Ham of the Year" Award; & WA1VOR awarded Honor Medal by the Italian Government!!! Clubs: Please get Novice members into traffic work!! Traffic: WB1CPF 165, WB1AIU 80, K1DFS 80, W1BDN 50, W1XX 38, W1GVT 35, W1JA 32, W1JTD 25, W1KV 25, WA1HYN 18, K1OQG 15, K1AEQ 14, K1XA 14, WA1JGS 13, WA1LOU 12, W1BDI 10, W1QV 10, W1CUH 5, WA1BER 4, W1VB 3.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Asst. SCM: WA1OWQ. SEC: W1AOG. New appointments: W1UIQ as OBS. Endorsements: K1CLM as OTS, ECs: W1KTU K1EEG; W1AYG as OO. Our sympathy to W1CRO/4 on the death of his mother. K1YZ is ex-K1YZT. W1MOJ/VE1 mobile. NEEPN has 81 QNIs, 8 QTC. EMRIPN had 378 QNIs, 200 QTC. WA8USB is in Acton. N1AEK is ex-W1CGB, will be on 20 cw, 10 fone. W1DEU now in Reading. W1GCS in Brewster. KA1AQ was WB1DML. W1TTT move to FL. WB1DGG moved to CA. K1RAW on 10 with a six-element Yagi. W1XA now pres. of Foxboro ARC, their repeater K1HF on 147, 975/375. W1GXT has 18 states on 2.3 new states on 70 cm, K1PXE K4QIF K3IUV. WB1DXR assisted Flamouth Road Race on 2. WA1PGY going to Harvard in Sept. W1DMS handled medical traffic from Guatemala to hospital in Boston via phone patch. FB. WB1EMU has 25 wpm cp endorsement. SEC W1AOG received reports from ECs: WA1s BLG HPS ZLO; W1s BHD III BK IYD ZMO; K1NFW. WA1ZXB net mgr. for MMCW Net on 28, 150 Sun. nite at 2330. K1RAW has a Yaesu line. WB1KLK on 2 with new Yaesu memorizer. WA1YMD gave a talk at South Shore RA on computer software. W1PL has QCWA Golden Anniversary award No. 1884. K1PZU has new Ringo Ranger for 2. WA1FNM has new antenna system. WB1GEX now a General. WA1MKT now K1WF. W1JE moved to Harwich. W1JNI in Chatham for summer from FL also W1ZZU from AZ. K1MRO on 2, from Chatham. W1KTU temporary CD Radio Officer, hopes to have up thirty-three element & 90 watts. EM2MN had 38 QNIs, 9 QTC. K1CE now handling traffic. DA2-RM(WB1CIL) is in W. Germany with the Air Force. K1PD in ME fishing. WA1RTQ spending summer on a research grant at Cornell Univ. K1TR moving to Dover, MA, back to Univ. of Mich. for senior yr. Massasoit ARA had a MINI Auction with K1DC. W1CUY trip to Europe. W1FAD in Germany to see his son. W1ECK was in Russia & Lithuania. WA1ZAZ sends out a "ZERO BEAT", very newsy. K1TZC W1TC went to International Field Day in VT. Whitman ARC had their Flea Market. A very good NENN bulletin sent out by WB1CPF. Framington RC will now meet in their Center Library on the 1st Thur. of the month, at 7:30

SOME DRY INFORMATION ABOUT OUR ALL WEATHER ANTENNAS

Sooner or later almost all ordinary ham antennas are going to become victims of bad weather.

But Shakespeare's brand new line of two meter and HF antennas is anything but ordinary.

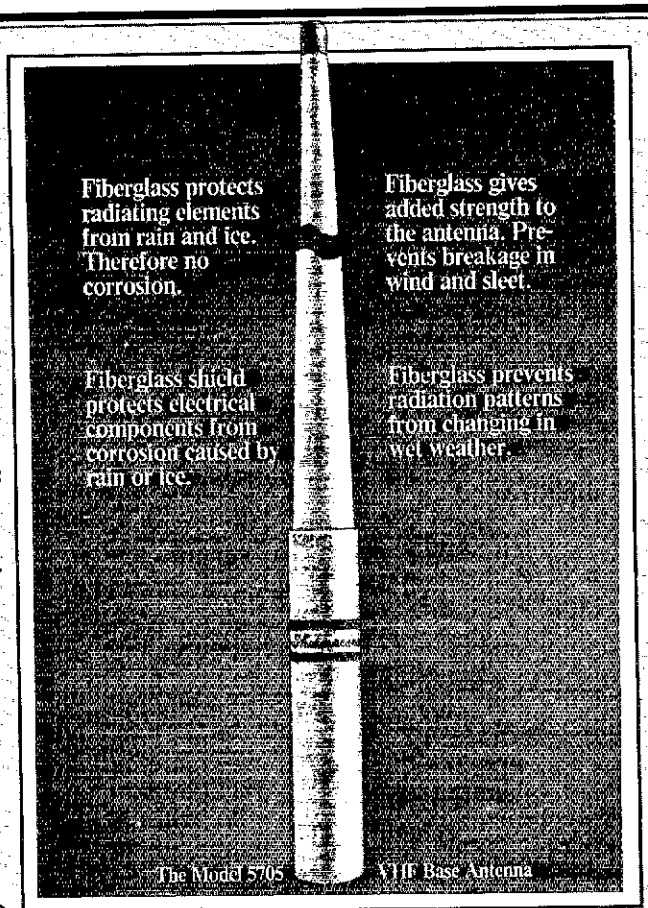
We're new to the ham market, but we've been making marine and military antennas for 26 years.

And those 26 years have taught us how to make a ham antenna that'll take just about anything Mother Nature can dish out.

Look at our 5705 omnidirectional VHF base antenna, for example.

Its radiating elements are non-ferrous brass and copper, the finest practical material available for conductivity and corrosion resistance. Surrounding the radiating elements and electrical components is a tough, flexible fiberglass shield. A shield that gives the antenna the strength to withstand winds in excess of 120 miles-per-hour.

The fiberglass keeps out rain, sleet and snow too. So the antenna's radiation pattern won't change, no matter how bad the weather.



And you don't have to worry about radials breaking off, because the 5705 doesn't have any.

But it does have seven vertically polarized and phased 1/2 wave elements, stacked in colinear array.

And you can get optional style 5709 reflector that blocks out unwanted coverage in one direction and gives you an additional gain in the opposite direction.

And here's another important piece of information: the 5705 is pre-tuned at our factory to operate in all environments. So you will never have to have it re-tuned.

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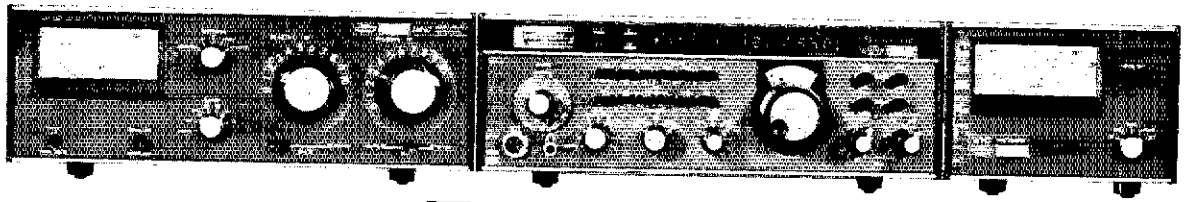

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- Audio and level characteristics custom designed to match the transmit audio requirements of the Drake TR-7.
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- Includes coil cord and plug wired for direct installation to the Drake TR-7.
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- Size 4.3"W x 5.8"D x 9.3"H (10.9 x 14.7 x 23.6 cm). Wt. 1 lb, 7 oz (650 g).

Drake 7077
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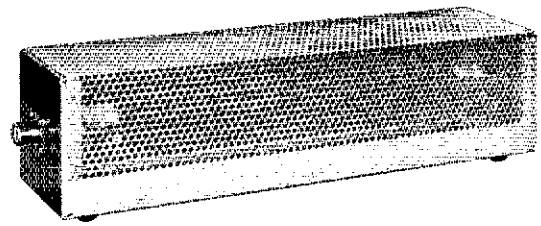
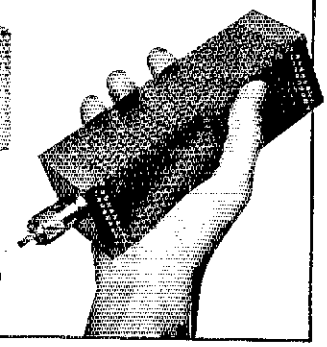


Drake DL-1000



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Model 1551 Drake DL-1000

- 1000 watts for 30 seconds, with derating curve to 5 minutes. Designed to accept Drake FA-7 cooling fan for extended high power operation.
- VSWR of 1.5:1 max. 0-30 MHz.
- Provided with SO-239 coax connector, and rubber feet for desk or bench use.
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PM. N1ABX back again to ham radio. Traffic: (July) K1BA 267, K1PAD 252, WA1EYY 149, W1DMS 121, WA1VAB 118, W1PEX 113, W1FJI 109, WA1JBY 109, WA1LAD 38, WB1GEX 37, W1OMH 36, WA9NEW 32, W2CZB 27, WB1EMU 20, WA1ZXB 17, K1BZD 15, K1CE 12, WA1YMD 11, WB1FGD 10, W1PL 9, WA1IFE 6, WA1YGJ 6, K1PNB 4, K1PZU 4, K1TR 3, W1ALP 2, WA1FNM 2, K1LCO 2, W1EMG 1. (June) WA1TBY 122, WB1DXR 65, WB1GEX 10, WA1PGY 4.

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. New Net Mgr. (MSN) and OTS: WB1AOD. Bangor, July 15 — for 3rd year, Pine State ARC furnished comms. for Paul Bunyon Marathon. July 22, Augusta — about a dozen hams made quick work of winterizing W1VXU's wood pile. Friendship, July 27-28-29 — 14 Yankee RCers and friends participated in Sloop Races again this year. Aug. 5, Auburn — SKY WARN session for hams put on by Nat. Wx Service. Pine State ARC officers: W1YTQ, pres.; K1TQK, vice pres.; W1OLQ, secy-treas.; N1SW N1DE WB1GRN, dir. FCC in Portland Nov. 29 & 30. CW nets great for improving code speed. Main Slow Net, 3596 kHz, MWF 1830 local; Pine Tree Net, 3596 kHz, Dy 1900. July rpts: Sess/QTC/QNI. PTN 31/135/235. SGN 26/82/1071. BYN 31/37/949. Traffic: (July) W1KX 190, W1RWG 83, N1RP 80, WB1AOD 60, W1HDC 50, W1BJ 47, WA1FCM 28, K1TVT 23, W1AHM 20, WA1SMY 17, K1TZH 10, W1JTH 8, N1PL 5, AA1H 2, WA1JCN 2. (June) K1TEV 2.

NEW HAMPSHIRE: SCM, Robert G. Mitchell, W1SWX/W1NH — SEC: K1RSC. NMs: N1NH & W1TN. Time now to get antennas ready for winter. Hope to see many of you at Central New England Net outing. W1UOB moved to NH. W1GUX all set on phone & cw but prefers the latter. N1NH rig problems solved and back on the air. WA1OMH moved to Claremont. WA1WGR visited St. Louis. K1HI visited Montreal. K1MFQ visited Milwaukee and W1SWX visited Hampton. W1GLD was flea marketing. OL2I & OH2IJ from Finland were recent visitors. WA1SOO gave rock climbing instructions at a recent AMC outing. WA1YTW moved to Fitzwilliam. WA1RQT now in Epsom. W1SWX & XYL visited K1NBN & XYL in York, ME. WA3ENU & WA3ZXP moving to Franklin. The GSPN had 344 check-ins & 199 traffic. Ambassador at large, N1CB, assists visitors to our state on the 2-meter repeaters. W1TN made BPL. W1DXB operated from York, ME during vacation. W1CP has a new Yaesu. W1HZH first OSCAR contact was with 10 watts & two-element Quad on a broomstick. TWA pilot W1GUX is ex-W8PHK, W6ZSK & K2AQU. Traffic: (July) K1BCS 459, W1TN 366, WB1ELP 69, W1GUX 66, N1AAI 19, W1HZH 16, WA1PEL 12, W1SWX 8, W1BYS 4. (June) W1TN 480, K1BCS 352, W1GUX 90, WA1VKM 43, W1HXR 13.

RHODE ISLAND: SCM, J. Titterington, W1EOF — WB1EWQ now an Extra with the call AB1D. Congrats! WB1CFT is Advanced and going after Extra. The Newport County RC furnished communications for "Battle of Rhode Island" re-creation. Ditto for N1NA & Co. on "Save The Bay" swim. The RI QSO Party was a true success. The first one in many years! Let's do it even better next year, gang! We would have liked to have heard more Novices and Technicians. N1RI has new Kenwood TS-820S and reports slow month on tfc. WA1CSO, Mgr., reports totals for RIEM 2-mtr. Tfc Net, QNI 118, tfc 54. The 2-Mtr Net deserves a lot more support and especially more net controls. Keep those reports coming in. Traffic: N1RI 15, W1EOF 14.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. The news this month is quite brief — no input! Guess all are enjoying the fine wx being given the area. WB1BZR reports working 13 states, 7 call areas, on 2-meter SSB, and is a member of SWO (Sidewinders on two). He did not report power used! Anyone interested in this, pse contact WB1BZR. Carrier 25/443/48; GMN 26/373/65; VT SSB 31/456/84; RFD 5/84/15; VPN 5/69/6. VT SSB is looking for traffic handlers, especially within VT. Late info — WB1BZR starting North East SWOT Net, 144.220, Mon. 2000 local time. Traffic: K1BQB 117, AA1E 48, WB1BZR 2.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB. W1KK new Section Traffic Manager. Responsible for all Traffic Nets, CW and Phone, including appointment of Net Managers. K1IJV at summer QTH on Cape Cod maintaining WMN NCS and 1RN Liaison skeds. WA1EDS and WA1TAI from CMARA assisting WA1OPN unravel rig problems. Well known K1VPS of NOBARC now Silent Key. NOBARC Hamfest in Cummington great success. WA1NQF W1SPG and K1BNT QSO SCM on 146.52 enroute W2-land. W1KZS and WA1RFA report good DX on 6m. Ex-W1EOB and XYL visiting W1BVR sends 73 to all. K1RGQ up from W4-land at summer QTH in Heath frequent NCS on WMFN. W1DOY spark plugging ARES in Worcester county. W1KK endeavoring WAC (WM) via OSCAR. Traffic: (July) W1TM 176, WA1MJE 124, W1KK 111, K1SSH 82, W1ZPB 67, W1BVR 33, W1DOY 27, WA1OPN 8, W1KZS 2. (June) WA1MJE 240, WB1CWH 13.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK — The Alaska Snipers Net has completed five years of activity without missing a single session. KL7HOV has been the PAM now RM since the net started. We are all looking forward to the ARRL State convention next month. KL7HDS has a new antenna complex, sure looks and performs well. KL7IJG on Adak reports 9 members of ARES on the island. KL7DC EC Anchorage reports 59 members of ARES now. They meet every Thur. on 146.52 at 8:00 PM. The Alaska DX Assn. are now an ARRL affiliated club with 100 percent ARRL membership. Propagation this month as been very bad, hopefully it will improve next month. KL7KX the Alaska SEC is in the interior keeping the fire camp crews radios functioning. Doug reports very few fires this year. Traffic: KL7JDI 34, KL7JFJ 32, KL7JDH 18, KL7AF 8.

IDAHO: SCM, Ed Hamlin, W7KDB — This report prepared by SCM-elect Lem Allen, W7JMH. Pocatello ARC had a very successful picnic July 8. Welcome to new Novices KA7ASX KA7ASY KA7BLB, all YLs. WB7PAV now Advanced, WB7SPJ upgraded to General at age 14 — congratulations! The Pocatello repeater WR7AMN had a face lifting recently, having 2 more cavities in the receiver input to bring it up to snuff. Now working FB. Northwest Amateur Monitoring Service is on the air all day on 3970 kHz for emergency services. W7ARM visited W7GGV's hamshack. W7KAU working on a new 2-meter repeater for the McCall Idaho area. W7JMH vacationed in OR and CA using many 2 meter repeaters. W7FOF has new KDK on 2 meters and Kenwood SM220.

Net	Freq.	Time	Sess.	QNI	QTC	Mgr.
FARM	3935	8 PM	30	1103	23	W7CJC

EEs

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At General Electric's Mobile Radio Department we produce equipment for a broad range of commercial and industrial businesses plus all levels of government.

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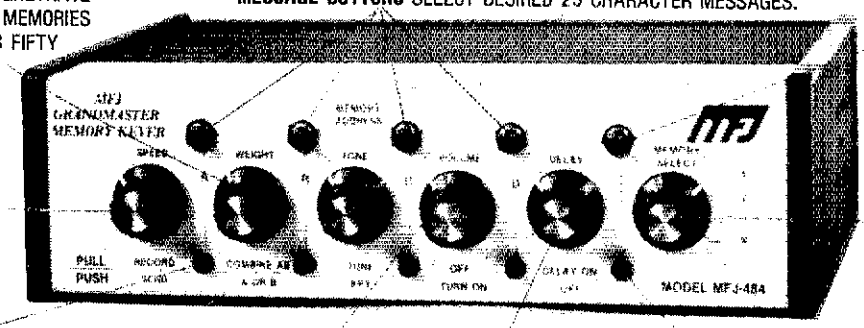
memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.



RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION** K GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control, 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

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Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

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Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

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- **Tune function**
- **Built-in memory saver**

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Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

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4. **Collins Station** - Excellent cond. used KWM-2 "wing" s/n 10410 with Waters & DX Eng. Proc., 516F-2 PM-2, 312 B-5, Spectronics DD-IC Dig. display bid on complete station only - subject to prior sale at asking price $1295.00
5. **Heath Station** - SB-102, SB-650 dig. display, SB-600 speaker, HP-23B P.S. Mint Condition. Subject to prior sale at asking price of $650.00
6. **Heath Station Accessories** - SB-620 spec analyzer, SB-610 Scope, SB-630 Stat. Console HM-102 SWR Meter HM-2102 SWR Meter. Mint cond. Subject to prior sale at asking price of $450.00
7. **Midland 13-510** with "PL" - Mint used. List $430.00

HOW TO BID

1. Enclose personal check in the amount of your bid and indicate which item bid is for.
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4. Enclose self-addressed stamped envelope.
5. Send to Arson Auction: Arson, Inc., 615 So. Gallatin Rd., Madison, Tennessee 37115.

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ICOM IC3PA Power Supply	99.00	69.00
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wo/key	12.50	10.00
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	List	Sale
SEI Power Supplies - all New		
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SPS-20	159.95	99.95
SPS-20 Meter	189.95	114.95
SPS-30	179.95	108.95
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SY-1	274.95	225.00
SY-2	219.95	175.00
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	List	Sale
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FT901DM	1459.00	1271.00
FT901D	1259.00	1100.00
FT901 DE	1259.00	1100.00
FL2100B (w 10M)	529.00	449.00
FT301	769.00	599.00
FT301 dig	935.00	749.00
FP301 dig.	239.00	195.00
FV301	125.00	99.00
FR101S	599.00	495.00
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IMN 3635 9 PM 21 203 43 WA7BDD OO W7FIS reported no violations during July! Traffic W7GHT 177, W7JMH 33, W7LLM 20, W7GBO 3.

MONTANA: SCM, Robert Leo, W7LR — Asst. SCM WA7PZO. SEC: W7TYN. RM: K7CHY. PAM: W7TGU. ECs N7AD W7AVD WB7AZJ K7CPC WB7EBK WA7FLG W7GWW W7IDK K7IMZ W7IXD WA7IZR WA7KMF W7LBK W7LYR WA7M1H WA7OBH WA7ONS K7OZL WA7PDC. Other appts listed next month. About 500 hams at WIMU — PB hamfest. WIMU next year last July weekend. MTN QNI 580, QTC 64. W7DB sends ARRL bulletins. IMN QNI 203, QTC 48. OO reports from WA7IJN WA7OBH K7ABV. Some W7LR DX PW0PP 9X5NH, CE9AT, OJ0MA. W7LR won WIMU cw contest. Please send more news for this column. Traffic: W7IXD 24, WA7OBH 14, W7LBK 3, W7LR 3, W7NEG 3, W7DB 2, W7HAH 2.

OREGON: SCM, Dale T. Justice, K7WW — Section nets:

Net	Time	Freq.	Mgr.	QTC
OEN	6/7 PM	3980	W7VIF	
OARES	7 PM	3993.5	WA7NEQ	3
PDX ARES	7:30 PM	147.32	K7WW	32
OSN	6:45 PM	3585	N7NO	
WCN	7 PM	3702	WA7YPJ	
1676	7 PM	146.76	K7KVV	38
BSN	5:45 PM	3908	WA7GFE	
JCARES	7:15 PM	147.06	W7VSE	10

New Ec for Columbia County is WA7OOB. Many local stations were for the new UHF contest. Some stations put on many miles providing latitude-longitude multipliers. WB7OIJ in Bay City is active on ARES and local repeaters. N7DB is working lots of summer E skip on six meters. The Eugene Hamfair was well attended with many league officials present. Several two meter bunny hunts were held and this seems to be popular sport. Traffic: (July) W7VSE 540, K7NTS 416, WA7IHS 182, K7IWD 63, W7HLF 48, K7WW 37, WA4HRG 32, WA7ZAP 26, W7LT 10, WB7OIJ 10. (June) WA7ZAP 17.

