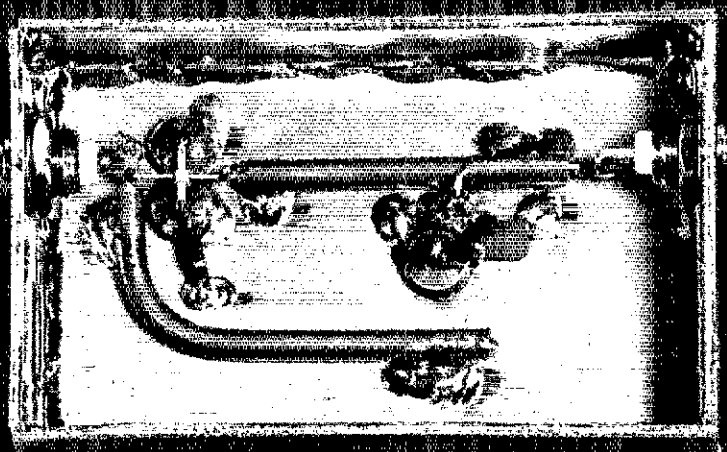
October 1985 $2.75

QST

devoted entirely to Amateur Radio



Another new band: 902 MHz is off and running

Page 21

HENRY REPORT #2

New models reflect our policy by design. Technology moves fast. At Henry Radio we keep up with a steady flow of new models, some for amateur use, some for commercial use, some for industrial use and some for scientific research.

Here are three new models for this month:
*New UHF model 3004 1500 watts output at 400 MHz.
*New VHF model 3002 1500 watts output at 144 MHz.
*New HF 5K Classic, 3.5 to 30 MHz (not for sale to U.S. amateurs)

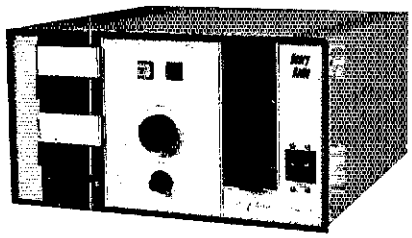
These three added to the already broad line of amplifiers we offer means that we can now cover two MHz to 500 MHz and power outputs as high as 10,000 watts depending on frequency. This may be the most complete line of power RF amplifiers available in the world.

Let us know your requirements. We want to help you.

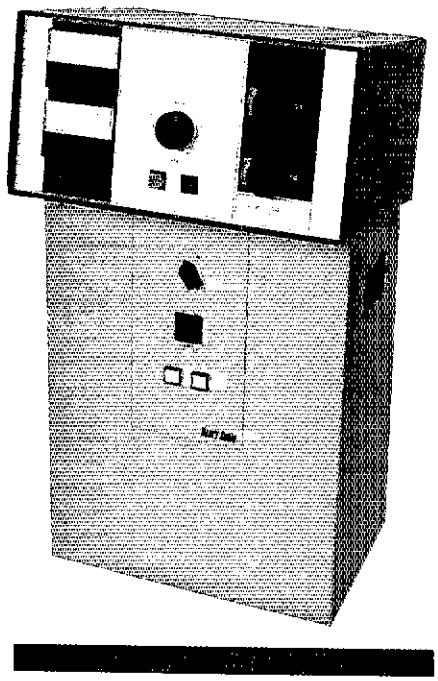
2K Classic...the culmination of more than fifteen years of developing the 2K series into the world famous line that sets the standards for top quality HF linears. A true "workhorse"; built to loaf along at full legal power, trouble free, for years of hard service. Operates on all amateur bands, 80 through 15 meters (export models include 10 meters).

2K Classic "X"... We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged...durable...the last amplifier you may ever need to buy.

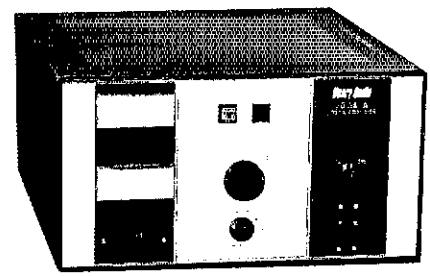
3K Classic Mark II...uses the Eimac 3CX1200A7 tube. More than 13db gain. We believe the 3K to be the finest amateur linear available ...the amplifier of every amateur's dreams.



2KD Classic...a desk model designed to operate at 2000 watts effortlessly, using two Eimac 3-500Z glass envelope triodes, a Pi-L plate circuit and a rotary silver plated tank coil. We challenge you to find a better desk model for even a thousand dollars more.



2002-A...a bright new rework of our popular 2002 2 meter amplifier. Uses the new Eimac 3CX800A7. The RF chassis uses a 1/4 wave length strip line design for extreme reliability. It provides 2000 watts input for SSB and 1000 watts input for CW. Because this tube is rated at an unheard of 15dB gain, only about 25 watts drive is required for full output.



2004-A is identical to the 2002A except that it is set up for the 430 to 450 MHz band. This amplifier uses a 1/2 wave strip line and offers all of the same specifications as the 2002A.

1002-A A rack mount 2 meter amplifier with the same design as the 2002A, except using one 8874 tube for 1/2 power specifications. Rated at 600 watts PEP output and 300 watts continuous carrier output. It employs the same strip line design as the 2002A.

1004-A...a rack mount half-power version of the 2004A. Covers the 430 to 450 MHz band using a 1/2 wave strip line design.

Henry amateur amplifiers are available from Henry Radio and select dealers throughout the U.S. and are being exported to amateurs all over the world. In addition to our broad line of commercial FCC type accepted amplifiers we offer special RF power generators for industrial and scientific users. Call or write Ted Shannon or Mary Silva for full information.

We stock these plus many other fine names.
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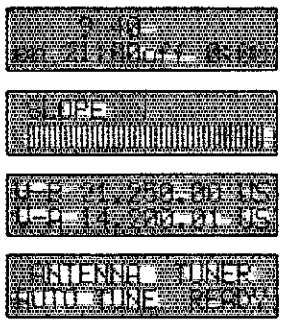
TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **Programmable scanning.**
- **Semi or full break-in (QSK) CW.**
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**



Optional accessories:

- AT-940 full range (160-10 m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First.

More TS-940S information is available from authorized Kenwood dealers.

KENWOOD

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

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

ICOM 25-1300MHz Plus! IC-R7000

ICOM's commercial quality scanning receiver...Top quality at a gem of a price.

ICOM introduces the IC-R7000 advanced technology 25-2000MHz* continuous coverage communications receiver. With 99 owner programmable memories, the IC-R7000 covers low band, aircraft, marine, business, FM broadcast, amateur radio, emergency services, government and television bands.

Keyboard Entry. For simplified operation and quick tuning, the IC-R7000 features direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob.

99 Memories. The IC-R7000 has 99 memories available to store your favorite frequencies, including the operating mode. Memory channels may be called up by simply pressing the Memory switch, then rotating the memory channel knob, or by direct keyboard entry.

Scanning. A sophisticated scanning system provides instant access to most used frequencies. By depressing the Auto-M switch, the IC-R7000 automatically memorizes frequencies in use while the unit is in the scan mode. This allows you to recall frequencies that were in use.

Other Outstanding Features:

- FM wide/FM narrow/AM/ upper and lower SSB modes
- Six tuning speeds: 0.1, 1.0, 5, 10, 12.5 or 25KHz
- Dual color fluorescent display with memory channel readout and dimmer switch
- Compact Size: 4-3/8"H x 11¼"W x 10⅞"D
- Dial lock, noise blanker, combined S-meter and center meter
- Optional RC-12 infrared remote controller
- Optional voice synthesizer. When recording, the voice synthesizer automatically announces the scanned signal frequency.

*Specifications guaranteed from 25-1300MHz. No additional module required for coverage to approximately 2.0GHz.

See the IC-R7000 receiver at your local authorized ICOM dealer. Also available is the IC-R71A 0.1-30MHz general coverage receiver.

ALL THIS AT A PRICE YOU'LL APPRECIATE.

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. R7000885

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OUR COVER

Hop on 902 with this receive converter, and listen in on the newest amateur band. (A followup article will show you how to build a simple but effective 902-MHz antenna.) See page 21.

CONTENTS

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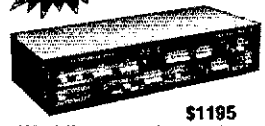

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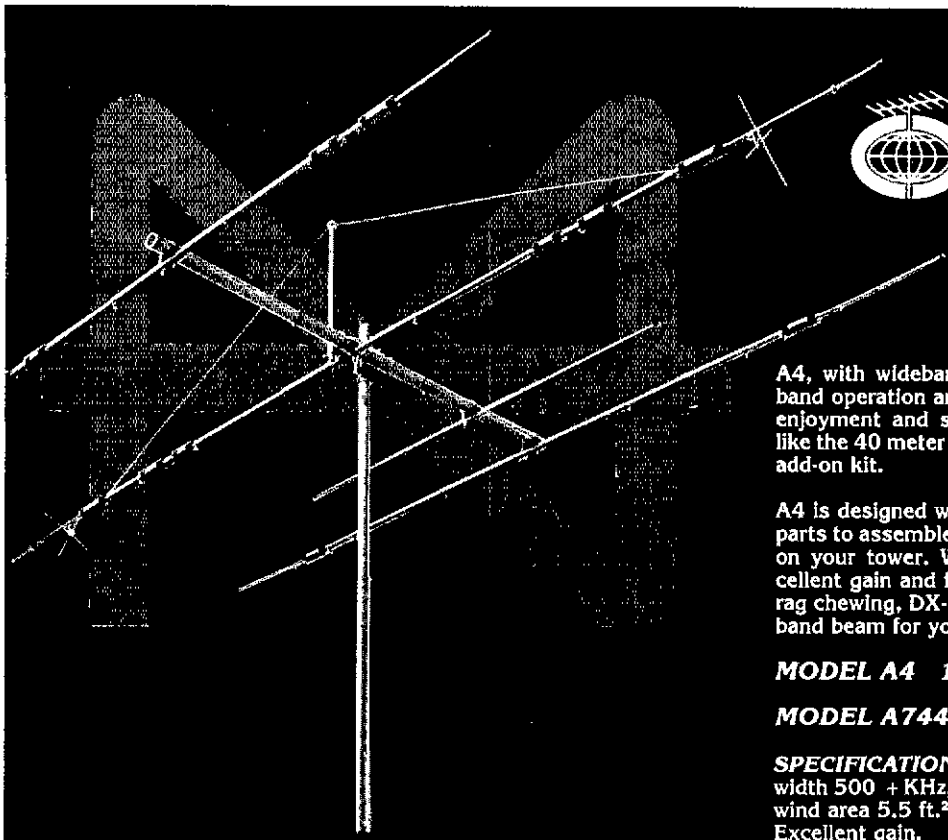

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A4, with wideband performance, easy installation, 4 band operation and moderate price will give you more enjoyment and satisfaction from your hobby. You'll like the 40 meter operating possibilities with the A744 add-on kit.

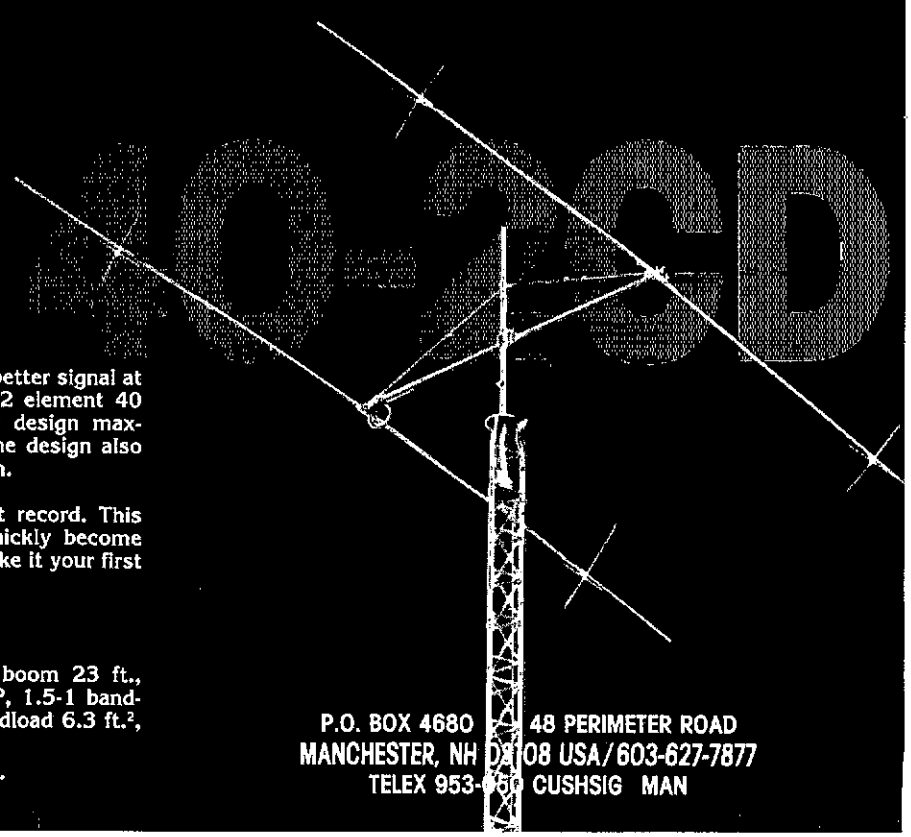
A4 is designed with you in mind because it has fewer parts to assemble, less weight and minimum wind load on your tower. With the 18 ft. boom, A4 gives excellent gain and front-to-back ratio. If your interest is rag chewing, DX-ing or contesting, A4 is the perfect 4 band beam for you.

MODEL A4 10, 15, 20 METERS

MODEL A744 40 METER ADD ON KIT

SPECIFICATIONS SWR 1.2-1 bandwidth 500 + KHz, boom 18 ft., longest element 32 ft., wind area 5.5 ft.², turn radius 18.4 ft., weight 37 lbs. Excellent gain.

MORE CONTACTS, MORE SATISFACTION WITH *CUSHCRAFT BEAMS*



More contacts, less interference and a better signal at the receiving end are yours with this 2 element 40 meter Skywalker Yagi. The computer design maximizes gain and reduces side lobes. The design also gives low SWR with excellent bandwidth.

Holder of the North American contact record. This compact two element antenna has quickly become "the most wanted" 40 meter beam. Make it your first choice.

MODEL 40-2CD 40 METERS

SPECIFICATIONS boom 23 ft., longest element 42 ft., beamwidth 70°, 1.5-1 bandwidth 180 KHz, turn radius 24 ft., windload 6.3 ft.², weight 40.7 lbs. Excellent gain.

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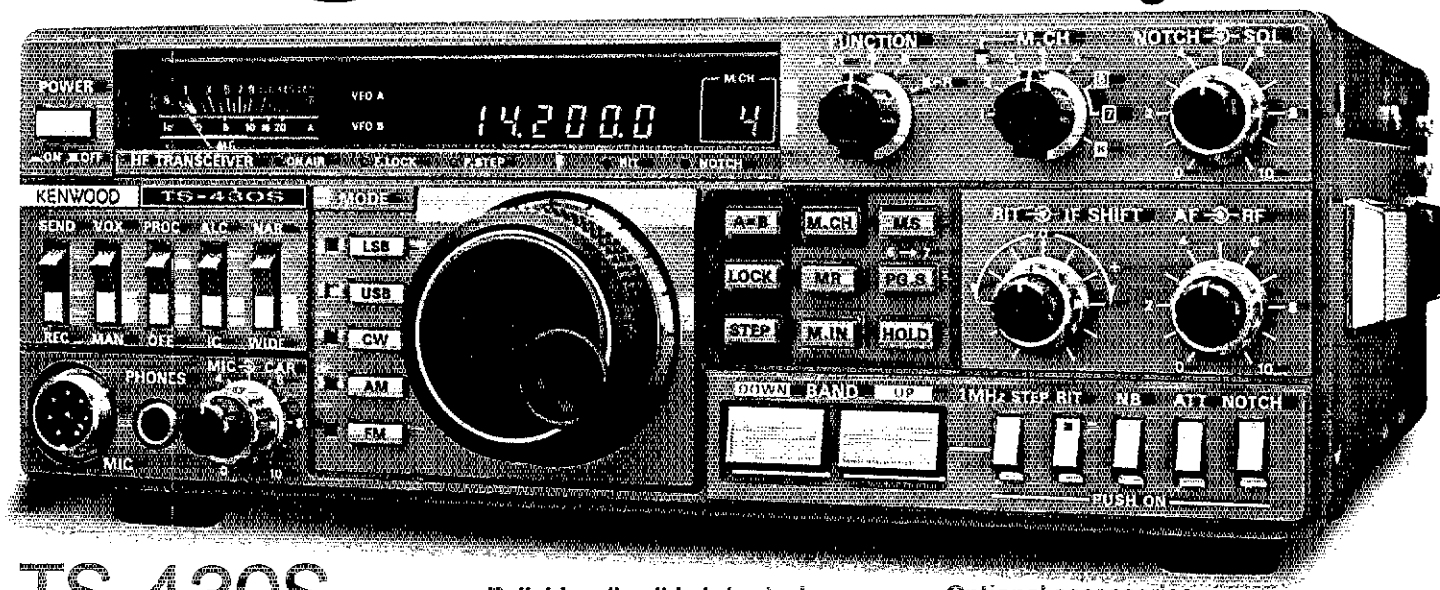
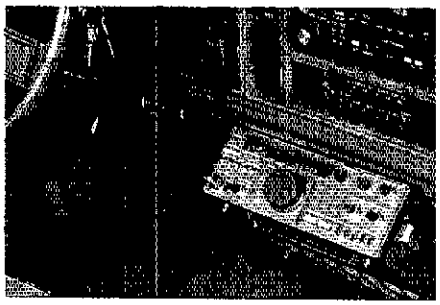
"Digital DX-terity!"

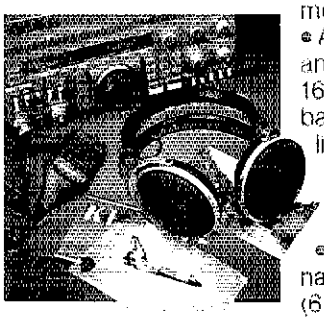


TS-430S

Digital DX-terity—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!

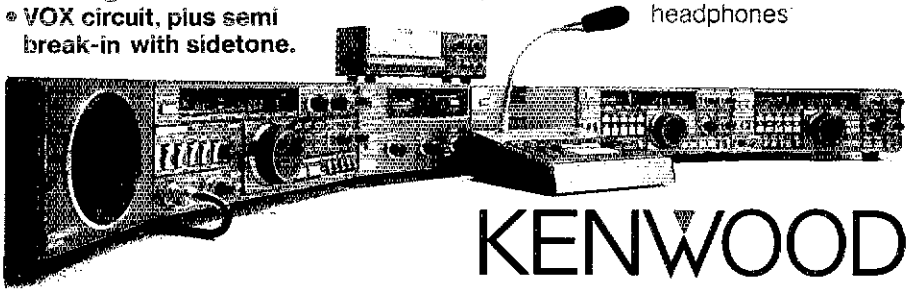


- **Covers all Amateur bands** 160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction** Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker supresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.
- **Reliable, all solid state design.** Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.** Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.



- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

Optional accessories:
• PS-430 compact AC power suppiy • SP-430 external speaker • MB-430 mobile mounting bracket • AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands • AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands • TL-922A 2 kW PEP linear amplifier • FM-430 FM unit • YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters • YK-88SN (1.8 kHz) narrow SSB filter • YK-88A (6 kHz) AM filter • MC-42S UP/DOWN hand mic. • MC-60A/80/85 deluxe desk mics. • SW-2000/200A SWR/power meters • SW-100A SWR/power/ volt meter • PC-1A phone patch • HS-4, HS-5, HS-6, HS-7 headphones



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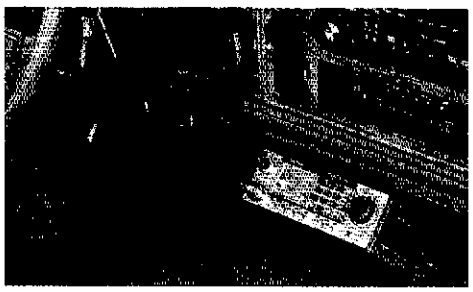
Up Front and Center!

TR-7950/7930

The exceptional front-end selectivity and sensitivity, coupled with Kenwood's excellent audio section, gives you lots to hear! Compact design makes this transceiver at home in the shack or on the go!



- **Large, easy-to-read backlighted LCD readout.** Indicates receive/transmit frequency, frequency offset, sub-tone selection, memory status. An LED readout indicates S & RF units, REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **Programmable scanning, with center-stop tuning.** Microprocessor technology allows you to scan the entire 2 meter band, or just a small portion of it. Scanning stops on the center frequency during band scan—**a Kenwood exclusive!**
- **21 Multi-function memory channels.** The TR-7950/7930 "remembers" frequency offset, and optional subtone channels. Memories 1-15 are for simplex and "normal" repeater operation. Memory pairs 16/17 and 18/19 are for "odd-ball" splits. Memories "A" and "B" store upper and lower band scan limits. The radio "beeps" when memory channel 1 is selected.
- **Extended frequency coverage.** Covers 142.000-148.995 MHz in 5-kHz steps. Repeater offsets are automatically selected in accordance with the ARRL 2 meter band plan. The front panel "OS" key may be used to allow manual changes in offset.
- **Multi-function keyboard.** The 16-key DTMF pad can also be used for direct frequency entry, subtone selection, memory address and scan programming. The keyboard is illuminated for night time use.

TR-7950 optional accessories:

- TU-79 three frequency tone unit
- PS-430 power supply
- KPS-12 fixed-station power supply for the TR-7950
- KPS-7A fixed-station power supply for the TR-7930
- SP-40 mobile speaker
- SP-50 mobile speaker
- MC-55 mobile microphone
- MC-46 16-key autopatch UP/DOWN microphone
- SWT-1 2 m, 100 W antenna tuner
- SW-100A/B power meters
- PG-3A noise filter

Model TR-7950 (45 watts) shown. TR-7930 is identical, but with 25 watts output.

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

More TR-7950/7930 information is available from authorized Kenwood dealers.

KENWOOD

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1111 West Walnut Street
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The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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"It Seems to Us . . ."

The Facts About RF Hazards

Radio amateurs have been using RF energy for good purposes since the earliest days of radio. Possible adverse health effects from exposure to RF energy have become a public concern only in the last decade. The ARRL's own committee on the subject, the ARRL Committee on the Biological Effects of RF Energy, has been dealing with the subject about six years.

Even at the highest levels of scientific research, there are many unanswered questions about the interaction of RF energy and biological systems. Thermal effects where exposure to strong RF fields causes the temperature of biological tissue to be elevated, are well documented. Less is known about non-thermal effects, however. The difficulty of replicating experimental results at low RF levels is among the challenges to fuller scientific understanding, as is that of extrapolating animal data to human exposure circumstances.

The British medical journal, *The Lancet,* recently published a letter from a Washington State epidemiologist, Dr. Samuel Milham (Vol. 1, p. 812, April 6, 1985). Dr. Milham studied the death certificates of 1691 deceased radio amateurs ("silent keys" appearing in *QST*) from Washington state and California. He found a greater number of deaths among the silent keys from certain kinds of leukemias than were reported in the general U.S. population (white male) in a typical year. Before you pull the plug on your rig lest you get cancer, you should also know that he recorded *fewer* deaths among silent keys from two other kinds of leukemia. *The Lancet* subsequently published the ARRL Bio-Effects Committee's criticism of Dr. Milham's methodology (Vol. 1, p. 1516, June 29, 1985). To be fair, we should also mention that there has now been a criticism of that criticism (Vol. II, page 106, July 13, 1985). Much of the argument centers around the methodological strength or weakness of a statistical total called the proportional mortality ratio (PMR), and the role of confounding factors. The bottom line, however, is that experts disagree whether Dr. Milham's discovery is significant. It certainly does not establish a causal link between Amateur Radio operation and certain cancer incidences.

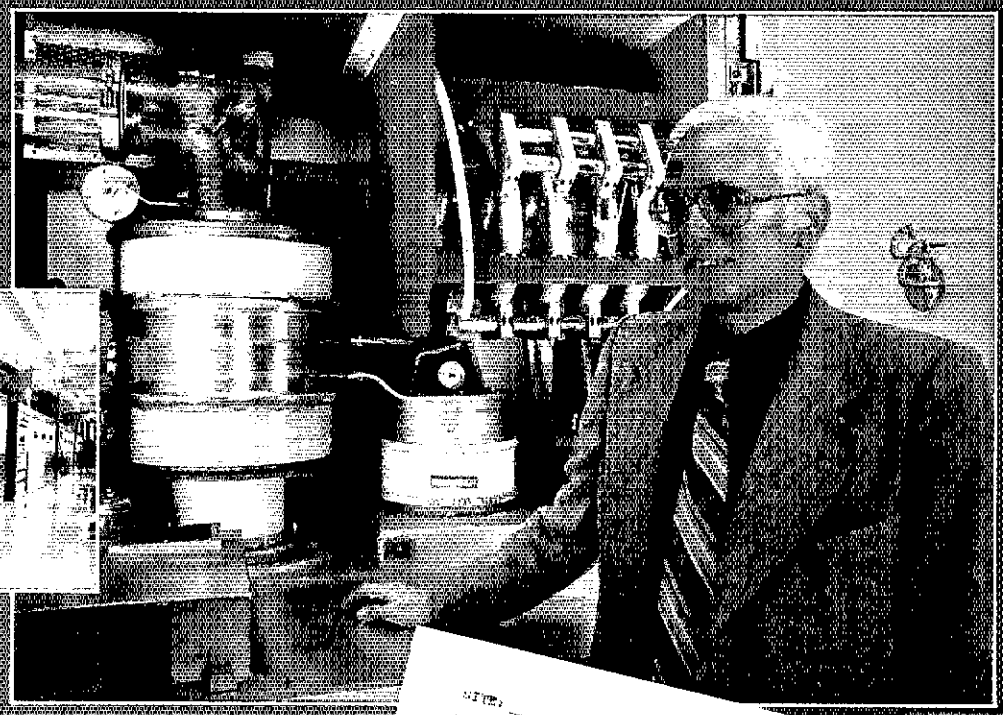
On the basis of the experiments and reports it has monitored, the ARRL Committee on the Biological Effects of RF Energy is of the opinion that the most modern Amateur Radio facilities are safe, with normal access complying with the American National Standards Institute's 1982 RF protection guidelines. The Committee measured radio-frequency energy levels around several typical HF amateur antennas (elevated Yagi beams and dipoles) fed with RF power amplifiers. All levels were found to be well below the ANSI maximum permissible levels.

Proximity to certain configurations of Amateur Radio facilities may involve potential exposures above ANSI limits. Poorly isolated high-EIRP situations, and ground-mounted vertical antennas fed with full legal power, are examples. Special care must be taken so that no person is within the high-power density zones close to such antennas. Common sense also dictates that no one should be in the space immediately adjacent to a "live" antenna, as would occur when climbing a tower with the power on. Small, low-power hand-held transceivers commonly used in Amateur Radio, though their antennas typically are positioned close to the operator, present a special case. ANSI states that "it would be unlikely for devices such as low power hand-held radios operating at frequencies below 1 GHz and radiating at rf em [radio frequency electro magnetic] power levels below 7 W to couple enough energy into any size human body to violate the [ANSI C95.1-1982 Standard] general provisions of the RFPG [Radio Frequency Protection Guidelines]."

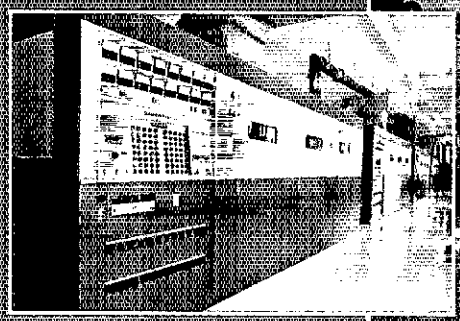
Regardless of the power and equipment they operate, all radio amateurs should understand the proper and prudent use of RF energy. That includes keeping RF out of the ham shack by maintaining balanced or well-shielded transmission lines and a good RF ground. The FCC recently amended its rules providing for the evaluation of human exposure to RF energy in relation to an interim protection standard (ANSI-1982). The new rule, scheduled to go into effect January 1, 1986, affects only broadcast, earth satellite transmitting and a few other types of stations. A decision on a proposal to exempt Amateur Radio stations from this rule has not yet been made, but our being exempted may be tied to the progress made in educating ourselves about RF energy safety. Cautionary advice about RF energy exposure already has appeared in *QST* and other League publications. A recent example can be found in April 1985 *QST*, p. 35, where there appears a microwave safety sidebar accompanying an article about 23-cm band equipment. More information appears in *The Satellite Experimenter's Handbook,* pp. 7-9 and 7-10, where ways are used to predict typical electric and magnetic field strengths at the higher frequency bands, along with advice about exposure standards.

The FCC plans soon to release a Technical Bulletin. It is intended to provide information and guidance about complying with standards (be it ANSI-1982 or a subsequent standard), methods for predicting field intensities around antennas, measurement techniques, and methods for minimizing or eliminating potential exposure problems. In future months the League will be presenting this information and additional data specific to Amateur Radio via the pages of *QST* and its other publications. The League is also committed to proposing questions on RF exposure safety for the amateur examination question pools.

As the scientific knowledge of RF exposure effects is advanced, so, too, should radio amateurs become more aware and more knowledgeable in this area. The few station configurations for which extra caution and prudence is indicated can best be handled by education. And always, of course, when in doubt QRP.—*W. Dale Clift, NA1L*



Hugh Fallis, VP Engineering, Radio Free Europe, Munich, stands beside CE 100 kW HF transmitter using EIMAC 4CV100,000C tube.



EIMAC tubes provide long life for Radio Free Europe Service.

Radio Free Europe transmitters in Biblis and Lampertheim, West Germany, use EIMAC 4CV100,000C power tubes in 12 Continental Electronics 100 kW HF transmitters.

The station logbook shows most tubes have over 50,000 hours of service, and many tubes logged over 60,000 hours! And EIMAC tubes are still running strong—that's long life!

These figures are representative of the long life EIMAC tubes log in a variety of high power broadcast applications.

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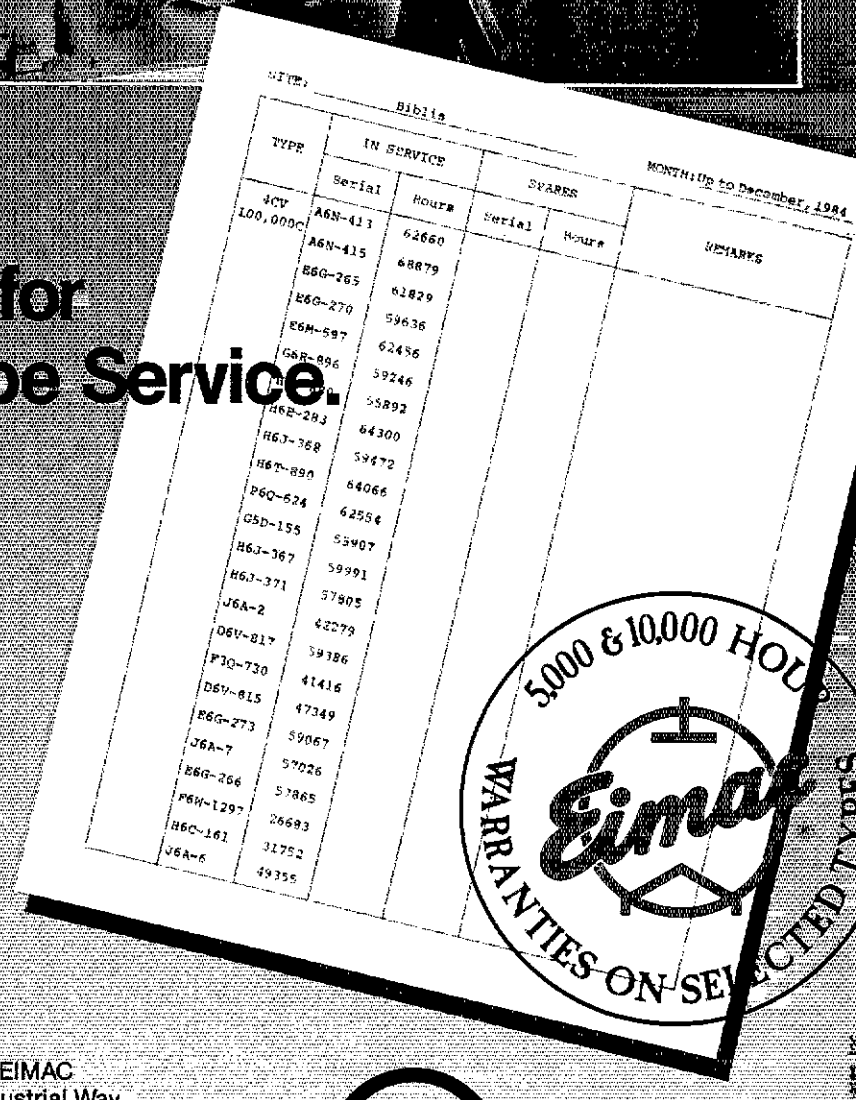

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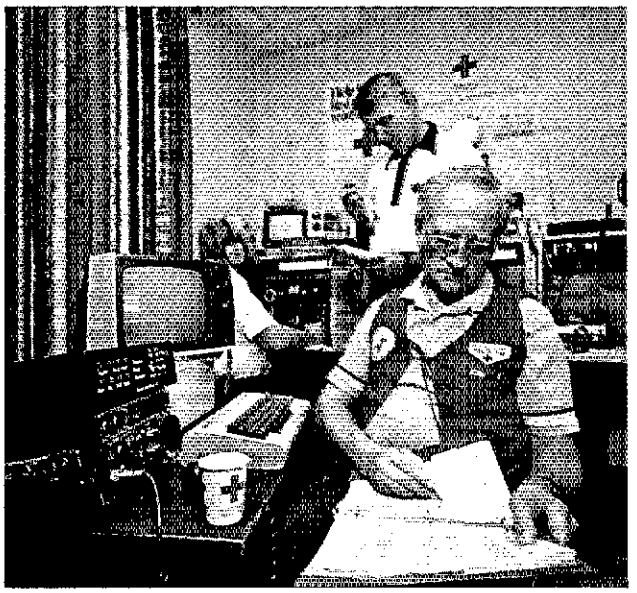


While Hurricane Elena wreaked havoc along the Gulf Coast in early September, many radio amateurs were busy providing communications support for disaster-relief agencies handling damage-assessment and the evacuation of local residents. At the Red Cross Emergency Communications Center in Jacksonville, Florida, were (l-r) KB4B, ARRL Assistant Emergency Coordinator for Duval County; WD4PFN, who handled VHF communications for shelters, information from the NOAA Weather Service and coordination with other counties; and WA4RGO, Duval County EC, who put packet radio to good use during the disaster. During three days of operation, this group checked in more than 150 amateurs and maintained 24-hour shifts at the EEC and at NOAA headquarters at the Jacksonville International Airport. Watch *QST* for further details. *(WA4B photo)*

W0ORE/Challenger: New Heights For Amateur Radio

Although NASA Astronaut Tony England, W0ORE, logged well over 100 contacts during his amateur operation aboard the Space Shuttle *Challenger* mission, the success story doesn't end there. In addition to establishing two-ways with numerous youth groups and individuals on SSB during the mission, from July 29 to August 6, Tony was able to send and receive live slow-scan images worldwide, achieving the **first-ever television monitoring from space.** NASA officials were so impressed they are looking at ways of using SSTV to troubleshoot future space projects. For a full report on W0ORE/Challenger, see page 47 of this issue and November *QST*.

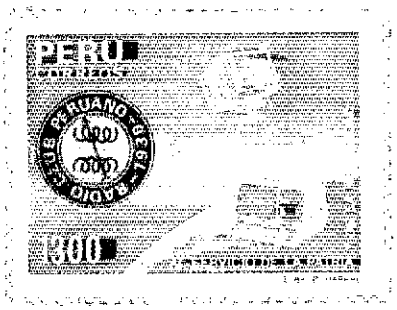
It's Official! 900-MHz Band Is Ours

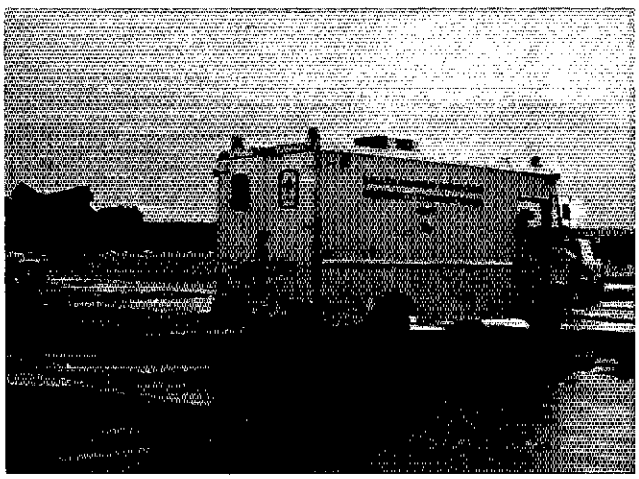
Radio amateurs in the U.S. have another band available to them. Acting on PR Docket 84-960, the FCC has authorized amateurs above the Novice class **access to the 902-928 MHz band, effective 0001Z September 28.** Amateur use, however, must be on a secondary, noninterference basis. See this month's Happenings for details on the FCC action, and the article beginning on page 21 of this issue to find out how you can check out the action on "902."

First German Amateur Operation Aboard Space Shuttle This Month

Two West German ham/astronauts will be operating from aboard a Space Shuttle sometime this month, if everything goes according to plan. During the D1 mission, the first scientific manned space operation for the Federal Republic of Germany, Dr. Ernst Messerschmid, DG2KM, and Dr. Reinhard Furrer, DD6CF, will operate DP0SL from aboard the Space Shuttle *Columbia* when they are not conducting experiments aboard the Spacelab. The ham activity is planned for off-hours beginning on mission day 3 and lasting until about 12 hours before touchdown. The amateurs, both members of the Deutscher Amateur Radio Club, will be working mostly European stations, but hope to attempt contacts in other parts of the world. Watch *QST*, *The ARRL Letter* and other amateur publications for developments.

Add yet another to the collection of Amateur Radio stamps worldwide. The latest, issued from Lima on July 24, is in honor of the Radio Club Peruano for service to the nation of Peru and all humanity since 1930. For a current list of Amateur Radio stamps, send a business-size s.a.s.e. to Taizo Arakawa, N2ATT, 444 Westminster Pl., Lodi, NJ 07644.





Moments after Delta flight 191 crashed while on final approach to the Dallas/Fort Worth Airport on the evening of August 2, the Dallas County Radio Amateur Civil Emergency Service was activated to help coordinate communications to and from the site. Immediately on the scene were members of the Dallas ARC and their emergency communications van, shown here about 100 yards from the tail section of the downed airliner. See the Public Service column in November *QST* for further details. *(K5HGL photo)*

HV1CN, the Amateur Radio station within the walls of the Vatican, has taken on a new look. Thanks to donations from the Knights of Columbus, the station now boasts a new transceiver, linear amplifier, five-element beam and various accessories. All new gear was installed and tested by technicians from Vatican Radio. HV1CN first went on the air in 1957 using some old military surplus gear. Nine years later, W9AC, founder of Hallicrafters, donated a complete station—to the immediate delight of DXers. Among those at the blessing of the newest station were William A. Wilson, K6ARO (left), U.S. Ambassador to the Holy See, and Domenico Petti, IØCNS, the first licensed amateur in the Vatican and operator of HV1CN since 1957.

OSCAR 1 Fails Philatelic Orbit

The chances of amateurs seeing a 25th anniversary commemorative stamp honoring the world's first nongovernment satellite, OSCAR I, are dim. On July 26, the Citizens Stamp Advisory Committee to the Postmaster General all but ruled out a stamp for 1986 in observance of the 25th anniversary of the Radio Amateur Space Program. OSCAR I was launched on December 12, 1961. The Postal Service announced it was producing only one 22 cent Christmas design, as against two normally, to save money, lowering tremendously amateurs' chances of success in getting such a stamp. The Committee meets again on November 1, and the OSCAR commemorative could be reintroduced at that time. But most observers believe efforts at this time might be better spent on seeking a stamp honoring the 75th anniversary of organized Amateur Radio in 1989.

Ham to Assist NASA in Teacher in Space Program

Dave Marquart, WA7QKD, of Boise, Idaho, may not have become the first teacher to fly aboard a Space Shuttle mission, but he's got the next best job. The high school data-processing teacher will take a leave of absence from teaching to help NASA develop lesson plans to be used in conjunction with the Teacher in Space Program. Marquart was one of 10 finalists and one of three hams vying for the coveted mission. The two other hams were Jeanine Duane, WB2MBW, and William Townsend, WB1CRB.

Super Duper, Part 2

Because of a last-minute publication glitch, the second part of the George Allison article, "Super Duper," originally scheduled to run this month, will appear in November.

VECs Meet in Gettysburg

The meeting between FCC's Ray Kowalski and representatives from the Volunteer Examining Coordinators across the country bore no resemblance to the famous Civil War battle, but it did leave much for Amateur Radio historians to ponder. At the August 9 meeting at the Commission's Licensing Division facility in Gettysburg, Pennsylvania, Special Services Division Chief Kowalski discussed the status of the VE program and its future, and included some observations of the program. Among them were his agreement that the VEC system has proven to be much more secure than the FCC's Field Office testing has been, and that the examining task cannot be returned to the FCC. Kowalski also hinted that VECs can expect to be more involved in the examining and licensing process, but that the assignment of call signs will *not* be a VEC function. See November *QST* for full details of this meeting.

Amateur Group "SAVES" Part of World Expo

Parts of the 1985 Louisiana World Exposition station will remain alive and well for New Orleans-area amateurs. Philip Spencer, W5LDH, a former ARRL Delta Division Director, has received permission to set up a station at the Salvation Army Headquarters in suburban Metairie, Louisiana. With the help of KV5E, KD5LP, W5FMO, KA5VPZ and KB5GA, and parts of the Expo station, Phil put the new station in fine order. They call themselves SAVES-Communications—for *S*alvation *A*rmy *V*olunteer *E*mergency *S*ervice-Communications—and use the call W5LDH. Other Salvation Army Amateur Radio groups interested in forming a net should contact Phil Spencer, W5LDH, 100 Robert E. Lee Blvd., New Orleans, LA 70124.

These Scouts at last year's Camp-O-Rama are pretty excited, and Amateur Radio was part of the reason why. This year, the 75th anniversary of the Boy Scouts of America, commemorative station N6BSA will be a big part of this massive event involving about 14,000 Scouts and 35,000 daytime visitors. The event's sponsor, the Los Angeles Council of the BSA, is planning on a three-day, two-night campout October 25-27 on the campus of California State University at Dominguez Hills, so amateurs there will be very busy passing traffic for participants to family and friends across the country. See this month's Special Events column for operating times and frequencies.

League Lines

The ARRL Board's Executive Committee met in Scottsdale, Arizona, on August 24, 1985. Consideration of the League's position in regulatory matters will result in the filing of comments in opposition to PR Docket 85-215, Auxiliary Operations; in the EC's view, auxiliary operations should be conducted only on frequencies above 220.5 MHz. The ARRL's position in PR Docket 85-196, "Maintenance of Question Pools in the Volunteer Examiner Program ... ," remains that FCC should retain maintenance of the examination pool and that only VECs should be permitted to design exams from questions in the pool. In General Docket 85-231, concerning field disturbance sensors at 54-72 and 76-88 MHz, ARRL will file in support of FCC's decision to disallow the devices in the 50-54 MHz band as requested by the original petitioner, Control Data Canada, Ltd. In PRB-2, a request for a waiver of amateur rules to allow use of Amateur Radio frequencies for newsgathering, Counsel was ordered to file comments opposing "in the strongest possible terms" the unwarranted intrusion of broadcasting into an amateur band.

FCC has announced that effective October 31, 1985, ***it will terminate both Phase I and Phase II of its Fee Refund Program.*** The program was implemented to return a portion of the fees collected by the Commission between August 1, 1970, and December 31, 1976, after court decisions in December 1976, held that the fees were unlawful because they exceeded Commission costs. FCC was directed to recalculate its fee structure and make appropriate refunds. Phase I was limited to fees over $20; Phase II to fees of $20 or less — CB licenses that cost $4 (those granted March 1, 1975, or later) do not qualify for a refund. There's still time for late filers to submit their requests for refunds; instruction booklets and forms for refunds may be obtained from local FCC Field Offices, or from the FCC Fee Refund Program Office, Box 19209, Washington, DC 20036. Applicants should specify whether they are seeking refunds under Phase I or Phase II.

All of us recall our first time on the air: the excitement, the unbridled fear, the white knuckles. ***QST is looking for first-person accounts of your first contact,*** CW or phone. We'd like to share some of them with other *QST* readers, especially those who haven't yet taken the plunge. Send your accounts, along with a photo if you have one, to Andrew Tripp, KA1JGG, at ARRL Hq.

If you're on your way to take an Amateur Radio license exam, ***be sure to bring your original current license for ID purposes.*** A photocopy of your license may be attached to the your Form 610 application, but the FCC requires the Volunteer Examiner team to verify the accuracy of the photocopy by comparing it to the original license document.

The ARRL/VEC needs copies of current licenses of all of its Volunteer Examiners. Any VEs who have renewed their licenses since applying for VE accreditation should forward copies of their renewed "tickets" to the ARRL/VEC office in Newington.

AMSAT, the Radio Amateur Satellite Corporation, will hold its Third Annual Space Symposium at the Westin Hotel in Vail, Colorado, on November 9, 1985. The event is expected to draw more than 250 space enthusiasts from around the world. AMSAT has issued a call for papers to be presented to the Symposium. Topics may include those of interest to Amateur Radio Satellite enthusiasts. Abstracts may be sent to AMSAT, P.O. Box 8005, No. 281, Boulder, CO 80306. Further information on the Symposium may be obtained from Chairperson Molly Hardman, N3CHZ, at 303-939-9334, or AMSAT Headquarters, 301-589-6062.

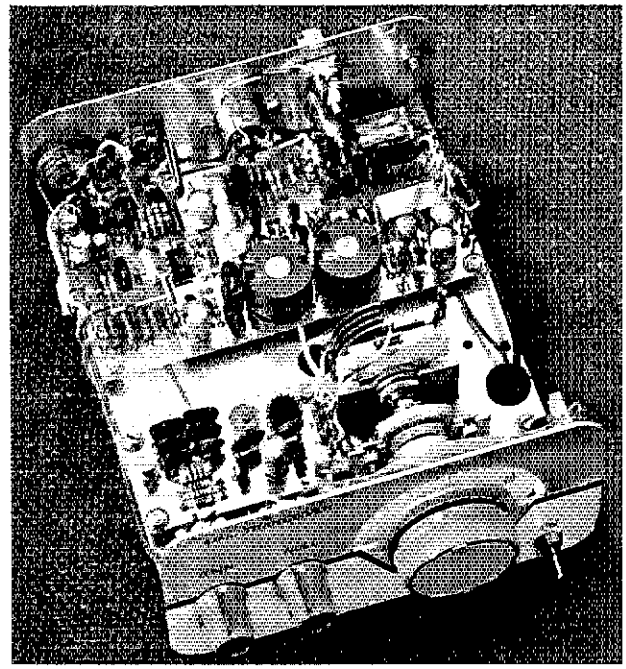
Technical ***papers on packet radio and other digital-communications subjects*** are invited for the Fifth ARRL Amateur Radio Computer Networking Conference to be held on March 7-9, 1986, in Orlando, FL. All papers are due February 1, 1986, camera ready. If you plan to present a paper, please request an author's package from Paul Rinaldo, W4RI, at ARRL Hq.

W1AW worked 2041 stations over the weekend of August 10 and 11, 1985, in celebration of Connecticut's 350th birthday. All regularly scheduled bulletin and code practice transmissions save one Qualifying Run were suspended as 24 operators put the Maxim Memorial Station on seven bands for almost 30 hours. All QSLs will be answered—is yours one of the 600 already received?

Want a new transceiver for your radio club? Your club's participation in "Club Challenge for the '80s" may net it one. But hurry—only three months are left in this ARRL membership promotion. For details, call ARRL Hq. (Tuesday through Thursday) and ask for Lori Chadwick.

No, it's not a national intelligence test—***it's the shift from Daylight back to Standard time,*** and it occurs October 27, local time. If your station clock is already set to UTC, you needn't change a thing. Remember, though, that W1AW's bulletin and code-practice schedules will shift one UTC hour *forward* to keep them at your same local time. Confused? Don't be! See the W1AW schedule on page 67, this issue.

Better Ears for the MAVTI-40 Transceiver



A transceiver need not be a complicated building project. Try QRP—and instead of tackling a superhet receiver, take the direct approach!

By Paul Kranz, W1CFI
RD 2, Box 370, Harvard, MA 01451

Although this article concentrates primarily on the redesign of the MAVTI 40 receiver section, there's enough information here to permit you to build a complete 40-meter QRP (low-power) transceiver. PC boards and parts kits are available to make your job even easier.

Direct-conversion (D-C) receivers are easier and less costly to build than their superheterodyne cousins, and assembling a D-C receiver is an educational and rewarding project. Although D-C receivers have some performance shortcomings, the receiver described here eliminates some of them. This receiver will reject AM broadcast interference to the level of inaudibility. It also provides a narrow-bandwidth filter for CW reception and a tunable notch filter. Modifications for improving the stability and wave shaping of the original MAVTI-40 transmitter are provided, as is a TR switch.

A Club Transceiver Project

In 1979, the Hewlett-Packard Amateur Radio Club in Andover, Massachusetts, began a Novice class with five prospective radio amateurs. Since none of them had any equipment, we decided that a simple transceiver construction project might solve this problem as well as offer some experience working with hardware. A search of back issues of Amateur Radio magazines turned up one transceiver design that seemed to offer many advantages over other designs. This transceiver, the MAVTI-40, had originally been designed and constructed as a radio club project, and several had been built.[1] This suggested that the 5-W-output, 40-meter transceiver

[1]Notes appear on page 30.

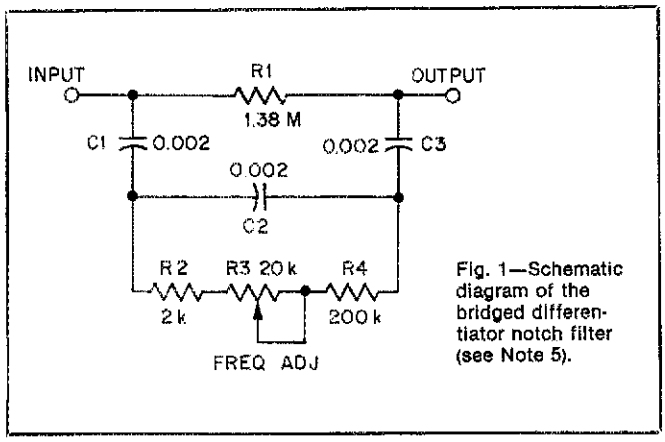


Fig. 1—Schematic diagram of the bridged differentiator notch filter (see Note 5).

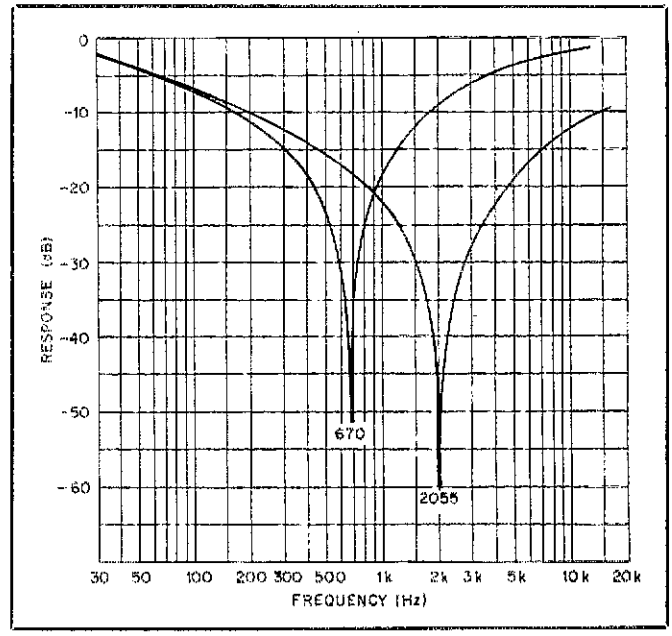


Fig. 2—Frequency response of the notch filter of Fig. 1 with the potentiometer set at each end. →

should be capable of being duplicated easily without the problems associated with many one-of-a-kind designs. Further, a PC-board negative was available from the author, making the construction repeatable and reliable.

Forty meters is a good band for beginners because it has an active Novice segment during daylight and evening hours. Also, the band offers good DX and QRP activity in the General- and higher-class portions of the band, and that encourages license upgrading. One disadvantage of 40-meter operation is the evening-hour AM-broadcast interference.

Five MAVTI-40 transceivers were built using a variety of construction techniques. Although the transceivers performed reasonably well, they all exhibited occasional instability in the transmitter and receiver sections. One of the units has been in use at my station for five years, and has served as a test bed for many experiments and subsequent improvements to the original design. Eventually, the instability problems were solved and the transceiver has provided many enjoyable contacts.

Receiver Improvements

The original receiver was difficult to use at night because it detected AM broadcast stations that resided more than 100 kHz above the usual 7040-kHz QRP operating frequency. This problem became increasingly worse as the sunspot activity declined. Several initial modifications, including the use of different mixers and additional input filtering, were tried without success. An examination of Amateur Radio magazine articles turned up some 40-meter transceiver designs that addressed the AM-detection problem.[2,3] These articles offered the inspiration needed to attempt a redesign of the original receiver.

Mixing Schemes

Measurements made at my location revealed broadband signals of 100-mV P-P at the feedpoint of a dipole antenna. These signals would need to be removed before they reached the mixer. AM broadcast stations at 7.2 MHz produced 8-mV P-P on a 50-ohm load connected to the antenna, while the strongest CW signals measured 50-μV P-P. AM-detection comparisons were made using an HP-3585A spectrum analyzer coupled to the MAVTI-40 MOSFET mixer, a harmonic detector (see Note 2) and doubly balanced mixers. These measurements were made by injecting a 50% amplitude-modulated signal into the mixer RF input while measuring the detected AM signal with the analyzer. The frequency of the AM input signal was chosen to be 100 kHz above the mixer local oscillator (LO) to simulate actual 40-meter operating conditions. The detected AM signal is the actual audio modulation (baseband). The result is expressed as a decibel ratio between this audio signal and the mixer output when the LO is tuned to receive the AM signal. The MAVTI-40 mixer was able to reject this AM signal by only 35 dB. The harmonic detector (with the LO operating at half the RF input frequency) rejected the unwanted AM signal by 60 dB. A doubly balanced diode mixer was the best performer,

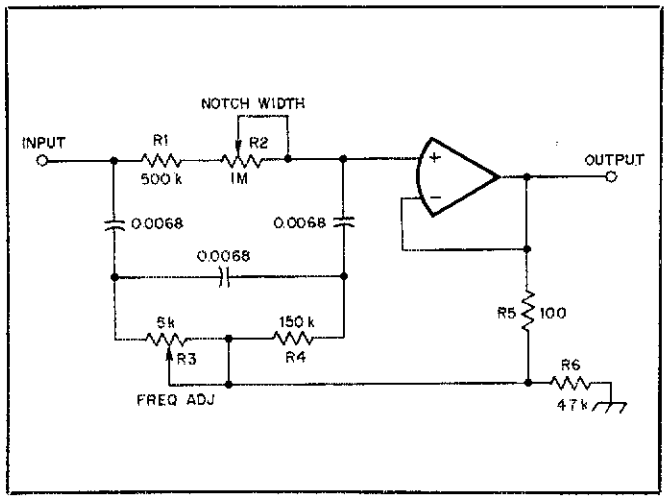


Fig. 3—Schematic diagram of the active notch filter; R3 controls the notch frequency. This filter has a gain of 0 dB.

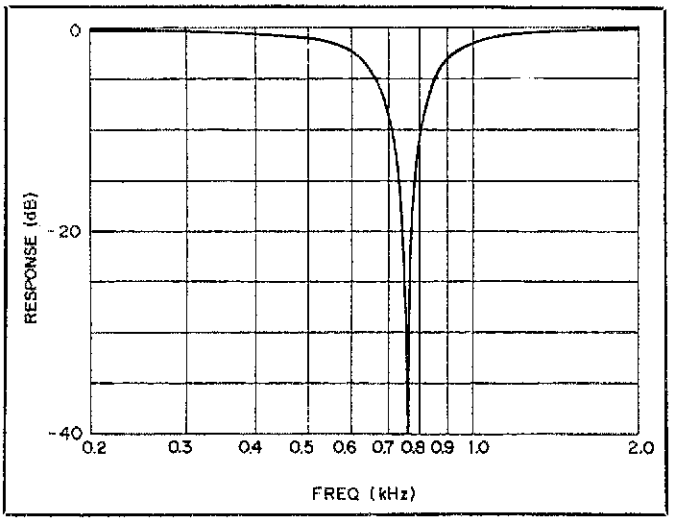


Fig. 4—Frequency response of the tunable active notch filter of Fig. 3.

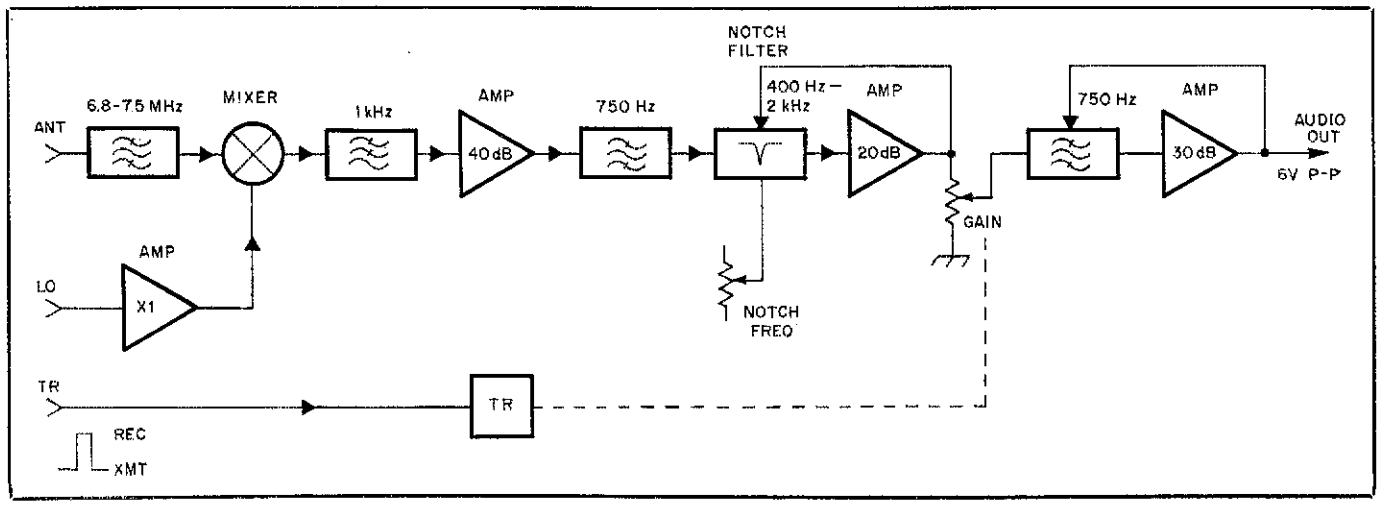


Fig. 5—Block diagram of the new D-C receiver.

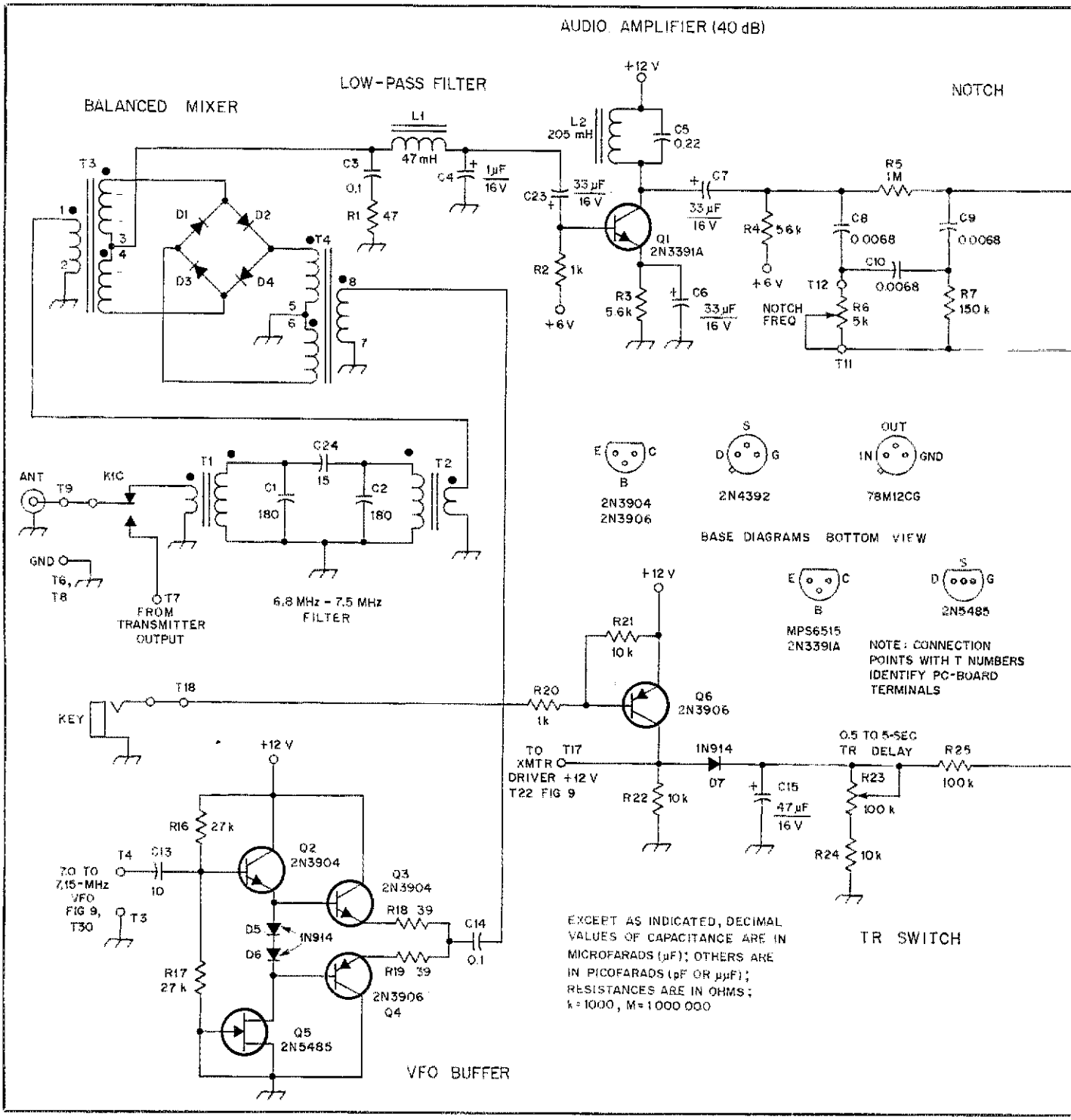


Fig. 6—Schematic diagram of the D-C receiver including the TR switch. Note: Equivalent parts may be substituted. Unless otherwise specified, enameled wire is used for winding inductors.

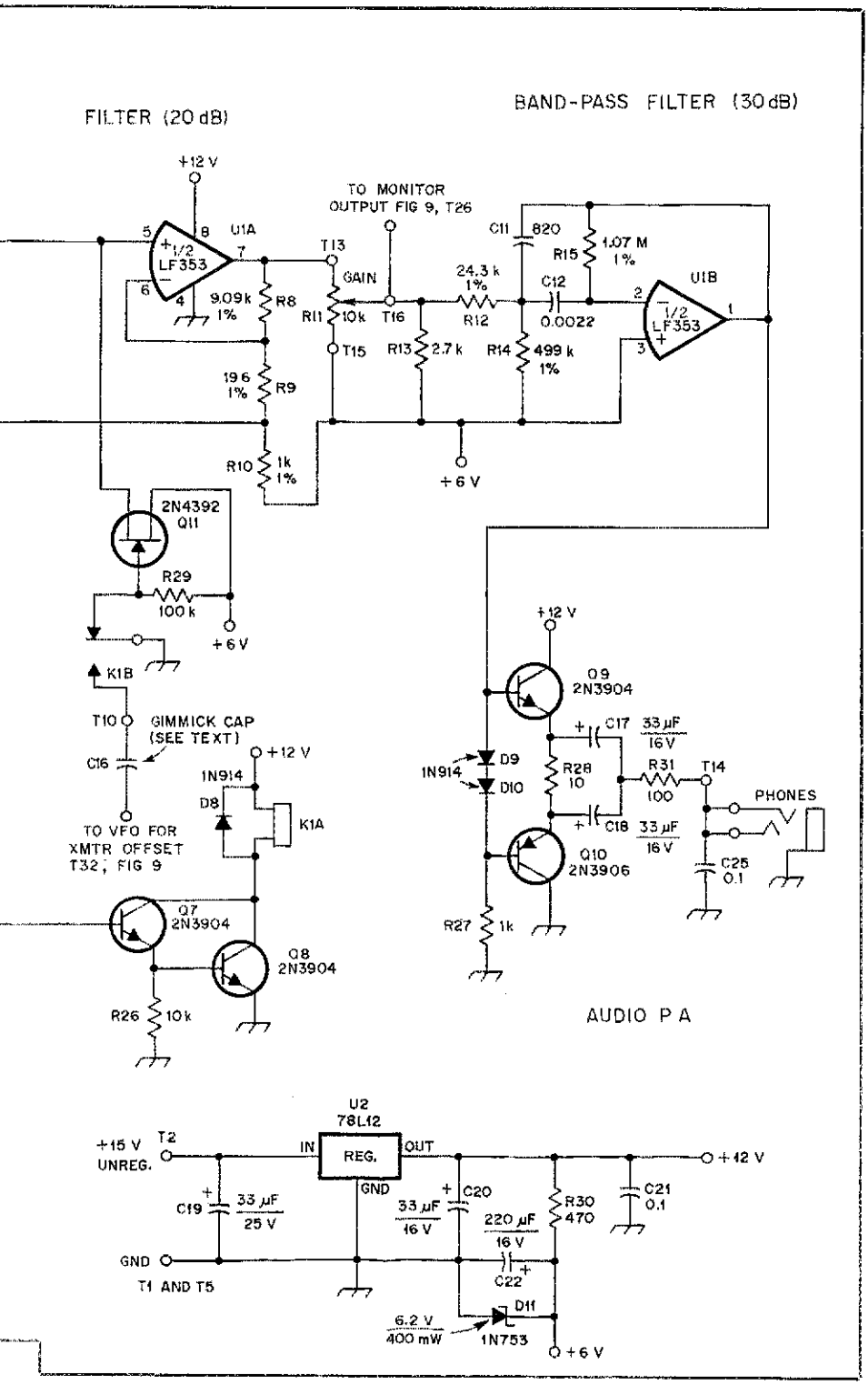
D1-D4, incl.—HP2800 hot carrier diode or part of U3 (see text).
D5-D10, incl.—1N914 or 1N4148.
D11—1N753, 6-V, 0.4-W Zener diode.
K1—12-V, DPDT (Radio Shack 275-213).
L1—113 turns no. 26 on Amidon pot core PC 2213-77.
L2—237 turns no. 30 on Amidon pot core PC 2213-77.
Q1—2N3391A, MPS6515.
Q2, Q3, Q7-Q9, incl.—2N3904.
Q4, Q6, Q10—2N3906.
Q5—2N5485 FET.
Q11—2N4392.
T1, T2—Primary, 4 turns no. 30 on Amidon

boasting a 73-dB rejection ratio.

Compared to the harmonic detector, the doubly balanced mixer has the additional advantage of being insensitive to the LO waveshape. In fact, this mixer is most efficient when driven by a square wave. The mixer diodes are used as switches and, as such, do not provide mixing by virtue of their nonlinear transfer curves as they do in the harmonic mixer. A disadvantage of the doubly balanced diode mixer is the amount of LO power required, typically 7 dBm.

Noise Figure

Although the atmospheric noise in the 40-meter band is not so low that a low-noise-figure receiver is required, an attempt was made to keep the receiver noise to a reasonable level. Since the noise figure will never be lower than the mixer conversion loss (6 to 8 dB), the remaining amplifiers serve only to make the noise figure worse. Atmospheric noise in a quiet location contained in a 200-Hz bandwidth on 40 meters



T25-2 core; secondary 28 turns no. 30.
T3, T4—15 turns no. 30 trifilar wound on Amidon FT-50-43 core or part of U3 (see text).
U1—LF353N dual FET op amp.
U2—78M12CG, 12-V, 500-mA, 3-terminal regulator.
U3—Mini-Circuits SBL-1 doubly balanced diode mixer (see text).

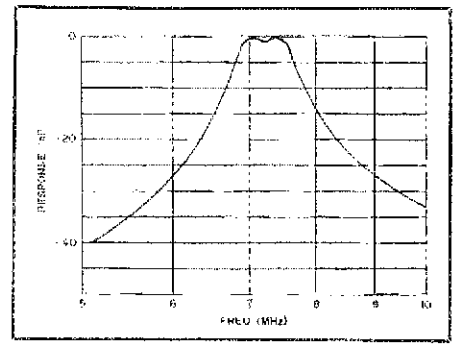


Fig. 7—Input band-pass filter frequency response.

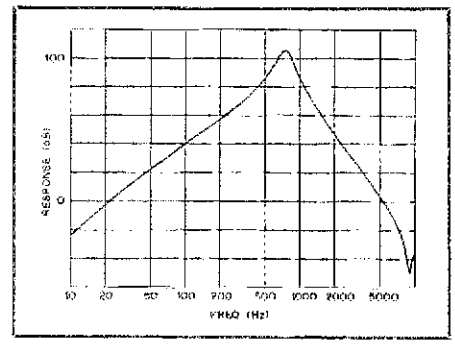


Fig. 8—Band-pass characteristics of the D-C receiver (see text).

has been shown to be approximately 0.4-μV RMS.[4] This amount of noise would require a receiver noise figure of 20 dB (10 dB S+N/N) where the receiver noise would be just equal to the atmospheric noise.

Single-Signal Reception

One of the major shortcomings of D-C receivers is their lack of single-signal reception. When a CW station is tuned in, it can be heard equally well when the VFO is tuned above or below the zero-beat frequency. This characteristic has the effect of doubling the number of stations falling in the receiver audio passband, compared to what a superheterodyne receiver would produce. Some solutions to this problem add complexity to the D-C receiver and result in a component count that differs little from that of a superheterodyne receiver. A tunable notch filter can be used to null out an offending signal and goes a long way toward solving the single-signal reception problem.

There are many notch-filter designs described in the literature; however, one design offers notch-frequency adjustment with only one potentiometer.[5] This bridged-differentiator circuit is shown in Fig. 1, and a plot of its response is given in Fig. 2. The main problem with this design is the width of the notch at frequencies above and below the notch frequency. The addition of feedback from an op amp solves this problem and provides a notch depth of 40 dB. The resulting circuit is shown in Fig. 3, and a plot of its response is in Fig. 4. In Fig. 3, R3 adjusts the notch frequency, while R5 is used to adjust the notch width, or Q. R2 maximizes the notch depth at a given frequency. Test results of the circuit show a tunable range of 400 Hz to 2 kHz, and a notch depth of 30 to 40 dB for the component values shown. This notch depth is adequate since deeper, higher-Q notches do not take into account the finite bandwidth of CW so the operator will still be able to hear key-click-like sounds from the offending station.

The best solution to the problems experienced by the MAVTI-40 receiver seemed to be to design a completely new

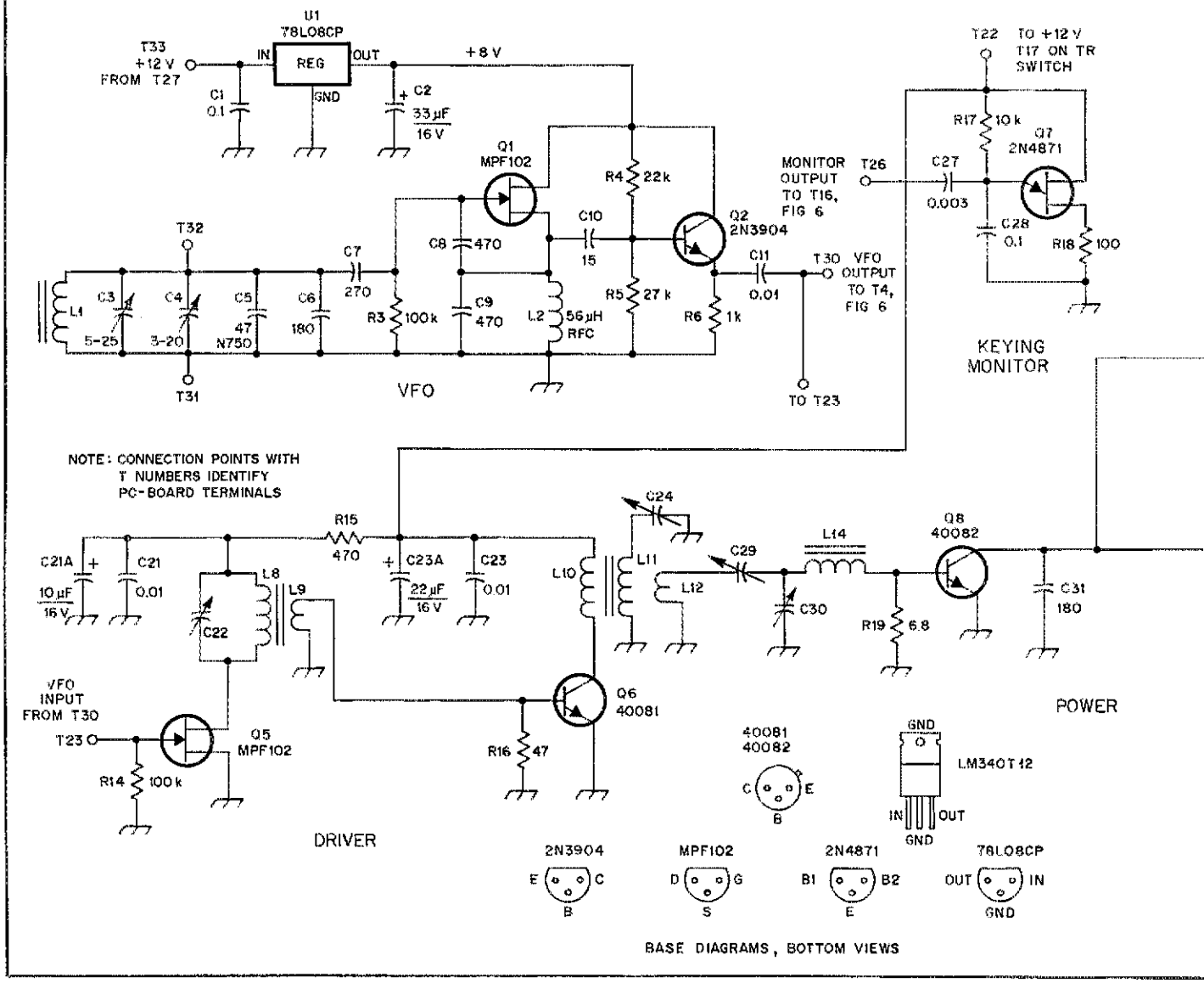


Fig. 9—Schematic diagram of the VFO and modified MAVTI-40 transmitter. Components are numbered to agree with those of the original MAVTI-40 VFO and transmitter. Therefore, designators Q3 and Q4 are missing. Note: Equivalent parts may be substituted. Unless otherwise specified, enameled wire is used for inductor windings.

C3—5-25 pF trimmer.
C4—3-20 pF air variable (Johnson 160-110-51).
C5—47 pF N750 temp. compensating capacitor.
C22—10-180 pF compression trimmer (ARCO 463).
C24, C29, C30, C32, C33—75-480 pF compression trimmer (ARCO 466).
L1—1.4 µH; 18 turns no. 24 enam. wire on Amidon T37-2 core.
L2—56 µH molded RF choke.
L8—34 turns no. 26 on Amidon T50-2 core.
L9—3 turns no. 24 on L8.
L10—7 turns no. 24 on L11.
L11—22 turns no. 22 on Amidon T50-2 core.
L12—4 turns no. 26 on L11.
L13—14 turns no. 20 on Amidon T50-2 core.
L14, L17—20 turns no. 24 on Amidon T37-2 core.
L16—65 turns no. 32 on Amidon T37-2 core.
Q1, Q5—MPF102, 2N4416 or 2N5486 FET.
Q2—2N3904.
Q6—40081 or MRF 8003 RF power transistor.
Q7—2N4871 unijunction transistor.
Q8—40082 or MRF 8004 RF power transistor.
U1—78L08CP, 8-V, 100-mA, 3-terminal regulator.
U2—LM340T12, 12-V, 1-A regulator.

receiver incorporating these improvements. A doubly balanced diode mixer solves the AM-detection problem and provides good immunity to third-order intermodulation distortion. The active audio filtering offers a 200-Hz bandwidth for CW reception. A tunable notch filter helps reduce interference from adjacent signals and the undesired audio image frequency common to D-C receivers. A block diagram of the new receiver is shown in Fig. 5, and its performance figures are given in Table 1.

Receiver Circuit Description

The receiver schematic diagram is shown in Fig. 6. Signals arriving from the antenna enter the receiver through the TR relay contacts K1C and the input band-pass filter (T1, T2, C1, C2, C24). The filter has a passband ripple of about 3 dB from 6.8 to 7.5 MHz; its frequency response curve is presented in Fig. 7.

A Mini-Circuits Labs SBL-1 doubly balanced diode mixer is used in my receiver.[6] Any doubly balanced diode mixer may be used including a "homebrewed" version.[7] The LO drive is supplied by a buffer amplifier consisting of Q2-Q5. The mixer output is terminated for RF signals by C3 and R1. Audio output from the mixer is filtered and is impedance matched to the input of Q1 by the low-pass filter consisting of L1 and C4. Because of its im-

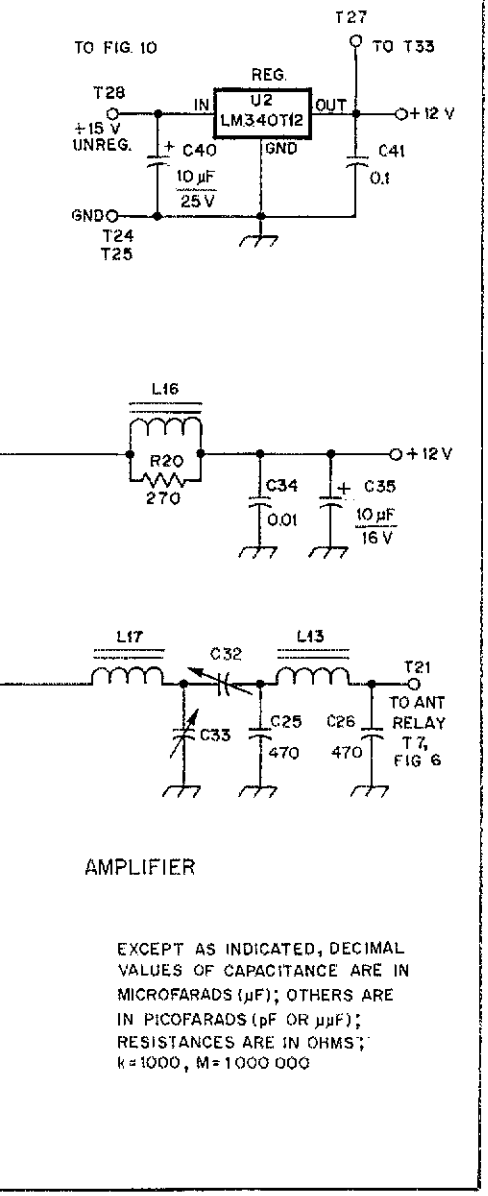


Table 1
Receiver Performance Specifications

Sensitivity (10 dB S + N/N)	0.4 µV (−115 dBm)
Bandwidth (audio IF of 750 Hz)	200 Hz
Gain	90 dB
Noise figure	20 dB
Third-order intercept	+15 dBm
Dynamic range	86 dB
AM detection	−70 dB
Notch depth	40 dB
Notch frequency	400 Hz to 2 kHz

pedance transformation, this filter has a voltage gain of 6 dB, which helps to make up for the mixer conversion loss.

The first receiver amplifier stage, Q1, is designed for low noise while providing a gain of 40 dB in a 200-Hz bandwidth. This bandwidth is controlled by the Q of L2 and the resistance of R4.

U1A acts as a 20-dB-gain tunable notch filter. The notch frequency is adjusted from 400 Hz to 2 kHz by R6. Notch-filter Q is controlled by R9 and R10, and seems to be adequate for CW. Since the notch depth changes from 30 to 40 dB as the notch frequency is varied, R5 can be selected for best notch depth at your preferred frequency. The value of R5 will vary with the tolerance and matching of C8-C10.

The band-pass filter, U1B, provides a gain of 30 dB at 750 Hz with a bandwidth of 200 Hz. This brings the total receiver gain to 90 dB. Fig. 8 shows the band-pass characteristic of the complete receiver from the mixer output through the band-pass filter. The notch filter has been set to a high frequency in order to remove the notch from the plot.

The output of the band-pass filter is buffered by Q9 and Q10, which provide sufficient power gain to drive a pair of low-impedance headphones, such as those used with a personal stereo radio. Because of the large amount of gain (90 dB) at 750 Hz, it is not possible to use this amplifier to drive a speaker and still maintain stable operation at full gain.

Fig. 6 also shows a TR switch, Q6-Q8. Keyed power for the original MAVTI-40 driver PC board is derived from the collector of Q6. A turn-off delay for the TR relay, K1, is produced by C15 and R23. The delay is adjustable from 0.5 to 5 seconds by adjustment of R23. One pair of K1 contacts (K1C) switches the antenna between the receiver and transmitter. Another contact set (K1B) turns off the receiver mute switch (Q11, R29) during receive periods. These contacts also provide a convenient way to shift the VFO frequency down by 750 Hz during transmission. This is accomplished by grounding a gimmick capacitor (C16) connected between normally open relay contact (K1B) and the VFO tuning capacitor. (The gimmick capacitor is a small-value capacitor made by twisting together two pieces of insulated wire.) The capacitor is trimmed to the correct value by cutting away small portions of the wire while measuring the frequency shift with a frequency counter or another receiver.

Transmitter Improvements

While I was adjusting the mica compression trimmers in the original transmitter section, the RF output across a 50-ohm dummy load jumped suddenly to maximum output. This behavior suggested that the transmitter section was oscillating at or near the VFO frequency. The transmitter instability was solved by making three minor changes to the original circuit.

Fig. 9 shows the schematic diagram of the VFO and modified MAVTI-40 transmitter, including the corrections to the original article. R16 is lowered to 47 ohms. Next, a 270-ohm resistor is added in parallel with L16. Finally, L15 is removed from the base of Q8 since the base resistor, R19 (6.8 ohms), provides adequate stability for this power amplifier. The transmitter section now tunes up smoothly to a 4-W output level, and no instability has been observed. Note that this solution to transmitter instability worked well on my transmitter, and some variation from one transmitter to another may require minor changes.

The keyed transmitter output of the original MAVTI-40 has a square-wave envelope since no attempt was made to shape this waveform. I've added a 10-µF capacitor in parallel with C21 and a 22-µF capacitor in parallel with C23 to provide output waveform rise and fall times of approximately 5 ms. I have received many compliments concerning the clean sounding QRP signal from this transceiver.

Construction

The receiver, VFO and transmitter sections of the transceiver are constructed on three PC boards, which are mounted inside an LMB CO-3 cabinet. The PC boards are double sided with the top side of each board serving as a ground plane; the boards have plated-through holes.[4]

I use an external, unregulated supply (Fig. 10) to power the transceiver. It's probably best not to include the power supply inside the transceiver cabinet since hum pick up could become a problem.[5] Voltage regulation is provided for on the receiver board by a three-terminal regulator. The 6-V supply is derived from the regulated 12-V line by using a 470-ohm resistor in series with a 6.2-V Zener diode (D11).

I fashioned a tuning dial by attaching a clear plastic disc to the mounting plate of a Jackson Brothers 30:1 reduction drive. Calibration marks are made by applying

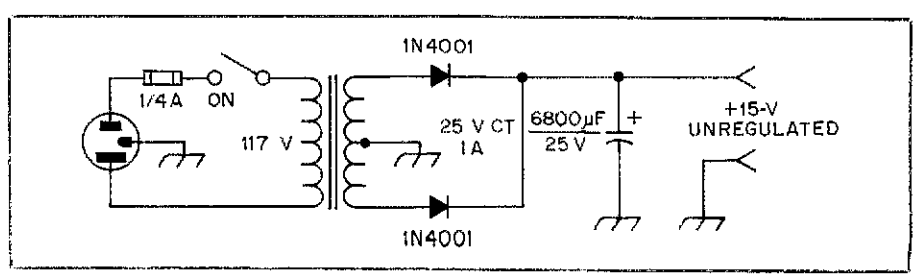


Fig. 10—Schematic diagram of the unregulated power supply.

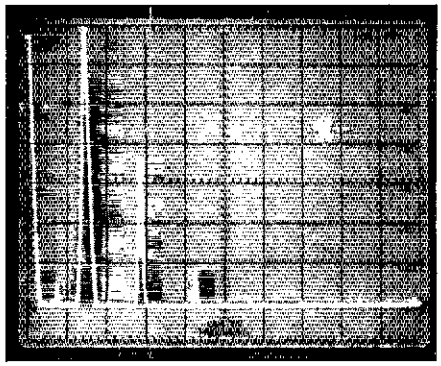


Fig. 11—Spectral display of the transmitter output. Vertical divisions are each 10 dB; horizontal divisions are each 5 MHz. Output power is 4 W at 7 MHz. All spurious emissions are at least 32 dB below peak fundamental output power.

dry transfers to a translucent piece of plastic film cemented to the plastic dial plate with rubber cement. Another piece of clear plastic is used for a dial window, and a hair-line indicator was produced by scratching the plastic with a scribe. The window is cemented to the inside of the front panel behind the dial cut-out and in front of the dial plate. Back lighting for the dial is provided by two small, colored lamps.

L1 and L2 are mounted to the PC board using the plastic mounting screws supplied with the pot cores. The gimmick capacitor, C16, is made from two pieces of no. 22 insulated, solid-copper wire twisted together over a length of 1 inch. C16 is connected between the VFO tuning capacitor and terminal T10.

The transmitter-board inductors are wired to the board in two different ways. L8, L9, L10 and L12 have each winding connected to the board at opposite sides of the toroid. All other inductors have their windings connected to the board on the same side of the inductor. The mica compression trimmer capacitors are mounted by soldering a U-shaped piece of no. 22 bare wire to each solder tab on the capacitor. The bus wire is then inserted into the two holes in the PC board. The 12-V regulator uses the PC board mounting stud as its heat sink. A heat sink must be used with Q8.

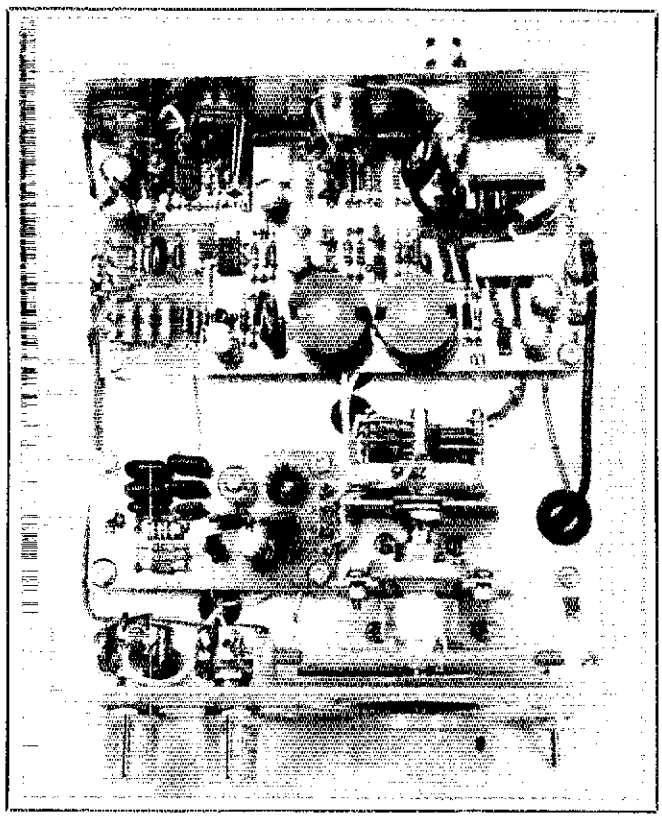
All boards should be tested (refer to the next section) before they are mounted in the transceiver. The PC boards are interconnected with unshielded wire in all cases except for the antenna-to-TR-switch and TR-switch-to-transmitter connections. RG-174 miniature coaxial cable is used for the latter connections. To avoid the possibility of creating unwanted oscillations, interconnecting wires should not run beneath the receiver board. PC-board terminals are used on my transceiver boards, but the wires can be soldered directly to the PC board. Notes concerning interconnection of the boards appear adjacent to each terminal in the *transmitter* schematic diagram, Fig. 9.

Initial Tests and Calibration

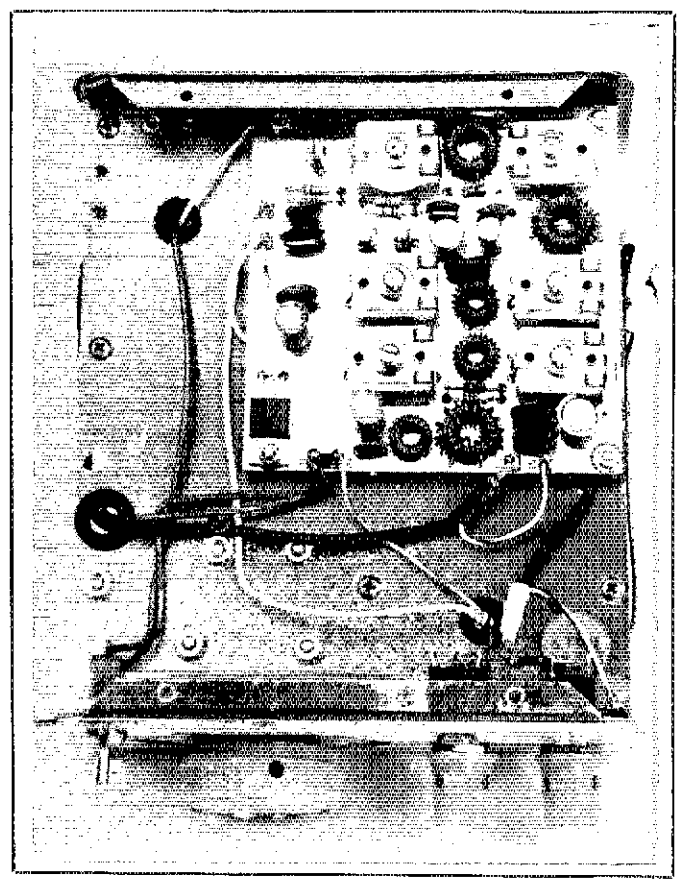
Because the VFO is needed to drive the receiver and transmitter boards, check it first. You may operate the VFO directly from the unregulated 15-V supply during these tests. See that U1 is supplying 8-V dc output, and that an RF signal output of approximately 4-V P-P is present at T30. For the moment, that's all for the VFO; its calibration will be done later.

With 15-V dc applied to the receiver board, check that U2 provides 12-V-dc output, and approximately 6-V dc is present at T15. Pins 1 and 7 of U1 should be at the same potential as T15. Connect a pair of headphones between T14 and ground. Short T13 and T16 together; white noise should be heard in the phones.

(continued on page 30)



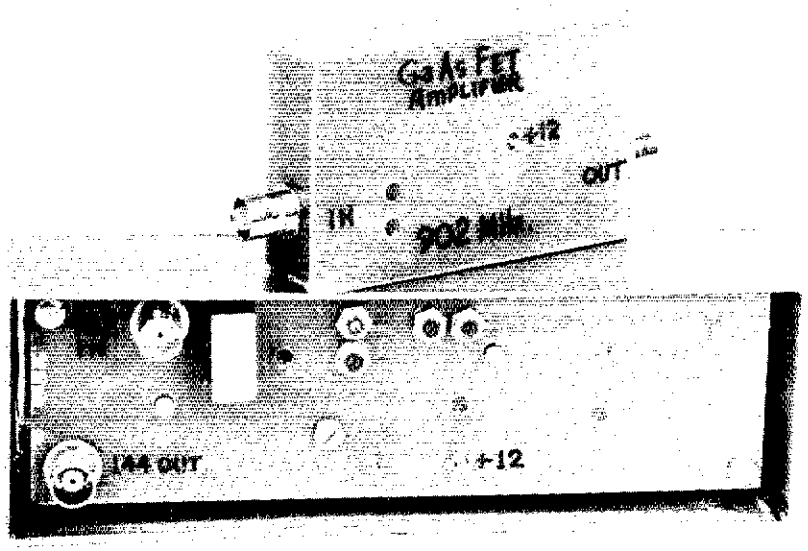
A top, inside view of the author's transceiver. The VFO PC board is at the front left, behind the GAIN and NULL potentiometers. The receiver board is at the rear of the unit. At the front right-hand side of the board is the doubly balanced mixer module. Almost directly behind it, near the rear panel, is the TR relay. The two cylindrical objects at the front center of the board are L1 and L2.



The transceiver viewed from the bottom. In this prototype, the RF output transistor has an elongated heat sink that runs parallel to the right side of the board.

A 902- to 144-MHz Receive Converter

Build this receive converter for your 2-meter rig and be among the first to listen in on our newest amateur band!



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Some years ago, when it was first rumored that the Amateur Service would get 902-928 MHz, I spent many hours developing equipment for that frequency. I have used techniques that evolved from that work in this project. This receive converter takes 902- to 906-MHz signals and converts them to 144 to 148 MHz so they may be heard on any 2-meter rig. The frequency range includes the weak-signal segment specified in the ARRL Interim 33-cm Band Plan.[1] This is a complete project—you'll need just an antenna, 12-V power supply and 2-meter receiver to get started on 33 cm.

In designing this converter, I have tried to minimize the number of components that might be designated "difficult to obtain." Also, I attempted to keep the circuit design as simple as possible without impairing performance. The complete converter, including the GaAsFET front end, has a 1.3-dB noise figure and 25 dB of gain.

Fig. 1 shows the converter block diagram. The design is straightforward. LO energy is injected into a commercially available doubly balanced mixer. A GaAsFET preamplifier delivers the 902-MHz signal to the mixer input. The 144-MHz mixer output drives a dual-gate FET IF amplifier.

Rather than develop a printed-circuit board, I chose to build the unit as a prototype, on a 6½- × 1-7/8-inch piece of single-sided 1/16-inch G-10 glass-epoxy circuit board. This keeps the construction time and expense to a minimum. Modular construction is considered to be more desirable, but if the circuit board is constructed as described, each stage is readily accessible for testing, evaluating or troubleshooting. The finished unit may be mounted where convenient or put in a chassis box or other enclosure.

Circuit Description

A schematic diagram of the converter is shown in Fig. 2. The LO uses four inexpensive RF transistors to develop approximately 7 mW of 758-MHz power. The 2N5179 oscillator circuit (Q1) is a standard overtone configuration. I usually use a fifth-overtone crystal, even when using it as high as the eleventh overtone. Fifth-overtone crystals are generally much cheaper than higher-overtone crystals, and you often get faster delivery from the manufacturer. In this case, Y1 is a 90.2380-MHz fifth-overtone crystal that is operated on the seventh overtone, 126.3334 MHz.

The oscillator is capacitively coupled to another 2N5179 (Q2) that triples the frequency to 379 MHz. The collector has a double-tuned circuit consisting of C9, L2, L3 and C11 that helps filter out some of the 126-MHz signal present in the output. C10, used between the two 379-MHz tuned circuits, is a "gimmick" type made by tightly twisting together two pieces of no. 26 plastic-covered hookup wire for a length of 5/16 inch. This produces a capacitance of approximately 0.7 pF. If desired, a ceramic chip capacitor of approximately that value may be used.

Another 2N5179 (Q3) is used as a doubler, producing the needed injection frequency of 758 MHz. Again, the collector uses a doubled-tuned circuit (C13, L4, L5, C15) to reduce the unwanted 126- and 379-MHz levels. C14, the coupling capacitor between the tuned circuits at this point, is a ceramic chip. A gimmick type

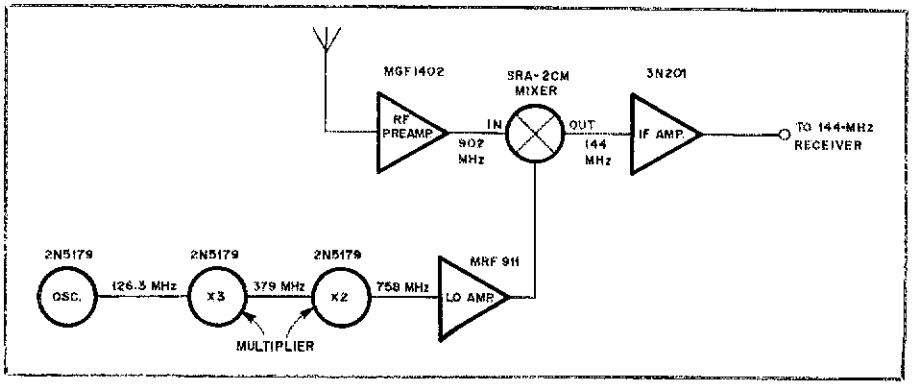


Fig. 1—Block diagram of the 902- to 144-MHz receive converter.

[1]Albert D. Helfrick, "The 900-MHz Band—What's in Store for Amateurs," *QST*, Jan. 1984, pp. 27-30.

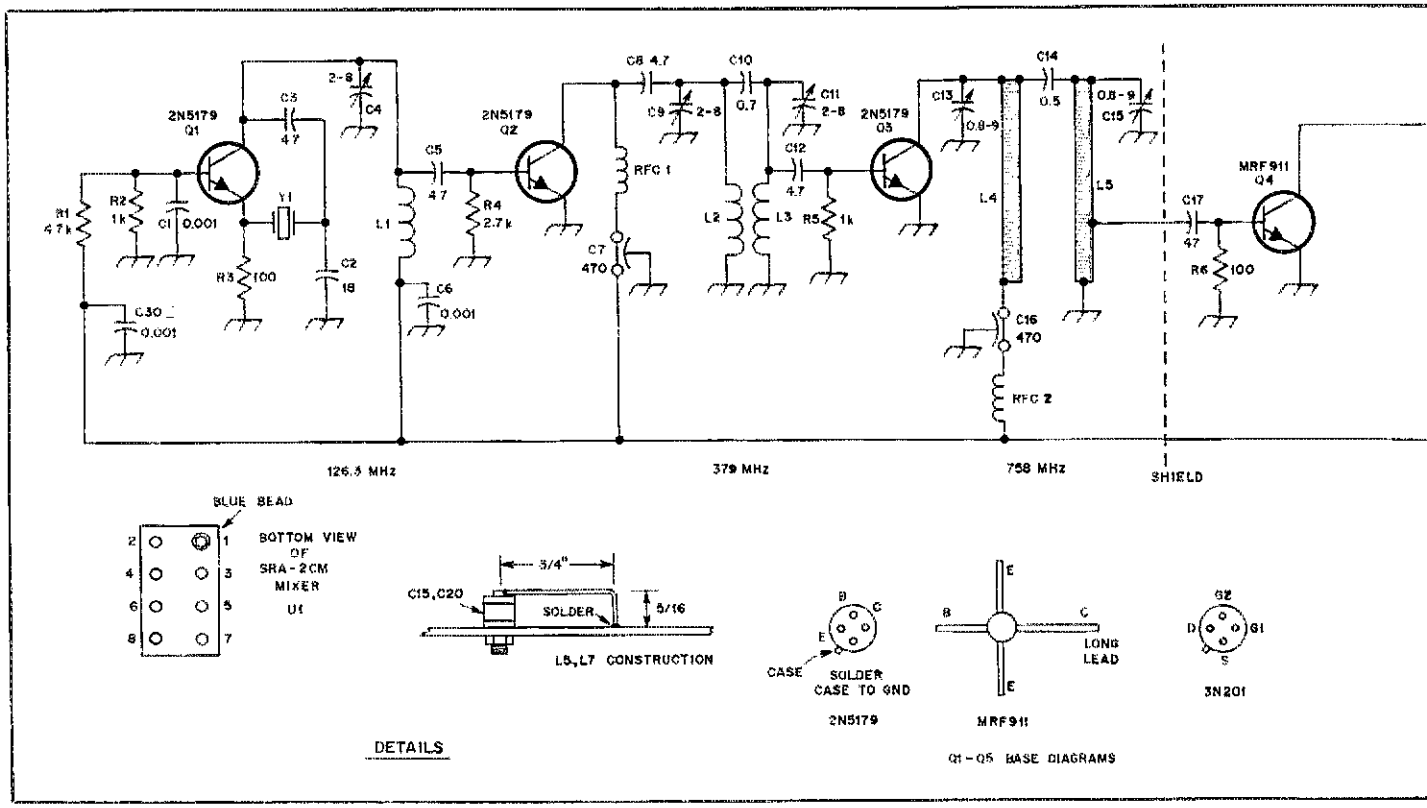


Fig. 2—Schematic diagram of the 902- to 144-MHz receive converter. All resistors are ¼-W carbon composition. Capacitors are 50-V epoxy-coated miniature ceramic types unless otherwise noted.

C4, C9, C11, C22, C25—2-8 pF adjustable ceramic trimmer capacitor.
C7, C16, C19—470-pF ceramic or mica button or feedthrough capacitor, solder-in type (see text).
C10—0.7 pF gimmick or ceramic chip capacitor (see text).
C13, C15, C18, C20—0.8-9 pF ceramic piston trimmer capacitor (Voltronics EQT9 or equiv. See text).
C14—0.5-pF ceramic chip capacitor (see text).
C28—470-pF solder-in feedthrough capacitor.
J1, J2—Chassis-mount female BNC connector (UG-1094 or equiv.).
L1, L3—5t no. 24 enam. wire, 0.190-in ID (no. 11 drill), closewound.
L2—3t no. 22 tinned wire, 0.190-in ID, spaced 1 wire dia.
L4—Piece of no. 18 tinned wire, 11/16-in long (see Fig. 4).
L5, L7—Piece of no. 18 tinned wire

might work here also, but I haven't tried one. Another alternative is a 0.3-3 pF miniature ceramic piston trimmer adjusted for the proper value.

LO output at this point is adequate to drive the mixer. The spurious components, however, are unacceptably high. Losses involved in adequate filtering would reduce the output level, so an MRF911 (Q4) is used to amplify and filter the LO signal even more. This stage is not "biased up" as are most amplifier circuits because only a small amount of gain is desired. The collector has a double-tuned circuit (C18, L6, L7, C20) to further reduce spurious responses in the output signal.

The output level at this point is approximately +20 dBm (100 mW), which is much higher than the +7 dBm required for the mixer, so a pi attenuator (R7, R8 and R9) is used. It requires more than passing care to make an attenuator from standard ¼-W carbon resistors that is usable at 750 MHz. Lead lengths must be as close to zero as possible. I used a 9-dB pad and ended up with approximately 8 mW. You may have to experiment with the resistor values depending on how much power you get from the MRF911 and on the tolerance of your resistors. All spurious responses at this point are at least −33 dBc, a level adequate for most applications. If a cleaner LO is required, this part of the converter could be boxed separately and a suitable filter used to obtain the required spectral purity.

There is another plus to be gained by the use of the additional amplifier stage. A two-port power splitter may be added at the output, providing an isolated output to drive a transmit mixer. Fig. 3 details one way to accomplish this. The three 50-ohm attenuators shown adjust signal levels for optimum in addition to providing proper termination for the power splitter. Attenuator values will depend on the amount of LO power available and the requirements of the mixers. Once you

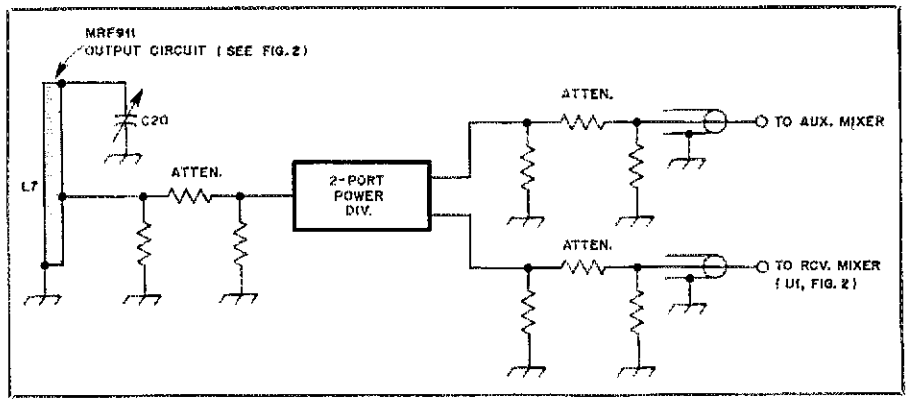
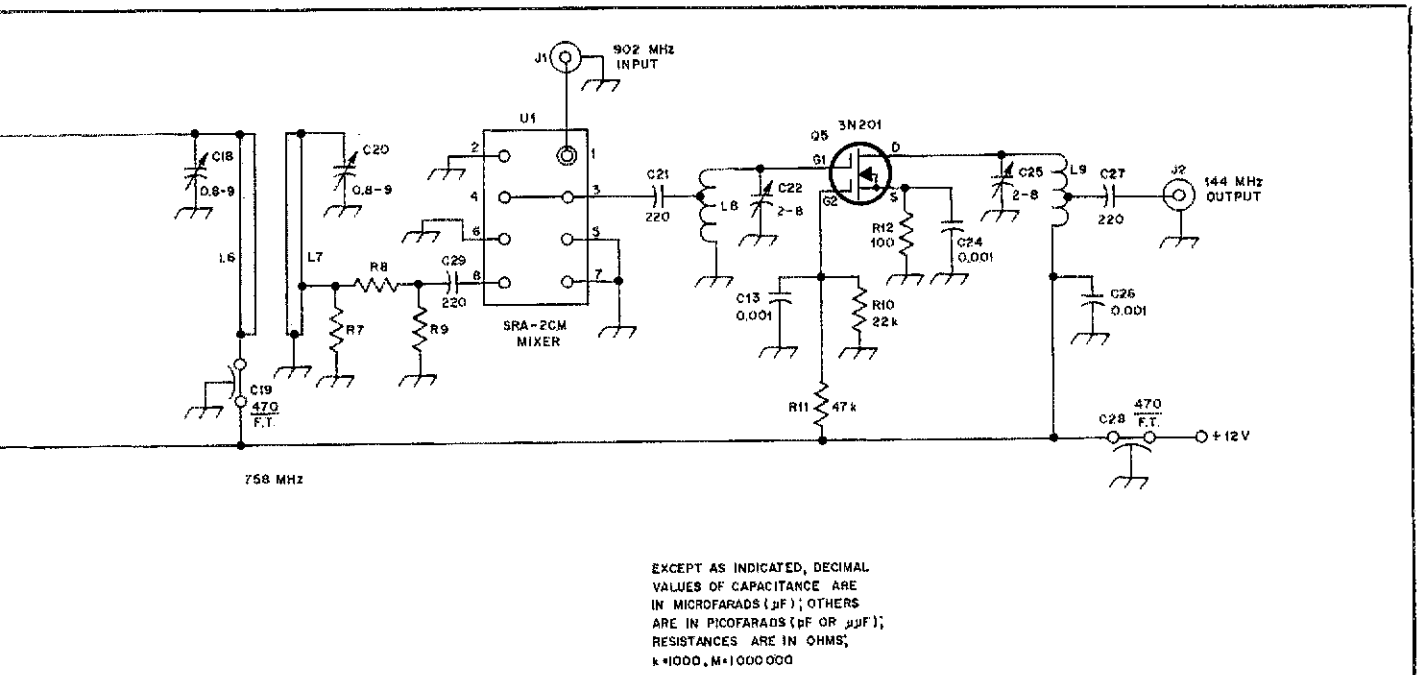


Fig. 3—The LO provides enough power to drive the receive converter mixer and an auxiliary mixer for a transmit converter, if desired. See text for details.



(see detail).
L6—Piece of no. 18 tinned wire, 5/8-in long.
L8, L9—6t no. 18 tinned wire, 0.25-in ID, spaced 1 wire dia, tapped 1¾t from ground.
Q1, Q2, Q3—2N5179 transistor.
Q4—MRF911 transistor.
Q5—Dual-gate FET (3N201, 3N204, 3N211, 3SK51 or equiv.).
RFC1—22t no. 30 enam. wire, 0.076-in ID (no. 48 drill), closewound.
RFC2—3t no. 24 wire, 0.082-in ID (no. 45 drill), spaced 2-wire dia.
U1—Mini-Circuits SRA-2CM doubly balanced mixer.
Y1—Fifth-overtone crystal, 90.238 MHz, or seventh-overtone crystal, 126.3334 MHz, HC-25/U holder (see text).

calculate the power levels necessary and the amount of attenuation required, resistor values may be obtained from Chapter 25 of *The 1985 ARRL Handbook*. If more LO power is required, Q4 may be "biased up" by adding a 2.2-kΩ resistor from the base to +12 V. Properly biased, Q4 is capable of delivering 150-200 mW.

The two-port power splitter may be one of the type typically used for television service, such as Radio Shack part no. 15-1141. Remove the toroid from the metal container, replace the 150-Ω power resistor with a 100-Ω resistor, and you have a small 50-Ω power splitter. Mini-Circuits (see the section on obtaining components) also sells a line of suitable power splitters.

The Mini-Circuits SRA-2CM doubly balanced mixer was selected because of its good performance, moderate price and reasonable delivery time. It is housed in a compact 8-pin package and is rated for use through 1 GHz.

The 144-MHz IF amplifier, Q5, is necessary to maintain converter noise figure. The design uses a dual-gate VHF FET in a circuit similar to one that might be used as a preamplifier ahead of a 2-meter converter or receiver. Although I used a 3N201, almost any dual-gate VHF FET will work here. Common devices include the 3N204, 3N211 and 3SK51. Typically, the noise figure of such a circuit will be approximately 3 dB or better.

The mixer conversion loss can be as high as 8 dB. This, added to the noise figure of the IF preamplifier, yields a typical converter noise figure of 10-11 dB. The noise figure of my prototype measured 9.25 dB. Although a noise figure this high can be considered adequate for many applications, a UHF enthusiast considers it to be unacceptably high. The solution, of course, calls for a low-noise preamplifier at the input frequency. Such a unit is described later in this article.

Component Layout

Unless you have had considerable UHF layout experience, you should follow the general layout scheme in Figs. 4 and 5. I usually build the oscillator first and then the succeeding multiplier stages, and so on. This way, the oscillator can be checked for performance, then the first multiplier and so on down the line.

All components except the mixer and BNC connectors are mounted on the foil side of the board. Ground connections are made directly to the copper ground plane. All parts are soldered together except Y1, which is mounted in a socket that is cemented to the board. Parts are supported by their leads above the ground plane where necessary. Keep all leads as short as possible.

Gather the components that mount through the board. These include Q1, Q2, Q3, Q5, C7, C13, C15, C16, C18, C19, C20, J1, J2 and U1. Using Fig. 5 as a guide, mark and drill the proper size mounting hole for each part. Q1, Q2, Q3 and Q5 fit snugly in 0.190-inch-diameter holes. After drilling the holes, mount the other components. Refer to Figs. 4 and 5 for an idea of the relationships between the various parts. Troubleshooting will be easier if you build and test each stage in succession.

Standard 3/8-inch-diameter, 2-8 pF ceramic trimmer capacitors (C4, C9 and C11) are used to tune the oscillator and first multiplier collector circuits. Two more ceramic trimmers, C22 and C25, are used in the IF amplifier. These trimmers are relatively inexpensive compared to the piston trimmer capacitors (C13, C15, C18 and C20) that are used to tune the collector circuits of the final two stages of the injection chain. Ceramic piston capacitors are preferred because they don't break as easily as the glass variety.

The solder-in button-type bypass capacitors, C7, C16 and C19, should be ceramic or mica types with good VHF characteristics. Feedthrough types may be used, then the power wiring could be done on top of the unit. Undesired interstage coupling could be further reduced. The wiring method shown in

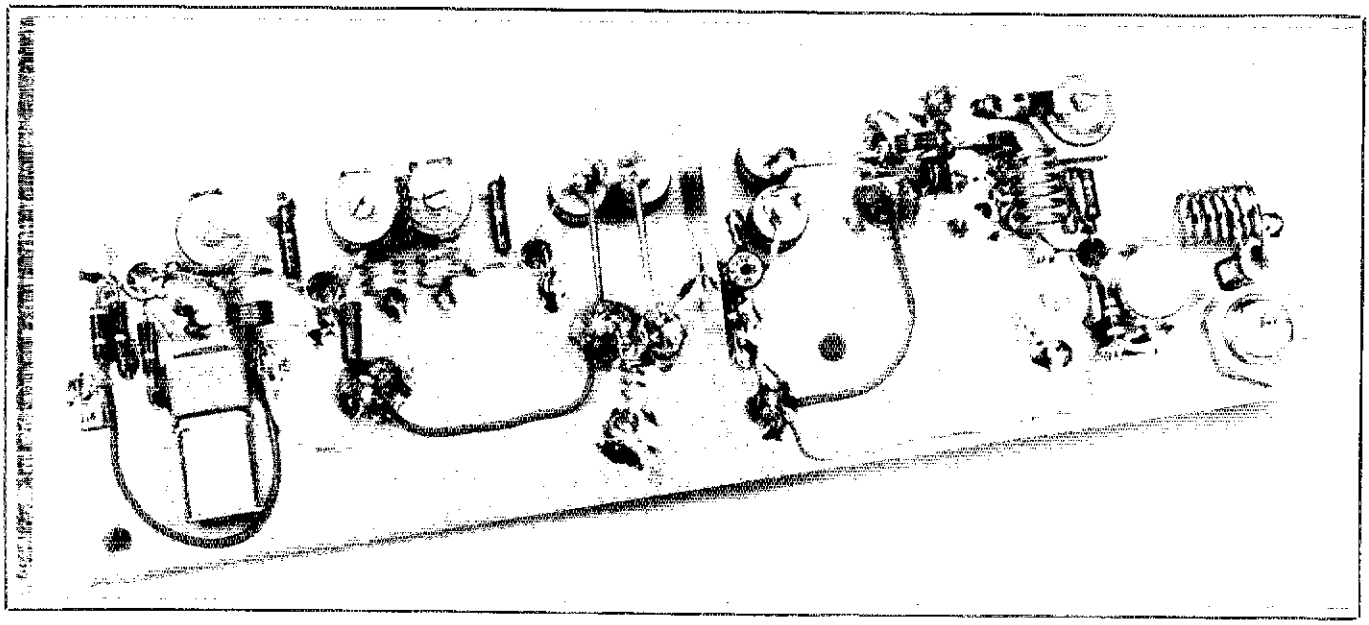


Fig. 4—The converter is built on a piece of copper-clad circuit-board material. Component leads are soldered together; lead lengths are as short as possible. Study this photo and Fig. 5 when you lay out your version.