WASHINGTON: SCM, Bob Klepper, W7IEU — NTN QNI 1394, QTC 45; ESN QNI 359, QTC 21; NWSSBN QNI 701, QTC 56; WSN QNI 313, QTC 67. W7LG glad to be back on nets and getting hamshack in shape. WA7TWB's Emergency plan officially accepted by San Juan County officials. QRN from power lines bothering K7VSZ's new antennas. WB7QWC setting up for mobile emergency operating from mobile on 10-80 plus 2mtrs. HAMS Oct. Pancake feed Sun. Oct. 1. WB7FGC very active in local ARES and RACES. N7AM making progress on vertical array hopes to have complete by winter. W7BCS prefers old call to N7CT, now using W7BCS for activities. N7RV moved into new hamshack and getting ready for winter activities. WB7BOZ is now a Silent Key. Tfc dropped as well as QNI on WSN due to the hot WX. W7AIB still having problems but QNI's CW nets occasionally. 23 H.A.M.S. and ARES members combined to provide communications for International Airfair. ECs WA7KGT WB7PUI. WA7PRG W7ETK and others handled much traffic on the Dosewallips River washout. K7MF added 450 MHz to mobile. K7ABH toured first call area in July. WR7AFJ now on 32/92 with new Micor and greatly extended coverage. N7AGG (K4JLB) is new State Emergency Services RO. WB7TYZ upgraded. RASC members provided 2 mtr coverage for Algier Horse club. WB7FDE has info for Vancouver area on cw and other net listings. W7PGY has cured his 820s now back on cw full bore when not QRL at hamfests and club meetings. North Seattle ARC is another club who didn't get their club call (W7DA) back from FCC when sent in for renewal. CBN WR7ADX WR7AEF as WR7AFJ used by K7CBL K7USE W7IEU and others to notify families of campers stranded in flash floods in Eastern Wash. 30 BEARS and their families enjoued FD. K7LAY is now retiring as trustee for BEARS station K7NWS, N7IL is the new trustee. W7AUK of West Seattle ARC has info on gtg your call on auto license plates. When renewing your amateur license send a copy to Olympia, save them from reminding us. Lower Columbia ARC had lots of fun and food for FD. N7CY, pres. of West Seattle ARC has some interesting thoughts on the word "Amateur." K7SSC looking for help for road rally Oct. 28 es 29, needs about 50 people. Northwest Novice Net (NNN) now meeting on 3720 at 1930 local time in hopes of increased activity. WB7WOX new Novice in Oak Harbor. Traffic: (July) W7DZX 543, K7GXZ 84, WA7KGT 83, N7AM 72, WA7BDD 50, WA7YCM 45, W7LG 43, W7IEU 40, WA7LOV 40, N7IT 36, W7EBU 33, W7APS 24, WA7OJI 23, W7ZEV 14, W7BCS 12, W7BUN 11, WA7TWB 6, K7VSZ 3. (June) W7PLF 34, WA7RCR 13, WA7LQQ 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — SEC: K6UWR. PSHR for July: W6OA & W6JXK. K6XO operated IARU Radiosport at W6YX and has his tower up with the quad on the way. N6NE was active in the North American Sprint & IARU in addition to vacationing in Ore. LCARS met at Great Western Savings in Lakeport; contact W6BIY for info. A very slick new publication, "Radio Amateur News," edited by WA6WTT, combines news of the Redwood Empire Radio Amateurs (RERA), Redwood Coast Amateur Radio Club (RCARC), and Lake County Amateur Radio Society (LCARS). Announcement of the establishment of a Pacific Division award, "The William W. Eitel Award," to be presented to a Pacific Division Amateur for his/her contribution to Amateur Radio, was made by N6WR of World Radio during the banquet at the Pacific Division convention in Reno. Mr. Eitel, W6UF, received a standing ovation from those in attendance. Also at the convention was soon-to-retire Communications Manager, W1NJM. After a particularly rousing speech he gave at a meeting of LDs George was given a round of applause and sincere thanks for his years of dedicated and outstanding work as a member of the HQ staff. Traffic: K6OE, 229, W6OA 169, W6JXK 112, N5MR 39, WB6VEW 15, N6NE 15, WA6DOO 7, WD6BMX 3.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. WB7UPF, age 13 is the youngest staff member on the Hoover Dam Boy Scout Council and may be in the world. W7PRM and WA7RPZ vacationing at Flatt Head Lake, Idaho. Your SCM had a nice visit with K7UDG who started the public service net from Stead AFB, the net is known as WCARS. WA7ESM WB7EOP WA7BRM W7FJN K7GHS K7ICW K7LRV W9OEO/7 (K7RBM), WA7VHP and K7YVH, at the Ft. Tuthill hamfest. K7YVH's motorcycle with 2 meters, 40 meters and a CB rig was wired for sound in case it was molested without the owners permission. Reno AREC net at 1930 hours on 01/61 repeater. Biweekly dinner at the 76 truck stop for Radio Amateurs and YLs attendance is growing. Traffic: W7ILX 188.

PACIFIC: SCM, George Morton, N7HR/KH6 — Tel: 808-499-1149. Mni tks to those who made Kailua 4th of July Parade a success thru 2 mtr comms: KH6s BI BR

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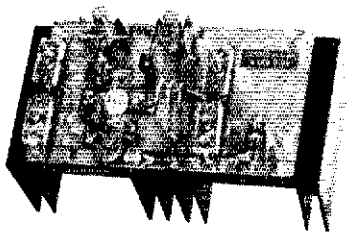

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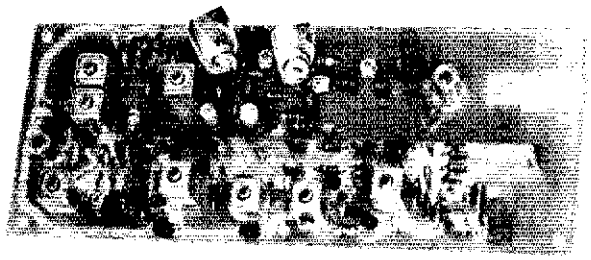

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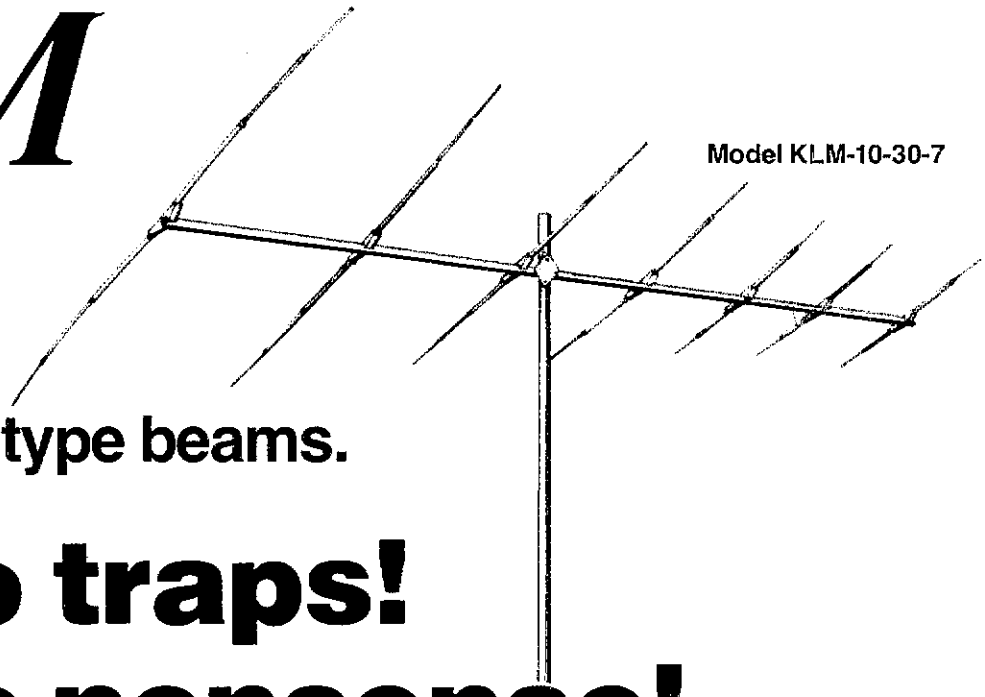

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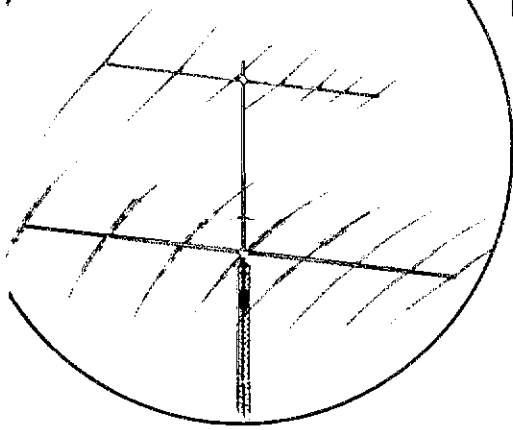

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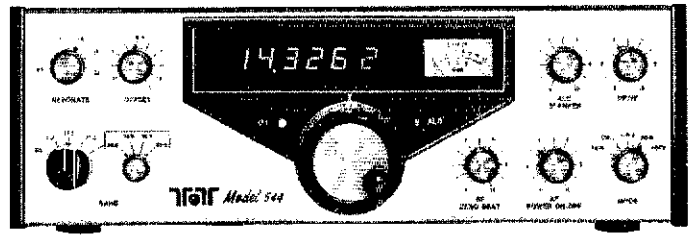

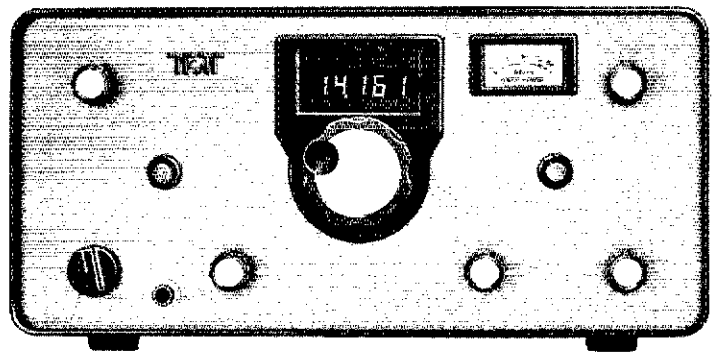

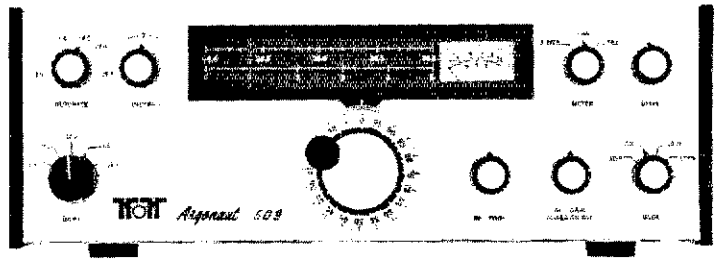

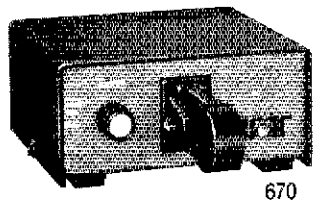

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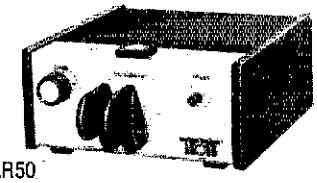

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BWE IQT JBS JCA JKS JNM & JUZ. Hurricane "Fico responsible for two mtr. opening fm Carmel, CA & 22/6 Mauna Loa. KH6BZF the DCA Pacific prop pr gnisticator predicted the condx! Many ducting report show more listeners looking for DX. ARRL VP Carl Smit treated to retirement aloha party by crew fm Western A Lines. Myriad of flowers, 80 lbs. of Mangos (!) and Laur (XYL-BZF) poemed appropros. Sigh. Nw rcvng news fr few clubs, super & tks, but hpe to get 100 percen KH6DD in new house, high on a hill super DX QTH, bu hw to get the old tower up? Your SCM nw speakin binary to new IC701/IC211 plans microcomputer to help 1001001. Traffic: KH6JJP 30, KH6BZF 10.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV – Asst. SCM: W6NJU. New officers for the Mt. Vaca R are: WB6PHQ, pres.; WB6GIF, vice-pres.; WA6CNB secy.; K6FO, treas.; WA6ESA, p. pres.; WB6DQP, trustee WA6s ACF APX and BAR, dirs. The River City ARCs ha their hottest rate during Field Day while putting out near-by grass fire. The River City net meets on Sun. nit at 8 PM on 28.700. The Foothill ARC holds their Mon. nit net on 146.52 at 7 PM. They are holding a General clas course and will start a Novice class in the Fall. WD6CG has an eleven-element 2-meter beam and WB6HBI has new two-element triband quad. WD6CGU now uses th alias N6AIV. WA6APE passed his Extra and WD6CQ with WD8JXS/6 now are General Class. W6WAH an family provided communications and med. assistanc after an accident on I-80 with the assistance of WB6LS and the WR6ADC rep. Traffic: W6RSP 164, W6DEF 14.

SAN FRANCISCO: SCM, Mark Nelson, AA6DX — Lat report for June. NCN members wishing new CD appoin ments are urgd to use the tfc nets to request apps W6IPL doing FB job in "Relay." New editor for NCDX "DXer" is WB6RIU. W6RNL reports new Atlas 350 work ing great in tfc nets. RCCC has 5 ops for Radiosport WB6QPG WA6TOE WA6GSR WB6SYQ and old ma AA6DX. WR6ACS not has two-meter touch-tone contro W6NL can be found on NCN or RN6. FWRA participate in simulated plane crash at Arcata Airport and ended u doing a major portion of the communicating! W6UQ was operations mgr. for the Pony Express Days Parad in McKinleyville — Kudos to the FWRA again! Field Da '78 a real success throughout the section. Murphy's ag is showing! W6GGR joins the micro computor rank with a KIM I. Traffic: (June) W6IPL 181, W6RNL 154 K6PB 119, W6NL 157, K6TP 89, AA6DX 8, W6GGR WA6ICB 2. (May) W6NL 154.

SAN JOAQUIN VALLEY: SCM, Charles McConnel W6DPD — SEC: WA6YAB. WB6TTP is a Public Relation Asst. W6MRT new EC for Mariposa Co. ECs are sti needed for San Joaquin and Amador Co. New officers o the Turlock ARC are WB6ZQY, pres.; K6IMN, vice-pres. WA6KJL, secy.; W6SM, treas. The club meets the 2n and 4th Tue. in Turlock. The Central Valley RC now ha 200 members and growing. Indian Wells Valle Emergency Net now planning for SET. Kings Count ARC now an ARRL affiliated Club. N6OZ plans a Novic class for the fall in Stockton. The keys of WA6HAA an WB6KSV are Silent. The following have changed ca signs: WA6ZSB to W6TWN; WD6AHB to N6AG WD6CFG to KB6DH; WB6DYQ to KB6DK; WD6CKF t KB6CC. W6VIJ made NCN Honor Roll for June. Mor stations for NCN check-ins are needed from the SJV WB6ETR made Extra. WB6VIN made Advanced. TI2VA active from Bakersfield. K6PKO has a TS520S WB6HWH an IC22A. WB6KUO a TR7400A. WB6VOG FT227R. WD6CNC an HR220. WA6TJW an Alda 103. A Clubs in the section are asked to notify the SCM of an changes in officers and of any activities of club. Traffic (July) W6DPD 22, WA6YAB 6, WA6JDB 4, WA6IQZ (June) WB6VJW 52, WB6TTP 7, WA6YAB 2.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. NM: W6RFF. W6KZJ reports he is hom from the hospital and back on the air. WB6SHD busy with a summer job as an electronic tech and awaiting ar rival of a new rig. W6OII busy with SJN, MTN and Navy MARS nets. OII heard two KH6 stations on 2 meters bu unable to QSO. W6AUC is another busy net op, QCWA (OOF, SKETO and Tuolumne Co. nets. CCRC is lookin for an editor and publisher for CCRC Circle. SCCARA i again running Novice and General classes in S.J PAARA Auction and Flea Market Oct. 7 at Ampex, RC NCN activity Honor Roll included W6IQU WA6JWK W6KZJ WA6NMQ W6RFF W6ROY WB6SHD N6YE W6YBV and K6YKG. ORS and OPS appointees ca receive new Official Traffic Station certificate upo receipt of s.a.s.e. by me. The Newbold family, W6MM WA6NDN and WB6HBL reports MMG busy on ARINC net NDN on trip to W7 and VE7 with 40-mtr rig, HB chasing DX. MMG reports WD6AOC and family sailing from W6 to KH6 on catmaran. SEC WB6IZF active o WCARS, WX, SCV ARES, WR6ADX and WR6AZD bet ween organizing and emergency planning for SCV. IZ reports EC VHF net is nearly complete for section wide coverage. All questions or info on emergency com munications in SCV should be addressed to our SEC There are EC openings in many communities throughou SCV, become involved! W1ARR/6 now working in Palo Alto and active on NCN. W6YBV continues to lead the section in traffic handled month after month, and has been active on NCN as NCS and RN6 for more than 2 years. Traffic: (July) W6YBV 148, W6RFF 51, W6AUC 44 W6OII 29, WB6SHD 13, W6KZJ 6. (June) W6KZJ 22.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — SEC W4EHF. STM: N4UE. Two Hamfests planned for Oct. In clude Eastern NC Hamfest on 15th in New Bern and the Asheville Autumntest on the 7th — see you there. Con grats to the Iredell Co. ARS now affiliated with ARRL W4WXZ now in a new renovated shack; WB4OXT work ing on a new 160 mtr ant; WA4QQS had slow summe recovering from broken collar bone; N4AA is installing a new 100 ft tower; K4FTB reports 40 mtrs very eratic du to solar activity. WB4GVG now supplying bulletins in th Durham area. Upgrades include WD4IJV to General WA4PLP to Advanced. New calls include K4JEY no AB4X, W4CQJ is AA4L, WB4SII is AE4N, WB4OWK i AB4T, K4GHR is AA4R, WB4BQC is N4AFY. CTN meets at 3737 kHz at 2230Z and invites your participation. New appointees this month include WD4JIE EC Lincoln Co. N4AGP OTS. Net QTC/QNI include NCSSBN 35/1279 THEN 205/1118; CNCTN 117/1674; RARS 34/287; Pied mont 220 Net 2/65. Handled any traffic lately? Join one of the many nets active in NC. N4UE, becomes the firs Section Traffic Manager (STM) effective Oct. 1 and wil be soliciting your ideas and opinions on Nets and traffic handling activities in our Section. Give Herb your sup port in this new assignment. "The Carolina Messenger" is a monthly publication devoted to covering traffic ac

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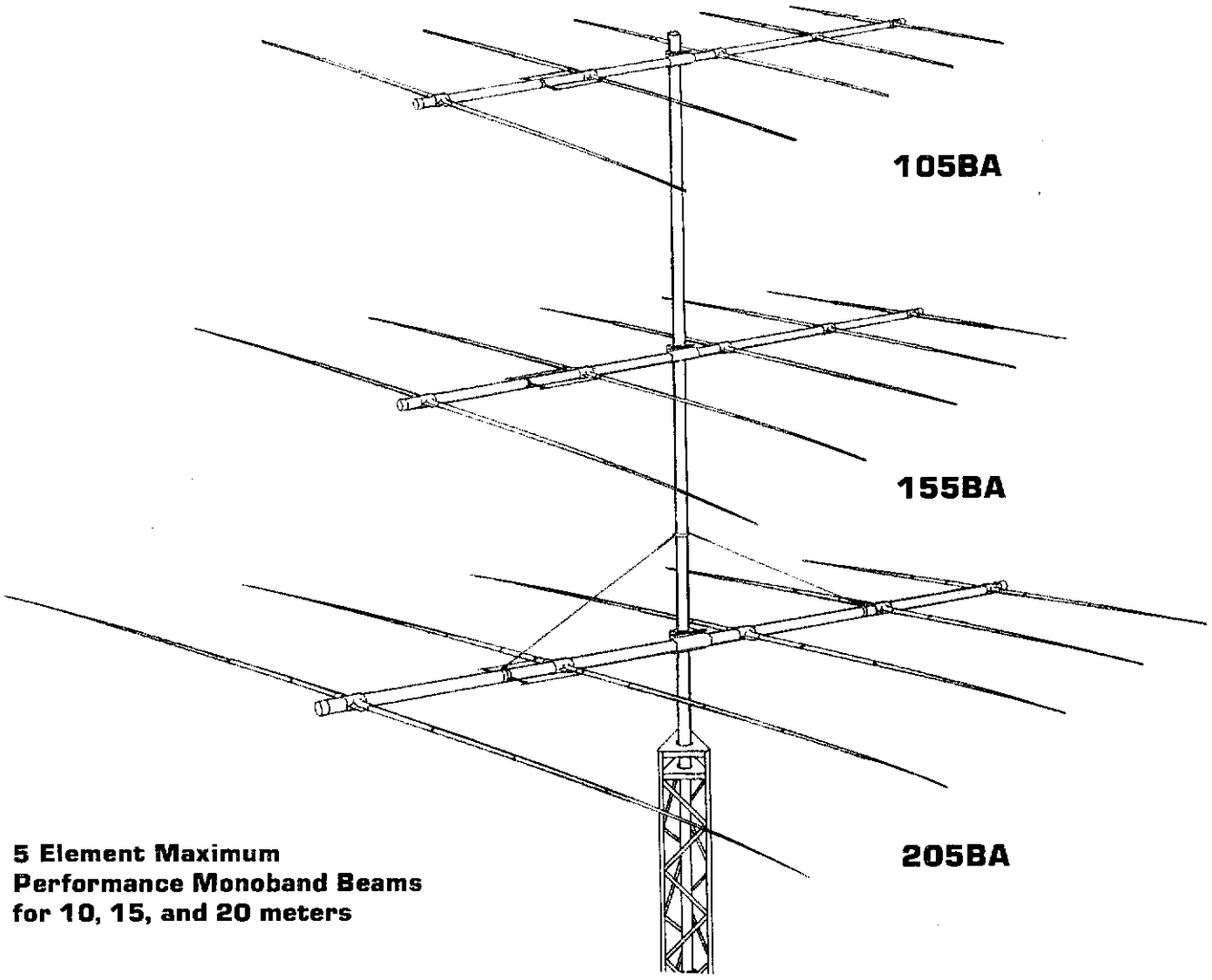

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Impedance	50 ohms	50 ohms	50 ohms
Power rating	Maximum Legal	Maximum Legal	Maximum Legal
2:1 VSWR Bandwidth	400 KHz	500 KHz	1.5 MHz
Longest Element	36½"	24½"	18½'
Boom Length	34'	26'	24'
Boom Diameter	2"	2"	2"
Turning Radius	25'	17½"	15'
Surface Area	9.0 sq. ft.	5.2 sq. ft.	3.9 sq. ft.
Wind Load at 80 mph	230 lbs.	133 lbs.	100 lbs.
Maximum Wind.Survival	80 mph	100 mph	100 mph
Mast DIA Accepted	1¼" to 2½"	1¼" to 2½"	1¼" to 2½"

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SX-115 Receiver	349
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HT-40 Transmitter	49
SX-99 Receiver	99
SX-117 Receiver	189
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SR-160 Xcvr	159
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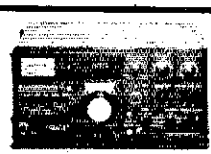

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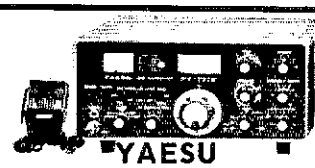

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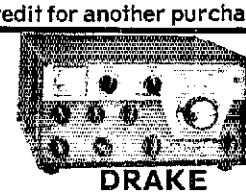

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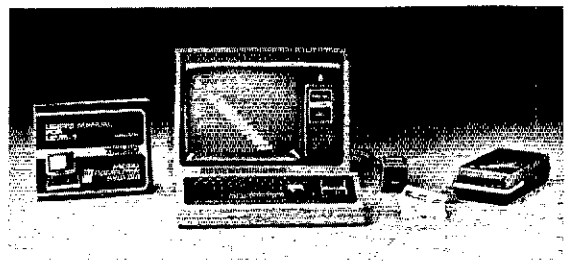

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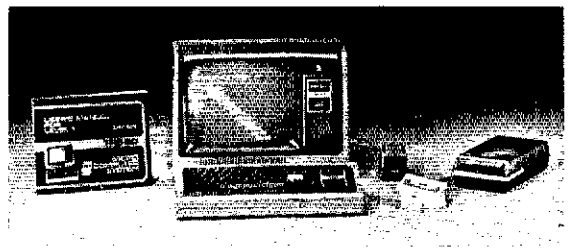

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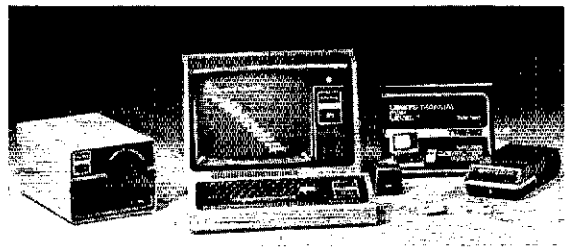

TRS-80 "Educator"
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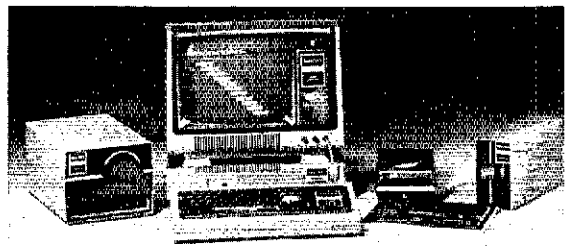
...or the Level-II 16K/printer/disk system at $2385



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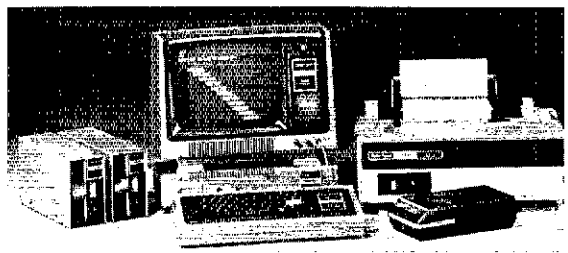

TRS-80 "Business"
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tivities in the two Carolinas . . . write W4OCX for details. Let's see NC active in CD Party this month. Traffic: (July) W4EAT 283, K4MC 176, N4AGP 124, W4OFO 114, W4FMN 95, N4UE 90, N4ZH 85, K4FTB 76, K4VHT 67, WB4MXG 60, AA4R 44, AA4NC 38, WD4FJM 30, W4WXZ 26, WB4OXT 25, WD4CNS 23, WD4MBV 23, W4ACY 20, WA4YMW 19, WB4ZIQ 17, WD4EMK 17, WA4SRD 14, WD4AAM 12, WA4UTC 12, WB4WII 11, K4AI 8, W4OCZ 6, W4IZI 6, W4EHF 2. (June) N4UE 66, WB4ZIQ 49, N4ZH 30, N4AA 26, WB4WII 14, K4AI 9.

SOUTH CAROLINA: SCM, Tom Lufkin WA4DAX — Asst. SCM: WA4MDP. CNM W4MTK. NMs WA4DZG, WB4CAK. There have been many questions concerning restructuring of appointments. As of July 1st ORS & OPS became OTS; RM & PAM became NM. This is automatic, you need do nothing. If you would like a new certificate from me now, please let me know. You will receive one from the new SCM. Charlestowne Hamfest was a hugh success, hope to see you at Rockhill. It is with deep regret I report K4JVV of Greenwood as a Silent Key. The sideband net & ham radio have lost a supporter & friend. K4GL & WA4VMV were on Sumter TV talking & answering questions about ham radio. SCM race is shaping up. It is gratifying to see the renewed interest in the League again. Net reports: SCSSBN: 1255 QNI, 159 QTC. Blue Ridge 2 mtr: 898 QNI, 9 QTC. Anderson 2 mtr: 691 QNI, 33 QTC (June) SCSSBN 1186 QNI, 155 QTC. PX: 131 QNI, 30 QTC. Ander 2mtr: 733 QNI, 25 QTC. Traffic: (June/July) N4PQ 317, K4ZN 154/175, W4NTO 83/43, W4FVV 43/51, WB4UDK 42, K4FRX 34/35, W4MTK 22/28, W4ANK 18, W4OCX 11, N4EE 5, WB4MOT 4, WB8TCT 6, WB4MOT 4, WB4NBK 2, WA4KXE 188, WA4KZX 12.

VIRGINIA: SCM, Rick Genter, K4BKX — Asst. SCM: W4YE. SEC: WB4ZNB. NMs: W4SUS VNTN, WB4DQZ VSBN, WA4YIU VSN, WB4FLT VN, WB4PNY 4RN-D, W4SHJ 4RN-E. Prompted by participation in 4RN-D, WA4NYZ put up a new 40-meter vee. NN3SI will host K9EF/4, Woody, as a guest op during Sept. WA4STO is looking for prospective hams for Novice class. WB4ODZ and his fine crew are busy, as usual, providing communications for the city of Hampton. W4OOL is repairing winter damage to his all-band vertical. EC N4UY is working with the Richmond Red Cross. W4YE visited his dad, W5KL, who is ex-W4YE. New England hosted vacationers WA4ERJ WA4FTJ and W4NWM this summer. EC, WA4RXY has a new 2-meter portable rig and a new HT should be in the hands of WA4LTO any day. W4KFC is busy with IARU Region 2 affairs, but still found time to attend the WVA convention, the ARRL Board Meeting and the NTS picnic. W4JUJ has now worked all of the U.S. counties but 9! WA4LJI is back on the air now that his rig has been returned from the factory. W4DR, (ex-W4QCW) now has his antenna farm rebuilt from last winter's damage. Bob recently worked SV1JP/P for NR. 294 on 40 and PW0PP for NR. 254 on 80, but what else would you expect from the holder of 5BDXCC serial nr. 1? The Williamsburg AARC, under chmn. WB4UHC, worked their first Field Day. N4LE has a new TS-820 on order and should be heard on ssb any day now. The Lynchburg ARC is working on a proposed HF operators committee. WA4OUF says that Dr. San Hutson, K5YY, will soon begin another DXpedition and will operate as ST0 among others. WD4IQF is expecting a new Triton 4. Per K4KBL, Crete, SV1FT is on 14.284 at 1500Z weekdays. PLEASE get your reports in to me by the 4th of each month. My deadline is the 7th. OO reports received from: W4HU WB4KCL WA4SBC. BPL: WB4PNY W4JK WB4DBK. Traffic: (July) WB4PNY 634, W4JK 513, N4NK 367, WA4CCK 359, WB4DBK 331, K4BKX 288, WD4IQF 177, WB4FLT 174, W4SQQ 163, K4KNP 150, K4KDJ 133, K4GR 123, WA4UYD 115, WA4YIU 101, K4JM 85, N4RF 82, WB4DQZ 80, W4SUS 80, WA4NYZ 77, AA4CK 70, K9EF/4 57, WA4QWC 48, WA4STO 46, K4EJ 44, WA4RDI 42, WB4ZNB 42, WB4ODZ 36, N4FM 33, K4VWK 30, WA4FDV 27, W4OOL 26, WB4FNW 25, W4OKN 25, WA4ZWT 24, W4NWM 21, WB2JAY/4 20, WA4QQI 20, WD4OVR 19, N4FI 18, K4ISW 17, WA4PBG 17, N4LE 15, N4UY 15, WA4RXY 12, W4YE 12, WB4KIT 11, WD4CYX 9, WA4LTO 9, W4LXB 9, W4PRO 8, WA4WTZ 8, N4AOP 7, W4KFC 7, N4OT 5, W4ZM 5, WA4FTJ 4, W4KAO 4, W4TZC 4, K4ITV 3, WA4YJF 3, W4DM 2, W4JUJ 2, W4KXE 2. (June) W4LXB 83, N4FM 37, N4UY 22, W4ZM 12, WD4IFP 5, WA4WQG 4, N4DW 2. (May) N4FM 46, WD4IFP 6. (Apr.) WD4IFP 7.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Asst. SCM: K8KT. SEC: WA8NDY. Net Mgrs.: W8YP WA8WPW. WD8JYM. Our deepest sympathy to the family and friends of K8QYG on his passing. State Radio Council sponsored a week of code and theory classes at Boy's State, Jackson Mill with W8IXG as instructor. Pete O'Dell, ex N1UM of Headquarters, now lives in Parkersburg, his call WB8NAS, wife's call WB8NOK, both Extra Class. WB8EKG resigned as EC for Berkely Co. and K8KXE appointed EC for Pleasant Co. New repeaters at Cameron and Buckhannon. Stonewall Jackson ARC officers, WB8BPS, pres.; WD8CYK vice-pres.; K8YL, secy.; WD8NWK, treas.

Net	Freq.	Time(Z)	Ck-In	Tfc.	Sess.
Hillbilly	14290	1700 Su	171	64	4
Novice	3730	2115 Dy	136	36	30
CW	3567	2300 Dy	205	50	31
Phone	3990	1600 Dy	383	28	28
Phone	3990	2200 Dy	751	84	26

Traffic: WA8WPW 71, W8YP 38, W8CKX 30, WB8TDA 20, K8KT 11, WB8JYM 8, WB8VAZ 8, K8ZDY 7, W8JM 7, WD8JYN 5, WB8IHA 5, K8JQ 5, WD8DHC 5, WB8UVM 5, WA8RUZ 4, W8FC 4, K8MS 4, WD8IGN 3, K8QEW 3, WB8LAI 3, WB8SAW 3, WB8INS 3, K8MHR 3, WD8MUP 2, N8JC 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA0HLQ — SEC: K0FLQ. RM: K0TER. NM: K0CNV, WB0ZQG. It is with deep regret that we add to the list of Silent Keys, the call of W0SIN, Chic Cotterell, Director, Rocky Mountain Division. Chic will be sorely missed, not only by Amateurs in the Rocky Mountain Division, but also by his many friends throughout the country. Our deepest sympathies go out to his family. 73 Chic. WD0DNM who is quite active on Columbine Net as well as the 12th Region Net, is enjoying his new Swan 1210-A. Grand County ARC will soon have their new 146.22/82 repeater operational. W0DYK reports the loss of his 6-meter antenna as well as his 80 & 40 meter "Vee" to recent high winds at his QTH. WB0FFV is the new net mgr. for the Colorado-Wyoming Net. Net Tfc. for July: SSN QNI 45, QTC 23, informals 22, QNF 331, Columbine Net QNI 821, QTC 122, informals 156, 31 sessions, QNF 1162. Late net Tfc. for June: SSN QNI 35, QTC 19, informals 8, QNF 331. Traffic: (July) W0WYX 2280, WA0HJZ 550, WD0AIT 394, K0DJ 226, W5HRS/0 143, WB0ZQG 106, WA0YNP 98, W0RE 87.

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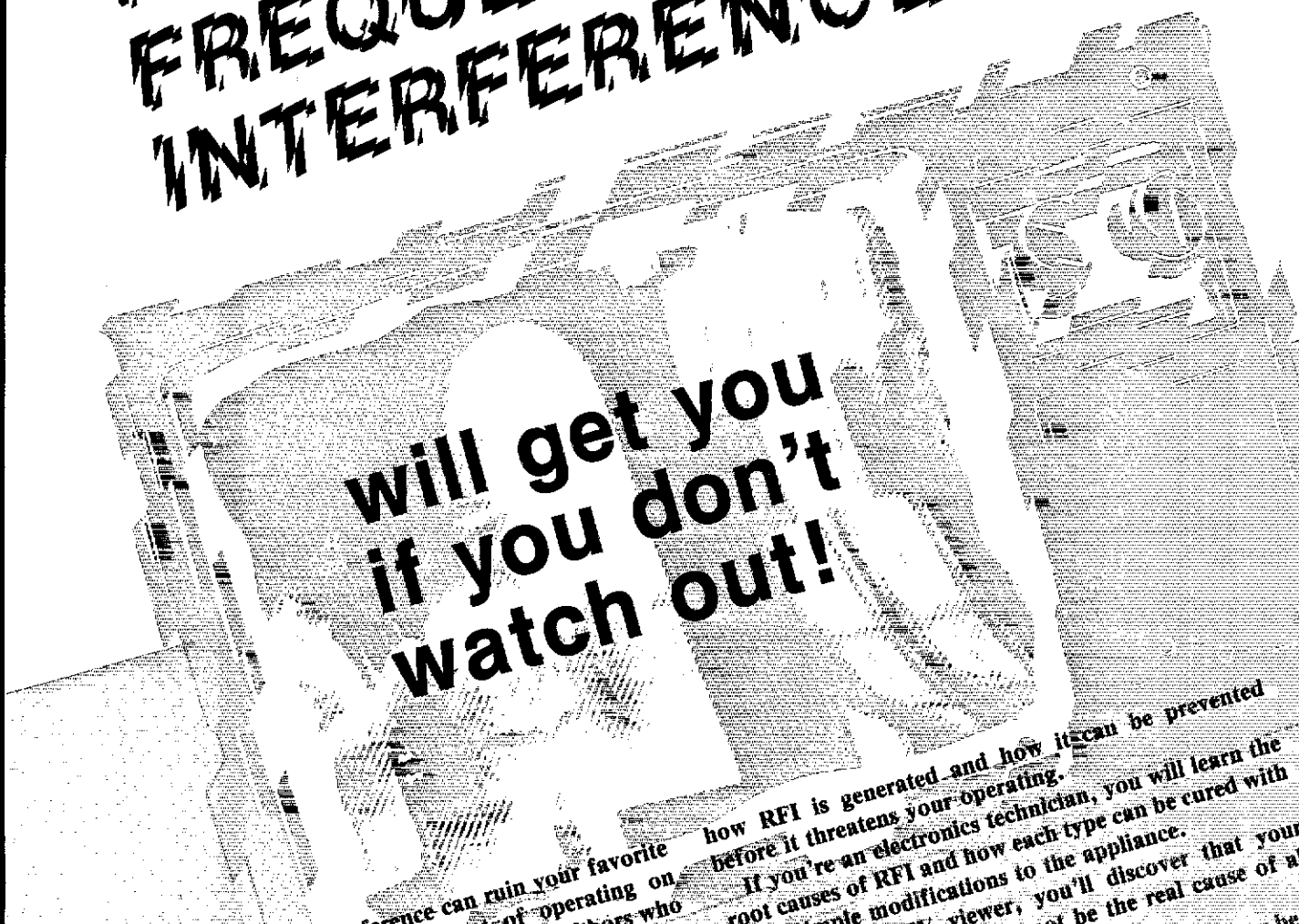

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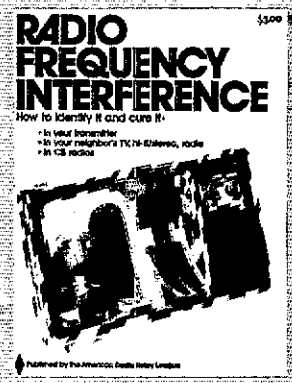

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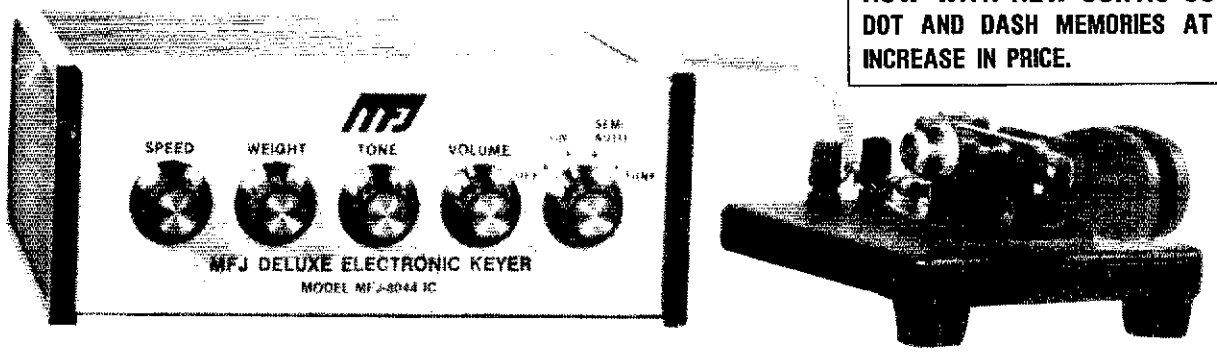

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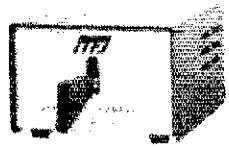

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Internal weight control lets you adjust dot-dash-space ratio for a distinctive signal to penetrate QRM for solid DX contacts. Sidetone and speaker. Internal tone control.

Panel Controls: Speed (8 to 50 WPM), pull-to-tune; volume, on-off; 3 conductor, ¼ inch phone jacks for keying output and key paddle input. Uses 9 volt battery. **Optional squeeze key** (see above), $29.95 plus $2.00 shipping/handling.

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KØPVI 51, WØGO 25, WØMDT 20, WDØDNM 18, WBØMCL 17, WBØYKH 16, KØSPR 4, WØNFW 3. (June) WAØHJZ 558, WBØZQG 119, WØMYB 11, WØNFW 10. (May) WØMYB 10.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. PAM: W5JOV. RM: K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 20:00 local time and handled 187 msgs with 176 stationns reporting in. New Mexico Roadrunner Net (NMRN) meets daily on 3940 kHz at 1800 local and handled 88 msgs with 903 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 98 msgs with 613 check-ins. With deep sorrow we mourn the passing of Chic Cotterell, WØSIN, or Div. Dir. His devotion to Ham Radio and to League affairs will be greatly missed. Also regret passing of K5ODN a devoted member of Los Alamos Club. Lots of NM hams enjoyed Flagstaff. Pecos Valley ARC Pres. WB5ORQ, VP WA5OTM & S/T WB5UWD. Lou McCoys vist much appreciated and most enlightening. Traffic: N5NG 295, W5DAD 232, W5JOV 231, W5UH 230, K5KPS 138, W5KH 136, WD5AHH 112, K5MAT 35, WA5MIY 22, W5IGO 15.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO. ECs: WA7BEG WA7BWF WA7GTL W7MUG W7TWZ and K7VJP. NMs: WA7MEL and W7OCX. OTSs: W7FYR K7HLR N7IE WA7MEL K7OA (ex-WA7OAU), W7OCX and W7UTM. OBS: K7HLR and K7UM. OVS: W7HKC. OO: K7JL and K7TLX. W7LLH Silent Key as of July 8. He was an old timer who did much for amateur radio. The Moab and Dixie ARCs are new affiliates of ARRL. OARC is planning request for affiliation when eligible. WA7MEL reports working with CB ops aimed at qualification for Tech. Class license. WA7ADK had aurora contacts on 2 mtrs with WA and MT. The Pioneer Days Parade went a bit smoother due to 2 mtr communication by K7DJI W7GPN WB4NVO/7 and WA7TEH. WB4NVO new in Ogden from Memphis. UARC had their annual steak fry July 7. K7PQB new job in SLC, and has moved to Bountiful. Traffic: K7HLR 79, WA7MEL 54, WA7JRC 39, W7RO 16, W7OCX 14, W7UTM 9, W7BE 8, WB7RQP 3.

WYOMING: SCM, Chester C. Stanwalty, W7SDA — Attendance at the 1978 Wy. hamfest was good with over a hundred registered. Entertainment included swap tables, SSTV display and transmitter hunts. Activities were provided for the ladies. All Wy. nets should have a representative monitor 3725 kHz for Novices with traffic. All two meter nets please report QNIs and traffic to K7YPT of Torrington. Thanks to W7KHH for handling June report. It is with deep regret that I report that Charles Cotterell WØSIN Rocky Mtn. Div. Dir. is a Silent Key as of Aug. 2, 1978. WB7NHR reports the Wyo. Cowboy Net held 20 sess., 553 QNIs, 9 QTCs. Traffic: W7TZK 426, W7SQT 341, K7VWA 145, WA7SGG 34, K7SLM 14.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Frank S. Brown, W4LNN — SEC: K4WYT. NMs: N4MD WA4RNN. New appointment: EC WB4HOK. Net reports: AENB QNI 253, QTC 149. AEND QNI 230, QTC 102. AENR (6 mtrs) QNI 37, QTC 2. OFL Net QNI 37, QTC 127. DRN5 covered 100 percent in June by WA4JDH. N4MD using new Accu Keyer with memory on the CW nets. WN4KKN makes BPL with a count of 502. WA4JDH also makes BPL for the 19th time with a count of 1288. WB1ASY visiting AL from NH. WB4EKJ was heard hunting DX on 20 mtrs. N4AIJ finds traffic work lots of fun. WA4VEK ready to smoke test his new SB-220. WD4NYL upgraded to General during vacation trip. Now urging his friends to join the fun of amateur radio. FD reports indicate a big success over AL. WB4IWW WB4ZRN working lots of DX with their Yaesu FT-7 QRP mobile rigs. Huntsville ARC receives letter of thanks for communication preparedness during Disabled American Veterans convention. The Mobile Local Training Net (Novice) now meeting on 28.190 MHz Thur. 9PM. WA4YQT WB4TCH explain Ham Radio to Enterprise Optimist Club. K4HJM reports asst. ECs get the job done when asked to do so. HAYLARC planning now for big summer for '79. WD4KWM presented W2BFI with a send-off gift statue of the Boll Weevil Monument. Traffic: (July) WA4JDH 1288, WN4KKN 502, N4MD 176, WA4VKD 101, K4AOZ 59, K4ZM 46, WA4FYO 32, W4LNN 32, WA4ZPZ 22, WB4RCF 16, W4IBU 12, K4UMD 11, N4AIJ 11, WB4ZNL 9, W4MHO 8, WA4VEK 2. (June) N4MD 179, WA4RND 58, WA4ZPZ 27, K4ZM 24, K4HJM 5.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — KZ5AS has been appointed SCM to serve out the term. The Atlantic siders have instituted code classes and generally seem very enthusiastic about their newly formed chapter of the CZARA. The Canal Zone Call Book has been updated and will be distributed to all KZ5s this month. Much thanks to KZ5PM et al. DF1KM and his XYL DJØJF visited several KZ5s as guest of KZ5EK. K2KFG (recent Extra Class) and his XYL K2ZCS (passed cw but waiting to retake Extra Class theory exam) visited KZ5AS and operated as KZ5SIT and KZ5YLT during July. KZ5VV announces new Novice classes to begin in Sept. at the Panama Canal Training Center.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ. PAM: K4JNL. Congrats to WA3NAZ/4 WB4ZOJ WB4DHC WB4TEK K4VHC WA4OMQ K4SWJ and W4HON making PSHR. Sadly we report that WB4AKL, K4ETH and WA4JJB are Silent Keys. Using WR4AED, WA4CBT WB4DEB WD4DUE WB4HXE WA4MIZ WA4OMQ WB4PSU K4SWJ and K4UON helped Red Cross at train wreck at Conyers. Congrats to WD4ICC making Advanced an KA4ARK KA4CNS and KA4CVP making Novice. New Columbus ARC officers; W4GKI, pres.; K4JNL, veep; K3MTY, secy.; WD4CCE, treas.; WD4AMR act. mgr. WB4ZOJ now net mgr. for GTN. Pse steer yourself and others to this net on 3.718 each evening. GSSBN QNI 1819, QTC 190 for June and QNI 1988, QTC 210 for July. GSN QNI 484, QTC 179 with 4RN liaison perfect. Great job! Cntrl Ga. VHF net QNI 83, QTC 8. WGA ARES net fm QNI 79, QTC 11, cw QNI 13, QTC 3. CVEN No.1 QNI 65, QTC 0. CVEN No.2 June QNI 1003, QTC 95 with July QNI 1053, QTC 101. NGSN QNI 47. WA4OMQ going to Navy. WB4TEK lost 2-mtr rig to lightning. K4VHC net mgr GARES net. GSSBN picnic at Little Ocmulgee was great. WA3NAZ/4 looking for RTTY ops for GA net. WB4RXE crosslinking HF and VHF. N4UZ can't get past 40 confirmed on 80 cw WAS. W4GKI got Clipperton and Syria cards. K4YRL due big thanks for bringing GA from 19th to 7th in EC/SEC rank and 1st in our class from 5th. Traffic: (July) W4GH 163, W4FOE 122, WA3NAZ/4 98, W4WXA 75, WB4ZOJ 74, WB4DHC 55, N4UZ 40, W4HON 34, WB4SPB 33, W4BIA 29, K4SWJ 26, K4NM 24, WA4OMQ 14, K4VHC 14, W4JM 6, K4WC 6, WB4FAS 5, W4GKI 5, WB4HXE 4, WB4TEK 4. (June) K4YRL 24.