Fig. 4 works fine, however.

With the exception of C10 and C14, the other capacitors are miniature, epoxy-coated, ceramic monolithic capacitors. Small, silver-mica types would work as well. C10 is a gimmick capacitor that was described earlier, and C14 is a ceramic chip.

Carbon ¼-W resistors are used throughout the converter. Avoid using metal-film types in the RF circuits; their associated inductance can make a big difference in the performance of VHF and UHF devices.

When you mount U1, make sure pin 1 is located in the right position. Pin 1 has a blue insulating bead for identification purposes. Fig. 2 denotes the mixer connections.

The shield between Q3 and Q4 is necessary for stable operation. This shield can be fashioned from a piece of sheet brass or copper, or from a piece of double-sided PC-board material. The two stages are coupled by C14, which is mounted in a small hole drilled in the shield.

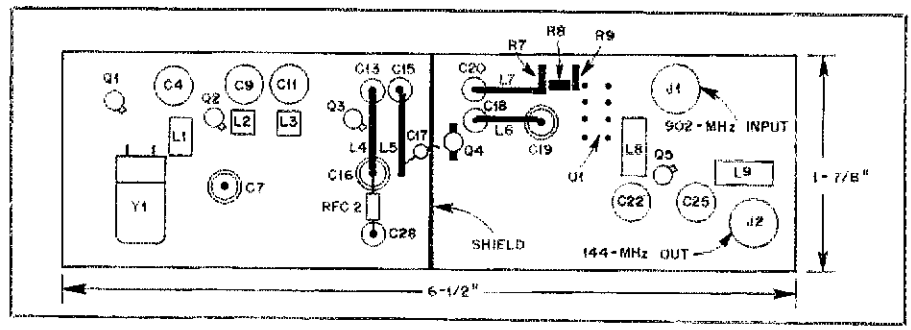


Fig. 5—Suggested parts placement for the converter board. Follow this placement guide carefully for best results. Refer to the text and Fig. 3 for additional details.

Adjustment Procedures

Most amateurs who build VHF gear have their own way of tuning up a multiplier string. I will offer a few comments for those who may not be familiar with these techniques.

First, use C4 to adjust the oscillator for output at 126.3 MHz. C4 tuning is fairly critical for reliable, stable operation. Next, adjust C9 and C10 in the first multiplier stage for maximum output at 379 MHz. Then adjust C13 and C15 in the second multiplier stage for maximum output at 758 MHz. After the multiplier stages are tuned for stable operation, tune C18 and C20 in the Q4 collector circuit.

LO tuning is relatively easy if you have access to a spectrum analyzer, but it can be accomplished with a dip meter capable of tuning these frequencies. Another alternative is to use a receiver capable of tuning the necessary frequencies.

The mixer, of course, is a broadband device and requires no tuning. The IF amplifier may be tuned up using either a 2-meter signal source or a 902-MHz signal injected into the mixer input. Most VHFers have preferred procedures for making all of these adjustments.

A GaAsFET Preamplifier

A low-noise preamplifier for 902 MHz is necessary to bring the noise figure of the converter down to a level acceptable for UHF weak-signal work. Some years ago, Bob Sutherland, W6PO, developed GaAsFET preamplifiers for 902 and 1296 MHz. The amplifier described here is an adaptation of these designs. It has a gain of approximately 17 dB and a noise figure of 0.75 dB as measured on a Hewlett Packard 8970A noise-figure meter with the HP 346A noise source.

Fig. 6 is a schematic diagram of the preamp. The input circuit consists of a tiny inductor, L1, and a section of 50-Ω transmission line, L2. Q1 is a low-noise GaAsFET device. The drain circuit is a simple stub match made from two more sections of transmission line.

Rather than design an etched circuit board with microstriplines, I chose to build the preamp prototype style on an unetched piece of single-sided G-10 PC-board material. All components are mounted to the board, and all ground connections are made to the ground plane. I chose to make the enclosure from circuit-board material. It measures 3/4 × 2 × 3-3/8 inches (HWD). Fig. 7 details the component placement, and Fig. 8 is a photograph of the finished unit.

L2, L3 and L4 are made from 0.141-in miniature semi-rigid coaxial cable (such as RG-402). This material is copper jacketed, has Teflon® dielectric and a silver-plated, solid center conductor. If you cut this cable

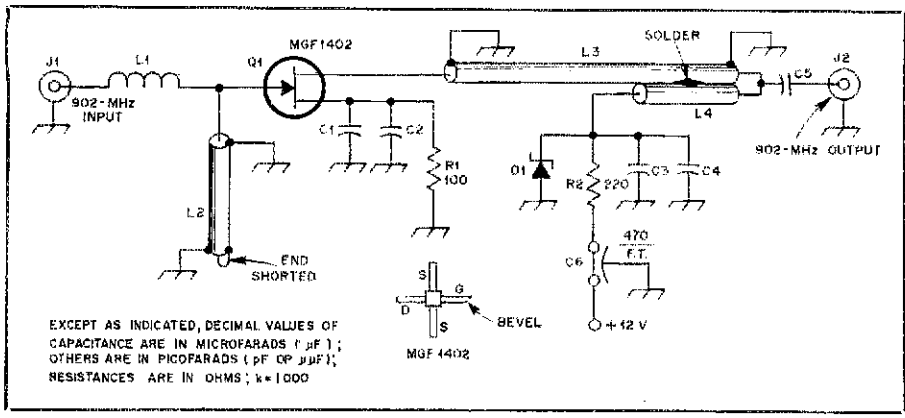


Fig. 6—Schematic diagram of the 902-MHz GaAsFET preamplifier. All resistors are ¼-W carbon types.

C1, C2—470-pF button or ceramic chip capacitor.
C3—470-pF ceramic chip capacitor.
C4—0.1-μF miniature disc-ceramic capacitor.
C5—220-pF ceramic chip or miniature disc-ceramic capacitor.
C6—470-pF solder-in feedthrough capacitor.
D1—3.6-V, 500-mW Zener diode (1N5227 or equiv.).
J1, J2—Chassis-mount female BNC connector (UG-1094 or equiv.).
L1—4t no. 30, 0.095-in ID (no. 41 drill), spaced 1 wire diam.
L2—2.3-in length of 0.141 50-Ω semi-rigid coax.
L3—1.6-in length of 0.141 50-Ω semi-rigid coax.
L4—0.465-in length of 0.141 50-Ω semi-rigid coax.
Q1—GaAsFET (MGF 1402, DXL2501 or equiv.).

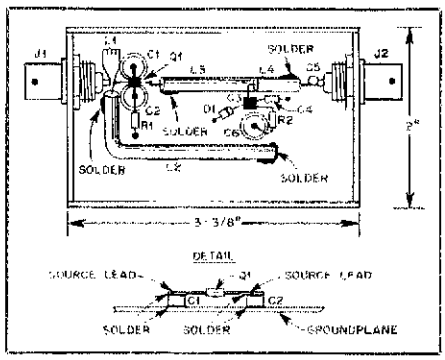


Fig. 7—Suggested parts placement for the 902-MHz preamplifier. Follow this layout carefully and keep all leads as short as possible. Good grounding is important for proper performance. See text and Fig. 8 for further details.

carefully to the dimensions given, you will have no trouble reproducing the preamp. These dimensions are for the section of the line that is inside the copper jacket, so remember that you'll need ¼ inch or so on each end to make your connections.

Use the following procedure to cut the sections of the 0.141 cable. Measure the desired length and mark the copper jacket. Lay the cable on a flat surface and score the copper jacket around its circumference with a sharp knife. You'll get the best results if you hold the knife blade stationary on the mark you measured and exert moderate pressure on the jacket while rolling the cable under the blade. Next, hold the cable tight in one hand and grip the section of copper jacket to be removed with a pair of pliers. Gently rock the section to be removed back and forth until the jacket cracks and breaks neatly where you scored it. Remove the unwanted jacket and use your knife to cut through the dielectric. Be careful not to nick the center conductor. Remove the dielectric and trim the center conductor to the desired length. Repeat this process for the other end of the cable.

Follow the parts placement in Fig. 7 carefully. Arrange the parts in the order they will be placed on the board and mark any holes. (Caution: GaAsFETs are static-sensitive devices. Leave Q1 in its protective package until you are ready to solder it in place.) You will have to drill a hole for the feedthrough, C6. If you use button instead of chip capacitors for C1 and C2, you will need to drill holes for these, too.

I prefer to first mount all the components except the GaAsFET. For best results, clean the circuit-board foil and the 0.141 cable jackets until they are bright and shiny. Make all component leads as short as possible. Q1 will be supported above the ground plane by its source leads. C1 and C2 are soldered to the ground plane, and then the Q1 source leads are soldered to the pads on top of these capacitors. See Fig. 7. Cut off the center pin on J1 so there is just enough contact left to solder L1 to. Remember to solder the jacket of L4 to the jacket of L3 and to solder the jackets of L2 and L3 to the ground plane at each end. Solder the enclosure sides to the ground plane along the entire length of the seams.

After all other components are soldered in place, remove the GaAsFET from its package. These devices should be handled carefully to avoid damage by static buildup. Quickly solder the device in place using a cordless or grounded soldering iron. If you don't have a grounded iron, unplug your hot iron from the outlet before soldering. Tweezers may come in handy.

As can be seen, there are no tuning adjustments on the RF amplifier. If noise performance measuring equipment is available, it may be possible to optimize the noise figure by adjusting the spacing between the turns of L1 at the input connector. The improvements are very small however, and the performance is excellent with no adjustments.

This type of amplifier is inherently broadband. If this unit is to be used in an area where there is significant RF pollution in the portion of the spectrum above 500 MHz (such as UHF television signals), it

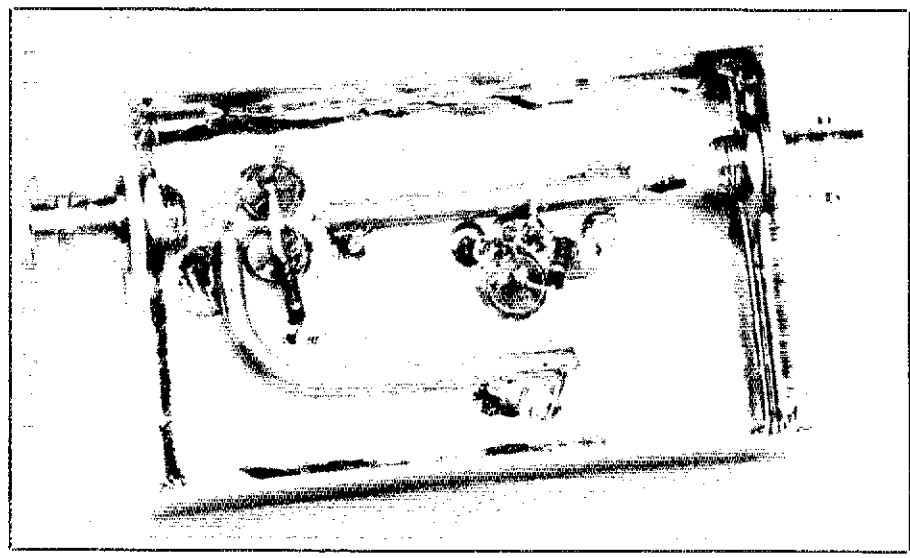


Fig. 8—The 902-MHz GaAsFET preamplifier is built on a piece of copper-clad circuit-board material. Follow the layout shown here and in Fig. 7 for best performance. The GaAsFET device, which is suspended from the source bypass capacitors, should be handled carefully and soldered in last. See text for details.

might be desirable to use a bandpass filter in front of the amplifier. Remember, however, that a filter will introduce some loss and will degrade the system noise figure.

Power Supply

Usually a 12-V regulated power source is available in most ham shacks. If you desire to build a separate power supply for this unit, a suitable one is shown in Fig. 9. This supply may, of course, power both the converter and preamplifier. It is a simple circuit using a full-wave bridge rectifier and 3-terminal 12-V regulator. The secondary voltage of T1 may be anywhere between 12 and 18 volts.

C2 and C3 should be mounted as close to the regulator pins as possible for best regulator stability. U1 should be mounted on a small heat sink. The parts for this unit are all available at any Radio Shack store.

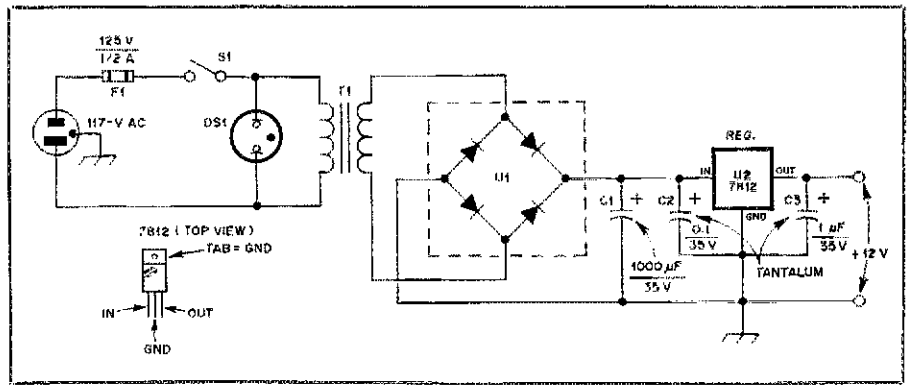


Fig. 9—Schematic diagram of a power supply suitable for both converter and preamplifier.
C1—1000-μF, 35-V electrolytic capacitor.
C2—0.1-μF, 35-V tantalum capacitor.
C3—1-μF, 35-V tantalum capacitor.
DS1—117-V neon pilot lamp.
F1—Fuse, 125 V, ½ A.
S1—SPST toggle switch, 125 V.
T1—Primary, 117-V ac; secondary, 12-18 V, 1 A.
U1—50-PIV, 1-A bridge rectifier module.
U2—12-V, 1.5-A 3-terminal regulator (LM7812 or equiv.).

Obtaining Components

Although I have tried to minimize the number of specialized components, there are a few that some constructors may have difficulty obtaining, such as the ceramic piston trimmers. I used Voltronics type EQT9 trimmers for this project. They are available in single-lot quantities from Voltronics Corporation, P.O. Box 366, E. Hanover, NJ 07936. A similar piston trimmer is sold by Trim-Tronics, Inc., 67 Albany St., Cazenovia, NY 13035 (part no. 60-0720-1501-000). Johanson is another manufacturer of several piston trimmer capacitors suitable for this project; these capacitors are available from most major parts houses. A source for adjustable ceramic capacitors is Stettner Electronics, Inc., P.O. Box 21947, Chattanooga, TN 37421.

The SRA-2CM mixer is available directly from the manufacturer, Mini-Circuits, 2625 East 14th St., Brooklyn, NY 11235. The crystal I used was obtained from Jan Crystals, 2400 Crystal Dr., Ft. Meyers, FL 33906. Order a 90.2380 MHz, series-resonant, 0.005%, non-oven, HC-25/U crystal.

Small pieces of 0.141 copper-jacketed coax used in the preamp may prove difficult for some to obtain. J. Smith and Assoc., Inc., 3540 N Academy Blvd., Suite 113, Colorado Springs, CO 80907 sells this cable in foot lengths.

The GaAsFET may be obtained from Advanced Receiver Research, P.O. Box 1242, Burlington, CT 06013. Applied Invention, RD 2, Rte 21, Box 21, Hillsdale, NY 12529, sells piston trimmers, chip capacitors and feedthrough capacitors. Yet another source for trimmer capacitors, chip capacitors, feedthrough capacitors, GaAsFETs and related parts is Microwave Components of Michigan, 11216 Cape Cod, Taylor, MI 48010.

Most of the other components can be acquired from many parts houses. One such company that deals in small quantities is Mouser Electronics, 11433 Woodside Ave., Santee, CA 92071. A catalog is available on request.

In Summary

The receive converter described here is a high-performance project that can be built from available parts. Although some test equipment is desirable for alignment, it is not absolutely necessary. If you follow the guidelines I have established, you should have no trouble duplicating the project and being among the first to tune into our newest amateur band. A companion 902-MHz loop Yagi will be described in another article.

New Products

SOLARTS MINIATURE SOLAR PANELS

☐ Three new miniature solar panels capable of generating 20 V at 250-500 mA have been announced by Solarts. These strong, lightweight, high-efficiency units use rectangular cells and high-density packaging for a high power-to-size ratio. Each panel contains 36 cells, each generating 0.55 V, on the average, compared to the usual 0.45 V (see Table 1). Open-circuit panel voltage is usually over 20 V. Encapsulated aluminum substrate construction makes them shockproof, weatherproof and ultra thin—only 3/16 inch thick. The largest model offered weighs less than 1 lb.

Included with each panel are a cigarette-lighter adapter with a 4-ft cord, two 12-in-long hookup wires with spade lugs, two wire nuts, a suction cup for temporary mounting and complete instructions.

For more information, contact Dick Smith Electronics, P.O. Box 2249, Redwood City, CA 94063, tel. 415-368-8844. —*Bruce O. Williams, WA6IVC*

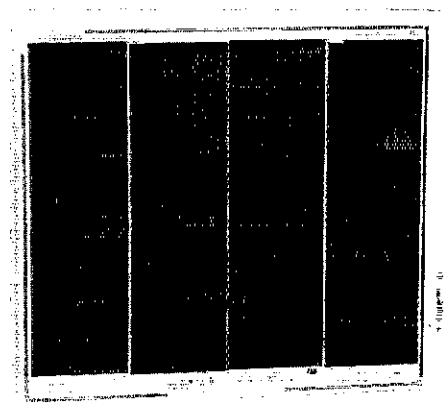


Table 1
Specifications

Model Number	No. of Cells	Output V	Output mA	Size (HWD) (in)	Weight (oz)
SPE-250	36	20	250	7 × 8 × 3/16	9½
SPE-400	36	20	400	8 × 10½ × 3/16	14
SPE-500	36	20	500	9½ × 10½ × 3/16	16

The Principles and Building of SSB Gear

Part 2: This month, we'll examine the speech amplifier, balanced modulator, filter, IF amplifier and carrier generator of an SSB generator. Practical circuits are offered for the amateur builder.

By Doug DeMaw, W1FB
ARRL Contributing Editor
P.O. Box 250, Luther, MI 49656

How many times have you heard SSB signals that contained distortion, RF-energy-caused squeals or hum? Chances are that you could tune across one of the phone bands at this moment and find several "dirty" signals. Generally, when a clean SSB signal does not appear at the transmitter output the cause is at the operator end of the line. Most commercial rigs are capable of delivering quality SSB signals, but too many operators feel compelled to use excessive mic-gain levels—they may shout into the microphone or operate improperly adjusted speech processors. In other instances, the transmitter audio section generates howls and squawks because poor transmitter grounding permits RF energy to enter the speech-amplifier stages. There are situations, however, in which poor circuit design can lead to these maladies. Too many audio "highs" or "lows" can also be attributed to faulty design, assuming the mic is capable of passing the desired speech frequencies. Let's consider a practical speech amplifier.

An IC Speech Channel

Good circuits can be developed using transistors, ICs or tubes as speech amplifiers. The choice is up to the designer, and the available parts in our personal project inventory may dictate the design we adopt. Our circuit will use an op-amp (operational amplifier) IC. It provides high gain, requires few components and is inexpensive. A practical circuit is shown in Fig. 1.

Last month, we acknowledged a need for some type of RF filtering at the mic-input terminal of the speech stage. RFC1 and the two 560-pF bypass capacitors in Fig. 1 provide filtering for unwanted RF energy that can enter the transmitter by way of the mic cable. This brute-force low-pass filter is effective through 30 MHz, and helps to prevent "unworldly screeching" during the transmit period.

Care must be taken to minimize the passage of 60-Hz hum through the speech amplifier. The values chosen for the coupling capacitors will restrict all frequencies below approximately 200 Hz. This blocks out the 60-Hz energy that could be picked up on the mic cord.

We need to match the characteristic impedance of the mic to the input of U1 if we are to preserve the frequency response and ensure maximum transfer of power from the mic. R1 has been added to make the input of U1 look like low impedance for the 500-ohm mics we have today. To use a high-impedance mic, such as a D-104, we may remove R1 from the circuit. The amplifier may be used for either type of mic.

It is important to keep low-frequency noise to a minimum when dealing with the first stage of an audio amplifier. Op amps are characteristically noisier than FETs or low-noise bipolar transistors. This variety of inherent noise (caused by current flow in the input section of the op amp) is known as popcorn noise among engineers.

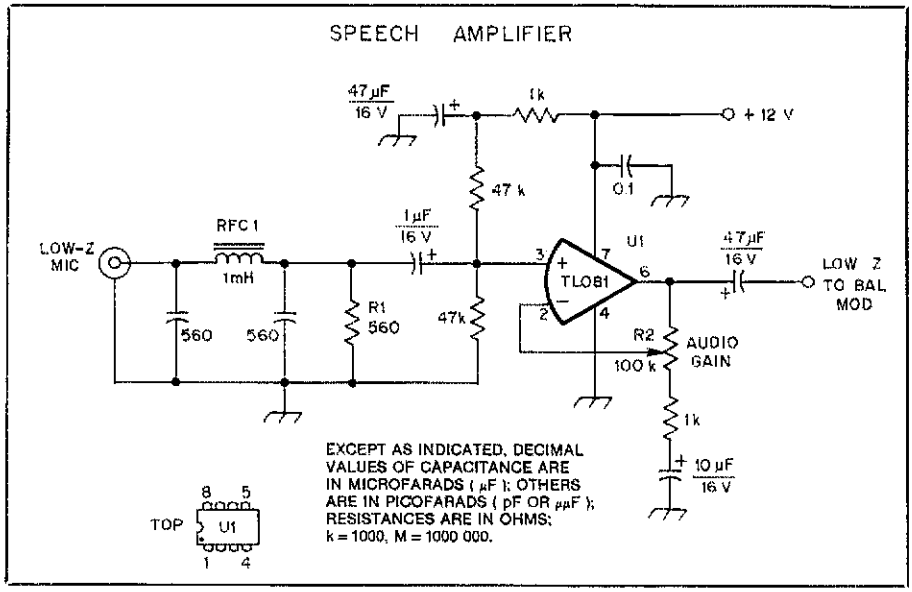


Fig. 1—Schematic diagram of a practical speech amplifier. Capacitors are disc ceramic or mylar, except those with polarity marked, which are electrolytic or tantalum. Fixed-value resistors are ¼-W carbon composition. R1 is used when a low-impedance mic is employed. R2 is a linear-taper, carbon-composition control suitable for panel mounting. RFC1 is a miniature RF choke (value not critical within 20%). Op amp U1 can be obtained at a Radio Shack store.

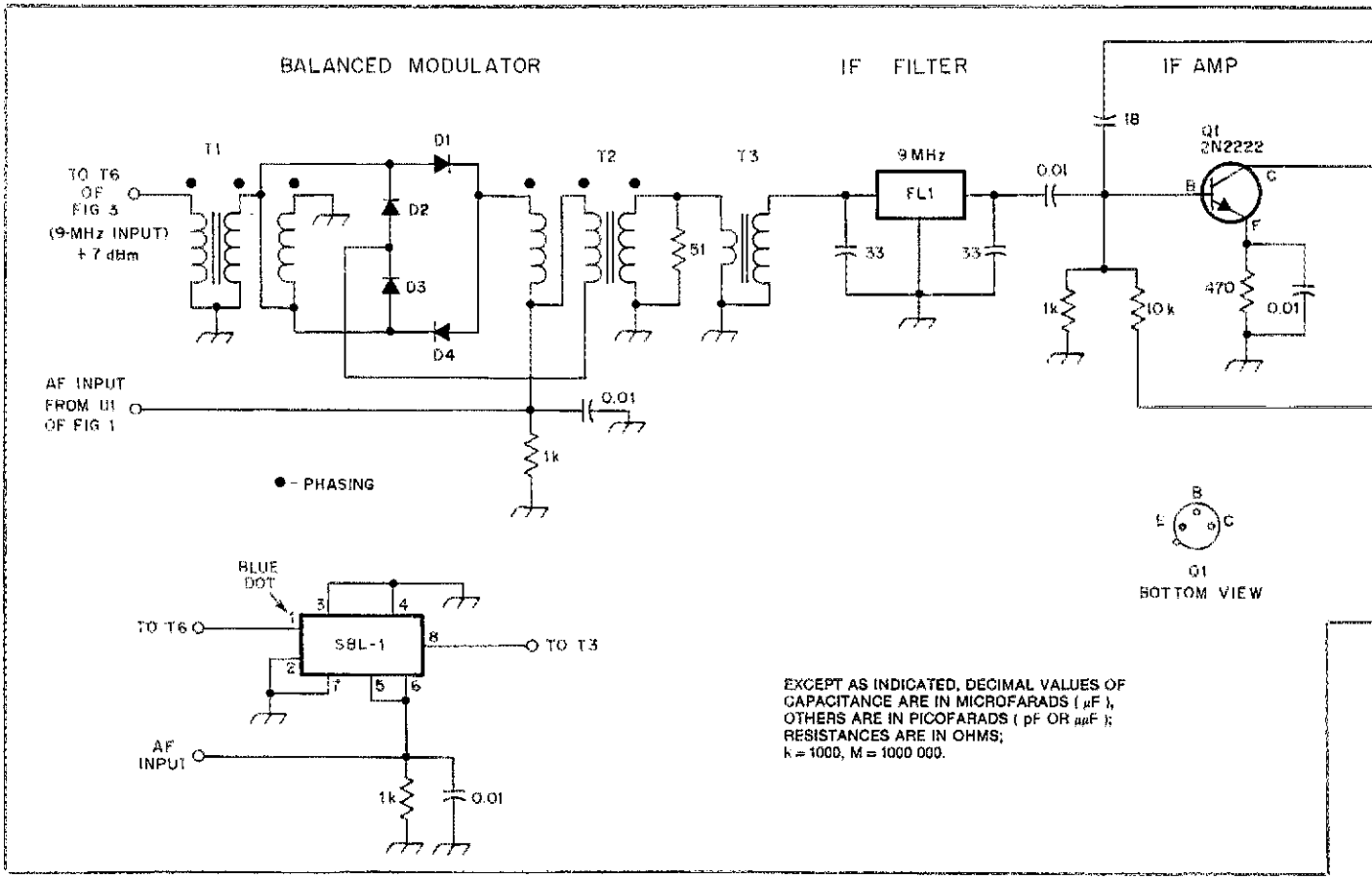


Fig. 2—Circuit diagram of a practical balanced modulator, IF filter and post-filter IF amplifier. The lower inset drawing shows the terminal connections for a commercial DBM module that may be used in place of D1-D4, T1 and T2 (see note 2). Fixed-value capacitors are disc ceramic. Resistors are ¼-W carbon composition, 10% tolerance or better.

C1—Miniature trimmer, 100 pF maximum.
D1-D4, incl.—Matched set of 1N914 or equiv. silicon small-signal diodes (see text).
FL1—9-MHz crystal filter, 2.4-kHz bandwidth (see note 2).
T1, T2—Trifilar broadband transformer. Use 15 turns of no. 30 enam. wire on an Amidon Assoc. FT-37-43 toroid core. Observe phasing of windings, as indicated by dots.
T3—Broadband toroidal transformer, 3:1 turns ratio. Secondary has 15 turns of no. 30 enam. wire on a FT-37-43 ferrite core. Primary contains 5 turns of no. 30 wire.
T4—Narrow-band tuned transformer. Primary is 3.8 μH. Use 28 turns of no. 26 enam. wire on an Amidon Assoc. T50-2 powdered-iron toroid core. Secondary winding has 8 turns of no. 26 wire (see text).

The low-cost family of op amps (741 group) are especially noisy. Such popcorn, if allowed to prevail, would be amplified and passed through the SSB generator, thereby appearing in the RF output signal. The TL081 op amp is a low-noise type that uses FETs at the input.

The larger the value of the input and output coupling capacitors in Fig. 1 (1 μF and 4.7 μF), the more pronounced the low-frequency response of the amplifier. Excessive highs can be rolled off by adding small-value bypass capacitors (0.01 to 0.47 μF) from pins 3 and 6 of U1 to ground. You can, through experimentation, shape your speech-amplifier response to suit your mic and voice characteristics. Maximum gain from U1 of Fig. 1 is roughly 40 dB.

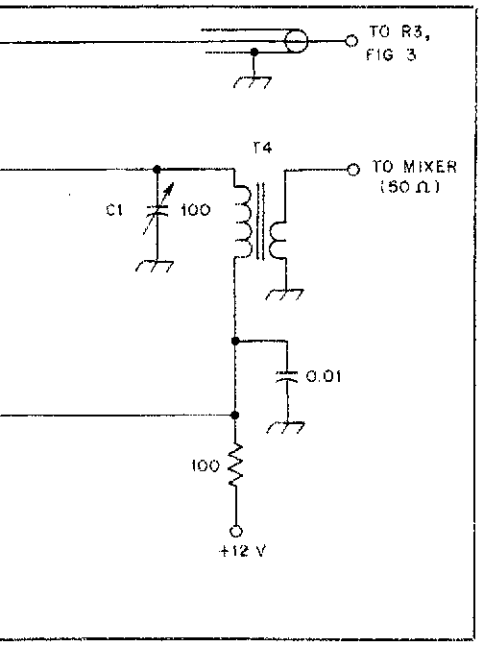
Modulator and Filter Section

We have chosen a diode-ring balanced modulator for our practical SSB generator. We could have used an IC balanced modulator, or combined bipolar or field-effect transistors in a balanced circuit. The diode-ring configuration is a *passive* circuit (no operating voltages required), whereas the other devices form *active* circuits. The active devices provide a signal increase called *conversion gain*. The diode modulator has a loss of approximately 8 dB. This is called *conversion loss*. The circuit of Fig. 2 illustrates the balanced modulator with its two broadband transformers and four matched diodes. D1 through D4, inclusive, can be generic style 1N914 high-speed silicon diodes. If they are used, a matched set should be selected from a group of diodes by measuring the forward and back resistances with an ohmmeter. The forward resistance is the most important when you are seeking a matched set. Typically, it will be on the order of 8-10 ohms. Back resistances are generally 1 megohm or greater. The more carefully we match the diodes, the greater the carrier null (desirable). If you have access to a matched set of hot-carrier diodes, use them. They offer somewhat better performance in this circuit than is available with small-signal silicon diodes.

We need not build our own balanced modulator if we are willing to purchase a ready-made doubly balanced mixer (DBM) module. The Mini-Circuits SBL-1 is a low-cost unit enclosed in a metal case and is suitable for PC-board mounting.[1] If you construct your own balanced modulator, try to follow a symmetrical layout while keeping all leads as short as possible. A DIP header makes a fine plug-in foundation for a homemade balanced modulator.

The diode modulator was selected because of its excellent balancing traits. Also, it is more resistant to unwanted IMD (intermodulation distortion products) than is an active balanced modulator. The Motorola MC1496 balanced-modulator chip is good for active circuits, provided the input-signal levels are kept low enough to prevent IMD problems. The diodes,

[1]Notes appear on page 30.



however, permit substantially more leeway in applied signal levels.

Coupling into and out of the balanced modulator of Fig. 2 is accomplished by means of trifilar (three windings) broadband transformers. They are easy to wind and do not cost very much. Small ferrite toroid cores are used for T1 and T2. The terminal impedances of the modulator (inclusive of T1 and T2) are approximately 50 ohms.

Filter Details

If you reviewed the *QST* paper by W7ZOI in May 1982 *QST*, pp. 21-27, you learned how to build your own ladder filter for a small investment. If you are not interested in developing a homemade filter, you may purchase a 9-MHz SSB filter for FL1 of Fig. 2.[2] The unit specified in Fig. 2 has input and output impedances of 500 ohms. T3 matches the 50-ohm modulator impedance to the 500-ohm impedance of FL1. A 51-ohm resistor is used between T2 and T3 to force a more precise impedance transformation. It also provides a termination for the balanced modulator: This tends to reduce IMD.

The input and output ports of FL1 need to be tuned to 9 MHz. The 33-pF capacitors at each end of FL1 serve this purpose. Proper tuning and filter termination ensure minimum ripple (see Part 1). The characteristic input impedance of Q1, plus the base-bias resistors, ensure a 500-ohm load for the filter output.

IF Amplifier

The combined signal loss through the balanced modulator and FL1 is approximately 13 dB. We need to recover this lost signal by adding an IF amplifier (Q1) after FL1. Practically, we will gain a few dB in the process of amplifying the output of FL1: Stage gain for Q1 should be on the order of 15 to 18 dB if all is as it should be. The IF amplifier operates in class A, which makes it a linear "gain multiplier." A tuned output transformer, T4, helps to "launder" the signal, and it provides an impedance match between Q1 and the mixer stage that will be described in the next installment.

Note the shielded RF input line above Q1. This is used to route some of the carrier-generator energy *around* FL1 and the balanced modulator if we wish to operate CW or AM with our SSB generator. We could, on the other hand, disturb the balance of the circuit by applying a dc potential between D1 and D4, thereby causing a carrier to appear at the transmitter output. The method indicated in Fig. 2 is perhaps a bit simpler, all things considered.

Carrier Generator

To produce an SSB signal, we must generate a 9-MHz carrier, then get rid of it in the balanced modulator. As ridiculous as this may seem, it is necessary! Fig. 3 shows the circuit we have adopted for our project.

Q2 is the oscillator. A 9.0015-MHz crystal (available from the supplier in note 2) is needed for lower-sideband (LSB) operation. Two crystals and a selector switch may be employed if both USB and LSB are desired: An 8.9985-MHz crystal is necessary for USB operation.

As we learned in Part 1, the frequency of Y1 should fall about 20 dB below the peak (center frequency) response of the filter (FL1). In order to "rubber" the carrier-oscillator crystal for precise placement of the carrier frequency, we may insert a 60-pF trimmer capacitor between the lower end of Y1 and ground. If this does not provide natural voice quality, try placing the trimmer in parallel with Y1, then adjust the capacitor while monitoring your SSB signal.

D5 provides a regulated operating voltage for Q2. This will aid stability, particularly if mobile operation is planned. A

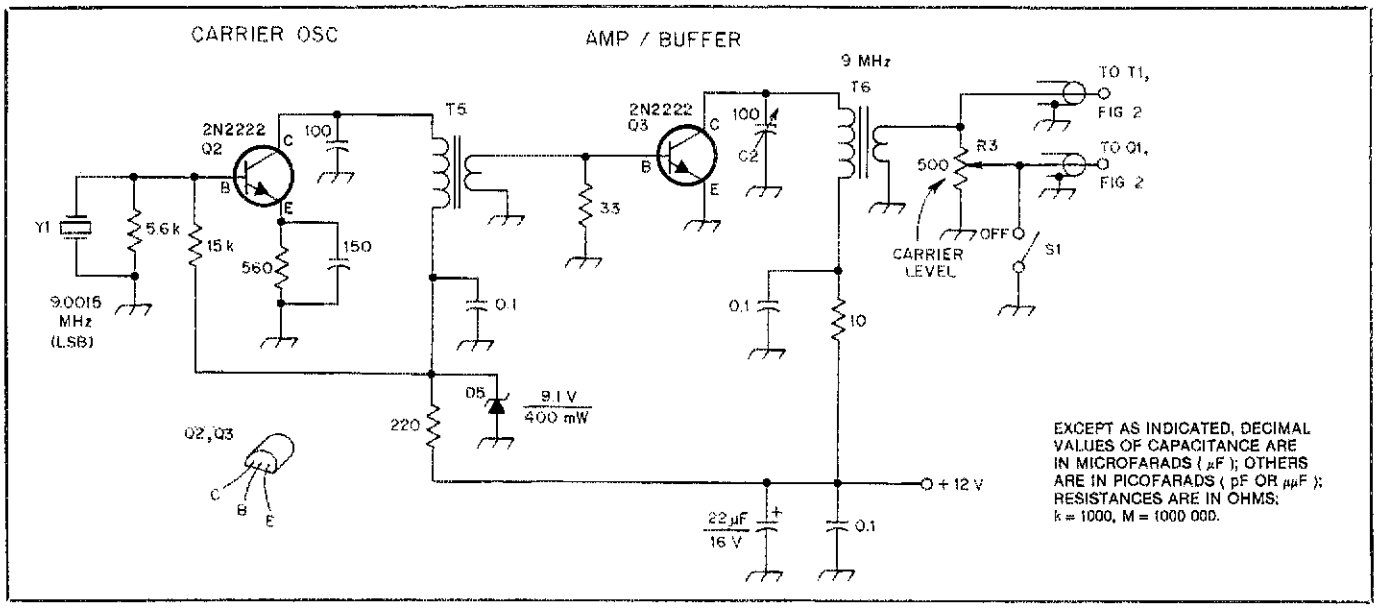


Fig. 3—Schematic diagram of a practical carrier generator. Fixed-value capacitors are disc ceramic. Resistors, other than R3, are ¼-W carbon composition.

C2—Miniature trimmer, 100 pF maximum capacitance.
D5—Zener diode, 9.1 V at 400 mW.
R3—Linear-taper carbon-composition control, panel mount.
S1—Part of R3 assembly, SPST.
T5—Narrowband RF transformer, 3.0-µH primary. Use 24 turns of no. 26 enam. wire on a T50-2 toroid core. Secondary has 5 turns of no. 26 wire.
T6—Same as T4 of Fig. 2.
Y1—See text and note 2.

fixed-tuned output transformer, T5, is used to couple the Q2 signal to the input of buffer-amplifier Q3. The primary turns of T5 may be spread or compressed to tune the Q2 collector for peak output.

We must amplify the oscillator output to a proper level for the balanced modulator of Fig. 2. The correct injection level is +7 dBm. The term *dBm* refers to the power level, as referenced to 1 mW. Hence, +7 dBm is roughly 6 mW, or 0.006 W. This being the case, and with the balanced modulator presenting a 50-ohm load for Q3, the RMS voltage across the T6 secondary winding (when terminated in 50 ohms) should be close to 0.55, as observed with a scope or RF probe and VTVM. The P-P voltage reading on a scope would be 1.55. The number of secondary turns on T6 may be adjusted to provide the desired injection level.

R3 of Fig. 3 is a carrier-injection level control for CW work or transmitter tuning purposes. S1 is a part of R3. It shorts the output line from R3 during SSB operation. This discourages unwanted leakage of the 9-MHz energy to the output side of FL1 of Fig. 2. Miniature shielded cable (RG-174) should be used for both output lines from R3. This will help prevent stray-signal leakage that could cause an excessive carrier level during SSB operation. The shield braids of these lines must be grounded at each end of the cables.

C2 is adjusted for peak output from the class-C amplifier, Q3. The 33-ohm resistor from the base of Q3 to ground is used to stabilize the output amplifier. Without it, self-oscillation may occur.

Parting Comments

If you enjoy laying out your own PC boards, there is no reason you can't combine the circuits of Figs. 1 and 2 in a common module. The carrier generator of Fig. 3 should be on a separate PC board, and it would be wise to enclose this assembly in a small shield box, perhaps a homemade one fashioned from PC-board stock. The shielding will discourage 9-MHz energy from wandering about in other parts of the SSB-generator circuit. Circuit boards, parts or a complete kit for the 75-meter SSB transmitter will be available by mail from A & A Engineering at the conclusion of this series.[3] Some of you may wish to delay your workshop project until that time.

Next month, we will discuss operation and practical circuits for the mixer and subsequent amplifier stages. CW keying methods will be treated later on. Meanwhile, why not breadboard these circuits and discover what your 9-MHz SSB signal sounds like? PC-board artwork and a parts-placement guide for these circuits will be presented later in this series.

Notes

[1]Mini-Circuits, P.O. Box 166, Brooklyn, NY 11235, tel. 718-934-4500. Minimum order is 10 units for the SBL-1, but the SBL-1X can be substituted and is available in single-lot quantity.
[2]Spectrum International, Inc., P.O. Box 1084, Concord, MA 01742, tel. 617-263-2145. Filter model XF-9A (2.4 kHz) suggested.
[3]7970 Orchid Dr., Buena Park, CA 90620, tel. 714-521-4160.

(continued from page 20)

Shorting T18 to ground should close K1, and adjusting R23 should vary the release delay from approximately 0.5 to 5 seconds.

Tune up the transmitter as follows. Connect a 5-W dummy load between T21 and T25. Set all mica compression trimmer capacitors for maximum capacitance (fully closed). Key the transceiver and see that 12-V dc is present at T22. Adjust C22 for maximum RF output across R16. Then adjust C24 for maximum RF voltage across L11. Set C29 and C30 for maximum RF voltage across R19. Last, adjust C32 and C33 for maximum output across the dummy load. Since C29, C30, C32 and C33 adjustments interact, the process will have to be repeated several times. During the final stages of tune-up, the trimmer-capacitor adjustments should provide smooth amplitude variations with no sudden jumps apparent. Monitor the temperature of Q8 closely during transmitter tune-up.

Adjust C3 to have the VFO cover the desired frequency range, and set the dial calibration. C5 provides temperature compensation. No noticeable drift should occur after an initial warm-up period of about 10 minutes.

The VFO offset during transmit is set by trimming the length of the gimmick capacitor, C16. Trim C16 to provide a downward VFO frequency shift of about 750 Hz when the transmitter is keyed.

Operation and Comments

Since the transmit frequency is shifted below the receive frequency, it is necessary to tune the receiver so the VFO frequency is above that of the received station. When the transmitter is keyed, the VFO frequency shifts down by 750 Hz and falls on the zero-beat frequency.

The transceiver has been in use for several months, and the improved receiver performance makes the redesign effort worthwhile. There is absolutely no audible amplitude modulation from the high-power 40-meter broadcast stations. The bandwidth of the receiver is adequate for CW reception, and no audio distortion or ringing is evident. In fact, the audio signal has good tone quality when personal stereo headphones are used with the receiver. The notch filter has proved useful; however, it is not a complete substitute for single-signal reception. When the transceiver is used to work other QRP stations, it is helpful to have a low-noise receiver since the received signals can be just above the 40-meter-band noise during the daylight hours. Get out your soldering iron and try your hand at building the receiver or the entire transceiver. I'm sure you'll be glad you did!

Acknowledgment

I'd like to thank Jim Conrad, N1GW, of Hewlett Packard, for his suggestions concerning the design of the receiver RF section and for his help with AM-detection measurements.

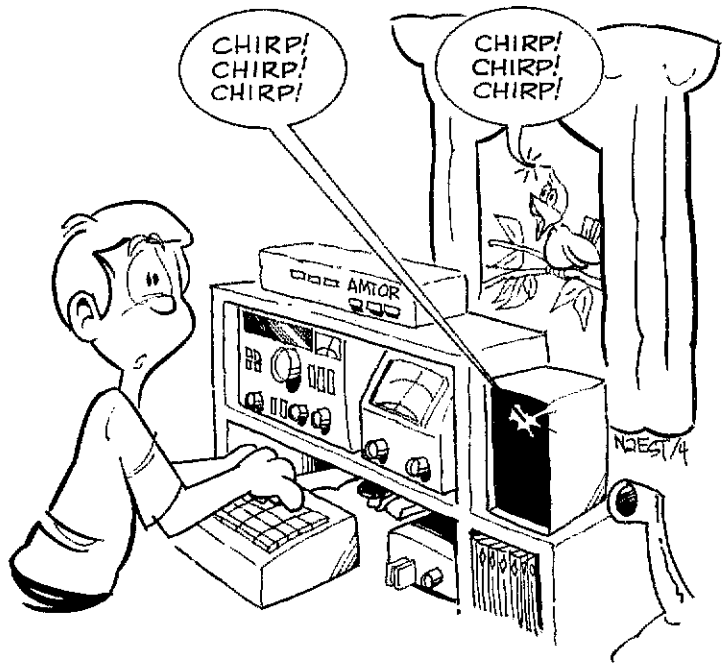
Notes

[1]D. K. Seimer, "The MAVTI-40," *QST*, June and July 1975. Also see Feedback, *QST*, Oct. 1975, p. 71.
[2]J. L. Keith, "40-Meter Transceiver for Low-Power Operation," *Ham Radio*, April 1980.
[3]R. W. Lewallen, "An Optimized QRP Transceiver," *QST*, Aug. 1980.
[4]J. A. Dyer, "High Frequency Receiver Performance," *Ham Radio*, Feb. 1984.
[5]C. Hall, "Tunable RC Notch," *Ham Radio*, Sept. 1975.
[6]Mini-Circuits Labs, P.O. Box 166, Brooklyn, NY 11235, tel. 718-934-4500.
[7]C. Hutchinson, ed., *The 1985 ARRL Handbook for the Radio Amateur* (Newington: ARRL, 1984), p. 12-19.
[8]Circuit boards and parts kits are available from Radiokit, P.O. Box 411, Greenville, NH 03048, tel. 603-878-1033. PC-board templates and parts overlays are available (note: this is a *double-sided* board) from ARRL Hq. for $2 and a business-sized s.a.s.e. Address your correspondence to the Technical Department Secretary and identify your request as MAVTI Updates.
[9][Editor's Note: See D. DeMaw, "Plug-In Wall Transformers—A Super Bargain," *QST*, June 1985. On page 37, Doug relates one of his experiences with D-C receivers and hum pickup.]

A User's Guide To AMTOR Operation

Are you ready to take advantage of the error-free RTTY communications offered by AMTOR? Before you start chirping away aimlessly, learn the proper operating techniques.

By Paul Newland, AD7I
P.O. Box 205
Holmdel, NJ 07733-0205



AMTOR is a new teleprinter-communications mode available for use by radio amateurs. Major features of AMTOR are: error-free communications, SELective CALling (SELCAL) and exchange of ANSWERBACKs (which enhance unattended operation). Previous articles have described what AMTOR is and how it operates, and have provided a description of a practical AMTOR code converter.[1-3]

In this article, I have assumed you are familiar with AMTOR and the terminology used with it. The article describes some general concepts about getting your station on the air, and outlines good operating procedures as well as a few bad habits you should avoid. For specific details of how to operate your AMTOR code converter, check the operator's manual.

Getting on the Air

Mode Bc

You should use Mode Bc—also known as Mode B (FEC) collective—for your first contact. Mode Bc is the simplest one to use and doesn't have the tight transmit/receive timing constraints that Mode A has. First, check your receiving system by tuning in a W1AW AMTOR broadcast, or monitor a calling channel for a CQ call or other message. Once you have learned to tune in an AMTOR signal and can print Mode Bc signals, you are a long way toward getting your station fully operative.

Next, test the transmitting system. One good way to perform this testing is to have a schedule with another station or to try responding to a CQ call. An even better method is to have a telephone contact with a friend who has a working AMTOR station, so he or she can tune in your on-the-air signals while you are testing. Real-time coordination of a radio test, via telephone, can be extremely helpful. Whatever method you use, however, the idea is to send a Mode Bc message that someone else can receive.

If no one is able to copy your signals, make sure you are not sending inverted tones. If you get reports of poor copy under good signal conditions, reduce your transmitter output power to see if the problem is RF related. I had an AMTOR system that was susceptible to RF from the transmitter. At the 25-W output level, everything worked great; at 100 W, about one in every 15 characters was received in error. They were received in error because my system, in the presence of a strong RF field, was sending errors! When you have Mode Bc running well, you can venture into the world of Mode A.

Mode A

Before trying a Mode A call for the first time, there are several things you should check. Make sure the transmit delay time on your AMTOR code converter is set to be compatible with your transceiver. A setting of 25 to 30 milliseconds is a good place to start. Also, be sure your system works well using Mode Bc. If Mode Bc doesn't work well, chances are that Mode A won't work any better.

Now find someone to carry out a few tests with you, and have a two-way Mode Bc QSO to ensure that the radio path is good both ways. Of course, whoever acts as your test station should have a fully tested and working AMTOR station. It is generally not a good idea for two new AMTOR stations to try helping each other set up simultaneously. It is much more difficult to determine which station may have a problem. Once you have ensured that Mode Bc works, and you have a good radio path, it's time to try Mode A.

Have the operator who is helping test your station call you using Mode A; this

[1]Notes appear on page 34.

will cause your station to act as the slave. If you have any timing problems, having your station act as the slave will give you the best chance of establishing a contact. As the other station begins to call you, you can get information about the process from the indicators (lamps or LEDs) on the front panel of your AMTOR code converter. (Some code converters don't have a full set of indicators, and won't be able to provide all this information.) When your station begins to chirp in response to the call, look at the display. If the RQR (ReQuest Repeat) light is on, the other station has not heard you or, if it has, it isn't hearing you now. A possible cause is that your transmitter is not getting up to full power before sending data. This is unlikely if you have selected the proper transmit delay value. If the ERR (ERRor) light on your code converter is lit, you are not hearing the other station. A possible cause for that could be that your receiver recovers too slowly after a transmission, but you are unlikely to experience this problem if your station is acting as the slave station. If the IDL (IDLe) or TFC (TraFfiC) lights are on, you are in business!

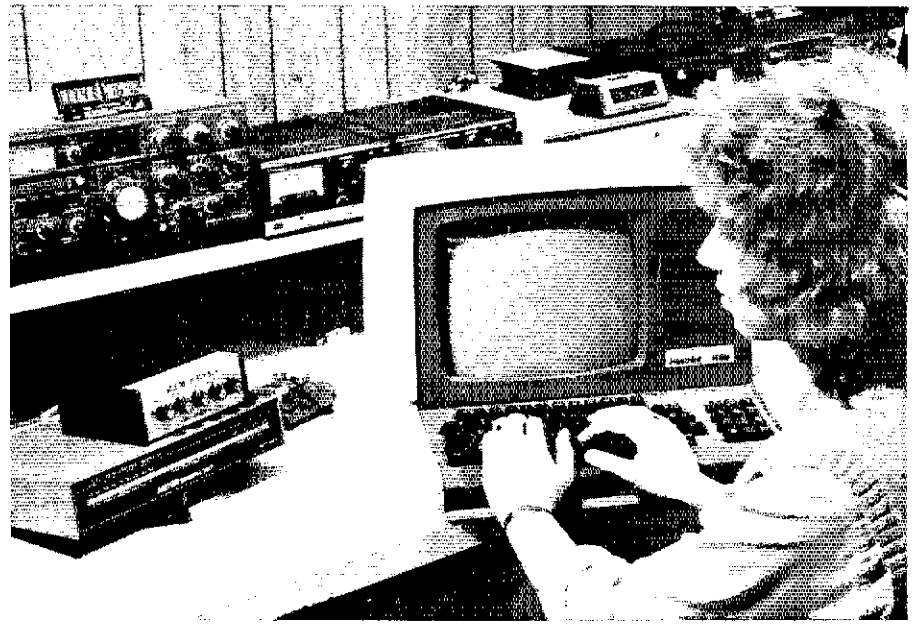
If you get this far, drop the QSO and try calling the testing station. This will make your station the "master" and will place much tighter transmit/receive timing constraints on your radio equipment. In this case, a lack of phasing or an RQR light probably means that your transmitter gets to full power too slowly and you will need to increase the transmit delay time on your AMTOR code converter. If you get an ERR light, your receiver probably recovers too slowly after a transmission. Again, if the IDL or TFC lights are on, you are in business!

Automatic Directional Control

According to the CCIR Recommendation 476-3, which defines the standards for AMTOR operation as allowed by the FCC, receiving the codes for FIGS Z B (the + and ? characters on an RTTY keyboard) while in Mode A, will cause the transmitting and receiving stations to change functions. The transmitting station is called the Information Sending Station (ISS), and the receiving station is the Information Receiving Station (IRS). So, to let the other person send data, type "+?" on your keyboard; the AMTOR code converters will do the rest.

Calling Channels

Calling channels are used on both the 20- and 80-meter bands. On 20 meters, 14,075 kHz is used worldwide as a calling channel, while on 80 meters, 3637.5 kHz is often used (at least in the Northeastern part of the U.S.) for a calling channel. When using a calling channel, remember one primary rule—move off the frequency once a contact has been established! Only stations that use single-channel crystal-controlled radios are excused from this rule. Those who are unable to move off the calling channel, however, should try to keep their QSOs as short as possible.



The console of the W1AW AMTOR station, used to transmit RTTY bulletins by AMTOR.

Frequency Scanning

Frequency scanning is a method of monitoring several channels and bands at the same time. Usually, the radio used for this operation is a modern SSB rig with internal memory for channels that can be selected for a scanning operation. The microphone may have an UP/DOWN switch that can be used to step through the memory channels, or there may be a set of buttons on the radio's front panel for this purpose. There is no reason crystal- or VFO-controlled radios couldn't be modified to operate also on several channels within the same band.

It's not difficult to set up such a scanning AMTOR system. You, the operator, load the radio memories with several frequencies, for example, two on 80 meters, two on 40 meters, two on 20 meters and two on 15 meters. Connect an oscillator with a period of three seconds (or a suitable time to allow your AMTOR code converter to respond to a call) to the frequency-step input of the radio (perhaps via the microphone connector). Every three seconds, this oscillator causes the radio to switch to the next memory channel. When a call to your station is detected, the oscillator should be stopped so that the operating frequency remains the same during the contact. If a "Call In Progress" (CIP) signal is available from the AMTOR system, it can be used to stop the oscillator during a QSO. If such a signal isn't present, then some other method is needed to determine when an AMTOR call is directed to your station (looking at the PTT lead from the AMTOR code converter will work for Mode A but not for Mode B). When the QSO is completed and the CIP signal returns to the inactive condition, the frequency-step oscillator is again allowed to run. You might also include a delay in the CIP/oscillator circuit so the scanning operation will not begin until 30 seconds after the CIP signal becomes inactive.

With solid-state transceivers, antennas must present a low SWR to the radio to achieve full output power. Trap antennas often can provide low SWR for several band segments. If you are not fortunate enough to have an antenna that provides low SWR on the bands on which you want to operate, but you do have a microprocessor-controlled transceiver, there is another possibility. Use the BAND output signals from the radio to select one of several impedance-matching networks—one for each band. As the radio steps through the different bands, the proper network is selected by relays, which are switched by a signal from the BAND output of your rig. Manufacturers often include a BAND output for use with linear amplifiers that automatically change bands when the radio changes bands. Often, modified binary-coded signals are brought out to the radio back panel. These signals tell the amplifier what band the radio is on.

Calling CQ

I have found that short CQs using Mode Bc on calling channels get the best results. Here is a method I recommend to call CQ using AMTOR on a calling channel:

1) Turn on the transmitter in Mode Bc

and let the system transmit IDLE signals for anywhere from 5 to 15 seconds (less is better than more). The IDLE transmission allows stations that are scanning many channels to lock onto the signal.

2) Send a CR/LF/LTRS sequence. Systems that conform exactly to the CCIR 476-3 specification for AMTOR will not begin printing a Mode Bc message until they receive at least one CR or LF character.

3) Limit the CQ message to four lines or less. Four lines are enough to ensure that at least part of the message gets through even if propagation conditions are poor. By limiting your message to no more than four lines, you will prevent anyone from getting upset about wasting printer paper. Remember, many stations monitor the calling channels 24 hours a day. The first two lines are the CQ DE AD7I type stuff. On the third line, you might give the frequency, date and time (in UTC). This information is useful to scanning stations or others who operate unattended. It tells them when propagation was open between your station and theirs. On the last line of your CQ message, you should state your location, perhaps give your SELCAL, and maybe a few other teasers.

4) I request that any station(s) responding to my CQ should also reply using Mode Bc. If several stations were to call me at the same time using Mode A, my AMTOR code converter would acknowledge only the first one it heard. If only one station responds to my CQ, I return the call using Mode A. If more than one station responds, I use Mode Bc so everyone can participate in a round-table QSO if propagation permits it.

If you don't get a response to your CQ, try a second time or change frequency. There isn't much incentive to repeat the call many times on the same channel, however. Anyone listening to the channel with AMTOR equipment will print the message (even if the path is only slightly better than lousy). There isn't much you can do if those printing your CQ message don't want to return your call. If you are not operating on a heavily-used channel, it's sometimes useful to transmit for a half minute to a minute so others tuning the band can find you. Don't fill the air with lines and lines of CQ, however.

To attract attention on unpopulated channels, without wasting printer paper at other stations that might be monitoring, I start up my transmitter in Mode Bc and send IDLE characters for 30 seconds; then send one line of CQ. I continue to do this, sending one line of CQ every 30 seconds while leaving my transmitter on the air for no more than two minutes.

Remember, be reasonable! The AMTOR IDLE signal sounds as rhythmic as a conventional RTTY CQ, but with practice anyone can tell an AMTOR IDLE from a BAUDOT or ASCII diddle. Don't transmit too long, though. If you call for more than a minute or two, the listening station(s) will probably get bored and tune elsewhere. The idea of calling CQ is to establish communications, not to heat the shack or watch the meter needles dance.

QSY Methods

There are many ways to change frequency (QSY) using AMTOR, and almost all fall into one of two categories: HOT switch or COLD switch. HOT and COLD refer, in this case, to whether the transmitter is active or inactive during the QSY process. Each method has its own place for proper use.

HOT Switch

One example of a HOT switch is asking another station to follow you down the band 3 kHz while tuning to your new frequency, with both stations chirping at full power. Avoid this method.

A better solution is to ask the other station to meet you on a particular frequency and jump there directly, without breaking the contact. This really only works if both stations have synthesized transceivers with direct frequency entry. If all the world used AMTOR, this method would be okay. If you happened to jump onto a channel that was in use, you would simply jump back to where you started and pick a new frequency. Anyone you bothered would just do a few automatic repeats and then continue with the message. Since not all stations are on AMTOR, though, you may interfere with someone on another mode. In that case, the repeats would be manual and would probably also include a few words of disgust about AMTOR!

Unless you give a lot of thought about how to avoid interference to other spectrum users, and take steps to remove the possibility of interference, I recommend that you *not* use HOT switch techniques.

COLD Switch

COLD switching is the most polite method of changing frequency, and it's my favorite. To COLD switch, a station announces the QSY, "Down 1 till clear—I call" and closes the contact. The operator requesting the frequency change then tunes down the band in 1-kHz steps until finding a clear spot and then begins calling. The other station can tune down in 1-kHz steps until his or her AMTOR code converter responds to the call.

If either of the stations is equipped with a nonsynthesized VFO, they just try to do the best they can. When tuning down the band, the slave station stops on each AMTOR signal for a few seconds and if the code converter doesn't respond, moves to the next signal. Most good-quality AMTOR code converters will respond within three or four chirps when called, so two or three seconds per signal is plenty of time.

If there is any question about which QSY method to use, I recommend COLD switching. But, you should realize that HOT switching isn't always a capital offense. If done properly, HOT switching will not adversely affect other stations, and that's our goal.

WRU and ANSWERBACK

When you call another station that is unattended using Mode A, how can you be sure you are really communicating with that station? (Currently, unattended operation in the U.S. requires a Special Temporary Authorization [STA] from the FCC.)[4] Also, how do you know the called station's terminal is powered up and connected to the AMTOR equipment? The WRU and ANSWERBACK are the solution to this problem. A WRU (Who aRe yoU) is a command from a teleprinter requesting that the other teleprinter (possibly unattended) send a short identification message (the ANSWERBACK) if the terminal is fully functional. Usually, the major implication of "fully functional" is that there is paper in any associated printer and the printer is on-line. So, if you receive the ANSWERBACK, your message will probably print on the other station's terminal. This ANSWERBACK response to a WRU command is provided by the receiving station's terminal and is automatic; an operator is not required to generate the ANSWERBACK message.

The WRU command has been standardized by CCIR 476-3 as "FIGS D". The letter D, typed in the figures case, is translated by the terminal (and CCIR 476-3 AMTOR code converters) as the WRU command. An ANSWERBACK is free-form; you can program your terminal to respond with any message that you desire. Some ANSWERBACKs are as simple as station identification, such as, "QRA AD7I". Others are more elaborate. To get the ANSWERBACK from another station, send the BAUDOT equivalent of a "FIGS" character, followed by the letter "D". Some AMTOR code converters use other keystrokes to transmit the "FIGS D" WRU command. For ZAMTOR using BAUDOT code, send "FIGS D" or in ASCII, send "CTRL E" where "CTRL" denotes a control character.[5] For other systems, refer to the operator's manual to see how to generate the required "FIGS D".

The other station's terminal should interpret this "FIGS D" as a command to send the ANSWERBACK message. If the other station's AMTOR code converter is not completely compatible with the CCIR 476-3 specification, you may need to follow the "FIGS D" WRU command with the characters "+?" (the AMTOR "OVER" signal) to let the other station send its ANSWERBACK. When the other station's terminal receives the WRU command (FIGS D), it will send the ANSWERBACK message to your station and that message

will print on your terminal.

AMTOR code converters that meet the CCIR 476-3 specification will send all buffered characters following a WRU command (including the terminal ANSWERBACK if it doesn't include "+?"), until two IDLE blocks are sent (in other words, all characters stored in internal buffers have been transmitted and the terminal has completed its ANSWERBACK). Then, the code converter itself will send the "+?" to allow the WRUing station to continue with its message. A code converter that doesn't meet CCIR 476-3 requirements can still exchange ANSWERBACKs. However, the transmission-direction changes are not automatic; operator intervention at the WRUing station is required.

ANSWERBACK Restrictions

Ideally, the AMTOR code converter itself should append the "+?" to the ANSWERBACK instead of having the terminal include it as part of the ANSWERBACK. I strongly recommend that stations not include the "+?" as part of their terminal ANSWERBACK. If included, it can render the ANSWERBACK totally meaningless.

If you would like a more detailed explanation of this problem, send me an s.a.s.e. and ask for my paper describing the use of WRUs and ANSWERBACKs on AMTOR systems.

ANSWERBACK Form

ANSWERBACK messages can be almost anything, but they are usually limited to one line. You should realize that ANSWERBACKs are often requested at the start and end of a radiogram (or other message) to ensure that the whole message was printed without terminal problems. There is no need to tell the life story of your station whenever someone asks for an ANSWERBACK. An ANSWERBACK of "QRA AD7I" is adequate. Remember: The "+?" shouldn't be included as part of the terminal's ANSWERBACK.

What a Lack of ANSWERBACK Means

If you send a WRU to another station and don't get an ANSWERBACK, that doesn't tell you much unless you know that the other station usually returns an ANSWERBACK in response to a WRU command. Anyone who calls my station is warned to get an ANSWERBACK at the beginning and end of any message he or she leaves for me when I am operating in unattended mode. I often forget to connect my terminal (a printing terminal that includes WRU/ANSWERBACK capability) to my AMTOR system. I have had several people ask why I haven't responded to a message left on my terminal. Those operators probably failed to check for an ANSWERBACK to ensure that my terminal was working properly, or even connected. If they had sent a WRU and not received my ANSWERBACK, they would know immediately that my terminal was not operating properly.

Dos and Don'ts

Here are some suggestions to make operating more pleasurable for everyone involved. No one is going to cut your antenna feed line for failing to follow these suggestions. Amateurs who follow them, however, will increase their chances of becoming known as courteous and efficient operators.

Back To yoU (BTU)

Some people feel compelled to use BTU (or to type out "BACK TO YOU") at the end of each exchange. I don't know why this is. AMTOR (Mode A) has a prosign already built into the protocol to indicate a change in transmit/receive status. You have to send the "+?" code anyway, so there is no need for another indication that your transmission is completed. Don't use BTU after each transmission.

Identification

Yes, I dislike extra regulations just as much as the next person. I cheered when the FCC dropped the requirements to sign portable, change your call sign when you move, give a CW identification when you are operating RTTY and so on. There are times, however, when it is useful to send such information to the station you are in contact with. It is a good idea to identify the station you are in contact with during an AMTOR QSO. Other amateurs may be monitoring the frequency to try to determine propagation characteristics. By identifying both stations, if people can hear you but not the station you are talking with, you can help them determine not only which propagation paths are open, but also which are not! Such information can often be helpful.

Conclusion

I hope these notes will be useful to those operators who are just getting started on AMTOR, or who may just be thinking about it at this time. If you have questions, comments or suggestions, I would be happy to hear from you. If you wish to receive a reply, please include an s.a.s.e. with your correspondence, or IRCs from outside the U.S.

Finally, I would like to give special thanks to my wife, Mary Carol Day, for her helpful comments about this article.

[1]P. Newland, "An Introduction to AMTOR," *QST*, July 1983, pp. 11-13.
[2]J. P. Martinez, "AMTOR, An Improved Error-Free RTTY System," *QST*, June 1981, pp. 25-27.
[3]P. Newland, "ZAMTOR: An Advanced AMTOR Code Converter," *QST*, Feb. 1984, pp. 25-34.
[4]P. Newland, "Report on the Unattended Use of the Teleprinter Code," *QEX*, March 1985, pp. 8-9.
[5]See note 3.

Strays

I would like to get in touch with...

☐ anyone with an operator's manual for a Lincoln Model L-2754 6-meter transceiver. Charles Hadden, NØFOC, 626 Prairie Rd., Colorado Springs, CO 80909.

☐ anyone who knows how to estimate power-company transmission losses due to broadband (0.5-200 MHz) RFI. Ronald Pitts, AH6AZ, 3520 Keahi Pl., Kihei, HI 96753.

☐ anyone with a schematic diagram and manual for a VHF MT 500 or a UHF HT 220 Motorola hand-held radio, and anyone who has converted the MT 500 to the amateur band. Ray Lukaszywicz, WD8RCL, 20610 Alaminos Dr., Saugus, CA 91350.

☐ anyone with technical information on the Sencore PS 148, 1970 or 1971 model. Alvin E. Watkins, 291296 Eastham Unit, P.O. Box 16, Lovelady, TX 75851.

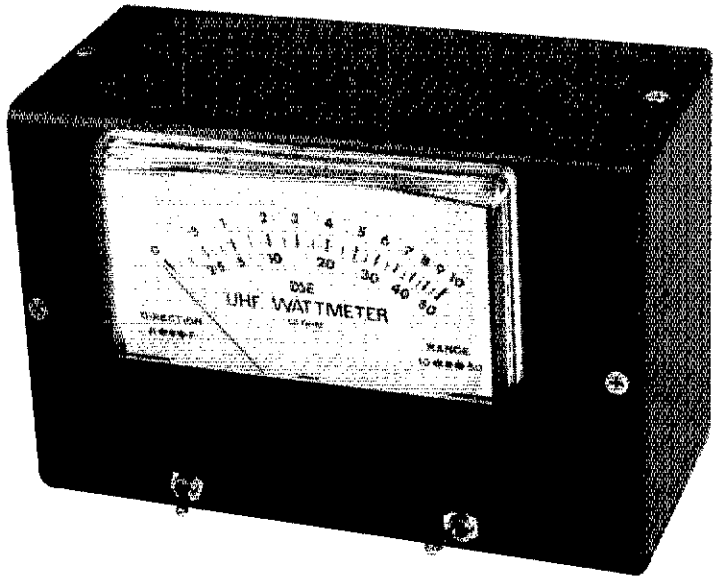
☐ anyone with information on locating or building a battery pack for a Standard C-118 hand-held radio. Ron Radmann, K9DGR, RR 4, Box 41, Portage, WI 53901.

☐ anyone with a modification of an SB-230 linear amp for 160 meters. Harry E. Madden, KDØJB, 600 S. Central, Olathe, KS 66061.

Next Month in *QST*

In November, there will be plenty to keep the amateur builder busy if the colder weather forces you indoors. The RF experimenter will find an inexpensive spectrum-analyzer project for which a complete kit is available. Computer buffs and beginners will be interested in the CW-receive program for Atari computers. This program also provides a model for developing CW programs for other PCs. DFers will want to find their way to the article on direction finding using an interferometer. And don't forget to tune into the exciting adventures of Loop Skywire. Also in this issue will be a report on the VEC meeting in Gettysburg and the rules for the 10- and 160-meter contests.

Build a UHF Wattmeter



Here's a one-evening kit construction project for you.

By Bruce O. Williams, WA6IVC
Asst. Technical Editor, *QST*

In the last few months, something new has happened in Amateur Radio equipment offerings. A long-established company, new to the U.S., is offering high-quality kits, but is making the circuit-board patterns and schematics available to the home constructor or even to commercial manufacturers on a no-cost basis. To find out what we can expect from this source, I spent an interesting evening assembling Dick Smith's UHF Wattmeter, Model K-6312, supplied by Dick Smith Electronics, Inc., an Australian firm that is introducing their product line to the U.S.

What's in the Kit?

Every kit instruction manual I've ever seen says to inventory the kit parts before doing anything else. These kit instructions neglected this important instruction, but I did it anyway. The largest component part, and thus the first to catch your eye, is the wattmeter case. It consists of a rectangular-cross-section aluminum extrusion, prepunched for mounting all controls, the meter and connectors. The case is black anodized and well finished in all respects. End covers are preformed and drilled for sheet-metal screws. The meter is a large (3½- × 4-inch) plastic-faced, 100-μA dc type in a black plastic case. A new dial face is included for installation in the meter, together with two extra dial-mounting screws. (A must—I always drop at least one of these tiny screws into the shag carpet!)

There are several small plastic bags filled with parts—two noninductive 75-ohm resistors, two 0.001-μF feedthrough capacitors, three PC-mount potentiometers, a pair of HP 2800 hot-carrier diodes, two BNC panel connectors, ferrite beads and a "jillion" nuts, screws and miscellaneous pieces of hardware. There was even a separate bag of metal screws, for which I never found a use. Three glass-epoxy circuit boards are provided. The main circuit board is double sided and is inletted to allow flush mounting of the resistors and diodes. The board is predrilled for insertion of through pins to connect the component side ground to the underside ground plane (see Fig. 1). A plain, single-sided board mounts over the main board with nylon bolts to minimize extraneous capacitance and ensure constant impedance. The third circuit board is soldered to the switch contacts of the two

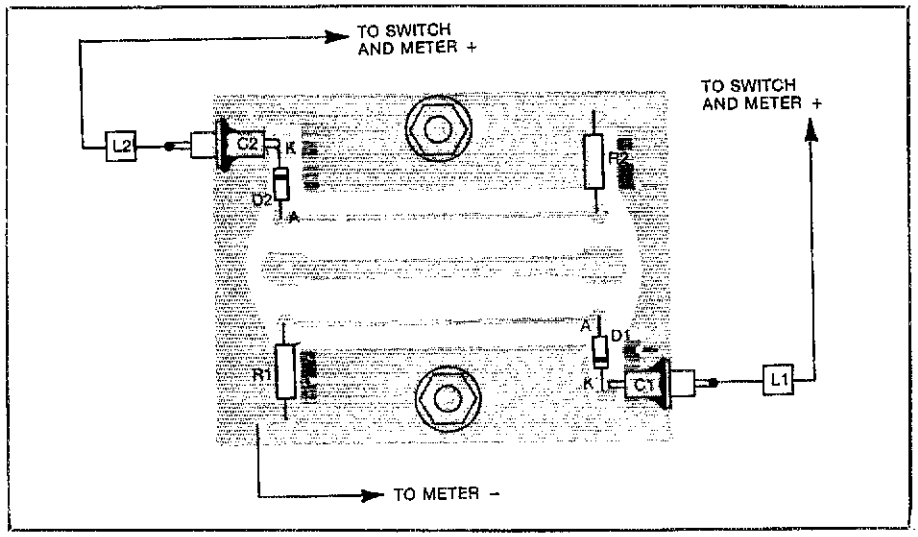


Fig. 1—UHF wattmeter main circuit-board layout.

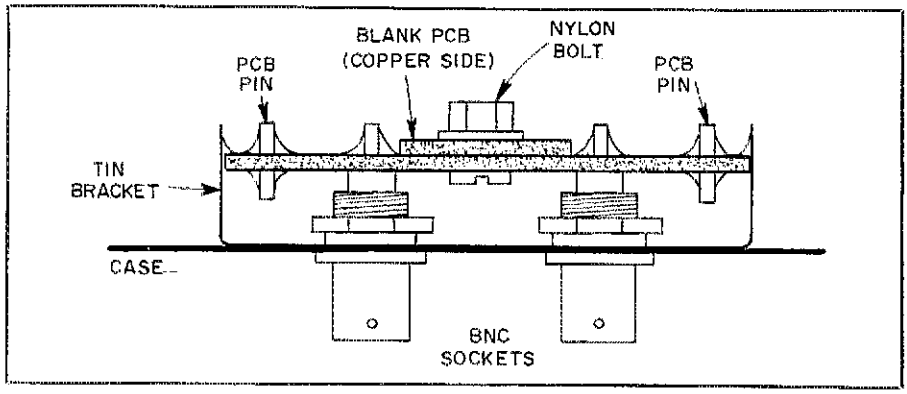


Fig. 2—Main circuit card and channel bracket assembly.

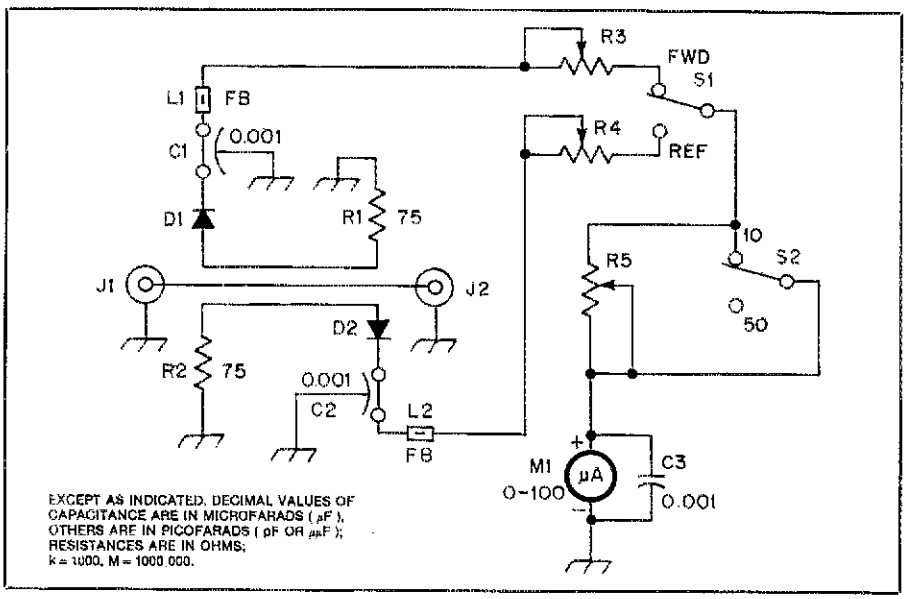


Fig. 3—UHF wattmeter schematic diagram.

SPDT switches, and the three potentiometers are mounted on this board.

Construction

The assembly manual devotes four pages to text describing the theory of antennas, SWR meters, characteristic impedance, and wattmeters and their use, but less than one page to assembly and calibration instructions. There are only three illustrations. The assembly of this little device should be straightforward and simple—but because of the design of the meter case, it ain't necessarily so! Construction consists of building up three subassemblies, which then have to be interconnected through the ends of the meter case and the meter mounting hole. I learned a lot of new tricks working on these assemblies.

Main Circuit Board

The main circuit board (Fig. 1) is a double-sided, ground-plane type. Through holes are drilled to allow insertion of pins to connect the ground plane to the ground foil on the component side. The holes were too small to accept the pins. A note in the shipping container pointed this out. After rummaging through my "miscellaneous" box, I found my pin vise and a no. 57 drill bit, which allowed me to ream all eight holes to a proper fit. I also reamed the pin holes on the other circuit card. After soldering in all the pins, I attempted to install the other six components on the main board. The board allows flush mounting of the 75-ohm resistors and diodes, and clipping of the leads to a minimum length. These components went in without a problem. The feedthrough capacitors, however, gave me fits. The flanges on the capacitors are extremely thin, and the only aid to installation was a slight flattening on one side. The flange must be soldered to the component-side ground, which meant trying to balance the capacitor on the flange and solder it in. The axial lead is stiff and heavy—too heavy to bend, and clipped so short that it was impossible to mount the capacitor and solder it so that the lead was flush. If I were to do it over, I would scribe a small slot through the ground foil that would hold the capacitor flange while I soldered it. A Dremel® tool with a tiny circular saw bit would be perfect. The capacitor leads were slightly corroded and difficult to tin. During soldering, the heat is transmitted through very short leads to the diodes. I was lucky, though, and didn't burn them out.

The next step is to mount the board and a tin-plated channel bracket to the case with the BNC connectors (Fig. 2). The center conductors of the BNCs fit through the two holes in the center conductor of the stripline and are soldered there. The circuit board then recesses into the channel bracket, and the ground plane must be soldered to the channel bracket. These steps are performed by working through the meter mounting hole, (about 2¼-inch diameter) or the ends of the case. Neither the circuit board nor channel is exactly straight, so there are hard-to-solder gaps between the board and channel. I used a piece of wood, held in place by self-locking pliers, to hold the channel snug against the circuit board during soldering.

Meter Circuit Board

This assembly went together quickly. This circuit board is solder-mounted on the switches located on the front panel below the meter. To ensure proper alignment of the switches, they are mounted backward in the switch holes, and the circuit-board pads are soldered in place. When reinstalled properly, switch spacing is just right.

Meter

Modifying the meter was a breeze. Remove two front screws, lift the plastic face and unscrew the two small dial-face screws. The new dial face goes in quick and slick, and the procedure doesn't take five minutes. Soldering in the 0.001-μF capacitor and meter leads and mounting the meter to the front panel took longer. Trying to thread and tighten four tiny nuts when working in a small space will get you talking to yourself.

Overall

Final assembly of all of the parts is straightforward. A schematic diagram of the wattmeter is shown in Fig. 3. Construction took less than three hours. It would have been shorter if I had foreseen some of the problems. Still, that isn't bad!

Calibration

Meter "calibration" is really just adjustment. The procedure is to set the meter to full scale using the three potentiometers with specified voltage inputs. The directions say to feed a specified voltage through a 100-ohm resistor to the hot end of the 75-ohm resistor on the stripline. After trying to hook a clip lead to what is undoubtedly the smallest, cleanest solder joint I ever made, and adjust the potentiometer from the other end of the case while

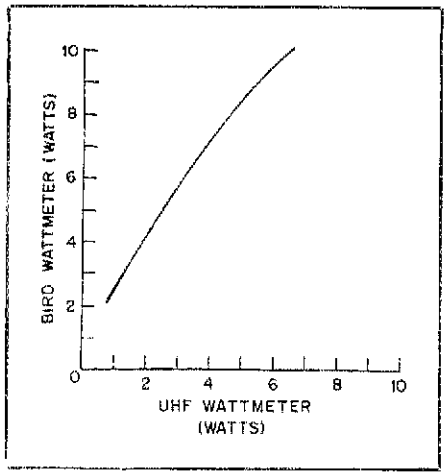


Fig. 4—Initial comparative meter readings.

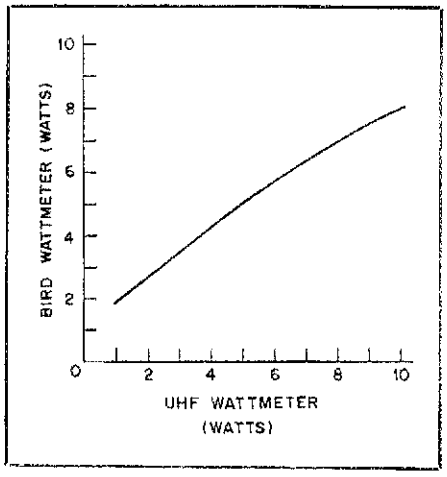


Fig. 5—Comparative readings after RF calibration.

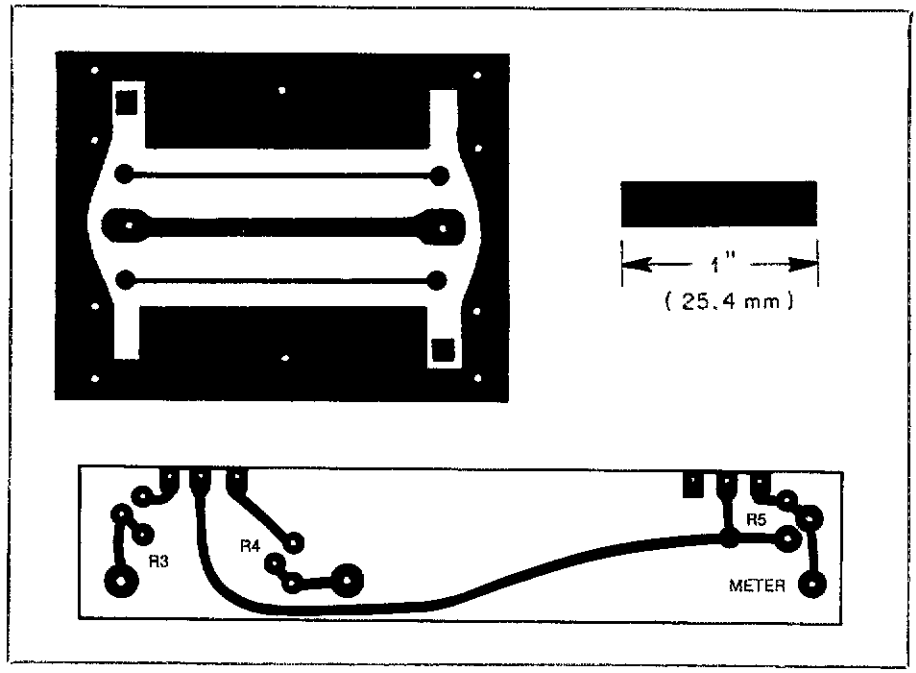


Fig. 6—Full-size circuit-board etching patterns for the UHF wattmeter, shown from the foil side. Black areas represent unetched copper.

standing on my head, I finally got smart! The hot end of the resistor is really the output of the coaxial feedthrough capacitor. It was a snap to connect to this, and "calibration" then took about three minutes.

Performance

After completion, the wattmeter was turned over to the ARRL lab for testing. A series of comparative readings was made, using a Bird Model 43 wattmeter as a standard. A plot of the readings is shown in Fig. 4. The errors noted were of sufficient magnitude to justify a recalibration. We checked the original settings and found they hadn't changed. We recalibrated by inserting 5 W at 435 MHz and adjusting the scale potentiometers to indicate 5 W on the meter. A new series of comparative readings was made. A plot of these readings is shown in Fig. 5. As can be seen, this plot is nearly linear, and the maximum error occurs at the high end of the scale.

Considering that this wattmeter is not intended to be a laboratory quality instrument (approximate cost, $700-800), I feel it is a good value at the kit price of $44.95. After all, the primary use of this instrument should be for comparative measurements (maximum output or minimum SWR), where absolute values are of minor importance.

Conclusion

The manufacturer has made available complete 1:1 scale circuit-board layouts. The full-scale board patterns are shown in Fig. 6. Amateurs and manufacturers are free to reproduce the circuit boards, even for commercial purposes!

I think projects like this serve a real purpose in today's Amateur Radio Service. We will never again see the "good ol' days" when all you needed was a field-strength meter or a neon bulb to get on the air. I just hope that more test equipment projects, at reasonable prices, are forthcoming. The UHF wattmeter, Model K-6312, is available from Dick Smith Electronics, Inc., P.O. Box 2249, Redwood City, CA 94063. QET

Strays

***QEX*: THE ARRL EXPERIMENTERS' EXCHANGE**

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

- Convert a CB board to 10-meter FM, by David Donaldson, WB7DRV.
- Compute a Smith Chart on your C64 for noise-bridge applications, by Gary White, KOØP.
- Learn about the 1537A Voltage-Controlled Attenuator and the Teltone DTMF Receiver Kits, in BITS.

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

I would like to get in touch with ...

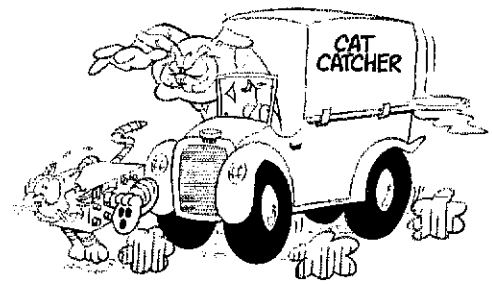
☐ anyone with a manual for a Mirage M75 linear amp. Ronald Pitts, AH6AZ, 3520 Keahi Pl., Kihei, HI 96753.

***QST* congratulates...**

☐ Philip Labombarde, W1OMZ, of Nashua, New Hampshire, on being named Citizen of the Year by the New Hampshire Association of Commerce and Industry.

A CAT Control System

Fret not, Felix! This is a means of controlling Yaesu computer-aided transceiver with a BASIC program and a simple interface.



By Kjell W. Strom, SM6CPI
P.O. Box 2, I-28041, Arona, Italy

Many of the Amateur Radio transceivers manufactured today are controlled by one or more microprocessors. Ever since the first radio of this kind appeared on the market, ingenious radio amateurs have tried to access the central processing unit (CPU) by different means in order to make a "smarter radio"—a radio with customized features. But the microprocessor systems have generally been designed to work with the internal codes necessary to supervise and control the standard functions of the radio. The result is that considerable amounts of hardware and software have been required even in "simple" projects.[1]

In contrast, the Yaesu CAT (Computer-Aided Transceiver) system was obviously designed while keeping communication with the outside world in mind. The language spoken is ASCII, and the interface is a simplified form of RS-232-C. The first CAT was the Yaesu FT-980, a two-way data-communications system employing echo-back and status reports from the transceiver to the controller. It got the reputation of being complicated since all of the early CAT programs were written partly in machine language. Later, however, programs were written entirely in BASIC, so the reputation for complication was not fair. In fact, all you need (if you have a microcomputer with a built-in or external 4800-bit/s RS-232-C interface) is a short BASIC program and an interface circuit that is almost comparable to a dummy antenna in simplicity!

A later entry into the CAT system, the FT-757GX, uses a one-way control system in which the microcomputer sends orders to the radio without acknowledgment from the transceiver; this simplifies the software requirements considerably. Similar versions are also used with the FRG-8800 general-coverage receiver and the FRG-965 VHF/UHF scanning receiver. The scope of this article is to describe these later versions of the CAT system: the data format, hardware and software. It will provide a tool kit and ideas for further development. The program was written using a Radio Shack TRS-80® Model 100 microcomputer, but care has been taken to write it so it will run on almost any computer after adjustments are made to the screen and output routines.

Data Format

Fig. 1 shows the data format, transmitted at 4800 bit/s. A command word consists of five bytes: one instruction byte and four parameter bytes. Each byte is made up of one start bit, eight data bits and two stop bits. The least-significant data (the units position of a selected frequency, for example) are transmitted first, and the most-significant data (the instruction) last. You can imagine this as pushing the bytes on top of a stack as they arrive. The CPU will then fetch the data, starting from the top, getting the most-significant data first. If you keep this in mind, the procedure soon feels natural.

The command-word codes are listed in Fig. 2. Note that only the Frequency Set command is making use of the parameter bytes, and for other commands, dummy data are inserted. Fig. 3 shows examples of two command words. The left one sets the frequency to 14.25000 MHz. Note how the tens of MHz go into byte 4, the unit and the first decimal position into byte 3, the next two decimal positions into byte 2 and the last decimal positions into byte 1. The instruction "set the frequency to the enclosed parameter" is found in byte 5. The second example in Fig. 3 shows how the

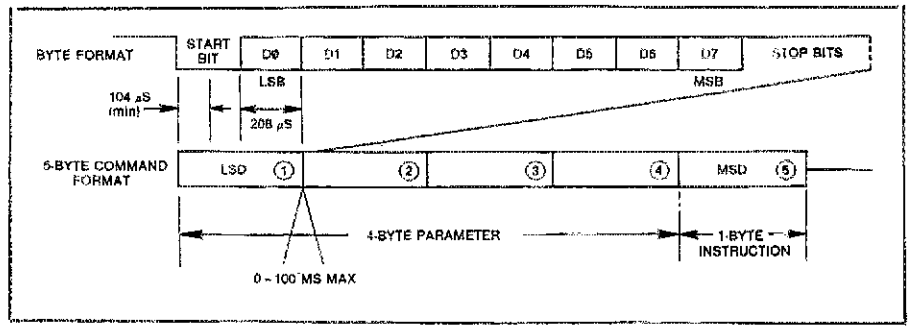


Fig. 1—Data format of the Yaesu FT-757GX CAT (computer-aided transceiver).

COMMAND BYTE CODES

No.	COMMAND	DATA 1	2	3	4	5	FUNCTION
1	SPLIT	X	X	X	X	01	VFO-A/VFO-B SPLIT ON and OFF.
2	MR/VFO	X	X	X	X	02	Exchange operating freq. between memory and VFO.
3	V ► M	X	X	X	X	03	Write VFO data into memory.
4	D LOCK	X	X	X	X	04	Lock tuning dial.
5	VFO A/B	X	X	X	X	05	Exchange operation between VFOs A and B.
6	M ► V	X	X	X	X	06	Write memory data into operating VFO.
7	500 UP	X	X	X	X	07	Step up 500 kHz (BAND UP)
8	500 DWN	X	X	X	X	08	Step down 500 kHz (BAND DOWN)
9	CLAR	X	X	X	X	09	Activate or deactivate clarifier.
10	Frequency set	1	2	3	4	0A	Enter new operating frequency.
11	V ►◄ M	X	X	X	X	0B	Exchange freq. data between VFO and memory.

"X" = dummy data (value irrelevant)

① ② ③ ④: Frequency data, LSB first.

Fig. 2—FT-757GX command coding.

[1]Notes appear on page 40.

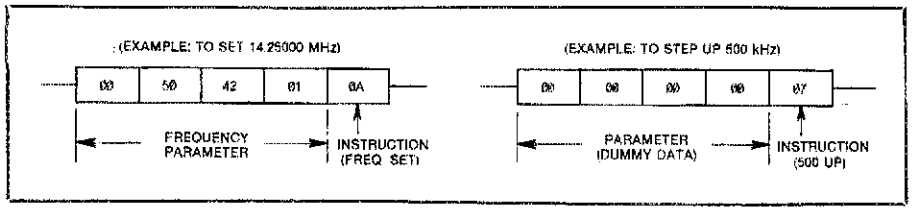


Fig. 3—Examples of two command words (see text for an explanation).

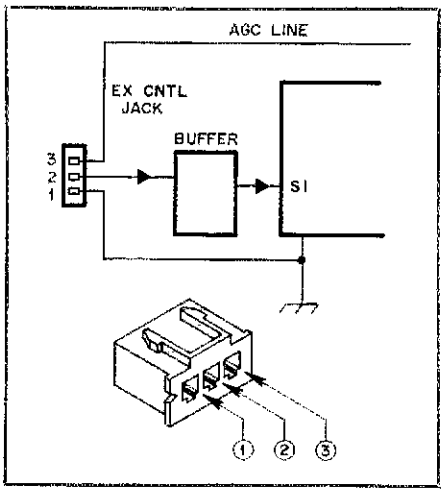


Fig. 4—Connections for the EX CNTL jack on the FT-757GX transceiver.

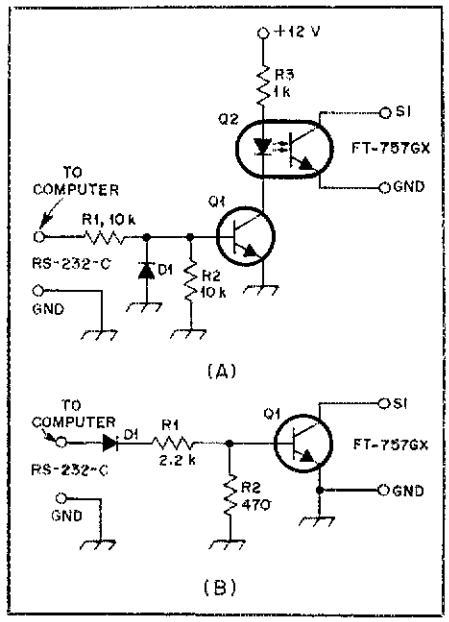


Fig. 5—Two ways to interface a computer with the FT-757GX transceiver. At A, TTL levels (pseudo RS-232-C) drive an optoisolator. The circuit at B is the simplest of all. All diodes are 1N914s, transistors are 2N2222, and the optoisolator is a TIL111 or equiv. Resistors are ¼-W, 5% tolerance. Resistances are in ohms; k = 1000.

other command words are stuffed with dummy data. The values are unimportant since they will be disregarded by the transceiver CPU.

Let's see what this means in terms of the person behind the keyboard—you. If your computer accepts hexadecimal arguments in the CHR$ function and you have initialized File #1 for the required byte format and bit rate, you simply send the line

```
PRINT#1, CHR$(&HØ); CHR$(&H5Ø);
  CHR$(&H42); CHR$(&H1);
  CHR$(&HA)
```

where the &H denotes that a hexadecimal number follows.

The leading zeros, of course, do not change the value of the hexadecimal arguments and have been omitted. Many microcomputers allow only decimal arguments in the CHR$ function, however. In these cases, the hex numbers must first be converted to decimal. The command line would then be

```
PRINT#1, CHR$(Ø); CHR$(8Ø);
  CHR$(66); CHR$(1); CHR$(1Ø).
```

This hexadecimal-to-decimal conversion is taken care of by an algorithm in the BASIC program, so there's no need to worry about that.

Hardware

The Molex jack identified as EX CNTL on the rear of the FT-757GX (see Fig. 4) provides the following connections:

- Pin 1—GND: Common ground for signal lines and shielding.
- Pin 2—SI: Serial input.
- Pin 3—AGC: Analog signal from the AGC circuit, +2.6-V dc with no signal present, continuously decreasing to 0.4 V for strong signals.

The AGC signal can be used, for example, with an A/D converter to choose the strongest of several signals in a scanning routine, but this will not be treated here. We are more interested in the SI pin. Left open, it is in the "mark" state (TTL high, +5 V) and grounded (TTL low, less than +0.8 V) in the "space" state. That means that since the internal pull-down resistor is 680 ohms, we need to draw 6.5 mA or more from the SI pin in order to indicate a space.

Turning to the computer side, we may run into some complications since the microcomputer manufacturers traditionally have not been fond of standardization. So, even if the label at the connector says "RS-232-C," it is not necessarily EIA RS-232-C, where mark is specified as between −3 and −12 V and space as between +3 and +12 V.[2]

If you're not fond of the smoke from solder flux, you might prefer to buy the Yaesu FIF-232 interface. It has its own built-in power supply and is switchable in order to take care of some of the variations on the RS-232-C theme. But Fig. 5 shows how you can "roll your own." As you can see, it is easy to do, and you can use what you have in your junk box.

Fig. 5A is a universal circuit that requires only that your RS-232-C line go to TTL low or less (including negative voltage) on mark, and to +2 V or higher on space. It also features an optoisolator—good practice, since microcomputers are inherently noisy devices and galvanic insulation between the computer and the radio greatly reduces the probability of interference between the two units. For this reason, also, the ground side of the shielded cable to the radio should not be connected at the computer end.

Power for the interface circuit can be taken from a separate power supply or from the computer (not the radio). In the latter case, you should make sure you do not violate any warranty or safety restrictions. If +12 V is not available, +5 V, with R3 reduced to 330 ohms, will do fine.

If you have a "clean" computer, you might like to try the ultimate in simplicity—the circuit of Fig. 5B. As it is, it needs about +5.5 V on space to work, but increasing R2 to 1.5 kΩ should take care of signals as low as 3 V. As mentioned earlier, the reservation must be made that the galvanic contact between the computer and the radio in this circuit may cause noise problems. The circuit has been used successfully between an Epson HX-20 and the FT-757GX, and what could be simpler?

Software

The BASIC program in Fig. 6 can be used as a starting point for more elaborate things: following broadcast schedules, tuning in W1AW and recording the bulletins when you are out of the shack, and so on—practically anything you ever wanted your radio and computer to do together. The software illustrates how you can access the FT-757GX functions. You often hear that it is no use to have a microcomputer do what you can do from the front panel of the radio. That is not necessarily true. Many people with physical disabilities find it much easier to be able to control the radio from a keyboard. Therefore, a routine for tuning in discrete frequency steps of varying increments has been added.

Line 1ØØ declares variables, starting with F and H as integers; that speeds up some operations. If DEFINT is not available on your computer, you can replace variable F1, F2, F3, F4 and H everywhere in the program with F1%, F2%, F3%, F4% and H% or alternately delete the DEFINT statement (but not H = 16). Check if there is any significant penalty in speed in the frequency-setting routine. If you wish to develop a continuous scanning routine, the delay can be critical.

The subroutine beginning at line 3ØØØ prints the title screen. Line 11Ø sets the RS-232-C output to 4800 bit/s, an 8-bit

```
10 REM ==============================
20 REM CAT CONTROL FOR YAESU FT-757GX
30 REM   BY Kjell W. Strom, SM6CPI
40 REM
50 REM                 November 5, 1984
60 REM ==============================
100 DEFINTF, H: H=16
105 GOSUB 3000
110 OPEN "COM:78N2E" FOR OUTPUT AS 1
120 T$=""
130 FOR I = 0 TO 9
140 FOR J = 0 TO 9
150 T$ = T$ + CHR$(I * H + J)
160 NEXT:NEXT
200 CLS
210 PRINT" [ 1] Split        [ 2] MR/VFO"
220 PRINT" [ 3] V=>M         [ 4] Dial Lock"
230 PRINT" [ 5] VFO A/B      [ 6] M=>V"
240 PRINT" [ 7] 500 kHz up   [ 8] 500 kHz down"
250 PRINT" [ 9] Clarifier    [10] Frequency"
260 PRINT" [11] V=>/<=M      [12] Quit"
300 INPUT"        What is your choice";C
310 IF C < 1 OR C > 12 THEN 300
320 M$ = CHR$(C)
330 IF C = 10 THEN 1000
340 IF C = 12 THEN 2000
500 PRINT#1, CHR$(0); CHR$(0); CHR$(0); CHR$(0); M$
510 GOTO 200
1000 REM FREQUENCY CONTROL
1010 CLS:PRINT
1020 INPUT"         Frequency MHz";A
1030 IF A < .5 OR A > 29.99999 THEN 1010
1040 GOSUB 1800
1050 CLS:PRINTUSING"  ##.##### \   \";A,"MHZ"
1055 REM * alt.:  180 CLS:PRINTA;" MHZ"
1060 PRINT"  New frequency [F]       Other [O]"
1070 PRINT:PRINT"                Fine tuning:
1080 PRINT"[A]100         <<-<kHz>+>>         100[']"
1090 PRINT
1100 PRINT" 10   5   1  .1  .01 .01 .1   1   5   10"
1110 PRINT"[Z] [X] [C] [V] [B] [N] [M] [,] [.] [/]";
1120 C$ = INKEY$: IF C$ ="" THEN 1120
1130 IF C$ = "B" OR C$ = "b" THEN A = A - .00001:
     GOTO 1300
1140 IF C$ = "N" OR C$ = "n" THEN A = A + .00001:
     GOTO 1300
1150 IF C$ = "V" OR C$ = "v" THEN A = A - .0001: GOTO 1300
1160 IF C$ = "M" OR C$ = "m" THEN A = A + .0001: GOTO 1300
1170 IF C$ = "C" OR C$ = "c" THEN A = A - .001: GOTO 1300
1180 IF C$= "," THEN A = A + .001: GOTO 1300
1190 IF C$ = "X" OR C$ = "x" THEN A = A - .005: GOTO 1300
1200 IF C$ = "." THEN A = A + .005: GOTO 1300
1210 IF C$ = "Z" OR C$ = "z" THEN A = A - .01: GOTO 1300
1220 IF C$ ="/" THEN A = A + .01: GOTO 1300
1230 IF C$ = "A" OR C$ ="a" THEN A = A - .1: GOTO 1300
1240 IF C$ = "'" THEN A = A + .1: GOTO 1300
1250 IF C$ = "F" OR C$ = "f" THEN 1010
1260 IF C$ = "O" OR C$ = "o" THEN 200
1300 IF A < .5 OR A > 29.99999 THEN 1050
1310 GOSUB 1800
1320 PRINT@2,;:PRINTUSING"##.##### \   \";A,"MHz":
     GOTO 1120
1325 REM * alt.:  1320 GOTO 1050
1800 A$ = MID$(A$, DP - 3, 3) + MID$(A$, DP + 1, 5)
1810 F1 = VAL(MID$(A$, 1, 2))
1820 F2 = VAL(MID$(A$, 3, 2))
1830 F3 = VAL(MID$(A$, 5, 2))
1840 F4 = VAL(MID$ A$, 7, 2))
1850 G1$ = MID$(T$, F1 + 1, 1)
1860 G2$ = MID$(T$, F2 + 1, 1)
1870 G3$ = MID$(T$, F3 + 1, 1)
1880 G4$ = MID$(T$, F4 + 1, 1)
1890 PRINT#1, G4$; G3$; G2$; G1$; M$
1900 RETURN
2000 INPUT"         Are you sure";C$
2010 IF C$ = "Y" OR C$ = "y" THEN CLOSE1:MENU
2020 GOTO 200
2030 END
3000 REM TITLE SCREEN
3010 H1$="      C A T  p r o g r a m  f o r"
3020 H2$="      Y A E S U  F T - 7 5 7 G X"
3030 H3$="              by Kjell W. Strom, SM6CPI"
3040 CLS:PRINT:PRINT
3050 FOR I = 1 TO LEN(H1$)
3060 PRINT MID$(H$, I, 1);
3070 NEXT
3080 PRINT:PRINT
3090 FOR I = 1 TO LEN(H2$)
3100 PRINT MID$(H2$, I, 1);
3110 NEXT
3120 PRINT:PRINT:PRINT
3130 FOR I = 1 TO LEN(H3$)
3140 PRINT MID$(H3$, I, 1);
3150 NEXT
3160 RETURN
```

Fig. 6—BASIC program for computer control of the FT-757GX transceiver.

word length, no parity, two stop bits and XON/XOFF enable. This is done a little differently with different computers, so consult your programmer's manual.

Lines 120-160 initialize a string for the hexadecimal-to-decimal conversion. The string contains all the possible characters with decimal argument in the CAT system, and the hex numbers from the frequency input are used to "scan" along the string with the MID$ function in lines 1800-1880. Some computers (Commodore, for example) are faster in handling matrix elements than strings. For them, the listing of Fig. 7 offers replacement lines.

Lines 200-340 print the menu and handle the selection of commands. If you want to rearrange the menu, keep in mind that the selection numbers coincide with the hex arguments for the instruction byte (line 320).

Commands that do not require any parameters are sent by line 500. CHR$(0) has been used to pad the command with dummy data. Lines 1000-1040 are used to select the initial frequency. Remember that the computer cannot read the frequency from the transceiver display. The subroutine starting at line 1800 chops the frequency into the necessary parameter arguments (1810-1840), converts them from hex to decimal (1850-1880), and sends the frequency command to the transceiver (line 1890).

Lines 1050-1320 offer a frequency-selection menu, where you can decide to return to earlier menus or select "fine tuning" in steps of from 10 Hz to 100 kHz. Since keyboards differ, you may want to rearrange the key assignments in lines 1130-1240; perhaps you'll find the top row of keys more convenient.

As mentioned earlier, you may gain program execution speed if you make F1, F2, F3 and F4 integer variables by adding the necessary integer symbol (%) to these variables.

```
100 DIM M%(100):H%=16

120 REM DELETE
130 FOR I=0 TO 9
140 FOR J=0 TO 9
150 M%(I*10+J)=I*H%+J
160 NEXT:NEXT

1850 G1$=CHR$(M%(F1%))
1860 G2$=CHR$(M%(F2%))
1870 G3$=CHR$(M%(F3%))
1880 G4$=CHR$(M%(F4%))
```

Fig. 7—Replacement program lines for use with Commodore and other computers that handle matrix elements faster than strings (see text).

Final Remarks

Even if your computer does not have an RS-232-C port, it may not be necessary to find a full-featured external interface. There have been many articles in the Amateur Radio and computer magazines describing parallel-to-serial interfaces, often for RTTY use. One for Commodore computers was presented in *Compute!*[3]

Now it is up to you to make your own dream system, the reply to the "Why didn't he include . . . " questions. Drop me a line with a report on your results; maybe we can establish an exchange of CAT ideas.

Notes

[1] L. Studebaker, "Simple, Low-Cost Computer Control for the ICOM IC-720," *QST*, July 1984, p. 34. [Editor's Note: See also C. Terwilliger, "Computer Control of the IC-255A," *QST*, May 1981, p. 30; and G. Williman, "A Three-Chip Microcomputer for Your Station," *QST*, Aug. 1982, p. 19 (describes control of an IC-701).]

[2] C. Hutchinson, ed., *The ARRL 1985 Handbook for the Radio Amateur*, 62nd ed. (Newington: ARRL, 1984), p. 19-24, Fig. 26.

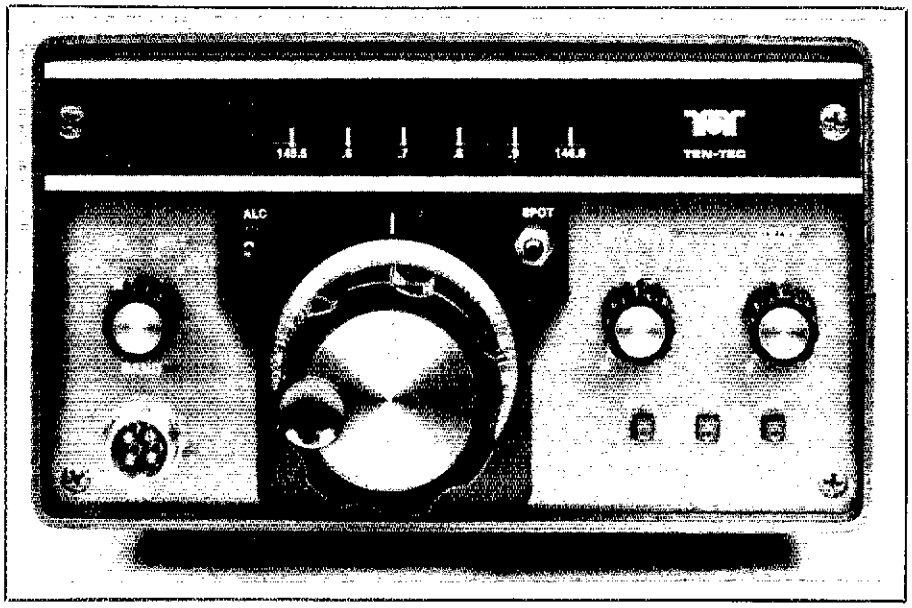
[3] J. Butterfield and J. Law, "VIC Communications: The RS-232 Interface," *Compute!*, Aug. 1982, p. 99.

Conducted By Bruce O. Williams, WA6IVC
Assistant Technical Editor

TEN-TEC 2510 Mode B Satellite Station

One of the most exciting aspects of Amateur Radio these days is satellite communications. AMSAT-OSCAR 10 brings improved communications possibilities by staying in view longer and provides greater range than its predecessors. OSCAR 10 operates Mode B and Mode L. Mode B is a transponder with an uplink (input) at 70 cm and a downlink (output) at 2 meters. (The Mode L transponder has a 23-cm uplink and a 70-cm downlink.) Mode B is the more popular combination. Some satellites in the planning stage are also expected to use Mode B.

The TEN-TEC 2510 Mode B Satellite Station is an SSB/CW transmitter and receive converter in one package (see the block diagram in Fig. 1). The 10-W-output, PTO-controlled transmitter covers the 435.0- to 435.5-MHz portion of the 70-cm amateur band. This range covers all present and anticipated Mode-B satellites. (The band switch in the 2510 includes provisions for expanded frequency coverage, should it prove desirable. Additional oscillators are needed to obtain the coverage, however.) Front-panel switches select USB, LSB or CW operation. FM is not used through Amateur Radio satellites because of the 100% duty cycle.



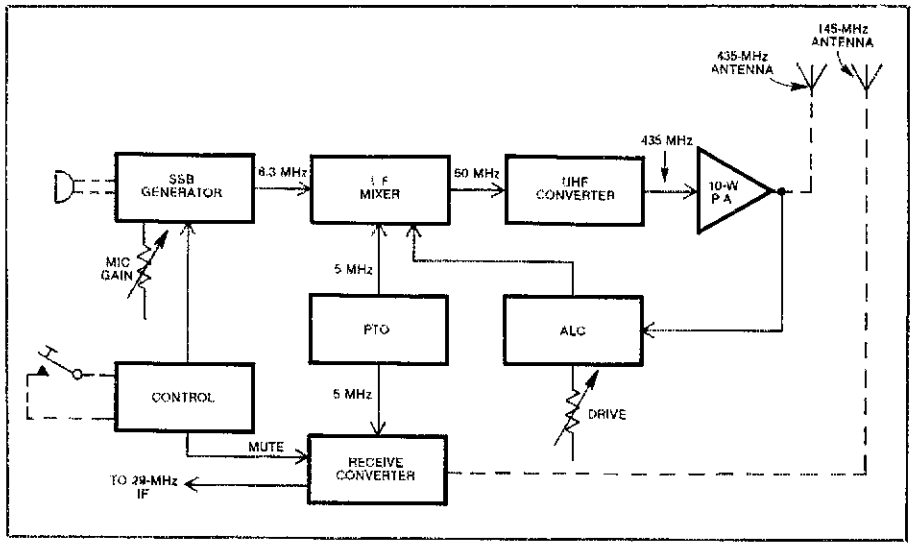


Fig. 1—Block diagram of the TEN-TEC Model 2510 Mode B Satellite Station.

Circuit Description

Several modules comprise the transmitter (see Fig. 1). Signal generation (SSB or CW) starts in the SSB generator module at an approximate frequency of 6.3 MHz. In the transmitter low-frequency mixer module, the SSB signal is mixed with the PTO output (approximately 5 MHz). The sum of these two frequencies (11.5 MHz) is then mixed with the output of a 61.5-MHz crystal oscillator to provide a 50-MHz output. This output is then raised to 435 MHz in the UHF converter module. An MRF641 bipolar transistor in the final-amplifier module increases the output power to 10 W.

Transmitter output power level is controlled by an ALC circuit. The 10-W output limit is factory set. You may wish to operate at a lower power level—particularly if you are driving a separate power amplifier. The operating manual contains a simple, seven-step procedure for setting the ALC level to any desired level below 10 W.

The receiver section is a converter with a few unusual features. Signals in the 145.5- to 146-MHz range enter the converter through an NE41137 GaAsFET preamplifier. Converter output is at 29 MHz, requiring an HF receiver or transceiver to be used as an IF strip. Once the HF receiver is tuned to the proper frequency, all transmitter and receiver tuning (with automatic tracking) is accomplished with the main tuning knob in the 2510. A PIN diode at the converter output is used for muting.

Two features that you might want to add outboard are an inline fuseholder and an ON/OFF switch. If you are using a power supply with current limiting and it only powers the 2510, the switch and fuse are not necessary. For battery operation, the switch and fuse are a must.

In Operation

I have tried several different radios for OSCAR-10, Mode-B communication. For that reason, it was with great interest and anticipation that I installed the 2510 at K8CH. I connected the equipment as shown in Fig. 2. I use commercial, circularly polarized antennas for the 2-meter and 70-cm bands; both antennas have switchable polarization. My HF transceiver served as the 29-MHz IF receiver. I used the transverter connection to prevent accidentally "cooking" the 2510 receive converter.

When the satellite is in view, I point the antennas and listen for the beacon at 145.810 MHz ... Yes! There it is, loud and clear. Well S5, but that's loud considering that the beacon (and the strongest signals on the downlink) should be only 22 dB above the

TEN-TEC 2510 Mode B Satellite Station

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Transmitter	
Frequency range: 435.0-435.5 MHz, extendable to 437 MHz with optional oscillator assembly (VFO overrun of approx. 30 kHz on each band edge).	As specified.
Output power: 10 W.	12.8 W at 435.0 MHz, 4.33 W at 435.25 MHz, 0 W at 435.50 MHz (better than 10 W across band).*
Output impedance: 50 ohms, unbalanced.	As specified.
Modes: Upper and lower sideband; CW.	As specified.
Sideband generation: Balanced modulator through 4-pole monolithic filter.	As specified.
Switching mode: Push-to-talk switch on microphone.	As specified.
Automatic level control: Factory set to 10-W output. Can be adjusted downward with internal control.	As specified.
Carrier suppression: 50 dB, min.	– 47 dB (– 55 dB).*
Unwanted sideband suppression: 30 dB min. @ 1 kHz.	USB, – 10 dB; LSB, – 28 dB. (– 22 dB);* (– 28 dB).*
Spurious and harmonic output: Greater than 50 dB below full power rating.	See Figs. 3, 4 and 5.
Microphone input: Low or high impedance with 5-mV level, min.	As specified.
Receiving Converter	
Frequency range: 145.5 to 146.0 MHz input converted to 29-MHz output (VFO overrun approx. 30 kHz on each band edge).	As specified.
Conversion gain: 25 dB, typical.	
Image rejection: Better than 60 dB.	
Noise figure: Less than 2.5 dB.	Noise figure: 2.5 dB (best).*
Dynamic range: 85 dB, typical.	Two-tone 3rd-order intermodulation distortion dynamic range (see Fig. 6).*
	Third-order input intercept, dB: – 20.5 dB.*
General	
Power requirements: 12- to 14-V dc, 3 A max., continuous.	
Size: 4-1/2 × 7-9/16 × 11 in (HWD).	
Weight: 6 lb.	