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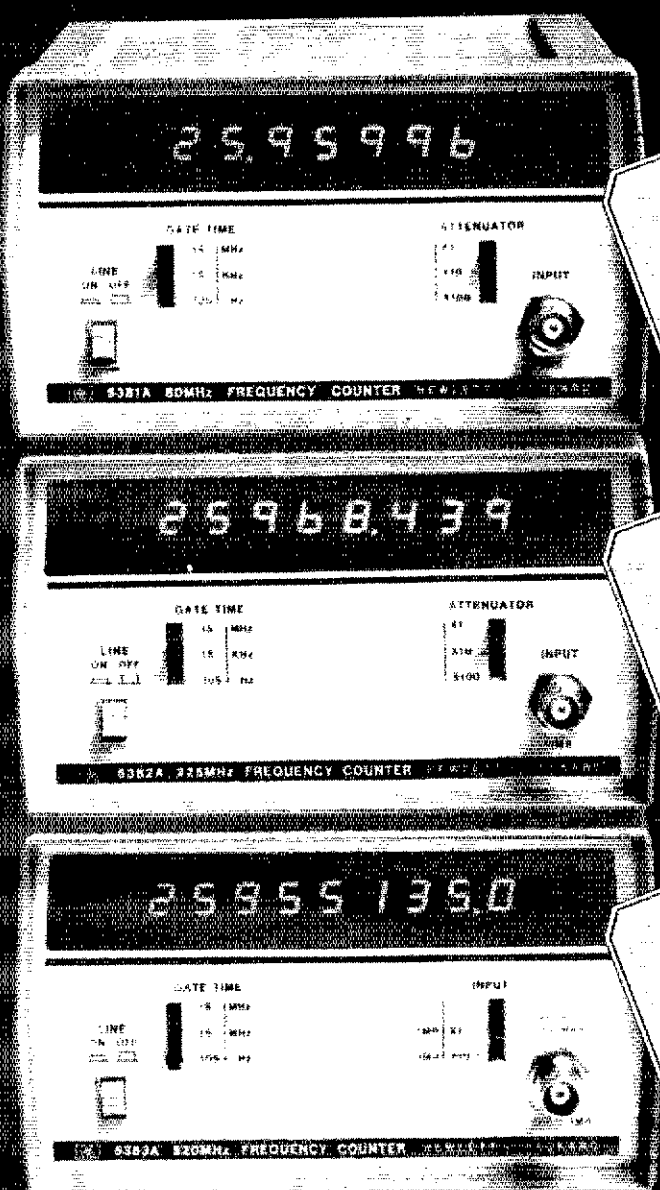

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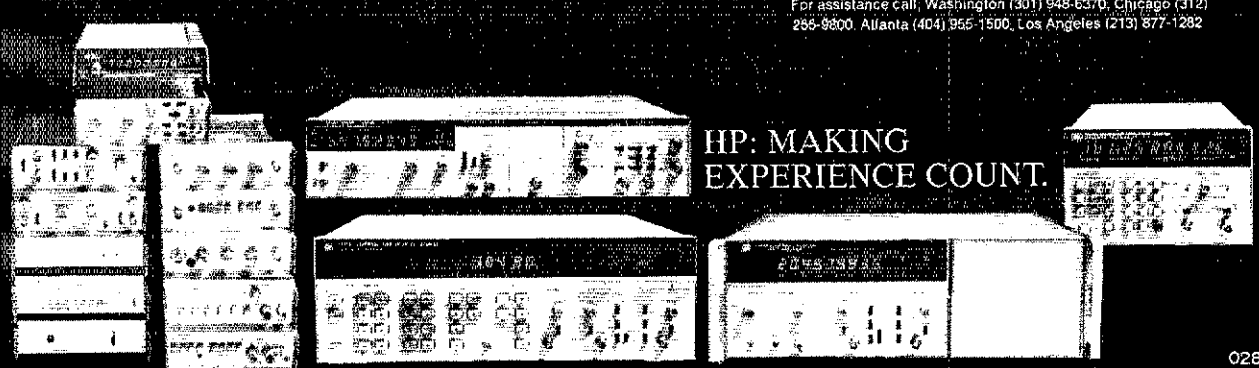

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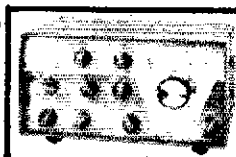

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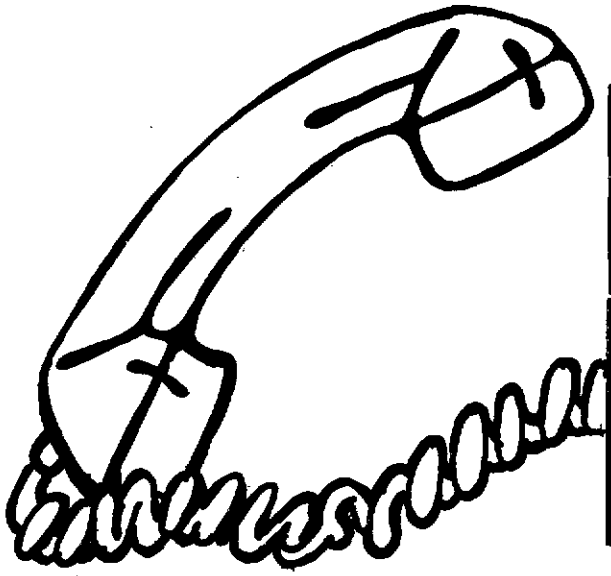

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NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: AA4FG. NMs: WB4PGB, WB4GHU WA4FKE. Former PAMs and RMs have been converted to Net Managers (NM). Since some nets cover both FL Sections, each Section may have an NM appointee for the same net. There will be only one actual mgr. of net operations however, as in the past. New appts.: WA4LJO as EC of Hernando Co. WD4IHA as OVS. SNCs earned by WD4BRT WD4HBG WD4HMS WD4HYE and WD4LUG on NFPN; by W4BKC on TPTN; and by K4LUT and WA4OEM on FMTN. Five Flags ARA held transmitter hunt; with WB4PKW the bunny. Winners were WA4RQH/WA4RAG. Playground ARC members provided comm. for another Hobie Cat sailing race. Panama City ARC members enjoyed a steak dinner organized by WB4GKV. New officers of the Tallahassee ARC are N4AME, pres.; WD4HWE, vice-pres.; WB4GTY, secy.; AA4US, treas. WA4DCN elected trustee of the 31/91 repeater. New calls, WB4NAY now AE4S; WB4AQM now N4AME; K8GAJ now KA4BRW. W4TK devotes considerable time to QO work on 20m phone. NOFARS held its annual auction, with K4OAC auctioneer. Nice 2-part article on how to rate your station in "Balanced Modulator" by N4UF. 146.49 MHz is the official NOFARS callinng frequency. HH2MC, pres. of Haitian ARC, named full member of N. FL DX Assn. WR4AAF 16/78 repeater now signs K4YLX/R. W4SZ moved to Tampa Bay area. Daytona Beach ARA donated $50 to ARRL fund to send radio kits to less developed countries. WB4HKP upgraded to Extra Class. Gulf Coast ARC has 18 enrolled in General Class course. WA4MOJ earned WAS award. Traffic: (July) WD4LUG 414, N4PL 307, WB4QBB 169, N4WA 152, WD4HIF 137, W4MGO 116, WA4FKE 108, WB4HKP 79, W4KIX 62, WD4NYY 59, WA4CRI 56, WD4IIO 54, WA4VLT 49, W4JL 45, N4SS 36, WA4EYU 34, WB4DTS 30, W4RH 30, WB4TZR/9 23, W4MVG 20, WB4VAP 20, K4RNS 12, W4FZX 4, K4IEX 4. (June) W4LDM 73, W4JL 70, WA4OEM 54.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCMs: WB4AID W4KGJ. SEC: AA4WJ. The ECs are WA4AYY W4BFQ AA4BN WA4BPE W4BX WB4CDQ K4CGX W4ESH WB4IKX W4IYT W4KMN WB4KYE W4LEP WB4NOZ W4QO K4RCP WA4RLU K4SCL K4SJA K4URX AA4WJ WA4YQI WA4YQW. We have vacancies for EC in De Soto and Glades counties. Interested applicants contact AA4WJ. Our OBS appointees are WA4BMC WA4CTM W4DL W4IYT W4KGJ WD4MIB W4NOK W4OGX W4ROA K4TH W4ZJ and WA4ZLW. W4DL continues as our most outstanding OBS, reporting 37 bulletin transmissions this month. WD4KPG has been appointed Mgr. of the new Southern FL Emergency Net (SFEN), 3940 kHz at 7:30 PM Wed. This net under ARRL/SCM sponsorship, replaces the FL Side-Banders Emergency Net (FSBEN). Our Asst. SCM (Training), WB4AID, conducts a brief training session as a part of SFEN. Y'all come! Net certificates issued this month are (net/stationns) FMTN/W4YCL, PEN/W4BNM WB4DWU WD4NSG K4WP, QFNS/WA4JPV, TPTN/WB4CDQ WB4NJU, FPTN/WD4COL WD4DNG WD4IUD, PBTN/WB4CWV WB4GIC WD4HYJ WD4CKS. Total 72 issued since Feb. 5th. Congrats to W4MEE and WD4COL, the only 2 BPLs this month, and to PSHRs WD4COL W4MEE WA4PFK WD4BAJ WA4MJT and WA4QGV. Probably lots more could qualify, but you have to report and claim your PSHR score. W4GPL and K4RKY both had equipment damaged by lightning. WD4NQZ upgraded to Tech. and got new call N4APZ. KA4CUX is new Novice, XYL of K4WYN. KA4CYA is new Novice, XYL of W4MUV. KA4BBB is XYL of WD4NSG. AF4L is ex-K4JBM. An "Atta Boy" goes to WD4DNC for helping WD4AVL with an antenna problem sho she could check in on QFNS. She is mother of N4WA. Thanks to WA4PFK for reporting. W4ESH getting fantastic results with new Quad and FT-901-DM. K1BCS in New Hampshire reports K4HVI up there for conference. WD4COL returned from vacationn trip visiting hams and relatives "up east." We hear WD4COL got a fine promotion with big increase in pay so he is buying a new house with "custom built" ham shack! Watch out traffic nets! WB4AID back from "30 day wonderful vacation" up in mid-west. Now walking 6 miles per day for health. W4BK getting ready for motor-home trip to San Diego for ARRL/QCWA convention. Sarasota Radio Club and St. Petersburg Radio Club both had Fred Crosby of National Weather Center, Ruskin, as guest speaker talking on tornado spotting. We are having a big increase in number of tornadoes reported in Southern FL. Mr. Crosby believes it is due to increased population density and better communication rather than more storms. A workshop session is planned to consider if and how better cooperation may be achieved between hams and weather bureau. Traffic: (July) W4MEE 699, WD4COL 300, K4SCL 295, WB4WYG 290, WB4NJU 236, WA4PFK 185, WA4JPV 169, WA4NBE 152, W4GPL 144, WB4FVV 103, WA4EIC 101, WA4RLV 83, WD4KPG 71, K4BLM 70, W4KMN 64, W4NTE 64, WB4AID 52, W4YCL 50, W4BK 47, WB4PIB 45, WD4NSG 39, W4WYR 39, W4IRA 36, W4IYT 36, WB4AOC 31, WD4BAJ 28, W4MPV 26, W4QM 26, WA4HXU 24, WB4GSV 22, WA4UQQ 22, WA4MJT 18, WA4MNX 14, W4KGJ 12, WB4SNX 12, WA4QGV 8, WB4KYE 6, W4TJM 6, W4SMK 5, WA4BYT 3. (June) W4QM 28.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — PAMs: W7UOQ WA7KQE. RM: W7EP. Tucson Rptr Assn. members helped the Jaycees with communications at the July 4th fireworks. OPRC received a National Merit award from the ARRL for Field Day publicity. K7RDH finished 5BWAS by working Maine on 75. W7UV won the Ham of the Year award at Ft. Tuthill. Tucson hams are trying to organize a city-wide radio council of representatives of clubs. The Ariz. ARC is running an Extra Class license class. The Club has been advised it will no longer be able to meet in the Red Cross bldg. With regret, W7BK and W7JAJ are reported as Silent Keys. W7WGW proudly reports his repeater on Mingus Mtn., WR7AFC, now is all solid state. Vacations, long days to enjoy outside the shack, and summer thunderstorms caused an expectable drop in activity in July. Clubs are reminded to send their news of activities and achievements to the SCM. Remember, they can't appear in QST until nearly two months after receipt by the SCM due to magazine publication deadlines. W7HFR now is AC7D. Cactus Net 195, ATEN 73, SWN 187. Traffic: (July) W7EP 223, K7NTG 142, K7UXB 82, WA7KQE 22, K7JKM 18, WA7WEB 17, W7DQS 10, N7EH 5. (June) K7NMQ 16, K7RDH 16.

LOS ANGELES: SCM, Perry Masterson, W6RHS — This must be the month for vacations, judging from the number of reports received this month. I can report only the news that is provided to me. W6INH reports good DX

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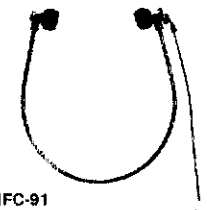

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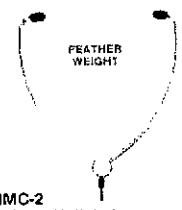

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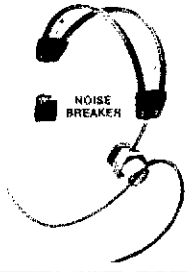

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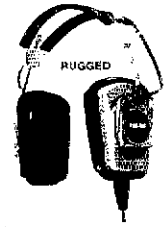

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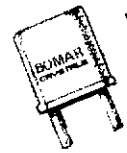

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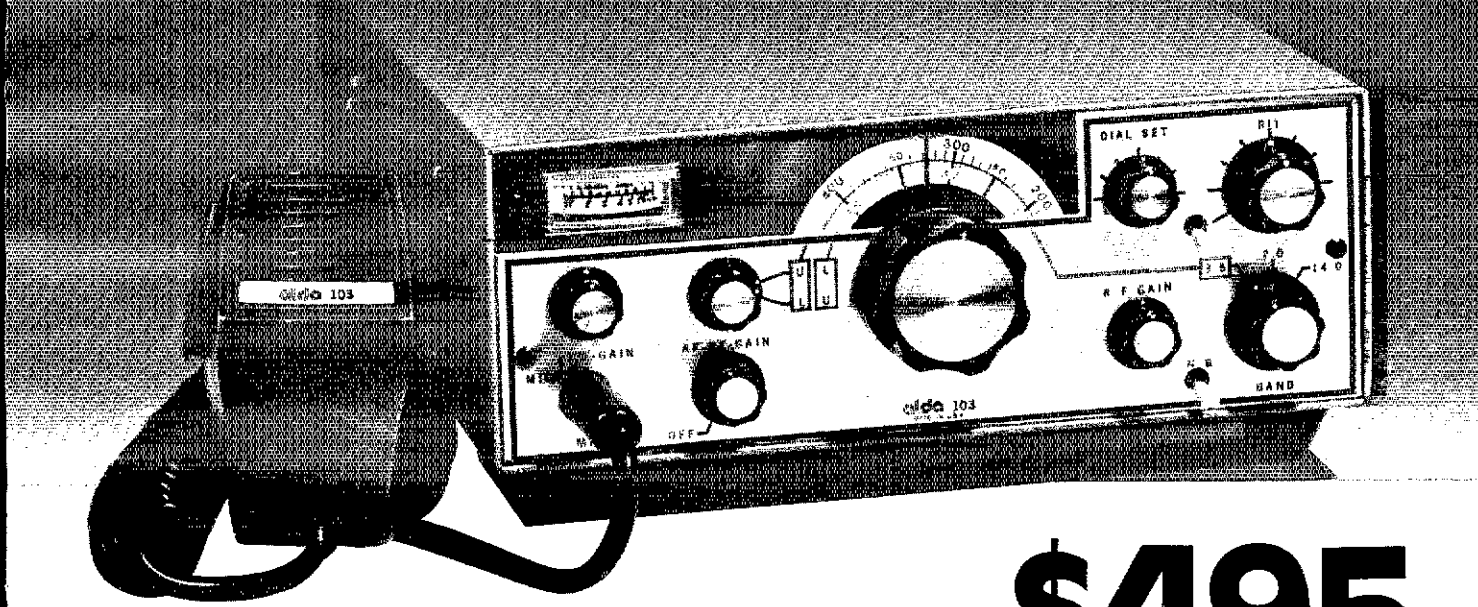

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Power Requirements:	Nominal 13.8 VDC input at 15 amps, negative ground only
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RF Input Power:	SSB — 250 watts PEP nominal CW — 250 watts DC maximum (adjustable)
Transmitter:	
Antenna Impedance:	50 ohm, unbalanced
Carrier Suppression:	Better than −45 dB
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Distortion Products:	Better than −26 dB
AF Response:	500 to 2500 Hz
Spurious Radiation:	Harmonics better than −45 dB below 30 MHz; better than −60 dB above 30 MHz
Frequency Stability:	Less than 100 Hz drift per hour (from a cold start at room temperature)
Microphone:	High impedance 3000 ohm
Receiver:	
Sensitivity:	Better than 0.5 watts audio output for 0.5 μV input
Signal-to-Noise Ratio:	Better than 10 dB S+N/N for 0.5 μV input
Image Ratio:	Better than −60 dB (typical with respect to 0.5 μV input: 80 meters — −130 dB; 40 meters — −100 dB; 20 meters — −75 dB)
IF Rejection:	Better than -70 dB (typical with respect to 0.5 μV input, 80 meters — 110 dB; 40 meters — 80 dB; 20 meters — 75 dB).
Intermodulation Intercept Point:	Better than 10 dBM
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on 20 meters. He worked 6 new ones for a new total of 240 confirmed. WB6YTU reported in for the first time. Glad to hear from him. I hope to receive more reports in the future. If you think this is a short report, it is all the news received. Traffic: W6INH 216, W6OEO 211, N6PZ 113, W6BWG 23, WB6YTU 6.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — To encourage club support of ARES, clubs which sign an agreement to support ARES are designatedd an ARES Affiliated Club. Thus far, the following have signed: SD Teleprinter Soc, 220 Club, North Shores ARC, SD Repeater Assn. Others are in the process. New OCWA officers: K6NC, pres.; W6YYV, VP; K6QM, secy; K6AM, treas. ARES members K6AM WA6JCG WB6TQF and W6INI provided communications from a fire camp to headquarters for Calif. Dept. of Forestry until phones could be installed. W6INI assisted in communications programs for the Red Cross Disaster Institute in Claremont, CA. Imperial valley's repeater operates on 147.72/12. With the National Convention a huge success, ARRL has approved a Southwestern Div Convention for San Diego, Sept. 3-6, 1982. W6PDA has assumed the presidency of SANDRA due to resignation of WA6SND. Thanks for a good job, Bob. Upgraded: W6VON Extra, WD6BRY WD6GUM to General, WA6YSF to Advanced, KA6BSU to Tech. Novices: KA6BRP KA6BST KA6BSV KA6BSW KA6BSX. Call sign changes: WA6AWM to AB6H, WA6OZS to AD6Z, WD6CWP to KB6AM, WB6VIQ to KB6AL, WA6FQZ to KB6CJ. Traffic: (July) WB6PVH 309, WA6UAZ 219, WB6FTY 182, N6GW 115, N6AT 85, W6HUJ 64, N6RD 54, W6DEY 19, WA6HJJ 12, WA6UFY 1]. (June) WB2BKC 140, N6RD 27.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — WB6JKM K6SZS WD6BNH and W6ZRR sent over 200 bulletins in July. WB6CBV now AD6J, WD6BMQ now N6ADI. New Novices: KA6AKA, KA6BQT. Generals: WB6ZWZ WD4NQH WA6OHX and WD6EZY. Advanced: WA6ZLC and WB6LPE. Techs: WD6FGV and WD6DSL. Congrats to all! New Equipment: WB6PRT WA6TLP W6QMV new FT227; WB6ZWZ HW2036; WD4NQH FT101; WA6ZDP TR33; N6UF tower and TH3. W6YCF and WB6YCH are Silent Keys. N6AG recovering from surgery. WB6DPL and WB6JKM have new harmonic. Simi Settlers have issued over 400 Worked Simi Valley certificates. K6PHT graduated 9 Novices in Moorpark and plans Novice and General classes in Sept. for CVARC. W6AB has a new TenTec 544. New officers for the Satellite ARC are N6UE, VP; W6SMJ, secy; WD6DSK, treas. WB6DCK is new VP for Sulphur Mountain. K6YD has been net control on SCN. N6YH now on RN6. W6MTK and WB6AGE are on RTTY. The Section net had 69 QNI in June and 43 in July. SCN/VHF sess. meets on WR6AKV (147.045-.645) nightly. Ventura County ARES provided comms at 4th of July celebration in Ventura. WB6LMX N6UO WA6QLQ WB6RVA W6TSV WB6RWY and W6RIC among those participating. PSHR: N6WP 35. Traffic: (July) WA6MBZ 380, N6MA 339, WA6BMH 305, WØKON 278, N6WP 229, WB6JKM 85, N6YH 46, K6SZS 20. (June) N6WP 228, K6YD 18.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, W5EJ — Asst. SCM/SEC: K5PC. RM: W5GN. PAM: AE5I. From the Public Service Dept; Amateur Radio played its most important roll in modern history here in North Texas during the first week in Aug. in the worst flood disasters ever recorded in the Albany-Graham areas. The heroics, dedication, and perserverance of the many stations who went all-out in this devastating chain of events not only upholds the fine reputation of Amateur Radio, but writes a new chapter on the capabilities of well-organized, well trained, and well-equipped operators. Entire cities were run, mountains of emergency and priority traffic was handled, untold amounts of life and property was saved; all via Amateur Radio! See next month's QST for more details of the Albany and Graham oeprations. New calls dept: WB5GBR now AE5C; W5GSN now AE5I; WB5TDG now KB5CM; WB5FBQ now AA5J; W5QYT now AD5I. WB5SDD receives BPL medallion for making it for third time this year! Congrats! New Sulphur Springs rptr. on 146.13.73 per W5BCB. Lake Country ARC at Graham now ARRL affiliated; W5GXU, pres.; WB5LAT, vice-pres.; K5STX, secy-treas. EC WB5WOE finishing up new Emer. Plan for Harrison Co. New QTH and new bride for N5BF; Welcome to Dallas! New ECs N5AE/Lipscomb Co. AE5C/Dallas Co. PSHR for July: WB5SDD WD5AAT W5VMP WB5LAT. Traffic: WB5SDD 751, WD5AAT 120, W5VMP 119, AA5J 91, WB5LAT 67, K5MC 45, WA5INJ 42, W5CTZ 38, AE5I/W5GSN 23, WD5JLF 21, K5PC 21, K5HBU 3, K5HT 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst. SCM: W5REC. SEC: WA5MLT. K5CKQ upgraded to Extra. W5UYH enjoyed the Rocky Mountain repeaters while on vacation. W5JJ enjoyed a long visit with his son in VA. Your SCM was ill and had to miss Ham Holiday, from all reports it was FB. Will try to make El Paso and then there is Texoma Hamarama. Cleaned out the files and started fresh with the new Appointment Structure. Issued all new certificates to a fine group of operators. Oklahoma Repeater Society officers for '78-'79: K5FVL, pres.; W5ATO, v-pres.; WB5UOE, secy; K5CAY, treas. This group needs our help to grow and become the organization it is capable of being. Oklahoma County ARES operators have worked out an agreement with National Weather Service to help at Will Rogers Airport Weather Station. We urge all amateurs to work with the NWS in their area. Operation SkyWarn is a good program. 6 out of 28 ECs reported in July. WB5RAP WD5ETD and WA5BYP reported interested in becoming ECs. Traffic: K5OWK 580, WB5NKC 370, W5RB 236, WB5NKD 202, W5REC 172, K5TEY 149, W5BYC 68, W5SUG 42, WA5OUV 36, WA5FSN 32, K5CAY 23, WB5ELG 21, WB5OCZ 20, WD5ETB 18, W5VOR 14, W5FKL 8, W5UYH 7, WB5OYU 6, WB5EAY 5.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst. SCM: N5TC. SEC: WB5LHK. RMs at large: N5TC WA5RKU. OOs reporting this month: K5DL W5VAH WB5CIT. OVSs reporting this month: WA5QCP WB5CIT WD5HJB WD5CZI. EC WA5RVT gave talk on ARES and traffic handling to Alvin Community College ARC; says he had good results VHF and HF while on vacation in Kansas; reports N5FN has new tower and beam up and operating. WB5UER also has new tower. OVS WB5CIT used TIRS link between San Antonio and Austin to pass routine traffic. W5AC made first 432 MHz contact during VHF contest in June; also operated mobile during Field Day in six sections and five states (Texas, Arkansas, Louisiana, Mississippi, Tennessee). ORS WB5HOD passed 2nd class Commercial radiotelegraph exam, ran a new random wire antenna, installed new ground system, and has resumed checking into TEX CW Net.

From W5ES Bulletin (El Paso): WB5VHZ upgraded to Extra; WD5CUL WD5BYZ to Advanced; WD5CUJ WD5GLV WD5HXH WB5VPT to General; WB5ZGG to Technician. GOOD WORK! TEX CW Quarterly Bulletin reports new calls: K5PE (ex-WA5JYH), N5NK (ex-WB5NKG), AA5J (ex-WD5FBQ), AA5R (ex-WA5UKN). That A5J has been busy!! OVS WA5QCP reports strange happenings with Knight P2 SWR/PWR meter on 144 MHz; he passed on his solution to QST with his very regular monthly OVS report. Traffic: (July) W5KLV 516, WA5RKU 280, K5HZR 260, N5TC 91, K5PE 76, WB5BWV 52, WA5RVT 22, W5KR 17, WB5LTW 7, K5RVF 4, WB5CIT 3. (June) WA5RKU 247, W5BHO 22, W5AC 4. (May) W5AC 4.

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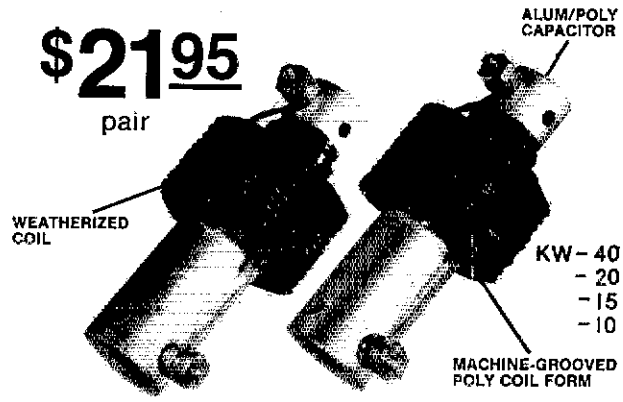

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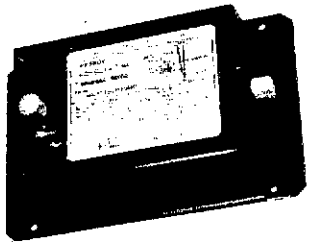

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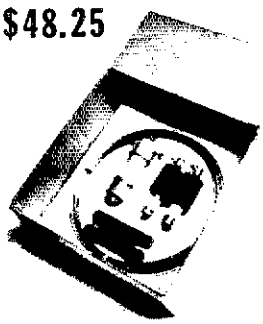
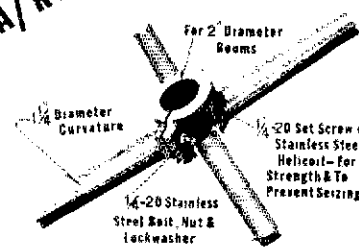


5 Bander Kit
Balun-Traps
'END-sulators'
125 ft Quality Wire
Instructions

See Chapter 21 ARRL Hndbk
"Multi-Band Trap Antenna"



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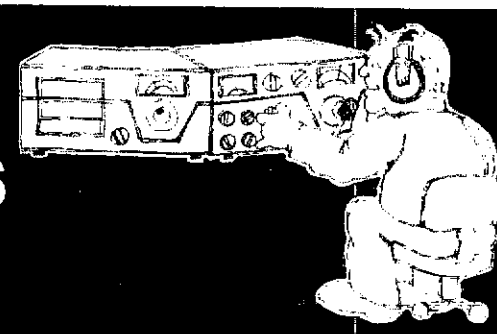

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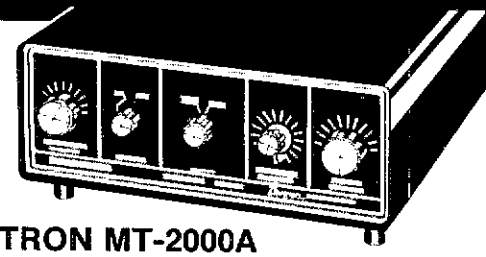

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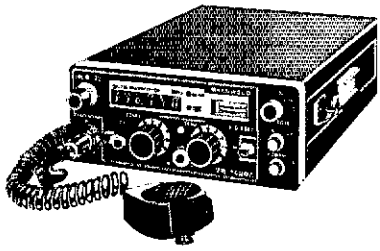

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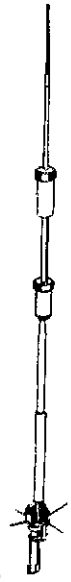

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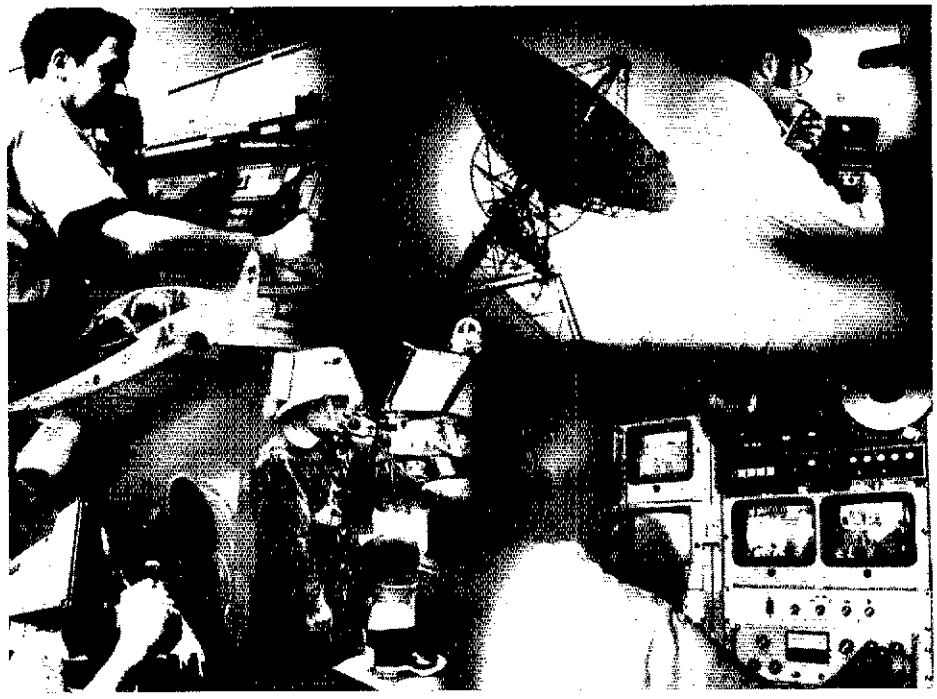

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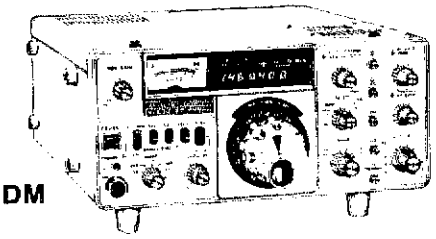

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FT901 DM HF Transceiver	$1459	FC 901 Antenna Tuner	$199
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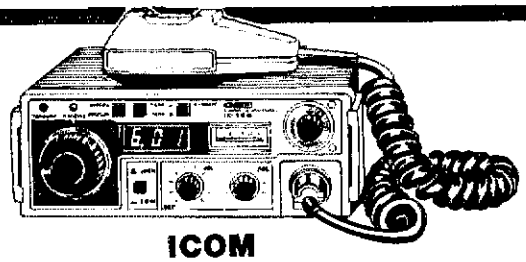

IC-280

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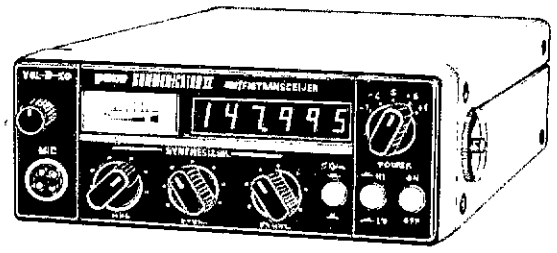

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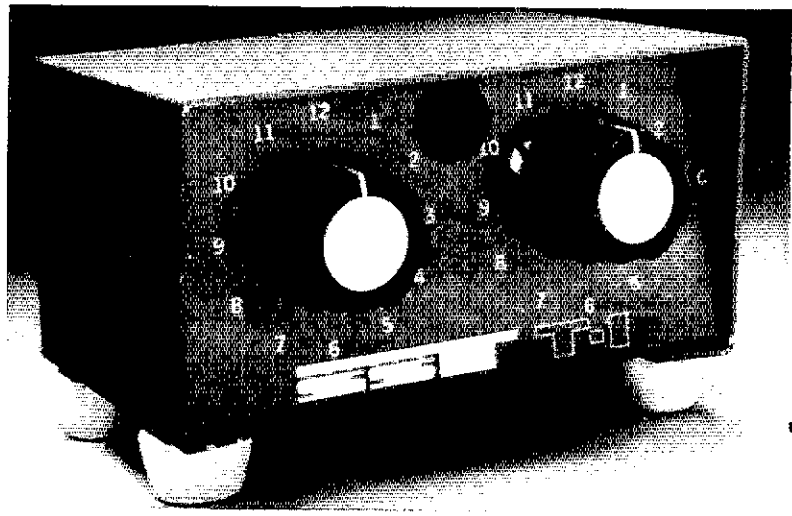
SST T-1 RANDOM WIRE ANTENNA TUNER



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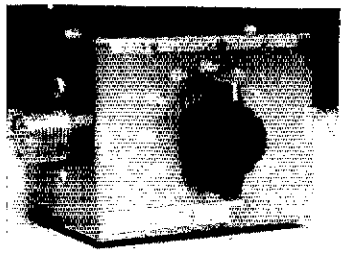

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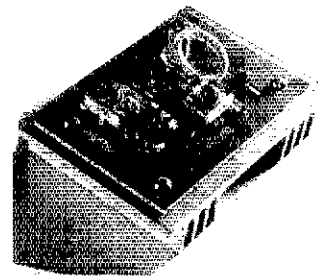

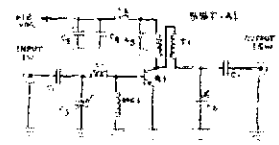

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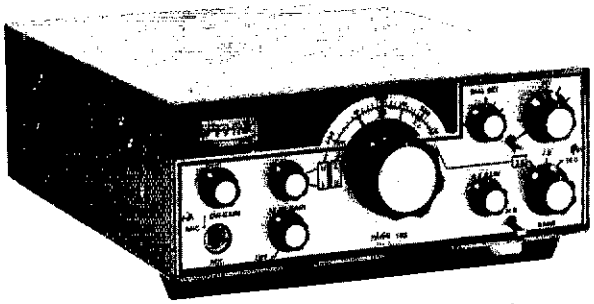

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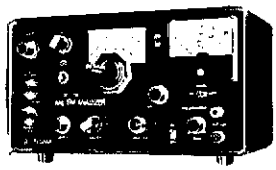
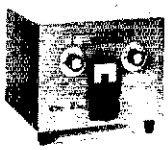


FEATURES: Extremely stable local oscillator for easy measurement of HF, VHF, and UHF bands employing negative feedback, to insure extremely high stability ● Easy to read, accurate linear scale ● Direct off the air signal measurement capability. **OPTIONAL 12v DC Power Kit - $12.** ***FULLY CERTIFIABLE FOR COMMERCIAL USE.***

SPECIFICATIONS: Frequency: 1.8MHZ-520MHZ/3 range select (A,B,C,EXT), A range: 26.5 MHZ-40MHZ, B range: 48MHZ-60MHZ, C range: 140MHZ-156MHZ (generous overranges), EXT. range: 1.8 MHZ-520MHZ (Need Signal Generator) ● Input level. (1) Through type input level: IW-200W (RF Input Terminal), (2) Direct input level: More than 80db/50ohm impedance ● Amplitude modulation: 0-100% ● Frequency diviation: 0-20KHZ ● Accuracy: +/-3% of full scale ● Intermediate frequency: 10.7MHZ ● RF Attenuator: 0-60db variable ● Audio Signal oscillator: (1) Audio Frequency—1,000HZ (1 KHZ), (2) Output level—More than 1V RMS (variable) ● Power Source: AC117 ● Dimensions: H-5½" (140mm), W-10¼" (260mm), D-7¼" (184mm) ● Wt.: 7lbs.

SUPERB NEW WANZER Z-4 TRANSMATCH

- Roller Inductor
- Switchable Double-L or Pi
- In/Out Switch
- Commercial Grade Construction
- 160-10 Meters
- 3KW

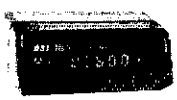


Introductory Price

$139

DSI

Fully Certifiable for commercial use



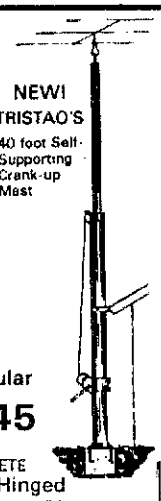
COMPARE!

$189

factory assembled not a kit

600 MHZ FREQUENCY COUNTER WITH CRYSTAL OVEN TIMEBASE

- Sensitive—No Direct RF Connection Required
- Accurate—.5PPM ● Selectable Resolution
- AC or DC Operation



NEW! TRISTAO'S

40 foot Self-Supporting Crank-up Mast

Regular **$345**

COMPLETE With Hinged Mounting Plate And House Bracket

Our Price

$310

$19 Shipping Anywhere USA

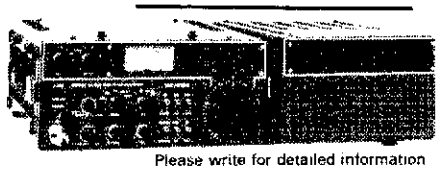
SIGMA RF-2000 SWR & POWER METER

$35

Introductory Price

Cal PWR Scales 200W-2000W Freq Range 3.5-150 MHz. Please do not confuse the RF2000 with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequaled at many times the price. Size 7" (w) x 2 1/3" (d).

SHIPPING ANYWHERE U.S. - $1

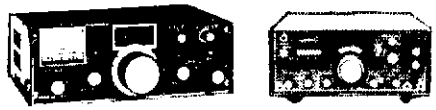


Please write for detailed information

SUPERB! NEW 1 COM IC-701 H.F. XCIEVER

ATLAS 210X-215X and 350-XL

Please write for special bonus and package offers.



FM2015R Accessories		KDK SPECIAL SALE FM144 Accessories	
FMSS	SUPER SCANNER 1000 Total Scanning Capability $112	FMOF-1	Offset Option Kit - 2 Extra Positions, Crystals Required . $5
FMPS-4R	Regulated AC/PS $39.95	FMOF-2	1 MHz Offset Option Kit (No Crystals to Buy) $5
FMMC-1*	Microphone with Built-in Touch Tone Pad..... $49.95	MARS-CAP	Option Kit - Any Frequency Any Split $12
FMTD-1*	Private Call Decoder for use with and Programmed by any Touch Tone Pad $75		
MARS-CAP	and Multiple Offset Kit* - Any Frequency, Any Split, No Crystals $5		
FMAT-1	¼ Wave Portable Antenna for Hotel, Motel or Apartment $7.95		
Extra DC Cord & Plug $4.00			
Service Manual $4.00			
Mounting Bracket (Extra) $6.00			

SPECIAL

NEW CDE HAM III ROTATORS—
Reg. $159.95—$125

New Standard 2 Meter FM Transceivers Model SRC 146A

Special Package

SRC 146A	$259
4 Xtals 34-94 and 94-94	NC
USA 2 Deluxe Base Charger	$47
PT3644 Leather Case	$12
A1 19 Rubber Ant and Whip	$ 8
N1-cads	$30

Reg. $356

NEW!!! Touch Tone pad completely wired and ready to plug in - $49.95

Our Price **$289**

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★ 10-Day Trial. (Pay only Shipping Charges) **7-25-78**
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★ Send Payment-in-Full or a 20% Deposit for C.O.D.
★ Mastercharge & BankAmericard (VISA) accepted.
★ Full Credit within 6 Months on Higher-Priced New Gear that is not Discounted or on Special sale.

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear

AMPLIDYNE	
621 VHF transmitter	$ 79
ATLAS	
215X/NB Xcvr	$499
AR-200 AC supply	69
10X6 Xtal osc	39
MT-1 Matching Xfmr	19
B & W	
361 Codax keyer	$ 39
BRIMSTONE	
144 2m FM Xcvr	$249
CLEGG/SQUIRES-SANDERS	
22'er 2m AM Xcvr	$ 59
66'er 6m AM Xcvr	69
Thor-6 6m Xmtr (RF)	39
417 AC supply/mod	39
418 DC supply/mod	35
Zeus VHF Xmtr	175
Interceptor VHF Rcvr	129
SS Booster	39
22'er FM 2m FM Xcvr	149
FM-27B 2m FM Xcvr	179
COLLINS	
75S-1 Ham Rcvr	$299
75S-3 Ham Rcvr	485
75S-3B Ham Rcvr	795
75S-3B Rcvr (round)	995
32S-1 Transmitter	349
32S-3 Transmitter	785
32S-3 Xmtr (round)	995
312B-4 Console	199
KWM-2 Xcvr	585
KWM-2A Xcvr	795
KWM-2A Xcvr (round)	1295
351D-2 KWM-2 mount	69
516F-2 AC supply	149
516E-1 KWM-1 DC PS	75
MP-1 DC supply	119
PM-2 Port AC PS	95
COMCRAFT	
CPS-6 AC supply	$ 49
DENTRON	
80-10A1 Wire tuner	$ 39
DRAKE	
2AQ Spkr/Q-mult	$ 29
2B Ham Rcvr	179
R-4C Ham Rcvr	449
MS-4 Speaker	19
SSR-1 SW Rcvr	249
SPR-4 SW Rcvr	349
SCC-4 Xtal cal	19
DSR-1 SW Rcvr	1195
TR-4 Xcvr	389
TR-4/NB w/blanker	459
TR-4C Xcvr	449
TR-4CW/RIT Xcvr	549
RV-4C Remote VFO	89
34PNB Blanker	75
TR-6/NB 6m Xcvr	589
2NT Transmitter	99
T-4X Transmitter	339
T-4XC Transmitter	475
AC-4 AC supply	85
DC-3 DC supply	65
DC-4 DC supply	85
MN-4 Matcher	69
WV-4 VHF wattmeter	59
ML-2 2m FM Xcvr	119
TR-22 2m FM Xcvr	129
TR-22C 2m FM Xcvr	149
AC-10 AC supply	39
AA-22 2m amp/preamp	99
GALAXY/GLOBE/WRL	
Galaxy V Mk II Xcvr	$229
GT-550 Xcvr	279
GT-550A Xcvr	299
AC-35 AC supply	65
AC-400 AC supply	75
DC-35 DC supply	65
G-1000 DC supply	89
SC-35 Speaker	12
SC-550A Speaker	15
GONSET	
GC-105 2m AM Xcvr	$ 69
HALLICRAFTERS	
HT-40 Transmitter	$ 49
SR-160 80-20m Xcvr	169
PS-150-12 DC ps	49
MR-150 Rack mt	15
SR-400 Cyclone II	450
SR-400 Cyclone III	599
P-500AC AC ps	75
FPM-300 Xcvr	349
SR-46 6m AM Xcvr	49
HAMMARLUND	
HQ-160 SW Rcvr	$159
HQ-170A Ham Rcvr	189
HQ-215 Ham Rcvr	199
S-200 Speaker	15
HK-1B Keyer	29
HEATHKIT	
SB-301 Ham Rcvr	$229
SB-600 Speaker	15
DX-60A Transmitter	64
HW-22A 40m Xcvr	85
HW-100 Xcvr	249
HW-101 Xcvr	269
HP-23 AC supply	45
HP-23A AC supply	49
HP-23B AC supply	54
HP-13 DC supply	45
SB-104 Xcvr	575
HP-1144 AC/spkr	89
SB-614 Signal monitor	15
SB-634 Console	159
SB-650 Dig display	149
HD-19 Phone patch	19
HD-1250 Grid dip	49
HM-102 SWR/watt	29
HWA-17-1 DC supply	9
HW-202 2m FM Xcvr	99
ICOM	
IC-202 2m SSB Xcvr	$199
IC-230 2m synth Xcvr	229
IC-245 2m synth Xcvr	349
IC-21 2m FM Xcvr	149
IC-21A 2m FM Xcvr	175
OV-21 Digital VFO	149
IC-3PA Power supply	59
KLM	
Multi-11 2m FM Xcvr	$179
Multi-2000 2m Xcvr	369
Multi-2700 2m Xcvr	499
PA2-12B 2m FM amp	39
PA10-40B 2m FM amp	139
KENWOOD	
VFO-520 Remote VFO	$ 89
TR-2200A 2m FM Xcvr	149
TR-8300 450 FM Xcvr	229
MIDLAND	
13-500 2m FM Xcvr	$129
13-505 2m FM Xcvr	159
13-510 2m FM Xcvr	299
MOSLEY	
CM-1 Ham Rcvr	$ 99
NATIONAL	
NCX-5 Xcvr	$279
NCXA AC supply	69
NYE	
250-30 Kw tuner/SWR	$199
PEARCE SIMPSON	
Gladding 25 2m Xcvr	$ 69
REGENCY	
HR-2B 2m FM Xcvr	$129
HR-212 2m FM Xcvr	119
HR-2S 2m FM Xcvr, ac	149
HR-2MS 2m FM Xcvr	149
ROBOT	
70A Monitor	$249
70 Monitor	239
80 Camera	239
61 Viewfinder	189
SBE	
SB-34 Xcvr	$239
SB-450TRC 450 Xvtr	149
SPECOM	
2m FM synth Xcvr	$295
SPECTRONICS	
DD-I Dig (Yaesu)	$119
DD-1T Dig (Tempo)	119
DD-1K Dig (Kenwood)	119
DFD/K Dig (Kenwood)	119
SC-250 Counter	149
STANDARD	
14U 2m FM Xcvr	$249
146A 2m FM HT	189
Desk charger	34
SWAN	
117B AC supply	$ 69
P-1215 AC supply	49
PS-20 AC supply	95
270 Cygnet Xcvr	329
14A DC converter	39
350 Xcvr	249
400 Xcvr/410 VFO	199
500 Xcvr	309
500C Xcvr	339
500CX Xcvr	369
700CX Xcvr	459
117XC AC supply/spkr	95
512 DC supply	59
510X MARS osc	39
600T Transmitter	359
600R Custom Rcvr	399
600R Custom/SS16	449
600SP Spkr/patch	59
250 6m Xcvr	189
210 Remote VFO	75
TV-2C 2m Xvtr 6m if	275
FM-1210A 2m FM, ps	129
FP-1 Phone patch	39
WM-1500 Wattmeter	49
DD-76 Digital disp	119
TPL	
502B 2m 1/30w amp	$ 99
802B 2m 1/50w amp	149
1202C 2m 20/80w amp	139
TEMPO	
VF/One Ext VFO	$ 75
FMH-42 450 HT/TTP	299
VHF/One 2m Xcvr	239
SSB/One SSB adapt	139
TEN-TEC	
Triton II Xcvr	$399
252 AC supply	75
262G AC supply	99
240 160m conv	79
244 Dig display	139
KR-5A Keyer	24
KR-40 Keyer	75
KR-50 Keyer	89
S-30 Signalizer	29
210 AC supply	19
WILSON	
WE-800 2m FM Xcvr	$349
1405 2m FM HT	229
YAESU	
FT-101 Xcvr	$489
FT-101E Xcvr	599
FT-101EX Xcvr	529
FTV-250 2m Xvtr	189
FTV-650 6m Xvtr	129
FTV-650B 6m Xvtr	169
FT-301 DIG Xcvr	699
FP-301 AC supply	99
YO-100 Scope	149
YC-355D Counter	169
200R 2m FM Xcvr	239
FT-2 Auto 2m Xcvr	199