*Measured after unit returned from manufacturer

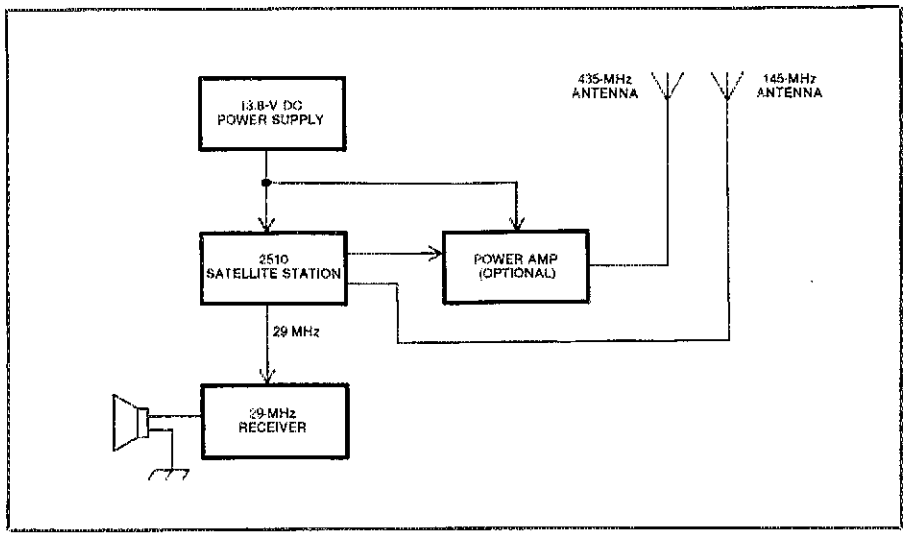


Fig. 2—Equipment interconnections for the installation at K8CH.

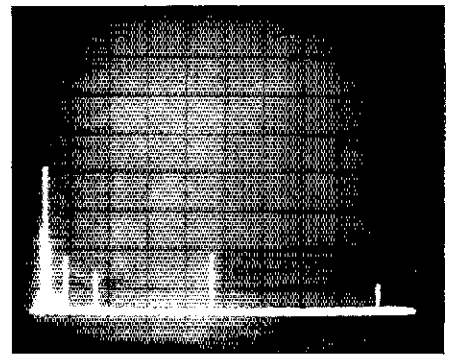


Fig. 3—Spectral display of the TEN-TEC Model 2510. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 10 W at a frequency of 435 MHz. All spurious emissions are at least 60 dB below peak fundamental output. The fundamental has been reduced in amplitude approximately 40 dB by means of notch cavities; this prevents analyzer overload. The 2510 meets the manufacturer's specifications for spectral purity.

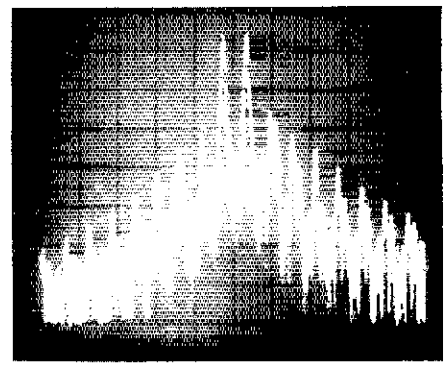


Fig. 4—Spectral display of the 2510 output during transmitter two-tone IMD test. Third-order products are 25 dB below PEP, and fifth-order products are 31 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The 2510 was being operated at rated input power on the 70-cm band.

noise. I check to see that the antennas are peaked. Doppler shift? As expected. Good! Next tune to a clear area in the CW portion of the downlink. Press the SPOT button and tune the 29-MHz receiver to find the downlink signal. Release the SPOT button and the signal goes away. Great? Well, at least okay. Ten watts on the uplink gives a signal that is just above the noise level on the downlink. I'll connect the amplifier later and try it at 100 watts. Now I can't wait to tune across the passband and ... CQ CQ CQ de SV1DO SV1DO K. Will it work? I call him ... SV1DO de K8CH K8CH K ... K8CH de SV1DO ...

Say, that was easy. No problem placing the transmitter on the right frequency. The PTO in the 2510 takes care of the whole operation. It's as simple as transceive. No need for an uplink/downlink frequency-conversion chart. No on-the-air dots required to find my signals on the downlink. However, as Doppler shift varies, it is necessary to readjust the 29-MHz receiver frequency slightly above or below 29 MHz. (Doppler shift at 435 MHz is triple that for 145 MHz.) Fortunately, that won't keep you very busy.

Later, I found that in my station 100-W output gives a downlink-signal strength approximately equal to that of the 145.810-MHz

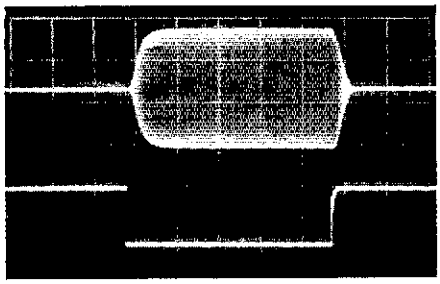


Fig. 5—CW keying waveform of the 2510. Upper trace is the RF envelope; lower trace is the actual key closure. Each horizontal division is 5 ms.

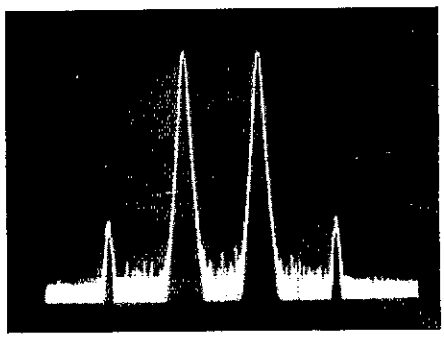


Fig. 6—Two-tone IMD waveform for the receiving converter. Third-order distortion products are down 45 dB. The input signal level was −43 dBm. Vertical divisions are 10 dB.

beacon. That is the maximum level recommended by AMSAT. Satellite transmitter power is limited. The signal strength of each signal it transmits depends on the number of signals in the passband and their relative power. If too many powerful signals are received, then the transponder AGC system reduces all lower-power signals proportionately without actually increasing the strong ones. As a rule of thumb, one should not have a downlink louder than the beacon.

Signals from OSCAR-10 are only a few S units above the noise. Couple that with the power limitation just mentioned and it becomes clear that the most important way to improve station performance is in receive capability. With the 2510 connected as shown in Fig. 2, I can hear the noise coming from the satellite downlink transmitter. I can hear clearly the 3-Hz shift in noise level caused by satellite spin modulation when the antenna is pointed at the satellite. When the antenna is rotated, the noise drops slightly and stays at a constant level. You can't do better than that. That GaAsFET preamp works!

Performance Problems

When the 2510 was tested in the ARRL laboratory, several discrepancies in performance were noted. The power output fell off sharply from 12.8 W at 435.00 MHz to 4.33 W at 435.25 MHz, and showed no output at 435.50 MHz. Sideband suppression was below the manufacturer's specifications: 10 dB in USB, and 28 dB in LSB. Carrier suppression was measured at 47 dB below single-tone peak output. After the unit was returned to the manufacturer for service, TEN-TEC confirmed, by letter, that the performance discrepancies we noted did exist. The unit was returned to us in a few days and, except for USB suppression, our complaints were rectified. [The suppression problem should not be a factor in operation, however, since all operating will be on LSB, and with received signals in the range of 8 dB over the noise, any USB signals will be lost.—Ed.]

Conclusion

If you want a convenient-to-operate station for Mode B, the 2510 belongs in your shack. The 2510 is manufactured by TEN-TEC, Inc., Sevierville, TN 37862. Price class is $490. *—Chuck Hutchinson, K8CH*

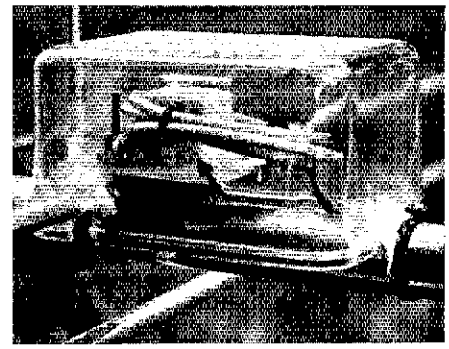


Fig. 7—KLM 2M-22C antenna CP switcher relay with relocated balun and protective cover.

KLM 2M-22C AND KLM 435-40CX YAGI ANTENNAS

☐ One of the really fun operating challenges in the VHF/UHF arena these days is communicating through OSCAR 10. Make no mistake about it—these are weak-signal operations! Getting good signals to and from the satellite is the problem. The answer to the problem is *antennas*. When the opportunity to test KLM's latest offerings in satellite antennas was presented, I nearly fell out of my chair trying to grab that tantalizing brass ring.

Satellite operations demand the use of circularly polarized (CP) antennas for really good performance. Many of us originally used the helical antenna as a logical choice for CP. OSCAR 10 is a different kind of bird, however, and requires that the CP antenna be readily switchable from right- to left-hand circular polarization. KLM's approach uses two long-boom Yagis mounted at right angles to each other on a single boom. One Yagi is mounted ¼ wavelength forward of the other. This design makes the feed-line coupling of the two Yagis somewhat simpler than other arrangements. KLM includes all of the hardware, baluns and relays required for readily switching the circularity of the antennas.

Assembly

Each antenna is well packed in its own compact box and comes with a very complete eight-page illustrated instruction book. Boom sections and elements are well-formed, straight and deburred—a really fine set of antenna hardware. The CP switcher for the '40CX causes a bit of a bulge on the sides of the box, however, exposing it to more risk of damage. The hardware is otherwise well packaged, and spares were included in most cases. Screws and bolts are all stainless steel, with the exception of the mounting U bolts, which are plated steel. One of these years, manufacturers of fine hardware like these antennas will decide to include stainless steel U bolts. Plated-steel hardware just won't make it in Florida.

These antennas use through-boom element mounting with molded button insulators to isolate the element from the boom. I was apprehensive about getting the elements properly centered in the boom. KLM was also concerned and gave explicit instructions in their assembly data. I used a 9/16-inch nut driver to start the button insulators on the 3/16-inch antenna elements. KLM provided a nifty added touch for the '40CX where each element is color coded for easy identification. This idea could well be used for the '22C. Assembly diagrams included a listing of the length of the protruding portion of each element, as well as all the other dimensions, saving some mental gymnastics on my part. I had no problems installing and securing the elements in their button insulators and locking pushnuts, and achieved 1/64-inch centering accuracy (half of KLM's requirement).

Boom assembly is straightforward, and I used three sizes of tubing for the '22C and two for the '40CX. Larger sizes are swaged to fit over the next smaller size. The swaged assemblies on the '22C are snug and close fitting. The '40 CX joints are not quite as close, and I added a third screw to this joint, located perpendicular to and between the two specified screws. This modification adds some lateral stability to the boom joints. There is some boom sag evident on each antenna, and a stiffening brace could have been provided by KLM.

Both antennas use preformed folded-dipole driven elements. Assembly of these elements is well illustrated, and straightforward. Teflon® -cable 4:1 coaxial baluns are supplied. Instructions for installing the CP switchers are complete, with no confusing adjustments required. The switcher for the '22C is identical to that used with KLM's 2M-14C, with a DPDT relay mounted right at the feed point of one of the folded-dipole elements. This relay switches the phase relationships of that element, reversing the CP direction. Two ¼-wavelength, 75-ohm Teflon® coaxial matching sections, preassembled to an SO-239 connector block, are provided with the relay assembly. From prior experience with schemes similar to the '22C switching, I think that the exposed relay will be prone to failure from diurnal pumping. The relay is cased in plastic and sealed to the switching circuit board with RTV—it is not hermetically sealed. As a result, the day/night temperature swings pump air and moisture in and out of the relay case. I protected the relay by relocating the 4:1 balun and placing a clear plastic refrigerator container over the relay (see Fig. 7). I would recommend a similar scheme to anyone installing this antenna. I rotated the antenna to an × position rather than a typical horizontal/vertical position. This allows the condensed moisture in the relay box to drain through two holes drilled

in the case. Similar venting of the '40CX relay case is needed.

The relay assembly for the '40CX is a little more elegant because of the higher frequency. The phase reversal is done before the 75-ohm matching sections go to the antenna. The RF path through the relay is balanced, and reversal is accomplished by inserting a ½-wavelength microstrip transmission line in one antenna feed. This neat assembly is housed in an aluminum die-cast box attached to a rearward extension of the boom.

Mounting

KLM has a very good rationale for mounting the antennas on a nonmetallic elevation-axis boom, but doesn't give much assistance in doing it. KLM does market a fine 1½-inch fiberglass tubular boom for the purpose, but not many radio stores stock the item, and few of the sales persons know its purpose. It is very hard to find. KLM might consider including a suitable length of this material with each antenna. One alternative is a length of 1¼-inch, schedule-40 PVC pipe (1¼-inch ID) stiffened with a length of 1¼-inch-OD wooden dowel or clothes rod. Drive the rod into the pipe for a single, stiff assembly. KLM provides for the coaxial cable to exit off the reflector end of these antennas, thus avoiding shunting the antenna pattern and affecting performance.

Installation

My satellite antennas are mounted about five feet above a large Yagi beam. I solved the problem of physical interference by orienting the elevation axis parallel to the boom of the larger antenna. The reflector ends of the long satellite antennas swing down between the director elements of the lower antenna and everything is great—except that I have to remember to add 90° to the beam heading of the lower antenna to get the beam heading of the satellite antennas.

Performance

I have not used switchable antennas previously, so some of my pleasure in these antennas is a result of that change. It is not easy to be very definitive about this type of antenna, but there is no question in my tests—having switchable circularity has improved my performance with OSCAR 10 in certain orbital positions. I hear the satellite very well at all antenna angles with the 'C22, and much better than with the 3.2-wavelength Yagi previously used. For transmitting on 70 cm, my tests show that the gain of the '40CX provides a very satisfactory ERP with only about 6-W RF power at 435.1 MHz. I receive return signals at about 8 dB above noise level, which is quite good copy. Definitely, lower RF power levels can be used with these antennas.

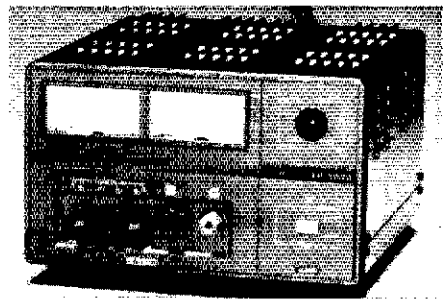
Using these high-gain antennas has put a lot of the fun back into OSCAR 10 operating for me, and I was surprised to find quite a few other operators already using this combination, all with equally good results. Without question, this antenna pair is an asset to the satellite user and provides superior performance capability.

The KLM 2M-22C and 435-40CX antennas are available from KLM Electronics, 17025 Laurel Rd., Morgan Hill, CA 95037, tel. 408-779-7363. Price class: 2M-22C, $120, 435-40CX, $170—*Dick Jansson, WD4FAB, ARRL TA*

New Products

ALINCO DC POWER SUPPLIES

☐ Alinco Electronics Corp. has announced a new line of heavy-duty dc power supplies for Amateur Radio use. The model EP-3030 dc power supply is rated at 25 A continuous and 30 A max (50% duty cycle). Maximum ripple voltage is rated at under 30 mV P-P. Voltage regulation is approximately 0.25%. Output voltage is variable from about 10-15 V by a front-panel control. Separate meters display voltage and current continuously. Two additional front-panel, spring-connect outlets provide up to 7-A output for auxiliary equipment. An automatic current-limiting system shuts down the supply if current is in excess of 30 A. The unit is finished in brown crackle paint, and its styling is designed to complement and blend with current Amateur Radio transceivers. Additional 10-15 V power supplies in the line include the model EP-660, rated at 5.5 A continuous and 6.5 A max (dual-purpose meter), and the model EP-5500, rated at 50 A continuous and 55 A max (two meters).

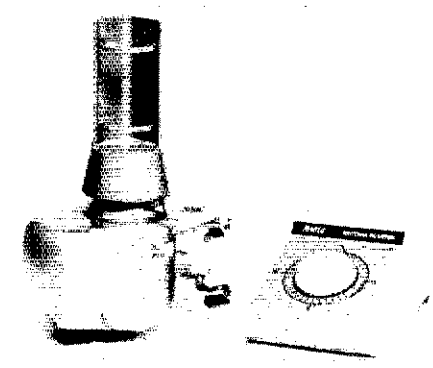


These units also feature automatic current limiting and ripple voltage under 30 mV P-P. Price class: EP-3030, $208; EP-660, $69. Available from dealers or Alinco Electronics Corp., P.O. Box 70007, Reno, NV 89570, tel. 702-359-1414—*Bruce O. Williams, WA6IVC*

AR-200XL ANTENNA ROTOR FROM CMC

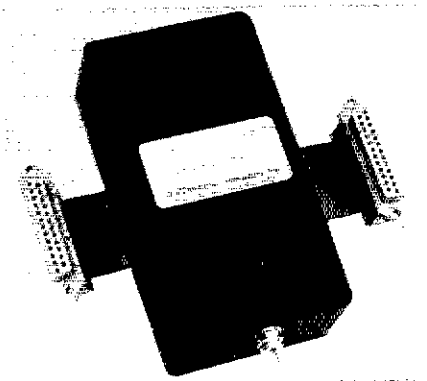
☐ The AR-200XL antenna rotor operates from 117-V ac and provides 220 lb-in of motor torque to turn an antenna array. Full 360-degree rotation is achieved in 60 seconds. Motor voltage is kept below 18-V ac for safety, and only three conductors are required between the control unit and the rotor. The control unit includes a demand-heading control and a present-heading indicator presented concentrically on a compass rose.

The AX-200XL is designed for medium duty, and will support a vertical load of up to 100 lb with a wind loading of 5 sq ft. For further information, contact CMC Communications Inc., 5479 Jetport Industrial Blvd., Tampa, FL 33612, tel. 813-885-3996.—*Bruce O. Williams, WA6IVC*



RS-232-C COMPUTER BUS PROTECTION

☐ The Electronic Specialists product line now includes Kleen Line RS-232-C computer bus protection. Models available range from 4-line through 24-line protection. Intended to suppress damaging high-voltage transients and spikes that may occur on LANs (local area networks) or long bus runs, the Kleen Line Security System uses modern semiconductor and gas-discharge suppression techniques, as well as RF interference filtering technology.



The Model PDS-232 (1-3,7) protects lines 1, 2, 3 and 7, and sells for $134. Available from Electronic Specialists, Inc., 171 S. Main St., P.O. Box 389, Natick, MA 01760, tel. 800-225-4876.—*Bruce O. Williams, WA6IVC*

DOWN EAST MICROWAVE ANTENNAS AND ACCESSORIES

☐ Down East Microwave has introduced a new line of loop Yagis, power dividers and stacking frames for the 23- and 13-cm bands. With these products, it is possible to assemble an array of two, four or even more loop Yagis for high gain.

The 23-cm antenna, model 2345LY, covers 1250-1350 MHz. It consists of 45 elements on a 1-inch-OD, 143-inch-long boom; weight is approximately 5 pounds. A Type-N female connector is standard, although other connector types are available on request. The 13-cm antenna (1345LY) for 2200-2350 MHz is also 45 elements, but the boom is ¼-inch OD by 81 inches long. The antenna weight is 3 pounds, and a female SMA connector is standard.

Boom material is 6061-T6 tubing. Elements are made from 5052-H32 for strength. All hardware is stainless steel. The antennas are shipped assembled and tested. Booms break in half for shipping.

Two-way and four-way power dividers are available for building multiple-antennas arrays. Available custom stacking frames can be built to specification. Price class: 2345LY, $90; 1345LY, $80; four-way power divider (either band), $50; two-way power divider (either band), $40. Manufacturer: Down East Microwave, Box 1655A, RFD 1, Burnham, ME 04922. —*Mark Wilson, AA2Z*

Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

A 12-METER BROADSIDE LOOP ARRAY

☐ I greeted the new 24.9-MHz band with a "make do" antenna that was not resonant, so it seemed appropriate to erect something that would be easy to construct, but specialized for the new band. An inexpensive wire antenna that provides gain over a dipole and a low wave angle is shown in Fig. 1. Two available trees support my antenna with broadside radiation to the east and west.

Two full-wavelength (40 ft, 4 in) wire loops are fed in phase, as shown. With bottom feed, the radiation is horizontally polarized. The approximate impedance of a single loop is 115 Ω. When L1 and L2 are each one electrical wavelength (including the 0.66 velocity factor), the impedance at the junction of L1 and L2 is roughly 58 ohms—a reasonable match for 50-ohm coaxial feed line to the station.

Half-wavelength spacing is used between the loops. Therefore, nylon line or another nonconductive line should be used for the guy between the loops. This prevents those half-wavelength guy sections from radiating and affecting the pattern of the array.

The minimum recommended height above ground is 20 ft, but heights as low as 5 or 6 feet still provide good results, especially for short-skip communications. As the height above ground is increased, the DX performance of the system improves.

Radiation is maximum broadside to the array, but I have had good results during E-layer propagation on a north-south path as well. The system can be scaled for other HF bands by using 1005/f(MHz) to obtain the total length (in feet) of each loop. A Delta Loop configuration may be substituted for the square-loop format, if desired.—*Doug DeMaw, W1FB/8, Luther, Michigan*

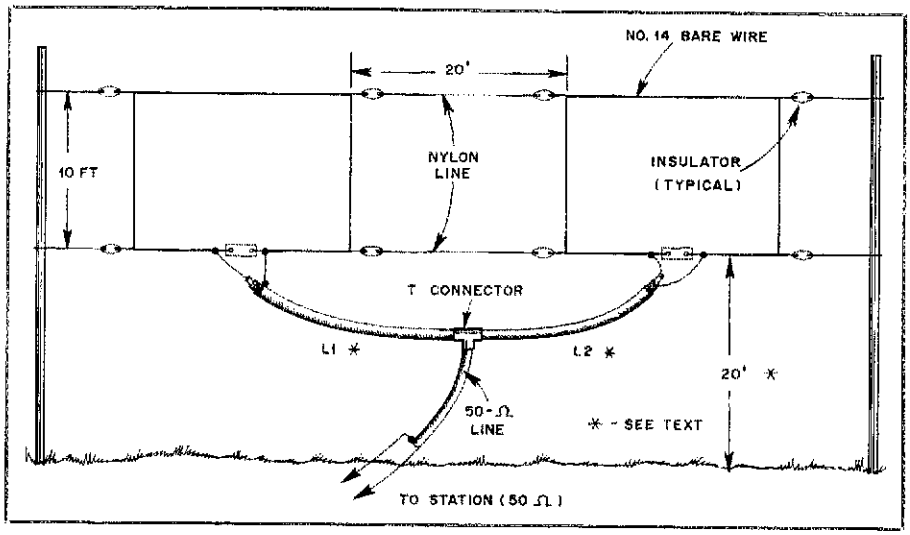


Fig. 1—The 12-meter dual-loop array. L1 and L2 should each be one electrical wavelength (approximately 26 ft, 5 in for solid-dielectric RG-58 or RG-8).

THE HH160RL ANTENNA

☐ HH160RL is an acronym for Hula Hoop™ 160-meter Receiving Loop. This antenna started as a purely fun project, but the results exceeded all expectations. About a year ago, I visited the local hobby shop to buy some sheet brass. While there, I noticed a large sign: DRASTIC PRICE REDUCTIONS—SPECIAL SALE, that pointed to a selection of "Hula Hoops" in varying sizes. Visions of loop antennas came to mind, and I bought a small hoop for about 25 cents (U.S.).

My hoop has a 24-inch OD. It is constructed of 5/8-inch plastic tubing formed into a circle with the tube ends secured by a 2-inch-long bamboo plug. Staples secure the tube ends to the plug. For a year, the hoop hung on a hook in my garage. I considered it on each visit to the garage, and then decided to use it in a 160-meter receiving loop project.

Construction

A schematic of the antenna appears in Fig. 2. The circuit consists of a 6-turn loop (L1) that is resonated by a series combination of C1 (100-pF silver mica) and C2 (a 180-pF variable capacitor). L2 is a 1-turn coupling coil connected to the end of a coaxial feed line. Although a ground connection is shown at the coax shield, my loop performed equally well with or without the ground connection.

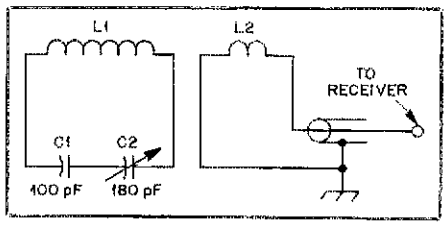


Fig. 2—A schematic diagram of the HH160RL antenna. L1 and L2 are constructed inside a small Hula Hoop, as explained in the text.

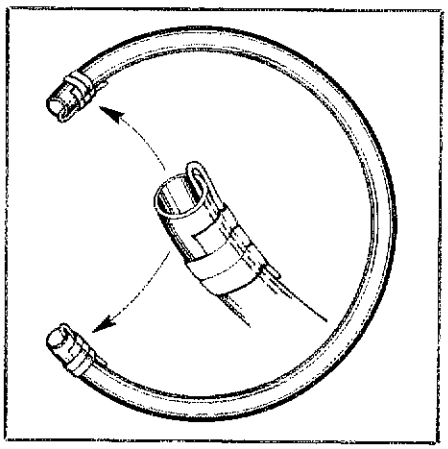


Fig. 3—Pull L2 tight against the inside of the hoop and secure the ends with tape while constructing L1.

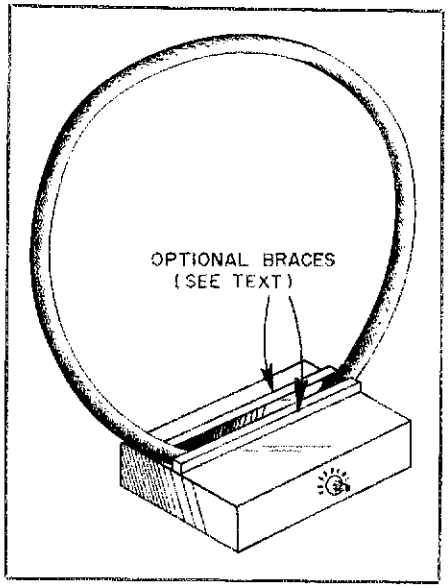


Fig. 4—The completed loop and chassis. Optional wood braces (see text) for the loop are shown in this drawing, but not in the other figures.

Begin construction of the HH160RL by carefully extracting the staples at the bamboo plug. Remove the plug and save it. Insert L2 (2-mm OD, PVC-covered, stranded wire) into the tube. Push the wire carefully through the tube so that 6 inches extends from each end. Fold one end of the wire back against the inside circumference of the tube and tape it in place (Fig. 3). Pull the loose end of L2 tight and secure it similarly. This ensures that L2 is pulled tightly against the inside surface of the hoop.

The six-turn loop, L1, is made of 0.6-mm, solid-core wire with PVC insulation (1.2-mm OD). Be sure that the wire is free of kinks for

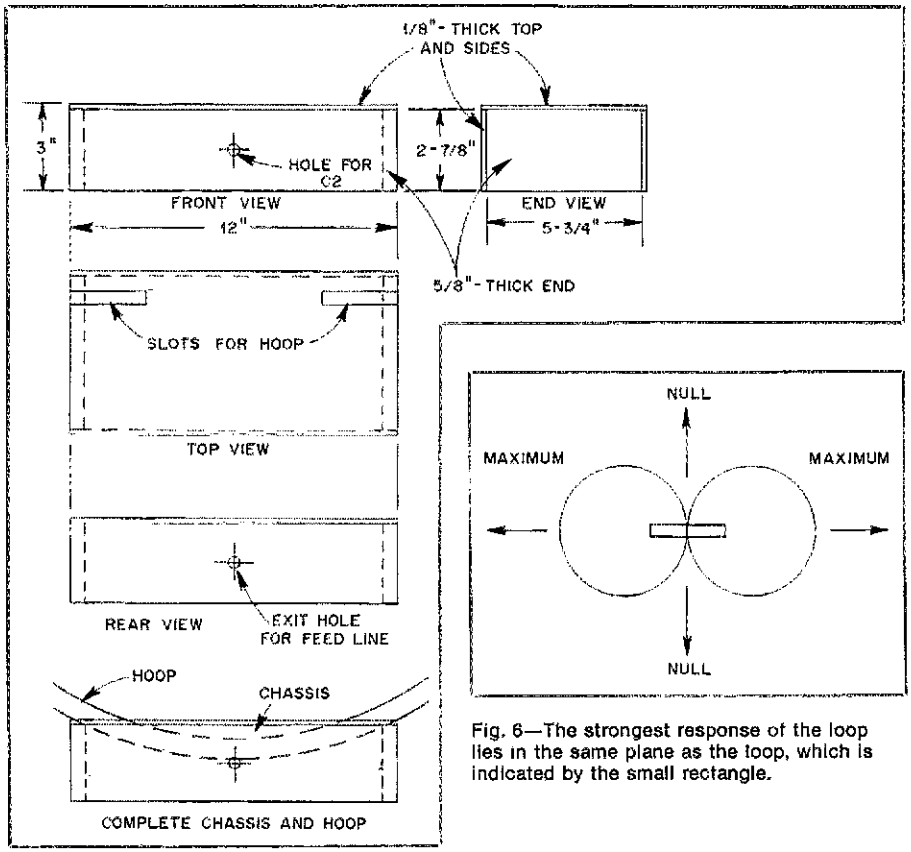


Fig. 5—Orthographic views of the chassis construction. Center the holes for C2 and the feed line in the respective chassis panels. The top, front and back are secured to the end pieces with wood screws.

Fig. 6—The strongest response of the loop lies in the same plane as the loop, which is indicated by the small rectangle.

smooth placement in the tube. I found it impossible to wind all six turns of wire in one piece, so I made two three-turn windings and connected them in series. Lay the hoop flat on a table and carefully push the end of the wire around for three turns. Repeat this process with the second wire and solder the ends of the three-turn windings together.

Split the bamboo plug lengthwise and insert it halfway in one end of the tube. Gently pull the ends of the six-turn loop and feed the free end of the bamboo plug into the open end of the hoop. When the gap is about ¼ inch, bind the hoop joint with plastic tape so it is again quite rigid.

Fig. 4 shows my completed antenna and the mounting chassis. Construction of the base is not critical, but 4 mm (1/8 in) should be considered the minimum thickness for the top piece. The loop chassis consists of five pieces; construction details are shown in Fig. 5. Assemble the sides and top with screws, then remove the top and cut two slots for a tight fit with the loop. Reassemble the chassis without the hoop, sand it and apply a finish if desired. Then permanently mount the hoop. I found that two 3/8 × 7/8 × 12-inch braces, screwed to the chassis top further strengthened my antenna.

Mount C2 on the front panel of the chassis. I used the series arrangement of C1 and C2 because there was no 100-pF variable capacitor on hand. A single capacitor may be used if one is available. Complete the loop wiring as shown in the schematic.

Operation

Plug the feed line into your receiver (set to 1800 kHz) and adjust C2 for maximum noise (or signal if one happens to be present). Repeat the procedure at 2000 kHz. This shows that C2 is adequate to cover the 160-meter band.

Tune in a signal near 1900 kHz and adjust C2 for maximum signal strength. Rotate the loop slowly, searching for a peak in signal strength. The peak should occur when the transmitting station is in the plane of the loop (see Fig. 6.). Interference from a local station can be minimized by orienting the loop broadside to the station.

Place the antenna on a table or shelf near the operating position. If the loop is kept away from electrical wiring, there is much less noise pickup than with common amateur antennas.

Results

My HH160RL has a frequency range of 1580-2000 kHz. It is very satisfactory for 160-meter DX operations when used with a receiver having a sensitive RF section or preamplifier. (Designs for preamplifiers appear in several ARRL publications.) This is a simple, interesting weekend project, and the total cost is only a few dollars!—*Richard Q. Marris, G2BZQ, Berks, England*

BAMBOO ANTENNA SUPPORTS

☐ I have used this method of preparing bamboo poles for many years. The resulting poles are excellent for supporting the ends of an inverted-V antenna or any other light support duty around the house. These poles are very durable: They have lasted up to 20 years for me.

Begin the treatment by spray painting the fresh bamboo pole. When the paint is dry, wrap the entire pole with plastic electrician's tape. Choose a paint color that blends with the environment at the planned pole location, and paint the pole again. I use Forest Green paint, to blend with trees. Two poles may be fastened together when more height is needed.—*Lawrence Briggs, W3MSN, Oxon Hill, Maryland*

MAKE YOUR HAIR DRYER A HEAT GUN

☐ I recently needed to apply heat-shrink tubing on some coil connections. The components were too closely spaced to allow use of a match. How could I shrink the tubing quickly, without using a flame? A friend told me that a pistol-type hair dryer would do the job. I soon found a 1250-W hair dryer and tried to shrink the tubing with it. Unfortunately, it did not work quickly and did not shrink the tubing to a tight fit.

I wondered if the dryer would work better if the heat was concentrated. A funnel made of some metal shim stock did the trick. The large end of the funnel fits over the hair-dryer nozzle and is taped in place. The funnel tapers to a ¾-inch opening over a length of about 6 inches. Concentrated hot air from the funnel produces a nice, tight heat-shrink joint in a few seconds.—*Velio S. Buccicone, W9XL, Portage, Indiana*

MORE ON THE FLEXIBLE WORK LIGHT

☐ Part of the flexible work light shown in the April 1985 Hints and Kinks column (p. 49) violates the National Electrical Code. Paragraph 410-47 of the NEC states:

> Lampholders of the screw-shell type shall be installed for use as lampholders only. Where supplied by a circuit having a grounded conductor, the grounded conductor shall be connected to the screw shell.

This prohibits the use of female outlet plugs with screw-shell lampholders.—*James H. Corliss, AC1R, Amesbury, Massachusetts*

[This code violation can be avoided by using an approved receptacle and box, rather than a screw-shell lampholder and female outlet plug at the wood base.—Ed.]

CDE HAM IV TIPS

☐ My CDE Ham IV rotor-control box contains a printed circuit board (part no. 51436-10) and a Zener diode (VR-1). An electrical mishap destroyed VR-1 in my control box. (Telex now owns CDE and services the Ham IV. They list VR-1 as part number 50153.00 at a cost of $4.50 each.) I found that Radio Shack sells a Zener diode that is a suitable substitute for VR-1 (number 276-564—they sell two for 89 cents). The diode is located in the meter circuit. It is rated at 15 V, 1 W, but the ratings do not seem critical.

I had to replace the Zener diode and meter fuse as a result of a lightning strike. All of my antennas were grounded, but a power-line surge did the damage. Here is a lesson: Disconnect power cords as well as feed lines in severe weather.—*C. Bayard Smack, W3NB, Westminster, Maryland*

W0ORE/Challenger: Picture Perfect from Space

Not only did the second ham-in-space operation break new ground for Amateur Radio, it may have also given NASA a new means of troubleshooting future space projects!

By Paul Courson, WA3VJB
Public Information Officer, ARRL

To have a picture of a particular problem where you might be able to transmit up, say, a schematic diagram or something like that, without having to give the crew step-by-step verbal instructions, might be extremely valuable.—NASA Associate Administrator Jess Moore

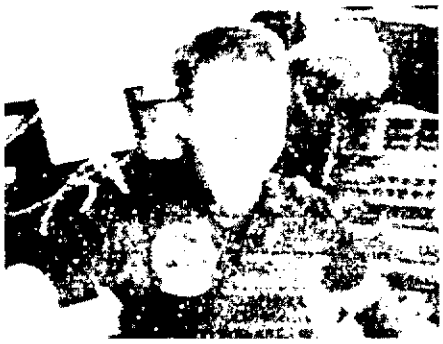
The quotation reflects the smashing success of the second Amateur Radio operation from a Space Shuttle: Not only did hundreds of young people get an unforgettable first taste of ham radio, but NASA once again sat up and took notice of what Amateur Radio technology can do. SAREX, which stands for Shuttle Amateur Radio Experiment, accomplished even more. It resulted in the first-ever television monitoring in space, as well as the first-ever exchange of TV images between ground stations and a manned orbiter.

The SAREX project interested NASA's Moore to the point that he made time to observe it being tested, during an orbit that amateur TV pictures were exchanged with the W5RRR station at the Johnson Space Center (JSC) in Houston.

"I was watching the video of the Mission Control Center in Houston," Moore recalled, "and actually saw the data that was being transmitted up. I was very impressed that we were able to do this, using amateur radios, and that's fantastic!"

Focus on Young People

Long before liftoff, NASA Mission Specialist Tony England, W0ORE, made sure that young people were to be a vital part of this historic project. He requested that community ham clubs hoping to participate invite young people to observe and take part in the experiment themselves. Hundreds of groups of young people gathered with hams across the U.S. and elsewhere to try to contact the Shuttle *Challenger* as it circled overhead. (A follow-up article will provide details of some of these groups' efforts to contact W0ORE.) Tony was convinced that this would be an ideal way to encourage the nation's youth to develop an interest in space technology.



Through the use of slow-scan television, Tony England, W0ORE, was able to send a live image from aboard the Space Shuttle *Challenger* to a worldwide audience. This amateur operation resulted in the first-ever television monitoring in space. *(KC5RG photo)*

Of course, it also became an excellent chance to recruit young people as potential hams!

During the flight, 130 independent voice contacts were established. In addition, there were 10 exchanges involving SSTV signals monitored by the Shuttle ham station. The audio logger tape is still being analyzed to distinguish "calls heard" for QSL purposes.

Organized groups of young people included Scouts, Civil Air Patrol and the Young Astronaut Program. The last group is affiliated with the White House Office of Private Sector Initiatives, but President Reagan's unanticipated surgery prevented any White House participation.

SAREX was a "spare time" project for the three Shuttle crew members who might have participated: Tony England, W0ORE; Payload Specialist John-David Bartoe, W4NYZ; and Mission Commander Gordon Fullerton, who at one time held the call WN7RQR. As it turned out, Bartoe was unable to find time to operate, partly because of equipment failures affecting important Spacelab experiments. But Fullerton managed to make a significant number of contacts as a third-party operator.

It was difficult to predict when the Shuttle amateur station would be activated. Many people hoping to contact W0ORE were frustrated not only by the indefinite operating schedule, but also by the constantly changing orbital tracking data. The premature shutdown of the *Challenger's* number 2 main engine during ascent resulted in an initial apogee altitude of 261 km rather than the planned 343 km. Gil Carmen, WA5NOM, of the JSC division of Flight Design and Dynamics, spent countless hours recalculating the orbital data to help us figure out where to aim our antennas to hit W0ORE/Challenger. Distribution of the latest information was orchestrated through the use of ARRL information lines set up at JSC, as well as bulletin updates on W1AW and WA3NAN, the Goddard Space Flight Center ham station, which was retransmitting Shuttle audio on a variety of VHF and shortwave frequencies.

"Our listening audience during this flight was probably in the thousands," according to Frank Bauer, KA3HDO, of the Goddard ARC. "Our frequency schedule has been carefully tuned the past two years during earlier Shuttle flights, so we can cover as much of the country as possible."

Many community ham clubs retransmitted Shuttle audio as well, enabling hams to monitor the mission. K4GCC, near the Kennedy Space Center in Florida, provided NASA audio as a public service for the thousands of people gathered to view the launch. Control operator John Anderson commented later that very little TV and radio broadcast time is devoted to Shuttle coverage any more. Thus, amateur retransmissions as a public service become one of the few up-to-the-minute sources of information.

In Prescott, Arizona, John Laing, K7PRS, found a way to convert his group's initial disappointment into excitement and enthusiasm. Laing used an inaudible Shuttle pass as an opportunity to transmit, explaining to the young people that the experiment was "like a fishing expedition, where you bait your hook and be patient that a nibble will come along."

During a late-night orbit, when his group had given up hope for a QSO, SSTV audio signals suddenly filled the room. Suspicious,

Tony England on SAREX

The idea of the Shuttle Amateur Radio Experiment (SAREX) was born in the early spring of 1984. Roy Neal, K6DUE, from NBC, Pete O'Dell, KB1N, from ARRL, and Dick Fenner, W5AVI, Doug Ward, WA5SFY, Owen Garriott, W5LFL, and I, from NASA/Johnson Space Center, met over a fine seafood dinner at a local Houston restaurant to discuss Amateur Radio possibilities for Spacelab 2. Owen's great success with the Amateur Radio Demonstration (AMRAD) on Spacelab 1 had generated a level of optimistic enthusiasm that would have been hard for anyone to resist. We were all believers, so the discussion quickly became a brainstorming session to define some objectives for the second "ham in space" project.

There were a lot of ambitious ideas that evening. We wanted to share the excitement of the space flight effectively through Amateur Radio. Roy convincingly argued that the second Amateur Radio flight include an operating mode, such as Owen's on Spacelab 1, that would involve the broadest amateur community possible. I wanted to talk to youth groups as partial repayment of a debt to Amateur Radio for memorable teenage experiences as a ham. Amateurs are experimenters, as well as communicators, so we wanted to push the technology a little bit. Spacelab 2 differed from Spacelab 1 in that the crew timeline was far more rigid. There would not be the flexibility to adjust Spacelab work around Amateur Radio passes over the U.S. We needed an untended mode that allowed amateurs on the ground to participate even while the crew was busy.

After lots of blind alleys and much friendly give and take, we came up with a proposal. Our station would include 2-meter, two-way voice to talk to youth clubs and to the general amateur community, a 2- to 10-meter repeater that would be accessible by amateurs on the ground to satisfy the need for an untended mode, and amateur TV (ATV), which would help us share the space flight experience with the amateur community. Both the 10-meter downlink from the ionosphere's F2 layer and the ATV were new to space; they constituted our experiments. The name SAREX was chosen to emphasize these experiments.

Our greatest challenge was not technical, but institutional. While NASA generally looked favorably at Amateur Radio after AMRAD, it was clear that the integration of SAREX into Spacelab 2 could not impact schedule or cost. To have a 10-meter downlink, we needed a loaded whip in the payload bay. The window antenna, used by Owen, would not do. Aside from its being too small to radiate efficiently on 10 meters, it might be an awkward companion on the Orbiter's flight deck, where we were to work during Spacelab 2. Owen's mission had a crew module/laboratory in the payload bay, so the flight deck window antenna was not a busy area. On Spacelab 2, we would always have three or four crewmen working within a few feet of that window.

There are unused bulkhead feedthroughs between the crew compartment and the payload bay on the Orbiter that are suitable for RF. We wanted to pick up one of these for our 10-meter feed line. However, the cost of integrating SAREX in this area would have been out of line for a "no cost to NASA" project. The SAREX team and NASA wrestled over this point for more than a year. During this year, SAREX was approved in principle but never manifested on Spacelab 2. It finally became obvious that we were going to have to give up the bulkhead feedthrough, and thus the 10-meter system, to have any chance of flying SAREX on Spacelab 2. The result was SAREX JR: a 2-meter, two-way voice and ATV system using Owen's window antenna. We could meet our two-way voice objectives, but our untended mode became ATV down, and our experiment became a communications experiment. Would 2-meter ATV reach a wide enough amateur community and spark enough interest to warrant its use?

To increase the use of SAREX during the mission, all the crew were encouraged to learn to operate the gear. I developed a cue card that included the words to use for anyone who wasn't comfortable with the ham protocol. Lou McFadin, W5DID, spent many hours supplying training hardware to the crew quarters and operating the Johnson Space Center Amateur Radio Club (JSC ARC) station during crew quarantine so the crew could practice ATV with another station. John-David Bartoe, W4NYZ, one of our Payload Specialists on Spacelab 2, supported SAREX but had even less time than I did during U.S. passes to operate. It turned out that each crewman, at some time, operated the ATV to provide the many downlink pictures. The real surprise was Commander Gordon Fullerton's latent interest in Amateur Radio. As a teenager, he had been a Novice, but had let his license expire. In orbit, he claimed that he was just trying to help me out by operating SAREX as much as he did. Don't believe it; he had a good time. He was responsible for about one-third of the ATV operations, and for 12 of the 130+ two-way voice contacts. We owe Gordo a hearty thanks (and encourgement to get his license again).

Conclusions about Shuttle Amateur Radio on Spacelab 2 include:

1) Amateur Radio nicely complements NASA science missions. Missions, such as Spacelabs 1 and 2, should be shared with the public as fully as possible. Amateur Radio is an effective vehicle for talking directly to the local communities through local Amateur Radio clubs about progress with the mission. When I talked to the Radio Society of Great Britain's club station, they wanted to know how the two British experiments on Spacelab 2 were doing. It was an opportunity for us to summarize some of the successes achieved by these experiments. Our account was proudly relayed to the British press, who covered it well.

2) We very much need an ICD-recognized RF passthrough between the crew compartment and the payload bay. Perhaps, ARRL and AMSAT might work that issue with NASA management now while the success of SAREX is still fresh. It will take a high-level effort, but future Shuttle Amateur Radio projects will be greatly constrained without an antenna in the payload bay.

3) ATV appears to have achieved all that we had hoped it would. The amateur community's acceptance was positive, and the TV scenes allowed us to share a little of what it was like to work in space.

4) Video uplink was a first for the space program. ATV deserves a lot of credit for convincing some of us in NASA that a video uplink should be part of the Shuttle's standard capability.

5) I particularly enjoyed the two-way voice contact with the youth clubs. To be able to hear and answer questions about the space program from young folks was a real kick. The format of unscheduled contacts on protected frequencies worked well. I'm only sorry that I couldn't spend more time in this mode.

5) Two-way voice contacts with the general amateur community also worked well. At first, I used Owen's technique of giving an invitation to call, listening for a specified time, and then listing the stations I had heard. This encouraged everyone to get on a frequency and to give their call continuously for the duration of the pass. This bedlam was not very satisfying for me, and it couldn't have been much fun on the ground. On the next pass, I tried the DX mode of acknowledging individual calls. This was far better. The ground stations stopped to listen for their QSL and, upon hearing it, left the frequency for others to use. Plus, the one-to-one contacts were a lot more fun, both for the operator on the ground and for me, than were the gang listings that I suspect few stations heard because everyone was transmitting. I would be interested in seeing a "letters to ARRL" debate about these two operating modes.

I want to thank the ARRL, AMSAT and all the individuals both within the amateur community and within NASA whose hard work and goodwill made SAREX a success. It was a real high point for me as an Astronaut and as an Amateur Radio enthusiast. I hope we can do it again.—*Tony England, WØORE*

Laing asked who was sending the signal. A surprised Tony England assured him that it was he, aboard the Shuttle, and the two stations exchanged voice and SSTV signals. No one was more surprised than John Laing!

The Westlink Amateur Radio news network reported on Al Hovey, WA9BZW, who may have been the first and only ham to work WØORE between automobile and Space Shuttle. A Wisconsin schoolteacher, Hovey had planned to have a group of students help attempt a QSO. But after more than 10 hours of calling over a two-day period, they were ready to throw in the towel. Hovey decided to calculate when to make a last try by using his home computer. While driving to a family reunion, he heard voice calls from WØORE, and managed to make voice contact despite using only 40 W and a mobile whip antenna!

One of the first international two-way

contacts during the mission was with GW6GW, the amateur station at the Oakdale Comprehensive School in Wales. Tony and his family had visited the school last year, and had met with Brian Davies, GW3KYA. Davies was at the school when a telephone call came in from Houston requesting that he come on the air for a QSO with WØORE. Davies had about 10 minutes to fire up the school station, and said it was quite a thrill to hear and watch the signals from *Challenger*.

W5RRR, at the Johnson Space Center in Houston, attracted a big crowd whenever WØORE/Challenger came on the air, particularly when SSTV images were received. Manning the station are (l-r) W5OBR (standing), WA5NOM, W5DID and KC5RG. Among the regular viewers were (l-r, center) Mrs. Fullerton (wife of the *Challenger* Commander) and Mrs. England. *(NASA photo)*

First Flight Laid the Groundwork

The Amateur Radio demonstration that Owen Garriott, W5LFL, conducted aboard STS-9 in late 1983 demonstrated that the amateur community could meet the technical hardware requirements for manned spaceflight. It was of equal importance, according to NASA/JSC Media Services Chief Doug Ward, WA5SFY, that the first-ever amateur operation from space could be conducted without interference to other mission objectives. The first amateur-in-space experiment had laid the groundwork for a more-ambitious demonstration of Amateur Radio on Spacelab 2, the *Challenger* STS-51F mission. Ward noted that NASA officials felt the second experiment should not be a mere repeat of the first one. So ARRL and AMSAT petitioned NASA for a new experiment.

Working with a small group of NASA hams, Tony came up with the idea of adding a repeater with a 2-meter input and a 10-meter output that also would have the capability for slow-scan TV uplink and downlink.

Frank Johnson, NASA's Director of Public Affairs in Washington, became enthusiastic about the prospect of the first-ever TV pictures monitored in space, and offered his support—as long as the ARRL and the amateur community could once again meet the stringent technical and operational requirements for placing equipment on the Shuttle.

Louis McFadin, W5DID, an Aerospace Technologist with NASA/JSC, led efforts to design a system comprised of an MX 300 series transceiver from the Motoroia ARC in Fort Lauderdale, Florida; a Panasonic TV monitor, camera and cooling fans; Abbott Transistor's DC-to-DC power converters; and a ROBOT scan converter. An Amateur Radio group at the NASA Lewis Research Center came up with the buffer amplifier required to provide the proper interface between the scan converter and the Shuttle's video system. It allowed images from the *Challenger* cameras to be selected in addition to the small, hand-held camera in the SAREX Jr. package.

McFadin said he realized a significant power savings by modifying the scan converter from its off-the-shelf design. Many of the unit's capabilities not needed for the flight were deleted. But, in order to accommodate the maximum number of SSTV hams worldwide, a circuit was added to allow a special automatic sequence of frame speeds.

The software was designed to provide two red frames followed by one green frame, one blue frame, a low-resolution color image and a high-resolution color image, concluding with a CW identification, WØORE/CHALLENGER.

Making It Happen

The SAREX team had only eight weeks to make it all happen. Through the efforts of the dedicated group, the deadline to build and test the circuit boards, wiring, enclosures and cables was met. A preflight test, however, revealed a problem: The camera seemed to be affected seriously by RF energy from the hand-held radio. Panasonic rushed a technician to Houston to solve the problem with a lot of aluminum tape inside the plastic camera case.

Hams at the Johnson Space Center had still more work to do: building a station to work WØORE from W5RRR—Tony's own club. Perhaps realizing the benefits from having young people play an important role in the mission, quite a few commercial manufacturers came to the rescue.

Chuck Biggs, KC5RG, chief of NASA/JSC Public Services, said a great deal of effort was spent converting the club's OSCAR station, located in the JSC Museum. ROBOT and Panasonic donated equipment identical to the flight hardware for use at the ground station. ICOM America sent an IC-471H and -271H. Mirage donated new antennas and amplifiers, and Mosley sent a set of Pro-Search digital rotator controls.

To help plot *Challenger* and automatically track the antenna array, Apple Computer donated a Model //e, a color monitor, a printer, disk drives and documentation. Applied Engineering tossed in the clock board and voilà, W5RRR had an autotrack antenna system! The final bugs in the station console were worked out only 24 hours before launch, thanks to long nights in the unairconditioned Museum spent by Candy Torres, KA5UKJ, Ken Schnell, W5OBR, and other members of the W5RRR club.

All this effort became critically important when it came time to transmit the first television images to be received on a manned orbiting spacecraft. The first image monitored by Tony—the first TV watched in space—was a picture of his wife, Kathi.

Also on hand for this historic QSO with the Space Shuttle ham station was Owen Garriott, W5LFL, the first ham to operate in space. When asked how the event ranked on the list of Amateur Radio achievements, he answered, "It's another major milestone, and it's certainly the kind of thing hams have been doing point-to-point on the ground, but never before from space to the ground."

NASA's Moore was clearly impressed. SAREX "performed just as designed," he commented. "It should have delighted ham radio operators all over the world about ... transmitting television uplink for the first time."

Once again, a communications first for Amateur Radio! QST

Tentative list of stations worked during WØORE SAREX project

GW6GW, W5RRR, WA3NAN, EI3ISJ, G2GJY, GB3RS, 4Z4ZB, JH1RNZ, WA9BZW, K8ORW, W8LNJ, W3VC, WB1FFZ, K3TC, KG3N, AA3O, W8QUE, WA2UFO, W2RL, W2RS, WA2KDL, __ODF, WB9KMD, I0LYL, I8WY, VE3AP, A1BPT, WA3Y, W1KWC, K1VOY, KA1IYR, WA1W__, W1BYK, K2OIJ, WA3DS, W1HUC, WA1UQC, WB2JSJ, W8KEL, W9KMD, N9EGE, KA4KVC, KD9FC, VE3KLW, AG9U, W3E__, WA3Y, KH6IBA, W8KMD, N9EGE, KA4KVC, KD9FC, KA9LQG, VE3KLW, KE9C, K8RZ, JH1RNZ, KJ6K, KA6PJL, KA6VNU, N6KBN, NI6M, K7PRS, WA2KDL, K__NJE, N6NR, NJ7E, __6FX, KH6OB, KH6IJS, W7QLG, NK7W, KA6VNU, KF8YG, W7MCU, N6HYM, WB6TE, KE7FC, KC7HC, WB5DSH, K6OL, N1HH, N6QP, W7MCU, N7GZT, AE0O, KA9CSL, KA9CFD, WB9MJN, N9EFO, WB8NNI, WB9HAD, K9JK, KA9__ __, WB0EQX, WB4ZOB, N9EJU, WB9KMD, W9ODI, KA9LQG, N9ETE, VK2DFY, VK__ASB, VK2BXQ, W4MOP, N4KZZ, K4OZQ, KA1KRJ, W8WLJ, K8ORW, W4AQL, KE4NS, WB4TOP, N4JVY, KG3N, N4JQD, ____LYV, W2WHD, KH6CC, KH6WA, NC9FN, _9GLB, VE3KXF, VE3KPK, VE3BFV, KB9HSQ, KI4LQ, WB1FFZ, WA1FCK, KE2N, K3TC, KG3N, KW1I, W3YC, N1AIS, KH6IBA, WA4CJ, WB2JSJ, KG3N, WB1FFZ, NJ6L, W6SG, WB6NOA, AG1U

The Great Armadillo Run of 1986

By Tom Taormina, K5RC
Rte. 1, Box 307, Manvel, TX 77578

The members of our club, the Texas DX Society, love to operate about as much as any group of hams. In the club's 14-year history, we have won many Field Days and captured three club gavels in the ARRL Sweepstakes, and hold the multioperator World Record for both modes in the ARRL DX Contest. We also have a flair for the unusual and are constantly looking for club projects that stimulate operating activities.

In 1983, our Club decided to participate in the County Hunters' CW Contest. Only a couple of members had any experience with county hunting or with mobiling, but it sounded like a good club project. To make it interesting, we decided to try to put on all 254 counties in Texas in one weekend! Now, Texans think big, but the idea of a club with less than 60 members covering 262,000 square miles in less than 48 hours seemed a little farfetched. To make it even more of a challenge, our club is based in Houston, in the far southeast corner of the state. Some of the members would have to go over 700 miles to get to their first county!

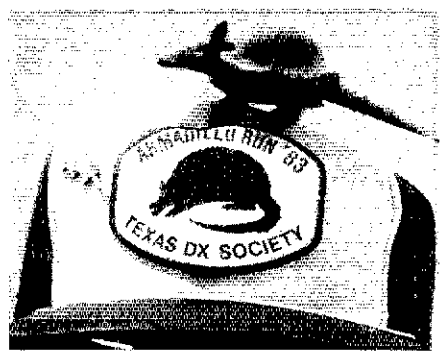
"Can Do"

If you want to witness the real ham radio spirit, get your club involved in a seemingly impossible project. KZ5M headed up the effort and dubbed it The Armadillo Run. The armadillo is the Texas state mascot, and seemed to symbolize the "can do" spirit of our club.

We spent months laboring over routes and logistics. We learned how to put HF radios in the family sedan, in motor homes and even in the back of a pickup truck towing a generator. If there was ever an exercise in logistics and emergency preparedness, this was it. By early summer, we had a map of the state with overlays for each "prime" mobile station, and overlapping routes for "roamer" stations to back up the prime stations in the event of a breakdown or other problems.

When that hot August weekend arrived, 10 prime mobile stations and four roamers hit the road. Back in Houston, two fixed stations kept track of us, while K5IY orbited the center of the state in a private airplane, and stayed in contact on 2 meters with many of the mobiles. It all came off without a hitch. We did a lot of overlapping and, with the roamers, covered many counties twice. We were mobile only during the daylight hours, and we each covered 30 to 40 counties. QSO totals of 1000 to 2000 were not uncommon.

There was very little advance publicity about the Armadillo Run, but it turned into a real on-the-air "happening." The Texas DX Society promised awards for anyone working 100, 150 or 200 counties, plus a special award for anyone who worked them all. Many positive remarks came from active hams like K1ZZ, N6AA, W2GD, and particularly K1TN, who commented, "I made the mistake of turning on the radio for a few minutes and got hooked tracking the mobiles as they crisscrossed the state, and spent the entire weekend in the Armadillo Run." Against all odds, K1ZX/4 actually worked all 254 counties during the Run! Just to be sure it wasn't a fluke, in 1984, our Club went out again for the CW County Hunters' Contest and activated all the counties in Arkansas, Louisiana and Mississippi!



The Armadillo is the state mascot of Texas and represents the "can-do" spirit of the Texas DX Society. *(K5RC photo)*

Country-wide County Hunt

Some months later, a group of us were sitting around the campfire trying to figure out what we were going to do for our next club project. Someone suggested that we do an Armadillo Run for the whole country! That brought a round of laughter, but it started us on a five-month feasibility study. We would obviously need the help of many other radio clubs around the country; it would be one of the largest logistical efforts ever undertaken in Amateur Radio. But the further we delved into it, the more achievable it appeared.

The principal question was how many people would it really take? If you determine the number of square miles in each state and divide that by the number of counties in the state, the average county in the average state is 35.3 miles wide. If we had to cover every single county mobile, at 40 mi/h it would take 2717 hours of driving to cover all 3076 counties. Assuming 22 hours of driving in a weekend per mobile, that would be 124 mobiles. Let's say that if we did it over two weekends (it now becomes 62 mobiles per weekend), allowing for a 100% round trip (124 mobiles per weekend) and allowing for total duplication, the whole thing could be done with fewer than 250 participants. That is certainly within the realm of practicality, considering all of New England could be done with nine mobiles (and we really did Texas with 14 mobiles). But what about the wide-open spaces of the Far West and Alaska and Hawaii?

To deal with these logistics, we needed regional coordinators who are familiar with the geographic and demographic peculiarities of each area of the country. As we discussed the project with amateurs around the country (after they got over the initial shock of the idea), we found no major logistical problems that couldn't be overcome in their specific region. In talking with the County Hunters, we found them to be a very eager and dynamic group who have overcome many of the problems of activating the "rare" counties. Their support makes the improbable "do-able."

Since 1986 is the 150th Anniversary of the State of Texas (The Texas Sesquicentennial), what better way to celebrate than to invite amateurs worldwide to join in The Great Armadillo Run of 1986 and activate all 3076 counties in the country in two weekends? The Run will be over the County Hunters' Phone and CW Contest weekends (phone in May and CW in July 1986). We will activate as many counties each weekend as possible, covering them *all* over the two weekends. The Texas DX Society will coordinate the effort, with the regional coordinators providing the manpower to cover the counties. The Run will be conducted as a contest, with specific rules and many different fixed and mobile categories to give everyone an opportunity to participate. Awards will be made for winners of various categories.

What is your club doing for a project in 1986? Why not join in the Armadillo Run? Everyone is welcome. The Texas DX Society can provide you with planning data, rules and guidelines, and promotional material. We can also provide speakers and slide shows to help your group get the project rolling. Contact us at P.O. Box 540291, Houston, TX 77254-0291. We will be starting regional on-the-air meetings late in 1985 to exchange planning information.

There will also be monthly updates on the progress of the project in the Awards Column in *CQ* Magazine.

The Great Armadillo Run of 1986 may be just the cure for the low-sunspot blues. Y'all join us!

Happenings

Conducted By David Newkirk, AK7M
Manager, Regulatory Information Branch

- *Japan-U.S. Reciprocity at Last*
- *420-430 MHz Lost Above Line A*
- *PRB-1 Action Soon?*

New Band at 902-928 MHz

Acting on PR Docket 84-960, on August 15, 1985, FCC announced the availability of 902-928 MHz for use by all radio amateurs holding Technician class licenses and above, effective 0001 UTC September 28, 1985. (For more on PR Docket 84-960, see Happenings in December 1984, and February and May 1985 *QST*.)

There were hurdles to jump. Opposition to the amateur allocation at 902-928 MHz cited FCC's decision not to create a Personal Radio Communications Service, and its dismissal of a Petition for Rule Making by the MURA Corporation for a new 900-MHz personal communication service, as evidence that the Amateur Radio Service should be required to make a showing of need for the 902-928 MHz band. Why should amateurs get 902-928 MHz if proposals for a personal radio service were dismissed "primarily due to an inadequate amount of spectrum in the land mobile reserve"?

The answer was straightforward. PR Docket 84-960 was initiated so FCC could implement the Final Acts of the World Administrative Radio Conference held in Geneva in 1979. Said FCC, "The amateur community faces no additional burden of proof to retain the 902-928 MHz domestic secondary allocation we made at that time."

Opposition to amateur use of 902-928 MHz was also raised on the grounds that it might cause destructive interference to field disturbance sensors. Part 15 of the FCC Rules covers unlicensed operation of low-powered communication devices, and, under that Part, field disturbance sensors may be operated in the entire 902-928 MHz band at a nominal frequency of 915, ±13 MHz. But the sensors lose out to amateur use of the band on two counts. First, the Code of Federal Regulations states that there is no vested or recognizable right to continued use of a given frequency by virtue of prior registration or certification of equipment. Second, in FCC's words, "Part 15 devices like field disturbance sensors are secondary to all other operations—they must cause no harmful interference to other stations and must suffer interference from them. Thus, the fact that they may suffer such interference as a result of this action is not a compelling argument against the proposal."

FCC did, however, find it necessary to prohibit amateur activity in the 902-928 MHz band within the states of Colorado and Wyoming, bounded by the area of 39 degrees to 42 degrees N latitude, and 103 to 108 degrees W longitude. "We concluded that this ... was necessary to protect existing Government operations in these areas." Reaccommodation of these services may be accomplished within a year, however; if it is, the Colorado-Wyoming prohibition will be deleted.

ARRL 902-MHz Interim Band Plan

Segment	*Use*
902-904 MHz	Narrow-bandwidth, weak-signal communications
902.0-902.8	SSTV, FAX, ACSSB, experimental
902.8-903.0	Reserved for EME, CW expansion
903.0-903.05	EME exclusive
903.07-903.08	CW beacons
903.1	CW, SSB calling frequency
903.4-903.6	Crossband linear translator inputs
903.6-903.8	Crossband linear translator outputs
903.8-904.0	Experimental beacons exclusive
904-906	Digital communications
906-907	Narrow-bandwidth FM-simplex services, 25-kHz channels
906.50	National simplex frequency
907-910	FM repeater inputs, paired with 919-922 MHz, 119 pairs every 25 kHz, e.g. 907.025, 050, 075, etc. 908-920 MHz uncoordinated pair.
910-916	ATV
916-918	Digital communications
918-919	Narrow-bandwidth, FM control links and remote bases
919-922	FM repeater outputs, paired with 907-910 MHz
922-928	Wide-bandwidth experimental, simplex ATV, Spread Spectrum

So, we have ourselves a new band. What are its vital statistics? It is available as of 0001 UTC September 28, 1985. The maximum PEP output limitation is 1500 W. Emissions presently allowed are NØN, A1A, A2A, A2B, A3E, A3C, A3F, F1B, F2B, F3E, G3E, F3C, F3F, F8E and PØN. The 902-928 MHz amateur allocation is available in ITU Region 2 only, and is made on a secondary basis. In the United States, the Amateur Radio Service is secondary to the Fixed and Radiolocation Services in this new band; in addition, in Region 2, the band is designated for industrial, scientific and medical (ISM) applications. This means that we must not interfere with and must accept interference from the Fixed and Radiolocation services and from ISM devices. Among such devices authorized at 915 MHz are microwave ovens.

There is an emission authorized at 902-928 MHz that is authorized at no other amateur band: F8E, or frequency-modulated telephony with the main carrier modulated by two or more analog channels. (Stereophonic FM broadcasting is one application of F8E emission.) Inclusion of F8E at 902-928 MHz is owed to comments of the Southern California Repeater and Remote Base Association. FCC agreed with SCRRBA that "such emissions would serve the dual purpose of permitting amateur operators to experiment with a new transmission mode and to efficiently utilize the spectrum when several different channels of information must be transmitted simultaneously from one location to another." We have a new mode *and* a new band.

To add the 902-928 MHz band to Part 97 in your copy of the *FCC Rule Book*, amend the Megahertz entries for the Technician, General, Advanced and Extra Classes in Section 97.7 by adding a new 0.35-meter entry in the Region 2 column between each of the 0.70- and 0.23-meter entries, and amend paragraph (b) by adding limitation (14) to read as follows:

> (14) In the 902-928 MHz band, amateur radio stations shall not operate within the States of Colorado and Wyoming, bounded by the areas of: latitude 39° to 42° N, and longitude 103° W to 108° W. The band is allocated on a secondary basis to the amateur service subject to not causing harmful interference to the operations of Government stations authorized in this band or to Automatic Vehicle Monitoring (AVM) systems. Stations in the amateur service must tolerate any interference from the operations of industrial, scientific and medical (ISM) devices, AVM systems and the operations of Government stations authorized in this band.

Paragraph (a) of Section 97.61 is amended by adding an entry to the Table therein under Megahertz, between the 450 MHz and 1215-1300 MHz entries. In the "Megahertz" column, add 902-928. Under "Emissions," NØN, A1A, A2A, A2B, A3E, A3C, A3F, F1B, F2B, F3E, G3E, F3C, F3F, F8E, PØN. "Limitations," none. (See also next item).

Paragraph (c) of Section 97.67 is amended by revising the heading of the third column of the Table therein to read "902 MHz" instead of "1215 MHz."

Paragraphs (c)(2)(ii) and (c)(2)(iii) of Section 97.69 are revised to read:

> (ii) 100 kHz on frequencies between 220 and 902 MHz.
>
> (iii) On frequencies above 902 MHz any bandwidth may be used provided that the emission is in accordance with §97.63(b) and §97.73(c).

902 MHz FORBIDDEN AT WHITE SANDS

In Order 85-444, released simultaneously with that authorizing amateur use of the 902-928 MHz band, on August 15, 1985, FCC restricted use of the band in and around White Sands Missile Range, New Mexico. The 902-928 MHz band was allocated to the Amateur Radio Service on a secondary basis; primary users of the band are Government radiolocation and industrial, medical and scientific (ISM) operations. Amateur users of the band must accept interference from and must not cause harmful interference to primary users. The Department of the Army informed the Commission that several critical radiolocation operations, including tracking and control operations of unmanned aircraft, require the use of frequencies in the 902-928 MHz band at the White Sands Missile Range in New Mexico, and that amateur operation in the area could impair or seriously disrupt these operations.

To protect these critical military operations, FCC modified Section 97.7 of its rules by adding limitation designator 15 to the 902-928 MHz band for the Technician, General, Advanced and Amateur Extra control operator license classes, and Section 97.7(b) was modified by adding the text of limitation 15:

> (15) The band 902-928 MHz is prohibited in those portions of Texas and New Mexico bounded on the south by latitude 31° 41′ North, on the east by longitude 104° 11′ West, on the north by latitude 34° 30′ North, and on the west by longitude 107° 30′ West; and in addition, outside the area but within 150 miles of these boundaries of White Sands Missile Range operation is restricted to a maximum transmitter peak envelope power output of 50 watts.

JAPAN-U.S. RECIPROCITY IS ON

Until September 7, 1985, alien nonresidents of Japan could operate their Amateur Radio stations in that country only after sitting for, and passing, the Japanese Amateur Radio license examination—in Japanese. No longer. A long-awaited reciprocal-operating agreement between the United States and Japan was signed in Tokyo on August 8, 1985, to take effect September 7.

At this writing, ARRL Hq. is expecting more detailed information; in the interim, U.S. amateurs interested in Japanese operation should contact the Japan Amateur Radio League, 1-14-2 Sugamo, Toshima, Tokyo 170, tel. 03-947-8221. Japanese amateurs may obtain information on operation in the United States from either JARL or ARRL.

420-430 MHz AXED ABOVE LINE A

December 1984 Happenings carried the news that FCC had proposed to prohibit amateur operation at 420-430 MHz along along the Canadian border. That action was ordered on August 15, 1985 as part of PR Docket 84-960, the same proceeding that gave us the 902-928 MHz band. And so, as of 0001 UTC September 28, 1985, 420-430 MHz was removed from the Amateur Service above "Line A" (The position of Line A is described below and is shown in Fig. 1; first, background on FCC's decision.)

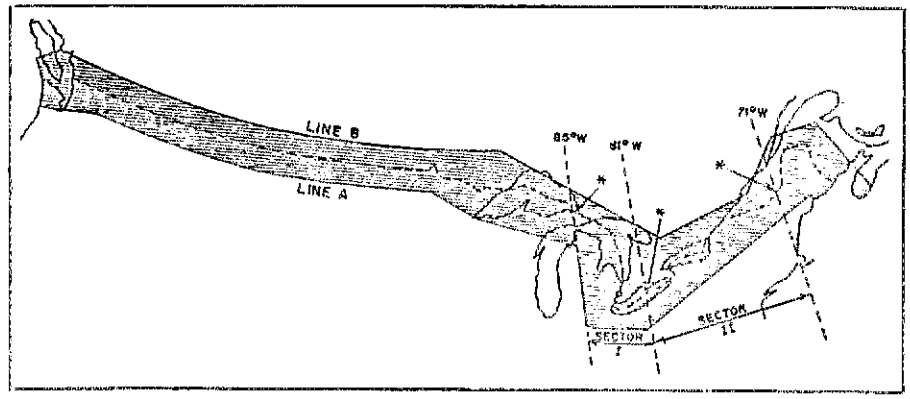


Fig. 1—Coordination zone for the 420-430 MHz band. The FCC has eliminated U.S. amateur operation on this band north of Line A. See text for details.

Source: *NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management*

FCC proposed to remove 420-430 MHz from the Amateur Radio Service north of Line A as part of action already taken in 1980's General Docket 80-739, titled "Implementation of the Final Acts of the World Administrative Radio Conference." In that proceeding, FCC amended its Table of Allocations in Part 2 of its Rules to indicate that the Amateur Radio Service is not allocated 420-430 MHz north of Line A. This was done pursuant to an agreement between the governments of the U.S. and Canada concerning the use of the spectrum between 406.1 and 430 MHz. FCC proposed also that Amateur Radio operators be granted waivers on a case-by-case basis to operate at 420-430 MHz " . . . subject to successful prior coordination by the FCC with the Canadian administration."

Several amateur commenters objected to the proposed removal of this band from the Amateur Radio Service north of Line A. Said FCC, " . . . the relative merits of this action are not at issue. We are required to honor the terms and conditions of the Arrangement which specifically states . . . 'The Amateur Service is excluded from the band 420-430 MHz in the Coordination Zone . . . ' " In the U.S., that zone is the area north of Line A.

The Southern California Repeater and Remote Base Association argued that the proposed rules language for this band was confusing. Was the band being withdrawn from the Amateur Radio Service or was it merely to be available subject to restrictions? FCC responded that the interpretation that the band be "withdrawn" was correct: "Any rules authorizing amateur operation north of Line A would be in derogation of the agreement."

Waiver of these rules would require successful coordination with Canada. The bad news is that such waivers are not allowed for as of this writing. "To date," wrote FCC, "we have not been able to arrange prior coordination of formal waiver requests to operate north of Line A at 420-430 MHz with the Canadian administration." No coordination, no waivers. The possibility exists, however, that the Commission may be able to arrange "certain FCC-licensed amateur operation on a secondary non-interference basis at the sufferance of the Canadian administration on a case-by-case basis."

To update your copy of the *FCC Rule Book* concerning 420-430 MHz operation north of Line A, revise Paragraph (i) of Section 97.3 to read:

> (i) Line A. Line A begins at Aberdeen, Washington, running by great circle arc to the intersection of 48° N., 120° W., thence along parallel 48° N., to the intersection of 95° W., thence by great circle arc through the southernmost point of Duluth, Minn., thence by great circle arc to 45° N., 85° W., thence southward along meridian 85° W., to its intersection with parallel 41° N., thence along parallel 41° N., to its intersection with meridian 82° W., thence by great circle arc through the southernmost point of Bangor, Maine, thence by great circle arc through the southernmost point of Searsport, Maine, at which point it terminates.

In Section 97.7, the Megahertz entries for the Technician, General, Advanced and Amateur Extra Classes in paragraph (a) are amended by adding limitation 13 to each of the 0.70-meter entries, and in paragraph (b), limitation (13) is added to read as follows:

> (13) No station shall operate north of Line A (see §97.3 [i]) in the 420-430 MHz band.

Subparagraph (5) of paragraph (c) of Section 97.185 is revised to read:

> (5) No station shall operate north of Line A (see §97.3 (i)) in the 420-430 MHz band.

Footnote 1 to Section 97.415 is revised to read:

> [1]Unless otherwise specified in this Subpart the rules regarding authorized emission modes (§§97.61 and 97.65) and authorized transmitting power (§97.67) are applicable for each of the listed frequency bands.

COURT TOLD OF FCC INTEREST IN PRB-1

Federal preemption in amateur antenna and tower matters is of high interest to amateurs anywhere. But it is running especially high in Kentucky. The case of *Thernes v. City of Lakeside Park* was to be heard September 19, 1985, in the U.S. Court of Appeals for the Sixth Circuit. The "fact pattern" of the case is as good as any to come along in years: The

city denied Thernes' (WM4T) application for a tower simply because amateur towers were not on the list of permitted accessory uses. Thus, the case is a good example of why the Federal Government should establish some degree of preemption in such matters. If PRB-1 were to be successfully completed before the oral argument September 19, it is virtually certain that the amateur would prevail. Without any input from Washington, DC, however, an unfavorable judgment was almost guaranteed.

Energetic work by the ARRL Counsel and Washington Area Coordinator got results on August 20. In a letter to the U.S. Court of Appeals, Sixth Circuit, Cincinnati, FCC General Counsel Jack D. Smith referred to Case No. 84-6009, *John Thernes v. City of Lakeside Park, Kentucky, et al.:*

"This office is informed that the above-referenced case, calendared for oral argument on September 19, 1985, concerns municipal regulation of amateur radio antenna structures.

"The Federal Communications Commission presently has before it a request for declaratory ruling delineating the limitations of local zoning and other state regulatory authority over federally-licensed radio facilities, File Number PRB-1. The staff has completed its analysis of the comments, and it is anticipated that the Commission will take some action by the fall.

"You may wish to consider the pendency of this proceeding in establishing the Court's own procedural timetable in Case No. 84-6009."

Aside from any effect it may have in the Thernes case, should positive action on PRB-1 be a cause for immediate celebration everywhere? Not necessarily. The preemption issue is labyrinthine, and variations in local law abound. How PRB-1 should be viewed at this point was perhaps best stated at Minute 27 of the ARRL Board's July meeting in Hartford: "It should be regarded as providing a useful legal tool, rather than a panacea to solve all problems."

KI4UT AWARDED 1985 GOLDWATER SCHOLARSHIP

Clark Stephen Barrow, KI4UT, has been awarded the ARRL Scholarship Honoring Senator Barry Goldwater for the 1985-1986 academic year. Clark's academic performance (he graduated third in his high school class of 454) was also recognized by the National Honor Society; Music, Science and Mathematics Honor Societies; and *Who's Who Among High School Students.* An Advanced class licensee, Clark has done extensive research in satellite communications. Not only has he developed a ground station to work through the OSCAR satellites, but he has also begun work on building and launching his own research satellite. This past summer he won a position in the Department of Defense Science and Engineering Apprenticeship Program. Clark plans to make a career in research and development in the satellite communications field and will major in Electrical Engineering at Auburn University this fall.

SECTION MANAGER APPOINTMENTS

In the Delaware Section, Harold K. Low, WA3WIY, has been appointed to complete the term (until December 31, 1985) of John Hartman, WA3ZBI (resigned).

In the South Dakota Section, Roland Cory, WØYMB, has been appointed to complete the term (until March 31, 1986) of Fredric Stephan, KCØOO (resigned)—*Arline Bender, WA1VMC*

Be a Contributor to the Goldwater Scholarship Fund

Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution *now.*

If your contribution is $25 or more, we will list your name and call in *QST.* If your contribution is $100 or more, in addition to your name and call appearing in *QST,* you will receive a signed photograph of the Senator, suitable for display in your ham shack. And for contributions of $1000 or more, we'll put your photo in *QST.*

We welcome all contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being? Please make your check payable to the ARRL Foundation Goldwater Scholarship Fund, and send to ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent contributors of $25 or more include: in memory of Frank Salzano, WB2VLE, from the PEARL; the OH-KY-IN Amateur Radio Society; in memory of Bruce Davis, WA8UQN, by the MACS Net; in memory of Jim Whipple, K8TAK, by the MACS Net; in memory of Joseph F. Beck, W8OHI, by E. Gansen, N4AUU; Frank F. White, W8OY; Edward Dudley, WA4ISI; Bill Leonard, W2SKE; Richard L. King, K5NA; Richard A. Reber, W7IQZ.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia and Pacific Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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

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

(place and date)

Field Services Manager, ARRL
225 Main St., Newington, CT 06111

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

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

Petition must be received at Headquarters on or before 4 P.M. Eastern Local Time December 6, 1985.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 2, 1986. Returns will be counted February 18, 1986. SMs elected as a result of the above procedure will take office April 1, 1986.

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, 1986. If no petitions are received for a Section by the specified closing date such Section will be resolicited in April *QST.* An SM elected through the resolicitation will serve a term of 18 months.

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

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

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office October 1, 1985:

Uncontested

Colorado	William M. Sheffield, KQØJ
Georgia	Edmund J. Kosobucki, K4JNL
Southern Texas	Art Ross, W5KR
Washington	Gene E. Sprague, KD7G
West Virginia	Karl Thompson, K8KT

Balloting Results

In the Kentucky Section, Dale Bennett, WA4JTE, received 312 votes, and Robert E. Forsee, WA4IGS, received 117 votes. Mr. Bennett was declared elected.

In the Los Angeles Section, Eugene R. "Bob" Poole, AJ6F, received 724 votes, and John V. Walsh, N6UK, received 459 votes. Mr. Poole was declared elected.

In the Sacramento Valley Section, Robert H. Watson, W6IEW, received 270 votes, Jettie B. "Jet" Hill, W6RFF, received 157 votes and Lyle Taylor, WA6ZUD, received 111 votes. Mr. Watson was declared elected.—*Arline Bender, WA1VMC*

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the San Francisco Section by the petition deadline of June 7, 1985 as a result of notices in April and May *QST,* nominating petitions are herewith resolicited. See the above notice for details on how to nominate.—*Arline Bender, WA1VMC*

Moved and Seconded . . .

MINUTES OF EXECUTIVE COMMITTEE
No. 419
August 24, 1985

AGENDA

1. Approval of Minutes of May 18 meeting.
2. Certification of candidates for Director and Vice Director, and review of candidates' statements.
3. FCC matters:
3.1 Consideration of ARRL comments in PR Docket 85-215, Auxiliary Operations, due September 24
3.2 Consideration of ARRL comments in PR Docket 85-196, Maintenance of Question Pools, due August 30
3.3 Consideration of possible comments of ARRL in General Docket 85-231, Field Disturbance Sensors in 54-72 and 76-88 MHz due October 11, 1985; object would be to support FCC's initial determination that such devices not be operated in 50-54 MHz
3.4 Consideration of ARRL comments in PRB-2, Waiver for Use of Amateur Radio Frequencies for News Gathering Purposes, due October 10
3.5 Consideration of ARRL opposition to Request for Reconsideration, Denial of Certification for TV device; Rabbit Systems, Inc.
4. Local antenna/RFI matters
5. Review of progress on Board directives:
5.1 Development program
5.2 Executive Vice President
6. Report on plans for 1986 National Convention at San Diego
7. Report on the IARU Region 2 Executive Committee Meeting
8. Report on discussions with Statue of Liberty/Ellis Island Foundation
9. Recognition of new Life Members
10. Affiliation of clubs
11. Approval of conventions
12. Date and place of next meeting
13. Other business

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:30 A.M. Pacific Daylight Time, Saturday, August 24, 1985, at the Camelback Inn, Scottsdale, Arizona. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Leonard M. Nathanson, W8RC; Executive Vice President David Sumner, K1ZZ; Directors Thomas B. J. Atkins, VE3CDM, Paul Grauer, WØFIR, William J. Stevens, W6ZM, and Hugh Turnbull, W3ABC. Also present were Vice President Jay A. Holladay, W6EJJ; Secretary Perry Williams, W1UED; Directors Fried Heyn, WA6WZO, and Clyde O. Hurlbert, W5CH; and Counsel Chris Imlay, N3AKD.

1) On motion of Mr. Atkins, the Minutes of the May 18, 1985 meeting, were accepted as printed in *QST*.

2) The Committee proceeded to examine the qualifications and candidates' statements of those nominated for Director and Vice Director for the 1986-1987 term.

On motion of Mr. Atkins, the Committee found the candidates listed below to be lawfully nominated and eligible. In addition, John Imhoff, N2VW, was found lawfully nominated for Director, Atlantic Division, but the Committee was in receipt of a telegram from Mr. Imhoff withdrawing his name. William J. Stevens, W6ZM, was found lawfully nominated for Director, Pacific Division, but the Committee was in receipt of a letter from Mr. Stevens withdrawing his name. In the case of uncontested positions, the candidates were declared elected without membership balloting pursuant to the By-Laws, the terms of office to begin at noon on January 1, 1986; in case of contested positions, the candidates' names were ordered placed on ballots to be sent to Full Members of the respective Divisions, accompanied by the candidates' statements of no more than 300 words.

Atlantic Division
For Director: Hugh A. Turnbull, W3ABC
For Vice Director: Vince H. Bardsley, KB3OM
James M. Mozley, W2BCH

Dakota Division
For Director: Tod A. Olson, KØTO
For Vice Director: Howard B. Mark, WØOZC

Delta Division
For Director: Clyde O. Hurlbert, W5CH
For Vice Director: Lionel A. Oubre, K5DPG
Robert P. Schmidt, W5GHP

Great Lakes Division
For Director: George S. Wilson, III, W4OYI
For Vice Director: Carolyn S. Elliott, KA4JMZ
Allan L. Severson, AB8P

Midwest Division
For Director: Paul Grauer, WØFIR
Robert S. McCaffrey, KØCY
For Vice Director: Dick L. Eilers, WØYZV
Richard W. Ridenour, KBØZL

Pacific Division
For Director: Rodney J. Stafford, KB6ZV
For Vice Director: Cynthia DeLauney, W6PHT
Kip Edwards, W6SZN
Jettie B. Hill, W6RFF
Glenn E. Koropp, W6YFW

Southeastern Division
For Director: Frank M. Butler, Jr., W4RH
Carl D. Henson, WB4ZNH
For Vice Director: Evelyn D. Gauzens, W4WYR

A Committee of Tellers was appointed for the ballot counting on November 20 comprising Director Edmond A. Metzger, W9PRN, Director Hugh A. Turnbull, W3ABC, Honorary Vice President Robert York Chapman, W1QV, and Director Thomas W. Frenaye, K1KI, alternate.

Mr. Atkins reported that elections had been completed for President and Vice President of the Canadian Radio Relay League. Nominations were received only for the incumbents, Thomas B. J. Atkins, VE3CDM, as President and Harry MacLean, VE3GRO, as Vice President, so they were declared elected for two-year terms beginning January 1, 1986. In accordance with Articles 4 and 5 of the ARRL Articles of Association, Messrs. Atkins and MacLean thus continue serving as Director and Vice Director, respectively, of the Canadian Division, ARRL.

3.1) The Committee next considered the ARRL position in PR Docket 85-215, Auxiliary Operations. On motion of Mr. Grauer, Counsel Imlay was directed to file Comments in the Docket in opposition to the changes proposed by the FCC; in the Committee's view, auxiliary operations should be conducted only on frequencies above 220.5 MHz (excepting 431-433 and 435-438 MHz). Among reasons advanced during discussion were the necessity to avoid adding high-duty-cycle operations to the crowded HF and VHF bands, and the need to protect satellite and weak-signal communications (additional to those taking place in the already protected segments of 431-433 and 435-438 MHz).

3.2) Next came consideration of the ARRL position in PR Docket 85-196, Maintenance of Question Pools in the Volunteer Examiner Program and Acceleration of the Timetable under which Volunteer Examiners May Create Their Own Test Designs. Counsel Imlay presented a draft of ARRL Comments following the guidelines adopted by the Board of Directors: that FCC should retain maintenance of the examination pool and that only Volunteer Examiner Coordinators should be permitted to design examinations from the questions in the pool. Minor amendments to the draft were made, and the document ordered filed by the deadline of August 30.

3.3) The Committee then considered the League's position relative to General Docket 85-231, Field Disturbance Sensors in 54-72 and 76-88 MHz. On motion of Mr. Grauer, Counsel Imlay was asked to file comments by the deadline of October 11, supporting FCC's decision not to allow the devices also in the 50-54 MHz band as was originally requested by petitioner, Control Data Canada, Ltd.

3.4) Turning now to consideration of ARRL comments in PRB-2, Request for Waiver of Amateur Rules to Allow Use of Amateur Frequencies for News Gathering, on motion of Mr. Atkins, Counsel was ordered to file comments opposing in the strongest possible terms the unwarranted intrusion of broadcasting into an amateur band.

3.5) On motion of Mr. Stevens, the Committee directed Counsel to file comments in opposition to a Petition for Reconsideration by Rabbit Systems, Inc., following denial of an application for certification of a device that appears to have great potential for interference to and from Amateur Radio.

4) Counsel Imlay reported briefly on local antenna and RFI matters. Significantly, the FCC General Counsel had, at ARRL's urging, sent a letter to the U.S. Court of Appeals for the Sixth Circuit taking notice of the oral argument in Thernes [WM4T] v. City of Lakeside Park, Kentucky. The letter advised the Court that the Commission planned to take some action "by the fall" in PRB-1, ARRL's Request for Declaratory Ruling delineating limitations of local authority over federally-licensed Amateur Radio facilities.

5.1) There followed an extensive discussion of development plans under which new people may be recruited into Amateur Radio. The discussion covered reactivation of former Novices within the grace period, "target-market" segments, advertising and magazine articles to bring Amateur Radio to the attention of potential hams, study materials, local guidance and support ("Elmerism"), pictorial booklet, public-service announcements, ham-in-space video, cooperative arrangements with youth organizations, and encouragement of family-member recruiting. During the course of the above, the Committee was in recess for lunch from noon to 1:30 P.M.

5.2) Mr. Sumner reported on progress made in compliance with actions of the past Board meeting, concerning award certification by Special Service Clubs, Hq. assistance to the Emergency Communications Advisory Committee in its RACES study, the pictorial pamphlet for recruiting, Standard Operating Procedures for advisory committees, a membership application for youth members, and the possibility of adding Amateur Radio to military technical school curricula. General questions and answers on other ongoing programs followed. The meeting was in recess from 2:58 to 3:03 P.M. On motion of Mr. Grauer, the Committee accepted with gratitude and warm thanks the donation of an IBM System 34 computer by a member.

6) Mr. Heyn presented a brief report on preliminary planning for the 1986 National Convention at San Diego.

7) Mr. Atkins, who also serves as Treasurer of Region 2, International Amateur Radio Union, presented a short report on the July meeting of that group's Executive Committee. A more-complete report will be made upon receipt of the official minutes, due soon.

8) Mr. Sumner discussed a meeting he had held with representatives of the Statue of Liberty/Ellis Island Foundation. On motion of Mr. Stevens, the Committee agreed to make free space in *QST* available to the Foundation for an advertisement seeking donations for the restoration of the statue.

9) On motion of Mr. Stevens, the names of 47 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in *QST*. With this action, there are 19,324 elected Life Members, with an additional 150 Life Memberships in process on the Quarterly Plan, a grand total of 19,474.

10) On motion of Mr. Grauer, the affiliation of the following clubs was approved, all in Category 1: Bedminster Far Hills Amateur Radio Club, Bedminster, NJ; Central Valley VHF-FM Club, Stockton, CA; Coastal Plains Amateur Radio Club, Inc., Ashburn, GA; Farmers' Mountain Repeater Association, Inc., Portland, OR; Houston Echo Society, Inc., Houston, TX; Kosair Amateur Radio Club, Louisville, KY; Marshall County Amateur Radio Club, Marysville, KS; Mohawk Mountain VHF Society, Brookfield, CT; Neshoba Amateur Radio Club, Philadelphia, MS; Northern Arizona DX Association, Flagstaff, AZ; Society of Midwest Contesters, Streamwood, IL; Society for the Promotion of Amateur Radio Communications, Opelika, AL; South Jersey DX Group, Pitman, NJ; Spring Hill Amateur Radio Club, Spring Hill, FL; Western Michigan Packet Radio Association, Muskegon, MI; Western New York DX Association, Buffalo, NY; Wisconsin Experimental Radio Association, Milwaukee, WI.

With this action, the League has the following number of active affiliated clubs: Category 1, 1783; Category II, 15; Category III, 176.

11) On motion of Mr. Atkins, the Committee approved the holding of the 1986 ARRL Atlantic Division/New York State Convention in Rochester, New York, May 16-18. On motion of Mr. Grauer, the Committee withdrew the authorization for an ARRL

(continued on page 58)

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

St. Vincent '85

Why St. Vincent? Bob Allphin, K4UEE, J87J, J87UEE, felt that St. Vincent had a lot going for it, particularly in terms of a DX contest location. It is relatively close and a bit on the rare side for those looking for either an overall new country or a new-band country, and it is relatively safe both physically and politically.

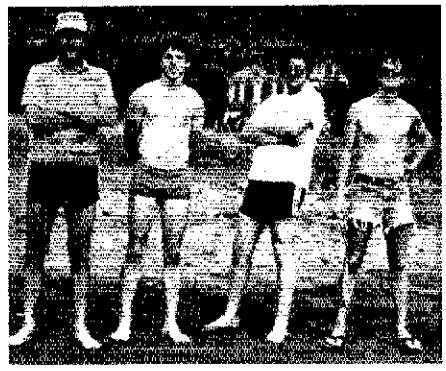
In October 1984, WB9TIY and K4UEE started discussion of where to go for the ARRL 1985 Phone DX Contest. (In 1983, they won the new multi 2-transmitter class from VP5KMX, and again in 1984 from K9GL/VP2V.) Some discussion with Bill, K4LTA, indicated that J88AC has been very helpful in Bill's operations on St. Vincent. Bob and Keith started keeping skeds with Vince for several months, working out the necessary arrangements. Keith suggested additional operators who wanted to join them, including K9GL (who had been with them on Tortola, BVI) and K9VV (with prior experience operating from CT1/VP5/VS6/EA/CR9/4X4/HL). A new ham, KA9CJG, also wanted to join up.

On February 20, the principals met in Miami, flew to Barbados, and then on to St. Vincent, a 45-minute flight away, where they were met by J88AC. Vince took them to the Permanent Secretary's office to discuss licensing, which occurred 24 hours and five visits later! As an intermediary, Vince proved most helpful in explaining their unusual call-sign request. The operators wanted a J87 call with their respective home call suffixes for use before and after the ARRL contest, and then a special call to use for the operating event. (Normally, they issue only home calls, portable J8.) Their persuasive arguments explained the importance of a short, easy-to-understand call sign that didn't require the use of phonetics. Two hours later they had it: J87J.

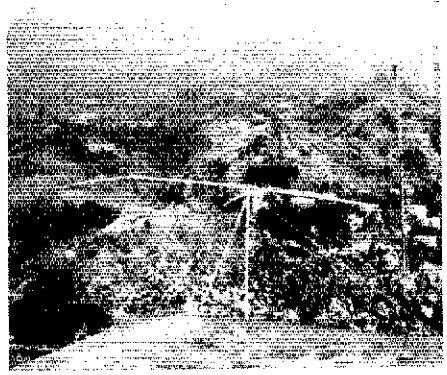
The initially chosen operating location on St. Vincent was a problem. The apartment lined up for them didn't have a good shot statewide. In fact, because of the island's terrain, the hotels and rental apartments were all on the southern end of the islands, near the beaches. This was Friday, February 22, and time was growing short (after all, CQWW 160 phone was to begin shortly!). Vince took more time off from work and located a better QTH, a lighthouse above the beautiful harbor at Kingstown, on a promontory 600 feet above the ocean looking northwest. (Bob comments that he thought he could see Florida, 1600 miles away!) Also on this promontory was the home of J88AF, from which J87UEE operated the top-band event for a successful 434 contacts, 44 states, 4 VE provinces and 41 countries—giving many newcomers and Europeans a "new one."

K9GL and K9VV arrived late Saturday night, took one look at the location and, with J88AF's acquiesence, decided to set up at his home for the ARRL DX Contest. During the week they set up antennas and completed the two stations—a TS-830S/MLA-2500 and an IC-745/MLA-2500. Antennas included a Hy-Gain TH3MK2 on a 25-foot mast (supplied by W8UVZ) and a TA-33 jr. on the roof (antenna furnished by K4SB). Other antennas included dipoles for 160 and 75, and a 3-element 40-meter wire beam supported by bamboo poles (supplied by J88AC). Rookie John, KA9CJG, arrived Thursday night during a party the group threw for the local radio club, an outstandingly friendly and interesting group—J88AC, J88AF, J88AQ, J88AR, J88BD—as well as several members of the local CB club (13 of whom are studying for their ham licenses!).

The 600-foot-high promontory, J88AF's QTH, where J87J was set up.



Prior to the contest, the J87J crew—(l-r) K4UEE, K9GL, WB9TIY, K9VV (KA9CJG missing)—relaxed on the volcanic black beach.



A view of the rugged terrain toward the northeast, showing J87J's tribander and 3-element wire 40-meter beam.

The contest went well, with good conditions on all bands (with the exception of 10 meters). Both 40 and 75 were particularly hot, with big pileups most of the time. The 75-meter station also served for 160, and they often had to leave big pileups on 75 to go to top band. (Maybe a lesson for next year?) Murphy struck just once, when the TA 33 jr. objected to the MLA-2500. In 30 minutes they were going again on 15 meters, with a 15-foot-high dipole (later replaced by the small tribander).

Sunday night finally came and with it, the final tally:

	Contacts	*Mulipliers*
160 meters	257	46
80 meters	1735	57
40 meters	1819	57
20 meters	3126	57
15 meters	2224	54
10 meters	136	19
Totals	9297	290

The approximate final score was over 8-million points. This compares with just under 10 million from VP5KMX in 1983, and 11+ million last year as K9GL/VP2V. Considering that they were another year down the wrong side of the sunspot cycle, and hundreds of miles farther from stateside than ever before, they were pleased.

All in all, a terrific trip. They made friends with some very nice people, gave a new country to a lot of hams and accomplished their goal of top multi 2-transmitter class for the third year in a row.

[Editor's Note: Bob has also operated as KR6LY, VP2KAE, ZF2FX, VP5FX, K4UEE/VP2V, K4UEE/C6A and J87UEE. He was also an operator at VP2KC, a 1979 CQWW world-record-breaking effort. Special thanks to K4UEE for his interesting report.]

NEW BANDS—DXCC CREDITS/CONTESTS?

At the ARRL Board of Directors meeting in July, some discussion took place on the possibility of using 10 and 24 MHz for both DXCC credits and contest operation. Up to now, the answer hasn't been a positive one, and may continue to be viewed that way. Our Regional IARU posture has been against this type use of the new bands. (After all, Amateur Radio

operating on 10 MHz is on a noninterference basis.)

It is a complex situation, and can be argued from several viewpoints. Certainly, there are few things that can stimulate that high degree of occupancy better than operating competitions and the DX chase! Certainly it is good to have more elbow room to relieve pressure on the modest amount of HF space now capable of supporting reliable HF DXing. DXers (and contest operators) by and large represent an unusually vocal segment of Amateur Radio. Demographically, they probably represent a fairly small percentage of the ham ranks (albeit an active one!).

Overt hostility toward DXers frequently takes place when a DXpedition pileup gets out of hand, and often during the heat of a contest operation. Thus, arguing the other side of the coin, isn't it nice for us as DXers to know that there are two DX-type bands where non-contest/DXers can go to escape the heat of the action and, while they're at it, possibly catch the bug themselves?

CEØAE

August *QST* carried the sad news of Father Dave's passing. Recent correspondence from CEØAE's brother, WB1ELI, clarifies several points. While CEØAE is survived by his five brothers, including WB1ELI, WA1PIQ, and KA5MMY, it was his brother, Father Reginald Reddy, OFM, a Franciscan priest from New York's Siena College, who flew to Easter Island to conduct the services. Father Dave's accomplishments were manifold, encompassing a long-standing interest in magic, philately, chess and the Boy Scouts.

DEADLINES

Almost monthly, your reporter receives items of substantial DX interest regarding events to take place within "just a few weeks." Unfortunately, this column can't extend magazine deadlines while awaiting hot news. If you're planning a DXpedition, or have other time-value news about special prefixes, etc., please note that copy for this column "closes" on the 14th of the month for the issue two months hence. For example, final writing on this column took place August 14. If time is short, give your reporter a buzz, after 7 P.M. Eastern Time at 305-248-0282.

Troster's Tips for Easy Listening

How does the DX station respond to a completed and confirmed QSO? Does he send QSL? Dit-dit? R? What? In short, if you work him, you will want to know how he will tell you that he received what you sent to him and that you are okay in his log. After a while, most DX stations working a pileup will get into a pattern, and you will detect how they respond to a "good" contact. It is very helpful to know this so you will not continue to call the DX station because you are afraid he didn't confirm your contact. (Listen!)

More next month from W6ISQ.

OPERATING STYLES

Things we do routinely, vis-à-vis our operating styles seem so self-evident that, at times, we forget that newcomers to our "trade" might possibly find them helpful. Seasoned DXers know by rote all of Troster's Tips, but the constant new crop of just-bitten DXers find them most helpful. Along this line, your reporter would be interested in *your* operating tips.

In fact, here's one your author routinely uses as a discipline while combing the bands, a routine well used by operating pros along the line of W9KNI. I keep a ruled pad in front of me while I tune the band, usually from the bottom "up." Anything of interest is noted. New-style gear makes it easy to note logging frequencies (left column) with approximate times, calls, names, locations, QSL routes, etc., to the right. At a later time, when you're cruising the band and hear just a few letters of a call on a certain frequency, you'll find it easy to figure out that the "AH" was FK8AH, etc., and can hustle to make the contact.

This is an easy operating tip that can bear generous fruit. If you like, staple the note sheet right into your log for future reference. Try it!

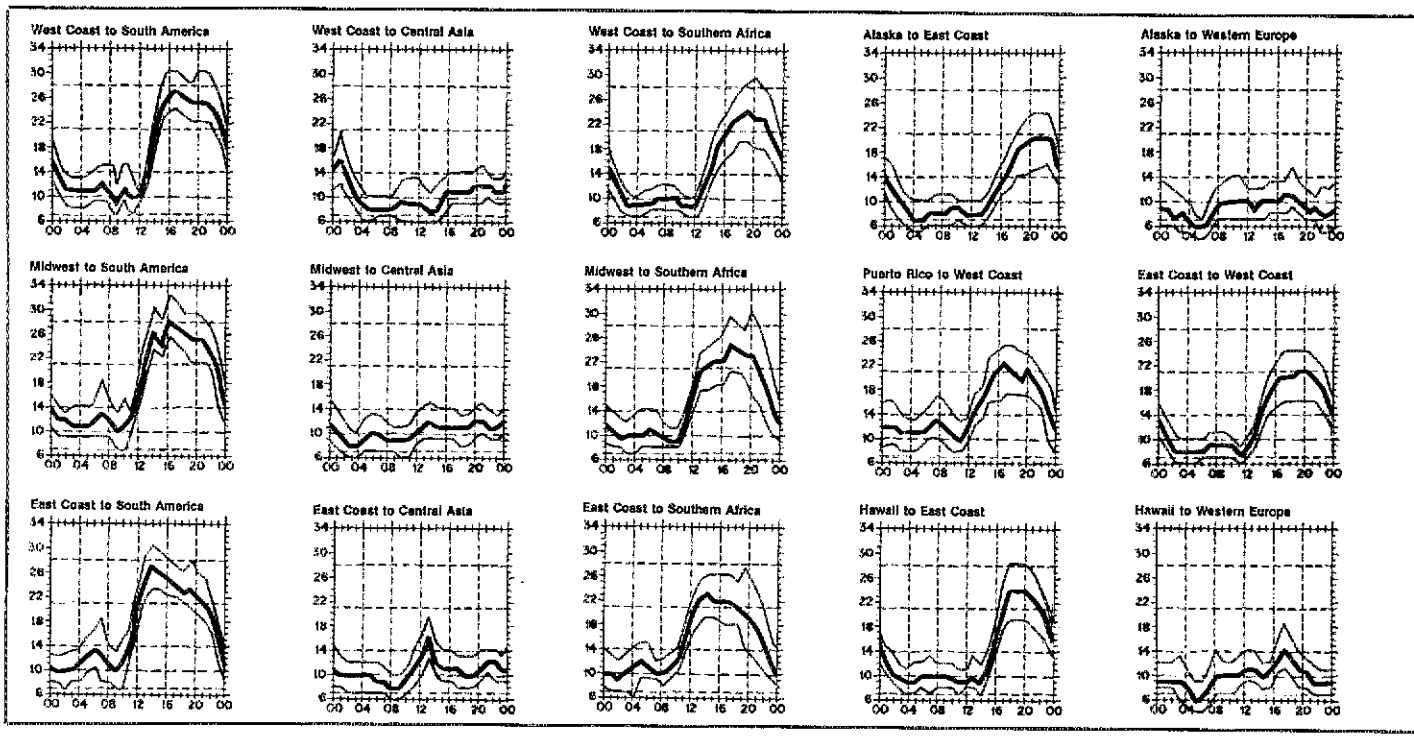
THE CIRCUIT

☐ **S42:** Al, ZS2U, says that he and some locals will be QRV from S42U either the first or second weekend in October—mostly CW barefoot. Watch for long path! (Thanks WA2HZR!)

☐ **National Conv.:** The DX Forum in Louisville will be Oct. 5 at 4 P.M. local, starring K5LZO and the TDXS 1985 Desecheo Island operation.

☐ **Desecheo/HI3RST:** Between June 21 and July 8, over 1200 cards for this station were mailed direct, except for those without s.a.s.e. or that went via the bureau. Jim assumed responsibility for managing the cards in late June and notes that considerably less than half the stations worked requested a card. Still need HI3RST/KP5? Send your s.a.s.e./request/card to Donald Jim Shearer, WØJRN, 5985 So. Milwaukee Way, Littleton, CO 80121-2831.

☐ **VU2CK:** K3GL is presently away from his home QTH and won't be able to handle confirmations—please go "direct" until John relocates either in California or Florida.



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

☐ **Hong Kong:** During the July Radiosport event, K5KG hoped to beat his 1984 score from OHØ. Cards for K5KG/OHØ go via Kim Carr, K5TU, 8302 Clover Gardens Dr., Houston, TX 77095. George also notes that QSLs for his previous operations (J3ABP, OHØ, OJØ, VS6) also go to K5TU.

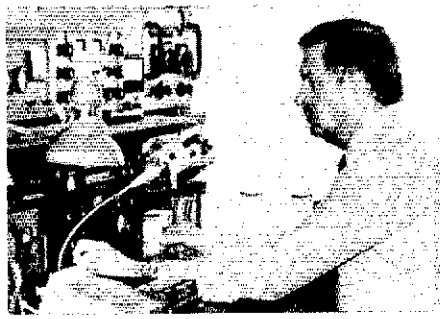
☐ **SW2:** 1986 will mark the 2300th anniversary of Thessaloniki, Greece. The Greek Radio Amateur Union, Macedonia Division, notes that 30 radio amateurs using the special prefix SW2 are planning all-year, all-band activity. For a special award, contact at least three of the SW2 stations (or one of them, along with the Radio Club SW2SV) and send appropriate cards to SV2SV with 10 IRCs. QSL Mgr. for SW2SV will be SV2SV, P.O. Box 10483, Thessaloniki, Greece.

☐ **Manitoba:** The special prefix CH has been authorized for use by VE4s October 16-November 16 to commemorate the 100th Anniversary of Louis Riel (whose 1869-70 rebellion established the nucleus of the province).

☐ **Montserrat:** This November, AJ6V will be returning to VP2MEV to single-op in the all-band category, CQWW CW. Ed changed his QTH last year, so be sure to direct cards to 25811 Estacada Dr., Los Altos, CA 94022.

☐ **Peter 1:** *The DX Family News Letter* raises the possibility of JF1IST having just a few hours on Peter I, if the JA krill boat leaves in December. It is chancy, at best, with a slippery landing from a rubber boat. JF1IST does *not* operate CW, which compounds the many problems. Final decisions should be made at the end of this month.

☐ **New countries?:** Some JAs are claiming that BTØNMN and BYØAA should count separately for DXCC since both are licensed by the local governments, which govern these areas separately from Beijing.



Durable Honor Roll DXer DL1BO, at 315/357 hurries from his city QTH to the country when prospects are good for a new one.

QSL Corner

Administered By Joanna Hushin, KA1IFO

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

CE3BRA (KD7TO)
C3ØBBA (F6ARI)
C3ØLBS (J1FOU)
EJ2B (ON5KL)
ELØAP (JH4NPP)
F6FCH (WA2ICE)
FOØASJ (N5DD)
G4WBJ (WA2ICE)
HH2VP (W1FJ)
HG4ØR (HA9KOB)
HG4ØU (HA8KVG)
HP1XKR (JA7AGO)
HSØIYY (JA8ATG)
JWØEQ (LA5NM)
OD5PA P.O.B. 166373, Beirut, Lebanon
OG1AA (OH1AA)
OH2MM/OJØ (OH2KI)
TU4BN (F6ATQ)
TU4BR (KN4F)
T47FM (CO7FM)
V2A (W2JT)
V2ACW (WB4OSN)
V3C (N5DDV)
XJ4RMP (VE4AKN)
ZC4WW (G3ZNF)
ZP5JCY (LU8DPM)
ZS3KC (K1ZLA)
ZV2ACZ (PT2ADV)
5B4MF (IK8DYD)
7S1SSA (SM1ALH)

QSL Manager Volunteers

WA2OIZ
KV3U

Special Notes

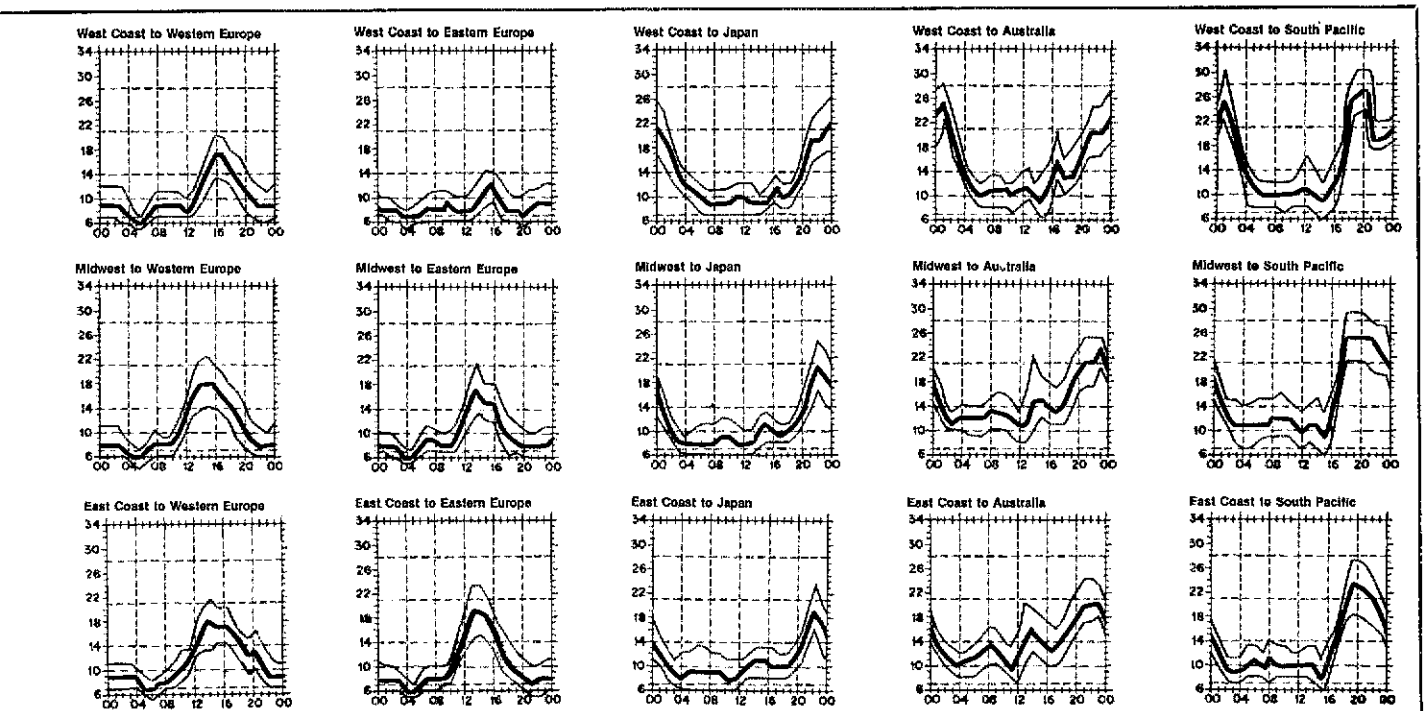
☐ In observance of the 41st anniversary of the Normandy Beach Invasion, June 1944, special prefixes were issued as follows: FV1PAX (F8BO); FV6PAX (F8BO). The operation took place on June 15, 1985.

☐ From July 7 to July 19, 1985, a group of Danish amateurs operated from the Republic of San Marino, T7, using the club call T7ØA. QSL direct only to OZ1HWS, P.O. Box 348, 3000, Helsingoer, Denmark.

☐ The following are *not* QSL Managers
TJ1FF (W9JW/4)
KH7CA (WA2ILB)
9M6VW (KØIA)
V3C (N5DDY)
DL7FT/SV/A (W3AZD)

☐ The new address of VK5 QSL Bureau is VK5 QSL Bureau, John Gough, VK5QD, Post Office, Williamstown, SA 5351, South Australia.

☐ QSL Corner, June 1985 *QST*, page 55, contains information and addresses for ARRL Incoming Bureaus. QSL Corner, Sept. 1985 *QST*, page 63, contains information on the operation of the ARRL Outgoing Overseas QSL Service. For additional information on bureau operations (Incoming and Outgoing), send an s.a.s.e. to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.



the lowest curve (optimum traffic frequency, or FOT). See April 1983 *QST*, page 63, January 1977 *QST*, page 58, September 1977 *QST*, page 35, and January 1979 QST, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for October 16 to November 15, 1985, assume a sunspot number of 12, which corresponds to a 2800-MHz solar flux of 74.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from June 17 through June 30, 1985. An s.a.s.e will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DK4NU/185 JR1TXR/143 PY2MIK/113 VE7EIK/150 N2JW/104 WA2WSO/115 WA3SPJ/176 KC4XA/102 N5CCX/129
G3ZOH/102 JE2VDG/113 TF5EP/110 YC0EBS/103 W2KKZ/221 KS3F/113 K4BOJ/105 KI4WA/105 AB9O/221
JA1NIR/109 OZ5EV/321 VE2FDY/101

Radiotelephone

DL5HBL/106 I6GKI/106 JE2VDG/113 TF5EP/104 W2FV/124 KD4XN/151 KD5YQ/103 KA7KZS/102 KA9MOM/100
EA3BTO/116 JR1TXR/142 JA7WKG/131 VE7AHA/296 W2KKZ/205 N4FZH/104 N5CCX/116 WD8BKT/103 KC0DJ/101
EA4CPK/112

CW

DL1NR/105 OH2BMC/103 OH2BVI/168 ON5CW/130 OZ1JLX/105 W2FV/160 K7BUY/100 N7EPD/104 K0IYF/126

RTTY

W5ZPA/106 K5KR/102

5BDXCC

AB9O W0KZV HC8MD YO6VZ VE3GCE KM1D I5ZJK W4OHZ

Endorsements

Mixed

DJ7ZG/343 I1APQ/330 OK3MM/356 ZL3IS/354 NA2N/149 K4YR/358 K6TWU/312 WB6FZN/225 WD8IFX/259
DL1BS/326 I0TIC/183 ON4IZ/347 ZS6LW/355 W2BOK/358 KC4CT/300 KG6AM/202 K7NN/330 K9BIL/304
DL1LD/333 JA1OCA/332 ON4NC/362 AB1A/294 W2FV/214 N4BQD/270 N6GM/345 KB7QC/281 K9CJK/340
DL3NBL/177 JA2AIR/332 PA0NA/321 K1RM/336 W2GKZ/344 N4PN/326 N6JJX/162 KB7QD/252 N9DOK/251
DL6KG/332 JA2JSF/321 PA0LOU/354 KA1CFA/152 W2GT/360 N4XR/311 N6UC/333 N7RO/330 N9ZN/346
DL7BK/347 JA3EMU/325 PY1APS/337 KA1KWD/125 W2LPE/359 W4IF/353 W6BS/358 W7BGH/348 W9GU/351
DL7HU/351 JA3FYC/317 PY2BW/329 W1EOA/329 W2SSC/358 W4JD/330 W6KH/353 W7EDA/331 W9IU/346
DL9OH/353 JA4AFT/332 SM3CXS/336 W1HH/353 W2TQC/355 W4VUL/270 W6KTE/344 W7FR/317 W9KB/329
EA3NA/323 JA7PL/319 SM4CTT/316 W1IKB/315 WA2DIG/351 W4YV/331 W6KYT/336 W7OF/359 W9KNI/347
F6BEE/313 JA7WKG/251 SM5BBC/336 W1RLQ/348 WB2YQH/330 WA4WIP/340 W6KZL/358 W7OIH/140 W9TKV/355
F9DK/129 JA9EYI/134 SM6EOC/331 WB1CCH/300 K3WGR/238 K5BDX/281 W6LQC/330 WA7FIG/318 W9ZM/365
G3AAE/361 JA9GPG/210 SP3BYZ/201 K2AGJ/326 W3CWG/358 W5DOZ/319 W6PT/359 K8MC/291 WA9NUQ/337
G3FKM/359 KL7VZ/200 VE3DMC/306 K2BK/356 WA3HUP/335 W5IRG/319 W6RJ/345 W8DGH/338 K0IYF/162
G3YBH/260 OH2BCV/328 VE4IU/260 K2CL/336 WA3LFU/151 W5JLU/314 W6RKP/356 W8JIN/366 KA0FPK/252
HB9MQ/359 OH2BMC/224 VE7AHA/311 K2JMY/343 K4DJ/339 W5KC/365 W6SN/352 W8PHZ/357 W0CJZ/335
HB9MX/352 OH2QQ/354 XE1VV/286 K2QPM/150 K4LR/307 W5TO/339 W6TJI/304 W8QY/355 W0GKL/351
HI8LC/310 OK1MP/347 ZL1ARY/339 K2UU/325

Radiotelephone

CT1FL/333 G3YBH/259 JA9GPG/210 PY2BW/318 K2UU/324 K4JDJ/250 W6BAF/351 WB6FZN/225 W8JIN/354
CT1UA/320 HB9BIN/128 LU2DX/324 SM3BIZ/356 KA2QYL/149 K4LR/304 W6CCB/330 WB6POP/317 WD8EMI/298
DJ3QX/326 HI8LC/309 LU3AJW/313 SM0ATN/324 KB2VK/302 KC4CT/299 W6KON/324 WD6AFC/207 WD8RKT/280
DJ9ZB/329 I1APQ/330 LU3YL/W4/322 VK6RU/363 N2EGR/210 W4BLB/250 W6KTE/343 K7FE/303 AB9O/221
DJ7ZG/342 I6IXJ/248 OA4OS/334 VO1CU/324 W2BOK/311 KV5E/251 W6KYJ/318 K7NN/329 K9BIL/299
DL1BS/270 I0TIC/176 OE1PPC/150 XE1VV/282 W2GT/308 NI5D/151 W6LQC/330 KD7FD/198 W9GU/328
DL7HU/348 JA1OCA/329 OE2WJL/285 ZS6LW/354 WA2NBV/186 KA6JDH/181 W6NLG/297 KD7TO/128 W9RNX/357
DL9OH/353 JA2JSF/309 OH2BMC/172 KB1BE/290 WB2NIC/303 N6UC/333 W6RKP/350 N7RO/326 W9ZM/353
EA4JL/335 JA3FYC/218 OK1MP/340 K2AGJ/315 W3CWG/356 W6AED/325 W6SN/305 W7FR/294 WA9NUQ/337
EA5JC/157 JA4AFT/329 PA0LOU/307 K2BK/318 K4DJ/318 W6AXH/323 WA6AHF/332 WA7FIG/316 W0GKL/350
G3FKM/355 JA7PL/313 OZ5EV/321 K2JMY/343

CW

DL1BS/261 JA3FYC/310 OK1MP/299 SM4JCE/156 VE7AHA/254 W6PT/313 K9LJN/200 W9KNI/320 W9ZM/309
DL1LD/202 JA2TK/275 PA0LOU/271 SM6EOC/228 K2AGJ/291 K9BIL/256 W9KB/256

(continued from page 54)

West Gulf Division Convention in September 1986, cancelled by its sponsoring group. The Committee took note of its prior mail votes approving the holding of a South Florida Section Convention, St. Petersburg, October 12-13, 1985; a Pacific Division Convention, Las Vegas, NV, November 2-3, 1985; and a North Carolina State Convention, Raleigh, April 13, 1986.