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Bankamericard (Visa); no trades.

	reg.	NOW
AMCOMM		
G-225 2m FM Xcvr	$399	299
ATLAS	reg.	NOW
350-XL/DD6-XL Xcvr	1424	1199
350-PS AC supply	229	199
BIRD	reg.	NOW
4352 VHF Ham-Mate	$ 94	59
CDE	reg.	NOW
HAM-II Rotor	$164	119
HAM-III Rotor	169	139
T-X Tailtwister rotor	299	239
QT-1 3A 12vdc supply	49	19
CES	reg.	NOW
100 Digital display	$299	149
200V Touch tone pad	59	39
COMCRAFT	reg.	NOW
CPS-6 AC supply, 6A	$139	59
DENTRON	reg.	NOW
MLA-2500 Linear (with 10m)	$899	799
4V 40-10m vertical	84	69
160-10AT Antenna tuner	129	119
DRAKE	reg.	NOW
TR-4CW Xcvr w/RIT	$799	599
RV-4C Remote VFO/spkr	170	149
R-4C Receiver	699	549
T-4XC Transmitter	699	549
AC-4 AC supply	150	119
MS-4 Speaker	33	27
2CQ Speaker/Q-mult	49	45
7075 Desk microphone	39	35
7077 Hand microphone	19	17
DSR-2 Receiver DEMO	3200	2495
WV-4 VHF wattmeter	89	75
AC-10 12vdc supply	49	45
AN-5 Shortwave ant	8	5
ELECTRA	reg.	NOW
BC-210 Synthesized scanner	$349	249
ELECTROLERT	reg.	NOW
Fuzzbuster II Radar detector	$129	99
GALAXY	reg.	NOW
2ZM Mobile floor mount	$ 6	2
R-1530 General cov Rcvr	1550	995
SC-1530 Speaker	60	39
FL-5306 6 KHz filter	80	60
RPA-1530 Rack adaptor	170	50
GENTEC	reg.	NOW
PM50U 500w dummy load	$ 48	24
ITC	reg.	NOW
Multi-2000 2m Xcvr	$695	399
ICOM	reg.	NOW
IC-230 Synthesized 2m FM	$489	289
IC-21 VFO Receive VFO	119	69
IC-21A 2m FM Xcvr	399	299
OV-21 Digital VFO	299	249
IC-245 (early) 2m Xcvr	499	369
IC-3PA Power supply/spkr	99	79
IC-245/SSB 2m FM/SSB	639	539
KLM	reg.	NOW
Force 5 Xcvr DEMO	1095	799
F5PS AC ps/spkr DEMO	249	199
Multi-2000 2m Xcvr	679	549
Multi-11 2m FM Xcvr	325	225
Multi-U11 450 FM Xcvr	379	299
KLM AMPLIFIERS	reg.	NOW
PA2-70B 2m 2/70w FM	$159	139
PA2-70BL 2m 2/70w FM/SSB	169	149
PA2-140B 2m 2/140w FM	229	204
PA10-40B 2m 10/40w FM	83	74
PA10-35C 450 10/35w FM	119	109
KENWOOD	reg.	NOW
TS-820 Xcvr	$919	799
TS-820 w/DG-I digital	1098	899
TS-820S Digital Xcvr	1098	988
TS-520S Xcvr	739	659
TV-502 2m Xvtr DEMO	249	225
TR-2200A 2m FM Xcvr DEMO	229	199
TR-7200A 2m FM Xcvr	249	199
TR-7500 2m synth Xcvr	299	249
PS-5 Power supply/clock	79	59
TR-7400A 2m FM synth Xcvr	399	359
MIDLAND	reg.	NOW
13-505 2m FM Xcvr	$229	179
13-510 2m FM synth Xcvr	399	349
13-509 220 FM Xcvr	179	149
13-513 220 FM synth Xcvr	449	399
REGENCY	reg.	NOW
HR-212 2m FM Xcvr DEMO	$259	149
ACT-W-10 Whamo scanner	329	149
DFS-5K Dig freq selector	199	99
ACT-T-16K Touch scanner	329	249
HR-6 6m FM Xcvr	239	149
HR-2B 2m FM Xcvr	229	139
AR-2 2m FM amp	119	99
HR-312 2m FM Xcvr	269	169
HRT-2 2m HT (no batt)	179	99
HRT-2 Deluxe HT package	295	195
HR-220 220 FM Xcvr	239	149
HR-440 440 FM Xcvr	349	249
ROBOT	reg.	NOW
f/1.4 lens	$ 47	19
SBE	reg.	NOW
Hood for Scanvision		1
SILTRONIX	reg.	NOW
FC-1 5 KHz-40 MHz counter	$169	99
SONAR	reg.	NOW
D-102D Depth indicator	$160	79
STANDARD	reg.	NOW
146A 2m FM hand-held	$314	229
SWAN	reg.	NOW
PS-20 AC supply	179	129
P-1215A AC ps for monoband	75	39
ST-1 Antenna tuner	189	159
WM-6200 6 & 2m wattmeter	87	59
WM-3000 SSB PEP wattmeter	87	69
TPL	reg.	NOW
502B 2m 1-4/30-45w amp	$149	119
702B 2m 1-4/45-70w amp	169	149
802B 2m 1-4/50-80w amp	259	219
1202 2m 5-15/80-120w amp	239	199
350 450 5-15/20-40w amp	189	149
PS3-A12D 12v 20A supply	136	119
TEN-TEC	reg.	NOW
544 Digital Xcvr	$869	769
262G Power supply	139	129
509 Argonaut Xcvr	369	319
570 Century/21 Xcvr	299	269
VENUS	reg.	NOW
SS2 Slow scan monitor DEMO	$285	199
YAESU	reg.	NOW
FT-901DM 160-10m Xcvr	1459	1313
FT-301S 20w PEP Xcvr (Fla)	559	459
FT-301S DIG Digital 20w (Fla)	750	599
FT-301 200w PEP Xcvr	769	599
FT-301 DIG 200w PEP digital	935	749
FL-101 Transmitter	649	575
FL-2100B Linear (with 10m)	529	479
FT-227R 2m FM synth Xcvr	349	315

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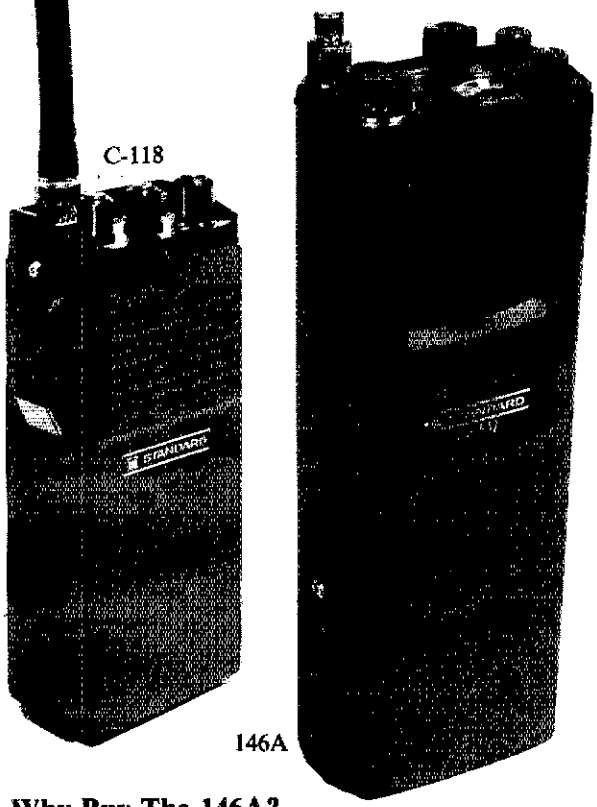

Standard Communications offers you a choice of 2 meter handheld radios in either the pocket sized C-118 or the professional sized 146A.

Why Buy The C-118?

- Compact — can be slipped in pocket or purse
- 6 channels but affords 18 channels transmit with unique offset switch which produces transmit offset of ±600 kHz
- Requires only one crystal for each channel
- BNC antenna connector
- Rubber flex antenna at no additional charge
- LED status lights indicate channel busy and RF output
- 1+ Watts output

Why Buy The 146A?

- More room means larger battery capacity
- Larger case affords greater audio fidelity
- Room for PL and other tone options
- Provisions for remote speaker mic
- Full size telescoping antenna is standard feature
- 5 channels
- Meter for RF and signal strength
- 2+ Watts output

Both the C-118 and 146A...

. . . Are ready to operate on 146.94 simplex and 34/94 repeat

. . . Have excellent sensitivity and selectivity characteristics

Standard Communications

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Standard Communications Corp.
P.O. Box 92151
Los Angeles, CA 90009

Gentlemen:

Please send me additional information on

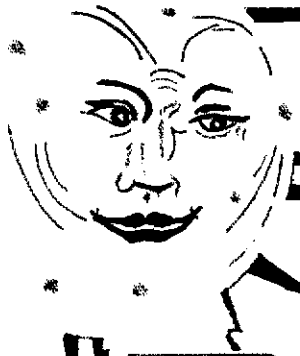
☐ C-118 2 meter 1 Watt FM Handheld Radio
☐ 146-A 2 Watt VHF Handheld Radio

Name _____

Address _____

City _____ State _____ Zip _____

B



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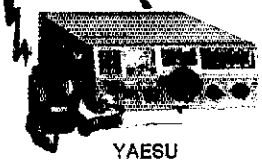
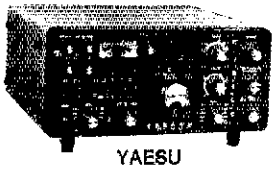
THOMAS COMMUNICATIONS

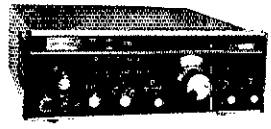


YAESU
FT-7



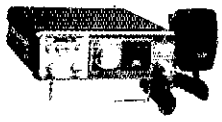
YAESU
FT-901

ICOM
IC-701



DRAKE
TR-7

KENWOOD
TS-820S



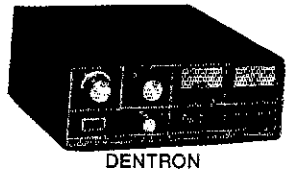
YAESU
FT-227R

TEN TEC
544

PANASONIC RECEIVER
RF 4800

KENWOOD
TS-700SP

KDK
2015R



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Bearcat® 250 Features:

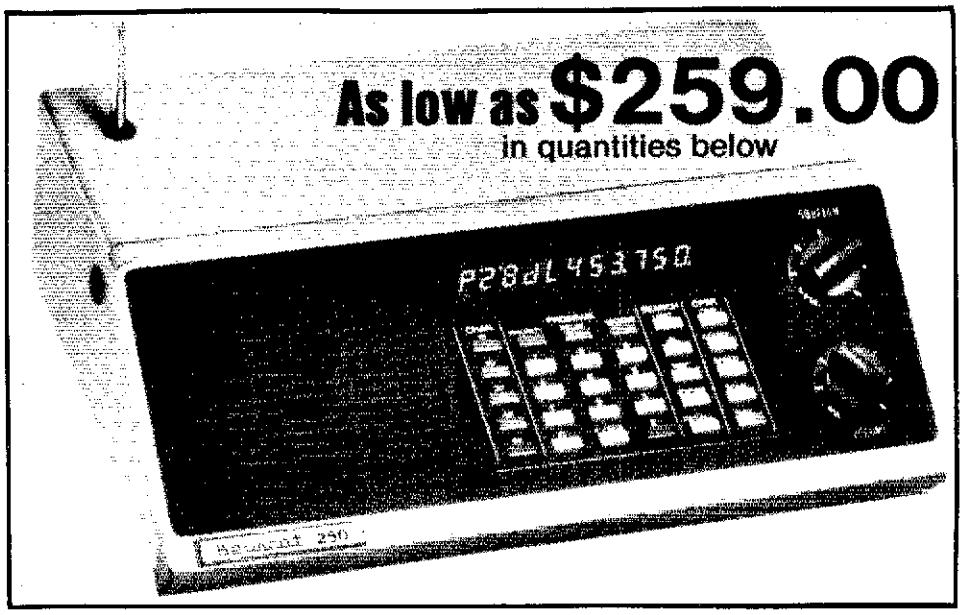
- **50 Channels/5 banks**—Program 50 frequencies from infinite frequency combinations. Designate certain banks for specific types of activity, for example, use bank 1-10 for Police, 11-20 for Secret Service, 21-30 for Drug Enforcement Agencies, etc.
- **5-Band Coverage**—Includes Low and High VHF bands, UHF, and 2 meter plus ¾ meter amateur bands. With special programming techniques, this unit can monitor additional frequencies not published in factory specifications.
- **Search/Store**— Hands-off automatic search operation that locates and "remembers" active frequencies.
- **Search/Recall**—Used in conjunction with search displays frequencies found in search/store sequence.
- **Communications Electronics"** —quality control approval rating #1. Our highest quality grade for technologically sophisticated equipment.
- **Crystalless** —Without ever buying a crystal, you can select from all local frequencies by simply pushing a few buttons.
- **Priority**—Samples programmed priority frequency on channel 1 every 2 seconds regardless of other scanner operations—important for professionals who must monitor a certain frequency.
- **Time**- Brilliant digital LED clock—will display hours, minutes and seconds. Extremely accurate!
- **Count**—Frequency "traffic analysis" may be easily set-aided to keep track of potentially hostile forces. Automatically counts numbers of transmissions on each channel to determine the most active frequencies.
- **Non-Volatile Memory**—No batteries required to retain memory, even when scanner is unplugged. MNOS integrated circuit utilized for memory.
- **Scrambler/Tape Audio Output**—Top secret cryptographic messages may be received and decoded by connecting the *Bearcat* 250's audio output jack to a correctly keyworded decrypting device, even if it utilizes the National Bureau of Standards Data Encryption Standard.
- **Small Size**—The *Bearcat* 250's small physical size lends itself to government monitoring applications. When used with a battery power supply and a tape recorder, the *Bearcat* 250 may be easily concealed in an attache case for unattended, unobtrusive surveillance.
- **Auxiliary**—On/Off control of auxiliary equipment (tape deck, alarm, light, motor) when transmissions occur on programmed channels. Now, law enforcement agents can activate a tape recorder by remote control when a "body mike" transmission is received.
- **Speed**—Choice of either 16 or 5 channels per second scan speed for closer monitoring of desired frequencies.
- **Limit**—Sets the upper and lower frequencies of the user-controlled search range.
- **Birdie-Lockout**—Avoid annoying scanner "lockup" during search mode. Scanner will skip over any programmed birdies!
- **Self-Destruct**—In case your scanner falls into enemy hands, you can *electronically erase* up to 64 frequencies in storage memory with only two key strokes.
- **Search Direction**—Determines in which direction search goes for faster return to desired frequencies.
- **Direct Channel Access**—Move directly to desired channel without stepping through all channels.
- **Automatic Squelch**—Factory-set squelch automatically blocks out unwanted noise.
- **Decimal Display**—Shows frequency and channel number as well as programmed function.
- **Deluxe Keyboard**—Makes frequency and feature selection easy for simple programming.
- **Patented Track Tuning**—Receive frequencies across the full band without adjustment. Circuitry is automatically aligned to each frequency monitored.
- **Selective Scan Delay**—Adds a two-second delay to prevent missing transmissions when "calls" and "answers" are on the same frequency.
- **Extended Frequency Coverage**—With special programming techniques, the *Bearcat* 250 can monitor 125-146 MHz and 399-420 MHz in addition to the normal frequencies *without* special modifications.
- **Simple Programming** —Simply punch in on the keyboard the frequency you wish to monitor.
- **Space Age Circuitry**—Custom integrated circuits, a *Bearcat* tradition in scanning radios.
- **Rolling Zeros**— This *Bearcat* exclusive tells you which channels your scanner is monitoring.
- **UL Listed/FCC Certified**—In addition to the #1 rating from **Communications Electronics,"** the UL and FCC certification assures you of quality design and manufacture.

The new **Communications Electronics** *Bearcat* 250 is an incredible scanning radio offering the scanning professional and the knowledgeable scanning enthusiast more monitoring capabilities, more frequency versatility than any other scanning monitor available today.

It uses patented *Bearcat* integrated circuitry, so there's never a crystal to buy. With pushbutton ease, up to 50 channels can be programmed in five banks of ten channels each. The keyboard is easy to comprehend, simple to use. All functions are instantly displayed in bright LED numbers and letters.

All programmed frequencies and pertinent scan instructions are memorized in an electronic memory that operates even when the unit is unplugged from wall power—there is no need for batteries.

Not only will the *Bearcat* 250 capture more scanning action, it will "remember" where and how often it heard that action. Now it's easy to identify which frequency is used most often. It will search automatically through a selected frequency range and memorize in its search memory up to 64 active frequencies. To determine what frequencies were found during the search store mode, simply push the recall button and they will be displayed one at a time. Press the enter key and any of these frequencies is entered automatically into the scan memory.



Bearcat® 250 Specifications

Frequency Reception Range

Low Band	32-50 MHz
VHF Band	146-174 MHz
UHF Band	420-512 MHz

Extended frequency range
With special programming techniques the Bearcat 250 will also cover the following frequencies with a slight reduction in sensitivity:

VHF Band	125-146 MHz
UHF Band	399-420 MHz

Scanner Dimensions
27.0 cm Wide x 7.6 cm High x 19.4 cm Deep (10¾" Wide x 3" High x 7¾" Deep)

Scanner Weight
2.27 Kilograms
(5 pounds)

Shipping Weight
3.18 Kilograms
(7 pounds)

Power Requirements
Note: 230 Volt AC Export model may be available January 1979
110-140 Vac, 60 Hz, 15 Watts
12-15 V dc, 8 Watts

Audio Output
At least 2.0 Watts rms

Antenna
Telescoping (supplied)

Scan Rate
16 or 5 channels per second

Sensitivity
0.4 microvolts for 12dB SINAD on VHF bands. UHF band slightly less.

Selectivity
Better than
-60dB @ ±25 KHz

Audio Quality
The BC-250's audio is more noise-free and suffers less distortion than the *Bearcat* 210 by a margin of 10 dB or more.

Image Rejection
The *Bearcat* 250 rejects image frequencies by at least 8 dB better in all bands than the *Bearcat* 210.

Connectors
External antenna and speaker. AC & DC Power. Auxiliary control output. Tape audio output.

Accessories
Vehicle mounting bracket and hardware. AC & DC power cords.

The **Communications Electronics"** *Bearcat* 250 even has an automatic count function that remembers how often any or all programmed frequencies were activated by transmissions while scanning. This will help you determine the value of your frequency selections. The *Bearcat* 250 will literally search and seize active frequencies.

An important feature for professionals who must monitor a specific frequency is the priority channel, Channel 1. If desired, whatever frequency is programmed for this channel will be sampled every two seconds anytime the set is turned on.

THE INCREDIBLE, NEW BEARCAT 250 SCANNER.

LEADING THE WAY TO REAL ENJOYMENT

The *Bearcat* 250 has an auxiliary output feature which can be programmed to activate external devices such as a light, alarm, motor, etc. Now law enforcement agents can activate a tape recorder by remote control when the *Bearcat* 250 receives a transmission from a "body mike" or when any number of *programmed* frequencies are active.

Even when the set is turned off it's working—as a brilliant LED quartz crystal digital clock, displaying hours, minutes and seconds. Time is kept continuously, even when your *Bearcat* 250 is performing other functions. You can always recall the time at the touch of a button.

The *Bearcat* 250 will scan any or all 50 channels at selectable rates of 16 or 5 channels per second. This variable scan rate allows for more detailed scanning. With the lockout feature, you automatically skip unwanted frequencies in scan and search modes to hear only the action you want to hear.

Besides all the advanced features that put the **Communications Electronics"** *Bearcat* 250 light years ahead of any other scanning radio, it has the superior engineering and "standard" features that have made *Bearcat* the greatest selling scanner in America. *Bearcat's* patented track tuning insures full band coverage for maximum reception. And a single electronically switched antenna eliminates the need for an additional low band antenna. A detailed service manual may be available by December, 1978.