12) The next meeting of the Executive Committee was scheduled for Atlanta, Georgia, on Saturday, December 14, 1985.

13) On motion of Mr. Atkins, Deanna K. Jajliardo, Chief Accountant, was authorized as an additional signer of ARRL checks on behalf of the Treasurer.

There being no further business, the Committee adjourned at 5:15 P.M.

Respectfully Submitted,
Perry Williams, W1UED
Secretary

LIFE MEMBERS ELECTED
August 24, 1985

Ronald Alexander, KD8ID; Alan L. Anderson, KA2GYL; James M. Bonner, K4UMD; David W. Bonser, N3DHJ; Richard L. Clark, K2LF; Marian J. Cottingham, KD0NP; James Kevin Davis, AD9M; Barbara J. Dodero, WB6IZB; George Buxton, N7EZJ; Stephen M. Gilbert, WA1AYS; R. Richard Gobel, K0US; Jennifer A. Goble, NE0M; Tom Guthrie, K2QGT; Lynda Hawke, KA1FKS; James O. Headlee, KJ4B; Robert Koerner, WB1AUW; Virginia E. Koropp; C. Mike Lamb, N7ML; Eva J. Licht, KA2OVA; Chao H. Lin, NE5O; Alice O. Lombard, N4DDK; Shripal P. Manilal, VU2SPM; Sheldon E. Mann, N0DRX; Peter A. Markavage, WA2CWA; Edward L. Morgan, NM0C; James P. O'Callaghan, DDS, NY4M; D. Parthasarathy, VU2DQP; Neil J. Remaklus, KA8PGH; Peter Rimmel, K8UNP; Joseph Rose, WA2PJP; Lance T. Rumfield, WD5KCX; Bruce A. Samborski, WA1OSG; Patricia Sanders, WB4FAJ; Carl E. Savage, KC4HN; John T. Schnetzer, WB9SAU; Rachel E. Sikes, KE4VS; Alan L. Silverman, N2DUI; Joseph J. Smaldino, N6ENS; James C. Smith, Jr., WB0MJY; Clara B. Stables, WB4NXR; William B. Stacy, K7EY; Lawrence Sutter, WD6FXR; Miles C. Tuthill, WN4X; Diane T. Vorwald, WD9DNQ; Keith G. Walkuski, WA3KYC; Lloyd C. Wood, N4HMD; Gary L. Zeller, KZ0H.

Correspondence

Conducted By Bruce Kampe, WA1POI
Information Services Assistant

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

NOVICE POWER LIMIT

☐ I agree completely with your ideas on Novice enhancement, with the exception of the "high power" limit at HF. I feel if a non-Novice wants to operate in the Novice segment, then he or she should be bound by the Novice rules. The Novice has to compete with enough problems on 80 and 40 from nonham activities. Why make it more difficult than it already is? What would be the next step: phone and RTTY operations for non-Novices in the Novice bands? We non-Novices have our own bands for kW operations.

The rest of the proposal is great and may accomplish its goal, but the high-power limit would be very detrimental. Keep up the good work!—*Thomas L. Mahoney, K5CI and Andrea R. Morales, KA5TNF, Texas City, Texas*

[Editor's Note: In its reply comments to the FCC regarding the Novice expansion proposal, the League modified its transmitter-power specifications to 200-W PEP output for all amateur licensees operating within the 80, 40 and 15-meter Novice subbands.]

EXAM FEEDBACK

☐ After having given four volunteer examination sessions here in Hilo, I really feel you folks are doing a fantastic job! All of our test sessions have gone very smoothly, thanks to the efforts of you folks back there in Newington. I want you to know your efforts are noticed and appreciated.—*Army Curtis, AH6P, Hilo Hawaii*

DIGITAL REPLY

☐ With reference to the comments made by WD5ELJ, Jack Coffee, in August 1985 *QST* regarding the proliferation of RTTY mailbox and MSO systems on 20 meters, I have to admit that what he said has some merit, and I'd like to add a few comments of my own.

The last few "Christmas" holidays have put a tremendous burden on 20-meter RTTY. It seems that every ham that received a VIC-20 or Commodore 64 as a present decided to put it on the air, and the QRM caused by these additional stations has really been something. And they, like me, are certainly entitled to put them on the air.

Those of us who have been running real, viable mailbox or MSO-type operations since 1978 have really tried to work with others, but I have to admit that it's been unproductive. The two groups that really have been the mainstay of 20-meter RTTY are the "National Autostart Frequency" on 14.0877 MHz and the "International Mailbox Frequency" on 14.0975 MHz. These two groups are the oldest running RTTY groups on the air today, and they have helped many a ham get started in RTTY. They have also been instrumental in many of the state-of-the-art RTTY electronics we have today. These two systems operate at 74 bauds (100 WPM), which helps to speed the traffic along, as there are many, many users from all over the world. The 14.0975-MHz group has 17 computerized systems on at present, and there is seldom a conflict. An unwritten gentlemen's agreement exists among the users, so there is very seldom a major problem. I know personally almost all of the users of both groups, and have found them to be really fine operators, considerate to all and willing to help anyone who requests it.

These two groups have come a long way in furthering the state of the art for RTTY on the high frequencies and also on VHF. Their expertise and capabilities have been responsible for all the new methods and equipment we have today. Where would AMTOR and packet be today without their knowledge? What new equipment would be available from manufacturers without their ideas and suggestions?

We have all seen the inconsiderate operators who are running illegal beacon operations, breaking into QSOs with the claim that others are "illegally" operating on "their" exclusive mailbox/MSO frequency, and those who cause malicious QRM. But keep in mind that these are the same "lids" who do the same on CW, SSB, etc., and are not restricted to RTTY alone.

By and large, most RTTY people are courteous and run legal operations. Those people who run mailboxes or MSOs with a beacon usually disappear after a few weeks on the air, as the good operators have learned a long time ago not to bother with them.

Mailboxes and MSOs are a very viable part of RTTY operations on 20 meters, and are here to stay. They are a very important service to the ham fraternity. Keep in mind that they are also used by NASA, the FCC, MARS and the military. I believe that the time has come for the ARRL to recognize the existence of microprocessed RTTY and to have a section in *QST* dedicated to this mode.

It is also time for CW and RTTY operators to learn that they have to live together in the very small section of the bands we both operate in. CW has been slowly sliding up to 14.100 MHz, as their part of the band is also getting crowded, yet I have yet to hear of a RTTY station going down into the CW portion. (I do not mean to imply that this has never happened!)

If you have a RTTY-related problem we might be able to help you with, c'mon up to 14.0975 MHz (74 bauds, with shift on LSB) and let us know. We are active 24 hours per day, seven days a week, with over 300 users worldwide (many with exotic calls).

Don't fight us—join us and let us help each other achieve not only state-of-the-art equipment, but state-of-the-art operations. Let's show the world how professional we can be.—*Jerome Trichter, WA1IUF, New Haven, Connecticut*

FREEZE CW

☐ My first Amateur Radio license, a Commerce Department "Temporary Amateur" ticket issued in 1928, specified the authorized mode of transmission as "slow speed telegraphy." Through personal preference, I have stuck to this mode practically all of my ham radio life.

In their wisdom, the FCC continues to authorize CW emission on all frequencies within the HF ham bands as a last-ditch mode of communication that will get through when all others fail. True, certain subbands have been allocated to telephone over the years, but CW continues to be authorized in these segments as a reliable backup when voice communications break down temporarily. This, I believe, is as it should be, since I have yet to see such provision maliciously abused.

In addition to FCC regulations, there is a gentlemen's (and ladies') agreement effectively confining teletype, AMTOR and other recently developed modes to certain band segments, which have been moving ever closer to the "straight CW" region, generally toward the low frequency limit of each band.

It would seem appropriate and, in my view, desirable to preserve the following band segments for straight CW work; in effect, "freezing" them about where they are now: 1800-1825, 3500-3650, 7000-7075, 14,000-14,075, 21,000-21,100 and 28,000-28,200 kHz.

Also, how many "keyboard" ops have a hand key or bug permanently wired into the keying circuit in case of computer breakdown? Not many, I think.—*Clarke F. Koffke, KBØB, Grand Island, Nebraska*

BAD APPLES

☐ Last night, as I was tuning through 80 meters, I came across an argument. Apparently, two amateurs were claiming the frequency was theirs exclusively and that others should get off the air. Half the time, they were talking over each other and adding more power.

I was demonstrating ham radio to a younger person at the time. How could I reply to, "This is worse than CB. At least there I don't need a license to listen to others argue!"

I had no explanation since these amateurs—and I use the word in this case loosely—hold Extra Class licenses! Is this any way to attract new hams? I remember when Amateur Radio stood for thoughtfulness, diplomacy and fellowship. I realize that every barrel has a few bad apples, but at least *keep it off the air!—Kenneth Hout, KA3LEF, Everett, Pennsylvania*

The World Above 50 MHz

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

Long-Haul Sporadic E At 50 MHz—It's For Real!

If there were any lingering doubts as to the ability of sporadic-E propagation at 50 MHz to extend far beyond what has been recognized as double-hop distances, the events of this past summer's season should dispel them. Note the distinction between sporadic E, or E_s, and F2. The latter commonly produces single-hop propagation of about 2500 miles and multihop propagation that can stretch around the globe. The intense E-layer ionization, which we call sporadic E, produces single-hop ranges of up to about 1200 miles. The difference is due to the height of the two layers. The E layer is at about 60 miles above the earth, while the F region can be 150 to 250 miles.

Everyone who was active on 6 meters during the "golden" years of 1979 through the spring of 1984 has fond memories of DX signals coming from strange countries half a world away. That DX was a product of the F2 layer, which is formed by ionization produced by ultraviolet radiation emanating from the sun. The amount of ultraviolet coming from the sun varies with the solar cycle. During years when there are few sunspots, that radiation is lower than it is during years of high solar activity. During those years at the bottom of the solar cycle, such as we are presently experiencing, the F2 layer is less ionized, and thus the frequencies it will reflect back to earth are lower than those during high-sunspot years. This is why we are no longer encountering F2 DX on 6 meters during the fall, winter and spring months. It's also why 10 meters and even 15 are almost dead these days. Take heart, however, F2 ionization will increase in about 3 to 5 years, perhaps enough to again furnish worldwide 6-meter DX. One cannot count on this, however, as solar cycles vary. Not all are as good as the one we have just been through. One thing is certain. The higher HF bands, 15 meters, 10 meters and the new 12-meter band will be alive with signals about 1989, if not sooner.

The cause of sporadic E is, at present, not completely understood. One factor that complicates finding an explanation for it is that there appear to be several types. Some evidence suggests that one type, known as mid-latitude E_s, forms above particularly intense weather systems, such as thunderstorms and tornadoes. Particularly those thunderstorms that reach very high altitudes (50,000 feet and above) appear to be associated with this type of E_s.

An extensive paper on the subject of mid-latitude E_s and its possible cause, by Mel Wilson, W2BOC, was published in December 1970 and March 1971 *QST*. Another article on the subject, particularly addressing E_s at 2 meters, further supported Wilson's theory of a connection between intense weather systems and mid-latitude sporadic E. It was written by Jim Stewart, WA4MVI, and appears in February 1984 *QST*. Whatever produces this heavier-than-customary ionization in the E layer seems to be relatively independent of solar activity. It is generally a summertime phenomenon, but there also exists a kind of miniseason in late fall and early winter.

Another type of E_s is known as auroral E. It is more prevalent at higher latitudes, and usually occurs during or after an aurora. Auroral propagation, as most VHFers know, is characterized by buzzsaw-sounding signals that generally peak in a northerly direction, regardless of the true direction to the station. Since auroras are caused by particles arriving from the sun interacting with the gases of the upper atmosphere, and because the frequency and magnitude of such particle eruptions depend on solar activity, auroras and auroral E do tend to be less frequent and not as intense during low-sunspot years.

This discussion of long-haul E_s propagation will be continued next month. Included will be a number of instances in support of its existence and a plea for governments not currently permitting 50-MHz amateur operation to make provisions so that their amateurs can participate in gathering data on this interesting and important phenomenon.

ON THE BANDS

6 Meters—The July 30 E_s opening between the East Coast and the British Isles certainly ranked as one of the greatest thrills in this conductor's 37 years on 6 meters. Prior to it, in my wildest dreams I had hopes that maybe, about 1990, F2 and longer operating hours for the G stations might team up to let some of us North American 6-meter enthusiasts add a few U.K. countries to our 50-MHz DX rosters. I even harbored a faint glimmer of hope that some of us in the Mid Atlantic states might be able to work one or two G stations on a fleeting E_s opening. As reported last month, one such E_s opening took place July 2. But who would have thought that a much bigger one would occur again so soon, and so late in the season? On top of that, it was a long opening, lasting upwards of two hours. It was also very widespread, stretching from New England to northern Florida. Although this time, unlike previous European E_s openings, the Is did not participate to the extent that those of us farther to the south did. Most northern stations report hearing only a few very weak signals. But those of us in the Mid Atlantic states fared much better. W4CKD, in the Virginia suburbs of Washington, made his first 6- to 10-meter crossband contact at 2152Z and went on to work four G stations via that mode prior to 2230, when those with special 6-meter permits are allowed to begin transmitting on 50 MHz. After that, Bob went on to work another 14 U.K. stations. Another busy individual was KB3QM in Delaware. Ron was racking up G contacts at a rapid rate. I can't complain. After being alerted by a phone call from WA3DMF, eight Gs plus GJ3YHU and GW4BCD now grace the W3XO log. Three new countries in about an hour isn't bad on any band! Farther to the south, W2CUK writes from Myrtle Beach, SC that he worked VP9GE at 2302Z, followed by eight Gs, the last at 2327. At 0130, Tom picked up a new state by hooking up with Denver OM/XYL team NØEAO and KAØNNO. These contacts were followed eight minutes later by W6RXQ. Quite an evening—working from Europe to California via 6-meter E_s in the space of a few hours!

From the perspective of the U.K. operators, G3COJ reports nine W QSOs between 2230 and 0005Z. Brian lists W4CKD Virginia, K2MUB New York, K3ACR and W3JO Pennsylvania, KB3QM Delaware, W2HFI New Jersey, W2CUK/4 South Carolina, W3XO Maryland and KA4DVH Florida. He says he heard 10-meter signals from W3 beginning at 2145 and completed a crossband contact with W4CKD 18 minutes later. Also attesting to the widespread nature of the opening, this conductor heard a 0 calling one of the G stations, although the British station came back to a W4. Although no contact resulted, the fact that propagation was extending to the Midwest at all is encouraging.

This was not the last of the E_s openings between North America and Europe. A few days later, on Aug. 6 about 2245Z, a number of stations were able to work crossband with EA4CGN. The information I have indicates that K1ZFE, K2MUB, WA1OUB, WA1UQC, W2CAP/1, W3JO and perhaps others were in on this one. These contacts took place during a very intense E_s opening in which Connecticut stations were able to hear K1TOL and KA1PE in Maine with very loud signals via direct E_s.

What appears to be a good example of auroral E is reported by WD9FFC Lake Station, IN. Russ says that at 0715Z July 27, he worked KL7NO in Fairbanks, AK. Signals ran from S2 to S9 with aurora modulation at times. Openings such as this between the upper Midwest and the Northeast to Alaska have been reported previously. They usually follow an aurora and normally occur quite late at night.

As noted last month, there is encouraging news on a 6-meter allocation for our G friends. It has been announced in the British Parliament by the government official responsible for telecommunications that U.K. amateurs are to be allocated 50.0-50.5 MHz. No mention was made as to when or whether operating time restrictions will continue to apply, however. This is the first step in what may be a long process, but it is good news indeed. A couple of hundred U.K. stations on the band without time restrictions should make for some interesting times for many 6-meter operators on this side of the Atlantic as well as in many other parts of the world.

Stay tuned!

The Other Bands—It's the West Coast's turn for some really big news for 2 meters and the higher bands. Once again, the tremendous duct that forms from the California coast to Hawaii is the producer of very exciting contacts. The first opening occurred over a two-day period, July 12 to 14. What made it unique was not only the fact that it stretched from the Mexican border to well north of San Francisco, but that it also extended quite far inland. Previously, these ducts have stopped almost at the shoreline. This time, stations in the San Bernardino area, 40 miles east of Los Angeles, and in communities on the east side of San Francisco Bay and beyond were able

23- and 13-Cm Standings

Listings are call, state, number of states worked, number of call areas worked, number of grids worked and best DX in statute miles for farthest terrestrial contact. Call areas are the 10 continental U.S. call areas plus KL7 and KH6, plus VE and XE call areas, plus other DXCC countries not located within the borders of the U.S., Canada or Mexico. Those not submitting updates or showing an interest in being listed in the Standings over a two-year period, are subject to being dropped. Compiled Aug. 15, 1985. Deadline for next update is Feb. 1, 1986.

23 Cm

W2SZ/1	MA	16	8	34	—
K1FO	CT	14	6	20	468
K1PXE	CT	13	5	—	448
W1JR	MA	12	7	26	655
WA1JOF	MA	12	4	18	725
W1RIL	MA	10	4	12	372
W1XP	MA	7	5	—	300
K1LPS	VT	7	5	—	288
W1QXX	MA	6	3	—	260
K2UYH†	NJ	20	9	—	770
WA2LTM†	NJ	17	6	—	770
W2VC	NJ	15	6	25	537
W2DWJ	NJ	15	5	—	—
K2YCO	NY	11	8	—	570
W3EVJ	NY	10	6	—	426
K2JNG	NY	10	4	—	305
W2PGC	NY	6	6	—	473
WA2FUZ	NY	5	3	—	125
WA2EUS	NY	4	5	—	320
N2BJ	NY	4	3	—	—
K2OVS	NY	3	2	—	135
WA3JUF	PA	14	5	20	300
WA3NZL	MD	11	7	—	780
W3HMU	PA	11	5	—	300
K3IUV	PA	9	4	—	290
K3HZO	MD	9	—	12	—
W3IP	MD	8	5	12	369
K4QIF	VA	15	6	—	790
WA4NXY	KY	9	5	15	730
W3IY/4	VA	7	5	—	274
K4NTD	FL	4	2	—	847
WS4F	GA	3	1	7	—
K4KJP	FL	2	2	—	670
W4VHH	GA	2	1	—	350
WB5LUA†	TX	20	23	49	1073
W5HN	TX	10	4	—	1071
W5DFU	OK	7	3	13	600
WA5TKU	TX	5	3	18	1112
K5DHU	TX	5	1	12	—
WB5AFY	TX	5	—	20	—
WA5VJB	TX	4	3	—	952
K5MWH	AR	4	2	—	200
W5HPT	TX	4	1	—	571
KR5F	TX	3	2	—	750
W5UWB	TX	3	2	—	720
N4JS/5	MS	3	2	—	467
W5RCI	MS	3	2	—	—
WB5LBT	LA	3	2	—	—
N5BBO	TX	2	2	3	1042
K5LLL	TX	2	2	—	847
W5LDV	TX	2	2	—	847
W5UKQ	LA	2	1	—	365
WA5DBY	TX	2	1	—	—
WA5TBE	TX	1	1	—	571
W5GVE	TX	1	1	—	366
K5PUF	TX	1	1	—	290
WA5HNK	TX	1	1	—	250
W5ASH	TX	—	—	—	1066
N6CA		8	10	30	2472
K6ZMW		4	3	—	402
W6KGS		3	2	—	362
W6XJ		2	3	—	250
W6OQQ		2	2	—	200
WB6NMT		1	1	—	296
KC6AJ6		1	1	—	130
N6TX		1	1	—	112
K7GNV/7	AZ	5	3	6	426
N6NB/7	UT	4	2	—	295
WB5TCO/7	AZ	2	2	2	403
WA7JUO	NV	2	1	—	—
W7LUX	AZ	1	1	—	130
W8YIO	MI	16	12	30	551
K8WW	OH	16	7	32	448
WB8BKC	MI	15	7	33	650
WA8TXT	OH	12	7	—	550
WB8PAT	OH	4	3	—	405
W9ZIH	IL	20	9	—	790
WB9SNR	IL	13	7	16	760
W9UD	IL	5	4	—	760
W9JIY	IN	5	3	—	300
W9WCD	IL	3	3	—	770
W9AAG	IL	2	2	—	350
WØOHU	MN	12	5	18	814
WØRAP	IA	11	4	14	678
WBØDRL	KS	8	2	19	—
WØYZS	MO	4	2	—	425
KØALL	ND	4	2	—	283
WØPW	CO	3	2	3	97
WØZJY	KS	3	1	—	170
WØMDL	MN	2	2	—	340
WØVB	MN	2	2	—	290
KH6HME		2	2	—	2472
VE3LNX		7	5	18	—
VE4MA†		3	5	8	475
XE2BC		1	1	—	370

13 Cm

W2SZ/1	MA	6	6	10	—
W1JR	MA	3	1	1	100
WA3AXV	PA	6	3	11	194
WA3JUF	PA	5	3	10	—
W4HHK†	TN	7	5	6	582
WA4HGN†*	TN	5	4	8	508
WB5LUA	TX	4	2	15	508
WA5VJB	TX	2	1	8	105
WB5AFY	TX	1	2	2	—
K5PJR	OK	1	1	1	271
WA5DBY	TX	1	1	1	65
WA8TXT	OH	3	3	4	291
W9ZIH	IL	5	2	340	—

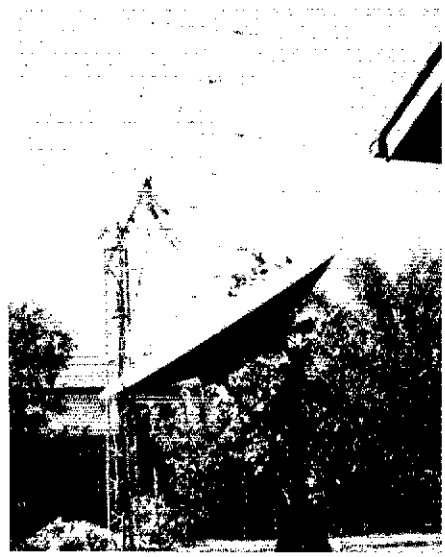
†Some contacts made via EME
*Silent Key

to join in the fun. Both KH6IAA and KH6HME set up shop 8000 feet up on the side of Mauna Loa. KH6IAA says the fact that they were about ½ mile apart restricted their operation somewhat. When they both operated on the same band, they had to take turns working each California station. Al also had to return to Hilo early Saturday afternoon because of a previous commitment. Nevertheless, he managed about 40 QSOs during his stay on the mountain. KH6IAA's 2-meter setup consists of an IC-211 to a 100-W amplifier and an eight-element quagi about 12 feet above the lava flow. He reports that one of the high spots of that session was KH6HME's completing a 23-cm SSB contact with N6CA. Paul had worked Chip last year for a new world record on the band, but on CW only.

K6QXY, who is well situated at a site 2000 feet above sea level near Santa Rosa, 50 miles north of San Francisco, says that both KH6HME and KH6IAA were in with very strong signals for 36 hours, with KH6HME especially strong on 70 cm. N6AMG, who is at his new site at El Sobrante at the northeastern end of San Francisco Bay, reports first hearing the Hawaiian stations on 2 meters and later on 70. Probably the most inland station to make the grade on 2 meters was W6YKM at Pine Grove, about 40 miles southeast of Sacramento and some 100 miles from the coast. He was certainly helped by his QTH at 3000 feet above sea level. In Southern California, the honor for being the most inland station appears to go to K6PVS, who is located at Hesperia, about 20 miles north of San Bernardino. He may also hold the 2-meter DX record for the W6-to-KH6 path with a distance of approximately 2550 miles.

KH6HME, when he ran out of amateurs to work, spent some time tuning the 88- to 108-MHz FM broadcast band. He found full-quieting signals on every channel and many that were several deep with West Coast stations.

The whole thing repeated July 28. Although it didn't last as long this time, KH6IAA says that it, too, included stations much farther inland than was considered normal in other years. Once again, he racked up about forty 2-meter contacts. Al notes the interesting fact that polarization seemed to be preserved. Many think that once a signal traverses a long tropo path, the polarization can be almost anything from what it began.



The 23/13-cm dual feed 9-foot dish at VE4MA. The array of sixteen 19-element RIWs for 70 cm is in the background.

In this case, however, turning the quagi vertical always resulted in poorer signals for SSB stations but improved those from stations operating on FM. The duct has opened again on several days since. The most recent, as of Aug. 15, when this section of the column was being wrapped up, occurred late in the evening of Aug. 14. Unlike earlier openings, N6AMG notes, this one appeared to be confined to the north. The Southern California stations heard nothing. Once again, KH6HME's 2-meter signals were heard first, followed by the 70-cm beacon. Joel says that, on this occasion, WA6LHD at Fairfield was able to make a 2-meter contact with KH6HME. Fairfield is all but in the Sacramento Valley, with three mountain ranges between it and the coast. An interesting sidelight took place during one of the openings. Both K6QXY and N6CA reported hearing each other on 70 cm while both had their beams aimed at Hawaii. It would appear that some kind of tropo backscatter is responsible for this. The distance between two stations is about 400 miles.

The other end of the country was not without its tropo excitement. Our stalwart reporter, K1FO, details 70-cm activity throughout the month of July. By far the most outstanding night was the 19th. For this occasion, Steve lists some 33 different stations, from WBØWMO Missouri (EN30), at 1094 miles away, to those he can hear almost anytime, like WA4SBC Norfolk, VA, at 365 miles. On this night, however, WA4SBC's signal was 90 dB above the noise! Another outstanding 70-cm signal was that of K9HMB in Illinois, at 790 miles. Frank's signal peaked at S9 plus 10. The activity that night indicated that news of band openings does get around. Steve wishes for higher activity on other nights, when conditions are not quite as outstanding but can still support good long-haul QSOs. He notes many other July evenings on which signals from up to 400 miles away were 50 dB above noise but there was little activity. On such occasions, he often spends his time watching, in amazement, DX UHF TV signals. K1FO urges, in particular, that the UHF Contest be given more publicity. He notes that the bands were good during this year's affair but the Test would have been more fun with greater participation. I'll try to build a fire or plant a seed or something next year, Steve.

WBØDRL reports on 23-cm tropo activity from Kansas. Pete says that during the evening of Aug. 3, St. Louis station NØIS was workable despite that station's relatively low power. A little later, WD8ISK in Ohio (EM79) was worked. This distance is about 685 miles. On the 11th, good SSB QSOs were held with K9HMB and N9KC (EN52). These were followed by a CW contact with WA9FWD Wisconsin (EN53). Pete says that 23-cm activity in Kansas is still rising, with WØRT and WBØYSG being the latest to get on.

The fine tropo conditions have been smiling on the packet-radio contingent as well as devotees of other modes. WB4KXB reports that on the evening of Aug. 13 he and several other central Tennessee stations were able to connect with WB8FQJ, WA8USO, AD8I and N8AJD in the West Virginia-Ohio area, over a mountainous 200-mile path. Several digipeaters were involved at various times in three hookups.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr., Wolcott, CT 06716
CompuServe ID no. 70645,247

You Will Like 220, Too

Is this the golden age of 220 FM? The popularity of the 220-MHz band is greater now than it has ever been. There are more 220 FM repeaters and more 220 FM users than ever before. The variety of 220 FM equipment is at its peak, with both portable and mobile transceivers to choose from. And all this, despite the fact that the band has for years been under continuous attack by the spectrum bandits from other radio services. So, how does one account for the popularity of 220 FM?

Two-Meter Spill

Certainly, the spillover from 2 meters accounts for some of the 220 growth. In most metropolitan areas, 2 meters is packed. Anyone desiring to put a new repeater on the air had better look elsewhere, and 220 is often where they look. As 2 meters is crowded with repeaters, it is also crowded with users. Those who do not like crowds move up to 220, where life is a little more relaxed. It is like moving from the city to the suburbs. Once you get a taste of life in suburbia, you may never return to the city, and you too will become a staunch supporter of 220. They are so dedicated to the cause they have their own newsletter called *220 Notes* (215 Villa Rd., Streamwood, IL 60103), published and edited by one of the greatest aficionados of the band, Art Reis, K9XI.

Besides the less-crowded lifestyle, propagation is another attraction of 220. It is similar to 2 meters, with the advantage that the antennas used are smaller. A quarter wavelength for 220 is approximately seven inches shorter than a quarter-wavelength antenna for 2 meters, yet both provide the equivalent geographical coverage, all else being equal. And under certain circumstances, the ether may favor 220 over 2 meters. According to *The ARRL Operating Manual*, "Signals on 220 seem more favorably suited to inversion openings than 2-meter signals."

Spectrum Bandits

What about the possibility of losing 220 altogether? Every time there is a threat to reallocate 220 to another radio service, the 220 users band together, gather support from the rest of the amateur community and manage to beat back the spectrum bandits. As the popularity and use of 220 continues to increase, the spectrum bandits are losing one of their main arguments for swiping the band: lack of use. There no longer is a lack of use of 220, leaving no room for the spectrum bandits. But there is still room for you.

KANSAS CITY-AREA COORDINATION

Having received a majority vote of confidence of the area coordinated-repeater operators, the MO-KAN Council of Amateur Radio Clubs in early July reaffirmed its established frequency-coordination authority for the Kansas City metropolitan area consisting of those counties in Kansas and Missouri where MO-KAN is currently the representative body of Amateur Radio organizations. Also, MO-KAN is formulating written procedures to ensure equal representation of all amateur repeater operators.

MO-KAN's jurisdiction encompasses the Kansas counties of Douglas, Johnson, Leavenworth, Miami and Wyandotte, and the Missouri counties of Buchanan, Cass, Clay, Clinton, Jackson, Johnson, Lafayette, Platte and Ray. Correspondence and requests for frequency coordination should be sent to MO-KAN Council of ARCs, Repeater Coordination Committee, P.O. Box 1024, Kansas City, MO 64141.

MISUSE OF SIMPLEX AUTOPATCHES

The following appears in the July 1985 issue of the Repeater Coordinator's Newsletter.

"I'm upset! I'm upset about manufacturers' advertisements in some amateur magazines which promote their products, but make no mention of the ease with which our rules can be violated by the uneducated use of their devices." So starts a letter from Gary Hendrickson, W3DTN, secretary of The Mid-Atlantic Repeater Council (T-MARC). He discussed a problem that many coordinators may be starting to experience.

Gary continued, "Take, for example, the ads for 'simplex autopatch' attachments. No mention is made of the requirement for proper control of the fixed station to which their box will be attached.

"I think these companies are doing the entire Amateur Radio Service, and us frequency coordinators, a great disservice. Yes, some of them describe the control requirements in an attachment to the instruction manual, but, by the time the purchaser has read the attachment, it's too late. The money has already been spent.

"As one manufacturer's representative explained at the 1985 Dayton Hamvention, they have only had one person return the device for a refund because he couldn't comply with the rule requirements. I leave it to your imaginations what the rest of the purchasers may do with their 'devices.'

"Is there anything we can do to improve this situation? Perhaps more public education, such as in the FM/RPT column in *QST* needs to be undertaken. And finally, we need to let the manufacturers know that we think they are sabotaging our efforts, and we don't like it."

REPEATER LOG

According to reports received in July, repeaters were involved in the following public-service events: 15 weather emergencies, 6 medical emergencies, 23 vehicular emergencies, 5 fire emergencies, 26 public-safety events, 21 drills and alerts and 3 power failures.

The following repeaters were involved (followed by the number of events): W3AVK 1, N3AFX 1, WAØFYA 2, N8CIY 1, WA8EFK 1, W3GV 1, WB4LAI 15, N8ACV 5, W3VER 13, KG1O 12, K8DDG 20, W7HSG 1, K7OMR 4, WA5LVT 1, WB6MFV 1, WA6YGD 1, W6NBJ 1, K6VDS 1, W9QYQ 1, W8BI 1, K1FFK 2, N8CV 4, W8DC 2, WA8URE 1, WØMXW 2, W2VL 1, WB2NHO 1, WB2WHH 1, WB7OPZ 1.

Strays

I would like to get in touch with...

☐ anyone with a copy of the Chandler high-speed typewriting course. Ray Beningo, WA2GJY, 1353-99th St., Niagara Falls, NY 14304.

***QST* congratulates...**

☐ The following radio amateurs on 60 years as ARRL members:

- Robert L. Van Osdol, W9ALW, of Morrison, Illinois
- Karl T. Dreher, WØWO, of Denver, Colorado

☐ The following radio amateurs on 50 years as ARRL members:

- W. Raymond Burrows, WA2FLT, of Verona, New York
- Richard C. Dunham, W1EWF, of Arlington, Virginia
- Walter Bernath, K4UAS, of Winston-Salem, North Carolina
- Lewis Kanoy, W4DCW, of Winston-Salem, North Carolina
- Ellicott Valentine, K4JO, of Pfafftown, North Carolina
- Willard Conrad, K4BE, of Winston-Salem, North Carolina
- Walter Arndt, of Poulsbo, Washington

☐ George M. Erickson, W5POG, of Waco, Texas, on being elected Master of Waco A.F.A.M. Lodge 92.

☐ Billy D. Smith, KA5RDY, of Waco, on being elected Junior Warden of Waco A.F.A.M. Lodge 92.

The New Frontier

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

2304-MHz NEWS

Ron Stefanski, W9ZIH, has written with information on 2304-MHz activity in his area of Illinois. After initially building his 2304-MHz equipment, he found little local activity, so he built a portable station. With the help of W9PBP, who took the equipment to NW Indiana along with a 4-ft dish, two contacts were made from different sites at a distance of about 30 miles. This took place in November 1984. In December, the equipment was moved to the QTH of WA9HOH, in Racine, Wisconsin, and an S8 contact was made with that state. Since that time, W9ZIH's station has been upgraded, and now consists of a Tx giving 50 W of SSB or CW and a 4-ft solid Andrews dish. States worked to date include Ohio, Michigan, Missouri, Wisconsin, Indiana and Tennessee. The portable station is now at WBØZJP, in St. Louis, in conjunction with a 5-ft dish, and is used nightly to provide skeds over a 260-mile path. Ron's most recent success was a contact with W4HHK on the evening of July 18. Signals from 'HHK's 18-ft dish were S9+5. Also heard on the same evening was N4MW. Ron is continuing to improve his station, and is currently looking for construction information on a 2-tube cavity amplifier for 2304 MHz. Can anyone help?

10-GHz NEWS

Fred Maberry, N5BBO, of the newly formed Texas Hill Country Microwave Society, has written with news of 10-GHz activity in his part of the country (the San Antonio area). Activity started in late 1983, when he and Frank Davis, W5VDS, started looking at the topography of the Texas hill country and plotting suitable microwave paths based on the W5VDS QTH. Two TR10GA Gunnplexer transceivers from Advanced Receiver Research (ARR)—one 35 mW and one 11 mW—and two dishes—one 30 in and one 48 in—were obtained. The first real contact was made on 1/21/84, over a 12.8-km path. By mid-1985, a number of people were showing interest in 10-GHz work, and so the Texas Hill Country Microwave Society was formed. As of July 1985, W5VDS, N5BBO, K5BTS, W5BLB and WD5EEE have 10-GHz capability, and N5BXH and W5FZH are developing equipment for the band. W5FZH is also obtaining topographic path information, with the hope of developing a computer data bank of this data.

On July 11, a group consisting of K5BTS, W5FZH, KA5ASZ and N5BBO set up a station at Devils Back Bone, Texas, and worked W5VDS at his home QTH, over a 17-km path. Contact was made immediately using the dishes. Horn antennas were also tried, but with little success. K5BTS was using a new search-and-lock local-oscillator AFC unit in his RXM3OVD duplex transceiver (ARR). The SL01VD swept local oscillator AFC unit (ARR) is apparently designed to work with the ARR transceivers or any varactor tuned cavity with an available output signal whose level is proportional to received signal strength. The group was impressed by the unit's performance.

Fred comments that plans are afoot for longer paths this fall and perhaps some "building bounce" paths around downtown San Antonio. It sounds like an active group is assembling down there, and I'm sure Fred would be glad to hear from others in the area interested in 10-GHz work.

24-GHz DX

In the December 1984 New Frontier column, I reported a 331-km contact on 24 GHz that took place on August 11, 1984. In a recent letter, I4SN points out an earlier contact made in the spring of 1984 between I4BER and I3SOJ, over a path of 290 km. This contact has been acknowledged by Region 1 IARU, but I have no other details at this time. If this information is correct, it would seem that this contact would be eligible for the M/A-COM award for the first contact over 250 km on 24 GHz. More details on this as I receive them.

INTERNATIONAL NEWS

DL7QY, editor and publisher of *DUBUS* (a leading German UHF/Microwave publication), has come out strongly against the new Maidenhead locator system. He claims that 83% of his readers agree that the system is not as efficient under difficult conditions as the old European (QRA) locator system.

The new system was introduced to enable a worldwide locator to be established, and that particularly benefits amateurs in the U.S., where there was no previous system. In view of the fact that many Europeans are going to change over to the new system, the least we can do is know and use our locators here in the U.S. Do you know yours? If not, see January 1983 *QST*, page 49, for how to obtain it.

EUROPEAN MICROWAVE DX

As an example of what is possible on the higher bands, the following report comes from the *RSGB Microwave Newsletter:*

On June 23, G3LQR worked DC9XO at 500 km on the 3, 6 and 9-cm bands. The report on 10 GHz (narrowband, of course) was 559. He then went on to work DC9XG at a distance of 545 km on 3 and 6 cm, DC4BK at 521 km on 9 cm, and DF9LN at 620 km on 3 cm and 6 cm. The report for this last 3-cm contact was 529!

Another notable DX contact was between G6LE and EA6XS on 23 cm at a distance of about 2700 km on June 29.

1296-MHz BIBLIOGRAPHY

A couple of articles, both by Peter Laakmann, WB6IOM, were inadvertently dropped from the 1296-MHz bibliography published in the August installment of this column. They are as follows:

"High-Power linear for 1296 MHz" (500W), Peter Laakman, *Ham Radio*, Aug. 1968, pp. 8-17.

"16 ft Parabolic Dish Antenna," Peter Laakmann, *Ham Radio*, Aug. 1969.

47-GHz NEWS

The world record 47-GHz contact between HB9MIN/P and HB9AMH/P was reported in last month's column. More details on the equipment used follow:

HB9MIN—23.5-GHz VCO from MA/COM, 25-mW output; doubler; and a mixer using MA40406 Schottky diodes. Output on 47 GHz was approximately 2 mW. IF at 30 MHz with 75-kHz bandwidth. Antenna: 60-cm parabola. Note that this equipment will be included in the upcoming ARRL *UHF/Microwave Experimenter's Book.*

HB9AMH—47-GHz Gunn oscillator with 10-mW output. Mixer using MA40406 Schottky diode. Antenna: 40-cm parabola (lampshade!).

24-GHz transceivers were used to align the antennas prior to the 47-GHz contact. Because of weather conditions, however, precise aiming was not needed, as signals could be copied at beam headings ±3 degrees from optimum with little signal loss. This was presumably due to precipitation scatter from light snow falling at the time.

GEOSTATIONARY SATELLITE EXPERIMENTS

Recent information from Stephen Dutka of the Public Service Satellite Corsortium and Don Bremer, KB6LO, outlines an opportunity for amateurs to take part in a NASA geostationary satellite experiment.

The Advanced Communications Technology Satellite (ACTS) will provide transponder time for two years, beginning in 1989, for experiments involving earth-station evaluation, rain attenuation, propagation, etc. Much of the ACTS technology is designed around digital signals in a switched satellite time division multiple access (SS-TDMA) arrangement (a kind of packet switching). There will, however, be a simple transponder that can provide relays of FM or other analog modulated signals. The satellite uplink will be between 27.5 and 30.0 GHz, and the downlink between 17.7 and 20.2 GHz. Both these bands are outside amateur allocations, so presumably special permission will be granted for this operation. Earth-station antennas are expected to be in the 2.5- to 4.5-meter range (quite large for such high frequencies). Permission for experimentation will be granted by NASA on an individual basis after a proposal has been submitted to them detailing planned experiments.

Interested amateurs may obtain a formal "notice of interest" and an introductory brochure from Ron Schertler, ACTS Projects Experiments Manager, NASA, MS-54-6, 21000 Brookpark Rd., Cleveland, OH 44135, tel. 216-433-4000, ext. 792.

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

Packet Radio for the Rest of Us

Packet radio is hot! It is the hottest thing in Amateur Radio since the repeater craze of the 1970s. Sending messages intercity and interstate from one's keyboard and uploading and downloading files to and from the local PBBS (packet bulletin-board system) have become full-time avocations for some packet-radio operators. And now packet radio is even more enjoyable because the interface between the packet-radio operator and the TNC (terminal-node controller) is easier to use.

MacPacket/TAPRterm is a program for the Apple Macintosh computer that creates an amiable user interface for the TAPR (Tucson Amateur Packet Radio) and TAPR-compatible TNCs. Jack Brindle, WA4FIB, wrote the program because "it seemed only natural to marry the Macintosh with the TAPR TNC." He continues:

> The introduction of the Apple Macintosh computer with its "new" user interface has brought new understanding to the ways information is presented to computer users. The user is no longer saddled with a "text only" presentation scheme, but now is free to use the computer to do his task the way he wants to do it, with information presented in a way that makes using the computer fun! The Macintosh user interface has eliminated the need to memorize long strings of complex commands in order to perform work. Instead, the user simply selects a function, points at it and "clicks" the selection button! Additionally, the renowned graphics abilities of the "Mac" allow information to be presented in a more natural form, making interpretation of the data easier. These features make the Mac a natural for controlling ham devices.

This column conductor obtained MacPacket/TAPRterm and gave it a workout.

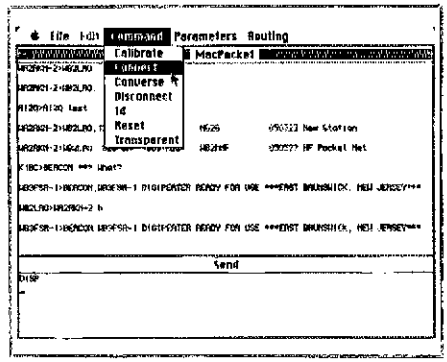


Fig. 1—The MacPacket/TAPRterm screen displays an upper window containing received data and a lower window containing transmitted data. The pull-down menus across the top of the screen access TAPR TNC commands.

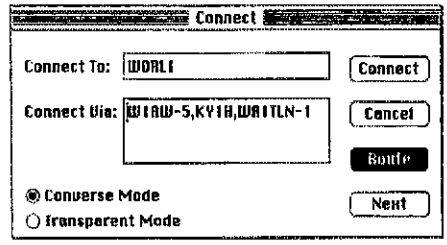


Fig. 2—When you mouse click the ROUTE button on the Connect command dialogue box, MacPacket/TAPRterm looks up the digital repeater path for the desired station (WØRLI). Once the Route is found, clicking the CONNECT button causes the TNC to attempt a connection.

PX: TI-99/4A SOFTWARE

Programs for the late Texas Instruments TI-99/4A are featured in this month's installment. They were written by Harry Bump, KM3D, John Davis, WB4KOH, Theodore Earle, WA1ZOJ, Clem Paskus, K1EM, and Bill Trojanowski, N2EZG.

Program number 82: packet-radio BBS program (N2EZG) (56 cents postage).

Program number 83: great-circle-bearing program (K1EM).

Program number 84: MINIMUF (WA1ZOJ) (56 cents postage).

Program number 85: logging program (N2EZG) (56 cents postage).

Program number 86: contest duping program (K1EM).

Program number 87: antenna-design program (N2EZG).

Program number 88: SWR-calculation program (K1EM).

Program number 89: waveguide-calculation program (WB4KOH).

Program number 90: electronic-formulas program (N2EZG) (56 cents postage).

Program number 91: CW transmitting program (KM3D) (56 cents postage).

To obtain a listing of any PX program, send a business-size s.a.s.e. with 39 cents postage (unless noted otherwise) to ARRL, Dept. PX, 225 Main St., Newington, CT 06111. Use a separate s.a.s.e. for each program request, and write the PX program number of the desired program at the lower left-hand corner of the s.a.s.e. Please do not send correspondence other than PX requests to Dept. PX.

A list of all 91 programs in the PX library is available by sending a business-size s.a.s.e. with 22 cents postage to WA1LOU.

Windows on the Packet Radio World

Run the program and the Macintosh screen divides into two windows. The top window displays received information from the TNC—that is, data received over the air and TNC command prompts, parameter dumps, etc. The lower window displays information sent from the Macintosh keyboard. Hams who use computers for RTTY and CW operation are familiar with this split-screen feature. Now, it is welcome relief to packet-radio operators; other communication software used for packet radio display this information as a continuous stream of data with no differentiation between received and transmitted data.

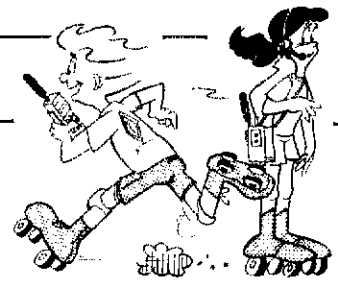
MacPacket/TAPRterm eliminates a lot of the keyboard entry that most packet-radio operators must perform. According to its author, "The philosophy behind the program is that the computer should take care of as many TNC functions as possible to allow the operator to use the system without any distractions. As packet radio moves to networking and beyond, this philosophy will become more important with each added layer requiring additional control information. The goal is to eventually allow the amateur to sit down at his computer, request a QSO with another station, and begin communication, exchanging files or whatever else he desires without having to address the linking or routing issues. This goal is still in the future . . . For now, MacPacket/TAPRterm goes a long way to isolating the user from the TAPR TNC."

For example, to connect with WØRLI, I must repeat through stations W1AW-5, KY1H and WA1TLN-1. Using the TAPR command protocol to attempt this connection, I key C WØRLI V W1AW-5,KY1H,WA1TLN-1 into my computer (the C is shorthand for CONNECT; V, for VIA). Using MacPacket/TAPRterm, I pull down the Command menu and click on the word Connect with the Macintosh mouse (refer to Fig. 1). The program displays a dialogue box that asks for the call sign of the station I want to work. I key in WØRLI or click the NEXT button (until WØRLI appears) and click on the ROUTE button. The dialogue box (See Fig. 2) displays the route to WØRLI (W1AW-5, KY1H, WA1TLN-1). I click on the CONNECT button, and the TNC keys my transmitter.

As can be seen by this illustration, MacPacket/TAPRterm eliminates the need to remember or to look up the TAPR commands. All commands are available on the pull-down menus. MacPacket also eliminates the need to remember or to look up the repeater paths required to make a connection. Up to 100 routes may be stored by the program. Type or look up (using the NEXT button) the call sign of the station you wish to connect with and click on the ROUTE button, and the program looks up the saved route associated with that call sign. How much easier can it be?

The program has other features, including the ability to save data to disk, send files from disk and print hard copies of data. Another version of the program, MacPacket/KANterm, is essentially the same as MacPacket/TAPRterm, except that it is intended to provide a user interface between the Apple Macintosh computer and the Kantronics "Packet Communicator" TNC rather than the TAPR TNC. For more information concerning MacPacket/TAPRterm and MacPacket/KANterm, contact Jack Brindle, WA4FIB, Brincomm Technology, 19451 Gulf Blvd., No. 503, Indian Rocks Beach, FL 33535.

Making Waves



Conducted By Scott Springate, N7DDM
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STARTING YOUR OWN SCHOOL CLUB

Perhaps one of the best ways to get started in ham radio is to join a club. Many young people have never been exposed to ham radio and don't even know it exists. This is where a school club comes in handy. Unfortunately, school Amateur Radio clubs are not exactly in abundance, but with a little planning and organization you can start a ham radio club at your school. Now is the perfect time to work on starting a club. School has been in session long enough to have gotten into a routine, and there is still plenty of time left in the school year. Here are some suggestions on how to get started. Some are my own, and some come from clubs already established.

Begin by asking around to find out if there are any clubs at your school that you didn't even know about. My school, for instance, has seven clubs. They are the German, French, Spanish, Art, Computer, Drama and Chess clubs. Our girls' tennis and boys' golf teams are involved with various activities around the school, also. If you have any clubs at your school, find out who is in charge of them, and ask if you can drop by and see how they are run. Be sure to ask the head of the club how they got started, how they let students know about their club, how the club stimulates interest, and whether they needed permission from the school's administration.

Next, find out if any teachers at your school are hams. If you find one who is, he or she may be interested in helping you form and work on the club, or at least offer some suggestions. Try checking in the science department for hams first because ham radio and science teaching go hand in hand. Once you find out how clubs operate, you can go ahead and get permission from the school administration. At this time, it would be a good idea to find a room the club could meet in and get that okayed. You are then ready to start organizing a club.

Begin spreading the news of the club by word of mouth. Go to the computer club if you have one and let everyone there know, too, because ham radio might interest them as well. If you don't have a computer club, find a teacher who teaches a computer class and ask him or her to convey the message to their classes. Next, get in touch with the person in charge of school announcements. My school has daily and weekly announcements and a monthly newspaper. We also have a newsletter that gets mailed to homes every so often. All of these would be good places to let students know about the new club. But however you do it, let them know! Get some of your friends to help you make signs you can put up in the halls, if that is allowed. The art club might even be willing to undertake this job. Make sure in all of your publicity that you mention the time and place the club will meet. Also state your name so that interested people can contact you.

Your first meeting will probably be small. But make sure you keep their interest in order to keep them in the club. Tell them plainly who you are and what ham radio is. If you have a 2-meter hand-held radio, take it along and demonstrate it to build interest. Tell the students the long-range goals for the club and what is involved in attaining them. Know in advance where they can go for a licensing course. If there is none available at that time, contact the ARRL for instruction books. Tell them they can study on their own until a course is offered. It would be a good idea to brush up on your own theory, too, in case they come to you with a question. Try and establish a group that will help you earn money and gather funds. Before leaving, let them know when the next meeting is and encourage everyone to come.

This 8th grader at Rocco Laurie Intermediate School on Staten Island, New York, uses a code-practice oscillator donated by a local radio club to brush up on his dits and dahs.

Before you seriously start thinking about putting out the word for donations, make sure you have a strong commitment from the members of the club that they will work to become licensed. Better yet, wait until some of the members *are* licensed and then look for donations. It will show would-be donors that the club is serious and won't break up after only four months.

Have any Slides of Young People?

The ARRL Office of Development is looking for help in putting together a slide show on young people involved with ham radio. We're looking for slides that show both the hobby and the public-service aspects of Amateur Radio. We'd also like to show school clubs and net operators just having fun. We'd appreciate hearing from you. Please send your slides to the ARRL Development Office, Attn. E. Karpiej, 225 Main St., Newington, CT 06111.

Once you are ready to collect funds, there are a number of sources to investigate. Your school administration may be willing to contribute some money if you appeal in a nice manner. Our student body also has quite a bit of money they give to worthwhile causes. If you have a similar student government, you could also go before some of the officers and ask them for some money. Most of your equipment will probably be donated by local clubs if you tell them you are starting a school club. Once word gets around, donations may also come in from individuals. But before you appeal to anyone for money and/or equipment, make sure the club is a sure thing. Members should be committed, and some should even have their tickets. Only then should you begin equipping a station.

When assembling a station, it would probably be best to purchase used equipment. The prices are much more reasonable and you can still get good service from it. Doug DeMaw, W1FB, wrote an article in his series "First Steps in Radio" on this. It is Part 19, "Equipping Your First Ham Radio Station," in July 1985 *QST*.

Another problem you may encounter is with the antenna. The administration may not be too keen on the idea of a beam on the school roof. You may have to settle for a dipole on the roof or a wire in the room the station is in. This brings up another point: When establishing a place for the club to meet, try to make it in a room not used very much. It makes things easier once the station is set up. That way licensed hams can use the radio during free time without having to worry about being bothered or bothering someone else.

Without exposure to ham radio, many students will never know of its existence. But if you are willing to put forth the effort, a school club started by you can introduce many other young people to our interesting and diverse hobby. I am now in the process of starting a club at my school, and am anxious to get it off the ground. If I come across any more hints, I will be sure and report them.

Some Examples

At Del Mar Middle School in Santa Cruz, California, there is a very active ham radio program. Their program consists of a station in a classroom and a licensing class. The classes are taught by science and music teacher Gary Frederick, KB6EZL, and retired Santa Cruz teacher Mary Duffield, WA6KFA. About 120 students at Del Mar are involved with the program. Much of the equipment used was donated by ham radio operators. Duffield has started clubs at six or so other schools, mostly junior high and high schools. She says, "After they get that first radio going and a few licensed young hams, the thing takes off." She has also been involved in such undertakings as the International Youth Telecongress and the First National Youth Congress.

Rocco Laurie Intermediate School on Staten Island, New York, has a program similar to the one at Del Mar. Carole Perry, WB2MGP, began their effort as a pilot program. She was able to convince the principal to let her try the class for one term. She encompassed all the major areas of study into her classes. It was such a success that the children's parents asked to have the course continue. The program has been underway for little over three years, with about 350 children per term. Radio equipment was donated mostly by local radio clubs. The students also have a bake sale every year to raise additional funds. The program puts out its own newsletter called *The Ragchewer*.

HELLO OUT THERE

I have received almost no mail from readers for the past couple of months. Your input and ideas are crucial to the life of this column. If you have any information about young people and ham radio, write to me and tell me about it. My address is at the top of the column.

YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

K1IJV: So Long From Cape Cod

August *QST* saw Jean Peacor, K1IJV, shut down her computer, clean out her files and step down as the conductor of YL News and Views. She now begins a much-deserved retirement on her beloved Cape Cod. The change is well earned, as Jean has served as the column's conductor for a total of eight years, during which she brought news of the world's YL operators to *QST*'s readers with a quality and style that all of us came to expect from K1IJV.

Jean was first introduced to ham radio by her mother-in-law, W1YPH, who had a weekly CW sked with Jean's neighbor, W1UPG. After many invitations and much nudging and prodding, Jean consented to visit W1UPG and subsequently discovered why these two YLs spent so many hours on the radio together. That was the beginning. Jean went home with a receiver lent to her by W1UPG. That evening, she and OM Norm talked about ham radio and decided to study for their Novice test. The bug bit both of them and, in 1958, Jean and Norm became KN1IJV and KN1IJU, respectively.

During her first year as a Novice, Jean spent countless hours calling CQ on 80 meters, only to wonder most of the time if her signal was being heard. Lucky for her, one day W1TA, who was filing a crystal, heard Jean and answered her. That was the beginning of a long and significant friendship. Jean recalls: "Ray, who was one of the truly great OT CW operators, decided that there was hope for me, and offered to have daily skeds to help me improve my CW efficiency." They became good friends and eventually met at the Nashua (New Hampshire) Mike and Key Club Christmas party. Not only was W1TA instrumental in helping Jean develop a real love of CW, but he also introduced her to traffic nets. For Jean, it was a thrill to check into a net and actually receive a welcoming automatic response after all those hours of calling CQ and hearing nothing except the blank ether. With the help of friends from the net, she and Norm upgraded to General. And thanks to the encouragement from W1BVR and W1DVW, she "dared" to make the transition from the Novice net to the big time of the Western Mass Net and First Region Net. After nearly 30 years, Jean is still with the WMN and serves as net control.

In 1963, Jean served as president of the Women Radio Operators of New England (WRONE). She recognized that the group's members were dissatisfied with the lack of YL input for convention activities. To remedy the disappointment, she and W1UKR represented YL interests in the Federation of Eastern Mass. Amateur Radio Association (FEMARA) and continued to do so for several years, which Jean remembers as a "thoroughly enjoyable experience."

In 1978, Jean and her husband embarked on what was to become a series of ham vacations in the various paradise islands of the Caribbean. The first adventure included friends W1JP and WB1ABF and a journey to Montserrat, where Jean operated as VP2MBJ. Jean recalls: "It was my first adventure in the thrill of being 'rare' DX, and it was fantastic being on the receiving end of pileups!" They were there only a week, but it was enough to whet their appetites for more ham vacations. Two years later, the group again ventured south, this time to Tortola, where Jean became VP2VFV. The timing was perfect because she was able to enter the 1978 YL/OM CW Contest. Much to her delight, she came away with the top world score. Quite a change from her Novice days!

Retired YL News and Views conductor Jean Peacor, K1IJV, takes on a new posture in Cape Cod.

YL Anniversary Party Dates

CW	*Phone*
1800Z Oct. 16-1800Z Oct. 17	1800Z Oct. 30-1800Z Oct. 31

Now that Jean and Norm were old hands at Caribbean travel, the winter of 1981 saw them making arrangements for the island of Bequia, one of the St. Vincent Grenadines. Jean was fortunate to obtain J87BO, one of the first of the new calls issued after St. Vincent had obtained its independence. This trip proved to be an exciting adventure before they even left the U.S. Their flight from JFK was unexpectedly changed, and instead they flew to St. Lucia and then on to Barbados. After a delay in Barbados, because the pilot's landing privileges had expired, they landed on St. Vincent, only to witness their boat for Bequia disappear around the point. J88AQ came to their rescue and found them passage on a delivery boat. Then they had to transfer to a small boat, which brought them to the island. As they were literally dropping their gear over the side, they caught a comber over the fantail that soaked Norm and his camera equipment. When they finally arrived at their rented house, it was locked tight because the maid was not expecting them. And the power on the island was out! But dinner at a nearby hotel gave them time to reorganize. The maid showed up, the power came back on, and they enjoyed a wonderful two weeks.

In 1982, they returned to Tortola. But during the winters of 1983 and 1984, the Peacors, again with Heather and Bill, chose the island of Nevis, where Jean operated as VP2KBD. During the winter of 1985, she and Norm returned to Tortola and found her old call waiting for her. They rented the home of a friend—a small house on the ridge known as Spyglass Hill. There was a panoramic view of the islands, good weather prevailed, and the beaches were as great as ever. Evenings were spent meeting new friends on 2 meters as well as taking advantage of the activity on HF. Because of the downswing in the solar cycle, QSOs were fewer than in previous years, but the excitement of being DX was just as enjoyable.

Most recently, writing and hamming have taken a back seat because Jean has been working with her architect son to finalize plans for the remodeling of their home on Cape Cod. Renovations are now nearly complete except for what Jean refers to as "endless painting." This summer has been so busy with house activities and visits from their children and friends that Jean recently commented, "It must have been a sixth sense in retiring from YL News and Views when I did—there is no way under the sun that deadlines could have been met from this QTH this summer. Talk about sheer madness!"

It appears that Jean is not slowing down but rather keeping up the pace on a different track. The upcoming retirement years at the Cape don't mean an end to ham radio. Not a chance! The new home will have a special place for the Peacors' radio gear, and Jean hopes to be more active on the high bands. Whatever her new endeavors or pursuits, we, her friends and fellow hams, wish her many years of relaxation and enjoyment at the Cape.

In a recent conversation, Jean, in her modest manner, commented, "It has been a privilege to write and share with others the many exciting doings and accomplishments of other YLs in Amateur Radio. In the course of this, my one goal was the hope that if through writing a new or different aspect of Amateur Radio was sparked for just one other YL (or OM or XYL), it was well worthwhile."

Those of us who faithfully and enthusiastically followed her column during her eight years as a *QST* contributing editor know that personal goal was attained many times over—her column touched thousands in many ways. Her ability to find a new YL with a story to tell and her sensitive style of telling that story are what made Jean's columns fascinating as well as just plain good reading. For that and much more we have been most fortunate. Your readers and friends thank you, Jean, for your talent and efforts on behalf of the Amateur Radio community. You will be missed and fondly remembered.

In Training

Conducted By John Foss, W7KQW
Training Manager, ARRL

ON FINDING STUDENTS FOR HAM CLASSES

A few clubs have no problem attracting students. Others have a grim problem. Why the difference? To answer the question, we must consider what is necessary for a person to enroll in a ham class: (1) that person must know that ham radio exists; (2) that it is not the same as CB; (3) that becoming a ham does not require that one be an electronics or mathematics whiz; (4) that help in passing the examination is available, either through a formal class or through Elmering; (5) that ham radio offers so many varied activities that it is almost impossible to become bored with it; (6) that the equipment necessary to enjoy ham radio is within his/her financial reach; and (7) that the opportunities for various kinds of public service through ham radio are unlimited.

Of all these, the one that blocks more people than any other is the first. It's a safe bet that half the American population has never heard of ham radio—and this in spite of the tremendous publicity hams have gained over the past few years through publicity from the Grenada incident, the Space Shuttle, tornadoes, forest fires, the Olympic Games and dozens of emergencies in which hams were active. Don't these people listen to the news broadcasts and read the newspapers? They listen, but do not hear; they read, but do not understand; they look, but do not see.

Here's where the work of a competent and eager publicity chairman pays off. The club lucky enough to have such an officer seldom has a problem filling its classes. Citizens of that club's area already know a great deal about ham radio. Many have had their interest piqued enough to get them to attend the first class meeting to see what it's all about.

Clubs not so fortunate usually must do something special to attract attention to Amateur Radio. Now—with SAREX just completed and the SSTV pictures from Tony England's transmissions from the Space Shuttle still fresh in the minds of millions—is the best possible time to launch your campaign. By all means set up a booth where it will be seen by as many people as possible. Be sure an experienced ham is available to talk to onlookers and explain what the operators are doing. Tie in the demonstration with the Space Shuttle. Remind the passers-by that they saw the pictures on commercial TV and read about the ham-radio activities of WØORE in the newspapers. Invite them to a meeting and show some good 16-mm films or some videotapes. (Contact the ARRL Film Library for available films, tapes and dates.)

But what of the half of the population who *have* heard of Amateur Radio but still are not hams? Their problem must be one of the remaining six mentioned above. We'll consider those in a later column.

Now what of the question, "Do I have to start as a Novice?" The answer, of course, is a flat, certain "No!" A more important question by far is, "*Should* I start as a Novice?" The answer to that one isn't nearly so easy. Unfortunately, it will be "No" for some and "Yes" for others. How can one tell into which category someone falls?

First, most people are capable of earning a Technician license without first obtaining a Novice license. Second, it's a sad fact that more than half the Novices never upgrade or renew their licenses. Furthermore, a large portion of these Novices never even once get on the air from their own stations. (The proximate cause is probably the lack of an Elmer, but it's a fact nevertheless.) No evidence exists to indicate that such is the case with either Technician or General class licensees. Perhaps, then, we shouldn't consider a ham "hooked" until he/she earns at least a Technician class ticket. Thus, courses designed to take the student from scratch to Technician or General level (or higher) make lots of sense.

Certain people, however, should not enter such a course. One such category of people is those who cannot read English well enough to master the material in the *Technician/General License Manual* and *The FCC Rule Book*. Into this category fall most children below fifth grade and many of those for whom English is a foreign language (unless they already have a strong knowledge of electronics). Another group that probably should not attempt Technician or higher as their first licenses are those who have extreme difficulty with mathematics. Although no exotic mathematics is required for any class of amateur license, the most simple arithmetic calculations terrify more people than is generally realized. Finally, those who are so busy that they can spend precious little, if any, time doing their homework are not good candidates for a Tech/General course as their first exposure to Amateur Radio. They probably will not be able to keep up and may quit before obtaining any class of license.

Most are not in these categories, however. Almost certainly they will stay with us longer as hams if they are led to Technician or General as their entry-level licenses, rather than Novice. Granted, it puts somewhat more burden on the instructor or Elmer. But isn't it worth that to see one's student really active and successful in Amateur Radio, rather than a first-year dropout?

W1AW Schedule

October 27, 1985—April 27, 1986 **MTWThFSSn = Days of Week** **Dy = Daily**

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

UTC	Slow Code Practice	MWF: 0300, 1400; TThSSn: 0000, 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300: Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	CW Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Teleprinter Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CST	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	CW Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Teleprinter Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
MST	Slow Code Practice	MWF: 7 A.M., 5 P.M.; TThSSn: 2 P.M., 8 P.M.
	Fast Code Practice	MWF: 2 P.M., 8 P.M.; TTh: 7 A.M.; TThSSn: 5 P.M.
	CW Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Teleprinter Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Voice Bulletins	Dy: 7:30 P.M., 10:30 P.M.
PST	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	CW Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	Teleprinter Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.
Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2300 UTC they are beamed south.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1985 *QST*, pages 9 and 76," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 76.

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

On Wednesdays at 2330 UTC, an IARU Region 2 bulletin in English and Spanish on 45.45-baud Baudot is sent on the regular teleprinter frequencies, beamed to Central and South America. The 2300 UTC Teleprinter Bulletin transmission is also beamed south on Wednesdays.

W1AW bulletins are sent on OSCAR 10, Mode B, when the satellite is within range. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1600 UTC transmissions, and 2300 UTC on TThFSSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8:00 A.M. to 1 A.M. EST and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EST. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on November 28 and 29, December 25, January 1, February 17 and March 28.

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
500 Riverside Dr.,
London, ON N6H 2R7

CRRL Officers and Directors

Honorary Vice President: Noel B. Eaton, VE3CJ *General Manager:* Raymond Staines, VE3ZJ

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO
CRRL, Box 7009, Station E, London, ON N5Y 4J9, Tel. 519-225-2188
CRRL Outgoing QSL Bureau, Box 113, Rothesay, NB E0G 2W0

Directors: G. Andrew McLellan, VE1ASJ
Albert G. Daemen, VE2IJ
Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
William Kremer, VE7CSD

Counsel: B. Robert Benson, Q.C., VE2VW
Suite 1600, 2020 University Ave.,
Montreal, PQ H3A 2A5.

UPDATE: JACK RAVENSCROFT LAWSUIT

Jack Ravenscroft, VE3SR, is off the air. A hearing, held in Ontario District Court, Ottawa, on July 25, resulted in an interim injunction that prevents Jack from operating the amateur station at his home.

This interim injunction *does not* and *will not* set a precedent. It simply provides a "cooling off" period for Jack's neighbour, who is suing Jack for $35,000 for allegedly interfering with the operation of a furnace control, a microwave oven, an electronic organ and a television set. Theoretically, the injunction provides a "cooling off" period for Jack as well.

Amateur Radio interests were well represented at the hearing. There was one disappointment: DOC was absent. Jack's case will now go to trial. The outcome of this case *will* set a precedent, one that could adversely affect not just radio amateurs, but all radio users who, like Jack, are licensed and operating with "clean" transmitters within the law. This case, then, merits involvement by DOC.

This case also merits your involvement. By mid-August, Jack had received some 215 donations totalling $6500. By that time, however, Jack's legal expenses were just under $5000. Jack needs much more than the remaining $1500 as he goes to trial. He needs *your* support. Please, if you have not done so already, send a donation to the Jack Ravenscroft RF Susceptibility Defence Fund, Box 8873, Ottawa, ON K1G 3J2. Help Jack win this case for all Canadian amateurs.

CRRL ELECTION RESULTS

Tom Atkins, VE3CDM, has been re-elected CRRL President, and Harry MacLean, VE3GRO, has been re-elected CRRL Vice President for two-year terms of office that will begin on January 1, 1986. Under ARRL By-laws, Tom also becomes ARRL Canadian Director and Harry becomes ARRL Canadian Vice Director. Both nominations were uncontested, eliminating the need for a ballotted election.

SECTION MANAGER APPOINTMENT

As a result of an administrative error, there was no call for Alberta Section Manager elections in January 1985 *QST*. William Gillespie, VE6ABC, has been appointed Acting Section Manager, Alberta Section, until elections are concluded. Bill takes over from Roy Ellis, VE6XC.

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Alberta and Maritimes-Newfoundland Sections: You are hereby solicited for nominating petitions pursuant to elections for Section Manager. Names of the incumbents appear on page 8 of this *QST*.

A petition, to be valid, must carry the signatures of five or more Full members of the League residing in the Section concerned. It is advisable to have more than five signatures. Photocopied signatures are not acceptable. Signatures must be on the petition.

Petition forms, FSD-129-D, are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

The Secretary, CRRL
Box 7009, Station E
London, ON N5Y 4J9

We, the undersigned Full Members of the League residing in the ... Section, hereby nominate ... as Section Manager for this Section for the next two-year term of office. (Signatures ... Calls ... Addresses including postal codes ...)

A Section Manager must be a resident of his or her Section, a licensed amateur holding a Canadian Amateur Certificate or higher, and a Full member of the League for a continuous term of at least two years prior to the receipt of nomination petition at CRRL Headquarters. Petitions must be received at the CRRL Headquarters office before 1600 EST Friday, December 6, 1985.

If only one valid petition is received from a Section, the person nominated will be declared elected. If more than one valid petition is received from a Section, a ballotted election will take place. Ballots will be mailed from the CRRL Headquarters office on or before January 1, 1986. Returns will be counted after February 18, 1986. Section Managers elected as a result of these procedures begin their new terms of office on April 1, 1986.

If no valid petition is received from a Section, that Section will be resolicited in January 1986 *QST*.

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

Harry MacLean, VE3GRO
CRRL Secretary

CRRL NEWS

☐ CRRL is pleased to be able to distribute a training aid designed by Mary Drummond, VE3IYY. This training aid is ideal for people with limited movement. Instructors of potential amateurs who are quadriplegic will be especially interested. For more information, contact the CRRL Headquarters office in London, Ontario.

☐ The Minister of Communications has replied to the CRRL telegram that requested that Canadian amateurs be given access to the new 24.89-24.99 MHz band at the same time that it became available to amateurs in the U.S. The Minister indicated that such access would have to wait until a number of fixed stations assigned to this band were either confirmed as non-operational or moved onto another band. Then there would have to be an appropriate amendment to the General Radio Regulations, Part 2. Recent experience shows that enacting such an amendment can take years. CRRL continues to pursue the matter.

☐ Between 1982 and 1983, and 1983 and 1984, growth in the Canadian Amateur Service was about 2½%. Between 1984 and 1985, however, growth in the Canadian Amateur Service dropped to 1½%. Fewer and fewer new amateurs are joining our ranks. A CRRL Committee studying the problem is becoming convinced that a new entry-level licence, perhaps with a 5-WPM code requirement and a basic theory and regulations exam, possibly administered by accredited amateurs and giving limited operating privileges, could be an answer. By the time you read this, DOC will have made public its thoughts on the matter, at the DOC Forum at the RSO-CRRL '85 Convention, held in London, Ontario, on September 27-29.

☐ The CRRL Headquarters office has been moved, about seven miles north of its previous location. This move does not affect the address, which is still Box 7009, Station E, London, ON N5Y 4J9. The telephone number has been changed to 519-225-2188.

☐ In other CRRL Headquarters news, the new CRRL computer has been installed, the software has been written and Canadian League membership records have been loaded in. It all works beautifully. If everything else goes according to plan, the CRRL Headquarters office in London, Ontario, will be ready to keep membership records and issue renewal notices and membership certificates early next year.

NOTES FROM ALL OVER

☐ It's not too late to qualify for the National Parks 100 Award. The idea is to earn 100 points for working Canadian Amateur Radio stations during 1985, the 100th Anniversary of Parks Canada. For Canadians, contacts with Canadian stations operating from Parks Canada sites count for 10 points; contacts with Canadian stations using special prefixes, for whatever occasion, count for 5 points; and contacts with all other Canadian stations count for 1 point. For U.S. and DX stations, the points are doubled. To receive the award, send a copy of your log, certified by yourself and two other amateurs, to the CRRL National Parks 100 Award Manager, Garry Hammond, VE3XN, 5 McLaren Ave., Listowel, ON N4W 3K1. Please include $1 or 5 IRCs to help cover the cost of printing and mailing the award.

IARU News

Conducted By Richard L. Baldwin, W1RU
President, IARU

President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, WØBWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, JH1VRQ/N1CIX

Regional Secretaries:
John Allaway, G3FKM
Secretary, IARU Region 1
10 Knightlow Rd.
Birmingham B17 8QB
England

Alberto Shaio, HK3DEU
Secretary, IARU Region 2
9 Sidney Lanier La.
Greenwich, CT 06830
USA

Masayoshi Fujioka, JM1UXU
Secretary, IARU Region 3 Association
P.O. Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union — since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

WARC-ORB '85

The World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It—isn't that a mouthful! And so the short title is WARC-ORB '85. Some 100 countries are represented by over 900 delegates. As these paragraphs were being written, less than halfway through the Conference, in late August, no problems had arisen for the Amateur Radio or the Amateur Radio Satellite Services. Had any problems arisen, there was quite a crew of radio amateurs on hand to deal with the situation.

Amateurs on the delegations of the various countries included CE3LD, DL7IH, EI7BV, EL2P, G3SDL, G4AQJ, G8IFB, I0ELE, JA1AN, JA1IF, JA1QQI, JA2PKK, JA4ABD, JH1EZS, J28AA, K3NU, K3OYQ, KC2MT, LA3AD, LA7OF, LX1HA, N4EKL, N4FK, OH2AZN, OZ9MO, P29BH, SM5BLC, TA3A, T77I, VE3CTM, VE3WI, VK3BBK, VU2ZR, WA2YHQ, W3AR, ex-W8LCH, YV5HXM, ZL2UQ, 4S7MS, 9H1Z, 9K2FM and 9Y4FT.

Present on behalf of IARU were (at various times; none of the IARU people was here for the entire 5½ weeks of the Conference) HK3DEU, I1RYS, JM1UXU, SP5FM, YU7NQM and W1RU.

IARU was at this conference for several reasons. First, it was another opportunity to keep IARU visible and to maintain the level of acceptance of IARU by the members of ITU that we so successfully gained at WARC '79. Second, it was an opportunity to handle any amateur matters that crop up in a conference from time to time. Third, it was an opportunity to respond in person, generally in private conversations, to ITU members who have some questions about the Amateur Service. Fourth, it was another opportunity to extend our already excellent liaison with Secretary-General Butler and his staff at ITU Headquarters.

A week into the Conference, IARU sponsored an evening reception, to which all heads of delegation were invited, along with all radio amateurs at the conference and also members of the International Amateur Radio Club (4U1ITU). There were 145 people in attendance, and for over two hours they talked Conference and ham radio, it being another opportunity for radio amateurs and decision makers to mingle and become better acquainted.

Our fundamental goal in attending this sort of conference is to make lots of new acquaintances and cement old friendships, resources we are putting in the bank in anticipation of the next World Administrative Radio Conference (WARC) dealing with the allocation table.

Among those representing IARU at the WARC-ORB '85 were (l-r, foreground) Masayoshi Fujioka, JM1UXU, IARU Region 3 Secretary, and Richard L. Baldwin, W1RU, IARU President. In the center is Shozo Hara, JA1AN, who (along with five other JA amateurs) was a member of the Japanese delegation. JA1AN frequently sat with the IARU team when his services were not required with the Japanese delegation.

JAPAN-U.S. RECIPROCAL-OPERATING AGREEMENT

In case you haven't already heard, a reciprocal-operating agreement between the United States and Japan was signed in early August, to take effect on September 8. This agreement was a long time in coming, having necessitated extensive negotiations between the U.S. and Japan for some four years. We are delighted that these long and detailed negotiations were finally crowned with success. A great many people on both sides of the Pacific were involved in the eventual successful conclusion.

Strays

I would like to get in touch with...

☐ anyone who served aboard the AGC-1 *USS Appalachian* during WW II. Aaron Weissman, K3VWP, 404 West 38th St., Wilmington, DE 19802.

☐ anyone with a manual or schematic diagram for a Weston 660 VOM. Isidore Seidman, W2GNZ, 902 Van Court Ave., Elberon, NJ 07740.

☐ amateurs who are alumni of the U.S. Naval Academy. Kirk R. Benson, N6ILO, 12th Company, USNA, Annapolis, MD 21412.

☐ anyone who was with the 5th Air Force in WW II. Chet Driest, K4MJC, 687 E. Wacker St., Hernando, FL 32642.

☐ any hams who enjoy model-railroading or train collecting. Shawn Wakefield, KA5UDL, 120 NE Wilshire, Bartlesville, OK 74006.

☐ any amateurs who served on the *USS Bainbridge*, the *USS Niagara*, the *USS Mayflower*, *USS Arizona* or LST774, to form a net. Ross Mirgaux, NØCPJ, 1120 Swallow La., Florissant, MO 63031.

☐ anyone with information or schematic diagrams for a Monsanto 6400A oscilloscope. John Anderson, N7GGO, P.O. Box 1145, Shelton, WA 98584.

Coming Conventions

SOUTH FLORIDA SECTION CONVENTION
October 12-13, St. Petersburg

The 10th annual South Florida ARRL Suncoast Convention will be held at a new location. All exhibits will be at the National Guard Armory on 38th Ave. South, about 200 yards west of 34th St. South (Rte. 19). The convention hotel is the Holiday Inn I-275, a few blocks north at 3000 34th St. South. There will be acres of free parking and a few spaces for RVs.

There will be the usual fine women's programs, and some interesting programs are planned with technical talks, traffic net meetings and an ARRL forum hosted by ARRL Southeastern Division Director Frank Butler, W4RH. A special technical feature on both days will be a demonstration on packet radio by the Florida Amateur Digital Communications Association (FADCA) for beginners and advanced operators. A QCWA luncheon will be held on Saturday, our famous luau with entertainment that evening, and a women's luncheon with fashion show on Sunday. Amateur examinations will be given on Saturday at 9:30 A.M. at the Armory. Bring a copy of your license and $4. Registration tickets are $3 and $4 at the door. Saturday QCWA luncheon $8, luau $15, and Sunday luncheon $7.

Hotel rooms are $34 per day. Swap tables are $12 for both days. Make all requests for tickets and hotel rooms to FGCARC, 1556 56th Ave. North, St. Petersburg, FL 33703 and make checks payable to FGCARC. S.a.s.e. requested. Talk-in on 37/97 and 96/36. For convention information, write to or call Eli Nannis, K4JMH, Convention Chairman, 14996 Imperial Point Dr. North, Largo, FL 33544, tel. 813-595-3111.

KANSAS STATE CONVENTION
October 12-13, Concordia

The Kansas Nebraska Amateur Radio Club will sponsor the Kansas State Convention at Cloud County Community College in Concordia. This will also be the Kansas state MARS meeting. There will be VEC exams, all classes, Saturday at 10 A.M. Preregistration deadline is September 12. Free flea-market tables to individuals and commercial exhibitors. Admission is $3. Banquet tickets are $9.50 per person. The Kansas Amateur of the Year award will be presented at the banquet Saturday night. There is limited seating.

Sunday noon, the WBØYYG-WAØUXI pig roast will be 50 cents per person. Pig roast tickets free with banquet tickets; limited number available. Technical seminars will be held both days, with excellent programs for computer and satellite enthusiasts. Talk-in on 13/73 and 34/94. For reservations and more information, contact Wendell Wilson, WØTQ, Box 462, Concordia, KS 66901.

DELTA DIVISION CONVENTION
October 26-27, Chattanooga, TN

The Seventh Annual Hamfest Chattanooga Amateur Radio and Computer Convention will be held at the new Convention and Trade Center. Highlights include the ARRL Delta Division Convention, license exams by Volunteer Examiners on both days, all dealer and flea-market displays indoors, free admission, convenient parking and lodging facilities, and numerous forums.

Eight-ft flea-market tables are $6-1 day/$10-both days (power $5 extra). Talk-in on 146.19/79. Cooperating motels are Best Western of Chattanooga, Carter St., tel. 615-266-7331; Holiday Inn, Trade Center, tel. 615-756-0002; Days Inn, 20th St., tel. 615-267-9761. Specify attendance at Hamfest Chattanooga.

For additional information, write to Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404, or call Nita Morgan, N4DON, tel. 404-820-2065.

PACIFIC DIVISION CONVENTION
November 1-2, Las Vegas, NV

Everyone's going to Las Vegas! Convention cochairmen Jan, N7YL, and John, W7IA, say you should plan to travel on Oct. 31 so you won't miss a minute of the activities, which start Friday morning, Nov. 1, at the Hacienda Resort Hotel on the Las Vegas Strip.

There will be beginner's and expert's forums on packet radio by TAPR; AMSAT on satellites; amateur TV by W6ORG; moonbounce by WA7JUO, VHF conference for the weak-signal crowd. WB6NOA will play his tapes of the recent VHF-UHF tropo-duct California/Hawaii openings and will illustrate with weather maps how to predict the next one. Gordon will also share his wealth of knowledge on how to prepare for the FCC exams. NTS members will help those interested in learning how to handle traffic. NA6T and AA6DX will show slides of the Belize V3OAA DXpedition. W7QGP will host a YL forum. Also, ARRL, YLRL, MARS, QCWA, etc.

A special treat will be a tour of the U.S. Coast Guard Loran-C station at Searchlight, NV, on Friday. This tour is free, but space is limited. Bus transportation will be available for $8. The outdoor flea market will be open from 10 A.M. until 6 P.M. both Friday and Saturday; exhibit hall from 9 A.M. until 5 P.M. Friday and from 8 A.M. until 4 P.M. Saturday. Free cocktails Saturday at 6:30 P.M., poolside, for those registered. An elegant Cornish game-hen banquet will be held at 8 P.M. Saturday, with special guest speaker, Astronaut Tony England, WØORE. Price for the banquet is $15 per person. FCC exams will be given; to take an exam, send your FCC Form 610, a copy of your license and $2 directly to OCTOBERVENTION FCC EXAMS, c/o Jan Welsh, NK7N, 59 Constitution Ave., Henderson, NV 89015. Include s.a.s.e. for confirmation. Walk-ins accepted on a space-available basis only.

For special airline fares, call 1-800-634-6705. Use this number for transportation only. For registration, rooms, and information, call 702-361-3331 or write OCTOBERVENTION, P.O. Box 19675, Las Vegas, NV 89132. Flea-market spaces $10. Camperland $8 plus tax. Hotel rooms $48, incl. tax, with registration before October 1. General registration $15. Admission to exhibits and flea market only (no forums, etc.) $1.

†October 12-13—Kansas State, Concordia
†October 12-13—South Florida Section, St. Petersburg
†October 26-27—Delta Division, Chattanooga, Tennessee
†November 1-2—Pacific Division, Las Vegas, Nevada

ARRL NATIONAL CONVENTIONS
†October 4-6, 1985—Louisville, Kentucky
September 5-7, 1986—San Diego, California
July 10-12, 1987—Atlanta, Georgia
August 19-21, 1988—Portland, Oregon

†At press time, Amateur Radio exams are scheduled to be given at these conventions. For other exam opportunities see Hamfest Calendar.

Hamfest Calendar

Administered By Marjorie C. Tenney, WB1FSN
Convention/Travel Coordinator

[*Attention*: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

Alabama (Opelika/Auburn)—Oct. 19: 1st Annual SPARC Swapmeet and Packet Exhibit will be held at Lee County Fairgrounds, U.S. 431, just north of U.S. 29 junction. Easy access from I-85. Open 10 A.M. to 5 P.M. Spaces per vehicle are $5 advance, $7 at the gate. Gate donation $1. Free parking. Packet demonstrations conducted by Robert "Bob" McGwier, N4HY. Refreshments available. Talk-in on 147.66/06. Reservations contact: Ray, P.O. Box 2423, Opelika, AL 36803-2423. For information, call Ray at 205-745-2838; Gene, 205-821-8010; Danny, 205-745-7455.

†ARRL Hamfest

†Alabama (Montgomery)—Nov. 9: The Central Alabama ARA will host the 8th Annual Montgomery Hamfest at the Civic Center. Free admission, free parking, all indoors, including the flea market. Flea-market setup at 6 A.M.; doors open 8 A.M. to 4 P.M. FCC exams: code testing begins at 8 A.M.; written exams at 9 A.M. Bring copy of current license and $2. Talk-in 146.24/84 (call W4AP), ragchew 146.32/92, 147.78/18, 442.925/7.925. For information or flea-market reservations, write to Hamfest Committee, c/o 2141 Edinburgh Dr., Montgomery, AL 36116 or phone Phil at 205-272-7980 after 5 P.M.

Connecticut (Poquetanuck)—Oct. 26: 3rd Annual Tri-City ARC Auction will be held at St. James Parish Hall, 1½ miles east of Rte. 12 on Rte. 2A (south of Norwich). Setup at 9 A.M.; auction from 10 A.M. until sold out. Admission free; food available. Bring your equipment to be auctioned. Talk-in on 52. Call WA2RYV at 203-464-6555 for information.

Connecticut (North Haven)—Nov. 10: The South-central Connecticut ARA (SCARA) will hold its 6th Annual Indoor Electronic Flea Market at the North Haven Rec. Center, Linsley St., 9 A.M. to 3 P.M. This is Connecticut's largest indoor flea market, featuring ham equipment, computers and other consumer electronics. Tables (6 ft) available on reserved basis only for $10. reserved. Deadline for reserved tables Oct. 31. Sellers set-up 7 A.M.; open to public 9 A.M. Admission $2. Food and sodas available. From I-91 North use Exit 11; I-91 South use Exit 12; from Wilbur Cross Pkwy. (Rte. 15) use Exit 63 North and South. Talk-in on 01/61. Information and advance table reservations (s.a.s.e) to Jerry Trichter, WA1IUF, General Chairman, 136 Alden Ave., New Haven, CT 06515, tel. 203-389-4423 (after 6 P.M.); or 203-934-2647 (before 5 P.M).

†Florida (Vero Beach)—Oct. 12-13: 12th Annual Treasure Coast Hamfest and Computer Show, sponsored by Vero Beach ARC, at the Dodgertown Conference Center. Hours: 9 A.M.-4 P.M. Sat.; 9 A.M.-2 P.M. Sun. Admission: $3 advance, $4 at door; children under 12 free. Tables: $10 advance, $12.50 after Sept. 15 cut-off. Outdoor tailgating: $5 advance, $6 at door. FCC exams Sat. (walk-ins accepted), QCWA Luncheon, packet demonstration. Lodgings available at Dodgertown ($51.75 single, plus $5 additional person);, tel. 305-569-4900. Lodging at Sheraton on the Beach ($44/night), tel. 305-231-1600. Please make own reservations, as rooms are limited. Talk-in on 175/775 and 04/64.

†Georgia (Warner Robins)—Oct. 12-13: 7th Annual

Central Georgia Hamfest, sponsored by Central Georgia ARC, with free indoor and outdoor flea market at the Recreation Center, Watson Blvd. Hours: Sat. 8:30 A.M.-5 P.M.; Sun. 9 A.M.-2:30 P.M. Free admission. Sat. events include VE testing (all classes, walk-in, $4), packet demo, transmitter hunt, CW speed and left-foot contests, MARS and ARES meetings, family barbeque and entertainment. Sun. includes GA State CW Assn. breakfast, ARRL forum, GA SSB Assn. and GA Cracket Net business meetings. Both days: dealer displays, free flea market, arts & crafts, snack bar, QSL swap, HF station operation. Free flea-market spaces, bring own tables. Fri. P.M. setup available, with inside security furnished both nights. Free paved tailgate spaces outside. Free RV parking (no hookup). Talk-in on 25/85. Information: Curt, K4KKQ, 912-929-4390.

†**Georgia (Lawrenceville)—Nov. 2-3:** The Alford Memorial Radio Club of Stone Mountain will hold the Ham Radio and Computer Expo '85 (formerly Stone Mountain Hamfest) at Gwinnett County Fairgrounds, 20 minutes northeast of Atlanta. Hours: 9 A.M.-5 P.M. Sat.; 9 A.M.-4 P.M. Sun. Admission $4 advance, $5 at door. FCC license exams both days, free cookout Sat. night. Many other activities for the entire family. Fantastic dealer facility; giant flea market under cover. Discount hotel rooms. Free parking for 3500 cars. RV sites with full hookup available. Talk-in on 16/76, 449.25/4.25. Information: Alford Memorial ARC, P.O. Box 1282, Stone Mountain, GA 30086, tel. 404-476-2944.

Georgia (Rome)—Oct. 6: The Rome Hamfest, sponsored by the Coosa Valley ARC, will be held at the Rome Civic Center on Georgia Highway 20, across from Shoney's. Admission free. Homemade barbeque and stew. Camper parking; no hookups. Inside tables $5; outside $3. Fun for the whole family. Talk-in 90/30. Contact Buddy Waller, NO4U, 24 Wellington Way, Rome, GA 30161, tel. 404-235-5417.

†**Iowa (West Liberty)—Oct. 6:** The Muscatine and the Iowa City ARCs will cosponsor the Southeast Iowa Hamfest at the West Liberty Fairgrounds. Rain or shine, gates open at 7 A.M. and close at 3 P.M. Indoor/outdoor flea market. Packet demonstration. Camping available on grounds Sat. P.M. for $2. ARRL/VEC exams start at noon; preregistration suggested but walk-ins accepted on first-come basis. Talk-in on 25/85 and 52. Tickets $3 advance, $4 at gate. For further information, please contact: Tom, KEØY, 905 Leroy St., Muscatine, IA 52761, tel. 319-264-3259.

†**Kansas (Pierceville)—Oct. 20:** Sand Hills ARC swapfest at the Pierceville Community Bldg. (14 miles east of Garden City on U.S. 50). Hours: 9 A.M.-4 P.M. Admission: $2 advance; $2.50 at door. Swapfest, VE testing, QLF contest, tour of KANZ radio, women's activities and covered-dish dinner. Snack bar also available. No gas except Garden City. Talk-in on 31/91, 52, 3920 kHz. Information: SHARC, Box 811, Garden City, KS 67846, ATTN: Raymond, KØLZR; tel. 316-335-5238.

Massachusetts (Framingham)—Oct. 27: The Framingham ARA will hold its annual fall flea market and exams at the Framingham Civic League Bldg., 214 Concord St. (Rte. 126). Doors open 10 A.M. Sellers may begin setup at 8:30 A.M. Admission $2; tables $10 (includes one free admission). Preregistration required for tables and exams. Talk-in on 75/15. To reserve tables, contact Jon Weiner, K1VVC, 52 Overlook Dr., Framingham, MA 01701, tel. 617-877-7166. For license exams, send completed 610, copy of license, and $4 check (payable ARRL/VEC) to FARA, P.O. Box 3005, Framingham, MA 01701.

Massachusetts (Feeding Hills)—Nov. 1: An auction of radio/computer/electronic items will be held at the Granger School (intersection of Rtes. 57/187, west of Springfield) starting 7:30 P.M. Sponsored by Hampden County RA, which will collect 10% commission on all sales. No admission charge; refreshments available. Information: Ron Beauchemin, WB1ETS, tel. 413-739-5228.

Michigan (Benton Harbor)—Oct. 6: Blossomland Blast, sponsored by the Blossomland ARA, will be held at the Lake Michigan College Community Center, one mile off Exit 30 of I-94 near Benton Harbor. Big indoor flea market with lots of tables. Free paved parking. FCC license exams. ARES and SKYWARN seminars. Homebrew contest. For further info, write to Blast, P.O. Box 175, St. Joseph, MI 49085.

Michigan (Lansing)—Oct. 13: The Central Michigan ARC and Lansing Civil Defense Repeater Assn. are sponsoring Ham Fair '85 at the National Guard Armory, 2500 South Washington Ave., 8 A.M. to 3 P.M. Admission $3; tables 75 cents/ft (reservations in advance). Dealer sales, swap shop, handcrafted items. Talk-in on 144.79/5.39 and 34/94. Information and reservations, contact Rowena Elrod, KA8OBS, 111 Lancelot Place, Lansing, MI 48906; 517-482-9650.

Michigan (Kalamazoo)—Oct. 27: 3rd Annual Hamfest/Electronic Flea Market held at the Kalamazoo County Fairgrounds. Dealer setup 8:30 A.M.; doors open 9 A.M. to 4 P.M. Admission: $2 advance, $2.50 at door. Eight-ft table space $6; spaces with power must be reserved/paid in advance. Contact Ken, KA8RUA, 2825 Lake St., Kalamazoo, MI 49001. License testing 10 A.M.; limited walk-ins. Send $4 fee (payable to ARRL/VEC) and 610 to Al Nelson, K8OQB, 10603 Cora Dr., Portage, MI 49081, tel. 616-323-3812.

†**Minnesota (Richfield)—Nov. 2:** Hamfest Minnesota and Computer Expo, sponsored by the Twin City FM Club, will be held at Richfield High School, 7001 Harriet Ave. South, 8 A.M.-3 P.M. Admission: $3 advance, $4 at door. FCC exams, commercial booths, giant indoor flea market and food. Talk-in on 16/76. For more information, contact Clyde Green, NØDVP, 5406 Zealand Ave. North, New Hope, MN 55428, or Twin City FM Club, P.O. Box 555, Minneapolis, MN 55440.

†**Missouri (Grandview)—Oct. 27:** Octoberfest, sponsored by the Southside ARC of Kansas City, will be held at the Granview West Junior High School cafeteria, 19th and Main, 9:30 A.M.-4:30 P.M. Setup at 8 A.M. Advance tickets, $2 or 4/$5; at door, $2.50 or 3/$5. Swap tables, commercial exhibits, forums, snack bar. Talk-in on 72/12. Exams: 9:30 A.M. Cutoff on exams, Oct. 22; walk-ins on first-come basis. Applications ($1 fee) and requests for information to Rick McLeod, 1603 Richmond, Pleasant Hill, MO 64080, tel. 816-987-3936.

†**New Jersey (Paramus)—Oct. 13:** The Bergen ARA is holding a Ham Swap 'n' Sell at Bergen Community College, 400 Paramus Rd., from 8 A.M. to 4 P.M. Tailgating only; bring own tables. Amateur license exams. Sellers $5; buyers free. Thousands of spaces. Talk-in on 19/79 and 52. For more information, contact Jim Greer, KK2U, 444 Berkshire Rd., Ridgewood, NJ 07450, tel. 201-445-2855, nights only.

†**North Carolina (Maysville)—Oct. 13:** Sponsored by the Maysville Hamfest Club at Maysville Community Park, 9 A.M-3 P.M. Free admission. Flea market, tailgating, women's activities, lunch on grounds. Talk-in on 144.61/5.21 and 146.52. Contact Jo Ann Taylor, Rte. 1, Box 80-36, Swansboro, NC 28584, tel. 919-326-4433 (work) or 919-393-2120 (home).

†**North Carolina (Concord)—Nov. 3:** 7th Annual Cabarrus ARS Hamfest will be at Central Cabarrus High School, 505 Hwy. 49 South, 9 A.M.-4 P.M. Large flea-market area. Tables $5 each or space $3 (own tables). Setup time 8 A.M. Tickets: $3 or 4/$10 advance, $4 or 4/$12 at door; children under 12 free. Ticket requests received after Oct. 25 will not be mailed, but may be picked up at the door. Concessions, forums, free tailgating, free parking, lounge, parking for handicapped on request. Talk-in on 055/655. Preregistration: CARS Advance Tickets, c/o Charlie Menius, KO4WB, P.O. Box 1093, Kannapolis, NC 28082.

Ohio (Springfield)—Oct. 6: Springfield Hamfest and Computer Expo at Clark County Fairgrounds, ¼ mile west of the intersection of I-70 and Ohio Rte. 41 (Exit 59). Indoor flea market. Doors open 8 A.M. to 4 P.M. Tickets: $2 advance, $3 at door; under 12 free. Tables: $6 advance, $7 at door. Advance registration must be received by Sept. 28. Send to Independent Radio Assoc., Inc., P.O. Box 523, Springfield, OH 45501. Talk-in on 144.85/5.45, 13/73, 222.66/4.26. For more information, call 513-322-8236, 513-390-6220 or 882-6521 (local).

Ohio (Marion)—Oct. 27: The Marion ARC will hold its 11th Annual Heart of Ohio Ham Fiesta from 8 A.M. to 4 P.M. at the Marion County Fairgrounds Coliseum. Large parking area, food. Tickets: $3 advance, $4 at door. Tables $5. Check-in on 146.52 or 90/30. For information, tickets or tables, contact Ed Margraff, KD8OC, 1989 Weiss Ave., Marion, OH 43302, tel. 614-382-2608.

†**Oklahoma (Lake Texoma)—Oct. 26-27:** An introduction to Amateur Radio for the potential ham and Dutch oven cooking for the traveling amateur will be special features of HAMRAMA '85, scheduled for Lake Texoma Lodge, overlooking beautiful Catfish Bay near Kingston. Also on the program will be forums on severe-weather and emergency operations, radio club organization and problems, traffic handling, and what's happening in the ARRL and FCC. The 7 P.M. banquet will be followed by entertainment, including the traditional Saturday night dance. A full schedule of programs and amateur exams are on tap. For additional information, contact Texoma Hamarama Assn., P.O. Box 610892, DFW Airport, TX 75261.

†**Pennsylvania (Carlisle)—Oct. 13:** 2nd Annual Cumberland County ARS Hamfest at the Carlisle Fairgrounds. Directions: from exit 17 of I-81 or exit 16 of PA Turnpike, follow U.S. Rte. 11 south to Clay Street; then turn right into fairgrounds. Hours: 7 A.M. to 4 P.M.; open for early dealer setup Sat. 8 P.M. Admission $3; XYLs and under 12 free. Tailgating $2; inside spaces $7 (includes table and power). Campsites available (send s.a.s.e for information). League representatives and personnel from Third Call Area Incoming and Outgoing DX and QSL Bureaus will be present for inquiries and information. Most Unique/Attractive QSL contest. Preregistration by Sept. 25. Send to C-CARS, P.O. Box 448, New Kingstown, PA 17072-0448.

Pennsylvania (Sellersville)—Oct. 29: The RF Hill ARC will hold its 9th Annual Hamfest at the PA National Guard Armory, Rte. 152. Indoor spaces $8; tailgating $6. Food, beverages available on premises. Doors open for sellers 6 A.M.; buyers at 8 A.M. Buyers $3, with nonham spouses and children free. No advance ticket sales. Sellers call Robert, WB3AIG, at 215-674-4800, ext. 515, to reserve indoor space only. Tailgate space is outdoors and assigned on first-come basis. Talk-in on 144.71/5.31 (Almont), 28/88 (Hilltown) and 146.52. Sellersville is located about halfway between Philadelphia and Allentown, and one mile east of PA Rte. 309. For additional information, contact Robert, WB3AIG, at above phone number or 215-721-0278.

†**Tennessee (Gray)—Oct. 19:** The 5th Annual Tri-Cities Hamfest, cosponsored by the Johnson City and Kingsport ARCs, will be held at the Appalachian Fairgrounds. Forums, dealers, flea market and RV hookups. Admission: $2 advance, $3 at gate. For further information, write to Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City, TN 37602.

Texas (Lubbock)—Oct. 6: The Caprock Repeater Assn. will hold a hamfest at the Cocoa Convention Center. VE exams Sat.; swapfest Sun. Open 8 A.M.-3 P.M. No admission charge. Talk-in 34/94. Information: Ronny Ashmore, 806-799-2639.

†**Texas (Odessa)—Nov. 2-3:** The West Texas ARC is sponsoring the Odessa Amateur Radio Hamfest at the Odessa Hilton, 5200 East University. Hours: 8 A.M.-5 P.M. Sat.; 8 A.M.-3 P.M. Sun. Admission: $5 advance; $6 at door. Seminars, forums, FCC exams, women's functions, contest. Free reception on Sat. night. Reduced hotel accommodations. Talk-in on 63/03, 28/88, 16/76, and 52. Contact G. B. Brock, NG5R, 1126 East 44th, Odessa, TX 79762, tel. 915-362-6069.

Virginia (Dublin)—Oct. 19: New River Valley ARC sponsors the Hamfest and Electronic Flea Market at the New River Community College. Hours: 9 A.M.-4 P.M. Tickets: $2 at door or from club member. Tables $3. Food available on premises. Talk-in on 78/18 or 07/67. For information, tables or directions, contact Bill Lineberry, WB4TGT, tel. 703-731-1594; Clyde Albert, N4KEF, 703-980-5746; Rick Frisby, KI4ZE, tel. 703-382-8371.

[*Note:* Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

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Amateur Satellite Communications

Conducted By
Vern "Rip" Riportella, WA2LQQ
P.O. Box 177, Warwick, NY 10990

Antennas for Working OSCAR

It seems likely man has always looked skyward in search of inspiration. Today, when amateurs seek to expand their vistas, they naturally look skyward toward OSCAR. What antennas do they use?

A typical OSCAR station is equipped for three or perhaps four Modes: A, B, J and maybe L.[1] This implies the station has antennas for 10 m, 2 m and 70 cm. A fully equipped station may also include a 24-cm antenna for Mode L. What kind of antennas are typical on each band?

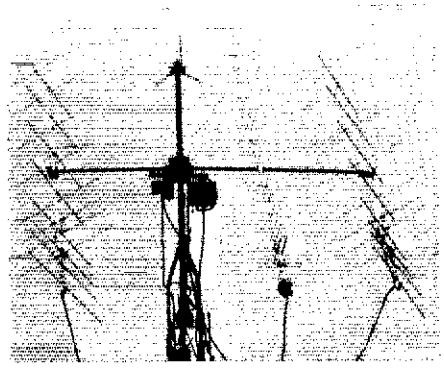
For 10-meter Mode A reception, there are several approaches. With a 10-meter beam and preamp, you'll hear the Russian amateur satellites well. However, when the RS satellites are overhead, your beam's low elevation pattern is a disadvantage. Supplement your 10-meter beam with another type of 10-meter antenna. Several selectable sloping dipoles help. A turnstile is easily built and surprisingly effective for overhead passes. A horizontal dipole stapled to a bedroom wall will even suffice, but a vertical is generally a poor choice.

Two-meter OSCAR antennas are used for Modes A, B, J and the future JL mode. Antennas for VHF and above can be interesting and occasionally baffling.

Recent OSCARs, such as AO-10, use circular polarization (CP). CP can be thought of as a mixture of vertical and horizontal polarization. AO-10 is spinning and what might be vertically polarized one moment could be horizontal the next. Moreover, radio waves passing through the geomagnetic field have their polarization rotated in passing. This is called Faraday rotation. The polarization of the downlink at your QTH is not only unpredictable, but it's rapidly varying! A CP antenna solves this problem by (ideally) being equally effective in both horizontal and vertical planes.

CP comes in two "flavors" (engineers call them senses): Right Hand (RHCP) and Left Hand (LHCP). A handy visualization tool for CP is to imagine you could see the plane waves launched by your CP antenna. Imagine a ribbon-like plane wave twisting off regularly into space. The rate of twist of the ribbon would be exactly one turn per wavelength of travel. The direction of the twist is the sense. If a mouse were to run down the RHCP ribbon (away from you), the mouse would appear to be rotating clockwise as he scampered off into the distance. Conversely, a mouse running down a LHCP ribbon would appear to be rotating counterclockwise.

Many antennas can generate CP, but few of them do it really well. Two CP figures of merit are gain and circularity (axial ratio). Circularity is the relative sensitivity of the antenna to RF energy in various planes. Gain for CP antennas is analogous to linearly polarized Yagis.



A typical Mode B OSCAR antenna system—a pair of 2-meter crossed Yagis and a single 70-cm crossed Yagi. See text for details.

The easiest way to get CP on 2 meters is with a helical antenna. The 2-meter helix tends to be bulky, but it can be fun to build and is very forgiving of lax dimensional tolerances. Several types of helices are described in the *Satellite Experimenter's Handbook* (SEH).[2] Helices tend to be a little lower in gain than you might want for 2 meters.[3]

The most popular solution for the Mode B downlink is crossed Yagis. The Yagis can be on different booms or they may share a common boom. They are oriented at right angles to each other and fed so that the resultant wave acts like that imaginary ribbon. This can be done by equally splitting power to the two Yagis and then delaying the power to one Yagi by 90 degrees. The result will be either RHCP or LHCP, depending on which antenna is leading and which is lagging. An alternative is to have both Yagis on a common boom but to offset them physically on the common boom by ¼ wave. Then they can be fed in phase to generate either RHCP or LHCP. To reverse the sense, a ½-wave delay line is inserted in one feed or the other. AO-10 uses RHCP for all its antennas except the 2-meter omni, which is rarely used. Experience has shown it very advantageous to be able to switch your station antennas between the two senses (RHCP to LHCP).

OSCAR antennas for 70 cm are currently used for Modes B and L. In the future, they will be used for Modes JL and S. Helices and crossed Yagis are very popular here, too. Gain of 14 or 15 dBic can be obtained with a single crossed Yagi of modern design. You'll see the quagi antenna also used on 70 cm. Some work has been done on a CP version of a quagi which, in its original version, was linearly polarized.

For Mode L at 24 cm, Yagis, loop Yagis, quagis, helices, dishes and some other rare varieties enter the picture. F9FT (Tonna) has made an excellent Yagi array for Mode L, and many are using it. It produces linear polarization. Consequently, users may observe some spin modulation.[4] Currently experiencing a surge in popularity on Mode L are loop Yagis.[5] Some designers claim close to 20-dBi gain for the longer versions. Arrays are in use producing 24 dBi or more. KØRZ has had excellent results with an array of four long-loop Yagis for Mode L. Spectrum International sells a shorter version that seems to work quite well. These antennas are very lightweight, have low wind drag and are relatively easy to construct. Dimensional tolerances need to be precisely held however. The loop Yagis are also linearly polarized and show some spin modulation effects. Also used at 24 cm are small- to medium-sized parabolic dish antennas of the 4- to 8-foot class. (We'll cover these in a subsequent column).

Let's take a quick look at a fairly typical Mode B OSCAR antenna installation. The photo shows a pair of 2-meter crossed Yagis and a single 70-cm crossed Yagi. The 2-meter Yagis are spaced at about 9 feet. The 70-cm Yagi is more than a ½ wavelength (at 2 meters) from the 2-meter antenna. The elements of the 70-cm Yagi are at 45 degrees to the 2-meter elements to improve isolation. The boom is off-center to increase the distance of the 70-cm antenna from the mast. Top guys are used to lower mechanical stresses on the elevation rotor caused by the off-center arrangement. The top guys are of nylon 150-pound-test line with turnbuckles. The feeds for the antennas all approach from the rear to avoid pattern distortion caused by running the coax and its associated field through the elements. The boom is, of course, nonconductive fiberglass. This is a must! The preamps for each band are mounted in the two black boxes just below the elevation rotor.

When Galileo first turned his telescope on the skies, a whole new world opened to him. What will *you* find when you turn your antennas skyward?[6]

Next time we'll discuss ways of keeping your OSCAR antennas accurately pointed: tracking.

Notes

[1]Transponder modes were delineated in Table 1 in the September 1985 column.
[2]Available from ARRL and AMSAT.
[3]For 2-meter OSCAR work, you want at least 12-dBic gain.
[4]Spin modulation is the received signal amplitude modulation that results from the spin of the satellite and the consequent satellite antenna-pattern rotation. The effect is akin to a low-frequency (approximately 100 Hz) amplitude modulation impressed on signals.
[5]J. Reisert, W1JR, "VHF/UHF World," *Ham Radio*, Sept. 1985, pp. 56-62.
[6]Information about getting started on OSCAR is available for an s.a.s.e. to the author at the address above.

Silent Keys

Administered By Nancy A. O'Neill

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

WA1BHB, Carl W. Lawson, Naugatuck, CT
W1NC, Earle F. White, Arlington, MA
K1RGB, George E. Osborne, Vergennes, VT
W1RWD, Grant N. Nickerson, Woodbridge, CT
WA1UNF, Gordon Hunt, Madison, CT
W2AJM, Max H. Wolff, Harrison, NY
K2BUI/CEØAE, David L. Reddy, Albuquerque, NM
N2CVT, Stephen O. Nichols, Clearwater, FL
W2DZH, Carl Lomupo, Whiting, NJ
W2ERF, Clarence M. Pulling, West Lebanon, NY
*WA2EVG, Richard H. Stevens, Greenville, NC
W2EYO, George A. Bastedo, Seneca Falls, NY
W2JBG, W. L. Wiggins, Yonkers, NY
K2JJ, Gordon R. Windham, Hammond, NY
K2LIE, William Tarino, Whitestone, NY
W2MLM, Carl Lindemann, Jr., South Freeport, ME
KA2PIP, Carl Pasho, Keeseville, NY
*WB2PKZ, James A. Wilson, Staten Island, NY
KC2RB, Frank L. Scrom, Schenectady, NY
W2SSL, Miller E. Kinne, Utica, NY
*K2UAT, John G. Courtney, Northport, NY
KA3BGP, William J. Hutchinson, Baltimore, MD
W3BW, C. Davis Belcher, Key West, FL
KA3FSE, Michael J. Dunn, Rosemont, PA
AK3H, Daniel G. Mazur, Silver Spring, MD
K3LHM, Carl L. Mook, Stoneboro, PA
W3OGD, George R. Sharp, Mechanicsburg, PA
W3VDQ, Robert A. Matthews, Ridley Park, PA
K3VQV, Clifford E. Ray, Greenville, PA
N4BHX, J. L. Lamar, Marietta, GA
WB4BPU, Marshall L. Banks, Folkston, GA
K4CYC, Merle L. Towle, Valrico, FL
N4EKJ, Harold L. Bowen, Fayetteville, TN
WA4GFA, Floyd L. Merritt, Alcoa, TN
WD4IIR, Elmer W. Chambers, Nokmis, FL
WA4JNH, Harold B. Stone, Nashville, TN
WA4LKY, George A. Romard, Fort Myers, FL
W4LMB, Bernard J. Bailey, Virginia Beach, VA
W4MJJ, Merriel D. Paris, Casselberry, FL
W4PPC, George H. Naftzinger, Miami, FL
K4QCO, Francis J. Wittlinger, West Palm Beach, FL
K4QI, Robert F. Johnson, Titusville, FL
KA4RGQ, W. Raymond Crosier, Falls Church, VA
W4SHJ, Harry J. Hopkins, Jr., Norfolk, VA
KD4WA, Thomas Anderson, North Augusta, SC
W5CIL, Edward O. Tyrolf, Jr., Kenner, LA
WD5EXK, William J. Perry, Jr., Houston, TX
W5FSM, Robert J. Holt, Amarillo, TX
W5GQV, Leroy D. Clough, Waco, TX
W5GSF, William G. Horn, Jr., Bay Springs, MS
WB5JAO, James W. Goodwin, Haynesville, LA
W5KAI, Vernie Martin, Oakwood, OK
WB5LSW, Gordon Franks, Cleveland, OK
W5SUX, Robert J. Dunkin, San Antonio, TX
W5WR, Tom M. Lytle, Houston, TX
N6AVV, J. M. Jackson, Stockton, CA
*WB6BEN, John D. Haller, Burbank, CA
N6BRL, Richard D. Kephart, Central Valley, CA
W6CQI, Richard J. Segerstrom, Menlo Park, CA
W6CXV, Joseph A. Crutcher, Fullerton, CA
KD6FE, Donald E. Joslin, Capitola, CA
*WD6FSW, Irvin Chas. Dumas, Coulterville, CA
W6GJC, Vincent E. Spade, Lancaster, CA
N6HFU, Edgar H. Martin, Modesto, CA
W6ND, Edward George Lindsay, Burlingame, CA
KD6QD, John Kwei, San Mateo, CA
W6VUY, Rex O. Oberbeck, Hermosa Beach, CA
WB6WBR, Lew F. Christensen, San Bruno, CA
W7AFQ, Royal H. Dimick, Salem, UT
W7KR, Fred M. Conover, Albuquerque, NM
W7LAB, James J. Curry, Las Vegas, NV
WA7VRF, Guy Phillips, Spokane, WA
WA7VWB, John A. Amundsen, Kirkland, WA
W8BXJ, Fred W. Brettschneider, Dearborn, MI
W8BZN, Jack H. Thornell, Cincinnati, OH
W8CH, Joe L. Smith, Jr., Beckley, WV
KA8CYJ, Frank I. Sanders, Toledo, OH
W8DYJ, Walter Zaleski, Weirton, WV
W8RUO, Emory L. Wright, Winfield, WV
WA8THZ, William A. Amreihn, Bay City, MI
WB8UHE, James B. DeShon, Bay Village, OH
WB8VOA, Cleveland T. Riley, Lancaster, OH
WA8WDY, James F. Leland, Detroit, MI
W9ALI, Lawrence J. Greenwood, Lombard, IL
KA9CKC, Sheri Underwood, Robinson, IL
W9DHS, James A. Teslik, Elk Grove Village, IL
W9FDF, C. Roller, South Elgin, IL
W9ICN, Maurice Dale Jones, Woodriver, IL
W9NDA, Paul L. Edwards, Onalaska, TX
W9SWK, Eugene A. Chase, Sr., Fort Wayne, IN
KAØCVF, Chauncey Q. McAbee, Sturgis, SD
WØHAC, Ellsworth L. Maxey, Marion, IA
WØTSA, Lee R. Craig, Emporia, KS
KH6OD, Fenton A. Martin, Jackson, MS
VE4HW, Harvey A. Wheaton, Flin Flon, MB
VE7BM, Sydney A. Woods, Victoria, BC
G3SUW, R. W. Cresswell, Basingstoke, Hants, Great Britain

*Life Member, ARRL

Correction

The call sign of Paul L. Edwards was listed incorrectly in September *QST*. His call sign should have been listed as W9NDA.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

October 1935

☐ The Editor bids welcome to a new Southwestern Division of the League structure, formed by splitting the too-large Pacific Division. The first director will serve only a one-year term, so that future elections will be staggered in California. Also in this autumn's elections an alternate director will be chosen as a standby in case the elected director is unable to perform his duties.

☐ W6AM and family backpacked (with the help of some Boy Scouts and a mule) 5-meter gear and antennas, plus some wilderness accommodations, to the top of California's Mount Whitney, highest in the U.S. Four days of activity, with physical restrictions because of the thin air, brought regular contacts to San Francisco and Los Angeles areas, over 200 miles.

☐ Out East, W2MO drove to the top of a 550-foot "mountain" in New Jersey and set up an 8-element array to achieve a number of Massachusetts and Rhode Island contacts on 5 meters.

☐ Activity on that band is very heavy in metropolitan areas such as Boston, some saying the QRM is as bad as on 80 meters. To help solve the problem, W1CTW outlines some of the modifications that can be applied to present gear for more selectivity in receivers and more stability in transmitters.

☐ George Grammer relates the various steps, including early mistakes, he took in designing and building a 47-203A oscillator-amplifier transmitter. His detailed explanation of options and choices as he proceeded will help in our own home-building efforts.

☐ Single-sideband—is it practical? Technical Editor Jim Lamb, responding to a Board request, describes the technical fundamentals and concludes that at the present stage of the art it is not practicable to generate a replacement carrier in the receiver in the precise relationship needed (without a lot of investment and a couple of rooms full of gear, that is).

☐ At the Brockton, Massachusetts, fair, T. R. McElroy copied 69 words per minute with only two errors to become the new world code-speed champion.

☐ Like most of us, W2AOE's residence has limited yard space, which restricts beam-antenna design. Dana therefore put up two housetop vertical half-wave elements and achieves a modicum of directivity by feeding in phase or out.

☐ What is a country? For amateur DX work and records this has been a continuing question. W1CBD has been studying the problem from his vantage point as unofficial I.A.R.U. activities coordinator. He concludes the only practicable basic rule is: "Each discrete geographical or political entity is considered to be a country." (Overly simple?)

☐ Voice modulation monitoring is important, but those cathode ray tubes are so darned expensive. W6CQH decided to use a neon-tube presentation in front of a revolving mirror to act as sort of a linear sweep.

25 Years Ago

October 1960

☐ W2YM used a hot-cathode Colpitts oscillator, silver-mica capacitors and a cathode follower circuit to achieve satisfactory stability in his design of a v.f.o.

☐ We have some growing pains in adjusting c.w., a.m. and sideband distribution in the newly expanded 20-meter voice band, but it seems to be settling down in the basic spirit of ham cooperation.

☐ A visual meter has no utility for the blind amateur. W6PIV describes his transistor unit, which produces an audio tone commensurate with the voltage drop across the usual milliammeter.

☐ For the Novice with limited space, W1ICP shows how a basic 30-foot vertical element can be fed with open-wire line through a matching coupler for good results.

☐ W9ERU used a number of relays and remote-controlled motor-driven switches to route his r.f. to desired points through coax cables.

☐ W5DQV has built a superhet receiver with crystal filter and an 8-W a.m. transmitter with v.f.o. into just 1/6 of a cubic foot—and it doesn't even look crowded.

☐ Get out your thinking cap to absorb the useful technical details in W3HEC's treatise on high-frequency crystals for s.s.b.

☐ W3MFW keyed W3ECR's rig to national high score in the c.w. section of the DX contest earlier this year. W1ONK topped the voice scores. Frankford nosed out Potomac Valley in the long-standing club competition.

☐ Canadian amateurs were polled by the Department of Transport on band subdivision matters, and in response the government has added a bit to each of the voice bands 40 meters and below.

☐ A fully equipped hospital ship, *Project Hope*, will shortly sail from San Francisco for Southeast Asia, and aboard will be ham gear with the call W8OLJ/MM.

☐ Inductance values seldom remain the same when a coil is put into a shield. Mayer Savetman of Westinghouse illustrates a construction method that allows touch-up adjustments from the outside with a simple screwdriver.

☐ W9HRH shows us a system of relays in a circuit to protect expensive tubes from erratic screen voltage, solving the problem encountered in some other relays with heavy armature inertia.—*W1RW*

Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN
Club Program Manager, ARRL

CLUB CHALLENGE FOR THE '80s

Only a few months are left to take advantage of the competition and earn a transceiver for your club. For a small amount of time invested in promoting League membership, your club could earn a state-of-the-art transceiver. But there's not too much time left. If you have any questions about the program, call ARRL Hq. and ask for Lori Chadwick (Tuesday-Thursday).

The Newest Special Service Clubs

Congratulations to the League's newest Special Service Clubs (SSCs). These are the groups that have that "extra little bit" that sets them above the rest. SSCs are the leaders in their Amateur Radio communities. They're the ones with the active training classes, the ones who work with youth groups in contacting the Space Shuttle, the ones who sponsor local Amateur Radio Explorer groups, and the clubs with members who actively pursue technical projects.

If members of your club would like to participate in this program, contact your Affiliated Club Coordinator. Here are the most recently appointed SSCs, followed by their city, state and number of members:

Allen County Amateur Radio Technical Society, Inc., Fort Wayne, IN (189)
Bartlesville ARC, Bartlesville, OK (78)
Cullman ARC, Cullman, AL (19)
Gloucester County ARC, Turnersville, NJ (182)
Goddard ARC, Burtonsville, MD (85)
Hattiesburg ARC, Inc., Hattiesburg, MS (26)
Hawkins County ARC, Rogersville, TN (9)
Kerbela ARS, Lenoir City, TN (26)
Klamath Basin ARA, Klamath Falls, OR (31)
Laurel ARC, Burtonsville, MD (38)
Marin ARC, San Rafael, CA (112)
Maury ARC, Hampshire, TN (35)
McMinnville ARC, McMinnville, OR (23)
Mesabi Wireless Assn., Iron, MN (30)
Miami County ARC, Peru, IN (16)
Mountaineer ARA, Grafton, WV (27)
Neptune ARC, Neptune, NJ (35)
Ocean Monmouth Amateur Radio, Bradley Beach, NJ (131)
Olympia ARS, Lacey, WA (82)
Peninsula Radio Operators Society, Inc., Salisbury, MD (56)
Porter County ARC, Valparaiso, IN (55)
Quad-County ARC, DuBois, PA (39)
Radio Amateur Club of Knoxville, Knoxville, TN (129)
Relay Repeater Club, Arcadia, CA (47)
Rock Creek ARA, Silver Spring, MD (104)
Salt City DX Association, East Syracuse, NY (60)
San Fernando Valley ARC, Inc., Van Nuys, CA (85)
South Brevard ARC, Melbourne, FL (63)
Southside ARC, Kansas City, MO (49)
Squaw Island ARC, Canandaigua, NY (48)
Wabash Valley ARA, Terre Haute, IN (93)
Willmar Area Emergency Amateur Radio, Bird Island, MN (97)
West Alabama ARS, Northport, AL (22)
West Jersey Radio Amateurs, Burlington, NJ (49)
W. T. Clarke High School ARC, Westbury, NY (18)

Newest Affiliated Clubs

Welcome aboard to our newest affiliated clubs, whose applications were approved by the ARRL Executive Committee in August:

Bedminster Far Hills ARC, Bedminster, NJ
Central Valley VHF-FM Club, Stockton, CA
Coastal Plains ARC, Inc., Ashburn, GA
Farmers' Mountain Repeater Assn., Inc. Portland, OR
Houston Echo Society, Inc., Houston, TX
Kosair ARC, Louisville, KY
Marshall County ARC, Marysville, KS
Mohawk Mountain VHF Society, Brookfield, CT
Neshoba ARC, Philadelphia, MS
Northern Arizona DX Assn., Flagstaff, AZ
Society of Midwest Contesters, Streamwood, IL
Society For The Promotion of Amateur Radio Communications, Opelika, AL
South Jersey DX Group, Pitman, NJ
Spring Hill ARC, Spring Hill, FL
Western Michigan Packet Radio Assn., Muskegon, MI
Western New York DX Assn., Buffalo, NY
Wisconsin Experimental Radio Assn., Milwaukee, WI

Renewing SSCs

After completing a year of Special Service, SSCs go through a review process with their respective ACCs. With successful programs behind them, they plan their next 12 months of activities. SSCs who recently renewed their status are:

Austin ARC
Beaver Valley ARA, Inc.
Chesapeake Bay Radio Assn.
Denver Radio Club, Inc.
Hernando County ARA, Inc.
Indianapolis Red Cross ARC
Muncie Area ARC
New Ulm ARC
North Florida ARS
Northeastern Indiana ARC
Pikes Peak Radio Amateur Assn.
Rochester ARA
Rocky Mountain Radio League
Southern Maryland ARC
Steel City ARC, Inc.
Theodore Roosevelt ARC
Triple "A" ARA Inc.
Tuscaloosa ARC
Wilderness Trail ARC

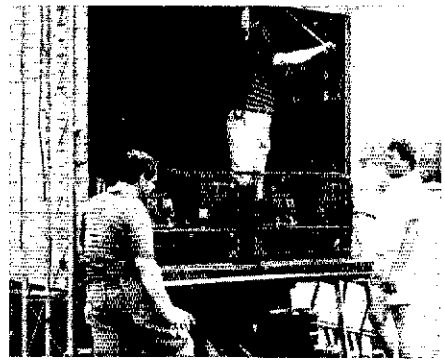
Photo Hints

Elsewhere in this column you'll find a photo essay for the 1985 Field Day. To secure the best chance that your photos will grace the pages of *QST*, follow these few rules: (1) take high-contrast photos; (2) make your pictures interesting! The most appealing photographs are those of groups of people doing interesting Amateur Radio projects; and (3) attach an adhesive label to the rear of each photo, identifying the participants and describing the scene. Too many excellent pictures aren't used because the participants can't be identified.

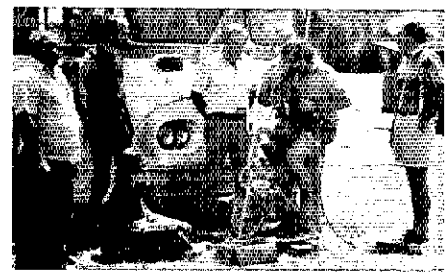
Field Day '85

It's called "doing the stairs, Field Day style," and it builds your leg muscles and improves skin tone. Members of the Manatee ARC (FL), K4GG, haul yet another Yagi to the top of the stadium.

Members of the Chehaw ARS (GA), K4HAV, pull in a new one.



The power crew (l-r), K5HW, W5BJ and N5BMU, switched generators every two hours for the Garland (TX) ARC. *(photo courtesy K5HGL)*



Here's the natural-power station at N6ME, the Western Amateur Radio Assn. KE6GS operates (and supplies power to) the 2-meter low-power rig, while K1IJCT, WB6BFH, N6NOA, NR6C and NO6S (l-r) do their best to help him out.

Conducted By Michael R. Riley, KX1B
Public Service Manager, ARRL

Blazing Stories!

During the months of June and July, the state of California seemed to be one huge inferno. Every day, the nation watched as thousands of people fought to contain dozens of fires throughout the Golden State.

The following reports by James "Knock" Knockenhauer, Byron Looney, Paul Ryan and "Ski" Brozowsky are a few of the hundreds received here at Hq. These gentlemen obviously didn't do all the work. Hundreds of amateurs provided communications for emergencies ranging from the smallest fire to the huge Lexington blaze. The efforts of every Amateur Radio operator, are to be commended, although it was impossible to mention everyone.

Santa Clara Valley Overview

Three fires bordered on the Santa Barbara Section and resulted in considerable "mutual aid" and coordination between the Sections. Most of this was accomplished through the excellent assistance of Walt Del Conte, WD6EKR, the DEC for the Salinas Valley, WB6IZF, AEC in King City , and Byron Looney, K6FI, the SM/SEC for the Santa Barbara Section. Additional assistance came from the EC in Kings County (SJV), James P. Christian, WA6SHO, who was able to get into some nearby inaccessible areas to provide contact with the California Department of Forestry back in King City. Additional assistance was given to the San Luis Obispo ARES (SB) over a five-day period when the entire city was threatened by a massive fire. Turnabout is fair play, and they gave assistance to the SCV ARES when a second fire broke out just north of the Santa Barbara Section and county borders.

For two weeks, Walt and his crew were occupied with 10 major fires in some of the most rugged and inaccessible areas of the state (the area covered exceeds 10,000 square miles and is almost as large as many of the Northeastern states!). It should also be noted that Walt, WD6EKR, was right in the middle of one of the major fires when a wind shift caught him and the California Department of Forestry fire coordinator in a fire storm, so-called because the raging fire created 50 mi/h winds. They were able to escape only by diving into a deep ditch and covering themseves with fire blankets. Vehicles and horses were also caught in the inferno, but all were able to escape with only minimal damage to the vehicles despite a complete burn to all the surrounding area.

Meanwhile, a combination of arsonist actions and lightning served as the spark for additional fires in the beautiful, but very rugged, Big Sur area south of Carmel. The other fires were on the east side of the coastal range while these were high in the U.S. Forest area on the West side. This resulted in a massive requirement to assist the state, military and Federal fire-fighting agencies, both in their own efforts and in coordination with the other agencies. Both HF and VHF overcame the environmental difficulties. A further complication occurred when the U.S. Forest Service requested a Coast Guard cutter to stand by offshore at Big Sur and set up a communications repeater. Coordination between the Forest Service and the Coast Guard was handled by the ARES.

Paul Hansen, KA6UPD, was "packeteering away" at the Ojai fire in Ventura County. The radiogram forms on the printer provide the evidence. After 14 days of operation, 99 amateurs had helped the firefighters. The efforts of these amateurs was quite impressive as the "population" of the fire camp exceeded 3000. *("Ski" Brozowsky, N6ADI photo)*

Over the three-week period from June 25 to July 15, more than 125,000 acres burned in just four counties!

While Walt and his crew were busy with the many fires in the southern portion of the Section, four new fires broke out in Santa Clara County, near San Jose. The Lexington Fire was near the City of Los Gatos, midway between San Jose and Santa Cruz. An explosive type of fire, it began suddenly on Sunday afternoon, July 8, with a puff of black smoke on the side of an extremely steep canyon. Fire crews, already weary from fighting the fires in San Diego, Ojai (near Santa Barbara) and San Luis Obispo for the past two weeks and seeking respite from the smoke, heat and unseasonably hot weather, were immediately flown to the Los Gatos staging area. The SCV ARES, which had already been alerted on July 3 by the California Department of Forestry, was activated for a full emergency. Many of the ARES members had already been active in the other fires, a like number had been on Red Flag Alert since Thursday, and others had been providing weekend communication support for the U.S. Navy air show at Moffett Field. By 6 P.M. Sunday, the Silicon Valley Emergency Communications Service (SVECS) had marshalled its forces and set up VHF voice and packet stations at the CDF headquarters, the main staging area, the front line fire command post and with the Santa Cruz County CDF office. Again, because of the rugged terrain and the distances between the many locations (14 in all), ingenuity became the paramount reason for success. Fire services as far as 200 miles away responded to the call. Portable repeaters were placed wherever possible. Hundreds of hams responded, and for the next six days, the hams provided what was needed—backup communications on a point-by-point and a tactical basis. Participants in the ARES came from at least six Sections (SCV, EB, SJV, SB, SV and SF) and from as far as 200 miles.

The fire literally exploded on Monday, 24 hours after it started, and was out of control Thursday, requiring the evacuation of 1000 people. One great fear by the CDF was that the fire would crest the summit of the mountains and spread southward toward Santa Cruz and Monterey or northward toward San Francisco. The heavy commitment of tanker planes, helicopters and personnel to other fire areas in California made such a possibility a real nightmare.

In the midst of the Lexington fire, two arsonist-caused blazes erupted in the rugged hills east of Morgan Hill, 30 miles south. These threatened to join if not controlled. Once again, ARES was asked to assist in providing communications among the fire bases, the CDF headquarters in Morgan Hill and the staging area. Four-wheel-drive vehicles were mandatory during the first two days of the fire. Each amateur operator was required to provide his own subsistence, as no central food or relief center could be established.

Although it seemed it could not get worse, another arson fire broke out just west of Morgan Hill in the Yuvas Meadow area. This, like the others, was considered highly dangerous due to the rugged terrain, tinder-dry underbrush and grass, and its proximity to the urban areas. Again, ARES was called upon to provide communications and, despite its thinning ranks, was able to do so.

Despite 12-hour shifts and the primitive conditions, there was no shortage of operators. Many hams worked at their own place of employment and then took on a split shift of 6 to 8 hours, either 6 P.M. to midnight or midnight to 6 A.M. With travel time, it amounted to at least 8 hours total.

While all this was going on, clean-up operations were underway near Stanford University following a tragic and rapidly spreading wild fire in Los Altos. Although smaller than the others, it caused more property damage and because of its location near major urban areas, it was potentially a greater hazard. At the time of the outbreak, about 3 P.M., Monday July 1, the South Peninsula Emergency Communications System (SPECS) was activated with Jim Lomasney, WA6NIL, EC for Palo Alto calling for all ARES members to respond. Ted Harris, N6IIU, EC for Stanford and the Disaster Assistance Chairman for the Palo Alto Chapter of the American Red Cross, along with Ron Chippiari, N6AUV, activated the packet network. Had this fire gone out of control, it might have spread down the hill crests to San Jose causing untold damage and probable loss of life.

Names that will not soon be forgotten ... Rat Creek, Las Pilitas, Ojai, Anderson 1, Anderson 2, Big Sur, Cherry Valley, Finley, Lexington, San Marguerita, Los Altos, Yuvas ... will continue to be problems as it is anticipated that the loss of vegetation creates the potential for floods and mud slides in the coming winter. Even now, plans are underway to

establish relocation sites and communication services that can be activated immediately.

What was learned? First and foremost, the 10 days of intense activity demonstrated the need for advance planning with agencies responsible for disaster response. The ARES in the SCV has had several years of experience in working with the California Department of Forestry and has become an integral part in the CDF planning. Equipment, antennas and manpower are all predetermined with specific missions. Response to an alert is, then, a matter of activating the various nets and making the duty assignments. All assignments are made on the basis of a six-hour shift for each location. Furthermore, an ARES operator is assigned to each supervisor as his "shadow" in order to ensure contact among the many bases and coordinators.

Second, it was clearly demonstrated that tactical frequencies should not be used for ARES management functions. Rather, a separate sectionwide "resources" frequency was established that served to give all ECs, DECs and the SEC means by which the constantly changing requirements could be met. It was also on this frequency that additional assistance was solicited and received, assignments made and confirmed, and personnel or equipment located.

Third, it became apparent at the outset that an on-scene supervisor was necessary at the major fire bases. The supervisor became the main contact for the agency director and directed the hams at the site in their operations. This avoided the "Hydra effect" in which everyone tried to be everything to everyone! Through careful selection of the supervisor, this ensures continuity of direction and avoids possible inadvertent contradictions. On-the-air discipline was not a great problem; in fact, very little non-fire-related transmissions occurred on any of the several repeaters or simplex frequencies that were in use. This is a credit to the net control stations who frequently informed anyone listening of the current situation and referred all non-tactical traffic to the resources net or a traffic net.

We also noted the need to intertie several repeaters in order to cover the vast area involved. UHF links were established that permitted coverage into almost any canyon, valley or other location and obviated the need for higher-power equipment or additional gain antennas.

The fire nightmare is over, at least for now. But the usual dry season in this part of the state extends from the middle of April to the middle of October, which means another 60 days before we can expect rainfall and relief. Fire-hazard warnings continue at the highest level in most parts of California and we can anticipate many more outbreaks. We also can hope that future fires will come one at a time, not all at once.—*J. D. "Knock" Knochenhauer, K6ITL, SEC Santa Clara Valley*

Ventura County Scenario

During the recent fires in the West, Amateur Radio has been utilized to an extent that we have not experienced in a long time. Practically every mode of communication we are allowed to use was called into action.

Variations in geography and population density gave each fire a character of its own. The Wheeler and the Gorda/Rat Creek fires were in Los Padres National Forest and under the supervision of the United States Forest Service (USFS). The Las Pilitas fire was in an area controlled by the California Department of Forestry (CDF). Working with these two agencies is not the same!

The Wheeler fire was in an area where 2 meter repeaters could be utilized. Because many of the fire fighters had been away from home a long time, Welfare messages were accepted and many passed out of the area by packet. Formal traffic was handled to supplement logistics communications. Red Cross traffic was exchanged to various shelters. Packet radio was used extensively to handle formal communications and Welfare messages.

The Las Pilitas fire was located in plains and hilly country to the north and east of San Luis Obispo. The repeater near San Luis Obispo was utilized almost exclusively for the operation. Amateur operators rode along with CDF FIOs (Fire Information Officers) to report progress of the fire and attempts to control it back to the Emergency Operations Center in San Luis Obispo. During operations around the mountain country near Lake Lopez, it was necessary to locate an amateur at a vantage spot to relay into the EOC. Amateurs also accompanied the FIOs on arson investigation trips. Some evacuation shelters were set up by the Red Cross. Amateurs supplied communications between these shelters and Red Cross headquarters in San Luis Obispio.

The Gorda/Rat Creek fire started on July 6 from lightning. This area is located in the coastal mountain region of Big Sur, and communications here were greatly affected by the terrain. Amateur assistance to USFS commenced on the morning of July 7 when a decision was made to set up a fire camp at Pacific Valley, a small community north of Gorda. The only repeater in the area, located at the Big Sur lighthouse, was of little use due to the rugged coast line and successive mountain ridges. Logistics for the fire camp were handled by three existing telephone lines in the area. Amateur Radio was used for communicating with USFS headquarters in Goleta, 150 miles south, to supply information such as spot weather forecasts and personnel information. To aid FIOs in gathering information on the fire, a mobile 75-meter antenna was installed on a USFS truck and an amateur rode along with the FIO to radio vital information back to the base camp. As many of the fire fighters had been in fire camps for over a month, Welfare traffic was transmitted during the last nine days of operation.

Ninety-six amateurs were active in the Wheeler fire area from Ventura County; Santa Barbara county supplied 71. Fifty-eight operators were active at the EOC or on patrols in the Las Pilitas fire. Fourteen amateurs operated at Gorda/Rat. Total estimated worker-hours estimated for activities associated with the three fires is in excess of 7000. Over 1000 Welfare messages were originated. Packet came into its own with heavy utilization at Wheeler.

Many lessons were learned about operating due to the wide difference in terrain, population density, availability of amateur resources and interfacing with many agencies.—*Paul Ryan, WB6RVA, EC Ventura County (submitted by Byron Looney, K6FI, SEC Santa Barbara)*

YOUR CONDUCTOR'S CABOOSE

We've received a couple of inquiries by members wondering why their activity reports or summaries are not published in this column. Rather than leave this matter unaddressed, we'd like to give you a brief explanation.

Your Public Service Branch receives an average of 100 Public Service Reports and brief manuscripts each month. Although the quality of the amateurs mentioned in these reports is never questioned the editorial quality of the report is immediately evaluated. If the report is well written, legible and of interest to amateurs throughout the nation, your report has jumped the first hurdle. You may wish to refer to page 80 of March 1985 *QST* for "pointers."

The next hurdle concerns timeliness. If the event or emergency happened in June and the report was sent to Hq. in August, it might be published in the October, but probably the November, issue. Reporting on an event five or six months after the fact isn't timely. If a summary or report is here soon after the event, it has jumped hurdle number two.

A report must outjump its competition to get past hurdle three. Space in this column is limited. The more professional a report is, the higher it jumps. Many reports fly over the first two hurdles only to crash headlong into this third barrier. We have a certain amount of space dedicated to reports and summaries in this column; no more, no less.

We would like to stress that an entrant in this race must be able to stand and run alone to "break the tape" at the finish line. The author of a summary is not a factor in the decision-making process. The report is running the race, not the author. We're sure you'll agree.

Finally, a summary must be entered in the race to win. If we don't get a report in the Public Service Branch, we can't print it!

We hope this leisurely tour of the "course" has been interesting. Good luck during your next race!

ARRL SECTION EMERGENCY COORDINATOR REPORTS JULY 1985

37 SEC reports were received, denoting a total ARES membership of 22,185. Sections reporting were: AB, CO, EMA, ENY, GA, IA, IN, KS, MDC, ME, MI, MN, NFL, NH, NJ, NE, NLI, NV, OH, OK, ONT, ORG, PAC, SC, SCV, SD, SDG, SFL, SJV, TN, UT, VA, WA, WI, WMA, WNY, WPA, WV.

Reports were not received by the following Section Emergency Coordinators: AL, AK, AR, AZ, BC, CT, DE, EBAY, EPA, ID, IL, KY, LA, MAN, MAR/NFD, MO, MS, MT, NC, ND, NM, NTX, NLI, NNJ, NV, OR, QUE, RI, SASK, SB, SD, SF, STX, SV, SNJ, VT, WIN AND WY.

SEC monthly reports for October should be received in the Public Service Branch at ARRL Hq. no later than Nov. 12. Reports received after the 12th will be entered as time permits.

Transcontinental Corps July 1985

October TCC reports should be received in the Public Service Branch no later than Nov. 12.

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	105	82.7	771	1541
TCC Central	77	82.7	408	906
TCC Pacific	97	78.2	700	1261
Summary	279	80.2	1879	3708
Cycle Four				
TCC Eastern	154	90.2	1063	2125

TCC Central	49	79.0	292	670
TCC Pacific				
Summary	203	84.6	1355	2745

TCC Certificates Issued This Month

N7FAP

TCC Roster

KK1A ND5T W5JOV KU6D K6UYK K6YBV VE7EIL KR7L KF7R WA7BZY W7TGU WB7WOW K7OVK KB7FE NØIA WAØOYI W4JL WA4JTE WF4X N5AMK N5BT W5CTZ N5DFO W5GHP W5KLV KD5KQ WB5OXE KD5RC KS5V KV5X WB5YDD KA9FEZ KW9J W9JUJ KA4MZY KAØEPY N5BB WB5CIC W5GHP K5GM K5OAF N5TC K5TL KV5X KW9J WB9NVN WB9UYU KB9X WØHI KSØU AA4AT W3ATQ N1AWK N1BHH WA4CCK N3COY KC3DW N4EXQ KK3F VE3FAS WA2FJJ WD4FTK N4GHI WB3GZU KB2HM KN1K K8OZ W9JMJ WB4PNY KT1Q W8QHB W1QYY WA1TBY KW1U AF8V W2VY N2XJ WB8YDZ.

National Traffic System
June 1985

October NTS reports should be received in the Public Service Branch no later than Nov. 12.

Net	*Sess.*	*Tfc.*	*Avg.*	*Rate*	*% Rep.*	*% Rep. to Area*
Cycle Two						
Area Nets						
EAN	31	1018	32.8	.633	90.3	
CAN	31	1319	42.5	.819	100.0	
PAN*	62	1094	18.2	.917	91.4	
Region Nets						
1RN	62	777	12.5	.047	95.0	100.0
2RN	54	319	5.9	.280	68.0	97.0
3RN	31	351	11.3	.005	96.0	100.0
4RN	62	775	12.5	.502	78.0	100.0
RN5	62	983	15.8	.542	92.0	100.0
RN6	59	513	8.9	.345	100.0	97.0
RN7	30	749	12.5	.703	88.0	97.0
8RN	No report received					90.0
9RN	59	503	1.1	.436	81.0	100.0
TEN	62	882	13.0	.477	81.0	100.0
ECN	No report received					58.0
TWN	57	400	7.0	.444	80.0	84.0
TCC[1]						
TCC Eastern	105	771				
TCC Central	77	954				
TCC Pacific	97	700				
Cycle Three						
Area Net						
EAN	31	237	7.6	.441	50.0	
Region Nets						
1RN	30	141	4.7	.029	77.0	65.0
2RN	30	208	6.9	.450	88.0	77.0
3RN	No report received					68.0
4RN	No report received					32.0
8RN	No report received					0.9
ECN	No report received					45.0
Cycle Four						
Area Nets						
EAN	31	1741	56.1	1.260	92.5	
CAN	31	1063	34.3	.971	99.5	
PAN	24	978	40.8	.944	99.3	
Region Nets						
1RN	55	403	94.4	.073	54.0	87.0
2RN	59	401	6.8	.552	91.2	90.0
3RN	62	244	3.9	.382	98.0	90.0
4RN	62	611	9.9	.035	100.0	93.0
RN5	62	598	9.6	.410	81.9	100.0
RN6	62	670	10.8	.064	99.0	100.0
RN7	62	506	8.2	.792	83.0	96.0
8RN	57	385	6.7	.363	88.0	100.0
9RN	62	710	11.4	.065	88.7	98.0
TEN	62	453	7.3	.504	78.2	100.0
ECN	No report received					93.0
TWN	59	404	6.8	.355	81.3	
TCC						
TCC Eastern	154	2125				
TCC Central	49	670				
TCC Pacific	No report received					

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.

Section and local nets reporting (282): APSN ATN (AB), ATNM WAEN AENR AENB AENV AENX AENY AENG AENZ AEND (AL), ATEN (AZ), BECN (BC), NCTN SCN/1 SCN/2 SCN/V RTTY/V SCN/SB (CA), DTN DEPN SEN (DE), QFN GN QFNS FMTN FPTN FAST TPTN FPON SEFTN SWFTN PEN PRVAN SPARC DEN ENEM FMSN PBTN CFRN FMTN GCVTN LSSTN NFPN QFN SVTN VEN (FL), GSN GSBN CARES CGVN GCN (GA), ILN ISN ITN (IL), KSBN KPN KWN KMWN CSTN QKS QKS-SS KS-RTTY (KS), ICN QIN ITN IRN (IN), EMRI EMRIPN EMRISS EM2MN HHTN CITN NEEPN WMN WMTN (MA), MEPN MSN (MDC), MAEN MPSN PTN YEAR (ME), MITN MACS UPN QMN MNN (MI), SN/1 MSN/2 MSSN MSN/RTTY MSPN/N MSPN/E PAW (MN), MON MOSSB MEOW MTTN CMEN HBN PHD PTN NEMOE RRABN CVE MOFON (MO), NTN (MT), NCMN CN CSN CNCTN PCTN RARS THEN PETN CFARS M2MEN (NC), DATA (ND), NE160 NE40 NE75 NCHN NCW NMPN NNN NSN WNN BVARES CC2MN ENTMARES HCARES MNARES ML220 MLARES2 PVARC PLVARES SBARES2 SBARES6 BRARES (NE), NHN MCEN GSPN GSFMD6ARES MARCTN WPA WPAPTN PFN WPA2MTN NWPA2MTN (PA), QSN (QUE), EMRI EMRISS EMRIPN RIEM2MTN (RI), CN CSN SCNTN LC2MN GPD2MN BR2MN YC2MN OC2MN (SC), TNCWNTS TNPNTS TVHFNTS (TN), TTN TEX TSN DFW (TX), BUN UCN DCESN (UT), VTN VSBN VSN VN/E VN/L VLN STARES SVEN SSN (VA), VTN (VT), EWTN NTN NWSSBN PSTS WARTS WSN (WA).

October section and local net reports should be received in the Public Service Branch no later than Nov. 12.

Public Service Honor Roll
July 1985

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS CW nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points, max.; (9) Participating in a public service event, 5 points, no max.

This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from Hq.

October reports submitted for this column should be received at ARRL Hq. no later than Nov. 12. PSHR reports should be listed separately from Section News reports.

1059 WA6ZUD
445 WA7AGY
241 K4SCL
172 WB7WOW
165 K7VW
164 K5CXP
163 W7LRB
KBØZ
148 KD8KY
KA5RGC
146 AA4RE
WB5SRX
144 W2PKY
141 N4GHI
KA3DLY
136 WX4H
135 KAØEPY
KB4WT
134 KD7ME
131 KK1A
127 K6UYK
126 K4NLK
125 WB2VUK
120 WBØTED
119 W9YCV
WB1HIH
WF4X
118 KT1Q
115 KC9CJ
114 KY4U
113 WA4PFK
112 W7VSE
KB1AF
KA1EXJ
KW1U
N4KFU
VE4IX
111 WA2ERT
NG4J

110 W4PIM
KA1KPS
109 AA4AT
WB4HRR
108 KAØARP
KT5Y
WØOYH
107 AG9G
N8EFB
N5AM
N4EXQ
VE2CP
106 WB1GXZ
105 W6INH
WB2OWO
WA2FJJ
104 KD8RD
WF6O
WA4JDH
103 N1CPX
WB4ADL
102 W9JUJ
WB8JGW
W2MTA
N7FXJ
KZ8O
KA4FZI
101 KB7FE
KØHSI
KB4OZ
100 WD8MIO
N4KSO
KA4RSC
KA2MYJ
99 W4ANK
K7GXZ
98 KJ3E
N6CVF
KA1GWE
97 KK3F
KB1PA
WD4ALY
96 W4CKS
WD5GKH
WØKK
95 W1TN
VE3WM
94 KAØODQ
WB6QBZ
93 K8CMR

92 WD9FRI
W9DM
N6AWH
WD8OUO
91 WA7VTD
WB2UVB
K3JL
W6VOM
90 WB2EAG
WD8LDY
WA2KOJ
W7GHT
WD8RHU
AF8V
KA8VOZ
KB5EK
WB2MCO
89 KA2BHR
N1AKS
N9BDL
WA2JBO
KA9OBP
KV5X
WA1TBY
KA5SPT
VE3DPO
KAØBWM
88 W3YVQ
WD4KBW
N3COY
VE4AJE
NØDZA
87 K8ND
K4VWK
K6YD
86 AE1T
K6OXO
WA6WJZ
ND2S
VE3KK
N4JRE
KC2TF
K2ZM
85 KS5V
NIØR
AA4HT
KA4EYF
84 WB2IDS
AL7W
W5CTZ
KA4BCM
83 KC4VK
NØCLS
NW4O
W8QHB
82 KJ9J
N1BGW
K5OAF
W7JMH

81 KA9FFO
WAØTFC
80 AE5I
79 NM8I
WD8KQC
VE4RO
WB4WII
78 N4PL
K2ZVI
77 AK2E
WB5YDD
VE3BDM
N6HYM
KN1K
K2YAI
N7BGW
KE5YG
KA4ERP
AA4GL
76 K2YQK
WA1YNZ
KA4YEA
75 VE2EDO
K4JST
NØBKE
N1BJW
74 W9FZW
WA4EYU
W4FMZ
KB4IVV
73 WB8GXT
KA8KHS
WDØBOX
KA1KTH
72 KC3Y
K8JDI
WX4I
WA4RUE
KF7R
KA4MTX
71 KG2D
KB4LB
W5KLV
N7BHL
WB4ZDU
70 K7OVK
KA5PEX
KD4KK
KA7KAI
KA5AZK
69 KF8J
W4ZJY
KCØOO
NBØD
68 W7LG

WDØGUF
WBØWNJ
KX2T
VE2FMQ
W3DKX
67 WA6QCA
AIØO
KB9LT
VE3GT
WA4RNP
WD4NYL
66 N2BFG
KI4YV
KA4YHS
WD6DZQ
N9EJO
WA3UNX
KA2DQA
WA4CCK
WB4TZR
65 N5DFO
W1KRV
W4JLS
WB4VMX
64 WØOUD
WD9IID
KC3AV
WA8GMT
WB4FDT
K4KDJ
63 KP4DJ
KB4BZA
NE7B
KA7TCE
62 KA6HJK
W4HON
WA4QXT
KD8WH

K6FI
WA3DUM
WD8PAF
WD4PBF
61 KAØBCB
KI1M
WB8KWC
KA5QYV
KA2OPG
KA7AID
KL7IJG
N1BUG
WD4HBP
WA4JTE
WA4MNR
60 N8FXH
WA3CKA
W6PHT
KA4GUS
WDØN

WA8DHB
W6IPL
58 KA1LIH/T
55 W1YOU/T
54 N1BYS/T
51 KB4MHH/T
KA8SAF/N
49 KA8TNT/T
KA7RFD/T
KB4EWO/T
47 KA1HPO/T
42 KA9RII/T

Brass Pounders League
July 1985

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month.

All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

October reports submitted for this column should be received in the Public Service Branch at ARRL Hq. no later than Nov. 12. BPL reports should be listed separately from Section Traffic reports.

Call	*Orig.*	*Rcvd.*	*Sent*	*Dlvd.*	*Total*
W3CUL	840	892	1281	92	3105
KA9CPA	35	1115	118	18	1286
W9JUJ	0	615	592	1	1208
K6UYK	44	608	536	13	1201
K6FI	515	68	515	45	1143
W3VR	401	266	401	34	1102
VE3KK	90	458	509	22	1079
VE3SCJ	570	8	480	8	1066
AA4GL	1	556	488	1	1046
N4GHI	64	484	442	30	1020
W1EOF	1	369	492	10	872
WA4JDH	0	435	371	3	809
KA9FEZ	1	357	390	2	750
N4EXQ	27	337	339	38	741
WX4H	0	370	340	10	720
KW9J	5	311	312	7	635
AA4AT	41	282	295	8	626
KT1Q	4	305	294	17	620
WB4ADL	21	293	245	44	603
VE3FAS	0	289	301	0	590
W6INH	26	264	257	14	561
W8BO	3	247	301	4	555
WB7WOW	14	296	222	16	548
KD7ME	7	245	282	8	542
WF4X	5	288	225	19	537
KB4WT	0	278	230	29	537
N4PL	94	174	242	24	534
KA4ERP	9	247	260	4	520
AF8V	2	243	269	6	520
NJ4L	70	217	207	26	520
N5AMK	0	308	209	1	518
WB4PNY	3	263	248	1	515
WAØOYI	0	238	282	0	512

BPL for 100 or more originations plus deliveries:

WB9YPY	380
K4EUK	203
KB9X	130
WØQBK	109
WB5SRX	100

Independent Nets 1985
July 1985

October reports submitted for this column should be received in the Public Service Branch at ARRL Hq. no later than Nov. 12.

Net Name	*Sess.*	*Tfc.*	*Check-Ins*
Amateur Radio Telegraph Society	62	340	243
Central Gulf Hurricane Net	31	167	2884
Clearing House Net	31	114	320
Early Bird Net	31	966	---
Empire Slow Speed Net	31	66	336
Golden Bear Amateur Radio Net	31	392	2030
Golden Years Net	9	23	68
IMRA	27	948	1562
Midwest RTTY Net	29	35	191
Mission Trail Net	31	220	884
New England Novice Net	31	42	136
North American Single Sideband	25	31	135
NYSPTEN	30	70	494
Southwest Traffic Net	31	231	1204
West Coast Slow Speed	31	148	440
20ISSBN	17	542	345
75 Meter Interstate SB Net	31	350	900
7290 Traffic Net	50	491	2663

Results, 1985 ARRL International DX Contest

By Billy Lunt,* KR1R and Mark Burke,** KA1MIS
*Assistant Contest Manager, ARRL
**Communications Assistant, ARRL

As we race to the bottom of the sunspot cycle, the ARRL International DX Contest keeps going on and on to preserve its spot as one of the top contests of the year. It seems harder and harder to roll up those large scores, but the big guns do it again and again by creating their own conditions with a multitude of kilowatts pounding at the ether with the ever-so-familiar sounds of "CQ Contest" and "UR 599 Mass." Twenty and 15 still remain the livelihood of the contest, with the most activity reported on 20. But with the ever-increasing number of 40- and 80-meter yagis appearing on the horizon, maybe the bands to watch in '86 could very well be 40 and 80 meters.

The number of logs received was below the 3000 mark, with only 2347 this year. Although the number of logs keeps in sync with the number of sunspots as we near the bottom of the cycle, there was still enough activity in both areas to make the 1985 contest a great success.

W/VE Highlights

This year, the W/VE single-op phone plaque was a battle between two YCCCers. When all settled down, last year's fourth-place finisher, Mark, K1RX, with 1.3M, had topped John, K1AR, by only 13k. W3BGN was the only other single op to break the 1-Meg mark, to finish with a fighting third.

The CW single-op battle was a bit more fierce with the entire top ten over the 1-million mark. John, K1AR, not content with second place on phone, came back with the top honors on CW with 1.9M points, beating N2LT by 123k to retain his last year's spot as CW plaque winner.

The low-power (150 W or less) class was won by two VEs. VE1NG took top honours on phone with 160k, and VO1MP coming from fourth place last year to claim top CW honours with 530k. The second-place spots remain the same as last year, with W2TZ second on both modes. K1UO ran away with the top QRP (less than 10 W) phone, winning by 58k with a score of 127k. On CW, W8VSK came from third place last year to win the plaque this year with 68k points. Great going, guys!

In the multiop unlimited class to beat the second-place blues is W3LPL with 2M points this year to win it by 167k on phone and then doubling his score with 4.5M to also win the CW top spot with a 1.3-Meg spread. Second place on phone goes to W4DR. W4MYA was the CW runner-up. King Fred, K2TR, and crew took both crowns of the two-transmitter class; on phone, squeezing past N2RM by 49k and on CW by beating K1DG by 118k. Fierce competition was evidence in the multi-single phone class, with K4VX/Ø (1M), up from fifth place last year, topping K3KG by only 57k for top honors. CW was another runaway with N4WW (2M) winning by 443k over second place W1KM.

Top single-band activity was close this year. On 160 phone, K1ZM topped W1RR by only 216 points, with 11k. WØMJ took 80 meters with 78k. KM6B was tops on 40 with 86k. On 20 it was KS8S (KU8E) with 234k. Fifteen-meter champ was W5XZ with 55k. WA3EEE resisted giving in to sparse activity on 10 to win the single-band plaque by 15 points with a score of 300. CW scores on the low bands were outrageous. W1RR scored five times his last year's score on 160, taking the plaque with 25k. W1FV kept the 80-meter fires burning by doubling his last year's effort, taking the honors with 147k. Forty was a tough band to top after last year's super effort by KQ2M at W2YV, but N4PN did it—to the tune of 285k. N2AA was the 20-meter winner, scoring 338k. N2EK was tops on 15, and WA7KLK braved the 28-MHz band, scoring 702 points for the plaque.

DX Highlights

On the DX side, North and South America dominated the top spots again this year. On phone, ZF2FL (N6RJ) again finished in top spot with 5M, 2.8-million points over second-place LU1BR with 2.2M. AI6V/KH6 gave a great try with 2.1M, for third place. On CW, VP2MGD (W2GD), with 4.5M, won over the 3.8M effort of second-place K5NA/KP2. Great tries by third place VP2MP (K2YY) with 3.7M and fourth place

Affiliated Club Program

Unlimited Category	*Score*	*Entries*	*CW Winner*	*Phone Winner*
Frankford Radio Club	40,937,512	94	N2LT	N2LT
Yankee Clipper Contest Club	33,598,302	74	K1AR	K1RX
Medium Category				
Potomac Valley Radio Club	15,310,131	30	K3ZO	K3ZO
Texas DX Society	11,975,054	12	K5DX	NA5R
Mad River Radio Club	7,657,353	17	K3LR	KS8S
North Texas Contest Club	7,199,226	16	K5MR	K5RX
Murphy's Marauders	4,038,806	18	K1BW	K1RM
Dixie DXers	3,475,872	9	WX4G	W1UA
Northern California DX Club	2,286,804	36	K6DR	KA6BIM
Southern California DX Club	2,259,921	41	W6TMD	K6EID
Western Washington DX Club	2,152,224	16	N7TT	N7TT
Kansas City DX Club	2,047,356	22	WØJLC	WØJLC
Eastern Iowa DX Assn.	1,979,330	22	WØEJ	WØEJ
Colorado Contest Conspiracy	1,912,680	7	KSØE	KSØE
Rochester (NY) DX Assn.	934,329	13	W2TZ	W2TZ
Northern California Contest Club	911,091	3	N6BV	WB6KBZ
Southern California Contest Club	861,633	10	NI6W	NI6W
Southeastern DX Club	612,255	8	N4PN	WA4DXI
Order of Boiled Owls (NY)	599,031	3	W2GGE	—
Mississippi Valley DX/Contest Club	588,135	8	WØHBH	WØHBH
Grand Mesa Contesters	548,595	5	KJØG	—
South Florida DX Assn.	467,493	3	K8UNP	K8UNP
South Jersey Radio Assn.	433,458	15	K2JLA	W2PAU
Western Pennsylvania DX Assn.	412,596	4	AD8J/3	—
Long Island DX Assn.	282,000	5	K2MFY	K2MFY
Local Category				
Central Virginia Contest Club	5,377,677	6	—	—
Central Indiana Contesters	2,110,656	3	W9RE	W9RE
Reading Radio Club	1,822,714	7	W3UM	WA3SPJ
Northern Ohio DX Assn.	1,654,110	5	KZ8Y	K8DJC
Meriden ARC	1,543,560	4	KS1L	KS1L
Greater Milwaukee DX Assn.	1,172,148	3	W9RN	W9RN
San Diego DX Club	1,044,270	10	K6TQ	WA6DBC
Falmouth ARA	911,256	4	K5MA	K5MA
Central Arizona DX Assn.	819,612	8	K7OX	K7OX
Willamette Valley DX Club	771,112	8	AI7B	W7FP
Four Lakes ARC	407,340	9	K9BIL	W9ZM
Grumman ARC	345,900	3	—	—
Neenah-Menasha ARC	343,443	3	W9OP	W9OP
Dauberville DX Assn.	200,904	5	—	WB3FYL
Carolina DX Assn.	355,308	4	N6AV/4	KF4HK
Fox River Radio League	184,497	8	—	KC9UM
Tri-State DX Assn.	175,050	4	K4XO	K4XO
Northern Illinois DX Assn.	169,983	4	K9QVB	—
Eastern Michigan ARC	129,288	6	K8DD	—
Redwood Empire DX Assn.	114,498	3	K6ZUR	—
Columbus ARA	96,408	5	W8DWP	W8NPF
Northrop Radio Club	92,739	4	N6AA	N6AA
Northern New Mexico ARC	73,759	5	—	N5ACP
Metro DX Club	63,690	4	W9LNQ	—
Utica ARC	52,884	4	NA2Q	NA2Q
Coconino County ARC	33,306	3	W7YS	—
Poway ARS	27,102	3	AA6EE	—
West Park Radiops	7218	3	—	—

Top Ten—DX Phone

Call	Score	160	80	40	20	15	10
ZF2FL (N6RJ)	5,076,579	252/51	1359/57	962/57	2693/56	842/55	1/1
LU1BR	2,249,976	0/0	265/46	344/45	1117/53	1025/55	359/42
AI6V/KH6	2,177,154	139/40	551/49	604/50	1556/55	393/27	26/1
XE1VIC	1,082,628	0/0	459/53	112/45	701/53	497/53	0/0
PP2ZDD	971,433	0/0	29/18	160/38	371/50	1189/53	60/20
9U5JB (N4HX)	961,248	0/0	85/20	275/39	1213/54	535/39	0/0
TG9GI	918,177	0/0	173/39	130/33	854/53	654/44	0/0
CE8DQN	803,640	0/0	57/28	161/44	571/51	615/53	44/9
HH2WL	703,131	0/0	45/19	8/6	1520/55	364/41	0/0
CT1BCM OH3ZE)	585,312	0/0	195/34	175/30	1032/54	54/16	0/0

Top Ten—DX CW

Call	Score	160	80	40	20	15	10
VP2MGD (W2GD)	4,571,112	317/47	697/55	991/57	924/57	1241/57	562/49
K5NA/KP2	3,792,678	280/44	611/56	835/55	878/55	1197/54	317/43
VP2MP (K2YY)	3,766,401	220/45	399/51	947/55	871/55	1183/57	443/46
P42J (W1BIH)	3,317,748	244/41	516/54	643/55	709/55	906/56	538/50
KU2C/V4	2,583,360	235/37	465/52	449/51	667/52	803/53	371/43
K4LTA/J7	2,449,632	*	*	*	*	*	*
F6ARC	1,833,867	74/22	435/48	788/49	869/54	651/44	0/0
HP1XKR	1,338,165	0/0	124/35	560/53	466/46	545/51	270/42
OK1ALW	957,870	4/4	304/40	586/43	590/50	351/37	0/0
5T5CJ	918,600	59/21	273/40	275/42	516/50	398/40	10/7

*QSO breakdown not provided

Top Ten—W/VE Phone

Call	Score	160	80	40	20	15	10
K1RX	1,291,059	36/28	114/62	99/52	1121/111	74/42	5/2
K1AR	1,277,460	30/28	100/62	85/52	1123/112	71/47	1/1
W3BGN	1,096,710	37/26	105/58	91/45	1073/93	71/37	13/4
N2LT	912,114	26/22	72/43	107/53	916/99	67/34	9/3
K2BU	902,388	60/38	90/51	103/47	745/102	69/36	15/4
W2RQ	841,572	18/18	97/57	67/42	923/90	57/33	2/1
NA5R (K5GN)	801,810	28/23	139/62	179/55	331/83	174/68	34/11
W9RE	787,788	23/20	88/56	105/53	610/91	109/51	13/6
K1VR	775,008	16/14	89/55	70/41	870/89	57/34	2/1
KS1L	717,408	0/0	82/45	42/26	1121/101	27/16	0/0

Top Ten—W/VE CW

Call	Score	160	80	40	20	15	10
K1AR	1,893,105	61/39	278/60	448/77	820/74	272/71	16/12
N2LT	1,770,018	46/35	181/51	330/67	973/76	329/69	20/16
W3GRF (KØDQ)	1,668,025	24/22	223/59	472/72	601/78	433/72	22/14
K1TO	1,584,243	45/34	154/55	311/63	933/76	249/67	17/14
K1BW	1,556,820	44/34	141/57	382/73	861/75	226/58	20/13
W3BGN	1,446,660	70/37	144/49	332/60	811/71	318/54	17/14
K1EA	1,410,270	36/24	216/53	375/69	767/71	210/61	17/12
N4AR	1,404,054	50/36	125/52	352/73	593/78	320/68	18/14
K3ZO	1,378,134	26/21	235/52	364/60	649/74	336/61	19/14
W9RE	1,256,073	26/21	113/52	292/62	611/76	322/73	27/17

Top DX Multioperator Scores—Phone

Single Transmitter

Call	Score	160	80	40	20	15	10
HH2CQ	5,961,660	187/43	1160/56	1487/56	3485/58	1096/55	0/0
P42J	5,087,844	192/41	976/55	944/56	1607/57	2166/56	129/08
KP4BZ	4,801,065	162/44	1061/56	926/54	2852/56	1084/53	0/0
KV4FZ	3,828,384	247/39	1563/57	583/55	1608/54	1061/46	2/1
KH6XX	2,874,648	199/45	750/55	989/51	1562/56	462/33	14/1

Two Transmitter

J87J	8,088,390	257/46	1735/57	1819/57	3126/57	2224/54	136/19
I8MPO	835,386	16/12	71/28	360/44	1514/58	0/0	0/0
I3EVK	667,320	41/17	268/33	211/32	1140/52	0/0	0/0
WH6W	543,144	0/0	148/23	582/43	718/44	36/12	0/0
YT4I	188,822	0/0	66/21	89/21	523/41	0/0	0/0

Unlimited

JA9YBA	367,092	0/0	120/11	272/29	808/52	36/7	0/0
JA7YFH	116,571	0/0	27/7	141/9	443/41	28/4	0/0

Top DX Multioperator Scores—CW

Single Transmitter

Call	Score	160	80	40	20	15	10
KV4FZ	4,229,097	267/46	699/57	1030/56	1091/56	903/54	457/48
KP4BZ	4,113,186	288/46	624/57	780/57	908/57	1318/57	380/45
N4BP/ C6A	2,480,796	274/42	629/51	602/54	921/53	468/45	124/29
KH6DW	2,054,325	63/28	370/50	856/54	722/55	774/55	10/3
AH6AZ	1,328,229	0/0	247/41	641/55	603/53	688/53	2/1

Two Transmitter

WH6W	761,454	8/4	161/30	548/50	480/50	237/43	0/0
JA7YAA	541,398	7/7	158/25	403/43	576/51	118/17	0/0
YU4EZC	53,625	0/0	13/8	12/10	213/32	37/15	0/0

Unlimited

KH6XX	4,026,036	390/54	707/52	1065/56	1258/56	1138/56	118/13
JA9YBA	932,448	30/10	226/37	502/46	795/54	213/29	0/0
JE3ZFS	36,729	0/0	29/10	103/17	71/19	28/7	0/0

Top Ten W/VE Low Power Scores (Less Than 150 W)

Phone

Call	Score	160	80	40	20	15	10
VE1NG	160,128	0/0	29/21	27/23	283/60	45/35	0/0
W2TZ	143,640	3/3	24/20	33/22	235/68	46/26	1/1
KMØL	105,216	0/0	20/14	48/27	129/62	55/32	4/2
WB3FYL	94,242	0/0	11/11	8/7	225/72	34/23	0/0
WC4B	89,963	0/0	45/31	32/22	96/50	40/22	10/2

CW

Call	Score	160	80	40	20	15	10
VO1MP	530,166	23/22	129/37	138/42	592/46	84/30	5/5
W2TZ	478,950	11/10	46/32	114/41	471/66	123/48	10/9
N7TT	392,814	8/4	117/16	317/31	432/51	58/29	10/8
NØDH	329,988	20/19	102/45	122/42	161/47	93/51	16/10
K5DX	227,136	17/13	53/34	128/46	148/41	49/34	21/14

Top W/VE Multioperator Scores—Phone

Single Transmitter

Call	Score	160	80	40	20	15	10
K4VX/Ø	1,064,115	32/26	104/61	171/63	661/109	122/55	15/7
K3KG	1,007,721	27/24	103/61	156/65	609/100	135/60	23/9
K3LR	927,864	32/27	115/60	109/54	694/102	94/47	8/4
WB8JBM	920,640	25/21	96/58	109/50	760/100	95/46	11/5
K3TUP	847,458	17/16	124/61	97/46	738/102	75/39	7/3

Two Transmitter

K2TR	1,719,804	59/39	134/73	190/68	1036/113	157/64	12/4
N2RM	1,670,400	43/32	145/75	143/63	1114/111	136/62	19/5
N5AU	1,557,270	31/25	194/72	278/75	636/105	251/71	40/15
W3MA	1,446,774	41/32	145/71	144/64	876/107	190/64	10/5
N5RM	1,323,051	19/15	124/58	222/55	754/102	255/67	35/16

Unlimited

W3LPL	2,258,610	57/37	161/79	309/83	1143/112	202/75	34/9
W4DR	2,091,312	71/43	172/80	250/75	1183/114	143/57	35/7
W3GM	1,378,620	47/37	136/71	169/68	824/103	132/59	24/7
KN6M/5	1,198,551	21/17	167/71	193/71	671/109	127/50	28/13
KS9K	1,108,800	30/21	81/50	125/54	916/100	153/48	15/7

Top W/VE Multioperator Scores—CW

Single Transmitter

Call	Score	160	80	40	20	15	10
N4WW	2,000,997	48/33	169/63	589/76	753/75	429/74	15/12
W1KM	1,557,898	61/38	214/53	415/66	787/72	300/55	12/10
N5AU	1,495,917	34/29	162/55	608/89	385/79	222/76	26/19
W2VJN	1,437,414	40/29	124/62	397/76	741/77	184/61	16/14
K3WW	1,368,444	29/27	160/59	343/65	622/76	311/68	16/13

Two Transmitter

K2TR	3,387,420	101/56	270/72	656/94	1200/90	501/78	26/20
K1DG	3,269,955	71/49	426/72	612/86	1072/100	464/86	20/16
K5RC	2,582,424	55/37	169/68	840/99	665/92	372/84	35/23
KT3M	2,331,054	49/38	250/66	387/77	963/90	452/79	22/16
K1RX	2,234,160	50/33	219/61	447/77	987/85	415/75	22/17

Unlimited

W3LPL	4,577,328	112/59	423/74	917/104	1209/103	646/95	39/21
W4MYA	3,260,160	64/44	334/63	684/83	1180/98	549/81	19/15
W3GM	2,764,761	67/50	313/71	524/86	903/91	508/74	24/19
NR5M	2,735,376	66/43	209/64	841/93	800/94	373/79	37/19
K5LZO	1,878,288	51/33	176/64	591/80	643/88	245/74	38/20

DX Continental Leaders—Phone

	Africa		Asia		Europe	
All Band	9U5JB (N4HX)	961,248	JA1XAF	155,376	CT1BCM (OH3ZE)	585,312
1.8 MHz	—	—	—	—	CT2CM	3600
3.5 MHz	—	—	JA2YKA (JF2DQJ)	8949	CT2CB	145,530
7 MHz	ZS6DW	22,890	JA2BAY	22,800	YU4EBL	83,895
14 MHz	EA8LS	87,702	JM1CAX	83,556	CT2FH	357,048
21 MHz	—	—	JM1MGP	1593	CT2CE	4914
28 MHz	—	—	—	—	—	—
QRP	—	—	JA2JSF	1584	YU1OWW	3402
Multioperator						
Single Transmitter	ZS6TUK	83,214	JA1YWX	195,822	F3TV	1,240,272
Two Transmitter	—	—	JA7YAA	143,640	I8MPO	835,386
Unlimited	—	—	JA9YBA	367,092	—	—
	North America		**Oceania**		**South America**	
All Band	ZF2FL (N6RJ)	5,076,579	AI6V/KH6	2,177,154	LU1BR	2,249,976
1.8 MHz	VP5SBX (AK8A)	51,348	VK6HD	3969	YV3AZC	27,552
3.5 MHz	KK9A/PJ7	403,389	—	—	YV5CVE	281,637
7 MHz	VP2ED	116,865	T32AF (KH6UR)	201,135	ZP5JCY	166,698
14 MHz	TI2ANL	25,584	KH6SP	30,690	HC1HC	403,731
21 MHz	FM5CD	187,200	YC6DPO	3	ZV9ZZ (PY5IW)	370,440
28 MHz	—	—	—	—	LU6ETB	77,013
QRP	—	—	AH6EK	12,462	—	—
Multioperator						
Single Transmitter	HH2CQ	5,961,660	KH6XX	2,874,648	P42J	5,087,844
Two Transmitter	J87J	8,088,390	WH6W	543,144	—	—
Unlimited	—	—	—	—	—	—

DX Continental Leaders—CW

	Africa		Asia		Europe	
All Band	5T5CJ	918,600	JH7DNO	561,903	F6ARC	1,833,867
1.8 MHz	—	—	JA1GTF	3024	CT1AOZ	33,228
3.5 MHz	EA8RL	129,426	JA1XAF	29,862	G3FXB	76,497
7 MHz	—	—	JA7RHJ	58,032	IO3FIY	135,252
14 MHz	—	—	JA3YBF (JA3-30356)	92,826	OH8OS (OH8PF)	248,304
21 MHz	—	—	JL1MUT	10,695	YU2LNI	38,646
28 MHz	—	—	—	—	—	—
QRP	EC8AFX	22,032	JA1KFX	9570	F9YZ	86,664
Multioperator						
Single Transmitter	—	—	JA1YCL	368,145	HG5A	1,167,480
Two Transmitter	—	—	JA7YAA	541,398	YU4EZC	53,625
Unlimited	—	—	JA9YBA	932,448		
	North America		**Oceania**		**South America**	
All Band	VP2MGD (W2GD)	4,571,112	N5AW/NH6	626,922	P42J (W1BIH)	3,317,748
1.8 MHz	VP5GEX (KØGVB)	67,620	—	—	YU1OB	57,312
3.5 MHz	K8CV/VP2E	117,978	VI3XB	4050	—	—
7 MHz	KP4FI	288,120	—	—	YV7QP	48,195
14 MHz	VP2EAG (KJØD)	267,456	KH6WT	20,049	PY2RLQ	21,720
21 MHz	ZF2AY (K9LA)	198,744	—	—	LU1BCE	131,040
28 MHz	—	—	—	—	LU5DVO	48,870
QRP	C6AAA (KF1V)	835,200	AH6EK	22,638	—	—
Multioperator						
Single Transmitter	KV4FZ	4,229,097	KH6DW	2,054,325	5JØLR	1,251,714
Two Transmitter	—	—	WH6W	761,454	—	—
Unlimited	—	—	KH6XX	4,026,036	—	—

P42J (W1BIH) with 3.3M.

The multi-op boys were out for blood, scrapping all the way to the wire. In the unlimited class, it was JA9YBA with 367k on phone and KH6XX on CW with 4M to win the plaques. In the two-transmitter class, J87J put in an impressive 8M score, taking the phone plaque. WH6W earned 761k on CW for top honors. The multi-single struggle was intense, with HH2CQ winning the phone plaque with 5.9M over P42J with 5.0. KV4FZ edged out KP4BZ, winning the CW plaque with 4.2M. What fantastic scores on the DX side!

The top single-band fight was up on CW, with scores topping last year's on all bands but 10, while phone scores were down on the high bands and up on the low bands. The top single-band plaque winners on phone were VP5SBX (AK8A) on 160 with 51k, KK9A/PJ7 on 80 with 403k, was T32AF (KH6UR) on 40 with 201k, HC1HC on 20 with 403k, ZV9ZZ (PY5IW) on 15 with 370k and LU6ETB on 10 meters with 77k. The top CW plaque winners were VP5GEX (KØGVB) on 160 with 67k, EA8RL coming from third place last year to win 80 this year with 129k, KP4FI on 40 with 288k, VP2EAG (KJØD) on 20 with 267k, ZF2AY (K9LA) on 15 with 198k, and LU5DVO on 10 with 48k. Great going, guys! Do it again in '86!

Affiliated Club Competition

Again this year, only the Frankford Radio Club and the Yankee Clipper Contest Club made it to the Unlimited Category. The FRC boys made a

Top DX Single Band Scores—Phone

160		*20*	
VP5SBX (AK8A)	51,348	HC1HC	403,731
YV3AZC	27,552	CT2FH	357,048
PT7BZ	16,851	YT3M (YU3ZO)	212,520
9Y4VU	6480	CT2DL	209,664
VK6HD	3969	OH8OS	158,592
80		*15*	
KK9A/PJ7	403,389	ZV9ZZ (PY5IW)	370,440
YV5CVE	281,637	LU8FEU	226,560
K8CV/VP2E	175,896	LU4DM	190,482
HC1OT	157,080	FM5CD	187,200
CT2CB	145,530	HC1EA	156,915
40		*10*	
T32AF (KH6UR)	201,135	LU6ETB	77,013
ZP5JCY	166,698	CE6EZ	75,000
VP2ED	116,865	LU1VK	11,340
PY5EG	107,484	YV6BTF	6930
CE6GDR	90,450	—	—

Top DX Single Band Scores—CW

160		*20*	
VP5GEX (KØGVB)	67,620	VP2EAG (KJØD)	267,456
YV1OB	57,312	OH8OS (OH8PF)	248,304
CT1AOZ	33,228	4N4WRS	170,940
F8VJ	12,006	YU4GD	163,020
PA3BFM	8820	IK4EWK	150,150
80		*15*	
EA8RL	129,426		
K8CV/VP2E	117,978	ZF2AY (K9LA)	198,744
G3FXB	76,497	FG/W0RLX/ FS	162,450
CT2AK	74,550	LU1BCE	131,040
CT3ET	66,411	KA2DIV/ V2A	105,371
40		PY8MWJ	48,042
KP4FI	288,120	*10*	
N8II/VP2E	266,418		
IO3FIY	135,252	LU5DVO	48,870
YU2AW	112,950		
DL6RAI	109,572		

W/VE Division Leaders

Phone	*Division*	*CW*
CZ3XN	Canada	VO1MP
W3BGN	Atlantic	W3GRF (K0DQ)
W9RE	Central	W9RE
NØAT	Dakota	NØAT
WA5IGD	Delta	W4XJ
W8TWA	Great Lakes	N4AR
N2LT	Hudson	N2LT
WØJLC	Midwest	K4VX/Ø (KM9P)
K1RX	New England	K1AR
N7TT	Northwestern	N7TT
KA6BIM	Pacific	N6BV
W3VT	Roanoke	K4PQL
KI3L	Rocky Moutain	KI3L
N4KG	Southeastern	K8UNP
K7OX	Southwestern	NI6W
NA5R (K5GN)	West Gulf	K5DX

Top DX QRP Scores—Phone and CW

Phone		*CW*	
Call	*Score*	*Call*	*Score*
AH6EK	12,462	C6AAA	835,200
YU1OWW	3402	F9YZ	86,664
JA2JSF	1584	(KF1V)	—
JH3LCU/1	180	DL8CM	64,701
—	—	AH6EK	22,638
—	—	EC8AFX	22,032

Top W/VE QRP Scores

Phone		*CW*	
Call	*Score*	*Call*	*Score*
K1UO	127,800	W8VSK	68,952
K3WS	69,930	W9LNQ	45,657
WA5IYX	31,920	KW6Q	42,768
WA7LHO	31,347	WB2ENW	30,843
W6CN	19,824	N5HB	30,003

DX Plaque Winners—Phone

Category		
Single Operator	*Winner*	*Donor*
World	**ZF2FL (N6RJ)**	North Jersey DX Association
Africa	**9U5JB (N4HX)**	John M. Shinall, K4BYK
Asia	**JA1XAF**	Acadiana DX Association
Europe	**CT1BCM (OH3ZE)**	Murphy's Marauders Contest Club
North America	**ZF2FL (N6RJ)**	Chod Harris, VP2ML
Oceania	**AI6V/KH6**	Doc Sayre, N7AVK, and DX International Society
South America	**LU1BR**	Carl L. Smith, W0BWJ
1.8 MHz	**VP5SBK (AK8A)**	W8FR, Fred Race, CPO USN
3.5 MHz	**KK9A/PJ7**	Trio-Kenwood Communications
7 MHz	**T32AF (KH6UR)**	Central Arizona DX Assn.
14 MHz	**HC1HC**	Don C. Wallace, W6AM
21 MHz	**ZV9ZZ (PY5IW)**	Trio-Kenwood Communications
28 MHZ	**LU6ETB**	Mike Badolato, Jr., W5MYA
QRP	**AH6EK**	Gerald Griffin, M.D., W8MEP
Multioperator, Single Transmitter		
World	**HH2CQ**	Gloucester County Amateur Radio Club
Africa	**ZS6TUK**	David Vogel, NL7P
Asia	**JA1YWX**	Trio-Kenwood Communications
Europe	**F3TV**	Metro DX Club
North America	**HH2CQ**	Nick G. Lash, K9KLR, Dennis T. Berkebile, KD9BG
Oceania	**KH6XX**	Trio-Kenwood Communications
South America	**P42J**	Trio-Kenwood Communications
Multioperator, Two Transmitter		
World	**J87J**	Trio-Kenwood Communications
Asia	**JA7YAA**	Trio-Kenwood Communications
Europe	**I8MPO**	Tom and Joy Middleton, WB4CKY
North America	**J87J**	John Brosnahan, W0UN
Oceania	**WH6W**	ARRL
Multioperator, Unlimited		
World	**JA9YBA**	Trio-Kenwood Communications
Asia	**JA9YBA**	ARRL

DX Plaque Winners—CW

Single Operator	*Winner*	*Donor*
World	**VP2MGD (W2GD)**	North Jersey DX Association
Africa	**5T5CJ**	Trio-Kenwood Communications
Asia	**JH7DNO**	Alamo DX Amigos
Europe	**F6ARC**	Clarke V. Greene, K1JX
North America	**VP2MGD (W2GD)**	Potomac Valley Radio Club
Oceania	**N5AW/NH6**	Tom Morton, KT6V
South America	**P42J (W1BIH)**	Herbert Clark Hoover III, W6HZ Memorial Award
1.8 MHz	**VP5GEX (K0GVB)**	Jim Dionne, K1MEM, and Bill Poellmit, K1MM
3.5 MHz	**EA8RL**	Mad River Radio Club
7 MHz	**KP4FI**	Trio-Kenwood Communications
14 MHz	**VP2EAG (KJ0D)**	Bencher, Inc.
21 MHz	**ZF2AY (K9LA)**	Southern New England DX Assn.
28 MHz	**LU5DVO**	Trio-Kenwood Communications
QRP	**C6AAA (KF1V)**	KZ2E and KA2TPA, Rick and Marlis Norton
Multioperator, Single Transmitter		
World	**KV4FZ**	John Brosnahan, W0UN, and George Schultz, W0UA
Asia	**JA1YCL**	Trio-Kenwood Communications
Europe	**HG5A**	Trio-Kenwood Communications
North America	**KV4FZ**	Trio-Kenwood Communications
Oceania	**KH6DW**	Trio-Kenwood Communications
South America	**5J0LR**	Trio-Kenwood Communications
Multioperator, Two Transmitter		
World	**WH6W**	Tom Frenaye, K1KI
Asia	**JA7YAA**	Trio-Kenwood Communications
Europe	**YU4EZC**	ARRL
Oceania	**WH6W**	ARRL
Multioperator, Unlimited		
World	**KH6XX**	H. Stephen Miller, N0SM
Asia	**JA9YBA**	Trio-Kenwood Communications
Oceania	**KH6XX**	ARRL

United States and Canada Plaque Winners

Phone

Single Operator	*Winner*	*Donor*
All Band	**K1RX**	Frankford Radio Club
1.8 MHz	**K1ZM**	Butch Greve, W9EWC, Memorial
3.5 MHz	**W0MJ**	Lance Johnson Engineering, K0CS
7 MHz	**KM6B**	David L. Thompson, K4JRB
14 MHz	**KS8S (KU8E)**	Trio-Kenwood Communications
21 MHz	**W5XZ**	Trio-Kenwood Communications
28 MHz	**WA3EEE**	Trio-Kenwood Communications
QRP	**K1UO**	KZ2E & KA2TPA. Marlis and Rick Norton
Multioperator		
Single Transmitter	**K4VX/0**	John Allyn, W7XR
Two Transmitter	**K2TR**	ARRL
Unlimited	**W3LPL**	Western New York DX Association—W2RR

CW

Single Operator	*Winner*	*Donor*
All Band	**K1AR**	Frankford Radio Club
1.8 MHz	**W1RR**	W1TX Memorial—Conn. Wireless Assn.
3.5	**W1FV**	Northern Illinois DX Assn.
7 MHz	**N4PN**	Northern Arizona Assn.
14 MHz	**N2AA**	Neenah-Menasha Amateur Radio Club
21 MHz	**N2EK**	Carl Luetzelschwab, K9LA
28 MHz	**WA7KLK**	Mike Badolato, Jr., W5MYA
QRP	**W8VSK**	Hollywood ARC, Inc.
Multioperator		
Single Transmitter	**N4WW**	Edith Holsopple, N1CZC, and Mike Kaczynski, W1OD
Two Transmitter	**K2TR**	Trio-Kenwood Communications
Unlimited	**W3LPL**	Colorado Contest Conspiracy

Special Plaque Winners

Single Operator	*Winner*	*Donor*
W/VE Operator Combined Score	**K1AR**	National Contest Journal
W/VE Low Power (Phone)	**VE1NG**	Rochester (NY) DX Assn.
Arizona (CW)	**K7OX**	Central Arizona DX Assn.
Arizona (Phone)	**K7OX**	Central Arizona DX Assn.
Fifth Call Area (CW)	**K5FA**	Red Stick DX Assn.
Japan (Phone)	**JA1XAF**	Western Washington DX Club, Inc.
USSR—All Band (CW)	**RB5SB**	K1KI,W1DA,W1KM,W3XU,NC5K,K7NW, K0BJ,W0ZV,SV0AA
USSR—All Band (Phone)	**UB4SWB**	K1KI,W1RR,WA2VUY,K3UA,NE4R,N5NM, NC5K,KM7E,W0ZV
Multioperator		
Caribbean (CW)	**KV4FZ**	The YASME Foundation
Caribbean (Phone)	**J87J**	Mike Badolato, Jr., W5MYA
Multi-Multi World (Combined Score)	**JA9YBA**	W2PV Memorial—Schenectady Amateur Radio Assn.

Top W/VE Single Band Scores—Phone

160		*40*		*15*	
K1ZM	11,592	KM6B	86,019	W5XZ	55,872
W1RR	11,376	K6TMB	50,697	WA6DBC	34,650
N4SU	6480	K5NA	38,850	KA5W	31,110
K5UR	6360	KG1E	35,838	N4MM	30,960
N4PN	4998	AD0O	34,104	KE4HX	16,632
80		*20*		*10*	
W0MJ	78,039	KS8S (KU8E)	234,675	WA3EEE	300
WX4G	50,076	K2IBW	215,202	WA7KLK	285
W6RT	48,510	N8ET	197,796	W3PWO	195
VE3XO	28,140	N2AA	176,988	KY1H	3
N7DF	26,532	KQ9L	143,256	WB2AMU	3

Top W/VE Single Band Scores—CW

160		*40*		*15*	
W1RR	25,020	N4PN	285,984	N2EK	165,735
AA1K	22,134	K5MR	210,588	K1RM	122,145
K5UR	19,902	N6CW	179,154	K3TUP	74,304
N4IN	14,250	W6YA	170,772	WB4TDH	60,480
W0ZV	13,818	K6NA	149,796	WA6DBC	59,292
80		*20*		*10*	
W1FV	147,840	N2AA	338,118	WA7KLK	702
KM1H	146,529	K2WK	181,680	VE2AEJ/3	540
W1ZM (K1ZM)	128,667	N3BJ	153,720	VE1BNN	462
		K9QVB	122,292		
WX4G	64,896	N6GG	122,148		
K8LX	52,611				

stupendous show with 40-million points, to edge out YCCC by 7 million. Potomac Valley Radio Club again took the Medium Club category gavel with 15.3-million points, to beat Texas DX Society by only 3.4 million. TDXS came up from the Local Club Category last year, to make their impressive second-place finish with 11.9-million points. Central Virginia Contest Club ran away with the Local category by beating Central Indiana Contesters by 3-million points.

Thanks to all who made this contest a great success despite declining sunspots. Be thinking of ways to beat this year's scores in the '86 contest. Hope to see everyone next year!

FEEDBACK

Please note the following corrections to the results of the 1984 ARRL International DX Contest starting on page 77 of October 1984 *QST*.

Phone: In the DX Europe Section, 5N8AFE's score should have read 515,040-1160-148-B.

CW: In the Oceania Section, VK3AGX is really VK5AGX, and had 228 QSOs instead of 288. In Scotland, GM8SQ should have been GM8SP.

Scores

The scores are listed by mode—phone and CW. For both W/VE and DX scores, single operators are listed first, followed by multioperator single transmitter, multioperator two transmitter, then multioperator unlimited. W/VE single-transmitter scores are broken down by call area and ARRL Section. W/VE multi-single scores are broken down by call area only. All W/VE multiop two-transmitter and unlimited scores are grouped together in descending order by score. DX single-op and multiop scores are broken down by continent and country. Under each ARRL Section (and country for DX), single-op scores are listed in descending order by catagory. All-band scores are listed first, followed by 160, 80, 40, 20, 15 and 10-meter single-band scores.

Each line score lists the following information: call, score, QSOs, multipliers, power output used (A = 10 W, B = 11-150 W, C = more than 150 W). The first station in each category (other than all-band) has a designator following the power indicator. Single-band entries are indicated by 160, 80, 40, 20, 15 and 10. For example, in Connecticut, the top all-band phone scorer is K1RX. The top low-power (150 W or less) entrant is KT1Y. KM1R has the top 80-meter single-band score, and K1YXG the top 20-meter; there were no QRP entrants.

W/VE-PHONE

Single Operator

1

Connecticut

K1RX	1,291,059	1449-297-C	
KS1L	717,408	1272-188-C	
WA1LVW	119,556	324-123-C	
K1RM	133,350	350-127-C	
K1KI	108,405	365- 99-C	
K1IN	88,560	248-120-C	
W1GNR	72,867	227-107-C	
KB1H	72,450	210-115-C	
K8HVI	65,790	215-102-C	
K1BV	40,986	198- 69-C	
W1DO	30,050	100-100-C	
KA1ION	21,780	110- 66-C	
KT1Y	20,496	122- 56-B	
KB1IZ	18,408	118- 52-B	
N1JW	18,231	103- 59-C	
KA1YP	10,950	73- 50-C	
W1QK	5742	58- 33-C	
AA2Z	900	20- 15-C	
KM1R	12,201	83- 49-C- 80	
K1ZZ	11,139	79- 47-C- 80	
K1YXG	30,012	164- 61-C- 20	
K1DII	4704	56- 28-B- 20	
KA1DSQ	3150	50- 21-B- 20	
KA1JSA	27	3- 3-B- 20	

Eastern Massachusetts

K1VR	775,008	1104-234-C	
K5MA	132,594	287-154-C	
K1HRM	75,276	204-123-C	
KA1EKR	60,282	197-102-B	
W1FJ	46,458	174- 89-C	
W1FM	45,900	170- 90-B	
W1WAI	40,248	156- 86-C	
K1DG	39,732	154- 86-C	
N1AU	19,992	98- 68-B	
KC1F	7611	59- 43-C	
KA1IOR	7380	60- 41-B	
WA1REI	5916	58- 34-C	
AB1A	5588	49- 38-C	
W3OD	4608	48- 32-B	
KT1O	2346	34- 23-C	
W1PLJ	1449	23- 21-B	
KG1E	35,838	181- 66-C- 40	
WA2AHP	585	15- 13-A- 15	

Maine

K1UO	127,800	284-150-A	
W1MGP	2940	35- 28-B	
K1JB	99,066	418- 79-C- 20	
W1XN	30,876	166- 62-C- 20	

New Hampshire

K1AR	1,277,460	1410-302-C	
KM1C (WB8BTH, opr.)	600,096	893-224-C	
AK1A	324,162	687-162-C	
W1RR	11,976	79- 48-C- 160	
K1TR	23,547	167- 47-C- 20	
W1VY	12,996	76- 57-C- 20	

Rhode Island

K1NG (KI1G, opr.)	657,621	821-267-C	
K1VSJ	155,904	406-128-C	
W1RFQ	4563	39- 39-C- 20	

Vermont

K1HKI	31,524	148- 71-C	
W3SOH	15,876	84- 63-B	

Western Massachusetts

W1DGJ	18,135	93- 65-C	
WA1ZAM	10,626	77- 46-C- 80	
W1GG	21,780	165- 44-C- 20	
KY1H	3	1- 1-B- 10	

2

Eastern New York

K2QF	107,136	279-128-C	
N2AIF	102,960	240-143-C	
N2JJ	36,450	135- 90-C	
W2DW	18,018	91- 66-C	
W2NC	6435	55- 39-C	
KC2WA	768	16- 16-A	
K1ZM	11,592	84- 46-C- 160	
K5NA	38,850	185- 70-C- 40	
K2IBW	215,202	806- 89-C- 20	
W2KHQ	18,360	120- 51-B- 20	
KB2MG	9270	103- 30-C- 20	

NYC & Long Island

W2MOY	45,144	171- 88-C	
AC2P	10,626	77- 46-C	
W2AYJ	9522	69- 46-C	
W2TE	6519	53- 41-C	
WB2PXA	4455	45- 33-C	
KA2QQT	2139	31- 23-B	
KA2WLH	1680	28- 20-C	
K2MFY	38,016	192- 66-B- 20	
N2CPE	15,870	115- 46-C- 20	
WB2AMU	3	1- 1-B- 10	

Northern New Jersey

N2LT	912,114	1197-254-C	
W2RQ	841,572	1184-241-C	
W1GD	181,125	345-175-C	
K2BK	108,920	270-132-C	
N2WT	72,963	201-121-C	
KR2J	29,646	122- 81-C	
W9NTU	19,152	112- 57-B	
WB2DND	18,894	94- 67-B	
W2VJN	17,889	89- 67-C	
K3JT	2346	34- 23-C- 80	
N2AA	176,988	602- 98-C- 20	
K2WK	133,920	558- 80-C- 20	
WA2VUM	45,150	215- 70-C- 20	
W2HAJ	19,293	109- 59-B- 20	
K4BNC	7344	68- 36-C- 15	

Southern New Jersey

K2BU	902,388	1082-278-C	
K2FL	196,512	368-178-C	
N2SS	163,836	333-164-C	
N2MR	109,326	266-137-C	
W2NS	47,748	173- 92-C	
W2PAU	42,900	130-110-C	
W2SDO	32,130	153- 70-C	
W2FGY	12,384	86- 48-C	
K2OSV	11,592	92- 42-C	
WA2WJL	7254	62- 39-B	
WB2ERI	7104	64- 37-C	
W2EA	5358	47- 38-B	
KD2AE	1638	26- 21-B	
N2DJY	1500	25- 20-C	
W2XN	1080	20- 18-C- 160	
WA2VYA	2560	63- 40-C- 80	
K2JLA	2346	34- 23-C- 80	
N2FHK	3075	41- 25-B- 20	

Western New York

KE2C (N2AU, opr.)	716,742	1021-234-C	
K2VV	284,624	596-148-C	
W2TZ	142,614	342-139-B	
KB2WN	57,630	170-113-C	
KB2NU	41,583	167- 83-C	
NA2Q	19,992	98- 68-B	
KB2SE	13,572	78- 58-C	
KA2PHQ	13,161	107- 41-C	
W2PHT	11,934	78- 51-B	
KA2VAJ	7524	66- 38-C	
KC2GZ	4350	50- 29-C	
W2HG	3648	38- 32-C	
KA2LCR	2028	26- 26-A	
WB2SZY	10,320	86- 40-C- 15	

3

Eastern Pennsylvania

W3BGN	1,096,710	1390-263-C	
K3OO	686,159	899-247-C	
K3NZ	481,457	729-211-C	
W3AP	405,980	665-204-C	
WA3SPJ	309,636	549-188-C	
N3ARK	275,772	469-196-C	
KS3F	219,051	399-183-C	
N3KZ (KH6CP, opr.)	210,759	431-163-C	
KJ3R	194,040	420-154-C	
W3DHM	187,590	370-169-C	
WB3CIW	114,318	261-148-C	
N3RW	91,125	243-125-C	
WB3FYL	94,242	278-113-B	
KA3DSW	86,751	243-119-C	
W3EVW	83,490	242-115-C	
KB3YJ	71,136	228-104-B	
N3BNA	70,848	192-123-B	
AD3Z	69,300	220-105-C	
W3ARK	66,123	237- 93-B	
K3OX	56,922	179-106-C	
N3HW	44,226	182- 81-C	
WA3YOB	12,900	100- 43-C	
KI3N	7770	74- 35-C	
WB3EPW	6840	57- 40-C	
WB3HYX	5301	57- 31-C	
KB3QH	4140	46- 30-B	
W3HMR	1944	27- 24-C	
K3DYX	1716	26- 22-C	
W3FTG	1320	22- 20-B	
WA3JXW	945	21- 15-C	
W3UM	1020	20- 17-C- 160	
KQ3V	5903	59- 39-C- 80	
K4JLD	2916	36- 27-C- 80	
WA3DMH	9009	77- 39-C- 20	
KB3YY	540	15- 12-B- 20	

Delaware

W3NX	122,208	268-152-C	
AA1K	30,345	119- 85-C	

Maryland-DC

K3ZO	664,875	985-225-C	
K3ZJ	434,928	697-208-C	
W3UJ	187,668	401-156-C	
K3ZNV	107,316	271-132-C	
W3HVQ	92,202	242-127-C	
K3WS	69,930	210-111-A	
KD3U	25,974	117- 74-B	
W3JPT	21,576	124- 58-B	
WB3BRF	20,412	108- 63-B	
W3RGX	7020	60- 39-B	
W3EE	4725	45- 35-B	
W3FQE	1224	24- 17-C	
K3TW	18,000	100- 60-C- 80	
W8AXX	2496	32- 26-C- 80	
W3TUX	2160	36- 20-C- 20	
WA3EEE	300	20- 5-C- 10	
W3PWO	195	13- 5-C- 10	

Western Pennsylvania

K3UA	2754	34- 27-C- 160	
W3FGS	5301	57- 31-B- 20	

4

Alabama

N4KG	552,006	674-273-C	
WZ4F	411,366	629-218-C	
W4NTI	125,286	266-157-C	
N4UN	76,494	209-122-C	
AC4X	17,820	108- 55-C	
KB4FAI	12,705	77- 55-B	

Georgia

W1UA	125,607	281-149-C	
W4DXI	104,448	258-138-C	
KC4TJ	92,619	251-123-C	
KC4GR	78,492	211-124-C	
W4UYC	41,418	177- 78-C	
W9KTB/4	39,840	168- 80-B	
K4BAI	24,660	137- 60-C	
WQ4B	4455	45- 33-C	
N4PN	4998	49- 34-C- 160	
WX4G	50,076	214- 78-C- 80	
WI4K	60,444	276- 73-C- 20	
WI9UIX	126	7- 6-B- 20	

North Carolina

N4UH	358,479	561-213-C	
KF4HK	103,530	238-145-C	
N8AVI/4	32,736	124- 88-C	
W2PDM	19,665	95- 69-C	
WD4AVY	9045	67- 45-A	
N4SU	6480	54- 40-C- 160	
W4UW	6240	65- 32-C- 40	

Northern Florida

W4WKQ	84,870	246-115-C	
W4WIJ	4185	45- 31-C- 40	

South Carolina

W3VT	491,526	658-249-C	
AA4V	41,040	144- 95-C	

Southern Florida

K8UNP	93,366	234-133-C	
WK4F	61,698	182-113-C	
W4YN	14,820	95- 52-C	
W4PZV	3827	39- 31-B- 160	
N4IN	3360	40- 28-C- 160	
W4BAA	1638	26- 21-C- 160	
KF4MA	5880	56- 35-B- 20	
W4JAT	2205	35- 21-B- 20	
W2SDB/4	840	20- 14-C- 20	

Tennessee

K4XO	104,250	250-139-C	
K4JHT	49,140	182- 90-B	
N4BSN	1584	24- 22-C	
K4RIG	26,460	147- 60-C- 40	
KE4HX	16,632	126- 44-C- 15	

Virginia

W3YY	445,836	701-212-C	
WC4B	84,963	223-127-B	
N4XD	84,216	242-116-C	
K4GKD	73,326	242-101-C	
KS2X	18,432	96- 64-C	
K4WHN	15,876	84- 63-B	
W4IQ	5130	57- 30-C	
WA4HOT	3999	43- 31-C	
N3RC	1377	27- 17-C	
W4VAN	2448	34- 24-C- 80	
W4LMJ	363	11- 11-C- 80	
KV4P	104,106	394- 88-C- 20	
W4YE	2178	33- 22-B- 20	
N4MM	30,960	172- 60-C- 15	
KC4HN	7659	69- 37-B- 15	

5

Arkansas

W5YM (K5GOE, opr.)	23,793	103- 77-C	
K5UR	6360	53- 40-C- 160	
K5UC	11,340	84- 45-C- 40	

Louisiana

WA5IGD	106,860	280-137-C	
W5OB	30,750	125- 82-C	
K5WGO	12,495	85- 49-C	
W8MJ	78,039	299- 87-C- 80	
W5XZ	55,872	291- 64-C- 15	

Mississippi

WA5OYU	26,289	127- 69-C	
K5MK	189	9- 7-C- 40	
W5MUG	26,352	144- 61-C- 20	
N5GRU	7200	60- 40-B- 20	
W5OSL	6045	65- 31-C- 15	

New Mexico

KI3L	167,580	420-133-C	
N5ACP	43,384	168- 96-C	
W7LHO	31,347	129- 81-A	
N5EPA	17,967	113- 53-B	
N5EZA	17,334	107- 54-B	
KT5X	1008	21- 16-C- 80	
K7UP	2415	35- 23-C- 15	

Northern Texas

K5RX	587,520	720-272-C	
K5RR	298,496	464-213-C	
NI5M	258,257	437-197-C	
N5JB	187,328	332-168-C	
N5AW	69,738	197-118-B	
N5UA	61,560	180-114-C	
N5FNW	54,162	177-102-B	
KE5CK	3078	38- 27-C- 80	
K4VUD/5	30,090	170- 59-C- 20	
KA5W	31,110	170- 61-C- 15	
W5VGX	5124	61- 21-C- 15	

Oklahoma

W5JME	83,394	225-123-C	
W5TZN	34,524	137- 84-B	
K5DEC	5088	53- 32-C	
K5WE	546	14- 13-C- 40	
WA4PPX	14,832	103- 48-C- 20	
KC5SR	1479	29- 17-C- 20	

Southern Texas

NA5R (K5GN, opr.)	801,810	885-302-C	
K5DX	255,852	414-206-C	
W5BE	52,089	179- 97-C	
WA5IYX	31,920	133- 80-A	

6

East Bay

W6BSY	44,280	184- 90-C	
WA6AHF	17,280	98- 60-C	
WE6G	10,212	92- 37-B	
K6CSL	3360	56- 20-B	
W6RJ	48,510	245- 66-C- 80	
K6TMB	50,697	393- 43-C- 40	

Los Angeles

K6EID	195,339	437-149-C	
K6YRA	58,905	197-105-C	
W6ABW	56,079	201- 93-C	
K5KT/6	45,600	160- 95-C	
W6MFC	35,568	152- 78-C	
WA6R	31,725	141- 75-C	
N6AA	27,939	139- 67-C	
K6OC	22,860	127- 60-C	
W6CN	19,824	118- 56-A	
W8FCF	19,764	122- 54-C	
N6IC	18,200	100- 54-C	
KG6MO	12,483	73- 57-C	
K9AGL	9345	89- 35-B	
W6OES	8760	73- 40-C	
KB8HW	8541	73- 39-C	
WA6POZ	5742	66- 29-C	
WA6HXM	4704	49- 32-C	
N6IBP	4050	54- 25-B	
VE3HWW/W6	3960	44- 30-C	
WA6TLA	2460	41- 20-B	
W6AUG	1800	30- 20-C	
W6GC	1581	31- 17-C	
NE6I	1710	30- 19-C- 80	
KM6B	88,019	541- 53-C- 40	
W6OK	18,270	145- 42-C- 20	
AI6Z	4320	60- 24-C- 20	

Orange

WA6HRH	19,494	114- 57-C	
NM6L	3525	47- 25-C	
W6TMD	58,764	332- 59-C- 20	

Santa Barbara

W6SWM	133,590	385-122-C	
WB6L	112,500	375-100-C	
WA6FGV	37,824	197- 64-C	
K6VMN	31,416	138- 77-C	
N6HK	13,377	91- 49-C	
NS6X	72	6- 4-B	
N6VR	4785	55- 29-C- 40	

Santa Clara Valley

WB6KBZ	85,365	271-105-C	
N6AN	21,204	124- 57-C	
N6NF	19,080	120- 53-C	
N6UW	18,972	102- 62-C	
W6SC	18,042	97- 62-C	
W6ISQ	4185	45- 31-C	
W6SSA	3627	39- 31-B	
W6QDE	1632	32- 17-C	
N6HR	3456	48- 24-C- 80	
K6LY (K6EJ, opr.)	58,764	332- 59-C- 20	
W6YVK	3480	58- 20-A- 20	

San Diego

NI6W	116,781	489- 83-C	
N6ADK	45,408	176- 86-B	
K6NA	27,966	118- 79-C	
K6MC	11,316	82- 48-C	
N6JMV	3822	49- 26-B	
AA6EE	2160	40- 18-B	
WA6DBC	34,650	210- 55-C- 15	

San Francisco

K6LRN	12,936	99- 44-B	
WA6LLY	1820	27- 20-B	

San Joaquin Valley

KA6BIM	125,136	316-132-C	
W6BYH	22,914	114- 67-C	
N6BJQ	2952	41- 24-C- 80	

Sacramento Valley

K6DR	49,278	191- 86-C	
N6JM	11,766	74- 53-B	

7

Arizona

K7OX	314,238	631-166-C	
W7AYY	56,604	212- 89-C	
KX7J	18,296	97- 56-C	
W5EIJ	18,254	86- 63-C	
K9JNB	3402	54- 21-B	
W7RIR	714	17- 14-B	
W9SE	18,096	128- 44-C- 20	
WA7KLK	285	19- 5-C- 10	

Idaho

NJ7J	8930	77- 30-C	

Montana

K7ABV	45,086	203- 74-C	
KC7UO	33,726	148- 77-C	
KS7T	25,875	125- 69-C	

Nevada

WB7VVH	2288	38- 21-C	

Oregon

W7FP	159,510	409-130-C	
KZ7I	15,180	115- 44-C	
KA7FEF	186	18- 4-B- 40	
AG7M	87,264	404- 72-C- 20	
W7GUR	7821	79- 33-C- 20	

Utah

W7HS	21,546	114- 63-C	
W7MFU	11,781	77- 51-B	

Washington

N7TT	250,512	614-136-C	
W7TSQ	46,008	213- 72-C	
K7HBN	32,400	150- 72-C	
W7QN	22,320	124- 60-C	
N7ABJ	17,820	132- 45-C	
W7TS	15,450	103- 50-C	
W7KKR	14,418	89- 54-C	
KC7QP	11,193	91- 41-C	

W7MCU 8760- 73- 40-C
W7LVI 8435- 85- 33-C
K7UU 504- 14- 12-B
KE7C (WB7OJV, opr.)
78,840- 385- 72-C- 20
K7LXC 72,864- 368- 66-C- 20

WA7GVM 9360- 120- 26-C- 20
W7IIT 3534- 62- 19-B- 20
K7RIE 1008- 24- 14-B- 20
WB7FAH 324- 18- 6-B- 20

Wyoming

KB8KW/7 27,945- 135- 69-C
KB7M 1377- 27- 17-C

8

Michigan

W8TWA 163,836- 369-148-C
K8KUH 7104- 64- 37-C
N8CQA 3441- 37- 31-A
W8FEM 2250- 30- 25-B
K8DD 1587- 23- 23-C
AC8W 432- 12- 12-C
K8LX 23,040- 120- 64-C- 80
KB8PK 83,913- 337- 83-C- 20
W8VSK 1482- 26- 19-A- 20

Ohio

K8DJC 97,356- 244-133-C
WD8BKT 37,296- 148- 84-C
W8UPH 28,350- 135- 70-C
W8NPF 27,000- 125- 72-C
K8EF 22,692- 122- 62-C
W8CFG 22,572- 99- 76-C
W8EX 17,199- 91- 63-C
W8DWP 17,010- 90- 63-B
K8MR 13,050- 75- 58-C
N8GFX 8442- 67- 42-B
NJ8L 8105- 55- 37-B
W8YGR 5796- 46- 42-B
W8BE 4410- 42- 35-B
W8IDM 1782- 27- 22-B
KU8E 5616- 52- 36-C- 80
KS8S (KU8E, opr.)
234,675- 745-105-C- 20
N8ET 197,796- 622-106-C- 20
W8LNO 34,452- 174- 66-C- 20
W8VSK 1482- 26- 19-A- 20

West Virginia

N8II 47,112- 151-104-C
W8WVM 18,408- 104- 59-B
WA8AJN 18,018- 91- 66-C
W8KKB 3861- 39- 33-B
K8OQL 468- 13- 12-C- 160

9

Illinois

KV9S 242,436- 454-178-C
KB9AW 101,331- 243-139-C
KC9UM 45,216- 157- 96-C
WD9GIG 33,750- 125- 90-C
W9LYN 25,122- 106- 79-B
KG9Z 14,931- 79- 63-C
KB8AC 10,293- 73- 47-C
W9TNZ 5550- 50- 37-B
W9ZGP 5472- 48- 38-B
N9CIW 3534- 38- 31-B
WD9DGE 3360- 35- 32-C
W9REC 3192- 38- 28-B
W9QWM 2697- 31- 29-C
W9DQV 507- 13- 13-B
WD9DYR 420- 14- 10-B
KS9O 18,408- 118- 52-C- 40
W9CH 11,421- 81- 47-C- 40
KR9G 34,371- 171- 67-C- 20
K9LJN 25,970- 145- 62-B- 20
KC9W 15,288- 91- 56-C- 20
K9QBV 7440- 62- 40-C- 20
WD9IFS 3321- 41- 27-B- 15

Indiana

W9RE 787,788- 948-277-C
K9VQK 22,230- 114- 65-C
KC9FC 20,160- 96- 70-C
K1TH/9 6150- 50- 41-B

Wisconsin

K9CAN 205,410- 410-167-C
W9OP 123,105- 283-145-C
W9ZM 101,376- 256-132-C
W9RN 45,600- 160- 95-C
WA9BZW 18,792- 87- 72-C
W9GXR 18,315- 111- 55-C
WB9SAU 10,098- 66- 51-B
WB9HRO 5859- 63- 31-C
KQ9L 143,256- 508- 94-C- 20
N9BUS 33,015- 155- 71-C- 20
K9XJ 16,995- 103- 55-C- 20
NB9B 11,115- 95- 39-B- 20

0

Colorado

KS0E 67,800- 200-113-B
N0EKK 63,054- 228- 93-B
W0OSK 57,570- 190-101-C
KJ0G 16,470- 80- 61-C
W0IZV 13,260- 85- 52-B
K0GAS 7068- 62- 38-C
W0BWJ 3600- 50- 24-B
K0OST 330- 11- 10-B
W0ZV 1914- 29- 22-C- 160
AD0O 34,104- 196- 58-C- 40

Iowa

W0EJ 299,097- 597-167-C
KC0XK 119,238- 334-119-C
K0GT 68,880- 205-112-C
W4NIM 63,030- 191-110-C
W0WP 59,670- 221- 90-B
KE0Y 52,632- 204- 86-C
W0IZ 40,455- 145- 93-C
N0BH 38,502- 138- 93-C
KC0FH 31,833- 131- 81-C
KC0Q 25,530- 115- 74-C
KK0R 24,102- 103- 78-C
W0PLS 23,331- 101- 77-C
W0PPF 22,914- 114- 67-C
N0SM 20,286- 98- 69-C
WD0EIF 19,850- 95- 70-C
WA0DCB 15,960- 95- 56-C
AG0Z 13,992- 88- 53-C
K0JGH 11,232- 72- 52-C
W0SML 5358- 47- 38-C
KF0Z 3162- 34- 31-B
AD0C 7560- 70- 36-C- 40

Kansas

W0FN/0 61,803- 189-109-C
WB0ISW 47,736- 153-104-C
K0VXU 39,192- 142- 92-C
K0BJ 27,537- 137- 67-B
KA0RVL 7260- 55- 44-C
N0FMR 243- 9- 9-B
N7DF 26,532- 134- 66-C- 80
AB0X 2208- 32- 23-C- 80
KB0U 8280- 69- 40-B- 20

Minnesota

N0AT 99,825- 275-121-C
WB0BJP 7314- 53- 46-C
W0LP 5814- 51- 38-C
W0NGB 4488- 44- 34-B
N0BSH 2886- 37- 26-C- 80

Missouri

W0JLC 421,260- 595-236-C
W0HBH 208,656- 378-184-C
KM0L 105,216- 256-137-B
K0IFL 89,100- 225-132-C
KC0LX 34,452- 132- 87-C
KA0IQR 18,564- 91- 68-C
AK0M 2430- 30- 27-B
KD0FW 2100- 35- 20-B
KA0P 324- 12- 9-B
K0CS 2673- 33- 27-B- 80
KB0V 2850- 38- 25-C- 40

Nevada

K0SCM 102,750- 274-125-C
KC0SV 28,782- 117- 82-C
KB0YK 840- 20- 14-B
K0SW 3675- 35- 35-C- 20

North Dakota

KC0CU 30,750- 125- 82-C

South Dakota

WD0BHV 2325- 31- 25-C- 20
K5LZT 18- 3- 2-B- 20

VE

Maritime-Newfoundland

VE1NG 160,128- 384-139-B
VO1MP 54,912- 208- 88-B

Quebec

VE2AYU 183,465- 405-151-C

Ontario

CZ3XN 290,400- 550-176-C
VE3FDP 61,938- 186-111-C
VE3MFA 2250- 30- 25-C- 160
VE3XO 28,140- 140- 67-C- 80
CZ3NBE 79,764- 391- 68-C- 20
VE3ST 27,342- 147- 62-C- 20
VE3NYT 3402- 42- 27-C- 20

Saskatchewan

VE5RA 130,419- 337-129-C

Alberta

VE6CHW 13,029- 101- 43-C

British Columbia

VE7FTC 4725- 75- 21-C- 20
VE7FJE 3456- 64- 18-C- 20

Multioperator

Single Transmitter

1

K1WA (+ K1DM)
405,240- 614-220-C
KA1X (+ AK1L)
319,680- 592-180-C
K1FL (+ AB1X, KB1NW)
295,302- 553-178-C
K1DD (+ K1NYK, KA1VC, KG1D)
209,643- 469-149-C
WB1EYL (+ KA1KVF, KS1N)
111,510- 354-105-C

2

NF2L (+ K3KNH)
532,896- 854-208-C
W2BHK (+ WB2YOF)
421,344- 627-224-C
WB2KQC (+ KZ2I)
223,668- 436-171-C
WA2LQD (K2DOD, K2UAT, W2DKM, W2DT, WB2FMP, oprs.)
135,864- 333-136-C
W2UI (+ N3KR)
120,060- 290-138-C
W2XL (+ KY2Z, NA2N, WA2WSO)
118,818- 267-138-C
K2TD (+ Net)
104,481- 247-141-C

3

K3LR (+ K8CC, AF3P, N4TY, WB3KKX)
927,864-1052-294-C
K3TUP (+ AI8S, KB8IZ, KJ3L, N3BJ, W8CY)
847,458-1058-267-C
K3WW (+ K3VW)
603,174- 703-286-C
K3ZUF (+ Net)
594,594- 726-273-C
N3RL (+ Net)
333,828- 562-198-C
KF3L (+ WB3HGQ)
183,216- 347-176-C
N3EC (+ Net)
132,444- 283-156-C
W3KV (+ Net)
56,385- 179-105-C
KD0U (+ KB3EII)
35,217- 129- 91-C
K3NA (+ Net)
19,530- 93- 70-C
W3KWH (AK3J, K3RYA, KA3s IVB, KSD, N3DOK, WN3VAW, oprs.)
9855- 73- 45-B

4

K3KG (+ KA4S, NQ4I, W4NL)
1,007,721-1053-319-C
WI4R (+ KB4IUB, KC4BB)
365,040- 624-195-C
WA4RDD (+ WA4ZZU)
6426- 51- 42-C

5

KC5CP (+ Net)
110,112- 248-148-C
W5PWG (+ WA3KMA)
16,074- 114- 47-B

6

WB6ZHT (+ K6SVL, KG6IP, N2DHZ, N6CGB, N6KN, WB0QPO)
206,610- 485-142-C
K6ZM (+ AK6T, N6BL)
108,891- 327-111-C
K7LJ (+ Net)
74,898- 219-114-C
WC6I (+ Net)
47,259- 177- 89-C
WB6OKK (+ K6JYO)
23,940- 114- 70-C
KD6NT (+ KE6WL)
22,125- 125- 59-C

7

NK7U (+ NI7T)
209,739- 463-151-C
NC7K (+ WA7UTM)
103,500- 276-125-C

8

WB8JBM (KC8MK, KV8M, KW8N, N8ATR, N8DMM, WB8PAT, oprs.)
920,640-1096-280-C
W8GWC (+ W8s CZN, JGU, WA8s DXB, DXG, RCN, WA4MAT)
469,950- 650-241-C
W8NGO (+ K8ZE)
169,128- 348-162-C
K8NZ (+ Net)
12,876- 74- 58-A
W8YX (KA8TEQ, KD8TF, N8FYH, N8GCO, NI8S, WB8OPX, WD8CNZ, WD8MGO, oprs.)
12,561- 79- 53-C

9

K9BQL (+ KA9QYA)
66,304- 232-124-C
KC9XF (+ N9EJL)
56,700- 180-105-C
WB9ZGY (+ WB9UAO)
8712- 66- 44-B
W9YB (KC9RG, WB9POH, oprs.)
1782- 27- 22-C

0

K4VX/0 (+ K9BGL, KM9P, KR0Y)
1,064,115-1105-321-C
NG0W (+ KB0BR, KD0Q, W0FO)
318,087- 567-187-C
KZ0C (+ K0VZR, KC0HY)
199,368- 418-159-C
KR0B (+ AF9T, KA0JZV, N0BKL, N0BNG)
145,722- 326-149-C
K0SR (+ AB0P, WB0HCH)
68,676- 194-118-C
KM0P (+ KM0R, G3JKX)
26,280- 120- 73-C

Multioperator

Two Transmitter

K2TR (+ K2RD, K2XA, KQ2M, WA2SPL)
1,719,804-1588-361-C
N2RM (+ KB3TN, KM3T)
1,670,400-1600-348-C
N5AU (+ K5ZD, KM5X, WB5VZL)
1,557,270-1430-363-C
W3MA (+ N3AD, N3RD, KT3M)
1,446,774-1406-343-C
N5RM (+ K2TNO, K5IY, KG5U, N5EA, N5JQ)
1,323,051-1409-313-C
KA1GG (+ K1KJT, K1VUT, KC1Q, KV1Y, W1KM)
1,127,763-1377-273-C
WA4JXI (+ KA3IKE, KA4ZIU, KF4GI, K0OO, WA4SVO)
808,044- 932-289-C
W1BR (+ K1KNG)
689,265- 901-255-C
K3II (+ KQ2O, WA3IMY)
561,738- 746-251-C
K2NJ (+ KB2HZ, KU2C, KY2O, KY2P, W2GD)
454,184- 614-252-C
WØAIH/9 (+ K0FVF, K0KX, WDUC)
340,704- 507-224-C
N7RO (+ KC7GX, W7EKM, WA7ZWG, WB7CLU)
193,764- 482-134-C
KJ9D (+ KK9V)
148,707- 403-123-C
N2VW (+ K2TD)
84,128- 167-128-C

Multioperator

Unlimited

W3LPL (+ AI3M, K3EST, KA1GD, KC8C, KD4NI, N2FB)
2,258,610-1905-395-C
W4DR (+ AA4GL, K3RZR, KI4GM, KX4S, N4BLX, N4EHJ, NB4A, NK4J, W4MYA, WA4HOT, WB4BVY, WK4Y, WU4G)
2,091,312-1854-376-C
W3GM (+ K3GM, K3ND, N2MM, W3FV)
1,376,620-1332-345-C
KN6M/5 (+ KE5CV, KY5N, NA5S, N6AUV, W6SZN)
1,198,551-1207-331-C
KS9K (+ K9CJK, KE9U, KJ9I, KS9Z, N9AW, WA9TZE, WB9s AUK, OJE)
1,108,800-1320-280-C
K5LZO (+ AK5B, KA5SBS, KD5SP, KE5IV, KE5TF, KF4VS, NM5M, NT5D, WB5RUS)
980,481-1031-317-C
K3ZZ (+ K3FT, KC3EK, N3AOE, WA3EKL)
844,533-1009-279-C
K5RVK (+ K5GB, KC5M, W5ASP, W6SJS, WA9VLI)
463,428- 613-252-C
K0UK (+ KI0G, ND0E)
355,095- 607-195-C
W0EEE (KA5SLN, KA8SFI, WB0YKG, WD0GZD, oprs.)
18,360- 102- 60-C

DX-Phone

Single Operator

Africa

W2ZZ/CT3 30,780- 171- 60-B
EA8ZI 328,860- 945-116-B
EA8LS 87,702- 622- 47-C- 20
EA9IB 12,882- 113- 38-B
ZS6DW 22,890- 218- 35-C- 40
ZS6BCR 1224- 24- 17-C- 20
5N8AFE 229,152- 682-112-B
5V8WS (DJ6QI, opr.)
109,890- 370- 99-C
5Z4DJ 6237- 63- 33-B
9U5JB (N4HX, opr.)
961,248-2108-152-C

Asia

K5KG/VS6 6441- 113- 19-C
HL1QT 24- 4- 2-B
HL1ABR 6- 2- 1-B- 40
JA1XAF 155,376-1872- 83-C
JA7GLB 145,928- 737- 66-C
JH6NBW/1 576- 24- 8-B
JH3LCU/1 180- 12- 9-A
JA1JGP 132- 11- 4-B
JA2YKA (JF2DQJ, opr.)
9949- 157- 19-B- 80
JH0LFE 420- 20- 7-C- 80
JL1MWI 9- 3- 1-B- 80
JA2BAY 22,800- 304- 25-C- 40
JF3CEC 3- 1- 1-B- 40
JM1CAX 83,556- 633- 44-C- 20
JH1AEP 59,052- 518- 38-C- 20
JF1SEK 28,971- 261- 37-B- 20
JE4VVM 16,524- 204- 27-B- 20
JA2ODS 3723- 73- 17-C- 20
JM1LRQ 3534- 62- 19-B- 20
JA0CGJ 2376- 66- 12-B- 20
JA1ASO 1833- 47- 13-B- 20
JA2JSF 1584- 48- 11-A- 20
JR3WKA 441- 21- 7-C- 20
JH3DEJ 360- 20- 6-B- 20
JH7AJD 216- 12- 6-B- 20
JH1MTR 135- 9- 5-B- 20
JM1MGP 1593- 59- 9-B- 15
JH7LRS 270- 30- 3-B- 15
JR1BVU 90- 10- 3-C- 15
JJ2FJM 3- 1- 1-B- 15
RA0FA 1008- 56- 6-B- 80
UA0ZDD 495- 99- 5-B- 80
RF0FWW 231- 11- 7-B- 20
UW0CM 120- 10- 4-B- 20
UL7QF 60- 5- 4-B- 20
4X6IF 7800- 108- 27-B

Europe

CT1BCM (OH3ZE, opr.)
585,312-1456-134-C
CT4KQ 352,137-1097-107-C
CS5TM 38,478- 242- 53-C
CT1CAK 1287- 33- 13-B- 20
CT2CM 3600- 60- 20-B- 160
CT2CB 145,530-1078- 45-C- 80
CT2FH 357,048-2052- 58-C- 20
CT2DL 209,664-1344- 52-C- 20
CT2CE 4914- 91- 18-C- 15

DL7MAE 780- 26- 10-C- 40
DJ3HJ 131,505- 797- 55-C- 20
DL7RAI 66,792- 506- 44-C- 20
DJ6BA 52,170- 370- 47-C- 20
DK5KJ 1755- 39- 15-C- 20
DJ0BX 1638- 42- 13-B- 20
DL9FAD 1134- 27- 14-B- 20
DA1CN (K0VIF, opr.)
495- 15- 11-C- 20

EA3CCN 308,454-1018-101-C
EA4GT 34,695- 257- 45-C
EA4KK 34,188- 259- 44-C
EA5JC 3168- 44- 24-B
ED4CFZ (EA4CFZ, opr.)
135,792- 943- 48-C- 20
EA7CFW 21,420- 204- 35-B- 20
EA7TK 12,276- 132- 31-C- 20
EA5FDO 7344- 102- 24-C- 20
EA7DUD 6942- 89- 26-B- 20
EA3ELM 6225- 83- 25-B- 20
EA2CR 5040- 168- 30-C- 20
EA5BMF 4623- 67- 23-B- 20
EA1YY 4290- 55- 26-B- 20
EA1AWW 3024- 48- 21-B- 20
EA3NU 2352- 49- 16-B- 20
EA5DWQ 663- 17- 13-B- 20
EA7FPT 420- 14- 10-B- 20

EA6URP 5220- 60- 29-B
EA6VQ 76,587- 521- 49-B- 20

FE6AOJ 86,154- 346- 83-C
FE6AJA 13,152- 137- 32-C- 20
FE6BVB 10,656- 111- 32-B- 20
FE6DRP 6984- 130- 24-B- 20
FE8WE 4410- 70- 21-B- 20
FE6CLM 450- 15- 10-B- 20
FD6KJO (FD1JTL,opr.)
405- 17- 8-B- 20

G2OT 44,460- 247- 60-B
G3NT 12,516- 149- 28-B- 20
G4XKR 11,040- 115- 32-B- 20
G4HBI 6156- 76- 27-B- 20
G3JKY 2052- 38- 18-B- 20

GI0AIJ 56,541- 401- 47-C- 20

GM3BCL 15,936- 166- 32-C- 20
GM3LYY 5472- 76- 24-B- 20

GU4WTN 107,700- 717- 50-C- 20

GW4BLE 369,090-1367- 90-C

HG5A 351,918-1197- 98-C
HG7B (HA7UG, opr.)
22,050- 210- 35-C- 40
HA4XX 30,303- 259- 39-B- 20
HA6NW 7332- 94- 26-B- 20
HA3HZ 5984- 71- 26-B- 20
HA8KWG 5451- 79- 23-B- 20

HB9DX 7917- 91- 29-C- 20

I4RYC 288,533-1027- 93-C
I6FLD 148,257- 969- 51-C
I2VRN 25,542- 258- 33-C- 40
I4CSP 11,385- 115- 33-B- 20

IK2AEQ 5700- 76- 25-B- 20
IT9YSW 3480- 58- 20-B- 20

IS0LLY 3078- 54- 19-B- 20

LA9ZV 9120- 95- 32-B- 20
LA2IE 4368- 56- 26-C- 20
LA4TG 4140- 60- 23-C- 20
LA5KK 2520- 40- 21-B- 20
LA1HCA 1296- 27- 16-B- 20

LZ1KSN 11,880- 132- 30-C- 20

OE5CWL 3087- 49- 21-C- 20

OH8OS 158,592- 944- 56-C- 20
OH1OR 2457- 39- 21-C- 20
OH4YC 1530- 34- 15-B- 20
OH1EB 1470- 35- 14-B- 20
OH2BYS 1470- 35- 14-B- 20
OH4PW 1392- 29- 16-B- 20
OH6YF 90- 6- 5-B- 20

OK2FD 147- 7- 7-C- 80
OK1ALW 97,008- 688- 47-C- 20
OK1AJN 29,592- 274- 36-C- 20
OK1AKX 6375- 85- 25-B- 20
OK3TAJ 2400- 40- 20-B- 20
OK1KZ 1920- 40- 16-B- 20
OK1DMA 1428- 28- 17-B- 20
OK1TW 405- 15- 9-C- 20