The **Communications Electronics"** *Bearcat* 250 is an extraordinary scanning instrument. It provides virtually any scanning function that the most professional monitor could require. The *Bearcat* 250 lets those who need to know, know more. To ***get the fastest delivery*** of your super synthesized *Bearcat* 250, send or phone your ***order directly*** to our *Bearcat* Scanner Distribution Center." Mail orders to: **Communications Electronics, Box 1002 - Department CM2, Ann Arbor, Michigan 48106 U.S.A.** Send $319.00 plus $5.00 for U.P.S. shipping or $9.00 for U.P.S. air shipping. Foreign orders mailed at a slightly higher cost. International customers, please read special shipping information (in our catalog) before ordering. Further price discounts are available to quantity buyers. Suggested list price is $399.95 but you can get a *Bearcat* 250 s @ $309.00, 12 units @ 299.00, 24 units @ $289.00, 48 units @ $279.00, 96 units @ $269.00, 252 units and up @ 259.00. Add $15.00 for each 6 scanners ordered for U.P.S. U.S. ground shipping. Add $195.00 shipping charge for each 6 scanners on international shipments, or write for a pro-forma invoice. If you have a Master Charge or Visa card you may call and **order toll free** 800-521-4414 to place a credit card order. If you are outside the U.S. or in Michigan dial 313-994-4441. All telephone lines at **Communications Electronics"** are staffed 24 hours, however our *Bearcat* Scanner Distribution Center" and Export Division's hours are Monday through Friday from 14:00 to 21:00 Coordinated Universal time (9 AM to 3 PM E.S.T.)

Since this *Bearcat* scanner is the most popular unit ordered through our Scanner Distribution Center," you must **order your *Bearcat* 250 today**, to assure prompt delivery.

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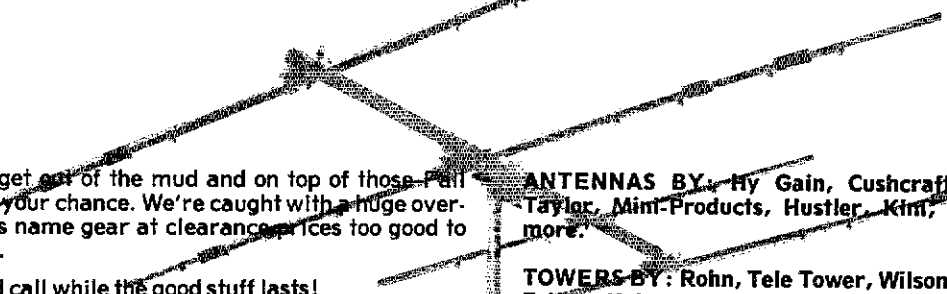

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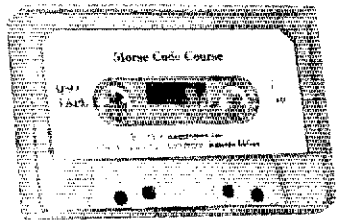

only $4.95

Kantronics QSO Tape and QXX Tape

Get prepared!

To pass the **new FCC code exams,** you'll need to identify unusual names, places, antenna heights, rig types and a variety of other items garnered from **simulated QSOs.**

Now you can really study for the new exams with the **Kantronics QSO Tape** and **QXX Tape!** Our C-60 **QSO Tape** cassette sends simulated **"on-the-air"** transmissions at **7½, 10, 13 and 15 WPM.** (Also available in a "13 WPM only" version.) The **QXX Tape speeds you on to 20, 23 and even 26 WPM!**

Both cassettes generate sharp, crisp code to **exact Morse specifications,** just as the FCC does. There's no better way to study for the new FCC exams!

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With 5/8 wave ready, all we left out was a high price.

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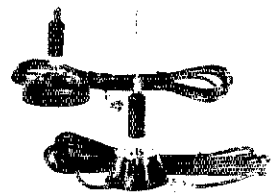
The original **Mobile 2** mounts to your trunk lid. The **Mobile 2 magnetic** grabs on almost anywhere, **and stays put.** Even when passing big trucks.

Both antennas come with all cable, connectors and hardware **in one package.**

Either way, you can't go wrong with a **Kantronics Mobile 2.**



magnetic **$19.95**

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2.5 watt MARK II and 4.0 watt MARK IV amateur hand-helds

Wilson hand-helds have been known world-wide for exceptional quality and durable performance. That's why they have been the best selling units for years.

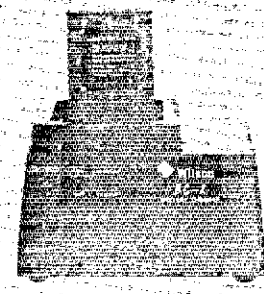
Now the American made Mark Series of miniature sized 2 meter hand-helds offers the same dependability and operation, but in an easier to use, more comfortable to carry size . . . fits conveniently in the palm of your hand. Like its size, the price is also the smallest on the market.

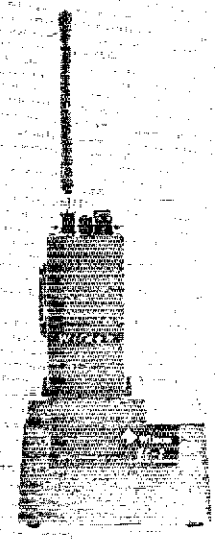
To obtain complete specifications on the Mark II and Mark IV, along with Wilson's other fine products, see your local dealer or write for our Free Amateur Buyer's Guide.

SPECIFICATIONS

- Range: 144-148 MHz
- 6 Channel Operation
- Individual Trimmers on TX and RX Xtals
- Rugged Lexan® outer case
- Current Drain: RX 15 mA TX - Mark II: 500 mA TX - Mark IV: 900 mA
- 12 KHz Ceramic Filter and 10.7 Monolithic Filter incl.
- 10.7 MHz and 455 KHz IF
- Spurious and Harmonics: more than 50 dB below carrier
- BNC Antenna Connector
- .3 Microvolt Sensitivity for 20 dB Quieting
- Uses special rechargeable Ni-Cad Battery Pack
- Rubber Duck and one pair Xtals 52/52 included
- Weight: 19 oz. including batteries
- Size: 6" x 1.770" x 2.440"
- Popular accessories available

Illustrated with optional Chomarics or Digitran Touch Pad.





Illustrated is Wilson's BC-2 Desk Top Battery Charger shown charging the Mark Series Unit or the BC-4 Battery Pack only.

Consumer Products Division

Wilson Electronics Corp.

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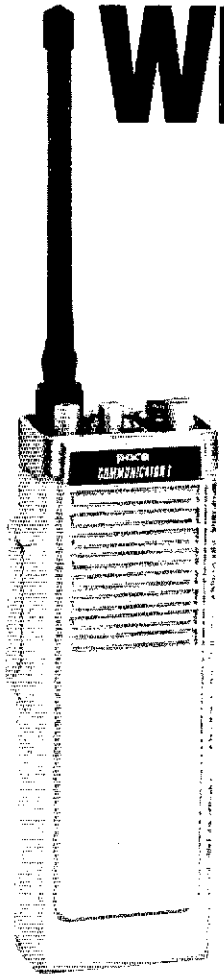
Prices and specifications subject to change without notice.

WE KNOW YOU WANT THE VERY BEST!



In a market already over crowded by others, all making claim to being "THE BEST", we knew we had to be better.*COMMUNICATOR I our 6 channel, 3 watt handheld, and **COMMUNICATOR II** our 800 channel synthesized 25 watt mobile offer all the features of the "BEST" – and a few extra, including our one year warranty and a toll free 800 number answered by other hams who speak your language.

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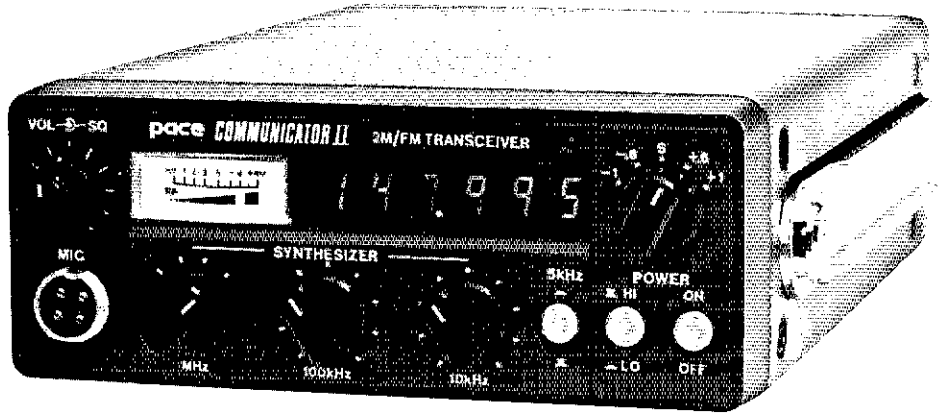

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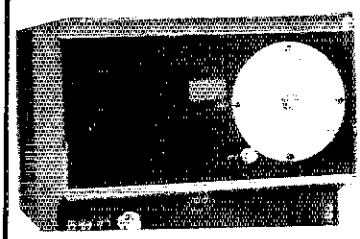
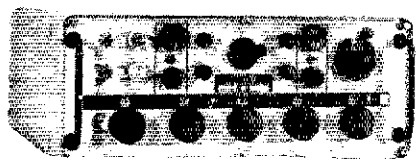
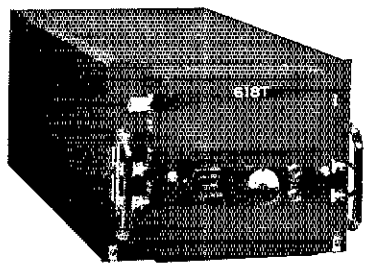




R1051 or T827



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2SC1307	5.75	HA1306W	5.20	STK050	24.50	UPC30C	3.95
2SC1678	5.50	HA1308	4.50	STK056	11.35	UPC41C	3.95
2SC1760	2.15	HA1322	5.20	STK415	8.50	UPC563H2	8.00
2SC2028	1.10	HA1339A	5.20	TA7045M	3.50	UPC566H	2.25
2SC2029	4.75	LA1201	4.25	TA7055P	5.50	UPC575C	4.10
2SC2074	3.00	LA4031P	3.50	TA7060P	1.85	UPC595C	3.60
AN203	3.75	LA4032P	4.50	TA7061P	2.25	UPC1001H2	5.15
AN208	4.75	LA4051P	4.65	TA7063P	2.25	UPC1008C	6.00
AN210	3.10	LA4400FR	3.80	TA7075P	4.90	UPC1020H	5.50
AN214	4.90	LA4400FS	3.80	TA7089P	2.90	UPC1025H	5.50
AN241	3.20	LD3120	3.10	TA7120P	2.20	UPC1152H	3.95
AN315	3.50	M5115PR	4.80	TA7150P	4.55	UPC1156H	6.50
BA511	3.50	MN3001	19.50	TA7153P	6.90	UPD277C	4.50
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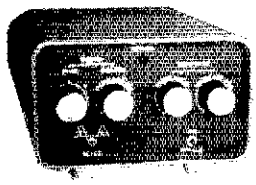
Continuously tunable bandpass filter (not lowpass) so that the passband may be positioned anywhere from 200 to 1400 Hz. 3 dB bandwidth is continuously adjustable from 14 to greater than 2100 Hz (20 dB bandwidth from 140 to 2100 Hz).

Audio input and output impedance is eight ohms with one watt output capability.

Dimensions — 5.5 X 7.5 X 3.5 inches.

Available in gray or green tones.



Positioning of simultaneous notch filter is continuously variable from 300 to 1400 Hz with FINE and COARSE position controls. Notch depth is fixed at nominally 30 dB. Notch tuning is independent of bandpass tuning and may be completely disabled.

Bypass switch restores the receiver audio output path to its original configuration.

Power Requirements — 115V ac at less than 1/16 amp. No batteries needed.

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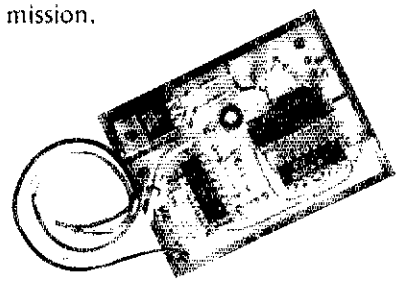

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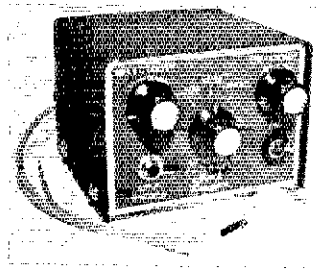

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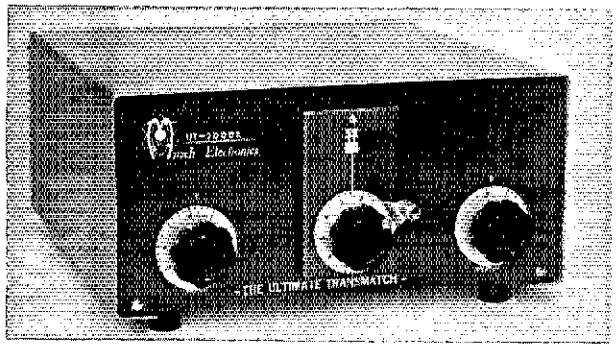

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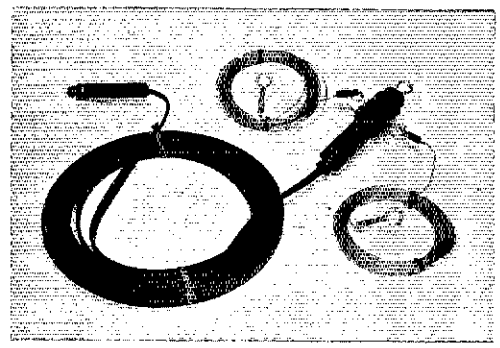

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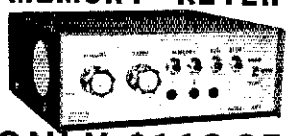

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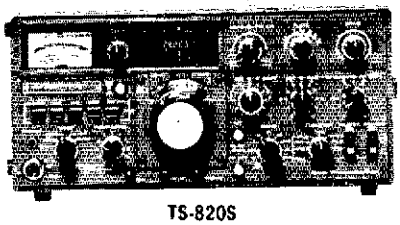

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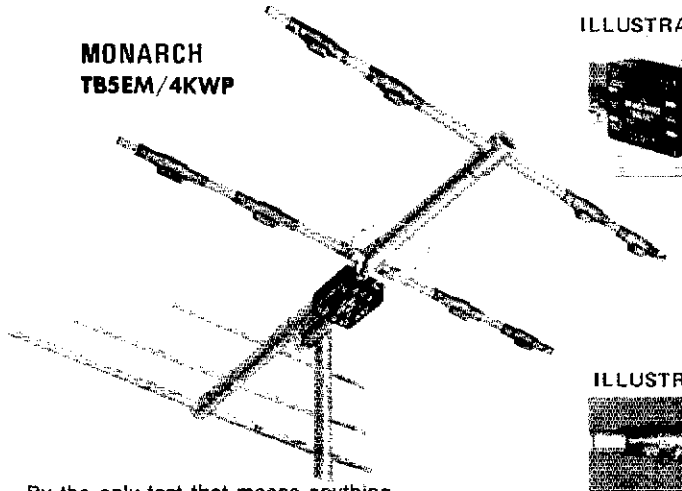

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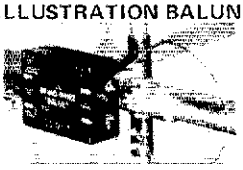

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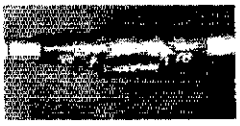

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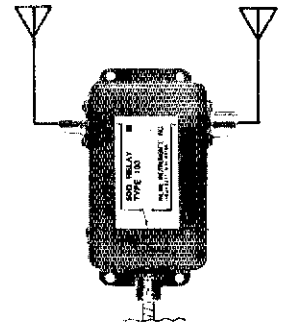

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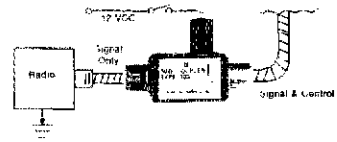

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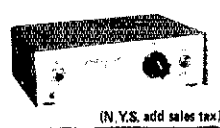

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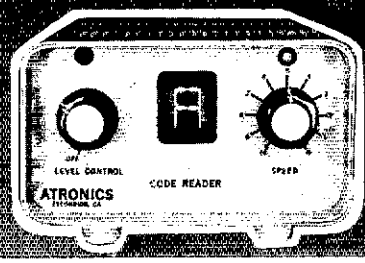

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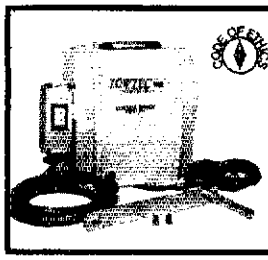

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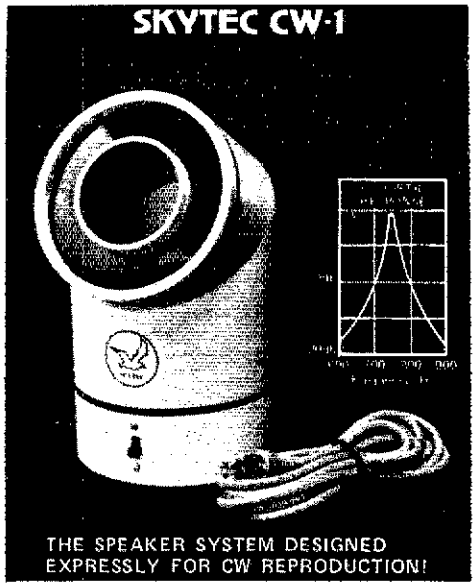

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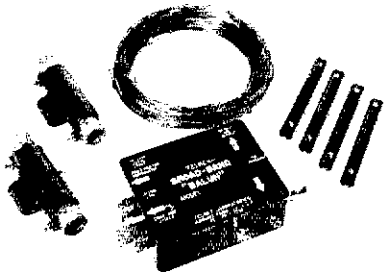

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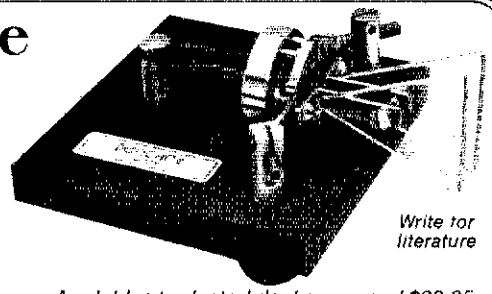

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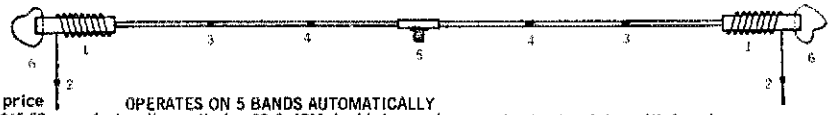

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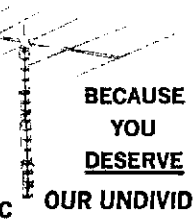

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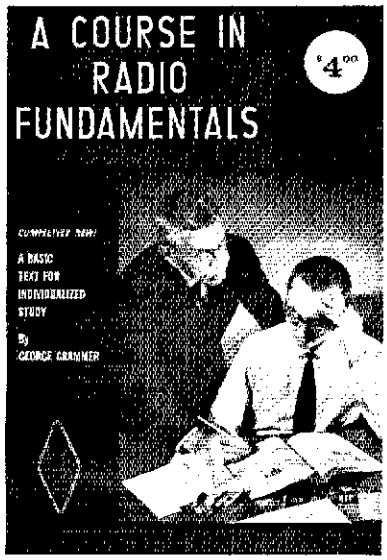

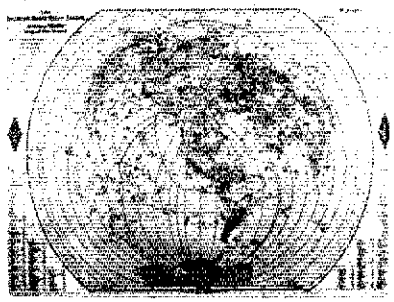

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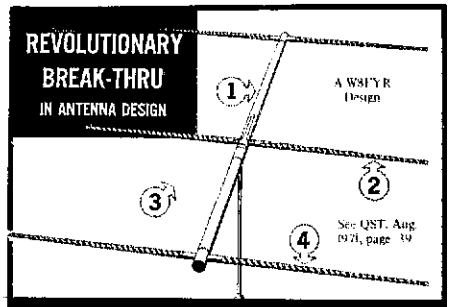

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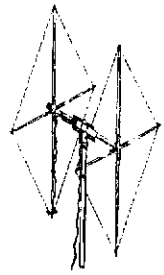

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TRADE: Western Electric 4-D, early 20's broadcast monitor, for digital sythesized 2-meter rig, with cw capability. Carl Elkins, AA4DE, 1701 Woodland St., Nashville, TN 37206. 615-226-0651.

SILTRONIX 1011-D, FS-301 watt meter, FD-1011 digital readout plus Shure 444 desk mike. Like new $450. E. Wholmaker, 139 So. Avenue 55, Apt. 10, Los Angeles, CA 90042. 213-254-3356 home, 213-221-2151 bus.

4-400A with socket and chimney $25. 2000 volt, 1 amp Collins plate transformer $30. 10 H choke 500 mA $20. Large Collins motor driven plate capacitor, approx. 300 pF, 7kV with spare motor $30. CMOS 4000 series, 10c each. Cassette player $5. 0.001/10kV $7.50. .004/5kV $5. WB4FPH, 332 Belinda Parkway, Mt. Juliet, TN 37122, 615-758-5598.

WANTED: Grebe CR-5, RORK amplifier, low freq. coil set for HRO-5. For sale: HW-12, home brew supply, like new, $125. W3HWT, 329 Evergreen, North Wales, PA 19454.

SELL: HW-100, ac/spkr pwr supply and mobile pwr supply $350. Factory aligned, manuals, immaculate. K1EPE 203-775-2117.

MOTOROLA 2-Meter fm receiver, ZRD1060AA. 13 transistors, 7 diodes, No conversion required — designed to operate 132-152 MHz. $67.50. Matching transmitter, ETD6030AA, $45. Both with technical manual, case, microphone, speaker and antenna $125. W6BKY, Box 1457, Campbell, CA 95008.

HRO-60R. Beautiful condx with 11 coils and 6 new tubes. Could use minor alignment. $375. You pay shipping. N6ADK, 714-421-0868.

SELL: HR-10B, DX-60B, Don, WDØAHO, 314-496-3451, $60 each.

WANTED: Dentron trim-tenna TT-20 beam antenna, new or excellent condition with assy. instructions, all hardware. Dealers replies welcome. To be shipped to Hawaii address via UPS. Write Jack Boorstein, USNS Nodaway (T-AOG 78), FPO, San Francisco, CA 96601.