ON8TX (K8GND, opr.)
3120- 52- 20-B- 20

OZ2OL 12,960- 135- 32-B- 20
OZ8T 6090- 70- 29-B- 20
OZ1GLN 3432- 52- 22-B- 20
OZ1APA 1395- 31- 15-B- 20

PA3CEF 11,745- 135- 29-B- 20
PA0QX 8280- 92- 30-C- 20
PA3AAN 2052- 38- 18-C- 20

SM6DHU 54,612- 444- 41-C
SK3AH (SM3COL, opr.)
36,844- 332- 39-C- 20
SM4CMG 27,540- 204- 45-C- 20
SM7WT 13,158- 129- 34-C- 20
SM5CAK 8175- 109- 25-C- 20
SM2LWU 6075- 75- 27-C- 20
SM0BDS 3960- 60- 22-C- 20
SM7NJJ 3525- 47- 25-C- 20
SM5CVC 3078- 54- 19-C- 20
SM5AWH 3080- 51- 20-B- 20
SM5AAY 1767- 31- 19-C- 20
SM7TV 1134- 27- 14-B- 20

SP6DVP 1440- 30- 16-B- 20
SP9MRO 1089- 33- 11-B- 20
SP5PBE 1023- 31- 11-B- 20

SV0DC 6966- 86- 27-C

WA2CPY/TF 1305- 29- 15-B- 20

UB4SWB 1596- 28- 19-B
UB5IFN 2058- 49- 14-B- 80

UC2AAD 1125- 25- 15-B- 20

UP2BO 12,576- 131- 32-B- 20

YO3YB 3150- 50- 21-B- 20
YO5BLA 189- 9- 7-B- 20

YU1OWW 3402- 54- 21-A
YU4EZC 378- 14- 9-C- 80
YU4EBL 83,895- 595- 47-C- 40
4N3E (YU3HAM, opr.)
6150- 82- 25-C- 40
YT3M (YU3ZO, opr.)
212,520-1288- 55-C- 20
YU7SF 1386- 33- 14-B- 20
YU7MGU 48- 4- 4-B- 20

Y25HL 9207- 99- 31-B- 20
Y54QL 5670- 70- 27-C- 20
Y28AL 5244- 76- 23-C- 20
Y32KE 3150- 50- 21-C- 20
Y31PA 3120- 52- 20-C- 20
Y38YE 1260- 30- 14-B- 20
Y38YK 1173- 23- 17-C- 20
Y59ZF 336- 14- 8-B- 20

North America

CM8CB 23,826- 209- 38-B- 80

FG/K2KTT/FS
15,318- 138- 37-B- 40

FM5CD 187,200-1300- 48-C- 15

HH2WL 703,131-1937-121-B

HI3AMF 212,424- 669-106-B
HI8A 140,556- 884- 53-B- 80
HI8GB 68,690- 494- 45-C- 80

HP1XKR 62,208- 324- 64-B

KL7LF 36,000- 240- 50-C

KV4AM 39,342- 166- 79-C

OX3KM 30,753- 201- 51-C

5K9A/PJ7 403,389-2391- 57-C- 80

K2KTT/PJ7 44,280- 360- 41-B- 15

TG9GI 918,177-1811-169-C

TI2ANL 25,584- 208- 41-B- 20

VP2EAG (KJ8D, opr.)
486,528-2896- 56-C
K8CV/VP2E 175,896-1047- 56-C- 80
VP2ED 116,865- 795- 49-C- 40

VP2ML 148,080- 617- 80-B

VP2VFI (K1JU, opr.)
39,432- 248- 53-B

VP5SBX (AK8A, opr.)
51,348- 389- 44-B- 160

K9DXO/V4 315,828- 849-124-B

XE1VIC 1,082,628-1769-204-B
XE2NNZ 567,378-1197-158-B
XE2MX 556,452-1189-156-C

ZF2FL (N8RJ, opr.)
5,076,579-6109-277-C

Oceania

AI6V/KH6 2,177,154-3269-222-C
AH6AZ 338,910- 869-130-C
W7PSO/KH6 121,728- 634- 64-B
AH6EK 12,462- 134- 31-A
KH6SP 30,690- 341- 30-C- 20
KH6IJ 225- 15- 5-C- 20
AH8A 480,000-1250-128-C
T32AF (KH6UR, opr.)
201,135-1219- 55-B- 40

VK3DNC 2280- 38- 20-B
VK6HD 3969- 49- 27-B- 160
VK6MD 68,832- 478- 48-C- 40

YC0DPO 3- 1- 1-B- 15

ZL1ANJ 9180- 85- 36-B
ZL1TM 2760- 40- 23-B
ZL2AH 1701- 27- 21-B

South America

CE8DQN 803,640-1448-185-C
CE5CFR 179,340- 610- 98-B
CE0DPD 48,198- 277- 58-B
CE6GDR 90,450- 603- 50-C- 40
EA4LH/CE3 29,040- 242- 40-C- 40
CE7BIY 49,923- 387- 43-C- 15
CE6EZ 75,000- 625- 40-C- 10

HC1OT 157,080- 952- 55-C- 80
HC1HC 403,731-2361- 57-C- 20
HC1EA 156,915- 951- 55-C- 15

HK5HKI 1104- 23- 16-B

LU1BR 2,249,976-3112-241-C
LU8ESU 143,472- 654- 56-B- 20
LU4DM 190,482-1198- 53-C- 15
LU8FEU 226,580-1280- 59-C- 15
LU5HLI 89,199- 583- 51-B- 15
LU6ETB 77,013- 597- 43-C- 10
LU1VK 11,340- 140- 27-B- 10

OA4BGP 75,276- 369- 68-B
OA4BLD 86,151- 611- 47-B- 15

PP2ZDD 971,433-1809-179-C
PY4OD 342,186-1066-107-C
PY2RE/4 50,787- 297- 57-C
PT7BZ 16,851- 137- 41-C- 160
PT7WA 17,010- 162- 35-C- 80
PY5EG 107,484- 689- 52-C- 40
PT2TF 5670- 90- 21-C- 20
ZV9ZZ (PY5IW, opr.)
370,440-2205- 56-C- 15

YV3AZC 27,552- 224- 41-C-160
YV5CVE 281,637-1647- 57-C- 80
YV5JEA 130,548- 948- 46-B- 15
YV6BTF 6930- 110- 21-B- 10

ZP5JCY 166,698-1029- 54-C- 40

9Z4F 442,476- 964-153-B
9Y4VU 6480- 72- 30-C-160
9Y4AT 78,351- 533- 49-C- 40

Multioperator

Single Transmitter

Africa

ZS6TUK (ZS6s BZP, DP, G, oprs.)
83,214- 414- 67-C

Asia

JA1YWX (+ JL1BLW, JM1LPN, JO1NAH, JF2IWL, JR4NIV, JA6- 9338, JH7PKU)
195,822- 759- 86-C

JA1YCL (+ JG1GOB, JK1STT, JL1QOC, JS1AFY, JH8MHZ, JF6YL, JF6POF, JH8DUG)
158,790- 670- 79-C

JA7YAB (JR0CDI, JA8-3881, JA0-3440, oprs.)
125,385- 643- 65-C

JA7YFB (JJ1GXY, JN1RON, JE7MOY, JE7GQK, JH7s XKI, XMO, JR7s GYC, JLU, LCI, QYW, JH0QNT, oprs.)
115,875- 515- 75-C

JA4ZQA (JA3ERG/4, JA4s CUU, CVJ, FXL, KKW, KLO, JH4RHF, JR4s BSM, DFO, NWN, oprs.)
71,451- 467- 51-C

JE1ZJC (JJ1KZZ, JK1BEY, JK1FLX, oprs.)
12,672- 128- 33-B

Europe

ED3CBE (EA3s BOW, BOX, CVA, DDU, DGQ, EIO, oprs.)
271,500- 905-100-B

EA3RCD (EA3CZM, EC3BZZ, EC3BZI, oprs.)
63,162- 319- 66-B

EI7H (EI7FB, opr.)
178,641- 863- 69-B

EI7DJ (EIs 8AU, 646, 748, 888, oprs.)
6156- 76- 27-B

F3TV (F6s ARC, BEE, CTT, oprs.)
1,240,272-2349-176-C

GW8GT (G3OAY, GW3s KYA, NJW, NWS, GW4s IGR, TTU, GW5NF, oprs.)
449,820-1470-102-C

HG9R (HA9s PP, PV, RB, RP, RU, RX, oprs.)
232,290- 890- 87-C

HA5KKC (HA5s KP, LV, MA, MD, MO, OG, oprs.)
140,184- 792- 69-B

HA4KYN (2 oprs.)
32,550- 217- 50-B

HA1KRR (6 oprs.)
25,974- 222- 39-B

HA6KNX (4 oprs.)
12,288- 128- 32-B

HB9CXZ (+ HA9s ALM, BLQ, CIP)
343,746-1014-113-C

HB9AUS (+ HB9s CFU, CVI, SFD, HE9ASD, HE9EEX)
92,862- 462- 67-C

I5NPH (+ I5s MPN, SDG, IK5BAF)
1,235,520-2640-156-C

ON6BR (ON4s ACH, ARL, AYL, ON6JN, ON7XN, oprs.)
123,750- 750- 55-B

SK6JA (SM6s CKU, CPY, CVT, DER, DOI, DQO, FYJ, LRR, oprs.)
58,995- 345- 57-C

UZ3TXL (3 oprs.)
828- 23- 12-B

UZ3DXW (3 oprs.)
1596- 84- 19-B

UP1BZZ (UP2PAJ, UP2BIG, oprs.)
139,320- 744- 60-B

EU2P (RP2BID, UA4HQB, UP2-038-1162, UP2-038-1237, oprs.)
47,916- 363- 44-B

EU1Q (UQ2-037-1161, UQ2-037-83, oprs.)
46,725- 445- 35-B

UQ1GWT (UQ2s GFB, GJW, -037-341, oprs.)
14,592- 152- 32-B

North America

WB6FCR/C6A (+ W6OWQ)
1,829,280-3296-185-B

KI4W/C6A (+ KE3C)
640,542-1414-151-B

HH2CQ (AK8P, K4JPD, HH2MC, oprs.)
5,961,660-7415-268-C

K4LTA/J7 (+ J73LG, K8OSN, N4FKO, WA8FSX)
1,830,162-3194-191-C

KP4BZ (+ oprs.)
4,801,065-6085-263-C

KV4FZ (+ K8TG, KM8O, N8BG, WA8RBW)
3,628,384-5054-252-C

ZF2HI (+ ZF2HJ)
2,397,096-4056-197-B

Oceania

KH6XX (+ KH6ND)
2,874,648-3976-241-C

KH6DW (+ KJ5S, VE7QO)
2,230,140-3410-218-C

AH2U (+ KD7P)
60,450- 403- 50-C

South America

HK3IJM (+ HK3BPB)
36,099- 191- 63-B

P43J (W1WEF, W1BIH, oprs.)
5,087,844-6014-282-C

Two Transmitter

Asia

JA7YAA (JJ1s MVV, PEU, JG3s EDV, JRM, JH7s CUO, GFO, HWR, NOT, JR7s DRV, KIB, OMD, PGL, UVL, JE7s GIV, HLZ, QCQ, JH9DLW, JH8s JIF, MRP)
143,640- 884- 70-C

Europe

I8MPO (+ I8CZW, I8ULL, I8UZA)
835,386-1961-142-C

I3EVK (+ I3s ON, MAU, JSS, AIM)
667,320-1860-134-C

YT4I (YU4s GD, WCW, WRR, VFF, oprs.)
188,822- 678- 83-C

North America

J87J (K4UEE, K9GL, K9VV, KA9CJG, WB9TIY, oprs.)
8,088,390-9297-290-C

Oceania

WH6W (+ JE3MAS, JK3GRR)
543,144-1484-122-C

Unlimited

Asia

JA9YBA (JA9s LNJ, NFO, PPC, QCE, QWJ, VBW, VDA, SSY, JE6JVJ, JH4VBQ, JH7UJR, JH8s CAZ, VUG, JJ1BTC, JR2GMC, oprs.)
367,092-1236- 99-C

JA7YFH (+ JR7MPT, JR7UOL, JE7ENK, JO1HBF/7, JA7-1131)
116,571- 637- 61-C

W/VE CW

Single Operator

1

Connecticut

K1TO 1,584,243-1709-309-C
KA1CI 624,834-1026-203-C
KS1L 564,564-1001-188-C
K1VDF 259,308- 686-126-C
K1KI 247,995- 501-185-C
WA1FCN 178,059- 427-139-B
W1GNR 109,386- 309-118-C
K1BV 107,580- 328-110-C
K1DD 104,496- 311-112-C
K1IN 89,919- 309- 97-C
KG1D 85,680- 240-119-B
W1OR 60,720- 176-115-C
W1WEF 49,599- 167- 99-C
AA2Z 29,928- 172- 58-C
W1VH 29,898- 151- 86-C
W1CNU 23,805- 115- 89-C
N1JW 22,200- 100- 74-B
W1HUE 18,522- 98- 63-B
W1KKF 2280- 38- 20-C
W1WY 810- 18- 15-C-160
W1ZM (K1ZM, opr.)
128,667- 557- 77-C- 80
W8MHK/1 4968- 46- 36-B- 80
W1QK 7743- 89- 29-C- 40
K1RM 122,145- 479- 85-C- 15
W1BWS 18,884- 134- 42-C- 15

Eastern Massachusetts

K1VR 970,380-1198-270-C
K5MA 761,070-1103-230-C
W1AX 266,463- 417-213-C
W1FJ 248,997- 497-167-C
K1HRM 227,286- 414-183-C
N1CWU 148,770- 342-145-B
KT1O 107,136- 288-124-C
W3OD 45,684- 162- 94-B
K1RB 38,573- 167- 73-B
WA2AHP 13,158- 86- 51-A
KA1IOR 10,212- 74- 46-B
KA1CLV 9849- 67- 49-B
W1OPJ 6435- 55- 39-B
N1AU 3393- 39- 29-B
W1PLJ 1512- 24- 21-B
W1FV 147,840- 640- 77-C- 80
N1QY 11,340- 90- 42-B- 80
WB1CNM 44,979- 319- 47-C- 20
W1BET 1980- 30- 22-B- 15

Maine

K1SA 51,660- 210- 82-C
KF1H 13,035- 79- 55-C
WB1GLH 867- 17- 17-B
W1XN 22,050- 147- 50-C- 20

New Hampshire

K1AR 1,893,105-1895-333-C
AK1A 154,110- 467-110-C
K1TR 128,502- 353-118-C
W3WDX 26,892- 108- 83-B
W1RR 25,020- 139- 60-C-160
KM1H 146,529- 603- 81-C- 80
W1END 5538- 71- 26-B- 40
W1LQQ 24,624- 152- 54-C- 20
W1VY 3700- 58- 50-C- 20

Rhode Island

KA1GQW 94,062- 257-122-C
N4XR/1 17,355- 89- 65-B
W1RFQ 1890- 30- 21-B
K1NG (KI1G, opr.)
149,160- 565- 88-C- 40

Vermont

W3SOH 41,334- 166- 83-B

Western Massachusetts

K1BW 1,566,820-1674-310-C
K1EA 1,410,270-1621-290-C
WA2CNF 80,040- 230-116-B
W1MM 17,010- 105- 54-C
W1GG 78,324- 428- 61-B- 20
WA1ZAM 5394- 58- 31-C- 20

2

Eastern New York

K2RD 687,582- 983-238-C
KF2O 188,156- 346-162-C
K2OF 161,100- 358-150-C
KN2Q 158,379- 403-131-C
N2AIF 148,800- 320-155-C
W2NC 112,980- 285-132-C
W2KHQ 93,210- 239-130-B
W2AWF 65,682- 246- 89-C
KC2QF 64,428- 182-118-C
KY2J 54,600- 175-104-C
W2DW 47,658- 169- 94-C
W2PTF 15,318- 111- 46-A
N2JJ 14,700- 100- 49-C
NE2Q 57,876- 371- 52-C- 20
N2EK 165,735- 635- 87-C- 15

NYC & Long Island

W2GGE 523,404- 804-217-C
K2MFY 203,184- 408-166-B
W2AYJ 56,105- 195-113-C
W2LPA 45,966- 163- 94-C
K2YGM 30,888- 143- 72-C
WB2ENW 30,843- 149- 69-A
W2GKZ 25,974- 117- 74-B
W2AFM 13,776- 82- 56-B
W2TE 3393- 39- 29-C
WA2ECI 1025- 19- 18-B
N2UN 27,318- 157- 58-B- 40
WB2AMU 1710- 30- 19-B- 15

Northern New Jersey

N2LT 1,770,018-1879-314-C
W2RQ 593,712- 912-215-C
K2NJ 476,655- 739-215-C
W1GD 189,879- 379-167-C
N2FT 176,484- 382-154-B
N2WT 117,957- 287-137-C
KR2J 89,918- 254-118-B
WA2ASQ 17,523- 99- 59-B
W2JEK 1320- 22- 20-A
K2JT 20,574- 127- 54-C- 80
N2AA 538,118-1199- 94-C- 20
K2WK 181,680- 757- 80-C- 20
W2HAJ 5307- 61- 29-B- 20
K2FE 13,248- 92- 48-C- 15

Southern New Jersey

K2BU 533,250- 750-237-C
NF2L 407,040- 640-212-C
N2MR 226,527- 469-161-C
K2FL 225,990- 405-186-C
K2QIL 175,380- 395-148-B
KB2XZ (K2SB, opr.)
171,387- 411-139-C
K2JLA 145,800- 300-162-C
W2EA 127,746- 302-141-B
W2NS 108,810- 310-117-C
N2SS 49,050- 150-109-C
W2LYL 31,200- 130- 80-B
N2IT 28,152- 136- 69-A
K2OSV 19,500- 125- 52-C
WA2VYA 9576- 76- 42-C
W2XN 6042- 53- 38-C-160
NG2V 27,405- 203- 45-C- 80
AA2F 5400- 45- 40-B- 80

Western New York

W2TZ 478,950- 775-206-B
N2KZ (KH6CP, opr.)
407,808- 708-192-C
NG2X 218,489- 427-169-C
W2HG 80,886- 221-122-C
W2HTY 75,264- 224-112-B
WA2ORX 45,864- 156- 98-B
W2SEC 45,069- 181- 83-C
KW2J 42,780- 155- 92-B
W2PHT 42,330- 168- 85-B
KB2NU 41,583- 167- 83-C
KC2QR 26,580- 120- 71-C
NA2Q 19,872- 92- 72-B
KA2MRP 2088- 29- 24-C
K2CC (N2DRR, opr.)
3584- 44- 27-C- 20
WB2SZY 2700- 36- 25-C- 15

3

Delaware

W3XU 970,596-1548-209-C
AA1K 22,134- 119- 62-C-160
K3WUW 69,930- 333- 70-C- 40

Eastern Pennsylvania

W3BGN 1,446,660-1692-285-C
K3OO 855,036-1092-261-C
W3UM 730,960- 930-262-C
W3OV 430,920- 760-189-C
K3NZ 375,938- 712-176-C
K3WGR 344,850- 550-209-C
K3OX 252,108- 447-188-C
W3ARK 204,872- 416-164-B
WB3CAC 177,927- 467-127-C
KJ3R 145,536- 379-128-C
N3HW 107,835- 365- 91-C
K4JLD 93,555- 231-135-C
WA3IMY 52,143- 181- 91-C
K3ZUF 42,840- 136-105-C
KD3H 40,584- 148- 76-B
W3QIR 40,044- 142- 94-B
N3BNA 39,732- 172- 77-B
WA3SPJ 39,249- 147- 89-C
N3RW 32,895- 129- 85-C
KC3Q 22,113- 117- 63-B
W3HMR 4935- 47- 35-C
K3NL 4515- 43- 35-C
W3CEI 4131- 51- 27-B
W3FTG 468- 13- 12-B
W8FJ 107,172- 458- 78-C- 40
W3AP 49,500- 300- 55-C- 40
N3CZB 3096- 43- 24-B- 20

Maryland-DC

W3GRF (K8DQ, opr.)
1,688,025-1775-317-C
K3ZO 1,378,134-1629-282-C
K3ZZ 723,168- 992-243-C
K3SA 702,720- 960-244-C
W3USS (K3TW, opr.)
526,614- 869-202-C
K3TM 399,312- 708-188-C
W3AZ 296,592- 592-167-C
W3UJ 277,200- 550-168-C
N3AM 185,186- 437-126-C
W3HVO 140,776- 474- 99-C
W3GN 84,888- 216-131-C
W3HVM 17,019- 93- 61-C
W3FQE 2898- 42- 23-C
W4KM 2277- 33- 23-C
W3TFA 1764- 28- 21-B
NN3SI (W4KM, opr.)
324- 12- 9-C
N3EBR 2223- 39- 19-C- 20

Western Pennsylvania

K3LR 1,083,680-1240-294-C
AD8J/3 29,568- 128- 77-C
KA3HGR 675- 15- 16-B
K3UA 6552- 56- 39-C- 160
N3BJ 153,720- 610- 84-C- 20
K3TUP 74,304- 344- 72-C- 15

4

Alabama

WZ4F 91,886- 259-118-C
KB4FA! 3078- 38- 27-B
N4KG 8875- 65- 45-C- 160

Georgia

W4DXI 94,068- 234-134-C
N4HHZ 61,152- 196-104-C
WQ4B 3360- 40- 28-C
WX4G 64,896- 338- 64-C- 80
WU4E 4263- 49- 29-B- 80
N4PN 285,984- 993- 96-C- 40
W1UA 128- 7- 6-B- 40
W84WRM 630- 15- 14-B- 20
W4JFL 7638- 67- 38-B- 15

Kentucky

N4AR 1,404,054-1458-321-C
N4XM 253,449- 447-189-C
WB4FOT 51,585- 181- 95-C
AA4FQ 8178- 58- 4-B
K4FU 43,260- 206- 70-C- 40

North Carolina

K4PB 184,824- 408-151-C
N6AV/4 178,002- 341-174-C

Northern Florida

W4VQ 5724- 53- 36-C- 160
WA4SVO 43,365- 245- 59-C- 80

South Carolina

W3VT/4 801,450- 975-274-C
NU4B 16,461- 93- 59-B

Southern Florida

K8UNP 359,775- 615-195-C
N8DH 329,988- 514-214-B
WD4AHZ 108,174- 298-121-B
W4YN 24,120- 120- 67-C
AA4GS 11,616- 88- 44-B
N4IN 14,250- 95- 50-C- 160
W4BT 11,562- 82- 47-C- 160
W4BAA 6438- 58- 37-C- 160
K5OTI 14,352- 104- 46-C- 80
N4ES 18,288- 127- 48-C- 40
WB4TDH 60,480- 280- 72-C- 15
K4MF 16,464- 112- 49-B- 15
W2SDB/4 4320- 45- 32-C- 15
WP4OFK 279- 31- 3-B- 15

Tennessee

W4XJ 856,152-1128-253-C
WM4Z 91,884- 247-124-C
K4XO 69,000- 200-115-C
W4VOS 14,940- 83- 60-B
W5RUH 6150- 50- 41-B
N4BSN 216- 9- 8-B

Virginia

K4PQL 929,775-1127-275-C
K4GKD 802,800-1115-240-C
WC4B 204,435- 385-177-B
N3OS 64,410- 190-113-C
W4XD 28,224- 112- 84-C
AA4EL 11,664- 81- 48-B
W4NM 5400- 50- 36-B
N3RC 2016- 28- 24-A
WU4G 1200- 20- 20-C
AA4FF 3078- 38- 27-C- 160
N4XD 15,042- 109- 46-C- 40
KV4P 102,120- 460- 74-C- 20
K4JS 7245- 69- 35-C- 20
K4FPF 4200- 56- 25-A- 20
N4MM 50,895- 261- 65-C- 15

5

Arkansas

W5EIJ 14,580- 81- 60-C
K5UR 19,902- 107- 62-C- 160

Louisiana

KA5OEU 2430- 30- 27-B

Mississippi

K5FA 416,955- 665-209-C
WA5OYU 2616- 56- 37-C
K5MK 12,546- 102- 41-C- 40

New Mexico

KI3L 258,960- 664-130-C
W7LHO 18,981- 111- 57-B
N5EPA 10,560- 80- 44-B
KT5X 840- 20- 14-B- 160
W5TVX 4250- 71- 20-B- 20

Northern Texas

N5JB 196,830- 405-162-C
KY5N 9996- 68- 49-B
WA9FWO 5328- 48- 37-A
KB5UW 5040- 48- 35-B
KE5CK 1944- 27- 24-C- 80
K5MR 210,568- 763- 92-C- 40
K5NW 91,008- 474- 64-C- 40
KA5W 116,424- 462- 84-C- 20
NI5M 17,856- 124- 48-B- 20

Oklahoma

N6IN 2484- 36- 23-C- 80

Southern Texas

K5DX 227,136- 416-182-B
N5HB 30,003- 137- 73-A
W5NR 9348- 82- 38-B

6

East Bay

N6BV 662,376-1144-193-C
K6ATV 85,365- 271-105-B
N6EK 38,408- 173- 74-B
WE6G 6600- 88- 25-B
W6RJ 41,310- 270- 51-C- 80

Los Angeles

WB6ZHT 134,043- 491- 91-C
K6EID 113,526- 318-119-C
N6AA 50,730- 190- 89-C
ND6G 40,455- 155- 87-C
AI6Z 39,600- 200- 66-C
K6OC 37,590- 179- 70-C
WA6TLA 22,140- 123- 60-C
W6MFC 19,494- 144- 57-C
W6ABW 17,316- 156- 37-C
N6IC 15,582- 98- 53-C
K9AGL 14,268- 116- 41-B
N6IBP 10,608- 104- 34-B
W6OES 5310- 59- 30-C
KK6P 2691- 39- 23-C
N2DHZ 2385- 53- 15-C
W6AUG 840- 20- 14-B- 80
N6AW 131,712- 686- 64-C- 40

Orange

W6TMD 557,280-1080-172-C
W6BA 104,775- 275-127-C
K6OS 76,320- 265- 96-C
W6VPK 9243- 79- 39-A
WA6TMY 3300- 50- 22-B
K6LEB 9720- 120- 27-C- 80
NC6T (NF6H, opr.)
24,192- 168- 48-C- 15

Santa Barbara

WA6FGV 81,765- 345- 79-C
W6SWM 72,576- 252- 96-C
N6HK 35,712- 192- 62-C
WA5VGI 34,740- 193- 60-C
NS6X 357- 17- 7-B
N6VR 4500- 50- 30-C- 40
AA4Q 27- 3- 3-B- 15

Santa Clara Valley

W6ISQ 146,916- 371-132-C
N6HR 122,331- 337-121-C
N6AN 52,722- 202- 87-C
K6MA 23,064- 124- 62-C
N6UW 19,992- 136- 49-C
W1HNZ 14,319- 111- 43-B
AJ6V 4176- 48- 29-C
W6QDE 1392- 29- 16-C
K6MO 90- 10- 3-C- 160
K6XO 3648- 64- 19-C- 80
W6SZN 39,102- 266- 49-C- 20
W6ATO 14,160- 118- 40-C- 20
K6OMB 10,440- 120- 29-B- 20

San Diego

NI6W 676,140-1180-191-C
K6TQ (WA6EJL, opr.)
270,882- 606-149-C
K6MC 44,523- 153- 97-C
KW6Q 42,768- 216- 66-A
AA6EE 21,120- 110- 64-B
WA6VNR 399- 19- 7-C- 80
N6CW 179,154- 807- 74-C- 40
W6YA 170,772- 749- 76-C- 40
K6NA 149,796- 684- 73-C- 40
AA4M 19,647- 177- 37-C- 40
W6ZT 16,899- 131- 43-C- 20
WA6DBC 59,292- 324- 61-C- 15

San Francisco

K6DR 160,401- 421-127-C
W6JTI 157,626- 417-126-B
W6WS 85,977- 233-123-C
K6ZUR 60,264- 216- 93-C
WA6JRB/6 32,640- 160- 68-C
K6LRN 22,950- 150- 51-B
K6BWX 21,594- 118- 61-B
WA6LLY 4929- 53- 31-B

San Joaquin Valley

K6CSL 19,500- 130- 50-B
W6SX 10,200- 136- 25-C

Sacramento Valley

W6NKR 70,992- 232-102-C
N6JM 19,856- 117- 56-B
N6GG 122,148- 522- 78-C- 20

7

Arizona

K7OX 405,810- 810-167-C
W7AYY 93,021- 307-101-C
W7YS 26,820- 149- 60-C
W2GGL/7 24,156- 122- 66-C
WA7NXL 6156- 57- 36-B
KD7XS 330- 10- 10-B
AA7A 95,823- 507- 63-C- 40
WB7APW 33,579- 273- 41-C- 40
WB8GUC 456- 19- 8-B- 40
KY7F 2754- 54- 17-C- 20
WA7KLK 702- 18- 13-C- 10

Idaho

KA7T 112,209- 331-113-C
KU7Y 24,966- 219- 38-B- 40

Montana

KE7X 194,304- 506-128-C
K7ABV 17,346- 118- 49-C

Oregon

AI7B 118,688- 572- 68-C
AD7T 28,688- 139- 64-C
W7TC 16,884- 134- 42-B
KA7FEF 12,255- 95- 43-B
W7QB 10,701- 87- 41-B
W7GUR 270- 10- 9-C
N6TR/7 16,560- 184- 30-C- 80
KZ7I 396- 22- 6-C- 40
KS7P 18,630- 135- 46-C- 20
K7DBV 10,170- 113- 30-B- 20

Utah

W7HS 65,100- 217-100-C

Washington

N7TT 392,814- 942-139-B
K7HBN 217,341- 589-123-C
W7IIT 60,000- 250- 80-B
K7TTZ 52,341- 239- 73-C
W7TS 46,683- 247- 63-C
W7QN 35,520- 148- 80-C
N7EPD 33,390- 210- 53-B
KS7L 22,575- 175- 43-B
W7IEU 20,511- 129- 53-B
NI7U 11,970- 105- 38-B
K7RIE 8925- 85- 35-B
W7YF 8004- 116- 23-B
K7UU 5940- 55- 36-B
W7MCU 3726- 46- 27-C
KT7G 2700- 75- 12-B
WA7UVJ 2145- 55- 13-B
WB7FAH 1320- 40- 11-B
KB7WD 1008- 28- 12-B
K7WA 396- 12- 11-B
W7TSO 54- 6- 3-C
W7KQU 351- 13- 9-B- 160
K7LXC 94,380- 484- 65-C- 20
K7EF 20,424- 184- 37-C- 20
W7LGG 8775- 75- 39-C- 20

Wyoming

N7NG 66,294- 254- 87-C
KC7KC 3225- 43- 25-B

8

Michigan

K8CC 340,272- 556-204-C
W8TWA 96,876- 276-117-C
K8DD 93,750- 250-125-C
W8VSK 68,952- 221-104-A
W8WVU 59,976- 196-102-B
N8CXX 25,704- 119- 72-B
N8CQA 14,931- 79- 63-A
W8FEM 8052- 61- 44-C
K8QWG 3420- 38- 30-B
W8SCW 2100- 28- 25-B
W8UVZ 1950- 26- 25-C- 160
K8LX 52,611- 247- 71-C- 80
AC8W 15,147- 99- 51-C- 80

Ohio

W8LNO 396,882- 621-214-C
WD8IXE 335,255- 515-217-C
W8GOC 90,288- 228-132-B
W8YGR 43,941- 151- 97-B
W8UPH 35,700- 175- 68-C
W8DWP 27,951- 121- 77-B
K8EF 17,380- 90- 64-B
N8EKS 11,424- 68- 56-C
W8CFG 1875- 25- 25-B
W8IDM 1026- 19- 18-C
KV8Q 5088- 53- 32-B- 80
WB8IBM (N8DCJ, opr.)
121,770- 495- 82-C- 40
KZ8Y 35,055- 205- 57-C- 40
KC8UR 3510- 45- 26-B- 40
KA8DJZ 13,104- 91- 48-C- 15

West Virginia

K8OQL 47,895- 155-103-C
WA8YTM 13,113- 93- 47-C
W8UMR 21,945- 133- 55-B- 20

9

Illinois

KV9S 208,377- 411-169-C
KC9T 112,266- 462- 81-C
N9TI 83,328- 224-124-C
NA9J 64,155- 235- 91-C
W9LNQ 45,657- 171- 89-A
W9AG 30,881- 127- 81-C
KC9W 17,955- 105- 57-C
K9PPW 10,584- 63- 56-B
W9TNZ 8184- 62- 44-B
W9REC 2997- 37- 27-B
KM9M 2325- 31- 25-B
W9DQV 1794- 26- 23-B
W9QWM 756- 18- 14-C
W9PNE 2175- 29- 25-C- 160
KB8AC 12- 2- 2-B- 160
K9RS 28,830- 156- 62-C- 80
KA9QYA 90- 6- 5-C- 80
K9QVB 122,292- 516- 79-C- 20
K9RHY 102,765- 403- 85-C- 20
KK9A 4608- 64- 24-C- 20

Indiana

W9RE 1,256,073-1391-301-C
WB9ZGY 1518- 23- 22-B
W9YB (KC8RG, opr.)
126- 7- 6-C
KJ9D (KK9V, opr.)
66,795- 305- 73-C- 40
K9VQK 1512- 28- 18-C- 20

Wisconsin

K9CAN 242,328- 439-184-C
W9QP 210,240- 438-160-B
K9BIL 33,012- 131- 84-C
W9RRT 31,758- 134- 79-C
W9ZM 25,244- 108- 81-C
NB9C 21,060- 108- 65-C
W9HE 15,732- 92- 57-C
N9BUS 14,553- 77- 63-C
W9GXR 13,200- 100- 44-C
WA9RMP 11,289- 71- 53-B
N9EZ 9900- 75- 44-B
W9RN 17,748- 116- 51-C- 80
KQ9L 16,500- 110- 50-C- 40
K9GDF 108- 12- 3-B- 20
W9WAQ 18,468- 108- 57-B- 15

Ø

Colorado

KJØG 149,760- 384-130-C
ADØO 86,100- 350- 82-C
KIØJ 51,381- 173- 98-B
KSØE 39,584- 157- 84-B
KØUK 20,202- 259- 26-C
NØFFZ 3654- 42- 29-B
WØZV 13,818- 94- 49-C- 160
KØOST 4050- 54- 25-B- 40

Iowa

KFØH 401,016- 682-196-C
WØEJ 308,132- 526-194-C
WØWP 224,808- 551-136-C
KEØY 42,687- 153- 93-C
KMØR 25,560- 120- 71-C
KAØSAC 18,414- 93- 66-B

Kansas

KØVXU 29,631- 119- 83-C
WAØCFZ 22,950- 150- 51-C
W6FN/Ø 13,923- 91- 51-C
WØWPL 9072- 83- 48-B
NØFMR 1440- 24- 20-B
WAØTKJ 5544- 56- 33-C- 160
ABØX 1560- 26- 20-C- 160
KBØG 50,838- 229- 74-C- 15

Minnesota

NØAT 174,066- 433-134-C
WØMCY 77,826- 218-119-C
WØRXL 31,302- 141- 74-C
NØBSH 22,950- 102- 75-C
WBØBJP 21,384- 99- 72-C
WØLP 7011- 57- 41-C
WØNGB 1512- 24- 21-B
KØKX 12,015- 89- 45-C- 80

Missouri

K4VX/Ø (KM9P, opr.)
873,252-1146-254-C
WØJLC 601,738- 909-294-C
KØRWL 285,384- 506-188-C
WØHBH 212,400- 400-177-C
NIØG 22,869- 99- 77-B
KØTLM 14,691- 83- 59-C
KAØP 1242- 23- 18-B
AKØM 5145- 49- 35-B- 80
KØCS 4950- 55- 30-B- 40
KMØL 2760- 40- 23-C- 40

Nebraska

KØSW 8664- 76- 38-C
KBØYK 1122- 22- 17-B

North Dakota

KØQQ 26,316- 129- 68-C

South Dakota

K5LZT 18- 3- 2-B- 40

VE

Maritime-Newfoundland

VO1MP 530,166- 971-182-B
VO1AW 201,405- 463-145-C
VO1QU 48,504- 344- 47-B- 20
VE1NG 17,550- 117- 50-B- 20
VE1BNN 462- 14- 11-C- 10

Quebec

VE2AYU 242,316- 508-159-C

Ontario

VE3IY 286,052- 494-183-C
VE3DZV 215,730- 510-141-C
VE3ST 51,300- 180- 95-B
VE3XN 14,580- 90- 54-C
VE3OMU 5472- 48- 38-B
VE3OOL 3840- 40- 32-A
VE3OME 2418- 31- 26-B- 160
VE3MFA 3726- 46- 27-B- 40
VE2AEJ/3 540- 15- 12-C- 10

Manitoba

VE4AEX 15,390- 90- 57-B
VE4ALP 495- 15- 11-B- 20

Saskatchewan

VE5RA 149,943- 331-151-C

Alberta

VE6CHW 38,980- 176- 70-C

British Columbia

VE7AHB 2583- 41- 21-B
VE7BS 924- 28- 11-B- 160
VE7FJE 10,350- 115- 30-C- 20

Multioperator

Single Transmitter

1

W1KM (+ K1VUT, KA1GG)
1,557,698-1789-294-C
KM1C (+ KB1T, W1PH)
1,353,015-1605-281-C
W1BR (+ K1KNQ)
328,416- 522-176-C
KA1X (+ AK1L)
256,035- 505-169-C
K1XM (+ KQ1F)
242,352- 459-176-C
W1BK (+ AI3E)
58,154- 191- 98-C

2

W2VJN (+ N2BA, WA2ZKY, Net)
1,437,414-1502-319-C
W2XL (+ NA2N)
870,525-1095-265-C
KY2P (+ KY2O)
788,250-1051-250-C
K2VV (+ N2VV)
578,646-1037-186-C
W2BHK (+ N2MM)
362,830- 619-190-C
KA2UJH (+ K2QMF)
284,625- 575-165-C
W2UI (+ N3KR)
243,516- 446-182-C

WA2LQO (AA2J, K2s DOD, UAT, W2DKM, oprs.)
194,166- 469-138-C
KB2MG (+ KC2WA)
89,031- 259-103-B
K2TD (+ Net)
46,458- 174- 89-C

3

K3WW (+ KB3GJ)
1,368,444-1481-308-C
N3ARK (+ WB3FLZ, K3IE)
418,458- 719-194-C
W3MA (+ Net)
382,472- 632-207-C
K3UEI (+ Net)
390,621- 623-209-C
K3MD (+ W2UP)
373,722- 626-199-C
K3II (+ Net)
204,777- 373-183-B
W3KV (+ Net)
135,216- 313-144-C
W3EVW (+ Net)
85,320- 237-120-C
N3EC (KA3NED, opr. + Net)
31,200- 160- 65-C

4

N4WW (+ oprs.)
2,000,997-2003-333-C
NQ4I (+ AA4GA)
933,699-1157-269-C
W8ZF/4 (+ KC4GR, N4HI, N4RJ)
849,915-1111-255-C
W3HHG (+ AA4GM, N3AKD, WR4S, K5KSY)
397,242- 761-174-C

5

N5AU (+ oprs.)
1,495,917-1437-347-C
K5RXC (+ N5RZI)
1,048,800-1150-304-C
KZ5M (+ Net)
336,528- 656-171-C
K7UP (+ W8MVR, KF7E)
217,684- 542-134-C
W5PWG (+ WA3KMA)
84,816- 248-114-B

6

W6BIP (+ AA6GM, WA6DJI)
412,587- 777-177-C
K6ZM (+ AK6T, WA6VEF)
293,514- 689-142-C
N6AUV (+ WC6I)
163,350- 495-110-C
K7LJ (+ Net)
66,458- 213-104-C
K6ANP (+ Net)
46,410- 170- 91-C
WA6HXM (+ WA6IBZ)
99- 11- 3-B

7

AG7M (+ KR7G, KW7Q)
667,584-1159-192-C
W7ZR (+ W7EJ, W7XN)
457,812- 972-157-C
N5CT (+ K8FX)
271,560- 620-146-B
NC7K (+ WA7UTM)
254,163- 637-133-C

8

W8GWC (+ N8DCJ, W8CZN, W8JGU, WA8s DXB, DXG, RCN)
1,040,325-1261-275-C
K8NZ (+ K8AZ, N8AA, W8KIC, W8HSK)
624,397-1061-259-C
W8LT (K8EM, K3JT, NZ4K, KD8NS, oprs.)
529,590- 695-254-C
W8YX (+ KA8TEQ, KD8TF, N8FYH, N8GCO, NI8S, WB8QPX, WD8CNZ, WD8MGO, oprs.)
4410- 49- 30-C

9

N9WA (+ KA9SLM, WD9GYX)
163,548- 354-154-C
N9EJL (+ KC9XF)
102,912- 268-128-C

0

K0SR (+ AB0P, KF0P, WB0HRX)
440,190- 670-219-C
K0GUG (+ KJ0U, KS0B, KS0M)
155,376- 332-156-C
W0NA (+ W0s AR, CY, YR, oprs.)
91,800- 255-120-C

Multioperator

Two Transmitter

K2TR (+ K2s LE, SX, XA, KQ2M, WA2SPL)
3,387,420-2754-410-C
K1DG (+ N2NT, KC1F, K1s GQ, JX, OX)
3,269,955-2685-409-C
K5RC (+ K5GA, K5GN, KF4VS, KN5H, NA5R, N5EA, WA2ZVE, WD5CBA)
2,582,424-2136-403-C
KT3M (+ N3s AD, LR, RD)
2,331,054-2123-366-C
K1RX (+ K1YR)
2,234,160-2140-348-C
N2RM (+ KB3TN, KM3T)
1,910,328-1918-332-C
KS8S (+ KU8E, KN8S, AD8P, N8ABL, WA8SAE, W8FN, KA8PLH, AD8C)
1,896,540-1732-365-C
K8RF (+ W8UA)
1,668,980-1824-305-C
K1WA (+ K1DM)
667,505- 961-235-C
KQ2O (+ K2BK)
598,545- 849-235-C

Multioperator

Unlimited

W3LPL (+ K3EST, K3RV, N2FB, KA1GD, AI3M, KT3Y, KC8O)
4,577,328-3346-454-C
W4MYA (+ AA4GL, K3RZR, K4JM, KG4W, KI4GM, N4EHJ, N4ND, W4s DR, HJ, XR, WA4HOT, WB4BVY, WV4G)
3,260,160-2830-384-C
W3GM (+ K3s ND, GM, VW, AA3B, KC2X, W3s FV, GM)
2,764,761-2357-391-C
NR5M (+ N5JJ, NM5L, WA9VLI, W5AB, W5SJQ, K2TNO, K5IY, KG5U, KC5CP, N3BB)
2,735,376-2326-392-C
K5LZO (+ NM5M, K5TU, AK5B, KA5SBS, NT5D, KD5SP, KE5TF, N5RP, WB5RUS, KE5IV)
1,878,288-1744-359-C
W0AIH/9 (+ KB9S, W0UC, K0FVF, W8KR, KN0V, K3WT)
1,300,779-1431-303-C
W3GU (+ K3CY)
1,109,760-1280-289-C
K2SB (+ AG2S, WA2HGM, WB2OYC, WB2YOF)
750,240-1042-240-C
K1WA (+ K1DM)
667,505- 961-235-C
W3NX (+ AD3V, K8MP)
485,100- 600-245-C
K5RVK (+ K5GB, KC5M, W5s ASP, SG, SJS, Net)
380,568- 628-202-C

DX-CW

Single Operator

Africa

W2ZZ/CT3	690,252-1186-194-B				
CT3ET	66,411- 411- 47-B- 80				
EC8AFX	22,032- 153- 48-A				
EA8RL	129,426- 814- 53-C- 80				
EA8ZS	1296- 24- 18-C- 80				
5T5CJ	918,600-1531-200-C				
5Z4MX	807,668-1282-158-B				

Asia

HL4CAE	2301- 59- 13-B- 40				
JH7DNO	581,903-1193-157-C				
JA7FWR	429,786-1137-126-C				
JA1BWA	370,500- 950-130-C				
JA7YAB (JA8-3881, opr.)	354,609- 861-123-C				
JF1EQA	331,344- 944-117-C				
JH7LVK	197,568- 672- 98-C				
JO1ITV	138,800- 475- 96-C				
JA5EGX	120,786- 491- 82-C				
JE4VVM	115,668- 459- 84-B				
JG1GGF	49,830- 302- 55-B				
JA8CGJ	43,605- 255- 57-B				
JA1DFQ	36,252- 212- 57-B				
JA9CWJ	28,362- 169- 58-C				
JA8SW	25,434- 157- 54-C				
JA9RPU	24,915- 151- 55-B				
JH1MTR	20,655- 153- 45-B				
JA2SAP/1	15,180- 110- 46-B				
JF3CCN	12,765- 115- 37-B				
JH7XGN	12,543- 113- 37-B				
JR3WXA	10,208- 126- 27-C				
JA1OHP	10,044- 108- 31-B				
JA4ESR	9600- 100- 32-C				
JA1KFX	9570- 110- 29-A				
JA1KWC	6399- 79- 27-B				
JJ1RZG	5913- 73- 27-B				
JA3ARM	5340- 89- 20-C				
JA7TJ	5226- 67- 26-B				
JA1JPM	5214- 79- 22-B				
JA1VZM	4818- 73- 22-C				
JA1JGP	4320- 80- 18-B				
JH0CZQ	3717- 59- 21-B				
JA1KPA	3150- 50- 21-B				
JA7ASD	2880- 48- 20-B				
JH7LRS	1326- 34- 13-A				
JE2JFY (JA2KSA, opr.)	972- 36- 9-A				
JI2NQS	525- 25- 7-B				
JH3LCU/1	294- 14- 7-A				
JA7OYM	270- 15- 6-B				
JA1GTF	3024- 48- 21-C- 160				
JA7NI	1365- 35- 13-C- 160				
JE1SPY	720- 24- 10-C- 160				
JA5DQH	684- 19- 12-C- 160				
JA1XAF	29,862- 237- 42-C- 80				
JA2YKA (JF2DQJ,opr.)	8949- 157- 19-B- 80				
JH0LFE	3294- 61- 18-C- 80				
JA1QZC	825- 25- 11-B- 80				
JA7RHJ	58,032- 403- 48-C- 40				
JR7BTI	9702- 154- 21-B- 40				
JN1AIF	4680- 104- 15-B- 40				
JA7FFN	1872- 156- 12-B- 40				
JR3BVX	1269- 47- 9-B- 40				
JH1IED	1209- 31- 13-B- 40				
JK1FLX	1161- 43- 9-B- 40				
JG2LGM	960- 40- 8-B- 40				
JA8CJY	792- 33- 8-B- 40				
JA7BE	588- 28- 7-C- 40				
JI3KDH	486- 27- 6-B- 40				
JH7AJD	420- 28- 5-B- 40				
JA8NCE	360- 20- 6-B- 40				
JA9FT	240- 20- 4-C- 40				
JA8GZ	108- 9- 4-B- 40				
JH8NBW/1	63- 7- 3-B- 40				
JP1EVD	15- 5- 1-B- 40				
JA3YBF (JA3-30356, opr.)	92,826- 573- 54-C- 20				
JH1AEP	86,178- 542- 53-C- 20				
JF1SEK	61,722- 381- 54-B- 20				
JH7WKQ	48,332- 351- 44-B- 20				
JH8JYV	38,442- 298- 43-B- 20				
JM1LRQ	30,240- 240- 42-B- 20				
JA2EIV	20,304- 188- 36-C- 20				
JF1MYI	8813- 319- 27-B- 20				
JA2DN	8400- 100- 28-A- 20				
JA4FMS	4293- 53- 27-C- 20				
JF2ONG	2268- 54- 14-B- 20				
JA1EIA	1620- 27- 20-B- 20				
JO1OZI	1575- 35- 15-B- 20				
JA0IMV	1155- 35- 11-B- 20				
JH7RZW	972- 27- 12-B- 20				
JG3EHD	792- 24- 11-B- 20				
JR4PPW	273- 13- 7-B- 20				
JA2KPV	18- 3- 2-B- 20				
JL1MUT	10,695- 155- 23-B- 15				
RA8FA	11,556- 107- 36-B				
UA0LJ	8556- 92- 31-B				
RA8JD	5538- 71- 26-B				
UW8CM	4800- 60- 25-B				
UA9CBR	792- 22- 12-B				
UA0ZBP	22,542- 221- 34-B- 80				
UA6ZDD	495- 99- 5-B- 80				
UA9MR	576- 16- 12-B- 40				
UA0QO	12,960- 135- 32-B- 20				
UA0SAU	7533- 93- 27-B- 20				
UA0ZDE	6660- 110- 20-B- 20				
UA9XAB	5796- 69- 28-B- 20				
UA9AU	1344- 32- 14-B- 20				
UA9SG	420- 14- 10-B- 20				
UA9AIA	84- 7- 4-B- 20				
UA9LE	27- 3- 3-B- 20				
UA0ZZ	171- 19- 3-B- 15				
UF6CX	663- 17- 13-B				
UH8EAA	17,784- 152- 39-B				
ZC4CZ	3240- 60- 18-B- 40				
4X6IF	46,008- 216- 71-B				
9M2RT	7182- 114- 21-B				

Europe

CT1AQZ	33,228- 284- 39-B- 160				
CT4CH	4830- 70- 23-A- 15				
CT2AK	74,550- 497- 50-C- 80				
DL7ON	586,311-1199-163-C				
DL8CM	64,701- 273- 79-A				
DJ4OE	56,842- 227- 82-B				
DL8MBS	55,440- 240- 77-C				
DJ1OJ	35,319- 193- 61-B				
DK7QB	29,280- 180- 61-B				
DL4BBO	22,785- 155- 49-B				
DF4QP	5829- 67- 29-C				
DF3QN	5490- 61- 30-C				
DL8ZAW	4140- 46- 30-B				
DL1SBF	4104- 72- 19-B				
DL7MAE	324- 12- 9-B- 160				
DF1LX	51,414- 418- 41-C- 80				
DL6EN	31,680- 264- 40-C- 80				
DL1JF	14,944- 147- 34-C- 80				
DJ5JH	6075- 81- 25-C- 80				
DK3KD	1386- 33- 14-C- 80				
DF4XG	234- 13- 6-B- 80				
DJ2YE	180- 10- 6-C- 80				
DL6RAI	109,573- 794- 46-C- 40				
DK9FE	8580- 110- 26-C- 40				
DL3HAH	7416- 103- 24-C- 40				
DL1EK	5472- 76- 24-B- 40				
DF5DK	108- 6- 6-B- 40				
DL8GAM	131,382- 811- 54-C- 20				
DJ0YI	94,563- 553- 57-C- 20				
DJ9ON	28,458- 558- 51-C- 20				
DL1RB	19,071- 163- 39-B- 20				
DJ2XP	15,375- 125- 41-B- 20				
DL0MN (DL8MBS, opr.)	9120- 95- 32-B- 20				
DL1TH	6084- 78- 26-B- 20				
DJ3GE	2280- 40- 19-B- 20				
DL2OM	24,966- 219- 38-C- 15				
DF4RD	19,158- 206- 31-C- 15				
DF1EI	6048- 72- 28-B- 15				
DL3CW	1938- 38- 17-B- 15				
EA2AX	71,568- 284- 84-B				
EA1CHN	52,455- 259- 66-B				
EA2CR	49,140- 210- 78-B				
EA3BOW	39,123- 189- 69-B				
EA5EXI	31,845- 193- 56-B				
EA3DWX	19,116- 118- 54-B				
EA5CKP	17,334- 107- 54-B				
EA3FAA	15,402- 151- 34-C				
EA7EVD (KB2QP, opr.)	14,025- 85- 55-B				
EA4CPI	13,850- 91- 50-B				
EA3EYB	1938- 34- 19-B				
EA7EI	324- 12- 9-C				
EA7CJM	10,440- 120- 29-B- 80				
EA4BV	5328- 74- 24-B- 80				
EA4CKV	819- 21- 13-B- 40				
EA1CIM	10,266- 118- 28-B- 20				
EA4AYD	5772- 74- 26-B- 15				
EA5BZM	3900- 65- 20-B- 15				
EA6GP	15,264- 106- 48-B				
EA6KZ	12,012- 91- 44-B				
EA6URP	1665- 37- 15-B- 20				
EI9J	115,566- 374-103-B				
EI4DW	20,574- 127- 54-B				
EI3DP	25,320- 211- 40-C- 15				
EU2P	124,950- 490- 85-B				
F6ARC	1,533,867-2817-217-C				
F9YZ	86,684- 314- 92-A				
HW5PN	57,354- 242- 79-B				
FE6CXJ	43,470- 210- 69-C				
F6ERZ	43,239- 203- 71-B				
F6DKV	15,456- 112- 48-B				
FE9QE	14,652- 111- 44-B				
F3AT	14,352- 92- 52-B				
F8TM	1530- 30- 17-B				
F8VJ	12,006- 138- 29-B- 160				
FE6TQ	27,240- 182- 40-B- 20				
FE9DK	8004- 92- 29-B- 20				
FE6AUS	34,560- 320- 36-B- 15				
F9KP	16,929- 179- 33-C- 15				
F6EQV	6240- 80- 26-B- 15				
G3MXJ	747,504-1392-179-B				
G2QT	142,332- 409-116-B				
G3APN	86,664- 314- 92-B				
G4XRX	14,076- 92- 51-B				
G3JKY	1638- 26- 21-B				
G8QZ	867- 17- 17-B				
G3ZFC	5865- 85- 23-A- 160				
G3XWZ	4290- 65- 22-A- 160				
G4OBK	990- 22- 15-B- 160				
G3FXB	76,497- 593- 43-B- 80				
G4CNY	107,019- 759- 47-B- 40				
G4MPK	7560- 90- 28-B- 40				
G3WPF	114,798- 722- 53-B- 20				
G2AJB	2142- 42- 17-B- 20				
G3VMY	1296- 36- 12-A- 20				
G4OTU	14,790- 145- 34-B- 15				
G4XTM	1176- 28- 14-B- 15				
GM3LYY	285,948- 676-141-B				
GM8SQ	19,500- 125- 52-B				
GU4XEA	3621- 71- 17-B				
GW3JI	155,916- 426-122-B				
HA5LZ	102,465- 345- 99-B				
HA8GZ	53,130- 233- 77-B				
HA8IH	45,225- 225- 67-B				
HA1DAC	38,828- 186- 68-B				
HA9TT	23,364- 177- 44-B				
HA4XX	18,029- 137- 39-B				
HA2MJ	7800- 104- 25-B				
HA5UA	3933- 57- 23-B				
HA3FLK	2970- 45- 22-B				
HA3MB	1710- 38- 15-B				
HA8LM	48,312- 366- 44-B- 40				
HA5ML	9963- 123- 27-B- 40				
HA5EA	5832- 81- 24-B- 40				
HA8EN	5412- 65- 22-A- 40				
HA7RB	35,604- 294- 46-B- 20				
HA3HZ	26,736- 203- 44-B- 20				
HA5CW	13,642- 127- 38-B- 20				
HA8DT	12,390- 118- 35-B- 20				
HA4ZX	7560- 90- 28-B- 20				
HA3HL	1080- 30- 12-B- 20				
HA3GJ	3564- 54- 22-B- 15				
HA3GQ	1296- 36- 12-B- 15				
HA7UJ	1980- 44- 15-B- 15				
HB9AGA	574,722-1101-174-C				
HB9AGH	20,880- 145- 48-B				
HB9AYZ	3432- 52- 22-B				
HB9DX	30,510- 226- 45-C- 20				
HV2VO (IK2DVG, opr.)	19,104- 199- 32-C- 40				
I4EAT	60,868- 472- 43-C- 80				
IO3FIY	135,252- 867- 52-C- 40				
I2SVA	6988- 107- 28-B- 40				
IK4EWK	150,150- 910- 55-C- 20				
I2MQP (I2VXJ, opr.)	105,570- 690- 51-C- 20				
I1XPQ	19,899- 201- 33-B- 15				
IS0OMH	86,494- 343- 86-B				
IS0LYN	15,792- 112- 47-A				
JW5NM	29,400- 245- 40-C- 20				
LA2EG	3906- 62- 21-C- 80				
LA9XG	12,528- 118- 36-B- 20				
LA7SI	3703- 53- 17-B- 20				
LA1HCA	2460- 41- 20-B- 20				
LA4IAA	1836- 36- 17-B- 20				
LA3BX	855- 19- 15-A- 20				
LZ2KHM	37,824- 197- 84-B				
LZ1PU	1782- 33- 18-B				
LZ2RF	1782- 33- 18-C				
LZ1KVV (LZ1GJ, opr.)	63,468- 492- 43-C- 80				
LZ1HN	30,969- 279- 37-B- 40				
LZ1KAU (LZ1A1362, opr.)	20,706- 203- 34-B- 40				
LZ1HY	3150- 50- 21-B- 40				
LZ1FJ	108- 9- 4-B- 40				
LZ2ZA	15,198- 149- 34-B- 20				
LZ1VB	11,160- 124- 30-B- 20				
LZ1KWS	9990- 111- 30-B- 20				
OE3ZOC	36,828- 188- 66-C				
OE3GSA	10,974- 118- 31-C- 80				
OE7SHI	4002- 58- 23-C- 20				
OH4RH	91,350- 406- 75-C				
OH7YF	20,043- 131- 51-C				
OH8OS (OH8PF, opr.)	248,304-1478- 56-C- 20				
OH3FM	25,284- 196- 43-C- 20				
OH8LL	14,256- 108- 44-C- 20				
OH2BYS	10,200- 100- 34-B- 20				
OH8EP	3900-65- 20- B-20				
OH7NW	2048-31- 22- C-20				
OH5FA	1152-24- 16- B-20				
OH6YF	288-36- 8- B-20				
OH5MX	90-6- 5- B-20				
OH0PA	6552-78- 28- B-20				
OK1ALW	957,870-1835-174-C				
OK3CGP	875,670-1445-202-C				
OK1DBM	69,825- 251- 95-B				
OK1KZ	52,836- 238- 74-B				
OK2YN	47,064- 212- 74-B				
OK3FON	43,800- 200- 73-B				
OK1AXB	38,553- 181- 71-B				
OK1MHI	28,497- 162- 59-B				
OK1AJN	23,712- 152- 52-B				
OK1EV	20,002- 142- 47-C				
OK1AJY	11,349- 97- 39-B				
OK3CJO	8828- 126- 28-B				
OK3CEI	7200- 75- 32-B				
OK1DMA	7104- 74- 32-B				
OK1MZO	7029- 71- 33-B				
OK3CEL	4650- 62- 25-B				
OK1DKR	4056- 52- 26-A				
OK1DZD	3366- 51- 22-A				
OK1HCH	1890- 35- 18-B				
OL6BID	792- 23- 12-A- 160				
OK1DXA	528- 17- 11-A- 160				
OL8COZ	90- 6- 5-A- 160				
OK2FD	24,045- 229- 35-C- 80				
OK2HI	12,288- 64- 23-B- 80				
OK2PLH	3672- 68- 18-B- 80				
OK3CUG	36- 1- 1-A- 80				
OK2BFN	35,784- 284- 42-C- 40				
OK2EC	22,422- 202- 37-C- 40				
OK1XJ	3534- 62- 19-B- 40				
OK2BCI	97,524- 602- 54-C- 20				
OK3CBU	49,770- 395- 42-B- 20				
OK2BUY	37,926- 294- 43-C- 20				
OK2BGR	19,696- 164- 38-B- 20				
OK2BFX	14,178- 139- 34-B- 20				
OK2ABU	9270- 103- 30-C- 20				
OK1JDJ	5742- 87- 22-B- 20				
OK2PFP	4092- 62- 32-B- 20				
OK2SKJ	3534- 82- 19-B- 20				
OK2TBC	3381- 58- 21-B- 20				
OK2KPS	2436- 58- 14-B- 20				
OK2BNX	1536- 32- 16-C- 20				
OK2SWD	360- 12- 10-B- 20				
OK1XM	238- 56- 4-A- 20				
OK2PO	14,043- 151- 31-B- 15				
OK2QX	7614- 94- 27-B- 15				
OK2XA	2538- 47- 18-B- 15				
ON4JT	1767- 31- 19-A				
ON6TJ	5478- 83- 22-B- 40				
ON4XG	11,808- 123- 32-B- 15				
OZ1LO	558,900-1150-162-C				
OZ7BW	41,391- 189- 73-B				
OZ5WQ	27,492- 158- 58-B				
OZ1IPP	11,664- 108- 38-B				
OZ1W	10,152- 72- 47-B				
OZ1III	1800- 40- 15-B- 80				
OZ1CMC	570- 19- 10-B- 80				
OZ1APA	126- 7- 6-B- 40				
OZ5KU	44,556- 316- 47-B- 20				
OZ1CAR	2340- 39- 20-B- 20				
OZ5EI	1680- 35- 16-B- 20				
OZ1FTE	1218- 29- 14-C- 15				
PA0QT	74,670- 262- 95-B				
PA3BLU	52,377- 221- 79-B				
PA3CEF	44,880- 340- 44-B				
PA0LOU	28,800- 150- 64-B				
PA0INA	17,013- 107- 53-B				
PA0ADT	15,480- 129- 40-A				

PA3DGW 12,222- 97- 42-B
PA3ACC 9990- 90- 37-B
PAØCF 5382- 69- 26-B
PA3CPZ 3240- 36- 30-B
PAØVLA 2664- 37- 24-B
PA3BNT 2442- 111- 22-B
PA3BFM 9820- 105- 26-A- 160
PAØUV 9630- 107- 30-B- 20

AI5P/TF 648- 18- 12-A- 20

UA1ZO 90,528- 328- 92-B
UA3OLC 10,434- 94- 37-B
UA6ED 8370- 90- 31-B
UA4ANZ 210- 10- 7-B
UW6HX 192- 8- 8-B
UA3PFN 12- 2- 2-A- 160
RA3EA 561- 17- 11-B- 80
RZ3DM 150- 10- 5-B- 80
RA3DX 22,113- 189- 39-B- 20
UA1OGI 9579- 103- 31-B- 20
UA3ICF 5346- 66- 27-B- 20
UA3IDT 4416- 64- 23-B- 20
UA3AGX 2430- 45- 18-B- 20
UA1DF 3762- 57- 22-B- 20
UA1ZD 14,508- 156- 31-B- 15

RB5SB 185,184- 643- 96-B
RB5GW 153,846- 462-111-B
RT5UO 42,768- 198- 72-B
RB5AL 13,536- 96- 47-B
UT5UEW 6603- 71- 31-B
UB4SWM 5220- 60- 29-B
UB5DW 1296- 18- 24-B
UB5IFN 12,636- 156- 27-B- 80
RB5WW 6900- 100- 23-B- 80
UB5IML 3717- 59- 21-B- 80
UT4UI 10,602- 114- 31-B- 40
UB5CBA 6006- 91- 22-B- 40
UB5LAJ 33,615- 249- 45-B- 20
UB5BZ 18,759- 169- 37-B- 20
UB5TN 8730- 97- 30-B- 20
UB5QKG 2091- 41- 17-B- 20
UB5VK 2058- 49- 14-B- 20
UT5UCM 1056- 22- 16-B- 20
RB5QL 741- 19- 13-B- 20

UC2CAM 648- 18- 12-A- 20

UR2QD 288- 12- 8-B- 80
UR2RKK 144- 8- 6-B- 40
RR2RU 66,384- 461- 48-B- 20
UR2RND 6480- 80- 27-A- 20

SM6DHU 197,736- 616-107-C
SM7LSU 31,290- 149- 70-C
SM5CVC 2016- 32- 21-C
SM5ALJ 48- 4- 4-C
SM4CMG 4836- 62- 26-C- 80
SK3AH (SM3COL, opr.)
84,480- 512- 58-C- 20
SM7NJJ 52,785- 345- 51-C- 20
SM7WT 36,414- 238- 51-C- 20
SM6CST 21,000- 175- 40-B- 20
SM5CLE 17,466- 142- 41-C- 20
SM6BZE 17,100- 150- 38-B- 20
SMØBDS 15,540- 140- 37-C- 20
SMØBVQ 11,424- 112- 34-B- 20
SMØTW 9660- 115- 28-C- 20
SMØBTS 9450- 105- 30-B- 20
SMØCOP (KB1Q, opr.)
9216- 96- 32-B- 20
SM6OLL 8835- 95- 31-B- 20
SM6LWH 7917- 91- 29-B- 20
SM2LWU 7656- 88- 29-C- 20
SM5ALJ 3111- 61- 17-C- 20
SM6DVZ 1638- 39- 14-B- 20
SM7LAZ 1530- 30- 17-B- 20
SMØKVI/Ø 2920- 47- 20-C- 15

SP4EEZ 33,276- 188- 59-B
SP6PDT (SP7QIB, opr.)
21,456- 149- 48-B
SP3BYZ 15,198- 149- 34-C
SP5INQ 495- 15- 11-B- 160
SP5GH 1620- 36- 15-A- 80
SP8MJ 1170- 30- 13-C- 80
SP3IOE 819- 21- 13-B- 80
SP2BLC 216- 9- 8-C- 80
SP9CVY 3192- 56- 19-B- 40
SP5LJQ/5 351- 13- 9-B- 40
SP7IIT 53,400- 356- 50-B- 20
SP3BEJ 6318- 81- 26-B- 20
SP2JUJ 1260- 28- 15-B- 20
SP3LWU 510- 17- 10-B- 20
SP5JTR 1092- 26- 14-B- 15

SV1RP 26,595- 197- 45-B

UA2FX 4836- 62- 26-B- 20

UD6CN 6300- 70- 30-B
UC2LB 6762- 98- 23-B- 80
UC2AFZ 1209- 31- 13-B- 80

UP2BO 180,285- 595-101-B
UP2BR 27,555- 167- 55-B
UP2PBM 882- 21- 14-B
UP2BEI 5451- 79- 23-B- 80
UP2OU 510- 17- 10-B- 80
UP2BBF 90- 6- 5-B- 40
UP2BIM 28,728- 228- 42-A- 20
UP2BV 10,395- 99- 35-B- 20
UP2BCW 5616- 78- 24-B- 20

UQ2GIP 24,300- 162- 50-B

UQ2GP 486- 18- 9-B- 80

YO3CD 40,200- 200- 67-B
YO8FR 35,343- 187- 63-B
YO8BSE 14,382- 102- 47-A
YO5AAT 10,578- 82- 43-B
YO6AAD 315- 15- 7-B
YO4CAH 6788- 78- 29-B- 40
YO3YC 924- 22- 14-A- 40
YO3RF 975- 25- 13-B- 20
YO2CMI 18- 3- 2-A- 15

YU3DBC (YU3RJ, opr.)
137,826- 806- 57-C
YU7ORS 78,186- 314- 83-B
YU1AST 49,464- 229- 72-B
YU7AJD (YU7ORS, opr.)
384- 16- 8-B
YU2AW 112,950- 753- 50-C- 40
YU7BCD 97,350- 649- 50-C- 40
YU1ABH 58,320- 432- 45-C- 40
YU4YA 54,912- 416- 44-C- 40
YU2KDE 47,760- 398- 40-C- 40
YU7SF 10,416- 112- 31-B- 40
YU3OS 10,082- 43- 26-B- 40
YU2WJ 4802- 59- 26-B- 40
4N4WRS 170,940-1036- 55-C- 20
YU4GD 163,020- 988- 55-C- 20
YU2CT 144,866- 893- 54-C- 20
YT3A (YU3SB, opr.)
74,529- 507- 49-C- 20
YU7AV 62,271- 407- 51-C- 20
YU7AV 48,087- 411- 39-C- 20
YU2LNI 38,646- 339- 38-C- 15
YU7AF 11,700- 130- 30-C- 15
YU2LLL 6450- 86- 25-B- 15
YU1OWW 4824- 67- 24-A- 15

Y54PL 167,238- 560-144-B
Y51XE 133,170- 397-115-C
Y35ZJ 32,028- 157- 68-B
Y38YE 24,138- 447- 54-C
Y25ZN/A 21,195- 158- 45-B
Y23CM 19,140- 117- 55-B
Y24MI 16,383- 127- 43-B
Y23FK 12,360- 103- 40-B
Y52VE 11,400- 95- 40-C
Y55UG 10,374- 91- 38-B
Y24ZM 9360- 80- 39-B
Y22BK 7569- 87- 29-B
Y21XC 5928- 76- 26-A
Y22HF 4758- 61- 26-B
Y75YH 4320- 60- 24-B
Y21UD 3213- 51- 21-B
Y41ZF 1620- 27- 20-B
Y54XA 1554- 37- 14-C- 80
Y49RF 1470- 35- 14-B- 80
Y69ZF 108- 6- 6-B- 80
Y28EH 3- 1- 1-A- 80
Y24YH 4473- 71- 21-C- 40
Y27IO 23,814- 567- 42-C- 20
Y78VL 20,535- 185- 37-C- 20
Y22TO 16,029- 137- 39-C- 20
Y31VL 14,280- 136- 35-C- 20
Y21NE 12,240- 136- 30-B- 20
Y25HL 12,150- 136- 30-B- 20
Y35UG 12,090- 130- 31-B- 20
Y23UH 9019- 99- 27-B- 20
Y27YH 6300- 75- 28-B- 20
Y59ZA 6177- 71- 29-B- 20
Y43VF 5616- 72- 26-B- 20
Y26WM/A 4761- 69- 23-B- 20
Y22UB 4725- 63- 25-B- 20
Y36VM 4485- 65- 23-B- 20
Y42WB 4200- 70- 20-B- 20
Y23JA 3825- 51- 25-B- 20
Y21BE 3726- 69- 18-B- 20
Y23JN 2352- 49- 16-B- 20
Y54OL 2052- 36- 19-C- 20
Y23WM 2040- 40- 17-C- 20
Y32KE 1800- 40- 15-C- 20
Y24JJ 1710- 38- 15-B- 20
Y59QA 1620- 35- 15-B- 20
Y24TG 1575- 35- 15-A- 20
Y28FL 315- 15- 7-A- 20
Y62XG 240- 10- 8-B- 20
Y38ZB 48- 4- 4-B- 20
Y24XD 9450- 105- 30-C- 15
Y42YG 4425- 59- 25-B- 15
Y36SG 1440- 30- 16-B- 15

North America

C6AAA (KF1V, opr.)
835,200-1450-192-A
N4RP/C6A 603,225-1149-175-B

FG/W2KN/FS 16,848- 156- 36-B
FG/WØRLX/FS
182,450- 950- 57-B- 15

HIØA 62,850- 419- 50-B- 40

HP1XKR 1,312,287-1927-227-B
HP1AC 317,382- 626-169-B

K4LTA/J7 2,449,632-3002-272-B

KL7UR 102,312- 392- 87-C
KL7AF 5220- 87- 20-C- 160
NL7DQ 23,517- 201- 39-B- 20

K5NA/KP2 3,792,678-4118-307-C

KP4FI 288,120-1715- 56-C- 40

KV4AM 14,850- 99- 50-C

TI4BGA 377,384- 799-156-B
TI2LO 4899- 71- 23-B- 40
TI4FGG (TI4BGA,opr.)
2640- 40- 22-B- 40

K8CV/VP2E 117,978- 742- 53-C- 80
N8II/VP2E 266,418-1558- 57-B- 40
VP2EAG (KJ0D, opr.)
267,456-1592- 56-C- 20

KA2DIV/V2A 105,371- 669- 53-B- 15

VP2MGD (W2GD, opr.)
4,571,112-4732-322-C
VP2MP (K2YY, opr.)
3,766,401-4063-309-C

KU2C/V4 2,583,360-2990-288-C

VP5GEX (KØGVB, opr.)
67,620- 460- 49-B- 160

K8WW/VP9 224,070-1358- 55-B

ZF2AY (K9LA, opr.)
198,744-1183- 56-B- 15

8P6EZ (W1RED, opr.)
293,400- 852-150-B

9Z4F 876,660-1538-190-B

Oceania

N5AW/NH6 626,922-1201-174-B
AH6EK 22,638- 154- 49-A
W7PSO/KH6 1260- 28- 15-B
KH6WT 20,049- 163- 41-B- 20
AH6N 5226- 67- 26-B- 20
KH6IJ 378- 14- 9-C- 20

P29PL 16,611- 113- 49-B

VK2APK 295,260- 665-148-B
VK2BQQ 145,590- 422-115-B
VK3DNC 42,968- 186- 77-B
VI3AUQ 2964- 38- 26-B
VK4SF 2574- 39- 22-A
VI3XB 4050- 54- 25-B- 80

YB5AQD 567- 21- 9-C

South America

HK1FCG 111,996- 366-102-C

LU1EWL 270,468- 683-132-B
LU1BCE 131,040- 780- 56-B- 15
LU5DVO 48,870- 362- 45-B- 10

PY4OD 184,922-1166-164-C
PY1AJK 31,860- 177- 60-B
PY4WAS/PU8 21,888- 192- 38-B- 40
PY2RLQ 21,720- 181- 40-B- 20
PY8MWJ 48,042- 314- 51-B- 15
PY1PL 7998- 86- 31-B- 15

P42J (W1BIH)
3,317,748-9556-311-C

YV1OB 57,312- 398- 48-B-160
YV7QP 48,195- 357- 45-B- 40

ZP5XGG 88,875- 375- 79-C

Multioperator

Single Transmitter

Asia

JA1YCL (JF6ROF, JG1GQB, JH8MHZ, JH8DUG, JK1STT, JL1QOC, JN1VKW, JO1GAD, JO1OEU, JS1AFY, oprs.)
368,145- 909-135-C
JA7YFB (+ JJ1GXY, JN1RON, JE7GQK, JH7XKI, JH7XMO, JR7s GYC, JLU, JVO, LCI, QYW, JH8QNT)
268,866- 766-117-C
JA1ZKL (JI1RXQ, JJ1NWX, JK1JHU, JM1WZP, JP1CZE, JH7CSU, JH8KFI, oprs.)
239,094- 718-111-B
JR1ZTT (JF2NXS, JH6NBW, JR4WKV, oprs.)
68,742- 342- 67-C
JA7YWD (JE7s FPT, LMP, XEH, oprs.)
45,762- 263- 58-B
JA7YFH (JA7- 11311, R7MPT, JR7UOI, oprs.)
17,205- 155- 37-C

UZØCWA (UAØs CB, CAR, CCD, CCL, CGN, 118- 300, 119- 297, UWØs CA, CM, oprs.)
189,975- 745- 85-B
UZØFWA (UAØs FCA, FFH, FFM, oprs.)
84,180- 460- 61-B
UZØCWO (UAØs CDG, CGI, CHD, oprs.)
53,244- 306- 58-B
UZØLWO (UAØs LD, NL, UWØs LT, MF, oprs.)
31,266- 386- 27-B
UZØQWH (UAØs QDL, QN, QCE, oprs.)
24,822- 197- 42-B
UZ9SWY (UA9s SHO, TY, oprs.)
19,656- 126- 52-B

UZØQWE (UAØQs AA, G, J, oprs.)
17,568- 168- 40-B
UZ9AWH (UA9s ACA, AE, ATR, 165-1454, oprs.)
3135- 55- 19-B- 20
UL7QF (+ oprs.)
693- 21- 11-B- 20

Europe

DKØTU (DK1PD, DK5GB, DK6QI, DL7ZN, DL4EBY, DF5GX, oprs.)
714,870-1410-169-C
DK7ZT (DKs 5OZ, 6FBL, 7FP, 7ZT, oprs.)
417,834-1002-139-C
DLØIU (DL4s AAA, AAE, oprs.)
312,576- 814-128-C

EQ3ATD (2 oprs.)
13,908- 122- 38-B

EU1Q (UQ2- 037s- 831,- 1181, oprs.)
157,410- 583- 90-B
EU3A (2 oprs.)
46,428- 292- 53-B

G3ASR (G3s PSP, SHY, SJE, ZDJ, G4s DUS, GKA, IUZ, UMS, oprs.)
225,420- 578-130-B
G3TBK (+ G4HVC)
166,320- 504-110-B

HG5A (HA5s JI, MK, PP, WE, GF, ML, HA7RY, oprs.)
1,167,480-2162-180-C
HG9R (HA9s PP, PV, RB, RP, RU, RX, oprs.)
668,472-1384-161-C
HA5KKC (HA5s KP, LV, MA, MD, MO, OG, oprs.)
513,450-1141-150-B
HA1KRR (HA1s RU, XO, XU, ZN, ZZ, oprs.)
244,188- 714-114-B
HA7KLG (HA7s LC, LD, MY, oprs.)
235,872- 672-117-B
HA8KVK (HA8VK + 2 oprs.)
143,550- 435-110-B
HA8KNX (+ 4 oprs.)
118,614- 373-106-B

LA1B (LAs 1QDA, 5RBA, oprs.)
24,453- 143- 57-B

LZ1KQZ (2 oprs.)
183,236- 446-122-C
LZ1KBL (3 oprs.)
35,136- 183- 64-B

OH8AA (OHs 6CR, 8DD, 8LP, 8NW, oprs.)
333,213-1019-109-C
OH9AB (OH5UW, opr.)
32,016- 184- 58-B

OK1KNR (OK1TD, opr.)
20,511- 161- 43-B

ON6BR (ON4AAJ, ON6JN, oprs.)
216,936- 552-131-B

OZ3FYN (OZ1EXZ, opr.)
13,992- 106- 44-B

SK6JA (SM6s AQU, CKV, CVT, CPY, DER, DOI, DRY, FYJ, oprs.)
391,050- 948-150-C

UT4UWV (RT5UN, UB5RCA, UT5UGI, UTS- 186- 2, oprs.)
219,906- 643-114-B
UB4QWW (RB5QW, UY5ZM, UB5Q4866, opts.)
22,278- 158- 47-B

EW2C (3 oprs.)
98,790- 452- 74-B
UP1BZZ (+ UP2BIG)
739,200-1408-175-B
UP1BWC (+ oprs.)
25,830- 210- 41-B- 20

UZ2FWA (UA2FX, RA2FA, oprs.)
72,072- 364- 66-B

UZ6LWZ (UA6BEN,UA6- 158s- 1071, -1103, oprs.)
330,042- 821-124-B
UZ3AWC (2 oprs.)
54,210- 278- 65-A
UZ6LWZ (UA6s AUN,- 158- 1240, 158- 1183, oprs)
46,110- 290- 53-B
UZ3AXH (3 oprs.)
2904- 44- 22-B

YT3T (YU3s BQ, EIJ, RM, oprs.)
489,234-1217-134-C
YU2BHI (+ YU2FK)
298,287- 759-131-C
YT3M (YU3DBC, YU3ZO, oprs.)
134,316- 861- 52-C
YU2AKL (4 oprs.)
39,744- 207- 64-B
YU7GST (+ oprs.)
17,100- 114- 50-C

4U1ITU (AA4V, N5UR, oprs.)
682,176-1216-187-C

North America

N4BP/C6A (+ N4UM)
2,480,796-3018-274-B

KP4BZ (N1EE, N2GC, NP4Z, oprs.)
4,113,186-4298-319-C

KV4FZ (+ KØTG, KMØO, NØBG, WØUO, WØWDW, WØZZ, WA8RBW, WAØVQR)
4,229,097-4447-317-C

VP2VIN (NP2AB, KA3DAG, oprs.)
230,391- 483-159-B

Oceania

KD7P/NH2 (+ AH2U)
484,800-1010-160-C

KH6DW (+ K7SS, K8MR)
2,054,325-2795-245-C
AH6AZ (+ VE7QO)
1,328,229-2181-203-C

South America

5JØLR (HK1QQ, opr.)
1,251,714-1822-229-B

Multioperator

Two Transmitter

Asia

JA7YAA (+ JJ1s MVV, PEU, JG3s JRM, EDV, JH7s CUO, GFO, HWR, NOT, JR7s DRV, OMD, PGL, UVL, XBN, JE7s GIV, HLZ, QCQ, JHs 9DLW, 8JIF, 8MRP)
541,398-1262-143-C

Europe

YU4EZC (4 oprs.)
53,430- 274- 65-B

Oceania

WH6W (+ JE3MAS)
781,454-1434-177-C

Multioperator

Unlimited

Asia

JA9YBA (JA9s LNA, NFO, QCE, QWJ, VBW, VDA, JH7UJR, JE1CKA, JH2QXG, JR2GMC, JF2DOJ, oprs.)
932,448-1766-176-C
JE3ZFS (JI3JGJ, JI3QBQ, oprs.)
29,799- 231- 43-B

Oceania

KH6XX (KH6s KV, ND, oprs.)
4,026,036-4676-287-C

CHECKLOGS

Special thanks to the following amateurs who submitted logs to assist in cross-checking entries:

AKØW, DJ2RE, DL4ON, EA2QU, EA3PE, EA5BGZ, EA5CTP, EA5WJ, EA7OI, EA7XC, EA8AGH, EV4AS, FE5BV, FG/WØRLX/FS, G3WPF, HAØHG, HA4YO, HA5EA, HA5FA, HA6NY, HA8ZO, I7PXV, JA2DN, K1VVT, K4CGY, K6FM, K9LA, KA1CLV, KA2VAJ, KA5GVW, KB3VV, KH6BZF, KO1F, LA2EG, LA3HY/PA, LZ1ED, LZ1KAZ, LZ1KKA, LZ1KVF, LZ1KVV, LZ2CC, N2FBV, N7CEE, N8II/VP2E, NA9J, NG6W, OH1XX, OH6DZ, OH6ZH, OH8LQ, OH8ZX, OK1DIJ, OK1FIM, OK1MKI, OK1US, OK2KVI, OK2KZC, OK3CQR, OK3IAA/UA3, OY7ML, OZ1ACB, OZ1FGG, OZ1HET, OZ1JNR, OZ1NF, OZ5MJ, OZ8AE, PAØPHK, PAØTA, PA3BFH, PA3DCS, PI1GOE, PY2LN, RA3EF, RA6AQT, RB5UU, RZ3AM, SMØMC, SM3CBR, SM4PBT, SM5BDV, SM6KMD, SM6MNA, SM7CZC, SM7IDF, SM7KWE, SMØCMH, SP2ZT, SP3GUV, SP3JWG, SP3LWU, SP4EAK, SP6BEN, SP6FER, UAØLFN, UA1CED, UA1OBW, UA1ZO, UA3ACD, UA3ACJ, UA3DFV, UA3DMY, UA3ET, UA3PB, UA3TBM, UA4HLO, UA6ADH, UA6YW, UA9FKM, UBØKA, UB4IZZ, UB4WZA, UB4XWB, UB5LAL, UC2AA, UO4OXD, UQ2GT, UT4UX, UT5GM, UV5DN, UY5GG, UZ1AWW, UZ4HWS, V3EZ, VE1RH, VE3DQB, VE3GWM, VE3IR, VE3MFA, VK2CWG, VO1QST, W9RTB, W2HAZ, Y22BC, Y22LB, Y24XD, Y26LN, Y33XB, Y54NL, YO7APA, YT3T, YU3AE, YU3BQ, YU3ND, YU4ELI, YU4GD, YU7AF, YU7SF, YV5BPG.

52nd ARRL November Sweepstakes Announcement

The rules for this year's contest are identical to last year's. Remember that there is a three-QSO penalty for unremoved duplicate contacts and for miscopied call signs. Take a few seconds to make sure you have the call right before you move on. At four QSOs each (including the original QSO), bad calls reduce scores quickly.

Another point to remember is that you must receive a *complete exchange* for each claimed QSO. If you get everything except the check, that's not good enough. You must copy it *all* for a complete contact. QSOs with stations "not in the contest" are fine, too — *if* you can get all of the required information.

Official log sheets, summary sheets and dupe sheets are available from ARRL Hq. Send an s.a.s.e. with one unit of First Class postage (U.S.) for each five sheets requested. You'll need one summary sheet and one dupe sheet for each mode. Log sheets hold 100 QSOs each, so order accordingly. Order your official entry forms now; they not only make it easier on the log checkers, but also help make sure you submit all of the required information.

Logs must be postmarked by December 18, 1985. You should send them via First Class Mail to ensure timely delivery. Entries not postmarked by the deadline *will* be classified as checklogs; no exceptions. If you want to make sure your entry arrived safely, include a self-addressed, stamped postcard. We'll return it to you when we get the log.

Club officers: Remember to send us a membership roster as detailed in the club competition rules (January *QST*, page 72). CU in SS!

Rules

1) **Object:** For stations in the United States and Canada (including territories and possessions) to exchange QSO information, as detailed in Rule 4, with as many other U.S. and Canadian stations as possible on 160 through 10 meters.

2) **Contest Period:**

(A) **CW** — First full weekend in November.

(B) **Phone** — Third full weekend in November.

(C) **Time** — Begins 2100 UTC Saturday and ends 0300 UTC Monday. Operate no more than 24 of the 30 hours. Off periods may not be less than 30 minutes in length. Times off and on must be clearly noted in your log, and listening time counts as operating time.

3) **Categories:**

(A) *Single operator.* One person performs all transmitting, receiving, spotting and logging functions.

(B) Multioperator, single transmitter only. Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.

4) **Exchange:** A consecutive serial number, precedence ("A" if you run 150-W output or less, "B" if more than 150 W), your call sign, check (last two digits of the year you were first licensed) and your ARRL Section. For example, K5ZD answers W1AW's call by sending W1AW NR178 B K5ZD 73 EMA for QSO number 178, more than 150 W, first licensed in 1973 and Eastern Massachusetts Section.

5) **Scoring:**

(A) *QSO points.* Count two points for each complete two-way QSO. No cross-mode contacts. Work each station only *once*, regardless of the frequency band.

(B) Multiplier. Each ARRL Section (listed on page 8 in this issue) plus VE8/VY1 — maximum of 74. KP4, KV4/KP2 and KG4 stations are in the West Indies Section, while KH6 and other U.S. possessions in the Pacific count as the Pacific Section.

(C) *Final score.* Multiply QSO points (two per QSO) by the number of ARRL Sections (plus VE8/VY1).

6) **Miscellaneous:**

(A) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/DOC).

(B) One operator may not use more than one call sign from any given location during the contest period.

(C) The use of two or more transmitters simultaneously is not allowed.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL Hq. for an s.a.s.e. Official forms are recommended. Any entry claiming more than 200 QSOs must submit duplicate-checking sheets (check sheets). Incomplete or late entries will be classified as checklogs. Logs must include dates, QSO times, exchange sent/received, band and mode. Postmark your entry within 30 days after the phone portion of the contest (December 18, 1985).

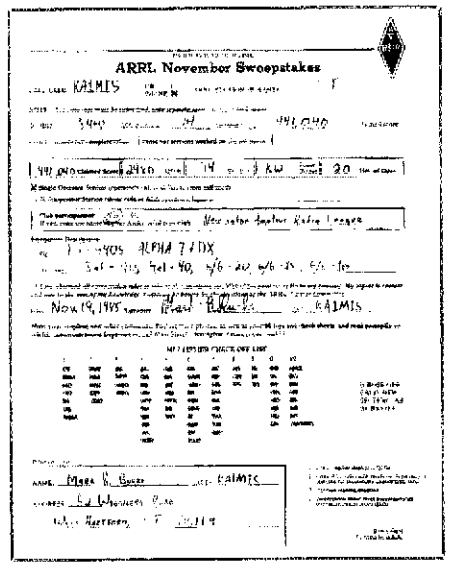
8) **Club Competition:** ARRL-affiliated clubs for club gavels and awards in the local, medium and unlimited categories as described in January 1985 *QST*, page 72.

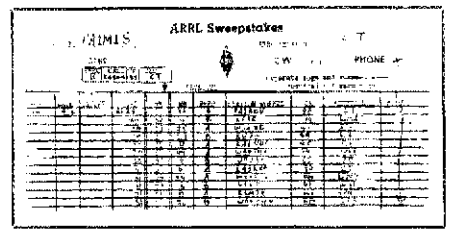
9) **Awards:** Certificates to the top single operator CW and phone scorers in both the "A" and "B" categories in each ARRL Section, and the top multioperator entry in each ARRL Division.

10) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications. See January 1985 *QST*, page 72.





Suggested Frequencies

CW	Novice	Phone
1800-1810		1855-1865
3550-3650	3710	3850-3950
7050-7100	7110	7200-7250
14,050-14,095		14,250-14,300
21,050-21,100	21,110	21,300-21,400
28,050-28,100	28,110	28,550-28,650

Contest Period

	Starts	Ends
CW	Saturday, Nov. 2 2100 UTC	Monday, Nov. 4 0300 UTC
Phone	Saturday, Nov. 16 2100 UTC	Monday, Nov. 18 0300 UTC

Explanation of Exchange

	Number	Precedence	Call	Check	Section
Exchanges	Consecutive serial number	Power output more than 150 W PEP	Send your station call	Last two digits of year first licensed	Your ARRL Section
Sample	NR1178	B	KA1MIS	84	CT

Results, Third ARRL VHF/UHF Spring Sprints

By Mark R. Burke,* KA1MIS
*Communications Assistant, ARRL.

Well, another Spring Sprint contest has come and gone—and this one brought more competition! The number of logs received this year is up from last year's 301 to 393. The 32% increase does not come close to the first contest, when there were 446 logs, but it's a step in the right direction.

Two meters christened this year's Sprints on April 15. Thunderstorms threatened the Southeastern Division, while good propagation to Pennsylvania helped W1VD (K1JX) defeat the 153 participants in claiming a record 266 contacts in 35 grid squares.

The smoothest running Sprint was on 220 MHz, when the 23rd of April arrived. Fifty-one people entered this one. The 59 that talked with WA3JUF, who operated N3CX, were in 21 grid squares, lifting him to a first-place victory over second place entrant W1VD, who had 69 QSOs but only 19 grid squares.

After an eight-day wait, the rigs were back on the air to fight poor propagation and short transmitting distances, to participate on 432 MHz. Eighty-six logs were submitted, and the top score belonged to K1FO, the New Englander who worked 115 people with 19 elements at 80 feet. Included in his log was W1VD, the second-place finisher, with 96 QSOs.

On May 9, with conditions remaining about the same, the 70-cm band had 35 contesters throwing in their calls. Seven grids contained the necessary 25 people, to give NF2P a fair lead over Eastern Pennsylvania's WA3JUF, who had 20 contacts.

Of all the bands, 6 meters suffered the most with very little propagation. It is no wonder why it lost 12 of its last year's 79 contestants. With all things against him, it was W1VD's station and K1JX's contest skills that put him on the top of the list. One-hundred and four QSOs and 31 grid multipliers gave him a 1k lead over the 78 QSOs of second-place WA2GBG.

Overall, the participants of the 1985 Spring Sprints enjoyed the contest very much, so that in 1986, the Spring Sprints will not fade away. The steady increase in participation ensures that there will be more people exchanging grid squares next year to help keep this contest moving in an upward direction.

SOAPBOX

Where did everyone go? (WA1OUB). Conditions, in a word. Caught the last five minutes only due to the eastern VHF conference (AC1J). Six-meter sprint should be in the afternoon—due to TVI problems! (N2BJ). Worst conditions I have ever experienced on 6 meters. QRN was so high, it was like running a 160-meter contest in July! (KA3B). Best QSO was with WA4LIT, who was using an eight-foot wire for an ant! (WB4NJG). No E skip, no activity! (W3EP/4). No skip during the 50-MHz event. Ground wave only (WD5ICC). Not much heard on the 50-band. We had severe storms in the immediate area. Lightning crashes showing high on the S meter. Maybe conditions will be better for the June UHF contest (KA5EBL). Band opened here 5/17/85! One day too soon! For a lone DX station, where 6-meter activity is "nil," DX is common if you want to have QSOs! Oh well, next year! (WB5KYK). Lots of snow, so I couldn't get as high as I wanted; only managed 11 contacts with the weak signal. Hope to go back in September (NR6E/6). Glad to have some openings to the West Coast. Only goes to prove that 6 meters is not as "dead" as it appears. Everybody needs to make noise (N7BUP). The band was not in very good shape, but I managed to work a few of the local stations on 6. There were about 15 minutes of aurora, but only worked one new one. I hope for better propagation in June (VE3LNX). Good aurora conditions (VE2TH). A real challenging contest with QRP, but did make one aurora contact with WB8BKC (VE3BFM). Lots of fun! (KA1BJ). Activity was excellent this year! (W1GXT). K1SND lives across town from me. Finally, I have someone louder at this QTH than W1VD! (WA3EEC). Condx were normal for this time of year—better than the January contest, but no surprises. Missed the first 45 minutes, as I had a one-day business trip into New Jersey. Finally everyone seemed to know their grid number. I don't suggest any rule changes—everything is fine (K8ZES/2). Excellent contest—keep it up (W2HRW). Like the contests very much (W2YJO). Nice participation! (KA2Q). Had a real nice time in the Sprint and enjoyed the great amount of activity this spring. I wish the people in Ohio and Michigan had been on a little more (N3CX). Certainly a lively 4-hour contest. Conditions were good—W3HQT (FN54) was better than 59 over the 600-mile path! (WB3JYO). How about a late night 6-meter sprint? A lot of ops are afraid to operate during prime time (N3BBI). Less stations total on, but they all were on for more of the contest (WA3FAE). Thanks for the contest; of the four ham magazines I get, *QST* is by far the best! (N4KCM). A very good time (WB4GFO). Very unstable weather conditions didn't help propagation. Nice level of activity was a treat though. Had fun (N3AHI). It was cool, overcast and rainy. Not much activity in my area (KB4DFK). Very disappointed in turnout on sprints—especially 220 MHz and 6 meters. Wish that I could have stayed on 2 meters longer but the lightning was too close ... maybe in a few years I'll look back on this log and laugh! (WB4SLM). Great local condx, but no real extended tropo for me—suggest we spread out away from 144.200 by at least ±5-6 kHz (K5YY). What happened to all the activity after 9 P.M.?? (NR5A). Condx poor (W5FF). These short contests are great. Please keep them going! (WA6AZP). Great conditions into L.A. after contest ended. Tried FM simplex with K6CH. Even with 1 W, still loud and clear. Talked for 45 minutes before packing up (NR6E/6). Next time, schedule an evening other than the 15th of April! I'm sure participation was down due to the IRS tax deadline (WB6FCS). As before, I really enjoyed the *short* sprints! I simply do not have time for more involved contests (W6HDO). This contest was my first "sprint." It really showed me where improvements in my station are needed. Great fun and I'm looking forward to the next one (WB6UPV). Delighted to make it into SF Bay area over mountains and nearly a 200-mile path! Considerable noise from mains running to commercial FM and two-way facilities made copy of some signals impossible; otherwise score would have been much larger (KCØW/7). Contests such as this never cease to amaze me: They prove that over and over, on any given night, if the operators are there, even a low-power station is capable of working tremendous distances. While many will contend that such is always due to good band conditions, the fact that it happens contest after contest would seem to indicate that perhaps activity is more important than conditions (K8CQA). Had a nice opening at 0314 UTC. It just should have started sooner and lasted longer. Lots of good activity on an evening of just average conditions in the Midwest. Many new stations heard, which attests to the popularity of the VUCC program (WB9MSV). Sure wish I had my GaAsFET preamp in line for this contest (N9DCA). Prefer all UTC time and dates and possibly extend to 5 or even 6 hours. Propagation not too good (N7AQX). Almost completed a QSO with KXØO in CO. Would have been quite a coup for my 10 W and 4-el beam. Activity was very good. WBØDRL has an awesome signal! (WAØVJF). Good activity (W1GXT). This sprint a 25% increase in activity since last one, but still long periods with no signals to work (K2GK). Very disappointed in 220 activity in general. We must use this band or lose it. Sometimes only one or two signals are heard on Tuesday night, sometimes none (N2BJ). The band was in good condition, as signals were quite strong; but as usual for 220, activity was lacking (KA3B). Sure wish there was more activity I could hear! (N3AHI). Worked more DX on 220 with 70 W than I did on 2 meters with a kW.—nice to have active band for once (VE3BFM). The band was not in very good shape on the north side of Lake Ontario. Couldn't hear the 4s and very few 3s. Hope conditions are better in May (VE3LNX). Two years ago, you couldn't work 115 stations on 432 in a weekend contest; now, 17 hours take four! (K1FO). New rig, new antenna, new contest, first QSO on 432—had a ball! (WB2SZY). Activity was low, condx poor. Number of QSOs up 30% over last year (WA2TIF). My operating time was limited (again!) by other commitments, but still had a good time waking the band from the winter doldrums (K2QR). Wow! What lousy propagation conditions for most of the four hours. Signals were weak, with much QSB (WA3UJE). No enhanced propagation from our location—activity lower than expected (WA4GBE). Hello out there! EM86 is very active—where is everybody? (KB4DFK). Finally got to San Diego after a year of trying on 70 cm (W6RXQ). First QSO ever from San Jose to San Diego (with 10 W)! (AJ6T). My first UHF mountaintopping experience, and I got to Southern California! My first UHF DX! These short contests are great! How about more of them—perhaps on a Saturday afternoon? (WA6AZP). I operated on top of the roof at the Ontario Airport. JNI (Jet Noise Interference) was very bad (WA6SNN). Two watts, two grids, too much! (K6GSS). Well, I tried, but an amp is definitely on the agenda soon—and more antennas! (KA6ING). Band conditions poor in this area ... have been completely Murphyfied! Just as the 4CX250B got ready to operate, the audio amplifier in the 471A quit! So, after several timeouts, I was completely out of the contest after 1 hour 15 minutes. The good news is that I worked one new square (NC9F). Heard W1VD and K1FO, but not my own square! (VE2BTW/3). A pleasant evening (W1RIL). Local activity in square FN42 was good. Where was everyone else? (W1GXT). I was very disappointed in the activity of this Sprint. I should have worked 50 stations easily! (WA3JUF). Living in a valley and using a nonrotatable antenna—it's a start (WB3FYT). My transmitting converter should be ready for the June VHF QSO Party (K7HSJ). Worked five states, but not my own! (WBØDRL).

Scores

Scores are listed by call sign, score, number of QSOs, number of grids and ARRL Section. The scores are arranged by band, from 50 MHz through 1296 MHz. Under each band heading, the scores are arranged by call area. Within each call area, the scores are listed in descending numerical order.

50 MHz

1

W1VD (K1JX, opr.)
3224-104-31-CT
WA1OUB 1488- 62-24-NH
K1ISW 716- 24- 9-WMA
WB1AAG 136- 17- 8-CT
W1XM 133- 19- 7-EMA
K1TOL 132- 12-11-ME
K1TR 76- 13- 6-NH
AB1U 77- 11- 7-CT
N1ABY 70- 14- 5-CT
K1VZI 39- 13- 3-EMA
AC1J 24- 8- 4-NH

2

WA2GBG 2184- 78-28-WNY
N2CEI 1554- 74-21-NNJ
N2WK 924- 42-22-WNY
KS2T 658- 47-14-SNJ
K2OVS 384- 32-12-NLI
K4BNC 336- 28-12-NNJ
NF2P 280- 28-10-SNJ
WB2WBT 252- 21-12-WNY
N2BJ 153- 17- 9-ENY

3

WA3YON 1323- 63-21-EPA
W3WFM 768- 48-16-MDC
KA3B 630- 45-14-EPA
W3CL 456- 38-12-EPA
WB2DNE 330- 30-11-MDC
WB3FYT 310- 31-10-EPA
W3HDH 252- 18-14-WPA
W3KJM 204- 17-12-WPA
K3AR 54- 9- 6-MDC

4

KJ4BF 308- 22-14-SC
WB4NJG 170- 17-10-AL
W3EP/4 72- 12- 6-GA
WS4F 60- 10- 6-GA
N4MM 60- 10- 6-VA
WB4WXE 21- 7- 3-GA

5

WD5ICC 378- 14- 9-OK
KD5RO 147- 21- 7-NTX
WB5RUS 133- 19- 7-STX
WA5VJB 90- 10- 5-NTX
K5IS 30- 6- 5-NTX
KA5EBL 25- 5- 5-NM
WB5KYK 16- 4- 4-NTX
W5NZS 16- 4- 4-OK
K5SW 4- 2- 2-OK

6

N6ENU 527- 29-13-ORG
WA6BYA 220- 20-11-SCV
K6GSS 184- 23- 8-SCV
W6RXQ 140- 20- 7-SCV
K6PHE 126- 18- 7-ORG
KE6NS 120- 20- 6-SCV
WD6AUP 102- 17- 6-ORG
WA6LLY 98- 14- 7-SF
KN6S 95- 19- 5-EB
KA6ING 90- 18- 5-SCV
NR6E/6 44- 11- 4-SJV

7

N7BUP 84- 12- 7-AZ

8

WB8BKC 891- 33-27-MI
N8FCJ 276- 23-12-WV

9

KB9NM 494- 26-19-WI
NC9F 300- 30-10-IL

0

N0LL 90- 10- 9-KS
WA0DCB 30- 6- 5-IA
KB0ZQ 9- 3- 3-MN
K0CQ 1- 1- 1-IA

VE

VE3LNX 330- 22-15-ON
VE2TH 272- 17-16-PQ
VE3BFM 54- 9- 6-ON

144 MHz

1

W1VD (K1JX, opr.)
9310-266-35-CT
WA1OUB 3744-156-24-NH
WA1VTA 3625-145-25-WMA
K5MA 2227-131-17-EMA
AA2Z/1 2214-123-18-CT
W1QK 1940- 97-20-CT
WA1HYN 1300-100-13-CT
KA1BJ 1184- 74-16-NH
K1GX 1088- 64-17-CT
KA1KRJ 980- 70-14-WMA
KA1MEW 938- 67-14-WMA
K1ISW 782- 72-11-WMA
K1SRZ 682- 62-11-EMA
W3HQT/1 637- 49-13-ME
W1AIM 615- 41-15-VT
KA1FVG 470- 47-10-EMA
KA1DHO 462- 42-11-EMA
WA1ZOJ 448- 32-14-VT
AC1J 432- 48- 9-NH
W1GXT 360- 40- 9-EMA
K1TR 280- 35- 8-NH
W1NMQ 234- 26- 9-WMA
W1XM 234- 39- 6-EMA
WA3EEC 48- 12- 4-WMA
W1JR 24- 6- 4-EMA

2

WB2NPE 7344-216-34-SNJ
NA2A 4830- 32-15-WNY
N2CEI 4437-153-29-NNJ
WA2TIF 4424-158-28-ENY
KB2ES/2 3783- 97-39-WNY
N2BJ 2760-139-20-ENY
W2HRW 2478-118-21-SNJ
NF2P 1980- 90-22-SNJ
WB2SZY 1917- 71-27-WNY
K2GK 1800- 72-25-WNY
W2EIF 1634- 86-19-SNJ
KA2RWA 1566- 87-18-SNJ
N2EK 1430- 65-22-ENY
KS2T 1343- 79-17-SNJ
K2BJG 882- 63-14-NNJ
WB2PSD 759- 69-11-NNJ
WB2ODH 722- 38-19-WNY
WA2RUW 572- 44-13-ENY
W2YJO 406- 29-14-ENY
WA2ALV 352- 32-11-ENY
WB2WBT 315- 21-15-WNY
KA2Q 136- 17- 8-ENY
K2QR 1- 1- 1-WNY

3

N3DQZ/3 4959-171-29-EPA
WA3FYJ 4680-117-40-WPA
WA3HMK 3915-135-29-WPA
N3CX 3640-140-26-EPA
WB3JYO 3519-153-23-EPA
WA3ONM 3224-124-26-EPA
K3ZO 2938-113-26-MDC
KQ3R 2760-115-24-EPA
N3BBI 2520- 90-28-EPA
WA2OMY 2400- 96-25-EPA
WA3FAE 2208- 96-23-MDC
K4JSU/3 1173- 51-23-WPA
KR3V 1160- 50-23-WPA
WB2DNE 960- 64-15-MDC
WB3BGU 616- 44-14-MDC
W3CL 572- 52-11-EPA
N3DUE 494- 38-13-MDC
K3AKR 460- 46-10-MDC
W3GN 182- 26- 7-MDC

4

N4DT 4212-108-39-NC
AA4ZZ 3668-131-28-VA
K2UOP/4 2592- 96-27-VA
N4KCM 1710- 57-30-KY
K4CKS 1176- 49-24-GA
W3EP/4 1008- 42-24-GA
WD4DGF 945- 45-21-TN
WB4GFO 820- 41-20-AL
WS4F 629- 37-17-GA
N3AHI 448- 32-14-GA
WB4NJG 400- 25-16-AL
XC3CL 261- 29- 9-SFL
KB4FAI 230- 23-10-AL
W4ISS 228- 19-12-GA
KB4CMF 222- 28- 8-VA
AA4FQ 221- 17-13-KY
KB4DFK 220- 22-10-VA
WB4SLM 176- 16-11-GA
N4MM 171- 19- 9-VA
WA4MMP 144- 18- 8-VA

5

K5YY 1456- 52-28-AR
K5SW 1450- 50-29-OK
WA5VJB 1323- 63-21-NTX
KE5EP 1196- 52-23-NTX
AA5V 345- 23-15-OK
KD5RO 252- 28- 9-NTX
NR5A 144- 12-12-AR
W5NZS 108- 12- 9-OK
W5FF 104- 13- 8-NM
K5MAT 63- 9- 7-NM
K5IS 9- 3- 3-NTX

6

WA6AZP 1032- 86-12-SCV
NR6E/6 690- 46-15-SJV
WD6AUP 374- 34-11-ORG
WB6FCS 224- 28- 8-LAX
WB9AJZ/6 208- 26- 8-ORG
K6PFW 154- 22- 7-ORG
W6HDO 119- 17- 7-SB
WA6HRH 64- 21- 4-ORG
WB6UPV 55- 11- 5-LAX
WA6SNN 44- 11- 4-ORG

7

KC6W/7 40- 8- 5-NV

8

N8FCJ 7360-160-46-WV
KA8IFC 3780- 90-42-OH
N8BJN 2376- 72-33-OH
WB8OOA 1092- 52-21-MI
WA8TXT 1075- 43-25-OH
W8IDU 748- 34-22-MI
W8CAP 720- 36-20-MI
K8CQA 450- 25-18-OH
K8LMN 231- 21-11-OH
KA8AOB 6- 3- 2-MI

9

K9MRI 5082-121-42-IN
WB9MSV 4510-110-41-IL
K9AKS 4320-108-40-IL
WB9CAS 2760- 92-30-IL
WD9HOZ 2548- 91-28-WI
WB9NTL 1769- 61-29-IN
KB9QC 1656- 72-23-IL
N9AZC 1450- 50-29-IN
K89NM 1403- 61-23-WI
N9DCA 1104- 48-23-IN
AA9D 864- 48-18-IL
K9PW 690- 46-15-IL
N9TD 615- 41-15-WI
NC9F 520- 40-13-IL
WB9OWJ 455- 35-13-WI
W9CBE 364- 26-14-WI
W9YCV 351- 27-13-WI
KW9O 275- 25-11-WI
KD4PS/9 264- 22-12-IL

0

WB0DRL (WA0TKJ, opr.)
2376- 66-36-KS
W0VB 1176- 49-24-MN
KB0OW 1056- 44-24-KS
KF0M 984- 41-24-KS
N0LL 840- 35-24-KS
KX0O 714- 34-21-CO
WDEMS 459- 27-17-NE
K0VUA 238- 17-14-KS
KB0ZQ 72- 12- 6-MN
N7AQX 49- 7- 7-KS
WA0WJF 45- 9- 5-KS
WD0ETA 24- 6- 4-MN

VE

VE3LNX 3430- 98-35-ON
VE3BFM 1653- 57-29-ON
VE2BTW/3 360- 30-12-ON
VE2DUB 348- 29-12-PQ

220 MHz

1

W1VD (K1JX, opr.)
1311- 69-19-CT
WA1WXV 216- 27- 8-CT
W1JR 184- 23- 8-EMA
W1GXT 184- 22- 7-EMA
K1SRZ 84- 14- 6-EMA
K1VZI 14- 7- 2-EMA
AC1J 3- 3- 1-NH

2

WB2NPE 1131- 69-19-SNJ
K2GK 774- 43-18-WNY
W2EIF 637- 49-13-SNJ
K2BJG 588- 42-14-NNJ
N2CEI 576- 48-12-NNJ
KB2ES/2 476- 28-17-WNY
KS2T 440- 40-11-SNJ
NF2P 374- 34-11-SNJ
N2BJ 370- 37-10-ENY
WA2RUW 133- 19- 7-ENY
K2QR 60- 10- 6-WNY

3

N3CX (WA3JUF, opr.)
1239- 59-21-EPA
K3HZO 774- 43-18-MDC
WA2OMY 672- 48-14-EPA
KA3B 429- 39-11-EPA
WA3FYJ 352- 22-16-WPA
WA3YON 312- 26-12-EPA
N3DQZ/3 310- 31-10-EPA
W3CL 140- 28- 5-EPA
K3AKR 96- 16- 6-MDC

4

AA4ZZ 490- 35-14-VA
K2UOP/4 348- 29-12-VA
K4JSI 175- 25- 7-VA
N3AHI 72- 9- 8-GA
WS4F 49- 7- 7-GA
WD4DGF 48- 8- 6-TN
WB4SLM 12- 4- 3-GA

5

K5SW 96- 12- 8-OK
WA5VJB 51- 17- 3-NTX
WA5TKU 32- 8- 4-NTX
W5NZS 28- 7- 4-OK
K5MAT 2- 2- 1-NM
K5IS 0- 0- 0-NTX

6

W6RXQ 28- 7- 4-SCV
NR6E 18- 6- 3-EB

8

WB8BKC 442- 26-17-MI
WA8TXT 368- 23-16-OH
N8BJN 225- 25- 9-OH
W8IDU 154- 14-11-MI

9

WB9CAS 108- 12- 9-IL
WB9NTL 66- 11- 6-IN

0

KB0DW 35- 7- 5-KS

VE

VE3BFM 450- 25-18-ON
VE3LNX 378- 21-18-ON

432 MHz

1

K1FO 3565-115-31-CT
W1VD (K1JX, opr.)
2976- 96-31-CT
W1JR 686- 49-14-EMA
AB1U 319- 29-11-CT
WA1HYN 279- 31- 9-CT
W1XM 224- 28- 8-EMA
WA1WXV 162- 27- 6-CT
K1SRZ 144- 24- 6-EMA
K1ISW 126- 21- 6-WMA
W3HQT/1 120- 15- 8-ME
W1GXT 100- 20- 5-EMA
K1VZI 60- 15- 4-EMA
AC1J 20- 10- 2-NH
W1MX (W1XG, opr.)
10- 5- 2-EMA

2

WB2QOQ 2650-106-25-NNJ
WB2NPE (N2SB, opr.)
2380- 85-28-SNJ
NF2P 1540- 70-22-SNJ
K2GK 741- 39-19-WNY
N2WK 576- 36-16-WNY
K2BJG 516- 43-12-NNJ
WB2SZY 490- 35-14-WNY
WA2TIF 484- 44-11-ENY
N2BJ 450- 45-10-ENY
KS2T 306- 34- 9-SNJ
W2EIF 272- 34- 8-SNJ
WB2PSD 145- 29- 5-NNJ
W2HRW 126- 18- 7-SNJ
K2QR 50- 10- 5-WNY

3

WB3ESS 1704- 71-24-EPA
K3HZO 1037- 61-17-MDC
WA3FYJ 864- 36-24-WPA
WA2OMY 840- 56-15-EPA
WA3JUF 444- 37-12-EPA
WA3UJE 252- 28- 9-MDC
W3CL 162- 27- 6-EPA
K3AKR 50- 10- 5-MDC

4

K2UOP/4 377- 29-13-VA
AA4ZZ 340- 34-10-VA
N4DT 325- 25-13-NC
W3IY/4 280- 28-10-VA
WS4F 153- 17- 9-GA
WA4GBE 150- 15-10-TN
K4JSI 126- 21- 6-VA
WB4SLM 117- 13- 9-GA
KB4DKF 16- 4- 4-VA

5

K5SW 660- 30-22-OK
KE5EP 240- 24-10-NTX
K5YY 165- 15-11-AR
WA5TKU 153- 17- 9-NTX
KD5RO 90- 15- 6-NTX
WA5VJB 72- 12- 6-NTX
W5EW 40- 8- 5-LA
W5NZS 54- 9- 6-OK
K5IS 12- 4- 3-NTX
K5MAT 4- 4- 1-NM

6

W6RXQ 162- 27- 6-SCV
AJ6T 144- 24- 6-SCV
KE5ZE 144- 24- 6-SCV
WA6AZP 126- 21- 6-SCV
WB4FCS 114- 19- 6-LAX
WD6AUP 95- 19- 5-ORG
K6PFW 70- 14- 5-ORG
WA6SNN 60- 14- 5-ORG
NR6E 45- 15- 3-EB
K6GSS 34- 17- 2-SCV
KA6ING 3- 3- 1-SCV

8

WB8BKC 1200- 48-25-MI
NI8O 600- 30-20-OH
WA8TXT 459- 27-17-OH
W8IDU 400- 25-16-MI
N8FCJ 198- 18-11-WV
W8CAP 170- 17-10-MI
N8BJN 24- 8- 3-OH

9

WB9MSV 810- 30-17-IL
KB9NM 187- 17-11-WI
N9TD 96- 12- 8-WI
NC9F 50- 10- 5-IL
WB9NTL 35- 7- 5-IN

0

K0TLM 352- 22-16-MO
K0TLM/0 240- 20-12-MO
WB0DRL 220- 20-11-KS
K0CQ 120- 12-10-IA
KB0ZQ 35- 7- 5-MN

VE

VE3LNX 820- 41-20-ON
VE3BFM 780- 39-20-ON
VE2BTW/3 40- 8- 5-ON

1296 MHz

1

W1RIL 65- 13- 5-WMA
W1JR 33- 11- 3-EMA
K1VZI 7- 7- 1-EMA
W1GXT 6- 6- 1-EMA
W3HQT/1 2- 2- 1-ME
W1XM (W1GSL, opr.)
1- 1- 1-EMA

2

NF2P 175- 25- 7-SNJ
W2EIF 48- 12- 4-SNJ
K2BJG 16- 8- 2-NNJ
N2BJ 10- 5- 2-ENY
N2CEI 6- 6- 1-NNJ

3

WA3JUF 140- 20- 7-EPA
KQ3R 98- 14- 7-EPA
N3CX 85- 17- 5-EPA
WB3JYO 39- 12- 3-EPA
WB3FYT 8- 4- 2-EPA

4

W3IY/4 105- 15- 7-VA
AA4ZZ 45- 9- 5-VA
WB4SLM 20- 5- 4-GA
K2UOP/4 16- 4- 4-VA
WS4F 16- 4- 4-GA

5

WA5VJB 40- 10- 4-NTX
WA5TKU 24- 6- 4-NTX
K5IS 0- 0- 0-NTX

6

NR6E/6 30- 10- 3-EB
W6RXQ 27- 9- 3-SCV
WD6AUP 6- 3- 2-ORG

7

K7HSJ 3- 3- 1-OR

8

WA8TXT 120- 12-10-OH
WB8BKC 96- 12- 8-MI

0

WB0DRL 63- 9- 7-KS
W0RAP 9- 3- 3-IA
K0CQ 1- 1- 1-IA

VE

VE3LNX 56- 8- 7-ON
VE3BFM 49- 7- 7-ON

Contest Corral

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

OCTOBER

1

West Coast Qualifying Run, 10-35 WPM, at 0400Z Oct. 2 (9 P.M. PDT Oct. 1). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

5

AGWC-DL Handasten Party (Straight Key Party), Sept. *QST*, page 91.

5-6

California QSO Party, Sept. *QST*, page 91.

Kansas State QSO Party, sponsored by the Boeing Employees' ARS of Wichita, from 0100Z until 0700Z Oct. 5, from 1300Z Oct. 5 until 0700Z Oct. 6, and from 1300Z Oct. 6 until 0100Z Oct. 7. Work stations once per band and mode. Mobiles/portables may be worked again as they change county. All bands/modes except 10 MHz and 24 MHz may be used. KS-to-KS QSOs allowed. Exchange serial number, signal report and QTH (county for KS stations; state, province or country for others). Suggested frequencies: CW—1.805 3.560 7.060 14.060 21.060 28.160; phone—1.815 3.925 7.260 14.280 21.380 28.580; Novice—3.725 7.125 21.150 28.160. KS stations count 2 points per phone QSO and 3 points per CW QSO; multiply by total number of states, VE provinces and countries worked. Others count 2 points per phone QSO and 3 points per CW QSO with KS stations; multiply by sum of different KS counties worked (max. 105). Non-KS stations may also count one additional multiplier for each group of eight QSOs with the same KS county. Certificates: Mail entry by Nov. 12 to Boeing Employees' ARS of Wichita, c/o Mike Thornton, WAØTAH, P.O. Box 16534, Wichita, KS 67216.

VK/ZL/Oceania Contest, phone, sponsored by the New Zealand Assn. of Radio Transmitters and the Wireless Institute of Australia, from 1000Z Oct. 5 until 1000Z Oct. 6 (CW contest, 1000Z Oct. 12 until 1000Z Oct. 13). Single-op and SWL classes. Work station once per band. No crossband QSOs. Exchange signal report and serial number starting with 001. Count 2 points per VK/ZL/O QSO. Multiply by total VK/ZL/O prefixes worked per band. Use separate log for each band and mode. Mail entries to be received by Jan. 31 to WIA. VK/ZL/O Contest Manager, 1 Noorabil Ct., Greensborough, VIC 3088, Australia.

6-7

Illinois QSO Party, Sept. *QST*, page 91.

12-13

Pennsylvania QSO Party, Sept. *QST*, page 91.

GARTG-RTTY Contest, Sept. *QST*, page 91.

Fall QRP QSO Party, Sept. *QST*, page 91.

VK/ZL/Oceania Contest, CW, see Oct. 5-6 for more detail.

Columbus Day Special Event, sponsored by the Columbus ARA, 1400Z-2400Z Oct. 12-13. On Oct. 12 work 15-meter phone, suggested frequency, 21.375. On Oct. 13 work 40-meter phone; suggested frequency, 7.240. Work Columbus, OH stations (Columbus stations work everybody). Exchange name, QTH and RST. Score 1 point per QSO, 6 points for QSO with CARA club station W8TO. A commemorative award will be issued to all amateurs and SWL with a score of 10 or better. The highest scoring Columbus, OH station will receive a plaque. Send logs within 120 days to Amateur Radio Station W8TO, Attn: Special Event Coordinator, 280 E. Broad St., Columbus, OH 43215.

13

21/28 MHz Telephony Contest, sponsored by the Radio Society of Great Britain, 0700Z-1900Z Oct. 13. Single and multioperator categories, 21 and 28 MHz, phone only. Entrants are requested not to operate 21.400-21.450 28.200-28.400 29.100-29.700. Exchange signal report and serial number starting with 001. Work British Isles stations only (G, GD, GI, GJ, GM, GU, GW); contacts with GB stations do not count. Count 3 points per QSO. Multiply by the total number of different British Isles prefixes (G3, GW4, etc.) worked per band. Mail entries, to be received by Dec. 9, to P.O. Box 73, Litchfield, Staffs WS13 6UJ, England.

14

W1AW Qualifying Run, 10-40 WPM, at 0200Z Oct. 15 (10 P.M. Oct. 14, EDT). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Oct. 1 listing for more details.

19-20

Simulated Emergency Test, Sept. *QST*, page 87.

Jamboree on the Air, sponsored by the World Scout Bureau, will be from 0001 local Oct. 19 until 2400 local Oct. 20, although some activity will flop over from Fri. to Mon. Scouts usually exchange their name, QTH, Scout rank and other hobbies, often becoming pen pals with their new-found radio friends. Look for K2BSA, the BSA Hq. station in Dallas, TX, and HB9S, the World Scout Hq. in Switzerland. No logs are necessary, but activity reports—including Scout unit number, number of participants and interesting incidents—are appreciated. Photographs with captions are especially welcome for the BSA report to the World Scout Bureau. Send reports to JOTA Coordinator, W2GND, 216 Maxwell Ave., Hightstown, NJ 08520. Suggested frequencies: CW—3.590 7.030 14.070 21.140 28.190; phone—3.940 7.290 14.290 21.360 28.990; RTTY, SSTV, ATV on normal frequencies; check Novice bands. Post-card size certificates from station worked or order your own for distribution via Jamboree on the Air, 1325 Walnut Hill La., Irving, TX 75038-3096.

RTTY DX "Twenty-Fifth" Sweepstakes, Sept. *QST*, page 92.

Rhode Island QSO Party, Sept. *QST*, page 92.

20

21 MHz Contest, sponsored by the Radio Society of Great Britain, from 0700Z to 1900Z Oct. 20. 21 MHz, CW only. Entrants are requested not to operate 21.075-21.125 MHz. Single-op and single-op-QRP (10-W max. input) categories. Exchange signal report and serial number starting with 001. Work British Isles stations only (G, GD, GI, GJ, GM, GU, GW); contacts with GB stations do not count. Count 3 points per QSO. Multiply by total number of different British Isles prefixes worked. Mail entries, to be received by Dec. 31, to P.O. Box 73, Lichfield, Staffs WS13 6UJ, England.

26-27

CQ World-Wide DX Contest, phone, sponsored by *CQ*, from 0000Z Oct. 26 until 2400Z Oct. 27 (CW contest, 0000Z Nov. 23 until 2400Z Nov. 24). 1.8 through 28 MHz. Entry classes: single op, all bands; single op, single band; single op, QRP; multiop, single transmitter; multiop, multi transmitter. QRP is defined as 5-W output or less. Multi-single: Only one transmitter and one band permitted during a 10-minute period. Exception: one—and only one—other band may be used during the same 10-minute period if—and only if—the station worked is a new multiplier. Stations found in violation of the 10-minute rule will be reclassified as multi-multi. Multi-multi stations are allowed one signal per band maximum. All transmitters must be located within a 500-meter-diameter circle, or within the limits of the licensee's address property, whichever is greater. All antennas must be physically connected to the transmitters by wires. Exchange signal report and CQ zone number. A station in a different zone or country than indicated by its call sign must sign portable. QSOs between stations on different continents count 3 points. QSOs between stations on the same continent but in different countries count 1 point. Exception: QSOs between North American stations in different countries count 2 points. QSOs with your own country count for multiplier credit, but not for QSO points. Multipliers: Count one multiplier for each different CQ zone worked per band (max. 40 per band). Count one multiplier for each different country worked per band (DXCC and WAE lists). Multiply QSO points from all bands operated by multipliers (zones plus countries) from all bands operated for final score. Single-band logs eligible for single-band awards only. Single ops must operate at least 12 hours (multiops, 24 hours) to be eligible for awards. Dupe sheets required for any band with more than 200 QSOs. Entry forms are available from the sponsor for an s.a.s.e., and all entrants are encouraged to send for a set. Each dupe removed by the CQ Contest Committee also carries a 3-QSO penalty. Phone logs must be postmarked by Dec. 1, 1985, and CW logs must be postmarked by Jan. 15, 1986. Mail phone logs to Larry Brockman, N6AR, 7164 Rock Ridge Terr., Canoga Park, CA 91307. CW logs go to Bob Cox, K3EST, 6548 Spring Valley Dr., Alexandria, VA 22312. Logs may also be sent to *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801.

27

W1AW Qualifying Run, 10-35 WPM, at 2400Z (7 P.M. EST) Oct. 27. See Oct. 14 listing for more details.

NOVEMBER

2-3

ARRL November Sweepstakes, CW, this issue, page 88.

ARRL International EME Competition, Part 1, Sept. *QST*, page 86.

International Police Association Contest, sponsored by the IPARC German Section, from 0600Z to 1000Z and from 1400Z to 1800Z each day, Nov. 2-3. CW Nov. 2, and phone Nov. 3. Non-IPA stations work IPA members only. Exchange signal report and serial number. U.S. stations also send state. IPA members send IPA with exchange. Phone and CW contests are separate. Work stations once per band on each mode. Count 1 point per QSO with non-IPA members and 5 points per QSO with IPA members. Multiply by sum of IPA countries/states worked per band. Suggested frequencies: phone—3.650 3.775 7.075 14.295 21.295 28.575 MHz; CW—3.575 7.025 14.075 21.075 28.075 MHz. Mail entries by Dec. 31 to Anton Kohten, DK5JA, P.O. Box 40 01 63, D-4152 Kempen 1, Fed. Rep. of Germany. For more information, contact WA8VDC, 4828 Elm, Newport, MI 48166.

6

West Coast Qualifying Run, 10-35 WPM, at 0500Z Nov. 7 (9 P.M. PST Nov. 6). See Oct. 1 listing for more details.

9-10

European DX Contest, RTTY, sponsored by the Deutscher ARC, from 0000Z Nov. 9 until 2400Z Nov. 10. Work stations once per band, 3.5, 7, 14, 21 and 28 MHz only. Entry classes: single op, all band and multiop, single transmitter. Multi-single stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single ops may operate a maximum of 36 hours. The 12 hours of off-time may be taken in one to three periods and must be noted in the log. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained later). Europeans use the ARRL countries list. In addition, each call area in the following countries will be considered as a multiplier: JA, PY, VE, VO, VK, ZL, ZS, UA9/0. Each W/K-state will be considered a multiplier, but not W/K call areas. Contacts between all continents and also one's own continent are permitted. Multipliers will be counted according to the European and ARRL countries list. QSO as well as QTC traffic with one's own country (district or state) is

not allowed. Multiply by number of EU countries worked per band (DXCC list, plus GM-Shetland, IT, UN1 and W/VE states.) The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (e.g., 1300/DJ1QQ/134). A QSO may be reported once and not back to the originating station. A maximum of 10 QTCs to the same station are permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent and that seven QSOs are reported.

Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Mail before deadline, Dec. 15, to WAEDC Committee, P.O. Box 1328, D-895 Kaufbeuren, Fed. Rep. of Germany.

Silver Jubilee Contest, sponsored by the Electril Antenna Factory, from 0000Z Nov. 9 until 2400Z Nov. 10. Phone and CW, single and multioperators, 2-80 meters (no WARC). Exchange RS(T). Work stations once per band. Score 1 point for each confirmed QSO, no multipliers. Single operators must take 12-hour rest period (may be subdivided) and noted in log. Multioperators must be clubs or associations only. Awards: Mail logs before Jan. 31, 1986 to P.O. Box 22, LABRE-Sao Paulo Section, SP-Brazil 01000.

11

W1AW Qualifying Run, 10-35 WPM, 0300Z Nov. 12 (10 P.M. EST, Nov. 11). See Oct. 27 listing for more details.

16-17

ARRL November Sweepstakes, phone, this issue, page 88.

18

W1AW Qualifying Run

23-24

ARRL International EME Competition, Part 2, Sept. *QST*, page 86.

CQ World Wide DX Contest, CW, see Oct. 26-27 listing for more detail.

Special Events

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

Petrified Forest National Park, Arizona: The Kachina ARC will operate WA7GWG **Oct. 5,** 1500Z until 2300Z, to recognize the finding of Gertie, the 225-million-year-old dinosaur. Operation will be in the Novice bands, General phone bands and 04/64. QSL via Kachina ARC, P.O. Box 781, Taylor, AZ 85939.

Fagan, Minnesota: The Minnesota School of Business ARC will operate KAØTOG and WAØKKE from 1700Z **Oct. 5** until 1700Z **Oct. 6** to commemorate the successful establishment of their club and, hopefully, the completion of their four-element 80-meter beam. Even hours: CW—80, 40, Novice bands; SSB—20. Odd hours: CW—40, 15, Novice bands; SSB—75. Certificates via MSBARC, Minnesota School of Business, 11 S. 5th St., Minneapolis, MN 55402.

Alcatraz Island, California: The Sacramento ARC will operate W6AK **Oct. 5-6,** 1730Z-2300Z each day, from Alcatraz Island. Frequencies: phone—3.950 7.270 14.300 21,400 146.52; CW—3.725 7.125 14.050 21.085; packet radio, W6AK-5—145.01. Special QSL via Sacramento ARC, P.O. Box 161903, Sacramento, CA 95816-1903.

Treasure Island, New Jersey: The Garden State ARA will operate W2GSA from 1600Z **Oct. 5** until 1600Z **Oct. 6** to commemorate the stay of Robert Louis Stevenson on Treasure Island. Suggested frequencies: 3.910 7.235 14.235 21.260. Certificates via Lucien Eloe, WA2SSH, 7 Carol Ave., Neptune, NJ 07753.

Albuquerque, New Mexico: KN5D will operate **Oct. 5-13** from the annual International Hot Air Balloon Fiesta. Frequencies: FM—29.600; SSB—1.840 3.940 7.280 14.285 21.365 28.625; Gateway station through OSCAR 10, conditions permitting, SSB—145.885-145.895. QSL via KN5D, P.O. Box 997, Corrales, NM 87048.

St. Charles, Missouri: The St. Charles ARC will operate WBØHSI **Oct. 11-12** at Frontier Park to commemorate St. Charles Days and the Boy Scouts 75th Anniversary Camporee. Operation will be 7.235 14.235 and other bands if open. Certificates via St. Charles ARC, P.O. Box 1429, St. Charles, MO 63301.

Johnson County, Kansas: WØLQV/Ø will operate **Oct. 11-13** in conjunction with the 1985 Diamond Jubilee Extravaganza by the Heart of America Council, Boy Scouts of America. Operation will vary between 0100Z Oct. 12 and 1700Z Oct.13 on 14.290.

Southington, Connecticut: The Southington ARA will operate W1ECV **Oct. 12,** 1400Z-2000Z, to commemorate the Apple Harvest Festival. Operation will be on 14.250. Certificates via Southington ARA, P.O. Box 873, Southington, CT 06489.

Hat Rock State Park, Oregon: The Hermiston ARC will operate KD7LC **Oct. 12,** 1800Z-0100Z, and **Oct. 13,** 1800Z-2200Z, to commemorate the 104th anniversary of Lewis and Clark's visit to Hat Rock. Operation will be in the General phone, Novice, 2-meter and 440-MHz bands. Certificates via HARC, P.O. Box 962, Hermiston, OR 97838.

Blennerhassett Island, West Virginia: The Parkersburg ARC will operate a special-event station on **Oct. 12-13** in conjunction with the bicentennial of Parkersburg, WVA. Operation will be primarily 15, 20 and 40 phone. Special QSL via Parkersburg ARC, P.O. Box 2112, Parkersburg, WV 26102.

Rogersville, Tennessee: The Hawkins County ARC will operate W4PTS **Oct. 12,** 1400Z-2300Z, and **Oct. 13,** 1700Z-2200Z, to celebrate the seventh annual Hawkins County Heritage Days. Operation will be on 3.960 7.260 14.260. Certificates via W4PTS Callbook address.

Connersville, Indiana: The Whitewater Hills ARC will operate KA9GHP, **Oct. 12,** 1700Z-2200Z, and **Oct. 13,** 1700Z-2000Z, in conjunction with the Founder's Day Fall Festival. Operation will be lower 25 kHz of the General bands. Certificates via Jack McCowan, KA9GHP, RR 3, Connersville, IN 47331.

Philadelphia, Pennsylvania: The Olympia RAC will operate from aboard the *U.S.S. Olympia* and the *U.S. Becuna,* 1300Z **Oct. 12** until 2000Z **Oct. 13,** to celebrate the anniversary of the U.S. Navy. Frequencies: phone—3.890 7.240 14.285 21.360 28.600; CW—3.590 7.050 14.050 21.090 28.150; Novice bands; 2 m. Certificates via Olympia RAC, P.O. Box 928, Philadelphia, PA 19105.

Duxbury, Massachusetts: The members of the Capeway RC will commemorate the 350th anniversary of Plymouth County from **Oct. 12-20.** Frequencies: phone—3.910 7.245 14.280 21.360 28.800; CW—50 kHz up from band edge. Certificates via Ray Witt, WA1OWQ, 62 Caldwell St., North Weymouth, MA 02191.

Moultrie, Georgia: The Colquitt County HRS will operate WD4KOW **Oct. 15-17,** 1300Z-2100Z each day from the 8th annual Sunbelt Agricultural Exposition. Operation will be in the General bands and on 19/79 for visitors. Special QSL via Colquitt County HRS, P.O. Box 813, Moultrie, GA 31776.

Circleville, Ohio: The Teays ARC will operate WB8PPH, **Oct. 16-19** 1900Z-0100Z each day, from the Pumpkin Capital of the world in conjunction with the annual Pumpkin Show of Circleville. Operation will be in the center of General phone bands. Colorful certificate via Len Campbell, WB8PPH, 895 State Route 188, Circleville, OH 43113.

Arkansas Pass, Texas: The Armadillo Gang will operate WB5YPE from the Shrimporee Family Festival **Oct. 17-19.** Frequencies: 7.260 14.280 21.375 28.600. QSL via WB5YPE, 5709 Bobalo, Corpus Christi, TX 78412.

Fort Walton Beach, Florida: The Playground ARC will operate a special-event station on **Oct. 19-20** in conjunction with the Boggy Bayou Mullet Festival. Operation will be in the center of the Novice and the General phone and CW bands, 10-80 meters. Certificates via PARC, P.O. Box 873, Fort Walton Beach, FL 32579.

St. Croix, U.S. Virgin Islands: The St. Croix ARC will operate KV4JC **Oct. 21** starting at 1400Z, to commemorate Hurricane Thanksgiving Day. Operation will be 14.260 and 10, 15 and 40 meters, if open. Certificates via St. Croix ARC, P.O. Box 4103, St. Croix, USVI 00820.

Lexington, North Carolina: The Healing Springs Mtn. VHF Society will operate WD4BBQ for the second annual Lexington Barbecue Festival **Oct. 26,** 1300Z-2100Z. Operation will be 15, 20, 40 General phone bands, 7.125 CW and local 2-meter repeaters. Special Bar-B-QSL via Healing Springs Mtn. VHF Society, Inc., P.O. Box 41, Lexington, NC 27293-0041.

St. Peters, Missouri: The St. Peters ARC will operate KBØHJ from 1700Z **Oct. 26, to 1700Z Oct. 27** at the Daniel Boone Home to commemorate the place Boone spent the last 40 years of his life. Frequencies: 3.915 7.240 14.280 21.420. A coonskin cap will be given to the first operator making contact on all four bands. Certificates via Bob Goin, KAØIKU, 3112 Powder Horn Trail, Charles, MO 63301.

Annapolis, Maryland: The Anne Arundel RC will operate W3VPR, **Oct. 26-27,** 1400Z-2000Z each day, in conjunction with Chesapeake Appreciation Days. Operation will be on 7.250 and 21.360. Certificates via Anne Arundel RC, P.O. Box 308, Davidsonville, MD 21035.

Dominguez, California: Commemorative station N6BSA will operate, 1500Z **Oct. 26** until 0200Z **Oct. 27,** in conjunction with the Camp-O-Rama sponsored by the Los Angeles Area Council celebrating the 75th Diamond Jubilee anniversary of the Boy Scouts of America. Frequencies: phone—3.910 7.250 14.250 21.350 28.550 145.690 223.500 146.235/146.835 224.600/223.000; CW—3.710 7.110 14.110 21.110 28.110; Packet—146.745/146.145. QSL via operator or P.O. Box 5082, Torrance, CA 90503.

Laurel, Maryland: The Laurel ARC will operate W3DQI **Oct. 27,** 1500Z-2230Z, to celebrate the anniversary of the restoration of the Montpelier Cultural Arts Center of Montpelier Mansion. Frequencies: lower 25 kHz of General bands on 75, 40 and 20 meters, and 147.54. Certificates via LARC, P.O. Box 91, Annapolis Junction, MD 20701.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by Oct. 15 to make the Dec. issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special Events Stations: To get your QSL or certificate from any of the special-events stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a stamped self-addressed envelope. If sending for a certificate, use a 9- × 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your s.a.s.e. to the address listed or to the address given on the air by the station you QSO. Be patient. Special-events stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

ALBERTA: SM: E. Roy Ellis, VE6XC—A/SM: VE6AMM, SEC: VE6XC. STM/NM/DEC: VE6ABC. VE6AFO is now TC for Southern Alberta. The AARCS net is on holidays till Sept to give VE6AMM a Chance for a Holiday. ADS is now known as APSS (Alberta Public Safety Services). New HF radio station from Fed Govt which is expect in near future will be installed at APSS. Holiday time means new voices on the rptrs of Hams from far away spots. If we can be of service to you just make your request known. Traffic: VE6CPE 19.

MANITOBA: SM, Jack Adams, VE4AJE—SEC: VE4FK. NMs: VE4ANR, VE4AFO, VE4AJE, VE4VJ, VE4TE. Congratulations to Dave Snydal, VE4XN, who was elected Ham of the Year for Manitoba at the International Hamfest at the Peace Gardens the weekend of July 13, 1985. We regret the loss of Edwin, VE4EF, who became a Silent Key July 17. A reminder to those who may have items of interest and would like to have it in section news contact your SM, yours truly Jack VE4AJE. Net reports - CRRL EPN - 31 sessions, QNS 966, QTC 16. MMN - 31 sessions, QNS 761, QTC 36. MTN (CW) sessions 16 QNS 95 - QTC 24. Traffic: VE4RO 60, VE4AJE 39, VE4TE 34, VE4AFO 31, VE4IX 30, VE4AAD 19, VE4GB 18, VE4DT 7, VE4FK 6, VE4CR 4, VE4NE 4, VE4DS 2, VE4AEE 1, VE4LQI 1.

MARITIME-NEWFOUNDLAND: SM, Don R. Welling, VE1WF—ASM: Aaron Solomon, VE1OC. PEI ARA operated XJ1PEI Cavendish, PEI celebrating National Parks Centennial. CG9XG active from Canada Summer Games, Saint John, N.B. VE3FXT/VE1 operated CY6SAB Sable Island. VE1AGH active as VE0MBX Maritime Mobile. Moncton ARA held successful Flea Market. VE1CBG now VE1RO and sporting new antenna. VE1CHA has new TS-430. VE1AS building another linear. Recent hospitalizations incl. VE1CAZ, VE1QK, VE1OC. Recent visitors VE-1 incl. WA1VQN, WD8DYQ, VE3BT, VE3WI, VE3WW, VE6YB formerly VE1AUT. Coming Events: Bicentennial Hamfest, Saint John, N.B. Oct. 18-20. D.O.C. Exam Oct. 16.

ONTARIO: SM, Larry Thivierge, VE3GT—BM: VE3LST, PGL: VE3AR. SEC: VE3GV. STM: VE3BDM. TC: VE3EGO. I had the opportunity to attend, as an observer, the recent CRRL Inc., annual meeting of the Board of Directors. The agenda was a lengthy one with all the items being covered in the one day meeting. The minutes of the meeting can be read in an upcoming Canadian Newsfront column. This was an enlightening experience. Many amateurs do not wholly appreciate or realize the work that is carried out on their behalf by this group of dedicated, elected officails who volunteer their time in the pursuit of our hobby. We all owe them our vote of thanks for doing an excellent job. New members of the Southern Ontario Chapter 73 QCWA are VE3CXK VE3JUD VE3BPO. The Boy Scout Jamboree held in Guelph generated an armload of traffic through their station, VE3SCJ, operated by VE3ISD. Unfortunately the NTS was not tipped off in advance in order to properly prepare for the heavy volume. With the bulk of the traffic computer generated, this occasion would have been ideal to employ packet and/or RTTY stations. BPLs were earned by VE3SCJ VE3FAS VE3KK. VE3EFX and VE3HIR have moved from Tiverton to Kincardine. A group of the Barrie ARC, with a budding interest in packet radio, decided to form a packet radio study group which became known as HEX 9 (originally nine members). Their work resulted in a local area network being established and 6 AX.25 stations are on the air. They are located in Orillia, Barrie, CFB Borden, Alcona Beach and King City. VE3LSR, in Edgar, is running a dedicated digipeater, and VE3HHW, in Alcona Beach, is running a packet radio bulletin board on a TRS-80 computer. Traffic: VE3KK 1079, VE3SCJ 1066, VE3FAS 590, VE3DCX 241, VE3CYR 214, VE3WM 158, VE3GOL 114, VE3GNW 107, VE3DPO 106, VE3GT 103, VE3WV 88, VE3BDM 80, VE3FGU 56, VE3KCZ 50, VE3AJN 40, VE3GSQ 39, VE3BAJ 34, VE3GFN 27, VE3EWD 19, VE3MCO 18, (Jun) VE3GNW 59, VE3AJN 48, VE3DCX 28.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. PIO: VE2YW. TC: VE2ED. A/TC: VE2CP. NM: VE2EDO. With the return of activities at the end of summer, more appointees will be needed, please contact your SM. The QSN has now returned to its winter schedule, daily at 1900 hrs. local on 3648 MHz. VE2VL est de retour sur HF, apres plusieurs mois d'absence. Plusieurs appointements sont disponibles, svp contacte votre SM. Traffic: VE2CP 250, VE2EDO 123, VE2EC 57, VE2BP 42, VE2EKC 32.

SASKATCHEWAN: SM, W. C. Munday, VE5WM—SEC: VE5CU. STM: VE5HG. TC: VE5GF. ATC: VE5X2. BM: VE5WM. OBS: VE5JA. NMs: PWXN - VE5EX; MJARC 2 Meter - VE5AEM; RARA 2 - VE5AEJ; SATN - VE5BAF; SPN - VE5HG. VE5WH became a Silent Key July 21st after a lengthy illness. After a stay in hospital, VE5LE and VE5WF are convalescing at home. Best wishes on a speedy recovery. VE5VJ/5H3HM returned from Tanzania for a short stay in the Province. This is hamfest season and by the time this appears in Section News, Hamfest '85 will be history. More detail will follow in the October issue. Remember the RSO-CRRL Convention September 27, 28 and 29 in London ON.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—STM: W3DKX. SEC: W3PQ. PIO: N3DIP. PSHR: K3JL, W3DKX, WA3DUM. John Hartman, WA3ZBI, due to a job change has moved out of state, and has resigned as SM. I have been appointed to finish his term. SARA furnished communications for the OLD Fashioned Sussex County July 4th Celebration. Those active were K3PFW WA3ZBI W3FEG KA3LWJ K3JL WA3VIT KA3CDF W3FKT WB3DUG WA3WIY. Sorry if I missed anyone. DTN: QNI 360 QTC 44 in 23 sessions. DEPN: QNI 61 QTC 8 in 4 sessions. SEN: QNI 41 QTC 1 in 4 sessions. Net managers: DTN W3DKX. DEPN K3JL. SEN KC3JM. Traffic: W3QQ 88, W3DKX 46, WB3DUG 41, WA3WIY 24, N3AXH 22, WA3KUM 15, KA3IXV 13, K3JL 11, K3ZXP 9, KC3JM 7, KC3FW 6.

MARYLAND-DC: SM, John A. Barolet, KJ3E—Thanks to Karl, W3FA, for being an active and likable SCM/SM for many years. I hope my efforts to replace him will be satisfactory. Traditionally, October is Simulated Emergency Test month; are you prepared for whatever test your local EC arranges this year? Be ready to handle traffic of some type and to operate on emergency power, either at home or away from home. That is the amateur radio tradition. Also, the time has come to organize a 2-meter traffic net, both to overcome the poor operating conditions on the evening HF nets and to provide a traffic-handling opportunity for the large number of VHF-only amateurs operating during the evening hours. How about 2030 local time? Interested? Contact me. The Southern Maryland ARC and the Mountain ARC report many upgrades from examinations given. W3PBV, KC3RW, KA3EMV, and WA3UMI moved to Extra Class. The Allegany County ARES provided communications for the Fifth Annual Great Allegany 15K Run; 18 amateurs led by EC W3DFW and K3MWI participated. Nineteen MEPN members led by Director N4DR and Manager WA2ERT, plus some family members, attended the MEPN picnic at Taneytown. KN3U is the new Montgomery County EC, replacing WA3BMM whose job keeps him on the road and away from RACES/AREX duties. A regional EC group has organized in the Washington, DC metropolitan area including members from Montgomery and Prince George's Counties, the District of Columbia and nearby Northern Virginia. WA2WDT is preparing a "resource Book" for use by members of this group. Congratulations to W3FQH who celebrated his 50th anniversary as a "ham" on July 9. And thanks to AK3B for arranging the Governor's Proclamation of Amateur Radio Week, June 17-23. I'm sorry to report that W3AZV, an Anne Arundel Radio Club old timer, became a Silent Key July 14. With the nets: Net/Manager Sessions/Traffic/QNI average: MEPN/WA2ERT 30/163/23, WRPON/WB3BFK 23/17/9, MDCPON/W3OYY 4/1/15, MSN/KC3Y 31/74/12, WaCty2-mtr/KC3DW 5/1/4, WiCty ARES/KA3HUT 4/0/9. Traffic: KC3DW 247, KK3F 208, KJ3E 173, KC3Y 143, K3NNI 103, KC3AV 92, WA2ERT 84, N3DE 71, W3YVQ 61, KA3EWV 58, W3DQI 28, N3EGF 21, K3MR 21, W3LDD 20, WB3BFK 18, K3ORW 15, W3FZV 12, WB3FUE 9, KA3IID 5, WA3TOY 5, KC3D 4.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: VACANT. SGL: KA2KMU. PIO: VACANT. BM: WB2UVB. OOC: WA2HEB. ATC's: N2BQT and K2JF. I'd like to announce that Ken Horning, KA2KMU of Cape May has been appointed our State Government Liaison (SGL). Ken is a retired school teacher who has been involved with state government relations while serving on the state committee dealing with legislative matters for the NJ Education Association. His address is: 105 Bayridge Road, Bayshore West, Cape May, NJ 08204. Please don't forget the annual Simulated Emergency Test (S.E.T.) on October 19 and 20. With each county in our section having an EC, there should be some sort of simulated disaster in your local area. This also gives our National Traffic System (NTS) a chance to see if there are any weak links while handling emergency traffic. Support your local and section ARES team by helping out in this important exercise. If you don't know your county EC, please contact our SEC K2QIJ, P.O. Box 73, Burlington, NJ 08016. 73. Traffic: WB2UVB 214, WA2MGV 29, KA2CQX 18, WA2HEB 14.

ROBERT W. MINK

Kaiserslautern, Germany—Robert W. Mink, W2TV, age 28, was killed in an automobile accident in Kirchheimboladen, Germany, on June 8, 1985. Bob, initially licensed as WN2RYD in 1970, had been an active traffic handler and ORS in New Jersey until enlisting in the Navy 1975. As a Navy Seabee, Bob operated as VQ9RM from Diego Garcia in the Indian Ocean and KG4RM from Guantaumo Bay, Cuba. Most recently he had operated as DA2XC from Germany where he was employed by the US Air Force. Bob graduated from the University of Maryland, cum laude, in 1984. He was a member of the ARRL and the Veterans of Foreign Wars. In addition to amateur radio, his hobbies included sailing, rackquetball, jogging, woodworking, and auto mechanics. He is survived by his parents, Charles and Elinor Mink, and a sister Patricia, all of Fair Haven, N.J. and a brother, Charles, KF2U, of Mount Laurel, N.J. He was interred at Beverly (N.J.) National Cemetery on June 17.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—SEC: W2BCH. ACC: N2EH. PIO: WA2PUU. TC: K2QU. BM: W2GLH. SGL: KO2X. OOC: W2AET. STM: OPEN. CLUB OFFICERS: GRAM-WB3JSU NA2O WB2JOD KC2QQ; Boonville NC2O W2VYI KA2SJG KA2FOR. RAWNY awarded "MEMBER OF THE YEAR" plaque to KD2V an active VE head of RAWNY training, Assistant Secretary NYSPTEN and active traffic Handler—CONGRATS Hall Reports: (OBS) WB2DSR WA2ZPE. (OES) W2MVH. COMMS: Boonville Pacemaker Millar Deer Run 15K; Oswego Fourth of July Parade; Oswego YMCA 5K and 10K; "Tour de UTICA"; Boilmaker Race; Westmoreland Bicentennial; Owego Y-athlon; tin Man Triathlon at Tupper Lake—with thaks to these public service-minded operators: NA2A KA2AIW KD2AL KA2AON N2AWS WA2AZA NF2B K2BFI WB2BHS W4BMY N2BOI K2BRF KA2CFH KA2CHX WA2CNB N2CNV WB2CWG WA2CZR N2DGD N2DLG W2EWO (EC) KB2DP (EC) KA2DTO KD2EE WB2EXL N2EZT KY2F (EC) N2FJS WA2FLX W2FMM WA2FSU WA2GIU W7GUN K2GVI WA2HWG KX2I WA2JFP KA2JJK WB2JNV WB2JRV KC4KN WA2KOJ WB2LBI WA1LLC WA2OEP (EC) K2OH KA7OLE WB2OPH KA2OQB K2OVH WA2PHM KA2PPS NA2Q WB2QFE KC2QV KA2BIR KA2RRY KA2RSC WA2SEF (EC) W2SVI WB2SZY KC2TB KA2TNH KA2TSC KA2UBD WA2UKR K2UNY W2VDX KB2VG KA2VTP WB2WGF WB2WMB W2WNK K2XU K2YAI WA2YNS KI2Z KB2ZZ. Public Service Honor Roll: KA2BHR KG2D KA2DQA WA2FJJ VE2FMQ WB2IDS WA2KOJ W2MTA WB2OWO ND2S KX2T K2YAI. No July BPL.

Net Name	QNI-QSP-QND	Net Name	QNI-QSP-QND
NYS/1* (M)	333-162-31	NYS/4 (E)	377-202-31
WDN/1* (M)	403-095-31	JCARCN	448-005-29
Mike Farad	219-027-31	LCARES(Sun)	052-000-04
NYPON*	592-337-31	OARCN (Wed)	068-000-05
NYSPTEN	494-070-30	BRVSN	357-018-31
ESS (3590)	338-066-31	CNYTN*	275-046-31
OCTEN/6* (E)	570-019-31	OCTEN/8* (L)	297-065-31
Q Net	413-007-31	STAR* (Sat)	024-000-14
WDN/8* (E)	605-143-31	WDN/8* (L)	662-147-31
Blueline	429-044-31	Mohawk VTN	010-007-07
VHF THIN	054-000-06	NYS/6* (L)	373-285-31

*NTS Net. Batavia HAMFEST BIG success even with wet green grass and about 1,000 present. Liverpool ARC/Special Service Club presented a Packet Radio Conference with W2DUC and other speakers—K2QCX/NA2C. CONGRATS: W2CUY (x8AMZ/W8CUY) now in 65th year with mamteur radio! ARRL 50 year plaques to WA2FLT and W2RIZ(former SCM WNY). WA2OEP reports Black River Valley ARC ahd booth at Lewis County Fair with good PR results! Again, THANKS to the Volunteer Exam Teams that have Been working so hard this Summer! CONGRATS to KB2KW, Southern DEC, FB PR in Binghamton Sunday newspaper supplement "Radio hams find fun in public service and friendship." Color Front Cover and two page spread with many pictures! Traffic: WA2FJJ 443, WB2OWO 381, WA2HSB 326, WB2IDS 307, W3GJ 274, W2MTA 245, VE2FMQ 231, K2YAI 156, WB2QIX 146, ND2S 128, KA2DQA 108, KG2D 102, KX2T 102, KA2BHR 90, WA2KOJ 84, W2HYM 73, WA2OEP 55, AF2K 48, W2FR 47, N2EVG 43, W2PPS 42, KA2DBD 31, W2UYE 29, WB2KCT 16, K2IUT 6, K2VR 4. (June) N2FIZ 38, K2IUT 6, WB2NAQ 3. (May) W2FR 76.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—ASM & STM: WN3VAW. SEC: WA3UFN. PIO: WB3IZJ. SGL: K3HWL. TC: K3LR. OO Coor: KJ3Q. BM: KR3P. WPACW QNI 235, QTC 120. WPAPTN QNI 492, QTX 108, WPA2MTN QNI 566, QTC 58, NWPA2MTN QNI 883, QTC 3 PFN QNI 172, QTC 90, all had 31 Sess. Now to finalize the storms and tornadoes that hit the Western Pennsylvania on the afternoon of May 31. According to the National Weather Service 11 different tornadoes hit within minutes of each other. These tornadoes had extremely high winds in the F4 & F5 range meaning wind speeds of 200 to 300 miles per hour. Some had a width of 2.2 miles compared to the average of about an eighth mile width. The distance traveled was more than usual one stayed on the ground fo almost an hour and went 41 miles. The work of amateurs in the disaster area was excellent. In Erie, Crawford, Butler and Beaver Counties the operators worked long hours with the American Red Cross and other relief agencies providing communicatins. Beaver Cty had about eighty Hams, Butler Cty 85 Erie 50, Crawford 50. The amateurs have been praised for their professional operating and dedication by the various groups. The toll was 62 deaths and at least 233 hospitalized. I want to express my thanks and WA3UFN the SECs also. WA3UFN will be writing to the ECs and ROs in the section on the linking of counties for a SKYWARN Net to provide a better coverage for a warning system. All information can be received from the national Weather Service. Also speakers can be had if requested. SKYWARN nets can be separate and tied in with section wide. Traffic: W3EGK 277, WA3DBW 200, KA3ETC 129, W3RUL 89, W3NGO 84, W3OKN 81, WA3UNX 78, N3FM 49, W3KMZ 44, K3SMB 44, KQ3M 36, KC3JQ 32, K3NPW 32, W3MML 22, WA3QNT 20, W3KUN 15, WB3GUK 11, KR3P 9, N3EKJ 7, KA3EGE 7, N3EMD 6, K3LTV 5, W3TTN 3, (June) W3KUN 22.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: KB9X. OOC: W9TT. BM: K9ZDN. SGL: W9KPT. PIO: K9IDQ. ACC: WB9SFT. TC: N9RF. ASM: K9ORP. Yes, this is the Illinois column! It may not look like the right place to you this month owing to a change in format suggested by the head shed in recent issues of "Section Leader." It was suggested that monthly rehashing of Section Net data in the form of a table, and lists of participating stations serve little purpose and waste valuable QST space. I for one am willing to give it a go, but I'll need your help. This is the column of YOUR Section. If you have news of interest which is not time sensitive please send it to me with your monthly report. If you have an event or meeting you wish noted here, send it with your monthly report FOUR MONTHS in advance of the event. The Radio Amateur Megacycle Society will be sponsoring the Illinois QSO party which will be held October 6th from noon to 7 PM local time. For a copy of the contest rules send an SASE to Joe LeKostaj, WB9GOJ at 9134 Ewing Ave., Evanston, 60203. Illinois ARES Seminar Part II: The "downstate" session of the Illinois ARES Seminar will be Saturday, November 2nd at the Mt. Vernon High School and will be hosted by Jefferson County EC WD9GHG. Talkin will be on the Mt. Vernon 147.735(out) repeater. Additional details will be published in the Illinois Emergency Communicator just before the meeting. THREE IN ONE MONTH! BPL's that is, going to KA9FEZ, KB9X and KW9J. Congratulations to all three for a first during my tenure as SM. On July 4th at 330 P.M. a resident of a local nursing home wandered away and quickly became lost. As the resident suffered from Alzheimer's disease it was imperative that he be found quickly as he was unable to care for himself. At the request of nursing home officials, Logan County EC WB9CWE called for local ham assistance on the 147.945 repeater. Nine area amateurs responded and were later joined in the search by police, K-9 units, Boy Scouts, REACT, and other citizen volunteer groups. W9LHS served as radio link between the amateurs and the local authorities, setting up a communications post at the nursing home. Hams combed large areas surrounding the home and provided radio communications for the search teams. At 430 P.M. the following day, the man was found by one of the search teams in the middle of a small cornfield. Nursing home officials cited the amateurs as being very instrumental in the search and expressed their sincerest thanks to all. Thanks and congrats to WB9CWE and his crew for the above report. Traffic: KA9FEZ 750, KW9J 635, KB9X 383, W9HLX 261, W9NXG 228, W9JIJ 197, WB8RFB 116, W9HOT 113, KD9K 80, NC9T 78, ND9V 78, KC9YN 75, KA9EWN 63, KZ9I 46, K9EHP 40, KA9BBV 36, W9KR 24, W9HBI 21, K9EUI 20, K9QEW 18, N9EWT 14, W9VEY/M 14, W9KPI 12, KB9QX 11, WB9TVD 10, W9LDU 9, W9LNQ 8, WA9RUM 6, WA9SID 6, N9ELU 5, K9WMP 4, W9IL 3.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WB9ZQE. STM: W9JUJ. SACC: K9TUS. STC: K9PS. SGL: WA9VQO. SOBC: KC9TA. SPIO: K9DIY. SRC: N9WB. SOOC: KJ9G. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, IRN KB9SU, VHF W9PMT, IWN KA9ERC.

July Net Reports:

Net	Freq.	Time Daily UCT	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	3164	481	2688	93
QIN	3656	1430/0000/0300	630	466	2034	93
ICN	3708	2315	77	34	562	26
IRN	3629	0000	143	35	797	29
IWN	3910	1310	1735	0	391	31
IWN	VHF	Bloomington	1027	0	310	31

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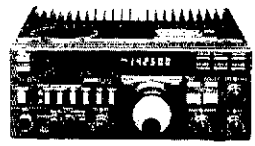

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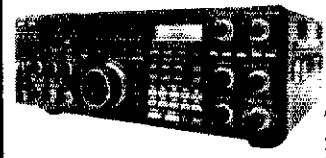

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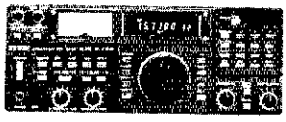

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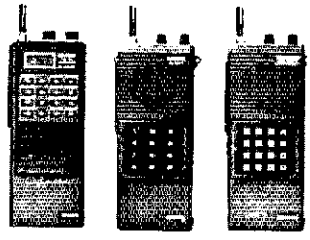

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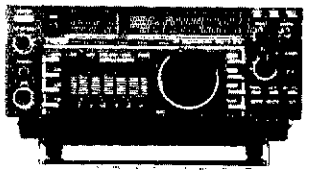

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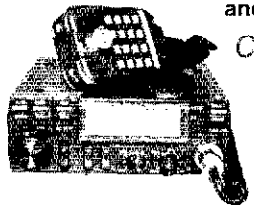

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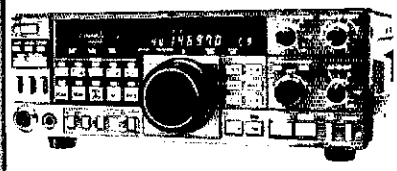

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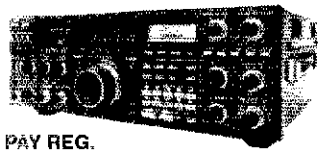

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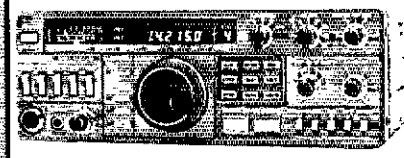

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IWN VHF Kokomo 1294 0 221 31 Hoosier VHF Nets for July QNI 6305, QTC 239, Bulletins 42, QTR 6166 in 211 sessions for 20 nets. 9RN cycle four QNI 389, QTC 710, QTR 1087, sess. 62 IN 100% Stns. N9AEI N9HZ KJ9J W9JUJ WB9OFG WA9QCF W9QLW WB9UYU K9WWJ D9RN 503 messages in 1154 minutes. IN. 69% Stns. K9CGS, W9JUJ, N9DWU, KA9BID. CAND 1319 messages in 31 sessions. D9RN 100%. Stns. N9DWU, W9JUJ, Appointments: EC K9JDF for Allen County. OO/AA KA9BYN Logansport. Silent Key W9UUN of Fort Wayne. WB9KJZ is in a nursing home in Middletown. The Richmond ARA assisted with the Rose Festival Parades and the July 4th fireworks. The Lake County ARC assisted with the Cerebral Palsy Triathlon. The Indianapolis Red Cross ARC assisted with the Eagle Creek Triathlon and the White River Park State Games. The Kokomo ARC assisted with the Festival Parade and Bicycle race. We now have two new Special Service Clubs, The Porter County ARC and The Miami County ARC. The Muncie Area ARC has renewed its SSC status. Certificates of Merit were awarded the following stations: KB9SU W9CNE W9UEM W9BTZ N9DHX N9AJM WA9VQO W9DUU W9RTH and K9WWJ. Congratulations to Charles and Louise Clark co-recipients of the IRCC Ham of the Year Award. Traffic: W9JUJ 1208, W9CNE 266, KJ9J 251, W9JZV 170, K9WWJ 163, WB9UYU 141, W9UEM 104, KB9HH 93, WA9QCF 87, KA9FFO 55, N9AEI 47, W9UMH 45, W9DFK 41, KW9D 38, WB9OZZ 35, W9HZ 33, K9KTB 33, KI9R 28, WB9OFG 28, N9DYC 24, WB9AWJ 23, KA9EIV 23, W9OYY 22, W9BTZ 22, KW9C 19, K9JDF 18, KD9ER 15, W9PMT 14, WD9ART 13, KA9KRE 11, WB9IHR 10, AB9A 9, W9XD 8, K9BRF 7, WD9DWD 6, WA9OKK 6, K9OUP 6, K9PS 6, W9EHY 6, KK9D 6, W9URS 4, K9SBW 4, WD9CIV 4, WD9GWM 3, N9DGO 2, W9RTH 2, KB9C 1, W9BDP 1, WB9ZQE 1, KM9B 1, KA9BID 1, WA9JNC 1, KC9DU 1, KB9SU 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9OAK. STM: K9UTQ. ACC: KA9FQZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. Two-way contact with W8ORE Space Shuttle Astronauts was made August 3rd by Al Hovey, WA9BZW, while he was mobile in Sheboygan County. Al may be first Wisconsin Amateur and first mobile operator to contact an Astronaut. On August 4th, contact with W0ORE was made by members of the young family, Dad N9EGE, Mom N9ETE, and Son KD9FC. N9ETE received a "loud and clear" report and she might be the first Wisconsin woman ham to contact an astronaut. Excited AJ9U in Milwaukee made contact on that same orbit. Thanks to PIO K9ZZ for getting the news of the astronaut contacts into many newspapers, including the Milwaukee Sentinel, and to the club newsletters. BM WB9JSW, busy organizing OBS activies, is looking for RTTY or computer capable amateurs. The Wisconsin Area Packet Radio (WAPR) has been formed with 43 amateurs attending the first meeting in South Milwaukee; contact WD9ESH for more information. KMRA Ham, Computer and Video Fest, is October 13th at Waukesha Exposition Center. Simulated Emergency Test (SET) is October 19-20, check with your EC, DEC or SEC for duties. Milwaukee Circus Parade and railroad train support was a tremendous success with help from Milwaukee ARES communicators; they're now preparing for Pumpkin Patrol. DEC NB9H needs ECs for Ashland, Bayfield, Burnett, Pepin, Polk and Rusk counties. N9ECE is now an OO; OOC NC9G is looking for more OOs, NM W9JSF says "This month's NWTN checkins and traffic was best it has been all year and beat last year." For a local 2-meter net, the support is great Carl. Milwaukee RAC License Classes doing well. If you are interested in computers, listen to the Computer Net on Milwaukee 146.91 MHz, Mondays at 9 P.M. For information about Society of Midwest Contesters write to Wisconsin Chairman W9XT. Silent Keys W9DYB and W9GTB. WA9OVU received Extra and has 290 DXCC. N9DIJ, wife of K9GDF, passed Advanced.

WSBN	3985	5:30 P.M.	WA9ZTY	787-236-31
WIN-E	3662	7:00 P.M.	WB9ICH	247-184-31
NWTN	34/94	6:30 P.M.	W9JSF	544-84-31
WCWTN	31/91	6:00 P.M.	N9DHT	521-42-30
WNN	3723	6:00 P.M.	KA9OBP	116-28-30
WSSN	3645	6:30P.M.	N9BDL	146-26-31
XPO	3925	12:31 P.M.	WA9YVC	301-12-21
WIN/L	3662	10:00 P.M.	KC9CJ	183-92-31
BWN	3985	6:00 A.M.	WD9IID	1248-1429-27

Traffic: KA9CPA 1286, WB9YPY 380, W9YCV 310, KC9CJ 286, W9CBE 237, K9GDF 202, WA9WYS 172, KA9OBP 165, N9BGE 148, WB9ICH 139, W9UCL 125, N9AUG 109, WD9IID 105, W8JSF 95, KA9BHL 91, N9BDL 91, AG9G 75, K9AKG 74, N9DHT 73, W9IEM 68, WD9FRI 68, W9DND 64, WB9RGO 56, WA9ZTY 56, WB9ESM 48, NB9H 48, W9FDY 40, N9BCX 39, KD9JF 37, K9JPS 36, WB9JSW 34, W9ODV 33, K9FHI 32, KG9B 30, WA9YVC 29, KA9JJY 28, N9DCF 27, KA9MSR 25, KA9RII 24, KA9BHK 20, K9UTQ 19, KV9U 13, W9UW 13, KY9P 11, WB8RGE 7, W9NGP 5, K9BED 4, (Jun) KC9CJ 265, N9BGE 165, WB9YPY 131, AG9G 68, WB9ESM 61, W9FDY 40, K9FHI 38, KD9JF 33, W9IHW 33, NB9H 30, K9JPS 28, N9DCF 25, KG9B 24, N9BCX 22, KY9P 14.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr. KCØT—SEC: KAØARP. STM: KDØCI. I wish I had the space in this column to salute each amateur who made a contribution to public service in July, or any month for that matter. Coverage of a tornado and two automobile mishaps were reported to me, there may be more. We can all be very proud of our collegues who demonstrate time and again how important and vital amateur radio can be. The tornado on Mille Lacs Lake was handled by amateurs who, as a group, were not trained for this type of situation, but conducted themselves in a disciplined manner. WAØCEL and WØLTP reacted to road mishaps as quickly as could be done, both incidents were away from any populated areas. Mobile two meters proved very valuable. The message out of all of this is, prepare for and participate in the upcoming SET. NET NEWS: After running MSN/1 for nearly two years, WØEHI resigned effective Aug. Our tnx to him for a job well done. As a result, some other changes are taking place on the CW net leadership, new assignments are: NCØE for MSN/2, KAØEPY switches from MSN/2 to MSN/1. "Ham of the Month" honors for July go to KØDUM who was NCS during the Mille Lac Lake tornado. KDØCL upgraded to Extra recently and KDØHB is now NMØS. This month we salute the New Ulm Amateur Radio Club, Pres: NDØA who is also the new assistant net mgr of MSN/2, VP: KAØQVX & Sec-Treas: KBØDV. New Ulm ARC is a Special service club and holds meetings the last Tuesday of each month. They have a very active group involved in ARES, the VE program, and various special events thru the year. Membership as of last March was 20. If you like the Section News and you wish to see it continue as part of *QST*, drop a note to HQ. Believe it or not, this column could be dropped in the future, so your input is very im-

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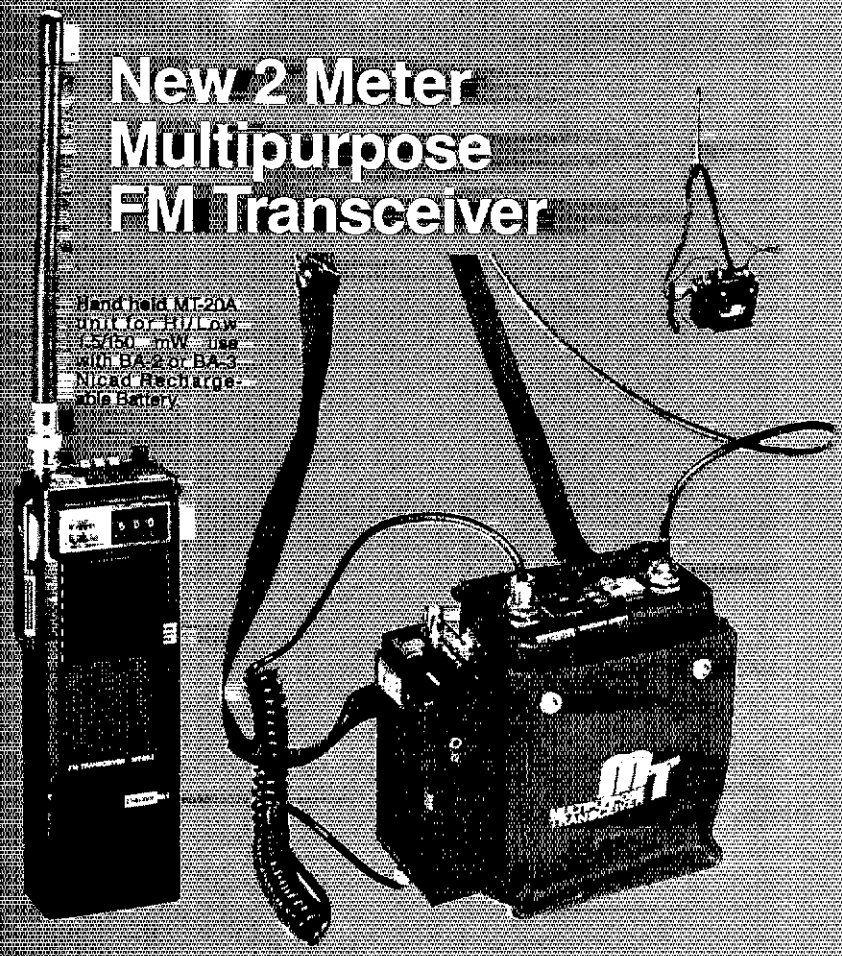
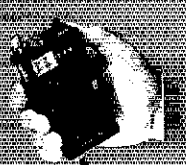


Hand held MT-20A unit for Hi/Low 1.5/150 mW use with BA-2 or BA-3 Nicad Rechargeable Battery.

Portable transceiver puts out 10 Watts... ideal for amateur participation events such as emergencies... athletic events... marathons.

The new MT-20A transceiver can be used as a 10 W portable unit with carrying case, LA-20 Linear Amplifier and rechargeable Nicad Battery.

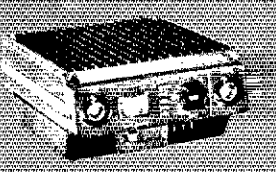
Easy to read thumbwheel digital switches provide complete coverage of the 2 meter band in 5 KHz steps.



In mobile operation, the MT-20A transceiver provides 20 W output when used with the LA-20 Linear Amplifier and plugged into the vehicle cigarette lighter through an SD-1 adapter.

Use hand held transceiver for all functions... Thumbwheel Frequency Selector... Built-in S Meter... Microphone... Speaker.

For base operation, the MT-20A transceiver provides 20 W output with the LA-20A Linear Amplifier, or can be used with any linear amplifier connected through the SD-1 Adapter.



The new LA-20 2 meter linear amplifier provides 20 W at 13.8 VDC/10 W with Nicad batteries of stable transmitting power using high performance transistors.

MT-20A SPECIFICATIONS

■ General	
Frequency	144-148 MHz in 5 KHz steps
Emission type	F3 (FM)
RF output impedance	50ohm unbalanced (BNC socket)
Power source	9.6V DC (8 x 1V DC)
Current drain	150mA Max. on reception 20mA on reception with no input signal 580mA Max. on transmission
Dimensions/weight	Main unit (without battery pack) 76mm(H) x 60mm(W) x 28mm(D)/250g Battery pack (Model BA-2/BA-3) 40mm(H) x 60mm(W) x 30mm(D)/120g
Repeater device	Built-in 600KHz transmit down shift switch 600KHz transmit up shift switch
Illuminated Dial	
■ Receiver	
Circuitry	Double-conversion Superheterodyne
Sensitivity	Better than 1 μV for 20dB S/N
Selectivity	Greater than ± 7.5KHz/ – 6dB Greater than ± 15KHz/ – 60dB
Image rejection	Better than – 60dB
Audio output	200mW (8 ohms)
■ Transmitter	
RF output power	High 1.5W Low 150mW
Modulation	(FM)
Spurious emission	Better than – 60dB
Microphone	Electret condenser Microphone, built-in (impedance 2K ohm)
TU-1	CTCSS unit optional

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MFJ-941D 300 WATT VERSA TUNER II

$99.95 (+$4) **MFJ's fastest selling tuner packs in plenty of new features.**
New styling! Brushed aluminum front. All metal cabinet.
New SWR/Wattmeter! More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.
New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.
New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 watts RF power output.
Matches everything from 1.8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.
Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ-940B, $79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
MFJ-945, $79.95, like MFJ-940B with balun, less antenna switch.
MDJ-944, $79.95, like MFJ-940B with balun, antenna switch on front panel, less SWR/Wattmeter.
Optional mobile bracket for 940B, 945, 944, $5.00.

MFJ-900 200 WATT VERSA TUNER

Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. **$49.95** (+$4)
5x2x6 in. **Use any transceiver,** solid state or tube. Operate all bands with one antenna.
OTHER 200 WATT MODELS:
MFJ-901, $59.95, like 900 but includes 4:1 balun for use with balanced lines.
MFJ-16010, $39.95, for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B 300 WATT DELUXE VERSA TUNER II

$139.95 (+4) **MFJs best 300 watt Versa Tuner II. Matches everything** from 1.8 - 30 MHz, coax, randoms, balanced lines, up to 300W output, solid state or tubes.
Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.
Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2 range wattmeter (300W and 30W).
6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-962 1.5 KW VERSA TUNER III

Run up to 1.5 KW PEP **$229.95** (+$10) and match any feedline continuously from 1.8 to 30 MHz; coax, balanced line or random wire. Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. **6 position** antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 inches.

MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

$329.95 (+$10) **Meet "Versa Tuner V". It has all the features you asked for,** including the new smaller size to match new smaller rigs - only 10 3/4"W x 4 1/2"H x 14 7/8"D.
Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP- the power rating you won't outgrow (250 pf-6KV caps).
Roller Inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.
Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.
Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter MFJ-1312 is available for $9.95.
6-position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.
Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.
MFJ-981, $239.95. 3 KW, 18 position switched dual inductor. SWR/Wattmeter. 4:1 balun.

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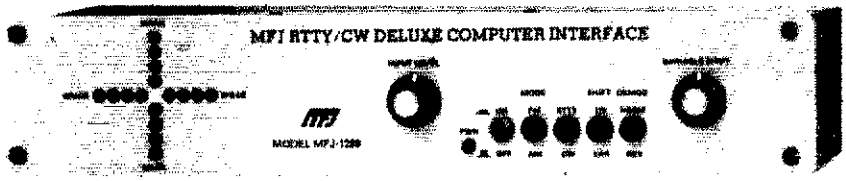
NEW FROM MFJ

MFJ'S MOST ADVANCED RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE HAS FM, AM MODES, LED TUNING ARRAY, RS-232 INTERFACE, VARIABLE SHIFT TUNING, 170/850 Hz TRANSMIT, MARK-SPACE DETECTION.



MFJ RTTY/ASCII/CW software on tape, cables for C-64/VIC-20.

MFJ-1229
$179.95

Engineering, performance, value and features sets MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from others.

FM (limiting) mode gives easy, trouble-free operation. Best for general use, off-shift copy, drifting signals, and moderate signal and QRM levels.

AM (non-limiting) mode gives superior performance under weak signal conditions or when there are strong nearby stations.

Crosshair mark-space LED tuning array simulates scope ellipse for easy, accurate tuning even under poor signal-to-noise conditions. Mark and space outputs for true scope tuning.

Transmits on both 170 Hz and 850 Hz shift.

Built-in RS-232 interface, no extra cost.

Variable shift tuning lets you copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift.

Sharp multi-pole mark and space filters give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Factory adjusted trim pots for optimum filter performance.

Multi-pole active filters are used for pre-limiter, mark, space and post detection filtering. Has automatic threshold correction. This advanced design gives good copy under QRM, weak signals and selective fading.

Has front panel sensitivity control.

Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output.

Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying for transceivers with FSK input.

Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack.

Kantronics software compatible socket.

Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch.

Metal cabinet. Brushed aluminum front. 12½x2½x6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ MULTI-FUNCTION TUNING INDICATOR

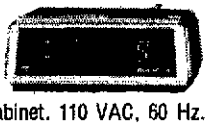
MFJ-1221
$79.95

Greatly improve your RTTY copying capabilities. Add a crosshair LED Tuning Indicator that makes tuning quick, easy with pin-point accuracy. **Add** mark and space outputs for scope tuning. **Add** LEDs that indicate 170, 425, 850 Hz shifts. Great for copying RTTY outside ham bands. **Add** sharp mark and space filters to improve copy under crowded/weak conditions. 170, 425, 850 Hz shifts. **Add** Normal/Reverse switch to check for inverted RTTY without retuning. **Add** output level control to adjust signal into your terminal unit. **Add** a limiter to even out signal variation for smoother copy.

Unit plugs between your tuner and receiver. Mark is 2125 Hz, space is 2295, 2550 or 2975 Hz. Measures 10x2x6 in. and uses floating 18 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

24/12 HOUR CLOCK/ID TIMER

MFJ-106
$19.95



Switch to 24 hour UTC or 12 hour format! Battery backup. ID timer alerts every 9 minutes after reset. Red .6 in. LEDs. Synchronizable to WWV. Alarm, Snooze function. PM, alarm on indicators. Gray/Black cabinet. 110 VAC, 60 Hz.

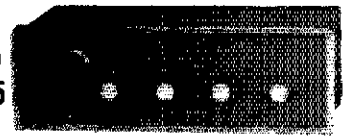
MFJ ELECTRONIC KEYER

MFJ-407
$69.95

MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

MICROPHONE EQUALIZER

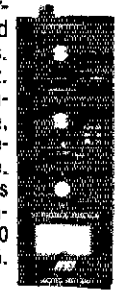
MFJ-550
$49.95



Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ±12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches. 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ ANTENNA BRIDGE

MFJ-204
$79.95



Trim your antenna for optimum performance quickly and easily. Read antenna resistance up to 500 ohms. Covers all ham bands below 30 MHz. Measure resonant frequency of antenna. Easy to use, connect antenna, set frequency, adjust bridge for meter null and read antenna resistance. Has frequency counter jack. Use as signal generator. Portable, self-contained. 4x2x2 in. 9 V battery or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ PORTABLE ANTENNA

MFJ's Portable Antenna lets you operate 40, 30, 20, 15, 10 meters from apartments, motels, camp sites, vacation spots, nearly any electrically clear location where space for a full size antenna is a problem.

A telescoping whip (extends to 54 in.) is mounted on self-standing 5½x6¼x2¼ inch Phenolic case. Built-in antenna tuner, field strenght meter, 50 feet RG-58 coax. Complete multi-band portable antenna system that you can use nearly anywhere. Up to 300 watts PEP.

MFJ-1621
$79.95

MFJ 24 HOUR LCD CLOCKS

$19.95 **MFJ-108**

$9.95 **MFJ-107**

Huge 5/8 inch bold black LCD numerals make these two 24 Hour clocks a must for your shack. Choose from a dual clock that features seperate UTC and local time display or a single clock that displays 24 Hour time. **Mounted in a brushed aluminum frame,** these clocks feature huge 5/8 inch LCD numerals and a sloped face for across the room viewing. Easy set month, day, hour, minute and second function. Clocks can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

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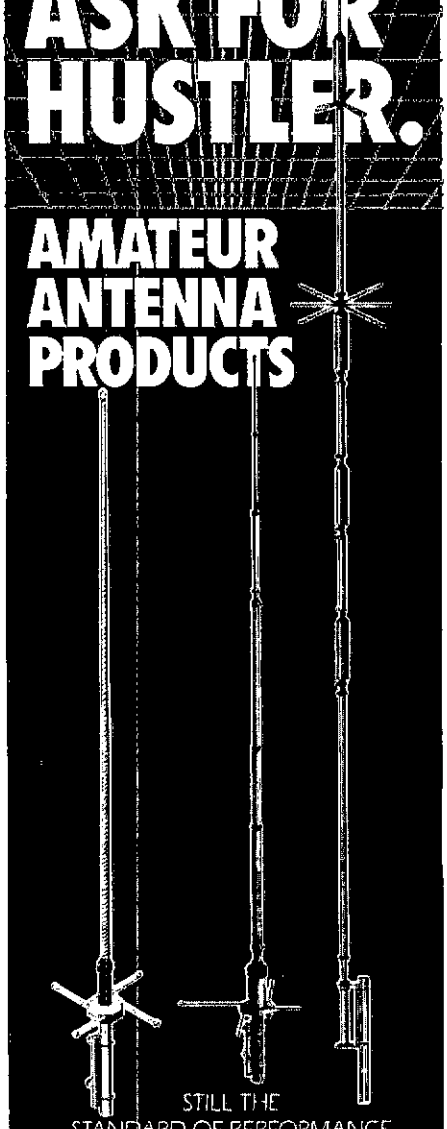

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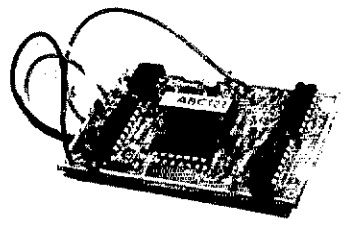
Identify your FM transceiver with automatic code on each transmission.



SMALL: 1 3/4" X 2 1/4" X 5/16"
Perfect means of RTTY code ID

PRICE **$49.95** Ppd.
+$3.00 for Calif. address.

Full feature repeater IDer with timer **$79.50** Ppd. +$4.77 for Calif. address.

WARRANTY
Returnable for full refund within ten day trial period. One year for repair or replacement.

Your call sign programmed at factory, please be sure to state call sign when ordering.

Inquire about commercial models.

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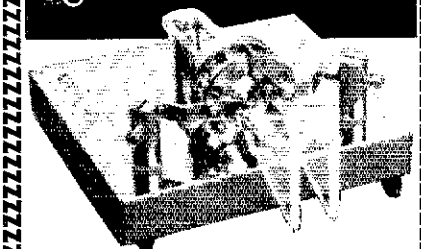
CAN'T AFFORD A "ZZZ"?



But you want a new excitement machine?
Are you ever in luck! For a whole lot less than the price of a new "Z", you can buy a new Bencher paddle - an investment for a lifetime of responsive, smooth keying that "Z" owners can only dream of. See your Bencher dealer. Ask for a test drive. Check out the model and color selection. And get set for a thrill!

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portant. This is YOUR column and your input dictates what goes into it. Let the folks at ARRL know what you think. Let your Section Leadership know what you think also. A complete list of Section Officials will be listed occasionally in this column. Our regrets to the family of WAØEWC who became Silent Key recently. He was active on MNAMWXNT. Special congrats to KAØNVT who appears on page 11 of August *QST*, with quite a list of credits. Uncle Hermans Horseradish Net members held their annual picnic on Portage Lake,with the usual fanfare. To accurately conceive how the picnic went, listen in on this group on Sunday morning at 10: AM at 3932 khz and you'll get a good idea. DON'T FORGET SET!!!....73 de KDØCI.

NET	FREQ	TIME	QNI/QTC/Sess.	MGR
MSN/1	3685	6:30P	310/125/31	WØEHI
MSN/2	3685	10:00P	169/68/31	KAØEPY
MSSN	3710	6:00P	245/18/30	KAØODQ
MSN/RTTY	3620	7:00P	60/1/13	WAØLUT
MSPN/N	3929	12:00P	503/116/31	WBØWNJ
MSPN/E	3929	5:30P	1063/177/31	WDØBGS
MNAMWXNT	3929	6:15P	NO REPORT	KADIZA
PICONET	3925	9:00A	2808/265/130	WDØBAC

MSO: 3620. EMERGENCY FREQUENCY:3929. Traffic: WAØTFC 448, WBØWNJ 370, WØEHI 212, KAØEPY 205, KAØARP 171, WAØONJ 112, KAØODQ 83, NØCLS 76, WD8LDY 75, KT9I 61, KDØCI 38, W9DM 36, WDØBGS 33, NØEWA 33, KAØAJF 29, KCØT 27, KDØXP 20, KBØWV 18, KTØR 17, WBØFMI 16, KAØBFP 15, WDØGUF 14, WØZSW 12, NØJP 11, KBØCD 8, KØOGI 8, NØCRO 6, KAØPQW 2.

NORTH DAKOTA: SM, Michael Mankey, WBØTEE—What was formerly the Bismarck Amateur Radio Klub is now the Central Dakota Amateur Radio Club. I am requesting that all N.D. Clubs send me a copy of their newsletters so that I may use appropriate articles in this space. My address is in the front of QST. Packet Radio in N.D. is being developed by Bill Ockert, WBØVHW, the Technical Coordinator of N.D. He can be contacted on either the DATA net or the Carrington repeater on the Superlink. If your club is planning to give exams and want to have it appear in this column please send it to me at least two months in advance. Is your club involved in the Club Challenge? If not you must not want a new HF rig free for your club! 73s.

SOUTH DAKOTA: SM, Roland Cory, WØYMB—"Ole" Johnson, NØABE and Bob Olson, WAØFPR, Asst. SM's. Roland "Ole" Johnson, NØABE has been appointed STM. Please foreward all net and traffic reports to Ole. Your participation would be greatly appreciated on the South Dakota CW net (3650 KHZ, Tuesdays at 0000 UTC). Send WAØFPR your net frequency and times and they will be listed in future columns. When, where, and what time does your amateur radio club meet? Send particulars to WAØFPR and they will appear here in future months. Thanks to the Black Hills Area Amateur Radio Club for the Dakota Division Convention. I believe a good time was had by one and all. 73 and see you on the nets.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF—SEC: N5BPU. TC: W5FD. ACC: NI5D. PIO: K5DW. SGL: W5LCI. Repeater Coordinator: WB5FDP. Congratulations to NI5D on her appointment as Affiliate Club Coordinator. Clubs should be hearing from her soon. New officers for the Crowley's Ridge ARC are WB5RCS Pres., K5KFY V. Pres., K5JHU Sec. Treas., and KD5DF Net Coordinator. The club provided communication for the 2nd annual Mightymite Triathlon on July 20 in Forrest City. I enjoyed meeting each of you at the Queen Wilhelmina Hamfest which was another big success. Packet radio interest is expanding well in Arkansas. Contact W5FD for additional info. Information on OSCAR 10 can be obtained from me. Traffic: W5QFU 110, W9OK 30, W9YGE 28, W5UAU 15, W5RIT 12, WB5IGF 12, W5KL 10, WB5GWU 10, N5BPU 8, KA5RRL 8, W4AJZ 8.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—SEC: KA5PFB. ACC: K5DPG. SGL: KD5SL. TC: N5JM. Martin, KE5QK, from Bastrop is our new section Official Observer Coordinator. He has been quite active monitoring, reporting and notifying the offenders and good guys of their operating procedures. Drop KE5QK a line if you are interested in assisting as an Official Observer. In the recent reorganization of ARRL Headquarters the RFI (radio frequency interference) program was transferred to the Section Technical Consultants and a new leadership position of Assistant Technical Consultant was established. There is a need to have a Technical Consultant/RFI Committee in each of our clubs and hopefully each of our club presidents will establish a commitee of 2 or 3 members to assist local hams with technical or RFI problems. There are many hams who are staying off the air or are on VHF/UHF only because they haven't been able to eliminate an RFI problem or overcome an antenna or technical difficulty. If your club Technical Consultants/RFI Committee appointees are also ARRL members they can receive an ARRL Leadership appointment as Assistant Technical Consultants and receive periodic technical/support material from ARRL. Contact John Meyers, N5JM, the Louisiana ARRL Tehcnical Consultant.

MISSISSIPPI: SM, Paul Kemp, KW5T—SEC: AL7GQ. STM: KB5W. VHF Coord: N5DWU. ACC: KC5VD. N5DWU VHF Coord. working on development of a repeater council for Ms. If you are interested in working on this project, contact him. There is a need and interest in linking Jackson to the coast on 2 Meters. With the HARC improvement in their 2 Meters repeater system, this should not be too difficult. Congrats to upgrades to Extra: WD5IKD, N5GZO, WD5UMX. Also my apologies to KA5VBE in not recognizing her upgrade to Tech in Jackson in the May session. With the increase in upgrades, it is difficult to list them all in the Section News, so will only list the Extra upgrades in future columns. Harc preparing for VE exams. They will be ready for testing by the time this gets in print. K5OS has formed The MARDA (Ms. Amateur Radio Digital Association). The purpose is to represent Ms Amateurs interested in Digital Communications. Reports are fax from appointees. Remember to keep your appointment current, you must report your activities. CAND (W5KLV) 31 sess WTC 1319. DRN5 (WB5YDD) Sess 62 QTC 983. MTN (K5OAF) 31 sess QNI 93 QTC 96. MSBN (W5HKW)31 sess QNI 2236 QTC 93. MMN (WB5RMW 31 sess WNI 527 QTC 6. GCSBN (W5JHS) 31 sess QNI 1085 QTC 13. MSN (N5AMK) 31 Sess QNI 125 QTC 22. MLEN (KE5WP) 4 sess QNI 99 QTC 0 HARN (KA5ROA) 4 sess QNI 53 QTC 0. Traffic: N5AMK 518, K5OAF 326, KT5Z 97, W5WZ 46, W5LSG 20, KW5T 18.

TENNESSEE: SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS. OOC: W9FZW. PIO: WK4V. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J. TC: W4HHK. It has been noted that several of the independant VECs have terminated and

have elected to begin operation as an ARRL amateur radio examining team. Frequency of exams and location are in most cases the same. If you have a number of amateurs or potential amateurs in your area and are having difficulty getting them scheduled, advise your Section Manager and assistance will be available to get the problem resolved. Looks like we are about to enter another winter season, so we need to get all those leftover antenna chores completed before the snow begins to fly. It seems about time for a hard look at the need for packet radio operations in Tennessee. Several stations are already in operation and utilization of this capability in times of emergency could be of immense assistance to those national and state agencies that we are bound to help and assist in such instances. The official observer coordinator, W9FZW, is still in need of applicants for that position. If you think you can fill the bill, send an application on to him. Remember you must have adequate equipment and time to scan the bands for the job of monitoring and associated tasks. It is very pleasing to be receiving the various club bulletins. This is of great assistance to your SM in keeping him and he ACC informed of the many activities of your Club. Even if your club is not mentioned by name, be assured that each and every bulletin is read in its entirety. That is the only way that your ideas and planned activity are known in many instances. In other words, the mailing is very much appreciated. The season of 1985 hamfest is at end and much discussions are being examined as to their success or short comings. Be sure that you let the various section staff know about your 1986 plans and schedules. It has been difficult in some cases to plan the much needed support from section, division and headquarters agencies. The CW net honor roll for this time has W4DDK and NG4J as winners. Traffic: NG4J 261, KA4RSC 186, K4WWQ 137, W9FZW 126, W4DDK 85, NN4S 38, W4PFP 26, W3HET 15, W4TYV 10, NM4W 9, WB4YPO 9, W4MRD 7, W4PSN 5.

GREAT LAKES DIVISION

KENTUCKY: SM, Rosie Perciful, KA4SAA—Asst. SM: WA4JTE. STM: WB4ZDU. Governor Martha Layne Collins has proclaimed Sept. 29-Oct. 6 "Amateur Radio Appreciation Week in KY." This coincides with ARRL National Convention in LVL. Any club wishing a copy of proclamation for PR purpose contact KA4SAA. Thanks to everyone who has worked so hard toward making the convention a success. Your efforts are appreciated and hope ALL KY hams will attend. New APPT: Al Alcock, W4CDA, EC Boyle Co. Congrats to new 14th DEC, KB4FDD, on fine job getting new EC's and ARES net going. Thanks to JAWS, NKARC and OARC for sending copies of their club newsletter. Congrats to 5 KY clubs participating in "Club Challenge for the '80s"—Good Luck! VE Testing: Oct. 5, Withers Memorial Library, Nicholasville - contact K4ZHM; Nov. 9 OBORO FEST, Oboro. Nets June & July: MKPN 2367 272, KTN 1815 148, KNTN 537 186, KYN 176 80, KRN 381 22, TSTMN 1027 32, KPON 155 16, 7ARES 155 4 NKARC 145 6, CARN 132 18, WTEN 113 12, 11ARES 79 11, 3ARES 66 3. Traffic: (June/July) WA4JTE 293/345, KI4QH 141/10, KA4SAA 91/—, WB4ZDU 77/83, KB4OZ 77/66, WD4BSC 42/14, KA4SKV 36/May 26, KA4BCM 29/47, W4WQV 25/52, WA4SWF 21/—, WD4IXS 20/12, KA4MTX 20/13, K4HOE 15/14, WD4PBF 15/11, KA4GBZ 14/14, WA4AVV 11/17, WA4NOG 9/14, WD4CQF 5/8, WA4YPQ 3/2, KA4USB —/24.

MICHIGAN: SM, James R. Seeley, WB8MTD—ASM: WA8DHB. SEC: WB8BGY. STM: WD8RHU. ACC: K8SB. PIO: KC8K. SGL: N8CNY. TC: W8TZ.

Net	Freq	Time	QNI	Tfc	Sess.	Mgr
MITN*	3953	1900	648	329	31	WD8EIB
MACS*	3953	1100**	524	187	31	K8LNE
QMN*	3663	1800**	572	153	60	W8UE
GLETN	3932	2100	700	93	28	KA9EIZ
UPN*	3922	1700**	896	92	35	WA8DHB
MNN*	3722	1730**	216	55	61	KA8NCR
WSSBN	3953	1900	818	37	31	K8MSJ
VHF Nets	4 rpts	314	7	20		W8CUP

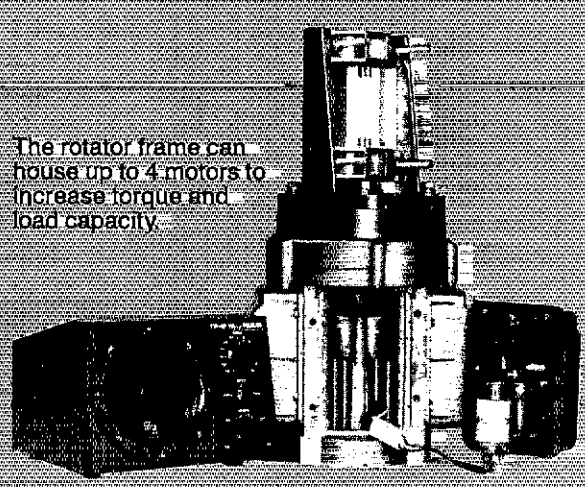
*NTS nets. Times local. **MACS Su, 1300; QMN late, 2200; UPN also Noon Su; MNN late 2000. 3932 is MI emer. freq. ARES Net. Su. 3932, 1730. Silent Keys, with deep regret: KC8OL, KM8Y. New officers for GLETN: KA9EIZ. Mgr; N8CVH, Ass't Mgr; N8EXS, Sec'y. W8ONN will be receiving his 50-year ARRL membership plaque. The Straits Area and Y.P. Hamfests were enjoyable and made worth while trips. Many old friendships were refreshed and a few new ones started. At the U.P. affair, the MI Lady Amateur of the Year award for 1984 was presented to VI, W8JXJ. My congratulations to a fine lady and a great amateur; I can think if no one more deserving. Aileen, WA8DHB was re-elected as manager of the U.P. Net, a post she has held longer now than I think even she can remember! She and the gang are doing things right as the net continues each month to set new records. As reported in a special edition of the Detroit Edison club's bulletin, Wayne County EC W8JEJ, on behalf of the ARPSC, presented the club with a five-year Meritorious Service Award plaque in recognition of their excellent record for community service throughout southeastern MI. Traffic: AF8V 520, (BPL), W8QHB 331, WD8OUO 200, NJ8S 189, WD8RHU 116, K8GXV 110, KA8VOZ 102, WA8DHB 94, WD8KQC 89, WD8MJB 88, KB8GT 72, N8CNY W7LVB 54, WB8MTD 48, WB8SIW 47, K8OCP 41, WB8YDZ 38, K8UPE 31, KI8Q 30, KA8SAF 29, NJ8R W8YIQ 27, W8TBP 23, K8ZJU 21, W8VIZ 19, W8EOI 18, W8IHX 17, WD8PAF 15, N8EXS 14, W8YZ 11, WB8WJV 10, K8EQO 9, W8URM 8, K8DD 2, WB8ITT 1.

OHIO: SM, Jeffrey A. Maass, K8ND—

NET	QNI	QTC	Sess.	Time(Local)	Freq.	MGR
BN(E)	220	113	31	1845	3.577	W8JMD
BN(L)	234	133	31	2200	3.577	W8BO
BNR	238	104	31	1800	3.605	W8EK
BSSN	399	244	61	0945, 1915	3.885	N8AKS
ONN	95	7	26	1830	3.708	WD8KBW
OSN	285	117	31	1810	3.577	N8AEH
OSSBN	1240	482	93	1030, 1615, & 1845	3.9725	WB8MZZ
OSSN	162	90	30	0640	3.577	KA8GJV
O8MN	170	25	27	2100	50.16	WD8CTX

Hamfests: Lima (Oct 13); Marion (Oct 27); ARRL National Convention (Oct 4-6) in Louisville KY. Don't forget the Simulated Emergency Test (SET) Oct. 19-20. Our hobby exists because it qualifies as a service, and *every* amateur should participate in this important drill. Contact your county's Emergency Coordinator and ask how you can assist. You might also contact the officers of your favorite repeater club, and ask whether *they* have registered the repeater(s) with the EC for use in your local SET exercise! The Ohio Section Conference and Picnic, held August 4 at the Columbus Zoo, was attended by alonst 90 amateurs and over 125 people in total. ARRL Public Service Branch Manager KX1B form ARRL HQ was in Attendance to observe, as was Great Lakes Division Vice Director AB8P. Former Ohio SCM and GL Division Director Dick Egbert, W8ETU, also was a very welcome guest. The Discussion ranged from current events to emergency planning, and

Advanced Multi Torque Antenna Rotator



The rotator frame can house up to 4 motors to increase torque and load capacity.

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

The main frame and reduction gear train have been designed to withstand maximum wind loading.

Maximum brake power is 18,300 lbs/in when 4 motors are installed.

Low voltage (24 VAC) motors. Low cost 6-wire control cable. can be installed on the same base as a TELEX unit.

Specifications

■ Rotator Unit

		MR-750E/PE	MR-300E
Rotation time	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque Brake power	1 motor	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch
Rotation angle		375 degrees	
Permissible mast size		1½ ~ 2½ inch (38 ~ 63 mm) < diameter >	
Control cable		6-wire cable 0.5sq—1.25sq (AWG16/18/20 etc.)	
Continuous running		5 minutes Max. permissible	
Dimensions		15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)	
Unit weight		16.5 lbs (7.5 kg) < with 1 motor unit fitted >	

■ Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

Wind Load	MR-750E/PE	MR-300E
1 Unit	16.1 Sq Ft	5.92 Sq Ft
2 Units	21.5 Sq Ft	11.84 Sq Ft
3 Units	26.4 Sq Ft	17.75 Sq Ft
4 Units	30.0 Sq Ft	23.67 Sq Ft

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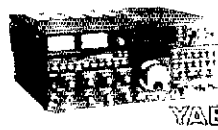

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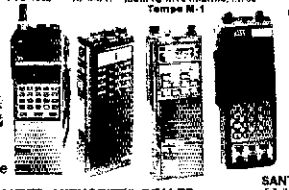

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proved valuable to us all. Where to next year? You will note that the Section-level leadership appointees have disappeared from the top of this column: they will appear every other month from now on, in order to free up more space for news. Technical Coordinator KB8MU's wife and daughter, with no urging from him, have successfully passed their General exams, and John expects that they will each be Extras by year end: good luck Helene and Sandy! At the suggestion of District 3 DEC WD8MPV, an Ohio Section ARES Net has been established, meeting on Mondays at 9 PM local time on 3.875 MHz. The purpose of this net is to discuss emergency planning and preparations, and participation by all ECs, DECs, NMs, and Section-level leadership officials in the Section is *Strongly* urged. Bring your ideas and problems to this net for discussion by those who share your goals. Buckeye net Radioteletype (BNR) NM W8EK says that the net needs RTTY Representation form NW, SW, and SE Ohio. Those with digital capability should try to participate *at least* once per week. Thanks to KD8KY for temporarily assuming NM duties for the OSSN while KA8GJV was busy moving to a new house. The Cleveland Hamfest Association had a *great* idea: they distributed FREE hamfest tickets in the high schools to encourage young people to attend and learn about Amateur Radio! It costs nothing, and it helps to advance our hobby: well done! New Appointments: PIA W8ILC; PRS KA8TNT, N9EJO; EC Athens Cty KA8NIE; EC Greene Cty N8CYS; EC Hamilton Cty AE8L; EC Jackson Cty N8GIY; EC Knox CtyKC8WH; EC Mahoning Cty N8CEP; EC Portage Cty N8FTP. Congratulations all! Those present at the Conference Aug 4 agreed that Local Net statistics need only be reported in this column quarterly, and so there is no list below. NMs should continue to report their net's activity to KF8J and to me each month, and the quarterly summary will appear in the March, June, September, and December columns. CU SET! Traffic: W8BO 555, K8JDI 355, WB8JGW 320, W8JMD 282, W8PMJ 253, WD8MIO 237, WD8KFN 223, KD8KY 222, W8SKP 203, WA8HGH 183, K8ND 167, W8QZK 161, KA8KHS 139, W8EK 120, N8EFB 119, KD8KU 117, K8TVG 116, N8AKS 112, WD8RIB 112, WB8MEK 98, NE8X 97, WA8GMT 96, KF8J 86, N8AEH 84, KA8JTT 84, WB8KWC 80, WD8KBW 71, NJ8P 70, WA8DYS 65, W8ZOL 65, K8CMR 64, NM8I 62, WB8HHZ 61, N8GOB 60, N9EJO 54, KA8TNT 53, N8XX 53, WA8SSI 51, WB8HMI 50, K8AN 48, K8LQM 48, W8MVE 47, NC8Q 47, W8WEG 41, WB8GXT 40, W8CXM 38, KD8WH 37, K8EF 35, WB8DMF 32, NI8W 32, KW8X 29, K8VOY 28, KD8XL 27, K8DXZ 26, N8FAZ 25, WD8JAW 25, WD8JYE 25, N8CW 24, KA8HBN 24, KA8WTM 24, KA8GJV 23, KV8Q 23, NF8B 22, K8BAX 22, N8FPH 22, KD8IC 22, WD8IKC 22, WB8KWD 22, WD8RAQ 22,WB8MRL 21, W8BHL 20, N8FWA 20, KC8UR 20, NK8B 18, WA8HED 17, KD8ZE 16, N8CJS 15, N8EEK 15, N8AUH 14, AB8P 13, KD8WI 13, KA8MEB 12, N2NS 12, KD8UW 12, KA8ICB 11, K3RC 11, N8GIY 10, W8HVK 10, K8NJQ 10, K8CKY 9, WD8CSP 9, KC8JI 9, W8RG 9, KA8RIX 9, WB8RSM 9, WD8EKI 8, NK8W 8, KC8ND 7, KA8OQF 7, KA8RBQ 7, KC8WH 7, NK8C 6, W8BNHV 6, W9SWM 6, N8AJU 5, NC8M 5, W8OQL 5, KA8THO 4, WB8TRK 4, KC8YV 4, KA8WJN 3, K8WLF 3, KA8MFG 2, KA8MFH 2, WD8NED 2, K8BV 0, WB8KKI 0, K1LT 0, K8LT 0. (Jun.) W8EK 80, AB8P 18, N8AJU 7, K8BXT 0, (May) K8BXT 26.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—STM: WB2MCO. SEC: AK2E. ACC & SC: N2BFG. BM: WB2EAG. SGL: KB2HQ. TC: KC2ZO. ATC: WA2VGM. ASM: K2ZM. NETS: AESN: QNI 64 ATC 3; EPN: QNI 23 ATC 16; ESS: QNI 336 QTC 66; NYPON: QNI 592 QTC 337; NYSE: QNI 377 QTC 202; NYSM: QNI 333 QTC 162; NYSL: QNI 373 QTC 285; SDN: QNI 200 ATC 73. June: EPN: QNI 26 QTC 18; NYPON: QNI 700 QTC 234. CLUB NEWS: Most clubs are not meeting during the summer so not much to report. Mt. Beacon ARC held their annual picnic during August. Rip Van Winkle ARC had KA2MYJ speak about 6-meter operation. I am still attempting to get out an ENY newsletter if I can get some assistance. But so far no one has contributed anything for it nor has any help been forthcoming. I realize that not much can be put into this column due to space limitations. Let's all get on the bandwagon and help to make an ENY newsletter a reality. If your ARRL membership is due for renewal, renew through your local club so they can get the credit. Nice to see so many of the traffic handlers up at MTA's picnic on the 10th. From here on in, only material received by the 10th will be included in the column. June PSHR: WB2MCO July PSHR: W2PKY WB2VUK KA2MYJ WB2MCO WA2JBO KC2TF K2ZM K2ZVI AK2E N2BFG KA2OPG. Traffic: KC2TF 312, WB2VUK 226, W2PKY 205, KA2MYJ 155, K2ZM 137, WB2EAG 133, WB2MCO 132, K2ZVI 70, WA2JBO 59, KA2OPG 38, WA2YBM 37, AK2E 35, N2BFG 18, AA2Y 16. (Jun.) WB2MCO 88.

NEW YORK CITY-LONG ISLAND: SM, John H. Smale, K2IZ—ASM/ACC: WB2IAP. SEC: KA2RGI. OOC: NB2T. TC/RFI: W2JUP. STM: WA2ARC. PIO: WB2DIN. The following are traffic nets in and around the section:

NLI CW*	3630khz	1900/2200	WB2EUF mgr
NCBHF	6.745 rpt	1930 m-f	K2MT mgr
BAVHF	6.67 rpt	2000 m-f	K2YQK mgr
SCVHF	5.37 rpt	2030 m-f	W2GZD mgr
ESS	3590 kHz	1800	W2WSS mgr
NYS/M	3677 kHz	1000	WB2EAG mgr
NYS	3677 kHz	1900/2200	WB2EAG mgr

*Denotes section net, all times are local, please try and help out by checking in whenever possible. If I get enough favorable response I will also start listing the "mail boxes" W2PVY has one on 145.68 simplex, publishes the "BAUD" newsletter, meaning "Blind Apple User Discussions", this newsletter is published on a C90 cassette, on a bimonthly basis, some of these cassettes are recorded at 15/16 IPS, but two track none, for further info call 516-433-0171 only during business hours please. LIMARC is sponsoring amateur radio exams the second Sat. of each month at the N.Y. Inst. of Tehcnology, Rt. 25A, Old Westbury, for further info please contact Woody Gerstner, WB2IAP, 42 Mohawk Ave., East Atlantic Beach, NY 11561. WA2DHF is still looking for people to help with the NYC Marathon, where else can you get a guaranteed parking spot in NYC, out in the clean autumn air??, and a front row seat to the marathon?, contact Steve ASAP. Congratulations to K2YQK on his appointment to net mgr for the Big Apple Net. Kings County Radio Club is looking for anyone that would be interested in helping set up a "Radio Shack" onboard the Intrepid, if you are interested please contact Richard Statfield at 718-376-7103 or Irv Salem, 718-258-6971. The W2JUP Radio Bulletin Board System is now operating on 144.390 simp..the RBBS/64 operation is presently sending a beacon call every minute, W2JUP would appreciate reception and access reports, also contact him for further operating details. Officers for Wantagh RC are: KI2M Pres., K2ES VP., WA2PPV Treas., NE2N Rec.

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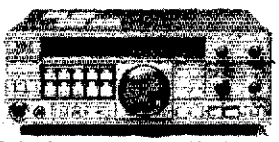

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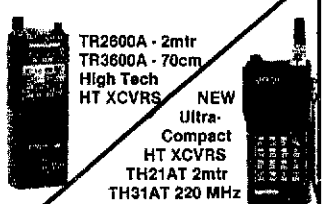

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B215	2M	Yes	2W	150W	$259
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$249
B3016	2M	Yes	30W	160W	$199
C22	220	No	2W	20W	$ 79
C106	220	Yes	10W	60W	$179
C1012	220	Yes	10W	120W	$259
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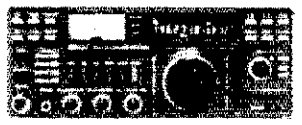

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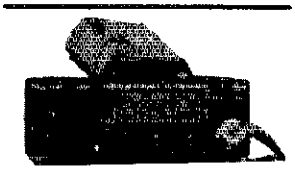

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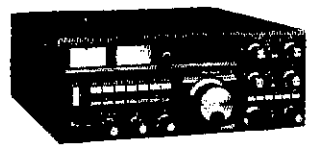

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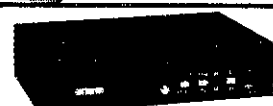

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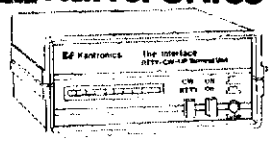

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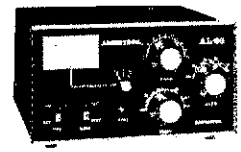

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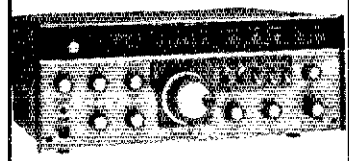

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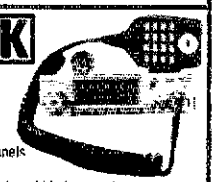

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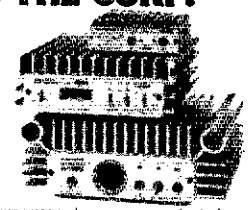

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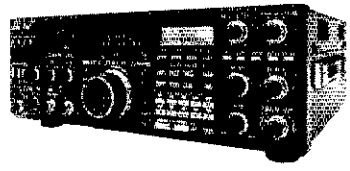
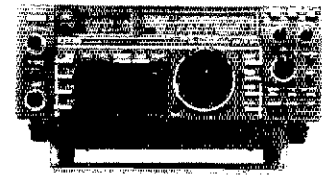
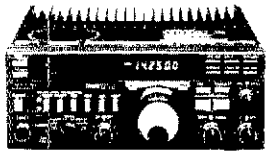


IC-735





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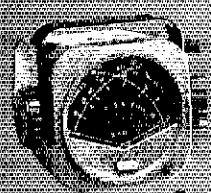

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Power: 2 Ranges (Forward, 20/200 W)
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Power Range:	200/2000 W	20/200 W	20/200 W

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Frequency Range:	3.5-150MHz	140-450 MHz	140-450 MHz
Power Range: Forward	15 W/150 W	15 W/150 W	15 W/75 W
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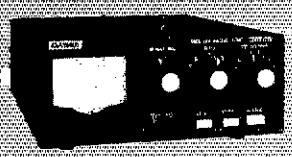

	CNW-518	CNW-419	CL-680 (no metering)
Frequency Range:	3.5-30 MHz (9 bands)	1.8-30 MHz (17 bands)	1.8-30 MHz (17 bands)
Power Rating:	1 kW CW (50% duty)	200 W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)
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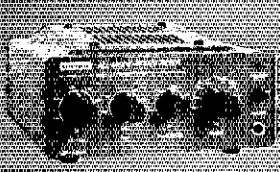

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Insertion Loss:	Less than 0.2 dB				

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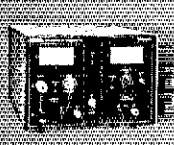

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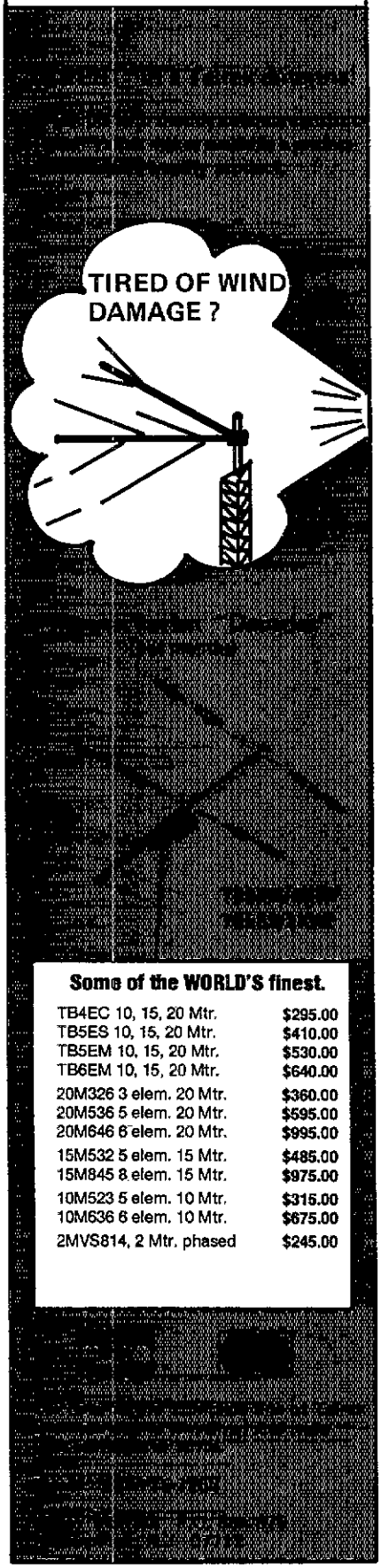

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Sec., WA2PZW Corr. Sec., KA2FVH Sgt. at Arms. Finally, K2IZ (that's me) and family spent a nice weeks vacation in Ohio, visiting with friends and relatives (mine, for a change). Traffic: K2YQK 182, W2GKZ 99, W2DBQ 54.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—SEC: KB2ZM. STM: KA2HNQ. OO/AA: N2WM. ACC: K2BJG. PIO: WB2NQV. SGL: W2KB. TC: K2BLA. BM: N2CXX. A new special leadership appointment is Carl Felt, N2XJ to ASM with duties of NNJ VE Board liaison. Carl is developing a plan to interest VEs and clubs in organizing to promote regularly scheduled exams rather than the random one-shot deals we have now. Contact Carl at 8 Charles Pl, Chatham NJ 07928, 635-7686. The current NNJ section appointment roster lists the number of: DEC = 2, EC = 7, OES = 1, NM = 3, ORS = 29, OO = 2, PIA = 2, and TCA = 0. It is evident that this data is not entirely correct. We may have more that have not been documented. The fact remains that our low numbers are not very impressive for a highly populated area like NNJ. We must remember that here in the NNJ section we are the ARRL and we must provide our own field organizational level staff. We need to build up our numbers in all functional areas. If you are interested in any field appointment and you think that you may be qualified or just want information, please contact the applicable leadership official listed above. We need you! Please remember that your ARRL membership must be current to qualify for or retain a field appointment. Recruiting has started. New appointments by the STM are: To NM: W2CC, W2RRX, and W2VY. To ORS: KA2HNQ, W2VY, and W2RRX was endorsed. The PIO made one new PIA appointment: KY2S and endorsed PIA N2EJO. Steve Mendelsohn, WA2DHF, our Division Vice Director has moved. His new address is 318 New Milford Ave., Dumont, NJ 07628. (201)384-0570. Congratulations to the following who upgraded at the July 13 session of the NNJ VE Board. To Novice: Dave Rockman; To Technician: KA2EDB, KA2NDY, KA2TXJ, KA2USU, and KA2YNG; To General: N2CSP, N2FPI, KA2VSL, KA2YHI and KA2YKJ; To ADVANCED: KA2SUB. To Extra: N2FMJ. Sorry to have to report Silent Key Ronald Ackerman, K2VAC. July data:

Net	Freq.	Time	Sess.	QNI	QSP
NJM	3695	1000 Dy	31	226	75
NJPN	3950	1800 Dy	35	277	99
		0900 Su			
NJSN	3735	1830 Dy			
NJN/E	3695	1900 Dy	31	263	163
NJN/L	3695	2200 Dy	31	203	173
NJVN	49/49	2230 Dy	31	305	156
OBTTB	147.12	2000 Dy	31	323	161
TCETN	147.225	1930 Dy			
NJRTTY	147.51	Autostart	325	208	
NJPTN	145.01	WA2SNA-1	PBBS		

UPLINK Amateur Radio News call 201-735-8550. PSHR: N2XJ 106, KA2F 105, KA2SPH 100, WB2QMP 90, and K2UX 87. Traffic: KA2F 269, N2XJ 262, W2RQ 154, WB2QMP 98, K2VX 91, KA2SPH 89, W2XD 35, W2CC 19.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY—SEC: KDØBG. TC: KØDAS. OOC: KDØRT. BM: KØIIR. ACC: WBØQAM. PIO: NØEBA. SGL: AKØQ. Please welcome aboard Don, KDØBG, the new SEC. He has served as EC for Polk for the past 3 years. Please send your support and reports to him if you are an EC/DEC. Hats off to the Linn ARES and CVARC for participating in a real SET, by evacuating CR residents after a poisonous gas explosion. I hope we all can be as prepared as they were. KØEGA is the EC. New ATC ranks are growing with the addition of NØGZU and WAØQBC. If you are interested in the ATC category contact KØDAS or KØCY. All OOs send your monthly reports to KDØRT (OOC). NØEBA has PSA available for your locale, if you can help place them in the media contact him. Special Event station include The "BIX" run in Dvnprt, Ottumwa Baloon Race, Rivercade in SooCy. Start planning SET activities if not done already, this year should be a big one, lets see some interesting SET problems this year. The ICN (Slow Speed) needs your support for the fall, support ICN and lend a hand to NCØR. Again thanks to the many who have participated in RAGBRAII. Net times listed last month: Net Results: 75mtr Phone 2157-317-WBØAVW TLCN 394-198-WØYLS; ICN 31-1-NCØR Traffic: KØGP 351 WAØAUX 218, WØSS 199, KØIPT 196, KAØADF 158, WØFQ 46, WBØJFF 132, KØCY 107, WØYLS 98, KØYL 90, W4JL 83, KØBRE 80, KCØXL 73, WBØAVW 55, WBØSRK 53, WBØIAX 53, KAØJRQ 38, WBØSTB 34, KØWKT 32, KØKQJ 26, KCØSC 24, WØBW 16, WØCS 48

KANSAS: SM, Robert M. Summers, KØBXF—Net reports for August will probably be included in the September report so I can list the ECs next month prior to SET. For July we find KSBN with QNI 1101 and QTC 152. KSBN meets daily on 3920 kHz at 6:30 local time. Join the net and represent your local area, traffic sometimes does get delayed due to lack of receiving stations. KPN QNI 385, QTC 35. KWN QNI 878 QTC 672. KMWN QNI 733 QTC 662. CSTN QNI 1750 QTC 56. QKS QNI 189 QTC 88. Our CW traffic net is still in need of a few more good CW operators. We know you are out there—please join QKS at 7 and 10 P.M. each night on 3610 kHz. QKS-SS QNI 30, QTC 17. KS RTTY net QNI 12 QTC 5. SEC WØKL reports only receiving only 6 EC reports this month. Just cause we have no disasters around is no excuse for not shipping in a report. EC's need to be contacted by YOU occasionally to get the activity stirring. How about it guys and gals!!! Is your EC an active EC? Understand the Garnett repeater is moving to 146.865 about the end of August. Everyone enjoy your vacation this year and come back rejuveninated. WØHI says renewed dedication is in the air since the Central Area Staff met in July. Now is the time to get a fresh start back into the traffic nets yourself, too!! Last but not least, regretfully I must report another Silent Key—WAØTVH, grandson of WØPB, July 20. Traffic: WØQBK 461, KSØU 310, WØFIR 218, WØFRC 194, ACØE 150, WØOYH 141, WØHI 136, WAØLBB 127, WØFDJ 87, WØKL 85, NBØZ 62, WBØZEN 57, KØBXF 44, WØMYM 18, WØQMT 16, WBØYJT 9, WØPB 8, WØCHJ 6.

MISSOURI: SM, Ben Smith, KØPCK. STM: KØSI. Bulletin Manager: WBØTEG. SGL: KA6CSJ. OO Coordinator: WBØRHK. TC/RFI Coordinator: K4CHS. All of these officials have volunteered their services to assist the amateurs of Missouri. Contact them for information on Field Appointments, club programs, RFI problems and Technical questions. KAØJJX, member of the Radio Club at UMR is looking for former members of the WØEEE Club to help in compiling a history of the club. If you are a past member of WØEEE contact Ray at WØEEE to see if you can help. He will also put you on the mailing list of QUA WØEEE. During the past month I received a list of 43 new novices in the Missouri Section. A lot of these people were assisted by club novice classes. What we need to do now, both clubs and individual amateurs, is to help these new novices get on the air and involved in amateur activities and club projects. By showing interest in these new amateurs we will encourage them to upgrade and keep them in our hobby. All novices are sent information and invitations to participate in the slow speed net, MTTN, which meets on 3.730 kHz at 6:30 pm Monday-Saturday. Net manager, KAØPGN welcomes everyone to check in. New Field Appointment for the month, KØPHD, OBS. Silent Keys reported to me; NØBVJ, NØFEB and WØQK. The Greater St. Louis Radio Interference Committee will hold a special meeting Oct. 10 with Fred Link as guest speaker. Contact Jay Underwood, WØOGS at 314-946-9980 for more information. The St. Peters ARC is holding an Electronic Swapfest, Sunday, Oct. at the Harvester, MO Lions Club. Time, from 6:00 A.M. to 4:00 P.M.
Nets reporting:

NET	Sess.	QNI	QTC	Day	Time PM	Freq. MHz	Mgr.
MON	62	326	196	Dly	7:00/9:45	3.585	KØSI
MOSSB	31	617	142	Dly	6:00	3.983	KT8Y
MEOW	31	543	62	Dly	5:30	3.983	KØDSQ
MTTN	23	88	27	Mon-Sat	6:30	3.370	KAØPGN
CMEN	5	94	18	Wed	9:00	146.16/.76	KØPCK
HBN	22	305	17	Mon-Fri	12:05	3.880	KØDSQ
PHD	5	161	11	Mon	9:00	146.43	WAØKUH
PTN	12	20	6	MWF	9:00	31.114	WBØROQ
NEMOE	12	69	5	TTSat	7:30	144.53/5.13	KAØFTS
RRABN	30	417	4	Dly	8:00	146.39/.79	KAØLLN
MOFON	4	25	4	Wed	8:15	222.42/4.02	AIØO
CVE	11	21	2	MWF	7:00	3.710	KAØFTS
LOZVM	4	84	0	Sun	9:00	146.13/.73	WØRTL
ZAEN	5	60	0	Tue	8:00	147.84/.24	K9OCU
SARN	5	56	0	Thu	9:00	146.43/7.03	WØENW
ARESN	4	48	0	Sat	9:00	147.855/255	NØEHU
TCN	4	44	0	Thu	9:00	147.09/.69	KAØLLO
IFN	3	31	0	Wed	7:30	147.84/.24	WBØSZI
LARES	5	34	0	Wed	8:00	146.10/.70	WBØRHC
LOZCW	4	5	0	Sat	9:00	3.707	WØRLT

Traffic: WØBMA 322, KØSI 213, KØPCK 178, KT5Y 157, NDØN 104, KCØAS 98, NIØR 89, AIØO 81, WØOUD 50, KØDSQ 48, WBØCJB 45, KØORB 44, NØBKE 36, K2ONP 29, WØOTF 27, WAØKUH 5.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. SEC: James Sanford, NØAIH. There is now a telephone line access computer bulletin board system in Omaha for amateur radio and computer enthusiasts. According to system operator KNØL, Steve, the file section has computer programs you can send and receive ranging from cw, games, swr and more. The BBS also contains an amateur bulletin section. The telephone number for the computer bulletin board system is 402-496-4788. Contact System operator KNØL, Steve, in Omaha for further information. The new president for the Nebraska QCWA Chapter is KØJFN, Tom Bracket, of Fremont. Tom begins a two year term of office November 1, 1985. Other Nebraska QCWA chapter officiers are: WØUPY-historiam WØUQJ-secretary WØAP-vice president and WØWVE-Treasurer. The space Shuttle "Columbia" made a stop in Nebraska July 4. the 747 airplane carrying the Columbia back to Florida made a re-fueling stop at Offutt Air Force Base. 18 amateur radio operators from Midlands A.R.E.S. assisted Offutt Military Police with communications during the time the base was open to the public for viewing the shuttle. Traffic: KØDKM 308, WØKK 192, WBØTEO 167, KØIXY 25, WBØGQM 22, WAØBOK 15, WØZYJ 14, KAØBOC 11, KAØBWM 10, KAØBCB 8, KØUDW 4, WØNIK 3, KDØHJ 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Robert J. Koczur, K1WGO—STM: K1EIC. SEC: KA1ECL. BM: K3ZJJ. ACC: KG1M. OO/RFI: KA1ML. TC: W1HAD. PIO: KX1B. SGL: K1AH.

NET	FREQ	LOCAL TIME	QTC	QNI	NM
CN	3640	1900/2200	190	271	K1EIR
CPN	3965	1800 m-s	126	308	KA1BHT
NVTN	22/88	2130	43	243	WA1EMI
WCM	78/18	2030	196	481	WB1GXZ
RTN	13/73	2100	28	205	KA1JAN

Greetings to all. The time has come to set back our clocks again. The old saying "fall behind in the fall" is all right for the time, but not for our section. Take time to contact your section leadership. Your help is needed. Once again, Congrats to Mary, WB1GXZ, for 100% representaton to FRN for July. Sorry about last month Mary, but we all know how hard you tried. Also congrats to Jim, W1BUK are in sorder for being a fine ambassador for amateur radio via the article published in the Stratford Star August 7. Jim is a young man of 78 who was first licensed in 1923. Keep up the good work. We'll look forward to seeing what you do in the next 78 years. The Section Emergency Test will soon be upon us. Please participate in this event. If you have any questions contact Steve, KA1ECL, SEC. The CQ Radio Club of Torrington will hold it's annual flea market on Oct 5, 1985. Contact Walt, KU1Q, for details. The Tri City ARC will hold it's 3rd annual auction on Oct 26 at the St. Johns parrish hall in Poquonock. Contact WA2RYV for further information. Nominations for the 1985 Herb S. Brier, W9AD, Memorial Instructor of the Year award are now open. Send Nominations along with letters of recommendation to: Instructor of the Year Program, C/O Rick Palm K1CE at ARRL headquarters. Bob, W1QV attended the IARU and ARRL July Board meetings. Congrats to Bob for your dedication and long time support of amateur radio. The section news column may be changing in the near future. I would like to ensure that the desires of our section are heard and noted. Take the time to send me your ideas and requests so I can serve you better-this coumn belongs to you. 73s. Traffic: WB1GXZ 423, W1EFW 288, KA1KPS 180, KA1KTH 110, KA1GWE 102, W1YO 57, KA1JAN 46, KA1BHT 42, N1BOW 32, K1AQE 31, WA1NLD 23, W1BDN 18, W1QV 7, W1CUH 15.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASM: N1BBT & K9HI. OO/AA: KA1KP SEC: KB1PA STM: KW1U. ACC: K1AZE. TC: KA1IU. PIO: K1HLZ.

NET	MGR	FREQ	TIME(LOC)/DY	QTC	QNI
EMRI	N1AJJ	3658	1900/2200/DY	464	378
EMRIPN	N1BGW	3880	1730/DY	299	245
EM2MM	KA1AMR	63/23	2000/DY	243	388
NEEPN	K1BZD	3945	0830/SN	10	44
HHTN	WB1CMQ	04/64	2230/DY	218	402
EMRISS	KA1EXJ	3715	1600/2030/DY	197	302
CITN	N1BYS	645/045	1930/DY	135	276

Welcome aboard to new Public Info Officer K1HLZ as PIO, Alan is responsible for seeking out and developing significant stories about amateur radio and coordinating the efforts of the PIAs in the section. This is an important function that deserves the support of all amateurs. Pls contact K1HLZ or KY1T for further details on how you can help. Tech. Coordinator KA1IU was Responsible for Transmitting data on STS51 on 2m and has several batches of SSTV footage that he'd be happy to show to clubs. Massasoit ARA has elected WA1CIM as Prez with N1DCB as VP - and is planning a flea market on Oct 19th. New SEC KB1PA working on upgrading the emergency

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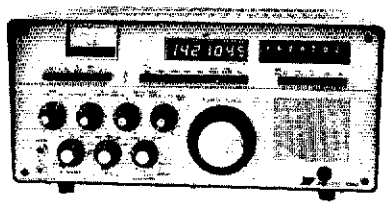

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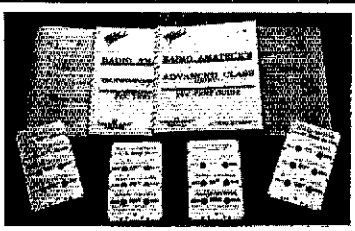

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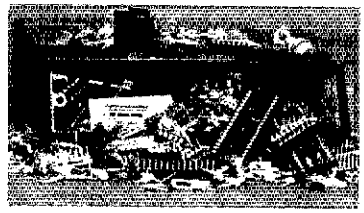

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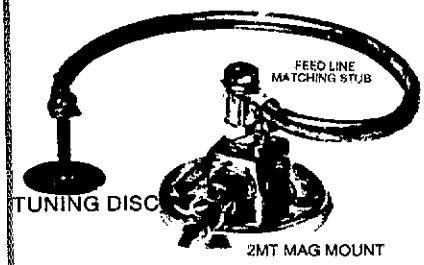

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communications capabilities of the ARES in EMA and notes that only a tiny percentage of towns have emergency coordinators. Wont you contact him to find out what you or your club can do to remedy that situation? W1IAY has a pet project to locate packet controllers at emergency operations centers throughtout the section - no small feat! Those of you thinking of putting a digipeater in your area would do well to consider placing it at an EOC - the benefit to the public in time of need would be enormous! Congrats to active public service net operators KW1U KB1AF K1ABO KB1PA KN1K KA1EXJ WA1TBY KA1LIH and N1DDC who all made the Public Svc Honor Role, and to Brass Pounders KW1U, KN1K WA1TBY who made BPL. How many of you reading this column have ever responed to a FCC notice of proposed rule-making, or expressed your opinions to your Section Manager or your Division Director? You should - your one voice can easily affect changes! Traffic: KW1U 675, KN1K 611, KY1T 605, N1BGW 480, WA1TBY 430, KA1EXJ 380, N1AJJ 208, K1GRP 181, W1PEX 161, KA1AMR 133, N1BHH 121, KB1AF 115, N1DDC 80, KB1PA 79, WA1SNH 79, KA1AE 78, K1ABO 70, W1ZHC 68, W1GE 65, KA1LIH 59, N1CVE 51, WB1CMQ 46, KA1EID 42, K1BA 41, KO1O 41, N1BYS, WA1CMQ 39, KA1KU 31, KA1MAM 27, K1BZD 15, W1DMH 15, KA1ON 11, KY1B 10, KA1DJV 10, K1LCQ 8, N1CKN 2.