SELLING: Kenwood TS-520S xcvr with cw filter, SP-520 speaker and Shure-444 mike. Mint condition. $650. WA2GBZ: Marc Lichtenthal, 1068-51st Street, Bklyn, NY 11219. Call eves. 212-435-6025.

INSTRUCTOGRAPH (new) plus 20 tapes $80. Heath Apache $125. HQ-110A $150. Heath AA-100 (50W) stereo amp $40, Nielsen, 68 Brook Road, Pittsford NY 14534, 716-381-0958.

HW-202 $145, case w/TT/GLB (needs work) all $175. RT70 6-M fm xcvr $25. Pentron T90 hi-fi tape recorder $50. Webster 80-1 wire recorder $50. 250W modulator pr809's w/speech amp $35. KW modxfrmr $25. BC-603 $15. Rad-Com 1970-78 mint $45. QST 1956-60 poor $15. QST 1966-77 mint $75. FOB W3TJ 412-872-5497.

HW-202, 7 sets of xtals, excellent condition $125. Call Steve, W2HTF/3, 301-647-8059 eves.

MANUAL needed for Hallicrafters SX-122. Send card naming your price. Mike Meuer, NØCF, 5431 Logan Ave., North, Minneapolis, MN 55430.

COMPLETE Station: Yaesu FT-401B transceiver with SP/patch — FL-2000B linear — FTV-650 6 meter — FV-401 VFO. Monty Kiel, 602-942-9374.

WANTED: Linear amplifier, uses 4-1000A tube with power supply. W8OAR, 3915 Grosvenor, Cleveland, OH 44118.

SSTV — Sell TEEC monitor HCV-2A and camera HCV-1B both for $300 plus shipping. W2BZF.

KWM-2, late (w.e.), serial above 15K-mint, 516F-2, (r.e.) — like new, both perfect — $799. Domestic and export offers considered. WA2FNY, 3 Kent, Plainview, NY 11803. 516-681-3152.

HEATH HW-202, tone burst, Micoder, HWA-202 $230. Wilson 1405SM, case, charger, mint $350. WA2GDE, 4 Scott Carpenter Road, Oxford, NY 13830.

SELLING entire station: SB-220 linear, Kenwood T-599 and R-599, SB-610 monitor scope, Johnson Matchbox and SWR bridge, RPC-3C speech compressor, 2-meter am rig, and many smaller items. Nicholas Pappas, 211 West 106 St., NYC, 10025. Day: 952-6230. Eve.: 662-2225. Best offer buys anything.

WILL pay $25 to anyone who will give me a demo of Hal, Info-Tech, or Microlog in morse code. W2OQK. Tel. No. 212-651-2798.

HAMMARLUND HQ-180AC with matching speaker, manual. Very good condition. $275. I'll pay shipping. K3WWT, 405 Morton, Ridley Park, PA 19078 215-532-5407.

HEATHKIT DX-60B xmtr with HG-10B VFO and manuals $125. Latayette HA-146 25W/1W 12 channel, 10 installed, plus Hustler co-linear and 11 ele. CushCraft beam $250. Will trade all for Kenwood T-599A. Prefer local pickup. WA2TVU, Mike Sparks, 4 Tedwood Path, Glen Cove, NY 11542 516-676-3429.

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POPULAR Electronics Magazine collectors — we have 69 consecutive issues: Dec. 1955 — Sept. 1961 (except Dec., 1958). Make offer. WA5RSC, 4419 77th St. Lubbock, TX 79424.

WANTED Collins: S/Line, 30L1, 312B4. WB9ARP, 1605 Ridge Rd., Green Bay, WI 54304.

WILSON DB-33 antenna $75, local pickup. SB-33 transceiver, needs finals and tune-up $110. WA4OEJ, 205-881-5327.

COLLINS KWM-2A round with 516-F2 power supply. Excellent, just tubed and aligned. $850. Kenwood TR-7400A with 4 amp DC supply $310. W7KKN 206-759-6747 or 3119 No. 32nd, Tacoma, WA 98407.

WANTED: Mint Heath SB-630 station console with manual. Richard Low, WB2HIR, 419 E. 93 Street, NY, NY 10028.

WANTED: Collins 148C-1 nbfm receiving adaptor. State price, condition. Earl Hoback, K6QEN, 39291 Long St., Hemet CA 92343, 714-925-9060

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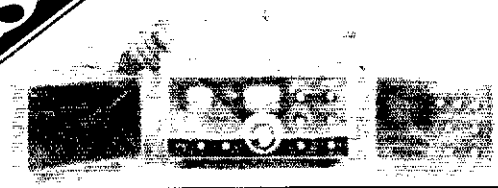

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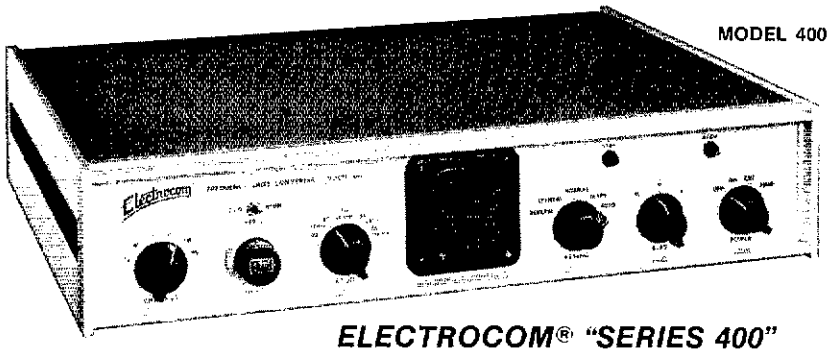

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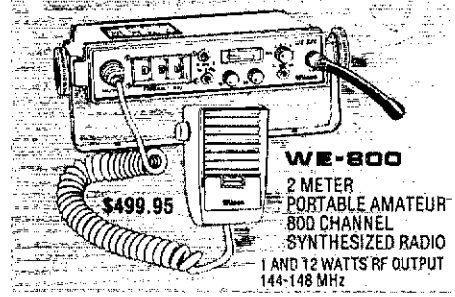

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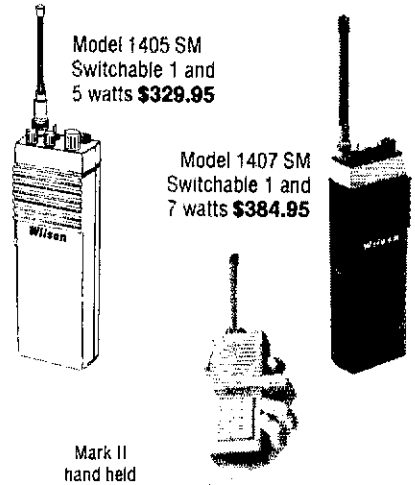

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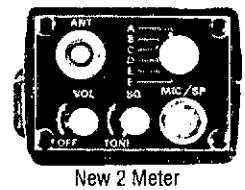

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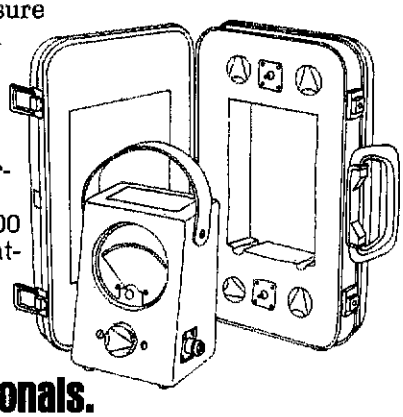

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SELL: Regency HR-2B, mint, loaded, $125. N1FB.

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SELL — Robot SSTV Camera 80 with Vivitar lens, Monitor 70, cables, manuals $400. KR-50 TenTec keyer never used $80. Squires-Sanders SS1R receiver, SS1V Video Bandscanner, SS1RS Noise Silencer, speaker, manuals and cables $1000. W0DEI, Francis Kramer, St. Charles, MN 55972. 507-932-4734.

YAESU FT-227R 2-Meter transceiver with memorizer. Includes mobile bracket, microphone and magnetic mount mobile antenna. Only 5 months old! Mint condition $275. WA6JGK. 805-644-7696.

ROBOT model 70 SSTV monitor $185. FFR receiver, 2-8 MHz with plug-ins $80. Radiation PDMS Radioteletype frequency distortion oscilloscope $69. Nortronics standard light source, for alignment of microwave antenna system $45. Above post paid. Collins ANS/TRAC 75 high powered military transceiver, two units, one operational, other for parts, 2-29.999 MHz digital dial, automatic antenna tuning oscillator, 2500-W PEP linear, cw, ssb, am, facilitates RTTY and FAX. Test equipment and generator included. Specs $1. Sent freight collect $750 or best offer. Norm Zink KA4CPE, Box 832, Taylors, SC 29687. 803-268-7606.

WANTED — Millen 90831 modulator. Jake Sfusarz, W2VDB, 1146 Sunrise Blvd., Rotterdam, NY 12306.

SELL: Kenwood TR-7400A 2-Meter fm transceiver. New — has not been out of the box. $325. WB0WLI 2810 Gray St., Denver, CO 80214.

TEN-TEC PM-3a HB ac supply and AC4 SWR AC5 tuner all for $35. K2VX, Wiesen, 18 Wilbur, Newark, NJ 07112. Days 201-575-1570 evenings 201-923-5322.

PERFECT TS-520 with cw filter fan, 12 Vdc supply, external speaker, in original box — $800; good SB-230 linear — $250. With manuals. Will ship but prefer pick-up. Joe Schachner, WB2FUL, 212-263-3193.

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160-METER converter, Ten-Tec 240, new, full warranty, $87.50. WB5FXI

LINEAR amplifier, Hallicrafters HT-45, 1000 watts PEP, with homebuilt heavy duty 4000 volt, Variac controlled supply, $200. Pick-up only. K2POA, 516-931-3374, 29 Boone, Bethpage NY 11714.

DRAKE R4B, late model, mint condition, with crystals for WWV and 28.0-28.5 MHz, manual. $325. Andy Faber, WB6CXI, 408-423-1485.

FOR SALE: QST from Feb. 1925 thru 1976. Radio: lot of copies June 1937 thru Mar 1942. CQ: Lot of copies May 1948 thru Apr. 1964. All in perfect condition. All copies sold only. $12 per year for QST. Balance free. Felix M. Whitaker, W4OC, 816 Wilkerson Ave., Durham, NC 27701.

BARKER & Williamson 6100, ultimate ssb xmtr., $350; HQ-170C (24 hun) w/extras, $170; Heath SB-10 ssb xmtr adapter, $40; all mint cond. w/manuals; Howard, WA3IMG, 215-548-5633 after 9 PM eastern time.

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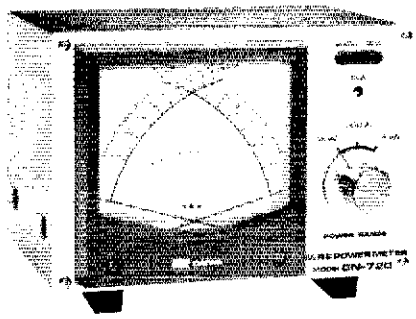

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DX-100 $35. Johnson Adventurer $12. Motorola: Handie-Talkie H23BAC $35, L41GGB-1 $10, Ten-Tec 210, like new, $18. All with manuals. WA2PAB.

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YAESU FT-221 2-meter all mode transceiver, no scratches, low noise preamp installed, $495. Bill AA6S, 209-732-7163.

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DRAKE R4B, T4XB, AC4, MS4 plus extras $775, Heath SB-220 $475, Johnson KW MAtchbox $100. All ex. cond. W8MQ, 225 W. Pearl St., Coldwater, MI 49036.

HRO-50, SB-101, QST, Callbooks and other items from W5FKR estate. S.a.s.e. to Gene Barnes, 434 Windcrest, San Antonio, TX 78239 for details.

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KENWOOD TS-900, VFO-900, PS-900, cw filter $675. R599A/T599A Twins $575, Spectronics DD-1-K, digital display $99. K1DFC, 4 Westwood Drive, Belchertown, MA 01007. 413-323-4088.

WANTED — Collins KWM-2 ac power supply, model 516F2. Must be in good working condx. with manual and cables. WB3EOM, 2814 Birdseye Lane, Bowie, MD 20715.

REQUIRED: Xeroxed schematic, Hallicrafters SR-500. Name your price. Cope, 5011 F St., Littlerock, AR 72205.

WANTED: Telrex Monobanders, 40/20/15/10; sell: 2-el 40-mtr Yagi; 204BA; Hy-Gain 400; SCS 220 MHz 70W amp; Rohn 25AG-2, TB-2, 45AG-3; K1VTM, RR1, Box 207D Bethlehem, CT 06751.

SIGNAL/ONE: CX-7B mint condition $995. Have matching speaker, cw filter, spare finals, documentation plus many extras. W3JW, 4513 Mountain Road, Pasadena, MD 21122. 301-437-0171.

SELL: KWM2 no. 11274 $595; 30L1 no. 12578 $495; PM2 no. 453 $95; MM1 $60; 312B5 no. 10674 $400; carrying case $50; exc. cond. with manuals. Also for best offer: Telrex 10-15-20; CDR; Shure mike; Heath dummy load 1kW; 5-Z Way tower RBX40; Panadapter PR-1; freq. meter BC221B; Millen grid dipmeter; 3 Heli Whips, 10/15/20; W9BE, Sharpe, Box 366 Glencoe, IL 60022. 312-835-1077 eves.

WANTED — SB-200 or SB-220 amplifier. George Driscoll, W9RHE, 6847 Wildwood, Chicago, IL 60646. Telephone 312-763-2360.

ATTENTION: Drake TR4-C (just factory aligned, mint new finals) MS-4, AC-4 complete $535 — Hewlett Packard electronic counter mint model 5381-A $205 — Sony World Zone SWL rig model CRF-230 (3 bands) $250 (retail cost $725). Dentron 80-10AT tuner, mint $30. WB8RMD — Bill Thee.

MANUALS: HT32/A, SX73, SX100, SR150, SX117, SR160, FPM200, SR400, SR2000, 32S3, 75S3B/C, 136B2, KWM2/2A, TS700A/S, TR7500, TR8300, TS900, 30S1, 30L1, $5 ea. CX7/A, $10. NCX1000, $795. R390A (late), $750. 75A3 (0.8, 3.1), $225. Valiant-I, $100. HQ210, $300. R391, $200. 516F2 xformer, $50. Wanted: KWS1, 75A4, SC101, SWM1, 312B2, SR2000, NCL2000. James Craig, Box 615, Portsmouth, NH 03801. 207-439-0474 (days) 603-436-2884 (nites).

MFJ CWF-2, Midland 13-510, Ten-Tec KR-40, Drake MS-4, Webster 160 Band-Spanner, Heath HD-15, IT-121, SB-610. All mint. Make offers. Tatar, 1625 North Park, Cleveland Heights, OH 44106.

WANTED: Tri-band beam, tower, rotor. AA1U, Carl Nebelsky, Box 182, Pleasant Valley, CT 06063. 203-379-1729.

WANTED: Heath SB-10 ssb adapter with documentation. K2EOP, 42 Guest Drive, Morganville, NJ 07751. 201-536-3540.

MINT Yaesu FT-101EE, filter, fan, speaker, YP-150 dummy load. $600 or trade for T-4XC. WA1YIO. 603-224-5737.

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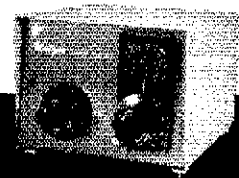

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WILSON — System one $199.95; System Two $164.95; WR-500 $99.95; WV-1 vertical $66.35; plus shipping. check, M.O., C.O.D. — info — s.a.s.e. K8FO. JRS Electronics, P. O. Box 18934, Cincinnati, OH 45201.

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HEATH HW-16 and HG-10 VFO (excellent condition). Tuned for Novice band. $125. WA2EVZ, Box 8, Patterson, NY 12563.

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DRAKE T4XB, R4B, MS4, AC4, LN, $855. TR-33C 9 xtals carrying case. Mobile mount, magnetic 5/8-wave car ant, rubber helix, Ex. $265. Hustler 4BTV 80-meter resonater $80. Turner & 2 mic $20. WB8VBH, Bob, 701 Jefferson, Bedford, OH 44146. 216-232-5796.

YAESU FT-101E, cw filter, desk mike, fan, SP-101PB, $650. HWTX1, SB-10, $100. WB3EIJ, 717-676-3548, Box 102, Greentown, PA 18426.

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MINT Hallicrafters HT-32A spare tubes, coaxial relay $200, HT-33A, factory modified to B, spare final $300. M. Silevitch K1PEV, 70 Harvard Avenue, Brookline MA 02146. 617-734-4170.

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ESTERLINE — Angus Model AW, 0-1 MA chart recorder. Like new, ten chart speeds, $250. Century 21, mint, $225. WD0DBH, 802 Baker, Ottumwa, IA 52501. 515-682-6344.

HEATH HW-16, $80. UPS prepaid in 48. For quick sale. Smith, Box 635, Oak Ridge, TN 37830.

CHANGE to get on air cheap — Hallicrafters SX-101A and HT-32A, both for $150. Both work. You pay shipping. C. Armstrong, 7 Robin Hood Dr., DeLand, FL 32720. 904-736-0566.

KENWOOD Service Manuals-TS-820(S) $10, all other Kenwood models $7.50. MINT Demo TS-820 with full factory warranty $799-limited quantity. TS-600 new $629. Used specials: Collins 32S-3 & 516F-2 $699, 75S-3B $699. New PTO, 75S-3 $349, Dentron 160-10AT 3kW $169, TS-820-S $899. All items include free delivery via UPS insured. We ship same day. Ham Radio Outlet, 2620 W. La Palma, Anaheim, CA 92801. 714-761-3033.

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COLLINS late KWM-2 $675. 516F-2 $125. 312B4 round $225. 209-733-3215 Dick Shideler, 3731 W. Evergreen, Visalia, CA 93277.

HEATHKIT HW-8 $130; Realistic DX-160 receiver $160. Andy, KA6AXV, 415-355-5311, 441 Lynbrook, Pacifica, CA 94044.

FOR SALE: HW-16, make offer WD4BQW, Box 551, Hazelwood, NC 28738.

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SELL: Argonaut 505 and built-in crystal calibrator, 210 power supply, 405 linear, all excellent condition. $315 plus shipping. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

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SELL: HW-8 ($115) and MFJ-16010 Antenna Tuner — ($25). Both in excellent cond. W9OEN — 404 Glenn Dr., Urbana, IL 61801. 217-344-4265.

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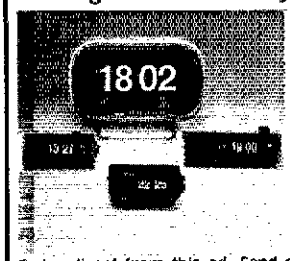

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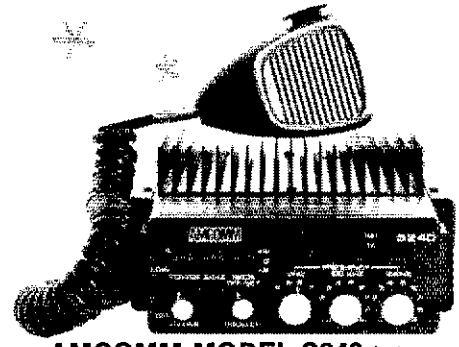

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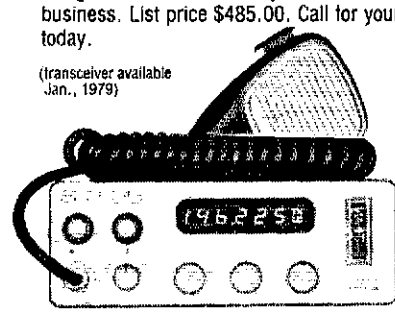

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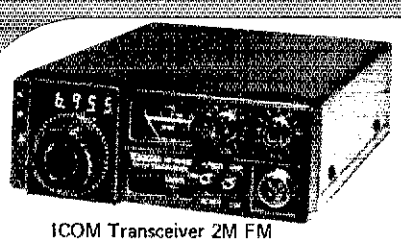

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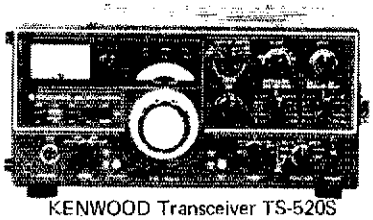

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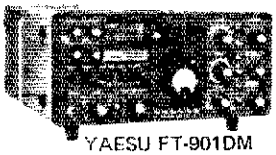

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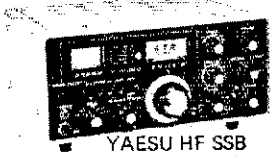

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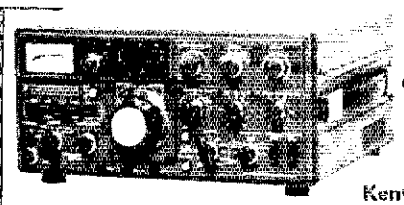

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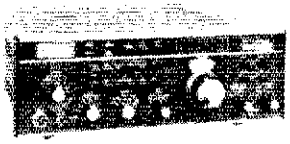

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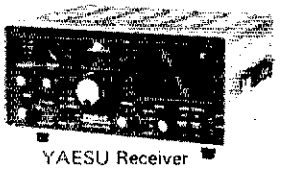

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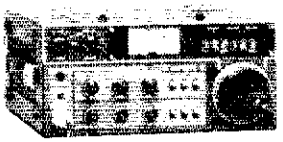

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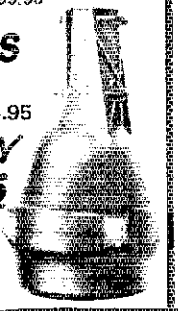

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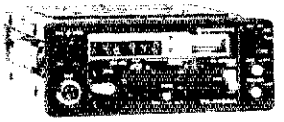

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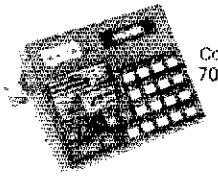

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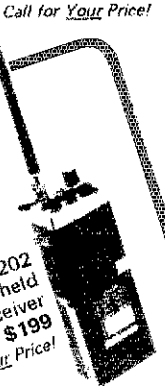

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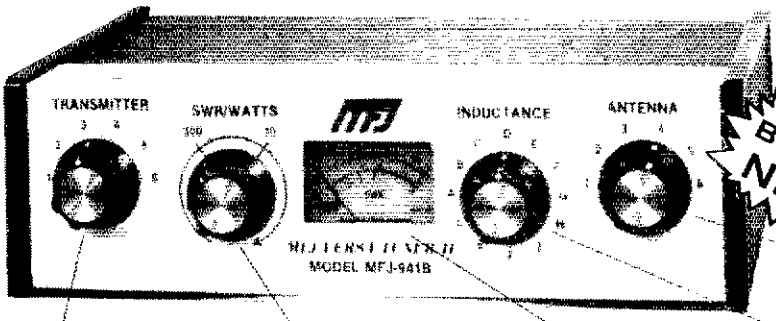

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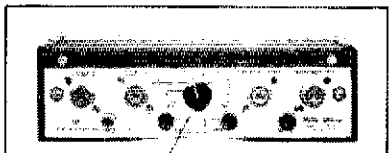

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