MAINE: SM, Cliff Laverty, W1RWG—DEC: KL7IJG/1. STM: AK1W. ACC: KY1C. BM: W1JTH. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: K1PV. Congrats to W1BYK, Don Dean, for receiving confirmation on his contact with the space shuttle *Challenger*. Amateur radio received good publicity on TV and in newspapers concerning ham activity with the space shuttle. The Coast Guard has credited two hams with an assist in a boat rescue. W1SJN on a sloop in Penobscot Bay guided the CG to two men by an overturned boat by relaying thru N1DOY. No casualties. Please send traffic reports in by the fifth of the month. PSHR: WA1YNZ 76, N1BJW 75, N1BUG 61, KL7IJG 61, WB1CBP (Novice) 42. Traffic: KA1JOJ 104, W1ISO 102, N1BJW 88, K1MZB 67, W1NV 58, W1KX 57, AK1W 50, WB1CBP 42, WA1YNZ 38, W1RWG 32, W1BMX 31, KA1AVU 26, KL7IJG 22, W1GCB 15, KA1FTL 10, W1OTQ 9.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—TC: W1JY. OO: N1NH. The Granite State ARA in Manchester supported an MS bike tour with comm at check points and rescue vehicles. Club president, Al Brown, W1VTP, reports that a pilot CW training course using a VIC20 was very successful. A student was copying at 11 WPM at the time of the test. The MSO sponsored by the club is being used to forward 3RD party tfc. The club is teamed with local 4H group to try Shuttle contact. Meetings are on the 3rd Tue at the Red Cross bldg. Port City club provided comm and safety for local fair. W1JY has put a Heath TNC on the air. WA1YZN and W1FYR rpt that a Novice class will be given in Keene in the fall. Traffic: MSO- 44, N1CPX 504, N1NH 502, W1FYR 174, W1TN 150, K6UXO 149, K1IM 123, N1AKS 92, W1GUX 90, K1PQV 75, KA1LBW 72, W1ALE 67, KK1E 53, K1TQY 33, KA1GOZ 14, WB1GXM 14, KA1HPO 14, N1ALM 12, K3IOG/1 12.

RHODE ISLAND: SM, John (Bob) Vota, WB1FDY—I received a letter from Jim Hatherley and the Networks Newsletter, requesting traffic handlers in the R.I. area for the EMRI Net PSE help out we need help in this area. Tnx Jim for the newsletter; I will try my best to get some help here. The Annual Fall 76 Auction will be held on Sept. 22, 1985 at 870 River St. Woon., R.I. Flea mart. Opens at 9:00 A.M. Admission is free. See you there. Tnx for letter from N.C.R.C. and Sub Sig Raython. Glad you all had a gud field day. New Pres. at P.R.A. K1HGC Robert (Bob) Mancini, VP, W1EYH Frank DePetrillo. Also received the Operator from P.R.A. I have sent it to the ACC. I hope it goes into the right column. New Officers of W1AQ Pres. KA1MO Mike Arminio VP K1JI John Isdoro Sec. WA1LAD Bill Frankland Treas. KM1X Bob Allen. Traffic: W1EOF 872, WA1CRY 21.

VERMONT: SM,Ralph T. Stetson,KD1R—STM/BM: AE1T. SEC: W1CTM. SGL: W1KRV. ACC: Open. RC: Open. ATC: Open. OO/AA: KD1R. QST ALL VERMONT AMATEURS: Are you helping your club with Club Challenge for the '80s? See your club sec. for details on how you can help. A special thanks to all who have responded so far. BARC Hamfest '85 is past us now with over 150 attending. Enjoyed meeting all of you there. Hope to see you all again next year. Congrats to KT1Q for BPL (July) and following upgrades: N1DGB, KB1SU, KB1PH to Extra; KA1LYI, KA1NEO, N1DGY to Advanced; KA1LDJ to General; KA1FJW to Tech at July 13th CVARC ARRL VE exams. Thanks to KK1U, WA1PDN, K1HKI, K1ZRD, KA1NW for your good job during Barre gas explosion aftermath assisting Red Cross in Montpelier. Heard that WA1ZMS, K2DDE and KA2MNZ were on Mt. Equinox for August UHF Test on 220 MHz. The K1MOQ 224.68 repeater is operational from Tunbridge. Expect to have 223.68 MHz operational from Burlington area by Oct. with linking to NE 220 Network, via K1MOQ. Can anyone tell me who is the youngest ham in VT? I would like to know, so send me a line if you think the youngest ham is in your group. More on this next month. All Techs, Novices, and anyone else that wants to join in the fun, the VT Slow Speed Net is for you. Contact KT1Q, W1KRV for details. Send a s.a.s.e. to me at address on page 8, and I'll forward request to KT1Q. Do you have items you would like to see included here? Send me a card or letter with information before 2nd of month, and will try to include it for you. Net Reports: VTN 31/116/92, VSSB 30/387/102, VTRFD 4/53/5, CAR 27/739/45, VTPN 4/66/5, GMN 27/414/54, CVFM 4/79/4. Traffic: KT1Q 620, AE1T 96, W3QQ/1 88, W1KRV 82, N1DGY 33, N1ARI 30, W1OAK 13.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T—OO/RFI: N1CM, PIO/ACC: K1BE, SEC/SGL: WB1HIH. STM: W1UD. TC: KA1JJM. Welcome to KA1MEW as new Public Information Asst. appointee. ARES hams in South Worcester County had good meeting with SEC WB1HIH and EC K1ISW to plan for emergency ops and organization. Very nice press coverage from Springfield on KA1KRJ contact with Challenger Shuttle. QSO had been arranged for Mt. Hermon boy recently moved from Wisconsin. Members of NOBARC Provided Communications for 15K running race in Gt. Barrington and were especially valuable when ambulance communications went down. Clubs - December is drawing near and the end of the Club Challenge. Recruit new members for ARRL and earn $5 each for the treasury. PSHR: WB1HIH. Traffic: W1SJV 197, W1UD 194, WB1HIH 142, KA1EKQ 101, KA1T 50, W1JP 41, K1IJV 32, W1ZPB 8, WA1OPN 6.

NORTHWESTERN DIVISION

ALASKA: SM, David W. Stevens, KL7EB—SEC: KL7QS. STM: KL7T. OO/RFI: AL7FL. PIO: NL7CP. The Motley Group picnic was a success with over forty hams

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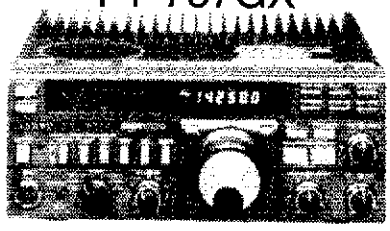

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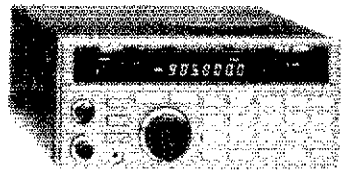

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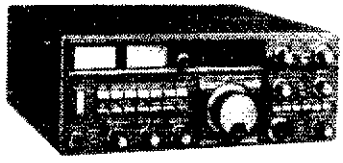

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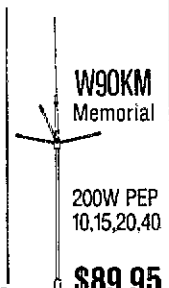

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attending. Unfortunately none passed the VE test. KL7GID-Gene Mocherman is now the Net Manager of the Motley Group Net. Gene asks for all to help with traffic, and reports that 889 checkin and 19 phone patches were handled in June. Mary Lewis-Northwest Director enjoyed herself at the Fairbanks and Anchorage Flea Markets, and also in Juneau. It is nice to see Dale Clift, asst. general manager, traveling our state. Montely-889, Seasaw-260. Traffic: KL7VL 14.

IDAHO: SM, Lem Allen, Jr. W7JMH—SEC: KD7HZ. STM: W7GHT. OO: KU7Y. RFI: K7QQP. PIO: WB7PFQ. CLUB NEWS: Boise Club had a Pot-Luck at K7SD ranch. Pocatello club had a picnic in the Park. Voice of Idaho club has a new repeater at Deer Point on 146.24/.84. ARRL MATTERS: KA7T appointed ASM. W7ZRC appointed TO. WIMU had 350 registered. NW & RM Div. Directors, plus Curt Holsopple & Kitty Hevener from ARRL HQ were there. Also SM's from WY, ID, MT & UT. N7GNV, George Seigel volunteered to put on WIMU sponsored by Idaho in 1986 at Jackson, Wy. Main prizes: Commodore 64 won by N7UT, Heath AT won by W7PKA, TS-430 won by K8PP. N7BHL reports the Panhandle Civil Defense/Code Practice Net on 147.08 FM, 0300Z MON Started in July is really going strong. PEOPLE AND THINGS: W7IWU reports giving new (used) Motor Home a shake-down outing. Everything shook down in fine shape. W7JMH and N7DYU visited Jerone and Gooding on Broadcasting business just before and just after attending WIMU. KD7JN has a new experimental sloper antenna.
NET REPORTS:

Net	Freq-time	Sess.	QNI	QTC
FARM	3936 Lsb 8P Da	31	1705	70
ID CD	3990 Lsb 81OA M-F	23	688	36
IMN	3635 CW 9P M-F	21	227	109
NW TFC	146.38/98 FM 630 P Da	30	785	9
PCDN	147.08 FM 730 Thu	21	—	—
PCDCPN	147.08 FM 8P Mon	21	—	—

GENERAL: Now is a good time to Inspect and replace tower guy wires and parts, before the winter winds give your antenna a surprise grounding! Traffic: (June) N7BHL 181, W7GHT 236, W7GHT 173, KA7KAI 114, W7JMH 51.

MONTANA: SM, Les Belvea, N7AIK—SEC: W7LR. STM: KF7R. ASM/TC: K8PP. BM: K7KCR. ACC: WB7TWG. SGL: W7JMX. PIO: N7HAZ. The hamfest season is now history for another year, must admit they were all great events, tnx to all who put them on, see you all next summer. At the annual meeting of the Treasure State Chapter #104 of the Quarter Century Wireless Association, held at the Glacier - Waterton hamfest, the 1985-86 officers elected were: W7JMX-pres; K7GL-vp; W7RLL-sec'y/treas, W7OIO-historian. The Montana QCWA will hold their fall meeting in Kalispell in October. The Great Falls Campfire girls gave the GFA ARC an award for their past support. Bill Horvath of NASA paid a visit to the Flathead Valley ARC and gave an interesting briefing on NASA's Space Shuttle/Spacelab programs. DX note: W7LR recently worked ZC4WW on Cyprus for his 299th on CW. PSHR - KF7R.

Net	Sess.	QNI	QTC	Mgr.
MTN	31	1305	176	KF7R
IMN	21	227	109	WA7BDD
MSN	3	38	0	K8PP

Traffic: KF7R 216, N7AIK 28, WB7WVD 10.

OREGON: SM, William R. Shrader, W7QMU—STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. STC: N7ENI. ACC: KB7CC. OO: N7SC. Upgrades this month: W7FZE, N7ENU (Extra); WA7UVH (Advanced); KA7HFQ (General); KA7SVH, KA7OEP, KA7URK, KA7VGH, KA7UWE, KA7UMA, KA7USP (Technician). Congratulations! The Northwest Amateur Radio Council has now conducted eleven sessions of Volunteer exams in this section. Additionally they have conducted two sessions for the handicapped. The Council members are from: ARRG, Clackamas ARC, Clark Co. ARC, Hoodview ARC, McMinnville ARC, Oregon Tualatin Valley ARC. Portland ARC, and Salem ARC. There are 66 registered VEs with the Council and 76 percent have taken an active role. This is a meritorious effort! If you are not DOING, check with your local club and find out how you can help. Check on club's status in the ARRL 'Club Challenge' for new League members. Any club could be a BIG winner but they need YOUR help to do it. If your club has questions regarding the program or if they want to find out about being a Special Service Club or need information, contact your Affiliated Club Coordinator, Bob Orr, KB7CC. Remember, your club is one of the most important links in a vibrant hobby. Traffic: W7VSE 657, K7OVK 276, W7ZB 209, W7LRB 194, N7FXJ 174, AL7W 99, KA7AID 38, W7LNE 13, KT7X 12.

WASHINGTON: SM, Joe Winter, WA7RWK—STM: K7GXZ. SEC: W6IIH. BM: N7IL. TC: K7UU. PIO/SGL: W7CKZ. OO/COORD: KC7FA. ACC: KD7G.

Net	Freq.	Time(Z)	QNI	QCT	Mgr.
EWTN	146.64/	0030/0430	77	62	WA7CBN
NTN	3970	1900	1146	84	W7UU
NWSSB	3945	0130	750	35	W7HFN
PSTS	145.33	0030/0430	218	158	W7IEU
WARTS	3970	0100	3206	275	W7IGC
WSN	3590	0145/0445	494	179	W7GB
WARNS	3940	0200	AR NEWS	NET	W7CKZ

Irma Curry, WB7FDC, of Arden, WA, received the National Weather Service Public Service Award on July 24, 1985. The award was for her dedication in collecting weather observations, over the last three years, from Amateur radio operators and relaying the information to the Nat'l Weather Service. The award was presented in Spokane by Richard Hutcheon, Area Mgr. in Washington State and Ken Holmes, MIC of the Spokane office. Hutcheon said, "Mrs. Curry's dedication to collecting and reporting weather conditions has been outstanding. He added, "During this past winter her daily attention to the program has been 100%." This information allowed meteorologists to "fine tune" Winter Storm Warnings, Traveler's Advisories and general forecasts for Eastern Washington. Irma is one of the NCS's for the ARES/NWS weather net which meets daily on 3910 kHz at 0930 PDT. The net concluded its fifth year operating from Oct. 1 through July. She is very active in the Weather Spotter System in Northeastern Washington. WA7LNC system coordinator reminds those in the area to listen to the weekly ARES net on Tues. 8 P.M. on the 147.90/.30 repeater for info. about the system. Olympia ARS operate amateur radio publicity booth at the Thurston Co. Fair July 31-Aug. 4. The five day event included ARRL and OARS video explaining Ham radio and club activities, a 20-meter receiving station and much more. N7AGG RACES Radio Officer for the Washington State Department of Emergency Management has resigned after serving the Department since 1977. Reade is to be congratulated for the work and service he has contributed on behalf of the amateur community. His volunteer effort is not only appreciated by the Hams but by those in the emergency sector and government agencies. Congrats Reade. Succeeding Reade in this position is Tom Sutton, N7DRT. The WARTS net picnic at Lake Kachess on July 14th was again a great success. Good weather, great food, door prizes and pleasurable QSOs made a good time for all. Directors of the net elected W7IGC net manager. Congrats Ron. Traffic: WB7WOW 548, KD7ME 542, K7GXZ 380, W7LG 215, NE7B 206, KR7L 129, KR7F 118, W7GB 92, N7GDW 50, KD7TJ 50, W7IEU 48, KD7G 40, N7DDP 31, KA7TCE 24, N7FXM 18, K7AJT 16, K7OXL 8. (June) N7FXM 4, KD7MW 8.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASM: W6ZF, N6DHN. SEC: W6LKE. STM: NI6A. KB6UY, XYL N6ERT and 7-year-old daughter, Charlotte, operated1-B Utah from the Dixie National Forest; a FB family FD. MDARC members who provided Communications for the Lafayette fire were: WB6JGV, WB6EZI, W6CPO, WA6ZFZ, N6KLS, N6JRK, WA6DQN, WA6ADW and W6IDW; on standby were: WB6TEE, K6UGS, KB6KZ, WB6MZQ and W6QEN. EBARC members on duty at the Lexington Fire in Los Gatos were KA6SOC. N6DRT and NI6A patrolled our Regional Parks on the 4th of July as part of the CDF (VIP) program. So many Benicia ARC members participated in events in July. There is not space to list them! Club historian KA6BPR is going to be very busy keeping track of this group. HARC's Novice class has 16 students, 7 of whom have completed their code requirements. Work is progressing on the new shack at Fire Station No. 6. Tarffic: K6APW 165, W6VOM 114, WB6UZX 22.

NEVADA: SM, Joe Lambert, W8IXD—SEC: K7HRW. TC: K7ICW. PIO: WA7JUO. Many Nevada hams attended the recent Flagstaff and Queen Mary hamfests. Don't forget the Nevada Weather Net, 6-6:30 A.M. on 3993 kHz, with KA7AUA as NCS. W7BES attended Nat'l Scout Jamboree at Fort A.P. Hill, Va. working as a K2BSA station operator. Don't forget Octobervention in Las Vegas, Oct. 31. This is the official ARRL Pacific Division Convention. Contact NK7N for FCC exams. In conjunction with the Red Cross, K7HRW provided Bikers on a charity marathon, messages to their families. White Pine A.R.E.S had emergency drills in conjunctin with R.A.C.E.S, Sheriff's office and Ely Hospital. KW6JF coordinated safety communications for an off-road race in the Pioche area. Traffic: K7HRW 5.

PACIFIC: SM, James Wakefield, AH6CO—All Islands report activity for preparedness for Ignacio. Complete cooperation with local CD officials was given. Fortunately aid was not needed but we were ready. BIARC reports 11 new novices form Waiakea HS Rm J classes. WH6BDW from novice to Tech, WH6BAV from novice to Gen and WH6BDE from Tech to Gen. Maui ARES rports KH6UU, AH6AM, KH6H, NH6O, KH6MX, WH6C and KH6HA provided communication for the "Run To The Sun" on Aug 4. KH6MX, WH6AKB, KH6OB and KH6WA coordinated sites for the Wailuku Jr Tennis Tourney over July 23-25. AH6P and KH6S connected via AH6P-1 digipeater on Mauna Loa for 1st BI to Kauai "packet". A new Cont/AP on KH6DLW/raat Wilcox Hospital is up. KH6LG: Kauai and AH6AZ: Maui are QSL managers. Aloha. Traffic: KH6S 28, KH6H 24, KH6HIJ 18, KH6RQ 17.

SACRAMENTO VALLEY: SM, Glenn Koropp, W6YFW—ASM: Hugh Nickles, WB6YKI. SEC: Lyle Taylor, WA6ZUD. STM: Al Blegler, WA6WJZ. Due to the resignation of Ron Menet, N6AUB, I have been appointed SM temporarily until Oct. 1, 1985, at which time the newly elected SM will take over. I am continuing Ron's appointments of those that are not involved in the election. Amador ARC reports: VE exams of July 20 had two blind Novice amateurs, KB6HFG and KB6HRB taking their Technician tests. They both passed and are to be congratulated. KB6BNC read for each. July 4th after a full day of fire patrol, KF6GY, N6JTJ and W6IEW motored to Calaveras County and relieved operators at the fire who had worked all day. AARC has now sponsored two bus trips to Lake Tahoe casinos, profits help the club. I had the pleasure of attending the Chico Club meeting in July. Jackie van de Kamp, W6YKU, their bulletin publisher, has been elected President International YLRL for 1986. Chico (GEARS) is giving their first VE exam Sept. 14 at Enloe Hospital, Chico. Weaverville-Trinity County ARC has been very active in communication during fires caused by lightening. During Field Day exercise hams were called upon to help in two search and rescue missions. 29 amateurs took part. WA6ZUD co-ordinated. North Hills ARC, Sacramento furnished 2 and 220 communications for the Carmichael Elks 4th of July parade with John, WB6PWT coordinating the group. Apples Great Race XII, July 13th was spearheaded by Ed. KW6N, net control. The River City ARC of Sacramento offer Novice and up-grade classes throughout the year. Call your SM (916) 483-0551 for info. I am sending out a newsletter to all clubs in the section every month. If your club does not receive one, please advise so that I get you on the list. Send me news from your area so that I put it in my newsletter and *QST* Section News. I need your input. The second Sunday of every month an Old Timers breakfast is held at Seasons, Fair Oaks Blvd., Sacramento at 9:00 A.M. All hams invited. Call Tony, K6DR-482-8147. Traffic: WA6ZUD 428, N6CVF 404, WA7AGY 392, WB6CLD 367, WA6WJZ 245, WD6BZQ 86, WA6ERZ 18, WB6SRQ 12.

SAN FRANCISCO: SM, Bob Smith, NA6T—Vomarc's Hamfest was a rousing success, good food, good scrounge. SFRC's 'OLD-TIMER NITE' will be Friday Nov. 8, 85. Who will be the oldest "oldtimer" this year? SFRC NOVICE CLASSES begin Sept. 24 at the Youth Guidance Center in SF. MARC was seen on Channel 7 before the Shuttle Flt. with demonstrations of the Computer Tracking system, SSTV, Etc. Tell the rest of us how you got the TV time!! SCRA novice and up-grade classes are starting-see WA6ACX, WB6UBA, or KS6W for further information. Sorry to hear Sam Van Liew, W6NL, is a Silent Key, Sam was Past President of SFRC, Helped W6AM learn the Code, and was very active in NTS with monthly totals always above 200, 73, Sam. "LPH hams" operated QRPP during FD this year from the Cloverdale area, pts, pts, pts. HARC is organizing a "GET-ACQUAINTED NITE" for Humboit County Amateurs. Watch your Mailbox or the local reptr. for your personal invitation. Don't Forget the VE TEST HOTLINE number for Pac. Div. Test DATES and Contact information 408-984-8353. Traffic: W6IPL 195, KK1A 143, K6TWJ 67, K6TP 54, W6GGR 24.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WA6YAB. STM: N6AWH. TC: WA6EXV. ACC: N6ECH. Asst. SMs: W6TRP and K6YK. K6BKZ and K6JKQ are SILENT KEYS. New officers of Madera County ARC are: Pres K6KLV; VP and Treas WD6GFF; Sec W6BWM. The club meets the 1st Tuesday at the library in Madera. As of July 31 only the Kings ARC has participated in the ARRL Club Challenge. Lets get going and recruit new ARRL members. New appointment: ORS

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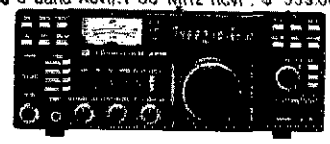

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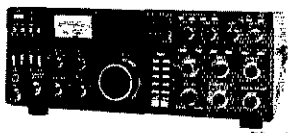

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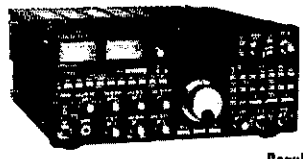

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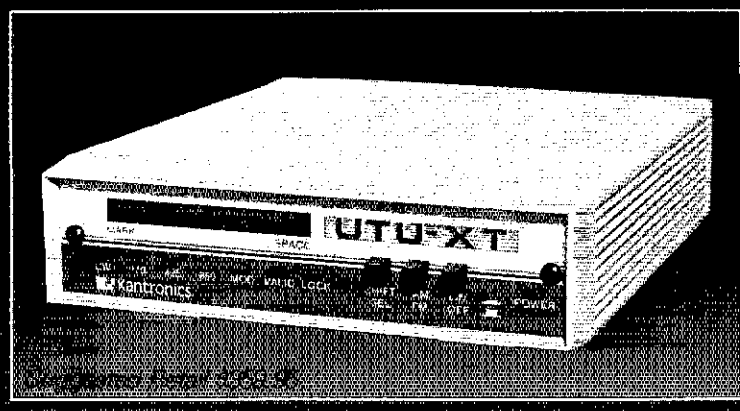

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KB6HGW. Renewed appointments: ORS K6PMG: OBS N6AM, W6XK, and W6NTK. Congratulations to the following upgrades: TECH- KB6GVZ, KB6JHZ, KB6GIB, KB6HAV, KB6HOI, KB6IDI; GENERAL-KB6BIC, KA6BGB, WB6JHN; ADVANCED-KA6UAP, K6PKL, N6LFP, K6OLK, KA6LAC. W6SX Has moved to New Mexico. WA6Z has a TS940. W6GR has a TS930. WA6JDB has an IC735. N6GPA has an IC37A. W6XP has an IC471A. KA6LAC has a KDK4033. WD6FFM has a TS530SP. WB6EHH had a TS940. WB7UGZ has an IC745. WA6OEC has a FT757GX and TS530S. K6YK has an IC730 and a beam for 12 meters. K7SQG has a FT301 and is mobile. Traffic: N6AWH 284, W6DPD 32, WA6YAB 32, K6PMG 20, W6SX 47.

SANTA CLARA VALLEY: SM, Rod Stafford, KB6ZV—BM: W6BCY, PIO: N6BIS, TC: K6HLE, SEC: K6ITL, ACC: W6MKM, ASM: NS6N, STM: W6PHT. Please make sure to take the time to send a letter to your California State Senator in opposition to SB 1413. SB 1413 is the proposal currently working its way through the State Senate which would make it a criminal offense to possess a scanner or receiver that receives radio transmissions in the 800-900 Mhz range. W6PHT and AA4RE both made Public Service Honor Roll for the month of July. Those of you involved in Public Service work should fill out the form CD-210 and send it to the Section Manager to qualify for the PSHR. I attended the Southwestern Division Convention on the Queen Mary in Long Beach and found it to be a very interesting and fun event. There were a number of amateurs from the SCV Section in attendance including: W6CUB, W6TMG, N6JBV, WA6OCV, W6JZU WA6Y and N6JCF. N6AJG had to cancel his plans to attend at the last minute but did win a new HT. N6BIS also won a new HT and also a gift certificate for placing first in the Homebrew QSL card Contest. Speaking of conventions, the 1985 Pacific Division Convention is to be held in Las Vegas, October 31-November 3, 1985. The name of the convention is "Octobervention" and looks to be a very good one with a lot of good programs and exhibitors. W6PRI reports that he worked over 100 new counties in a recent County Hunters CW Contest. A Final analysis of the amateur participation in the fires in the Santa Cruz Mtns and near Morgan Hill reveals will over 100 amateurs were involved with many putting in multiple shifts. WB6OML reports those working 3 or more shifts on the fires included: W6s BCY, DOM, NLG, QZE, K6s RQ, UEY, WA6s AOD, KZA, NIL, LSA, ODB, OCV, PWW, QYS, WB6s KEQ, MRQ, LZZ, KA6s PIA, TGE, YFB, YRK, KB6s FEC, FVA, GKJ, IMG, N6s DRT, CKV, JXV, KFJ, KFK, KL, NG6A, AI8A, WA8KNH, KG6TL and WB6W. N6HJJ, WB6BPU, KA6TGE and K6GNG all put in multiple shifts acting as net controls for Resource Net for the fire operations. The Gabilan ARC went all out in an effort to obtain some area coverage in the TV and written media in the "Ham in Space" program. On a Saturday afternoon during Tony (W0ORE) England's flight on the shuttle, Tony responded to the 6 grade students calling him on one of the 2-meter frequencies. Tony talked with 2 of the students and also briefly talked with NJ6L, the President of the Gabilan club. Congratulations to them for their fine effort, the good press they received and their good fortune in contacting the shuttle. SCV Section PIO N6BIS recently sent out many announcements to service clubs in Santa Clara County telling them that Amateur Radio operators are available to give non-technical talks to the service clubs. Quite a few clubs have requested speakers and KB6AV and K6RQ have been kept busy giving talks to local service clubs on Amateur Radio. If you're interested in helping out by giving a talk to a service club, let N6BIS or KB6ZV know on the Section Manager's Net on Tuesday nights at 9:00 p.m. on WB6OQS/R (146.76). KB9ZH is the new EC for the City of Saratoga. He replaces WB6OML who was appointed District Emergency Coordinator for the Central area of Santa Clara County. KB6FPW is recent Official Observer appointee. Traffic: W6PHT 543, W6YBV 96, W6KZJ 88, KA6CVM 62, W6PRI 41, W6ZRJ 8, (Jun) W6KZJ 112, W6PRI 4.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—Big event this month is the SECTION EMERGENCY TEST on 19/20. Contact you EC/SEC to join ARES and participate in SET. WD4BBQ Special Events Station on 26th. See Special Events Column this month. Congrats to WD4NTF as chapter and area Civitan of Year. To W4NHV who was presented Certificate of Merit and Public Service Commendation by EC WV4Z. To upgrades KB4HNX, N4JFK, KB4LDB, KA4EQR, KB4MZT, WD4DVS, KA4PMU, KB4LAZ, KB4ILA, KB4LBJ, WB4ELZ, KB4BAY. ATC KF4PW assisted N4BTK with antenna problems. He also assisted KB4JHF in proper selection of ham gear as he just upgraded at age 75. Tree Frog Mania hits Greenville (packet radio) with AI4J, K4WKZ joining the fun. K1PLR needs OOs in mountains, southern, eastern/coastal part of state. K4ITL would like to see an ATC in each club. If you're interested and qualify, contact your SM. All appointees make sure you send a report each month to appropriate Section Official. If anyone has any ideas about our hobby you would like to share, please let me know and will include in column. This is your column so get your pens ready. Helpful hint: if you have an active ARES program but your county people fail to notify you in case of local emergency, then contact them and remind them of your resources. WB4HRR is new NM of NCMN. AB4W advises that State Highway Patrol is interested in HAMWATCH program. Lot's of traffic generated at Boy Scout Jamboree. Thanks to all who made it possible. Be alert for Halloween spooks. Traffic: NJ4L 520, K4NLK 408, KA4EYF 201, WB4N 198, K4JHF 178, N4JRE 156, WB4HRR 128, KB4IVV 80, NT4K 73, KA4YMY 71, WD4RMQ 63, WD4EQK 62, WB4WII 51, K4GI 43, WA4MNR 42, N4JEO 40, KI4ME 34, WB4CYN 33, K4SWN 30, WD4CEB 28, N4CJJ 27, WD4HTE 25, K4YJB 24, N4LUO 20, KI4YV 20, WR4E 18, W4EHF 16, N4KYD 14, K1PLR 12, K4OXA 12, KU4W 12, KB4IRR 8, WD4BOQ 6, N4UE 6, NV4F 5, WA4SRD 4. (June) N4LFX 27, N4UE 8.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—Officials have allowed Lancaster County ARC to install their Club station on the top floor of the Lancaster County jail. The Club was allowed the use of an existing tower for mounting of HF and VHF antenna. The station will be an asset to our section during a communication emergency. CONGRATS to ALL! W4FX reports that a group of packeteers met in Columbia and formed the South Carolina Amateur Radio Digital Society (SCARDS) for the purpose of promoting the orderly growth of packet radio and other digital modes. In addition, SCARDS will give SC amateurs a voice in matters affecting digital radio locally and nationally. Charter membership in SCARDS will be available until Oct. 1. Contact W4VFR for details. Packet radio will be a major mode of communication during emergencies in the near future. Traffic: K4ZN 207, W4FMZ 125, W4ANK 76, KB4BZA 57, WB4UDK 39, KA4LRM 34,

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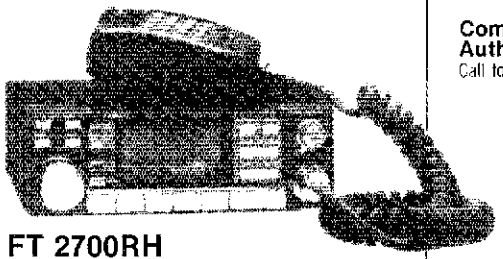

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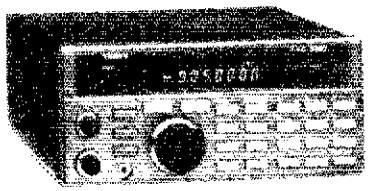

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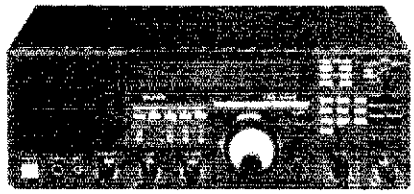

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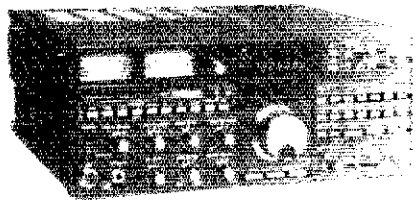

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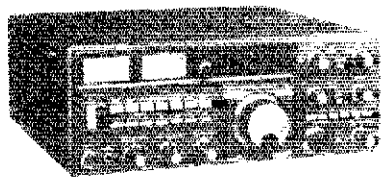

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VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: WB4UHC. OO CRD: W4HU. BM: AB4U. SGL: W4THV. TC: WB4MAE. A complete listing of Section NTS nets can be found in last months QST. Please change the Net Manager of VSN to NN4I who replaces KB4WT. Also please note that John Manning, WB4MAE, has been appointed Technical Coordinator (TC) for the section. John with the aid of the section's ATCs will be implementing the Technical program. It is with deep regret that I announce WD4APO and W4JUJ as Silent Keys. The Shenandoah Valley ARC has awarded a scholarship to a member of the Lord Fairfax Community College electronics class. This is the 3rd year this award has been made. The Roanoke RARES group has reached an agreement with their local Red Cross whereby they will be setting up a station at Red Cross HDQ. They have attended a disaster training class held by the Red Cross. The Williamsburg Club has been the main contact with the sailing vessel "Godspeed" for the past 3 months over 400 messages were handled with the ship. The Boy Scout Jamboree is now past history. Under the leadership of KA4ERP most of the outgoing traffic from the camp was handled via automated methods using RTTY, AMTOR and Packet. Stations active were; KA4ERP, AA4GL, KA4IUM, K4JST, WB4PNY and KB4WT. Monitoring this I learned a lot about automated traffic handling. First, it would help if our section would have an automated net where one could get some on-the-air training, also, standard operating and message format procedures are needed. It was good seeing many of you at Berryville and at the Traffic Handlers picnic At the picnic it was suggested that the section have a "Training Net" in the Novice band that would be separate from the VSN. What are your thoughts on this. Let me know. Also, ORS, OO, BM, OES, EC and ATC appointments are available contact the SM to info. Known exam dates are; October 13 at Williamsburg contact WJ4X, Hampton Nov. 16 contact KE4BW and Dec. 14 contact WB4BAB. So far ony 9 clubs in the section have taken advantage of the $5.00 rebate offered on new ARRL memberships and $2.00 rebate on renewals. The Lynchburg club will supply communications for their local Air Show and Ten Miler race. N6ANQ, N4GHI, N4GHK, KI4HK and KE4TZ of the Mt. Vernon club helped with the DC 4th July parade. July was a banner month for the traffic handlers: Total traffic count for the month 7789 with AA4GL, N4GHI, N4EXQ, AA4AT, KB4WT, KA4ERP and WB4PNY making BPL. OOs W4HU, KE4EQ, W8IRT and K4JDJ were active monitoring for operating discrepancies. Traffic: AA4GL 1046, N4GHI 1020, N4EXQ 741, AA4AT 626, KB4WT 537, KA4ERP 520, WB4PNY 515, W3ATQ 438, K4JST 376, WD4FTK 190, WD4ALY 151, WA4CCK 149, KA4IUM 145, WD4OCW 122, W4JLS 113, K4JM 100, K4AXF 99, NW4O 91, N4KSO 88, K3RZR 74, WB4EDB 73, WB4FDT 70, K4MTX 54, K4VWK 50, K4KDJ 47, K4GR 36, NT4S 34, WB4UHC 32, WB4KIT 28, K4BGZ 24, KB4PW 23, NN4I 22, N4DWO 21, K4JUM 20, K4MLC 20, WB4MVX 18, N4FNT 15, K8JH 12, N4TE 8, WB4DQZ 7, W4TZC 6, WY4T 5, KC4HN 3, W4KX 3, N4LE 2, W4LXB 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: KD8G. ACC: WA8CTO. SGL: K8BS. TC: K8CG. Rpt Coord WD4KHL. Hamfests were held in Ripley and Charleston in Aug.TNX to all who helped. KA8RWF is now a member of QCWA. WA8YTM is now a member of the WPX honor roll. Congrats Bill. Participation is needed on all section nets. See times and freqs. below.

Net	Freq.	Time	QNI	QTC	Sess.	NM
WVFN	3865	6:00	932	135	31	W8YP
WVMD	7235	11:45	762	45	30	W8FZP
WVN	3567	7:00	218	72	31	W8YP
WVRN	3639	6:30	146	32	30	KD8RD
Hillbilly	14290	Noon Su	100	18	4	W8YP
WVNN	3733	5:30	83	45	30	KD8RD

Traffic: W8YP 159, K8TPF 150, KZ8Q 115, N8GJO 94, WA8NUI 81, W8FZP 61, KD8RD 51, K8UQY 47, K8KT 43, KA8OGF 36, K8QEW 26, KD8G 25, N8FXH 24, NC8G 21, WA8KCJ 17, WD8EBH 9.

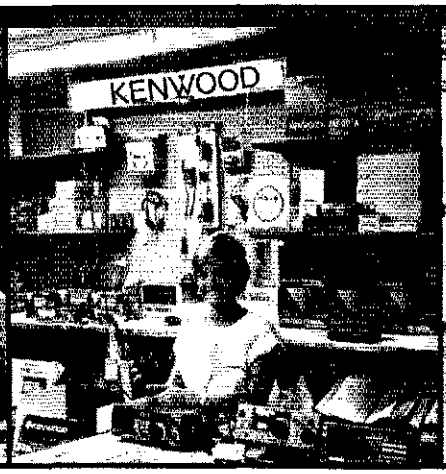
ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—SEC: WB0FQB. STM: WD0AIT, WA5M: W0RSG. ACC: WB0DUV, OO/AA: NM0X. PIO: N0FOE. SGL: WD0GQL. TC: NC0F. BM: W0MDT. DECs WB0TUB & KC0WR. The Fall season is beginning and October is SET month. ECs and ARES members are preparing for their annual SET. ORSs along with NTS & local nets will be busy trying to pass SET reports to the SEC & STM. As always I know Colorado will be well represented by its ARES districts. Communications for the Jerry Ford Golf Tournament in Vail were handled primarily by the Western Slope with five amateurs from the East Slope helping. Three packet radio stations used for this event proved to be very successful along with two meter communications. Congrats go to W.Slope ASM, W0RSG and E.C.H.O for the excellent coordination of this three day tournament. The RKY MTN Division Convention in Jacksonhole, WY. produced awards for the sections and the division. W5WRS of New Mexico named Division Amateur of the Year. Dual awards for Section Amateur of the Year for Colorado Presented to KA0CZW and N0EEE. Congrats to all. We now have four SSC's . . . DRC, PPRAA, RMRL and our newest addition Clements ARC. 73, KQ0J. Nets: Col; QNI 762, QTC 85-inf 82, 27 sess, 828 min. CWN; QNI 198 QTC 45, 28 sess. 411 min. CWXN; 31 sess. 2790 min. HNN; QNI 1424, QTC 109-Inf 346, 31 sess. 1405 min NCTN; QNI 223, QTC 80, 27 sess, 292 min. SCTN; 10 sess. 170 min. Traffic: WA0OYI 512, KB0Z 194, N0DZA 129, W0LAE 80, WD0BSZ 76, W0MDT 58, WB0FFV 39, W0NFW 14.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: W5HD. DEC: KB5XD. STM: ND5T. NMs: WA5UNO K6LL W5VFQ. TC: W8GY. ACC: W5HD. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 73 msgs with 453 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 60 msgs. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 97 msgs with 879 stations in. Yucca 2-mtr Net 78/18 & 93/33 handled 25 msgs with 397 checkins. Caravan Club 2-mtr Net 66/06 handled 14 msgs with 141 checkins. SCAT 2-mtr Net 66/06 handled 14 msgs with 583 checkins. W5WRS Division Ham-of-year. N.NM Hamfest with VE Sept. 28-29. Traffic: ND5T 740.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, WA7JJL. STM: John Sampson, W7OCX. It was good to see Utah well represented at WIMU; I hope everyone enjoyed it as much as I did. Congratulations to Ray Evans K7HLR for receiving the Utah Ham of the Year Award from the Rocky Mountain Division Director. Packet radio is off and running in Utah: Why does everyone involved in packet say so many good things about it? Traffic: K7HLR 438.

Rob, WA3QLS



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WYOMING: SM, Dick Wunder, WA7WFC—ASM: KA7AWS. SEC: W7TVK. Cheyenne Hams are to be commended for the efforts in providing emergency communications during the severe storms and floods. Thanks to the Laramie Hams for their help also. The Wyo. Hamfest was a great success & the largest ever. KB7WN won the 757GX, congats to Shirley. Cheyenne Hams provided communications for the four parades during Frontier Days. Marlene Barker from the FCC field office in Denver was a guest at the SHY-WY luncheon 7-30-85. Thanks to KT7V for fine Newsletter from the Torrington club. Recent upgrades include: WA0PFJ to Extra, WA7ZZY & KA7SQL to ADV, N0FRT & KA0SDD to GEN, & KA7DNI to TECH. Wyo Cowboy Net held 23 sessions with 737 QNI & 17 QTC. Traffic: NN7H 185, W7HLA 36.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, Jr., WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. The Huntsville Haylarc Ham of the Year Award went to WB4QOS, Jo Ann Tunstill. The Simulated Emergency Test (SET) is this month so I hope everyone is planning ways to test their emergency preparedness and how they can best interface with the other service organizations (Red Cross, Civil Defense, National Weather, etc) to get the most out of it. Here are two Silent Keys: W4OBV, Oliver W. Jackson of Huntsville and WA4CAI, Tony G. Harkey of Fayette. Here are a few upgrades I have heard about: Dave KB4KCH, to Tech; Pat N4HNV, Pat N4MMO and Paul N4JTD to Gen; Larry WB4AYH to Advanced; and Fred W4WHB to Extra Class. Traffic for July: CAND had 1319 messages in 31 sessions with Alabama rep by WX4I, NW4X, and W4CKS. DRN5 passed 983 messages in 62 sessions with Alabama represented by WA4JDH, W4WJF, WA4PIZ, NW4X, WB4IXA, WX4I, W4CKS, KC4GS and W4IBU. RN5 reports 598 messages in 62 turns with Alabama rep by WX4I, W4CKS, WA4JDH, NW4X, K4VIZ, and W4ZJY. BPL: WA4JDH. PSHR: WA4JDH, W4CKS, WX4I, WD4NYL, W4ZJY, and WA4RNP. Very seven three, Joe. Traffic: WA4JDH 809, W4CKS 254, W4ZJY 173, WX4I 125, NW4X 76, WB4IXA 66, KB4GAP 50, AA4KE 48, K4AOZ 34, WA4RNP 31, W4WJF 24, WD4NYL 20, W4DGH 12, WB4TVY 12.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: Bob Good, K4VHC. SEC: Jack Sanders, NC4E. STM: Jack Bramlett, W4PIM. ACC: Sandy Donahue, WA4ABY. BM: Bob Good, K4VHC. OOC: Ace Norton, NA4I. PIO: Jack Bolton, WA4PNY. SGL: Al Smarr, W4BTZ. TC: Curt Greenway, K4UDR. I am very porud to have the above listed hams to assist me on the ARRL Georgia Section Staff. They are volunteers and are looking for your help to keep the section on the move. When they solicit your help please tell them YES. My personal tnx go to the following who served the section & didn't desire to be reappointed: W4BIA (BM) W4RZL (OO) WB4ABY (SEC) The many VE & Instructor groups have to be commended for the excellent job they are doing in helping promote amateur radio in GA. Again they are volunteers. The section & local nets are trying to inform us of dates, times & places where examinations are given. If you desire & think that you can qualify as an Official Observer contact me or NA4I in Augusta. This program is very vital to the hobby. Here it's Oct. again & time for the Rome Hamfest on the 6th followed by Central Georgia on the 12th & 13th. The annual meetings of the GSSB Association & Georgia Cracker net take place on Sunday. I begin my 4th term on the 1st of this month. I once again ask for your support because without you I am nothing. If your club or group is planning a Hamfest in 1986 please write me or SE Director W4RH for the forms. They are listed and in 1985 there was no conflict on dates. Traffic: W4PIM 245, K4VHC 98, K4MOG 71, K4AKP 67, W9NXC 43, N4UZ 37, KF4FG 29, WB4SPB 28, N4DOM 22, W4HON 19, K4EV 18, K4BAI 14, N1BKC 4.

NORTHERN FLORIDA: SM, Phil O'Dwyer, WF4X—SEC: Rudy, WA4PUP. ACC: Roy, N4ADL SGL: John, KC4N. PIO: Petey, WA4POU. BM: Wimpy, KB4LB. OO: Stoney, K4JJE. TC: Charlie, N4KF. STM: Ron, WB4GHU. Rudy, our SEC reports that our DEC/EC Teams are still on the ball, and he has an Emergency Plan for our Section in final draft. WD4FJE, Virginia, your DEC for the Panhandle district doing a great job and has ECs in all but one county, while W4MLE, George Thurston our new DEC for the Capitol district has improved our coverage there from one EC to six. With the fires and weather problems over the last few months all DEC/EC teams have been doing good jobs and we thank them one and all! Please welcome our new ECs: WD4OSS, Phil, E. Volusia: WD4ODB, Pat, Madison: KF4TO, Art, Franklin and N4LNB, Steve in Liberty. Dave, WB4TPG, EC in Hernando County reports that amateurs met with county commissioners and helped defeat an ordinance on amateur towers. Our Technical Coordinator, N4KF, Charlie is still looking for a few good men to help aim as ATCs so let him hear from you soon! Really appreciate all of the Station Activity Reports that you have been sending me so keep them coming regardless of the size of your traffic count. Traffic: WX4H 720, WB4ADL 603, WF4X 537, N4PL 534, KB9LT 239, WB4GHU 150, WA4EYU 140, WA4QXT 131, KB4LB 127, KB4MHH 123, KD4KK 117, KC4VK 112, AA4HT 85, WD4IIO 78, KF4TM 75, N4DY 72, W4KIX 72, W4MGO 62, KF4U 61, N4JAQ 58, WD4MLQ 46, N4GMU 40, WA4PUP 37, WB4TZR 37, WD4HBP 37, WA4SXW 35, N4ADI 34, NQ4P 31, W4LDY 29, WC4D 27, KI4CQ 24, WD4EQB 23, WD4JDU 20, N4ENL 18, W8IM 15, N2AOX 14, N4EDH 12, N4UF 11, NS4C 11, N4JHI 10, KF4GY 7, WB4AWG 6. (June) KF4TM 68, WB4GHU 68, N4GMU 35, N2AOX 10.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OO: W4SS. WD4KBW reports a total of 145 bulletins received and transmitted this month. OBS stations reporting were: AA4BN 20, W4DL 29, W4ESH 10, WT4F 7, KA4GUS 15, K4IEK 12, WD4KBW 36 and AA4MI 16. There are areas in the Southern Florida section where there are no active OBS stations. If you are in such an area please let WD4KBW know if you are willing to provide this service. The Jacksonville Hamfest was held in early August—It was brought out at the Emergency Communications Forum of the importance of keeping the appropriate officials aware of local activity. Also the excellent articles related to emergency activities should be brought to the general public as well as the hams. The EMERGENCY OPERATIONS SCHEDULE FOR FLORIDA SECTION NETS was updated in the Traffic Handlers Forum. One item of discussion was the net member who "checks in and out" prior to the official opening of the net. The consensus was that the station was not there during the net and unavailable for handling traffic and should not be counted in the QNS. AA4MI has written an

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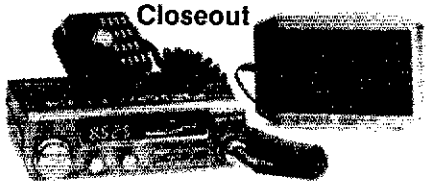

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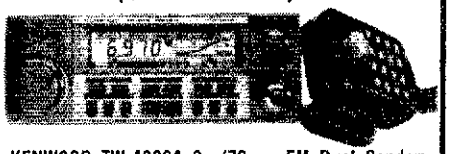

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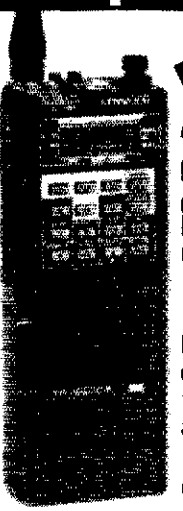

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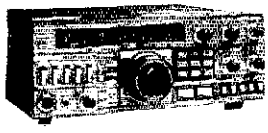

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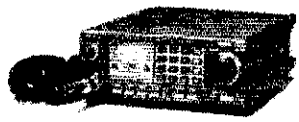

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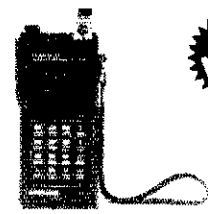

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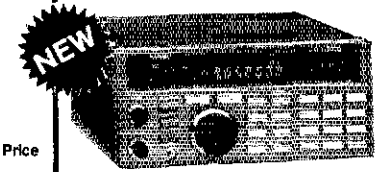

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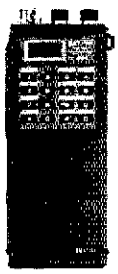
IC-02AT IC-04AT



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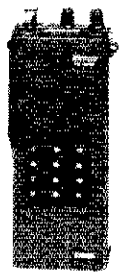

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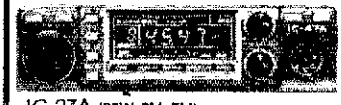

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IC-27H (45W, 2M, FM) ..... Sug. Ret. $409
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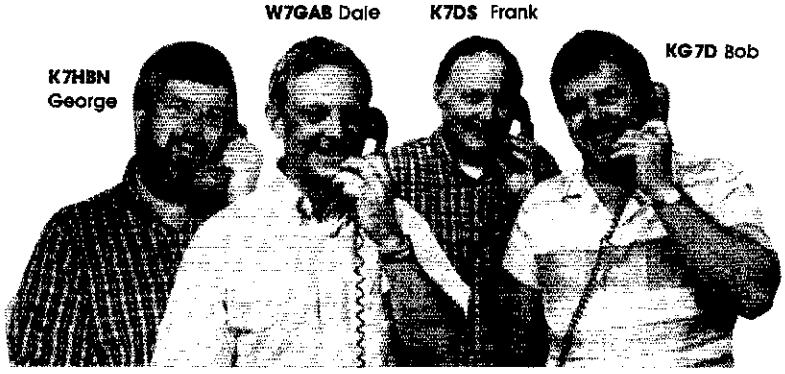

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Frequency range: 25-550 MHz. continuous coverage and 800 MHz. to 1.2 GHz. continuous coverage
In addition to normal scanner listening, the MX7000 offers CB, VHF, and UHF TV audio, FM Broadcast, all aircraft bands (civil and military), 800 MHz communications, cellular telephone, and when connected to a printer or CRT, satellite weather pictures.

NEW! Regency® MX5000-K

List price $599.95/CE price $329.00/SPECIAL
Multi-Band, 20 Channel • No-crystal scanner Search • Lockout • Priority • AC/DC Selectable AM-FM modes • LCD display World's first continuous coverage scanner
Frequency range: 25-550 MHz. continuous coverage.
Never before have so many features come in such a small package. The *Regency* MX5000 mobile or home scanner has continuous coverage from 25 to 550 MHz. That means you can hear CB, Television audio, FM broadcast stations, all aircraft bands including military and the normal scanner bands, all on your choice of 20 programmable channels.

NEW! Regency® MX4000-K

List price $629.95/CE price $299.00/SPECIAL
Multi-Band, 20 Channel • No-crystal scanner Search • Lockout • Priority • AC/DC Selectable AM-FM modes • LCD display
Bands: 30-50, 118-136, 144-174, 440-512, 800-950 MHz.
The *Regency* MX4000 is gives coverage in the standard VHF and UHF ranges with the important addition of the 800 MHz. and aircraft bands. It features keyboard entry, multifunction liquid crystal display and variable search increments.

NEW! Regency® Z60-K

List price $379.95/CE price $216.00/SPECIAL
8-Band, 60 Channel • No-crystal scanner
Bands: 30-50, 88-108, 118-136, 144-174, 440-512 MHz.
Cover your choice of over 15,000 frequencies on 60 channels at the touch of your finger.

NEW! JIL SX-400-K

List price $799.95/CE price $469.00/SPECIAL
Multi-Band, 20 Channel • No-crystal Scanner Search • Lockout • Priority • AC/DC
Frequency range: 26-520 MHz. continuous coverage. With optionally equipped RF converters 150KHz-3.7 GHz.
The *JIL* SX-400 synthesized scanner is designed for commercial and professional monitor users that demand features not found in ordinary scanners. The SX-400 will cover from 150 KHz to 3.7 GHz. with RF converters. Order the following RF converters for your SX-400 scanner. **RF-1030-K** at $259.00 each for frequency range 150 KHz.-30 MHz. USB, LSB, CW and AM. (CW filter required for CW signal reception); **RF-5080-K** at $199.00 each for 500-800 MHz.; **RF-8014-K** at $199.00 each for 800 MHz.-1.4 GHz. Be sure to also order **ACB-300-K** at $99.00 each which is an antenna control box for connection of the RF converters. The **RC-4000-K** data interface at $259.00 each gives you control of the SX-400 scanner and RF converters through a computer. Add $3.00 shipping for each RF converter, data interface or antenna control box. If you need further information on the JIL scanners, contact JIL directly at 213-926-6727 or write JIL at 17120 Edwards Road, Cerritos, California 90701 U.S.A.

SPECIAL! JIL SX-200-K

List price $499.95/CE special price $159.00
Multi-Band - 16 Channel • No-Crystal Scanner
Frequency range 26-88, 108-180, 380-514 MHz.
The *JIL* SX-200 scanner tunes military, F.B.I., Space Satellites, Police and Fire, Drug Enforcement Agencies, Defense Department, Aeronautical AM band, Aero Navigation Band, Fish & Game, Immigration, Paramedics, Amateur Radio, Justice Department, State Department, plus other thousands of radio frequencies most other scanners can't pick up. The SX-200 has selectable AM/FM receiver circuits, tri-switch squelch settings - signal, audio and signal & audio, outboard AC power supply - DC at 12 volts built-in, quartz clock - bright vacuum fluorescent blue readouts and dimmer, dual level search speeds, tri-level scan delay switches, 16 memory channels in two channels banks, receive fine tune (RIT) ± 2KHz., dual level RF gain settings – 20 db pad, AGC test points for optional signal strength meters.

Regency® HX1000-K

List price $329.95/CE price $209.00
6-Band, 30 Channel • No Crystal scanner Search • Lockout • Priority • Scan delay Sidelit liquid crystal display • Digital Clock
Frequency range: 30-50, 144-174, 440-512 MHz.
The new handheld *Regency* HX1000 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 30 channels at the same time. When you activate the priority control, you automatically override all other calls to listen to your favorite frequency. The LCD display is even sidelit for night use. Order **MA-256-K** rapid charge drop-in battery charger for $79.00 plus $3.00 shipping/handling. Includes wall charger, carrying case, belt clip, flexible antenna and nicad battery. Order now.

NEW! Bearcat® 100XL-K

List price $349.95/CE price $229.00
9-Band, 16 Channel • Priority • Scan Delay Search • Limit • Hold • Lockout • AC/DC
Frequency range: 30-50, 118-174, 406-512 MHz.
The world's first no-crystal handheld scanner now has a LCD channel display with backlight for low light use and aircraft band coverage at the same low price. Size is 1⅜" x 7½" x 2⅜". The *Bearcat* 100XL has wide frequency coverage that includes all public service bands (Low, High, UHF and "T" bands), the AM aircraft band, the 2-meter and 70 cm. amateur bands, *plus* military and federal government frequencies. Wow...what a scanner!
Included in our low CE price is a sturdy carrying case, earphone, battery charger/AC adapter, six AA ni-cad batteries and flexible antenna. Order your scanner now.

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The World's First 800 MHz. Handheld Scanner
List price $569.95/CE price $359.00
7-Band, 20 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC Sidelit liquid crystal display • Memory backup
Bands: 118-136, 144-174, 440-512, 800-950 MHz.
The HX2000 scanner operates on 120V AC or 6 VDC. Scans 15 channels per second. Size 3" x 7" x 1½." Includes wall charger, carrying case, belt clip, flexible antenna and nicad batteries. Selectable AM/FM modes.

NEW! Bearcat® 800XLT-K

List price $499.95/CE price $329.00
12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz.
The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½."

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Panasonic RF-B300-K Shortwave receiver..... $195.00
RD95-K *Uniden* Remote mount Radar Detector.... $139.00
RD55-K *Uniden* Visor mount Radar Detector..... $119.00
BC 20/20-K *Bearcat* 40 channel scanner..... $274.00
BC 210XW-K *Bearcat* 20 channel scanner..... $219.00
BC-WA-K *Bearcat* Weather Alert"..... $39.00
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TSG-K "Top Secret" Registry of U.S. Govt. Freq.... $15.00
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CIE-K Covert Intelligence, Elect. Eavesdropping.... $15.00
A50-K Magnet mount mobile scanner antenna.... $35.00
A70-K Base station scanner antenna..... $35.00
USAMM-K Mag mount VHF/UHF ant. w/ 12' cable.... $39.95
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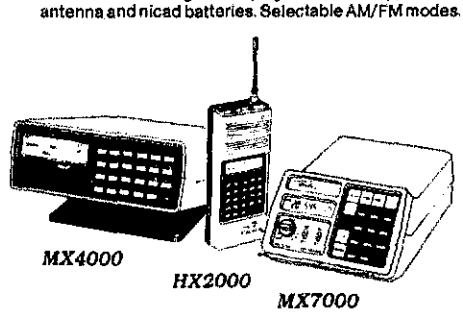

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JIL SX-200-H

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Regular Price $189.00

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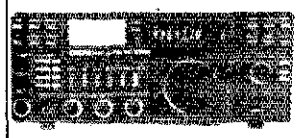

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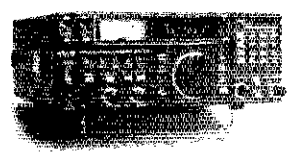

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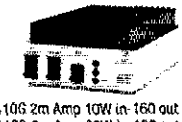

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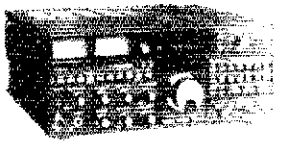

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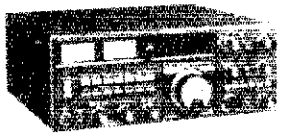

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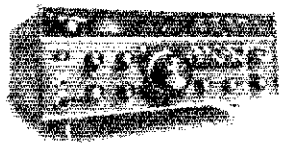

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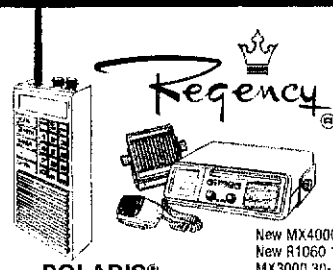

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open letter encouraging amateurs to become Volunteer Examiners—just write Mr. Curtis Holsopple, K9CH, Manager, ARRL/VEC Dept., ARRL, 225 Main St., Newington, CT 06111. Read in the Ft. Myers ARC Modulator that during Field Day, Bob, KB4JWA, made almost 400 points as sole operator of the novice station. Miss Phil KA4FZI was top CW operator and Louie WD9AEP the top phone operator. Gus, KA4GUS received a very nice Letter of Commendation from the Commander, Naval Telecommunications Command for his significant contributions to the success of the Navy-Marine Military Affiliate Radio System. Congrats also to Alma, KB4ELQ who now has her general license. W4LLA reports 46 phone patches this month. 73 de WA4PFK. Traffic: W3CUL 3105, W3VR 1102, WA4PFK 400, K4EUK 388, KY8Y 272, K4SCL 248, KA4FZI 238, KF4JA 206, N4KFU 176, KY4U 151, KA4NXF 128, KA4GUS 113, W4DL 113, WA4HXU 91, W4DVO 91, KI4ZW 90, N4EOW 88, K4IA 88, WA4RUE 87, WD4KBW 79, WB4WYG 73, KF4RL 71, KY8T 70, WD9AEP 68, AA4BN 58, W3TLV 54, K4JI 49, W4LLA 47, K5IHH 39, KA4YHS 38, W4ESH 33, KB4ELQ 33, N4ET 33, K4FQU 32, WA4HDH 30, WB4GCK 28, WT4F 27, KB4KAW 26, N4JOA 25, K4JLL 24, KB4KB 24, W4SS 22, W3IJR 20, KB4EWO 19, KA4SIH 16, W4PKP 14, NW4R 14, W4MPV 13, K4OVC 13, W4WYR 8, KD4GR 8, WK4F 8, K4IRT 8, WV4F 7, W4MFD 5, KA9AKY 5, KA4GDU 5, WA9VND 4, WR4J 3, WA4GIE 3, KA4KDD 2, K9ALX 2, W4PPA 2, WD4CHO 1, WD8SMT 1, KB4BLN 1. (June) N2WX 8.

WEST INDIES: SM, Carlos Flores, WP4J—WINS Net Daily 2300Z (3710 kHz), WINC Net daily 223OZ (146.940), 4RN Daily 2345/0130Z 7070/3567 kHz, KB4AN Tu-Th 1800Z/1430Z. Hello friends, greetings again from West Indies. SM WP4J has just appointed Papo Vives, NP4HF, as the new Section Emergency Coordinator; Rudy Sanchez, KP4ARY, as Technical Coordinator; Gregorio Nieves, KP4EW, (our past SM) as Public Information Officer; and Manolo Reina, KP4ABN, Public Information Assistant. SM WP4J appointed Alberto Valdellull, WP4SCG as SGL. The Puerto Rico Radio Amateur Club started a new educational program which includes Novice through Extra Class. Certificates of completion will be given. At the moment, Carlos, WP4J, is working hard with the ARES program in re-establishing a better means of emergency communications. WINS Net Manager KP4DJ reports sessions 32. So hasta luego amigos.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K6LL, KA7HEV, WB7CAG. New appointments include NJ7E as O.O. Coordinator and N7CEE as EC in Flagstaff. We need more O.O.s to get the new VOM program going. Apply to NJ7E or SM. Ft. Tuthill hamfest was another great success this year. Congrats to ARCA and all who contributed. The SM appreciates the help provided by Coconino ARC in manning the ARRL booth. K7KYW awarded "Ham of the Year" for his dedication to public service. N7ECE and WY0OY ran the VE exams along with numerous helpers, and handled approx. 150 applicants including "walk-ins." Success rate on 13 WPM code tests not as high as expected, but written tests seemed to go better. Scottsdale ARC announces they will sponsor the State ARRL convention next year on April 18, 19, and 20 in Scottsdale. Also at Tuthill, W7JU at age 82 passed the Extra class exam. Congrats. N7AOU now in Tucson is transmitting a one watt ATV beacon on 427.25 or 434.00 MHz and would appreciate receiving reports on signals. TA's in Phoenix are K7QWR and K7ES. AF7A starting new Novice class in Phoenix in Sept. Newly elected ARCA officers are: K7KNP, Chm.; WA7NAP, Vice Chm; WA0NNC, Secy; and N7ECE, Treas. New Packet Radio repeater on Mt. Lemmon at 147.70/10 links both Phoenix and Tucson packet operators. K7PYK was spark plug. FB job. Mingus Mt. Rptr Group's new 147.86/26 machine on Towers Mtn. works FB for mobiles between Phoenix and Flagstaff. WB7CAG put out a Cactus Net Newsletter pointing out that the net needs more traffic. KA7KHU became KE7GP. Last minute flash: NJ7E reports working WØORE on Challenger. 73 Jim. Traffic: KB7FE 356, W7EP 204, K6LL 145, W7AMM 108, W7KCM 102, W7OIF 55, KA7HEV 41, W7KXE 21, K7JKM 20, WB7CAG 18, WA7KQE 14, K7POF 7, K7NMQ 3, NN7A 2, KE5OY 1.

LOS ANGELES: SM, John Walsh, N6UK—ASM: N6ZH, SEC: N6UK, ACC: KX7Q, OO/RFI: K6BMG, STM: W6INH. Long Beach and the RMS Queen Mary will long be remembered by the more than 2400 registrants that attended the 1985 Southwest Division Conference. The Associated Radio Amateurs of Long Beach deserve our sincere thanks for a magnificent effort. Other sponsoring clubs included the Downey ARC, Young Ladies Radio Club of LA, West Coast ARC, Southern California Amateur Radio Computer Club, Hughes El Segundo Employees Association ARC and the TRW ARC. Special credits must go to Chairman K6OSC and Vice Chairman W6PGM. Well deserved recognition also to KA5VNB, KG6NE, N6LLK, KA6RRR, WA6UBU, AK6Y, K6GQV, WA6WZN, KG6KN, WD6BAI, K6PQZ, and K6YQ. Beginning in mid-August Southern California amateurs will have the opportunity to start training to assist the LA County Fire Department. To the maximum extent possible amateurs will begin preparing for the major fires expected this fall. Until the major campaign fires begin amateurs will be called up for all two-or more-alarm fires. The purpose is to train communicators and to exercise a variety of communications systems. Anyone interested in information contact W6ORD (213) 312-3600 days and (818) 966-2274 evenings. Anyone already signed up should have received an I.D. All licensed amateurs are eligible—we just need to know how to contact you if you are willing to help. The City of Los Angeles is also moving to get amateurs involved. In the aftermath of the Baldwin Hills tragedy, officials have raised questions about how much more amateurs could have been used to assist the communications.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Karl, N6BVU. SEC: Jim, AE6N. STM: Ernie, WA6QCA. BM: George, W6DXL. OOC: Alex, W6RE. SGL: Loren, N6HIQ. TC: Will, AA6DD. PIO: Joe WB6DXT. On behalf of the ORANGE SECTION ARRL congratulations to Nate K6OSC, Convention Chairman, Fried WA6WZO, SW DIV Director, sponsoring Clubs, Convention officers and Chairpersons. HAMCON SW Division Convention was fantastic, from the registration procedures, exhibits, technical sessions, banquet/breakfast seating all activities were well organized. The XYL reports that the Ladies Programs were exciting and fun filled. What Publicity Chairman, Ron (WE ARE TALKING BIG) Boan, AK6Y promised Aboard The R.M.S. Queen Mary, Long Beach, CA. came to pass. T-Hunt report from The Fullerton Radio Club, a tie for first place N6JDX and the team KØOVW/A6OPS. The Coachella Valley Amateur Radio Club has and idea for sign-up students for their Novice class. The Club offers a year's free dues for a member who brings or signs up at least two students. There is a stipulation. The students must complete the course. The Lee De Forest Radio Club reports that at the July 18th meeting of the valley emergency services committee (VESCOM), the amateur community was voted in as a full voting member. Capt. Parks of the sheriff's Dept., the chairman, made the motion along with some accolades of Amateur Radio Operator accomplishments in the Volunteer Public Service Field. Congratulations to ART N6GDM, The City Clerk has reported that ART had been appointed as a member of the Hemet Emergency Service Council. This Group is really on the move, under the guiding hand of VIC, N6AHB the Novice class produced nine new Hams. Congratulations to the proud Radio Amateurs. The new Hams get a written invitation to join the Lee De Forest Radio Club and it's Disaster Prepareness Agency affiliations. I was asked to attend an antenna regulation committee meeting in Corona, Ca. The Restrictive regulation progress report was good, it looks favorable for Amateur Radio. The discussion on forming a permanent organized group was productive. We all know that Public Safety and Public Service Officials like to deal with organized groups, so an amateur radio club was born. CORONA NORCO AMATEUR RADIO CLUB is now in the books. Pres: Gerhard, WA6BHR VP: John, KD7XR. VP: Mark, KB6GNZ. Secy: Larry KB6GQE. EC: Don,N6DYR. AEC: Lee, WD6DGI. It appears we have another ARRL Affiliated Club on the way. PSHR WF6O. WB6QBZ, WA6QCA. KA6HJK.

Net	Freq.	Time	Sess.	QNI	NM	Tfc.
SCN/1	3598	1900	31	359	WF6O	340
SCN/2	3598	2015	24	161	WF6O	66
SCN/V	146.645	2100	31	473	WA6QCA	572
RTTY/V	145.12	0900	62	415	KA6HJK	142

Traffic: WF6O 350, WA6QCA 246, KA6HJK 230, WB6QBZ 180, N6GOT 134, K6DD 120, K6ZCE 53, W6RE 20, W6CPB 76, KA6HMS 14, W6TKV 10, W6LNI 8.

SAN DIEGO: SM, Arthur R. Smith, W6INI—PIO: KG6LF, ACC: WA6COE. TC: N6NR. STM: N6GW. SEC: W6INI. Official Observers are needed to effectively "self-police" our bands. If interested see page 11, Aug 1984 *QST*. Contact W6INI (273-1120) to apply. Attn clubs! To fully utilize the capabilities of Amateur Radio in Disasters, the Cooperation of all clubs is vital. In view of recent earthquakes in San Diego, clubs are strongly urged to review their commitment to disaster communications, particularly degree of support to ARES and its activities. Do you have a written agreement with the EC of your area? Do you encourage or require members to register in and support ARES? Does meeting routine provide for ARES info. Have ARES officials been invited to speak at meetings? Do you have liaison with your local ARES unit? Are ARES Registration Forms available at meetings? For repeater owners: Repeaters will play a major role in disaster communications. Contact W6INI so you can be worked into the overall ARES disaster plan for San Diego County. NCTN: 30 sessions, 197 msgs. Traffic: N6GW 65, KU6D 32, WA6IIK 4.

SANTA BARBARA: SM: Byron Looney, K6FI—This was the month that California tried to burn up. Amateur operators in this section were active in three major fires at Wheeler Springs, Las Pilitas and Gorda. Assistance was rendered to USFS, CDF and Red Cross. Fire fighters from all portions of the country were able to send messages home via NTS. Packet was used extensively in some areas for formal as well as H&W traffic. Amateurs in the field numbered 96 in Ventura county, 71 in Santa Barbara county and 68 in San Luis Obispo county. The man-hour total is estimated to be in excess of 7000 hours. There is not room in this report for names and calls of those who were so active but take time to pat yourself on the back. Our special thanks to those taking our out-going traffic. H&W traffic is a great morale booster and greatly appreciated. Well done, gang! 73. Traffic: K6FI 1143, K6YD 117, N6HYM 70. (June) K6EVQ 25.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM/ACC: NI5V. STM: AE5I. SGL: W5IXP. BM: W5OXK. PIO: N5FDL. RFI: WB5JBP. KE5ZW reports from Snyder that their first repeater is on the air on 146.32/92 which is also the first known machine in our Section to be coordinated on the new 20 kHz spacing. Range is reported to be good (30-40 miles) and fills a vital gap in coverage, allowing stations in Sweetwater, Big Spring, Colorado City and Post to participate in ARES activity AE5I reports that the new club emergency van is in service, and was used at Dyess Airforce Base on June 29 during the B-1 Day celebration. The communications van concept has proven its great value in improving response time to disasters and quality of communicatins many times. The Dallas ARC van was on the scene of the crash of Delta 191 within minutes of the RACES net activation, and remained at the crash site for 8 hours, providing a direct link to all area hospitals, the Red Cross, two blood banks, and the Dallas EOC. Also, an autopatch was run for Government officials to Washington D.C. directly from the van. Hope to see you at one of the upcoming hamfests this fall. PSHR for July: KA5AZK KE5YG KA5SPT KA5RGC KA5QYV and AE5I. Traffic: KD5RC 278, KA5SPT 168, KE5YG 130, AE5I 129, W9OYL 105, KA5AZK 101, WB4HML 89, KA5RGC 76, KA5QYV 28, W5ERT 15, N5FXX 2, NJ5Q 1.

OKLAHOMA: SM, Dave Cox, NB5N—ASM: K5WG. SEC: W5ZTN. STM: KV5X. ACC: NJ5Y. BM: W5AS. PIO: WD5IFB. OOC: K5WG. SGL: W5NZS. TC: W5QMJ. Ham Holiday '85, ARRL State Convention, was a smashing success, thanks to CORA and all its member organizations. Reggy, WN5NWX, and his vivacious crew are to be commended for a great job. Many thanks also to QCWA for their tremendous job in manning the ARRL Booth at HH85. Hamfest season is winding down, but one of the traditional greats, Texoma Hamarama, is less than a month away (Oct 26-27). Plan now to attend. Time is upon us to start organizing fall Ham classes. Many clubs around the Section have found classes to be the single greatest generator of new members as well as enthusiasm. Congratulations to Bartlesville ARC for qualifying as a Special Service Club. Tulsa ARC added a new twist, a YL section, to its newsletter, thanks to Romona, N5HYG. Not a bad idea for others to consider. Tornado season is well behind us now so it might be a good time to closely evaluate your EC operations locally. Contact SEC, W5ZTN, for assistance. Linking research continues in the Section, with our TC, W5QMJ, testing several options, including operation from the Black Mesa. Traffic: WB5SRX 437, K5CXP 201, W5AS 176, KB5EK 165, W5VXU 152, W5REC 121, KV5X 86, WA5OUV 64, W5RB 53, KC5OU 51, WD5IFB 45, NB5N 42, K5CAY 36, KA5FUU 36, WA5ZOO 32, K5GBN 31, W5VLW 28, NR5L 28, KA5TTH 25, W5VOR 23, K5ENA 11, KX5W 7.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR—SEC: KA5KRI. STM: K5QEW. ACC: KS5V. ASM: N5TC. Congratulations to recent upgrades: KA5WLX, KA5VZQ to General; KA5PEX to Extra. From Seguin KA5PEX reports the GVRAEN provided parade communications for their Freedom Festival/4th of July celebration; parade officials and KWED/AM expressed thanks; ops were W5FFG, WA5YDN, W5UPS, KE5QW, WD5DQM, W5MTO, KA5PEX. South Texas AR Long Play Assn (STAR/LPA) net meets first Sunday each month on 7268 kHz at 1600Z; N5GLV is NCS. Brazos Valley ARC provided communications for the two-day "MS150 Bike Tour;" WA5RNL is new RACES radio op for Fort Bend County RACES. Old Timer W5ZPJ has upgraded and is now NX5R, active on 21 MHz. At least two stations in San Antonio operating packet on VHF: NØCCW and WD5DOE operate 145.01 MHz simplex. OOC WA2VJL presented an Amateur Radio film and a talk at San Benito Rotary Club. DRN5 Mgr WB5YDD reports STX represented 100% by N5DFO W5CTZ WB5EPA WB5FQU W5KLV KD5KQ W5URN N5EFG/NX5V KD5CB KA5THB N5AMH WB5YDD. CAND Mgr W5KLV reports DRN5 represented 100% by STX stations WA5JKY WB5YDD W5KLV N5AMK N5DFO NX5V KD5KQ WB5FQU WB5EPA W5CTZ. OBS W5KLV gave 8 bulletins, 4 DX bulletins, 8 ARRL bulletins, 28 satellite bulletins, 6 propagation forecasts 148 readings on 9 nets. Traffic: WB5YDD 431, W5CTZ 428, W5KLV 354, N5DFO 155, KS5V 140, WB5EPA 83, K5HZR 81, WB5FQU 71, WA2VJL 43, WD5GKH 38, KA5PEX 21, W5BGE 21, W5AC 17.

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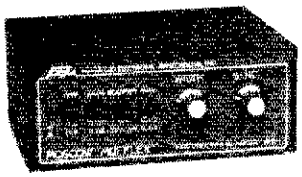

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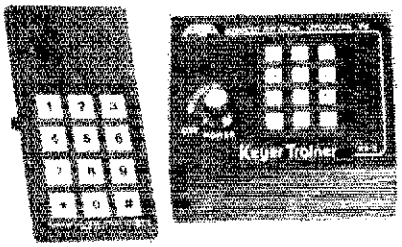

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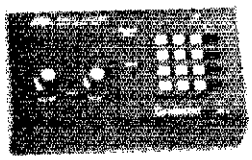

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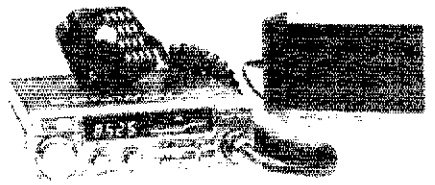

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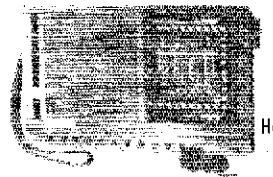

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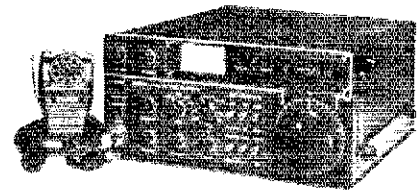

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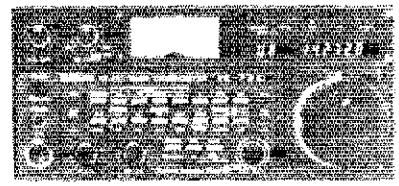

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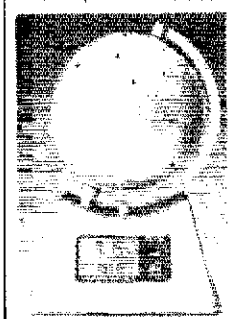

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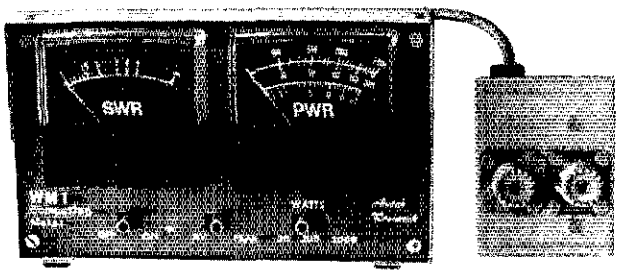

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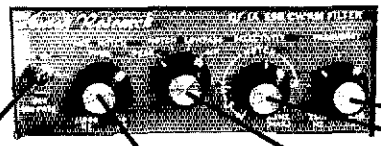

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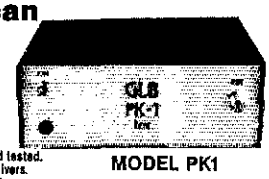

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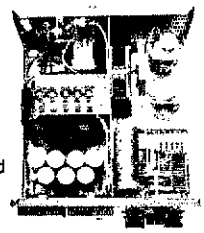

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The Amp Supply LK-500ZB is a self-contained, high frequency linear power amplifier capable of amateur continuous operation at output power levels of 1500 watts. The LK-500ZB is manually tunable from 1.8-2.4 and 3-22 MHz continuous. The amplifier is also available with the 10 meter band on export models.

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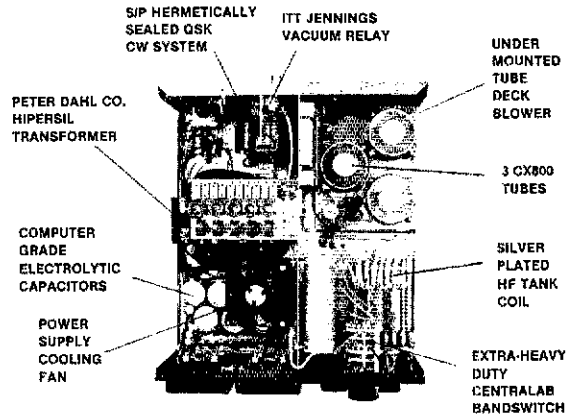

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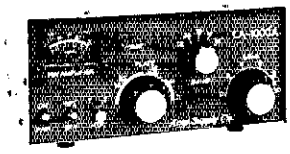

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The Amp Supply LA-1000A is a portable RF linear power amplifier that features its own solid-state power supply. It is capable of 1200 watts PEP input power on SSB or 800 watts DC input CW service with any exciter capable of 100 watts PEP nominal output. The LA-1000A covers the amateur bands between 1.8 MHz to 21.5 MHz. In addition, the LA-1000A may be operated outside the amateur bands for MARS and other services authorized for a Kilowatt amplifier. The amplifier stage uses four inexpensive 6MJ6 tubes connected in parallel with first grid and cathode drive.

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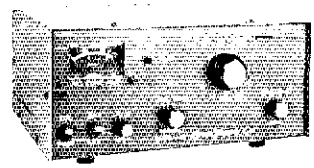

LA-1000-NT
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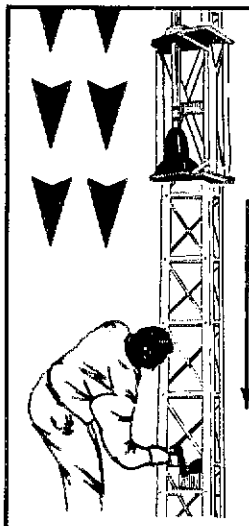

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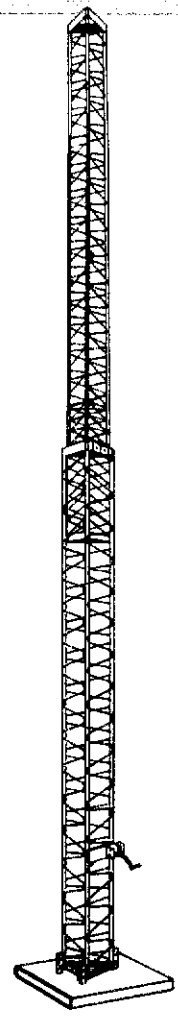

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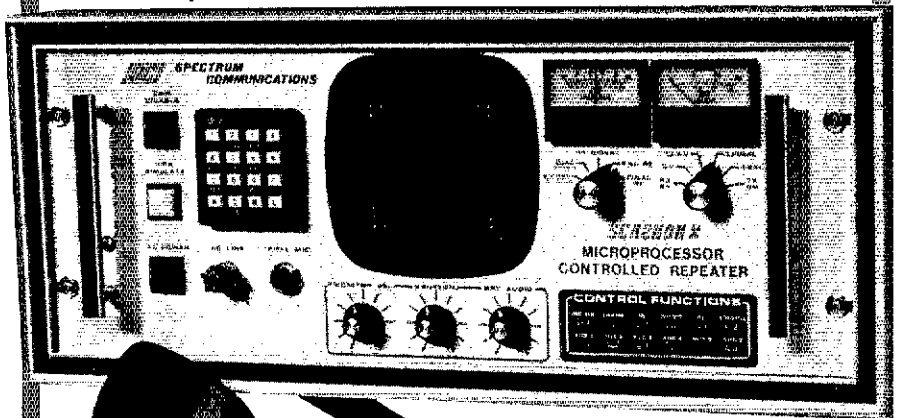

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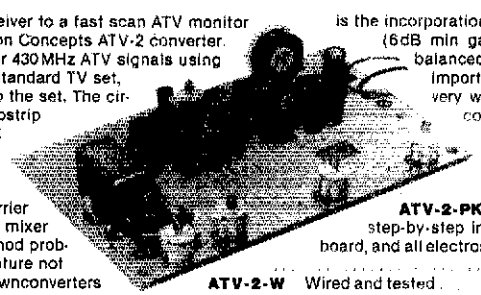

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100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
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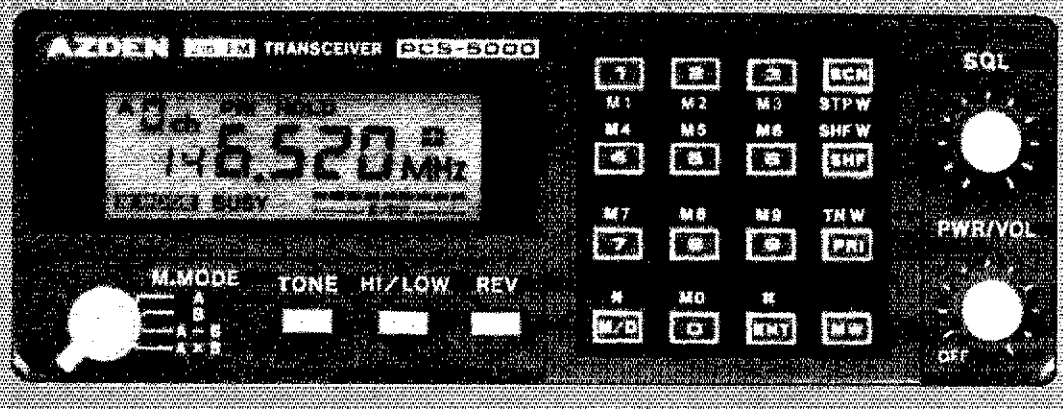

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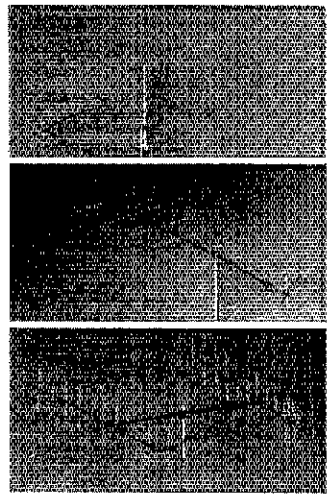

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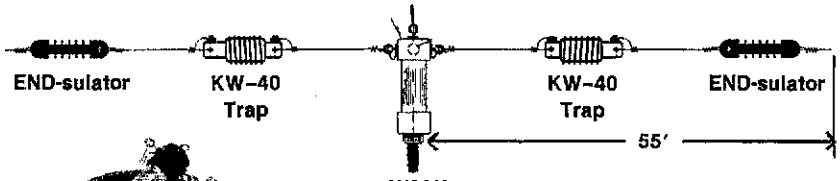

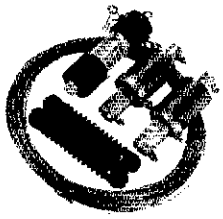

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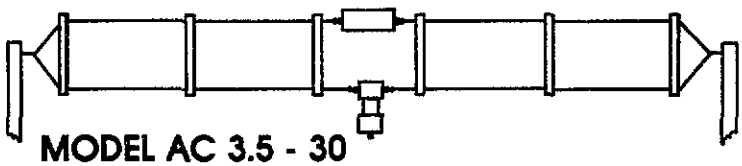

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- Used the world over in government & commercial communication installations
- Ideal for all operations - amateur, commercial, MARS - any frequency from 3.5 - 30 MHz

PRICE $159.50
PLUS $3.00 Shipping and Handling

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HOT ROD ANTENNA

Achieve gain over any ¼ wave two meter antenna on a handheld transceiver. The AEA model HR-1 Hot Rod™ antenna was designed by Dr. D.K. Reynolds (designer of the IsoPole) to deliver maximum performance for any handheld transceiver with a BNC fitting.

The factory-tuned HR-1 is 20% shorter, lighter and places far less stress on your handheld connector and case. It will easily handle over 25 watts of power, making it an excellent emergency base or mobile antenna. In the collapsed position, the Hot Rod antenna will perform like a helical quarter wave.

The Hot Rod antennas can be expected to make the same improvement to hand-held communications that the IsoPole brand antennas have made to base station operations. Why pay more when the best costs less?

Prices and Specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.
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(206) 775-7373
Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

KENWOOD

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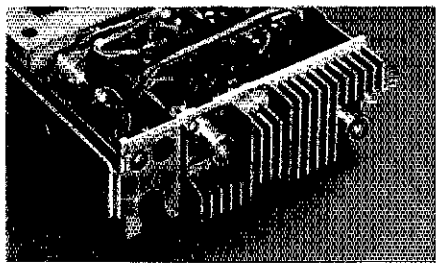
"Dual-Band" Leader!

TW-4000A

2-m/70-cm FM transceiver.

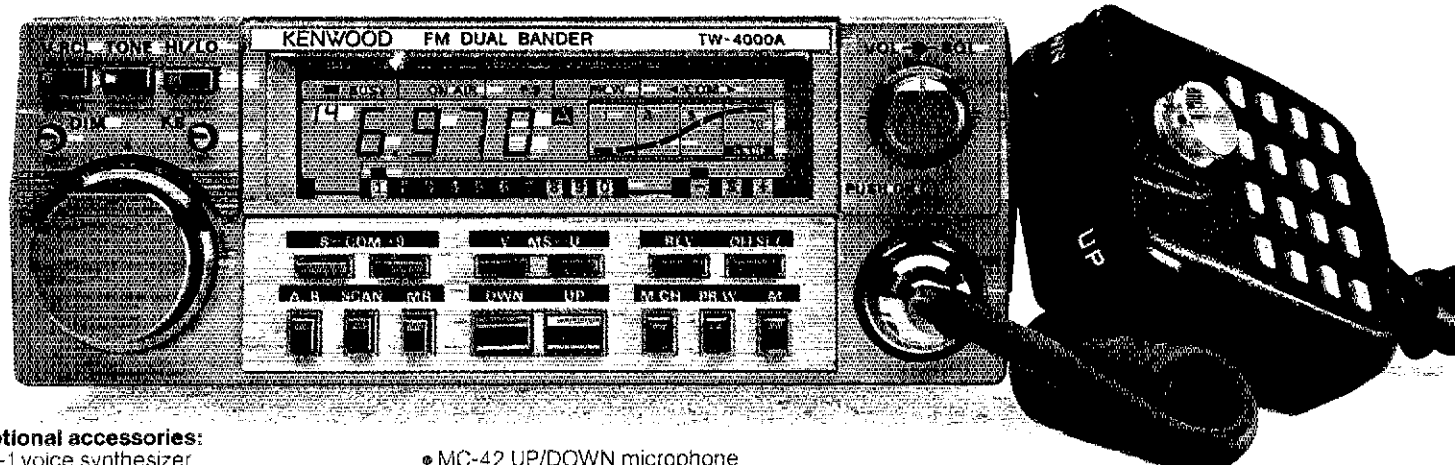
The first is still the best! The original FM "Dual Bander." TW-4000A delivers 25 watts output on both VHF and UHF in a single compact package.

- **2 m and 70 cm FM in a compact package.**
  Covers the 2 m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Single-function keys allow easy operation.**
- **Large, easy-to-read LCD display.**
  A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, "S" or "RF" level, VFO A/B, scan, busy, and "ON AIR." Dimmer switch.
- **Front panel illumination.**
- **10 memories with offset recall and lithium battery backup.**
  Stores frequency, band, and repeater offset. Memory 0 stores receive and transmit frequencies independently for odd repeater offsets, or cross-band (2 m/70 cm) operation.



- **Rugged die-cast chassis.**
- **Two separate antenna ports.**
  Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.
- **Programmable memory scan with channel lock-out.**
  Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.
- **Band scan in selected 1-MHz segments.**
  Scans within the chosen 1-MHz segment (i.e., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction may be reversed by pressing either the "UP" or "DOWN" buttons on the microphone.
- **Priority watch function.**
  Unit switches to memory 1 for 1 second every 10 seconds, to monitor the activity on the priority channel.
- **Common channel scan.**
  Memories 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.
- **High performance receiver/transmitter.**
  GaAs FET RF amplifiers on both 2 m and 70 cm, high performance monolithic crystal filters in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Optional "voice synthesizer unit."**
  Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Repeater reverse switch.**

More TW-4000A information is available from authorized Kenwood dealers.



Optional accessories:

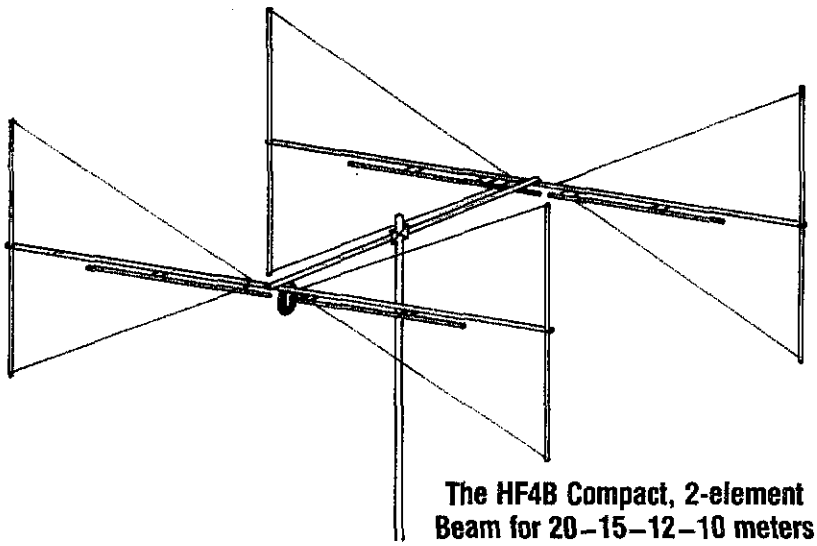
- VS-1 voice synthesizer
- TU-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- KPS-7A fixed station power supply
- MA-4000 dual band mobile antenna with duplexer
- SP-40 compact mobile speaker
- SP-50 mobile speaker
- MC-42 UP/DOWN microphone
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter
- MB-4000 extra mounting bracket

KENWOOD

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

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Antenna mag mount is not Kenwood supplied.

Introducing the BUTTERFLY™ Beam from Butternut!



The HF4B Compact, 2-element Beam for 20–15–12–10 meters

Compact Size
The HF4B's 12½-foot elements and 6-foot boom are ideal for home-station use and for weekend retreats, condos, apartments and other places where oversized beams are prohibited. Its light weight (17 pounds) means it can be turned with a tv rotator, yet it is robustly constructed in the best tradition of our world-famous Butternut verticals.

Performance
The HF4B **BUTTERFLY™** has not sacrificed performance for compactness. Its unique design with fanned elements and L-C circuits avoids use of power-robbing traps yet provided high-efficiency operating on all bands. The **BUTTERFLY™** outperforms anything in its class.

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CODE★STAR--PRICED FROM $129.00

- ★ Ideal for Novices, SWL s and seasoned amateurs
- ★ Built-in code practice oscillator & speaker
- ★ 12 VDC Operation or 120 VAC with adapter provided
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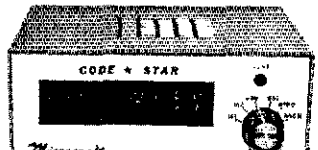

- ★ Copies Morse, Baudot & ASCII codes
- ★ Two optimized Morse ranges
- ★ Digital & Analog filtering with 16 db AGC
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More Features Per Dollar Than Anything Else! Copies code from your receiver! Improves your code speed too! Large LEDs. Easy to connect and operate. Compact, 2lbs. Connect computer (like VIC-20)/printer with optional ASCII output port.

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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*. If the 20th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

JOIN the Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. 1417 Stoneybrook, Mamaroneck, NY 10543.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FIND OUT what else you can hear on your general coverage transceiver or receiver. Complete information on major North American radio listening clubs. Send 25¢ and S.A.S.E. Association of North American Radio Clubs, 1500 Bunbury Drive, Whittier, CA 90601.

MORSE TELEGRAPH CLUB, established 1942, seeks landline and radio operators interested in telegraphy and Morse history. 46 chapters USA & Canada. For information and sample paper contact W. K. Dunbar, AD9E, 1101 Maplewood Dr., Normal, IL 61761 309-454-2029.

THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FREE QRP Info Kit. Send S.A.S.E. with two first-class stamps (U.S.) or three IRCs (DX) to: QRP ARCI, P.O. Box 354, Carlisle, PA 17013.

THE GOOD SAM HAMS CLUB invite RV operators to check in the Good Sam Ham Net 14.240 + or –, on Sundays 1900Z; also 3.880 + or –, on Tuesdays at 2359Z Net control, N5BDN, Clarksville, TN.

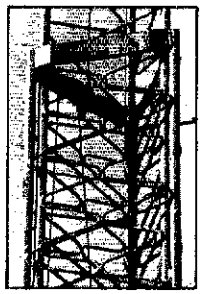
MARYLAND/DC - COMPUTER & Electronics Flea market, 300 vendor tables, indoors, Saturday, Nov. 9th. - Sheraton Hotel, New Carrollton, MD I-95 Exit #20B. 10 A.M.-4 P.M. Buyers $5, sellers from $25. Information 201-297-2526. W2TGH.

HELP! NEW College Club with young hopefuls needs your equipment donations. Please get us going! KN9S, Northland College, Ashland, WI 54806.

NEW JERSEY-SOUTH - Computer & Electronics Flea market, 250 vendor tables, indoors, Saturday, Nov. 23rd. Halloran Plaza Hotel, Pennsauken, Route 130 South. 10 A.M.-4 P.M. Buyers $5, Sellers from $25. Information 201-297-2526. W2TGH.

hy-gain®

TOWER OF STRENGTH



Rugged Hy-Gain antenna crank-up towers are made as no others. All steel construction and galvanizing after welding meets ASTM material standards. Giant welding fixtures assure straight and true alignment of tower sections for close tolerance crank-up guide systems. Diamond web bracing, 2.5 times the strength of ordinary "W" bracing, adds strength where tower sections meet. Open-end tubular steel legs are galvanized inside and out and permit unrestricted moisture drainage. It all adds up to long lasting, massive tower strength for antenna loads of up to 16 sq. ft. at 60 mph.

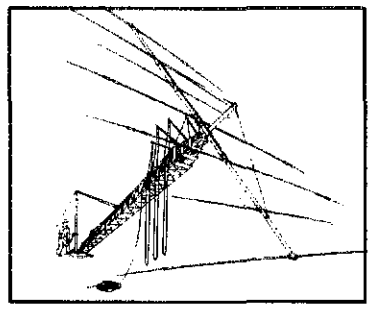
	Tower Sections	Height Extended	Height Retracted	Width at Base	Antenna Windload Limit	Weight
HG-52SS	3	52 ft. 15.8 m	21 ft. 6.4 m	16.44 in. 417.6 mm	9.5 sq. ft.-50 mph .88 sq. m-80 km/h	455 lbs. 206 kg
HG-37SS	2	37 ft. 11.3 m	20.5 ft. 6.2 m	13.75 in. 349.3 mm	9.5 sq. ft.-50 mph .88 sq. m-80 km/h	265 lbs. 120 kg
HG-54HD	3	54 ft. 16.5 m	21.5 ft. 6.6 m	19.53 in. 496.1 mm	16 sq. ft.-60 mph 1.5 sq. m-96 km/h	575 lbs. 261 kg
HG-70HD	4	70 ft. 21.3 m	21.5 ft. 6.6 m	22.63 in. 574.7 mm	16 sq. ft.-60 mph 1.5 sq. m-96 km/h	1100 lbs. 499 kg

Hy-Gain crank-up towers come complete with hinged base, installation steelwork, pre-drilled rotator plate and a manual winch.

Hy-Gain crank-up towers require no guying and conform to EIA, to the Uniform Building Code, and are approved by Los Angeles (license 1095). UBC documents for building permits are available on request (specify tower model) **before** you buy the tower.

OPTIONAL TOWER ACCESSORIES

Electric winch/Remote control • Mast • Thrust bearing • Coax arms • Rotators • Tower Gin Pole



An accessory tilt-over gin pole allows one person to tilt the tower over to ground level.

FREE FREIGHT

Order any Hy-Gain tower from your dealer for factory shipment direct to you. Hy-Gain will pay the freight on the tower and any of our antennas, rotators and accessories ordered for shipment at the same time. This offer is limited to within the 48 contiguous United States.

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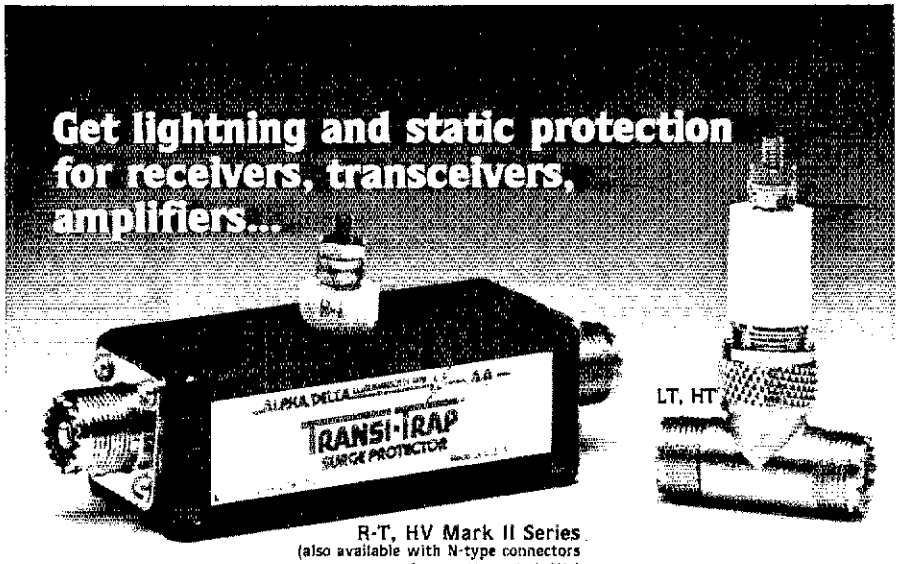

R-T, HV Mark II Series
(also available with N-type connectors for use through 1 GHz)

with Transi-Trap™ Surge Protectors

Protect sensitive solid state and tube-type components from high-surge voltages produced by nearby lightning strikes, high wind and static build-up. Even distant storm fronts can cause damaging surges without warning or time for grounding.

Standard air-gap devices are ineffective due to their erratic performance. Transi-Trap's replaceable Arc-Plug™ cartridge utilizes a special ceramic gas-filled tube with precisely tailored firing speed and level, safely by-passing surges to ground. Fires thousands of times.

Transi-Trap Protectors are the first devices in the industry designed with "isolated ground" — keeps damaging arc-energy off the chassis and routes it directly to ground.

Don't hook up your coax without one!

The 200 W models are most sensitive, best for RCVRS and XCVRS. 2 kW models designed for amplifiers. For maximum protection use both, with 200 W model between XCVR and AMP. All models include Arc-Plug cartridge.

UHF "T-type" Connectors: For use through 30 MHz

MODEL LT, UHF-type, 200 W output at 50 ohms $19.95

MODEL HT, UHF-type, 2 kW output at 50 ohms $24.95

Super Ruggedized Super Low Loss Models (0.1 dB at 500 MHz), for use through VHF/UHF, with UHF connectors:

MODEL R-T, 200 W output at 50 ohms $29.95

MODEL HV, 2 kW output at 50 ohms $32.95

At your Alpha Delta dealer. Or order direct in U.S.: add $2 for postage and handling. MasterCard and VISA accepted. Ohio residents add Sales Tax.

MasterCard VISA

See Data Sheet for surge limitations.

ALPHA DELTA COMMUNICATIONS, INC.

P.O. Box 571, Centerville, Ohio 45459 • (513) 435-4772

AA

ALL BAND TRAP "SLOPER" ANTENNAS!

FULL COVERAGE! ALL BANDS! AUTOMATIC SELECTION with PROVEN Weatherproof sealed Traps 18 Ga Copperweld Wire! GROUND MOUNT SLOPERS - No Radials needed! Ground to rod or house water faucet! Connect Top to Trees, Buildings, Poles, etc at ANY angle from Straightup to 60 degrees for excellent "SLOPER" DX Antenna Gain or bend it anywhere you need to! 2000 Watt PEP input, max. Permanent or portable Use. Installs in 10 minutes. SMALL - NEAT - ALMOST INVISIBLE - No one will know you have a Hi-Power DX Antenna. Ideal For COND'Os APARTMENTS - RESTRICTED AREAS - Pre-tuned for 2-1 or less SWR over ALL bands (except 80-160-300hh) No adjustments needed - EVER. 50 ft RG-58U Coax feedline and PL259 connector - Built in lighting arrestor - ready to hookup! FULL INSTRUCTIONS! COMPLETELY ASSEMBLED.

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No. 1040S	--- 40-20-15-10 --- 1 trap	26 ft. ---- $48.95
No. 1020S	---- 20-15-10 ---- 1 trap	13 ft. ---- $47.95
No. 1016S	-160-80-40-20-15-10 - 2 trap	83 ft. - $79.95

Tell the world what you would really rather be doing with this **BUMPER STICKER** on your car.
You will be helping a fellow HAM pay for college to become an Electrical Engineer at the same time. So how about it guys? Help me out! 2.00 + 50¢ postage to:
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RDC

THIS MONTHS GOODIE FROM THE CANDY STORE ICOM R-7000 UNDER $800.00 LTO

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Send SASE. Call letters, name & phone # for NEW HF list.

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TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, P.O. Box 203, Wynantskill, NY 12198. 518-283-0258.

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QSLs Samples 40¢ (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From $285. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, NY 11778 516-744-6260.

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BE SURPRISED - get a variety of cards - 100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST custom QSLs, large cut catalog and samples $1 refundable on first order. Ritz Print Shop P.O. Box 45018, Westlake, OH 44145.

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QSL samples — 25¢ Samcards — 48 Monte Carlo Dr., Pittsburgh, PA 15239.

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STAMP brings QSL catalog of new designs and samples, from $7 up. 22 years custom printing. WA6SOK, 4056 Acacia, Riverside, CA 92503.

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100% SATISFACTION GUARANTEED. Why take chances? Send for free samples and you'll find out why so many of the QSLs you receive were printed by . . . W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

QUALITY QSLs, Samples 50c. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

ANTIQUE-VINTAGE-CLASSIC

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels, "Skyrider Commercial," early transmitters — HT-1, HT-2, HT-8, etc., other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell, Austin, TX 78745.

WANTED; old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

MANUALS for most Ham gear made 1937/1972, plus Kenwood. Our 1985 catalog is $1 USA and required for ordering. Over 2,000 models listed. HI-MANUALS, P.O. Box E802, Council Bluffs, IA 51502-0802.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: PRE-1923 radios, pre 1940 T.V. Entire collections bought. Top cash paid immediately. Phil Weingarten, 67-61 Alderton St., Flushing, NY 11374, 718-896-3545.

WANTED: radios, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201. 818-242-8961.

KENWOOD

...pacesetter in Amateur radio

Handy Handful...

TR-2600A/3600A

Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signalling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.

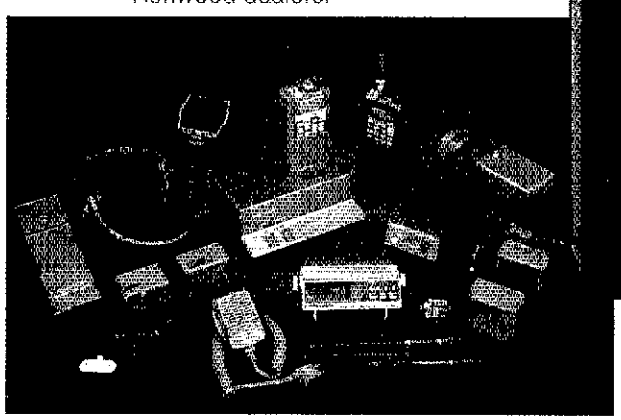
- **Simple to operate**
  Functional design is "user friendly." Built-in 16-key autopatch encoder, TX STOP switch, REVerse switch, KEYboard LOCK switch, high efficiency speaker.
- **Large LCD**
  Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.
- **Extended frequency coverage**
  Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz. (TR-3600A covers 440-450 MHz.)
- **Programmable scan**
  Channel scan or band scan, search for open or busy channels.
- **SLIDE-LOC battery case**
- **10 Channels**
  10 memories, one for non-standard repeater offsets.
- **2.5 watts high power, 350 mW low**
  TR-3600A has 1.5 watts high or 300 mW low.

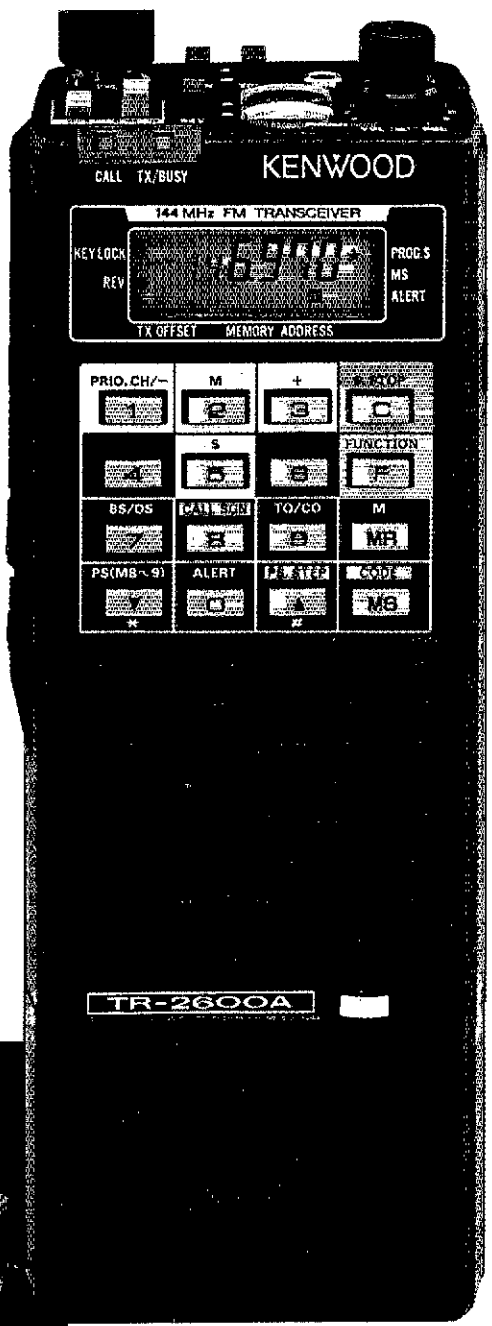
The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handful"!

Optional accessories:

- TU-35B built in programmable sub-tone encoder
- TB-2530 2-m 25 W RF power amp.
- ST-2 base stand/charger
- MS-1 mobile stand/charger
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/alkaline battery case
- RA-3 2-m telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- AX-2 shoulder strap w/ant. base
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.

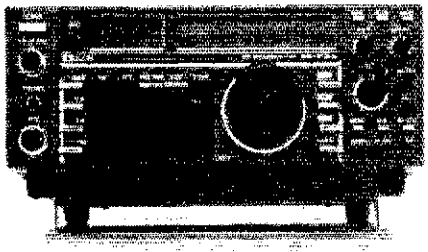




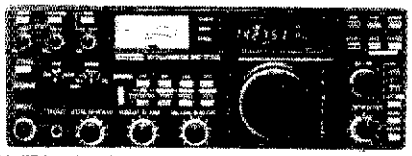
KENWOOD

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

TR-2600A shown. TR-3600A is available for 70 cm operation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.



HF Equipment	Regular	SALE
IC-735 Xcvr/SW rcvr/mic	849.00	749.95
PS-55 Power supply	160.00	144.95
AT-120 Automatic antenna tuner	TBA	
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
IC-730 8-band 200w PEP xcvr w/mic	829.00	569.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
SM-5 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band xcvr/.1-30 MHz rcvr	1349.00	799.95
FL-32 500 Hz CW filter	59.50	
FL-34 2.2 kHz AM filter	49.50	
SM-5 8-pin electret desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band xcvr w/.1-30 Mhz rcvr	999.00	779.95
PS-35 Internal power supply	160.00	144.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-44A SSB filter (2nd IF)	159.00	144.95
HM-10 Scanning mobile microphone	39.50	
SM-6 Desk microphone	39.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	19.50	



IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	1199
PS-35 Internal power supply	160.00	144.95
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-33 AM filter	31.50	
FL-70 2.8 Khz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	39.00	
CR-64 High stability reference xtal	56.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	
Options: 720/730/745/751	**Regular**	**SALE**
PS-15 20A external power supply	149.00	134.95
EX-144 Adaptor for CF-1/PS-15	6.50	

ICOM

Options - continued	**Regular**	**SALE**
CF-1 Cooling fan for PS-15	45.00	
EX-310 Voice synth for 751, R-71A	39.95	
SP-3 External base station speaker	49.50	
Speaker/Phone patch - specify radio	139.00	129.95
BC-10A Memory back-up	8.50	
EX-2 Relay box with marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile antenna w/tuner	289.00	259.95
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234.95
OPC Optional cord, specify 2 or 4-pin	5.50	
GC-4 World clock (Closeout!)	99.95	79.95
HF linear amplifier	**Regular**	**SALE**
IC-2KL w/ps 160-15m solid state amp	1795.00	1299
VHF/UHF base multi-modes	**Regular**	**SALE**
IC-551D 80 Watt 6m transceiver	699.00	599.95
EX-106 FM option	125.00	112.95
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271A 25w 2m FM/SSB/CW xcvr	699.00	569.95
AG-20 Internal preamplifier*	56.95	
IC-271H 100w 2m FM/SSB/CW xcvr	899.00	759.95
AG-25 Mast mounted preamplifier*	84.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted preamplifier*	89.00	
IC-471H 75w 430-450 SSB/CW/FM xcvr	1099.00	969.95
AG-35 Mast mounted preamplifier*	84.95	

For a Limited time!
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Common accessories for 271A/H and 471A/H		
PS-25 Internal power supply for (A)	99.00	89.95
PS-35 Internal power supply for (H)	160.00	144.95
PS-15 External power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for PS-15/CF-1	6.50	
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	
VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	479.95
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	579.95
VHF/UHF/1.2 GHz FM	**Regular**	**SALE**
IC-27A Compact 25w 2m FM w/TTP mic	369.00	299.95
IC-27H Compact 45w 2m FM w/TTP mic	409.00	359.95
IC-37A Compact 25w 220 FM, TTP mic	449.00	299.95
IC-47A Compact 25w 440 FM, TTP mic	469.00	399.95
UT-16/EX-388 Voice synthesizer	29.95	
IC-3200A 25w 2m/440 FM w/TTP	549.00	489.95
UT-23 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	449.95
ML-12 10w amplifier	339.00	299.95
6m portable	**Regular**	**SALE**
IC-505 3/10w 6m port. SSB/CW xcvr	449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	289.95
IC-04AT for 440 MHz	379.00	289.95
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	189.95
IC-2AT with TTP	269.50	199.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	**Regular**
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	69.00
BC-60 6-position gang charger, all batts	SALE 359.95
BC-16U Wall charger for BP7/BP8	10.00
LC-11 Vinyl case	17.95
LC-14 Vinyl case for Dlx using BP-7/8	17.95
LC-02AT Leather case for Dlx models w/BP-7/8	39.95
Accessories for both models	**Regular**
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-2AT Leather case for standard models	34.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95
SS-32M Commspec 32-tone encoder	29.95

Shortwave receiver	**Regular**	**SALE**
R-71A 100 kHz-30 Mhz digital receiver	$799.00	659.95
RC-11 Wireless remote controller	59.95	49.95
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	39.95	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
MB-12 Mobile mount	19.50	

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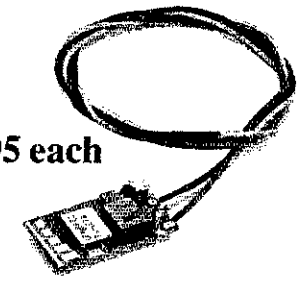

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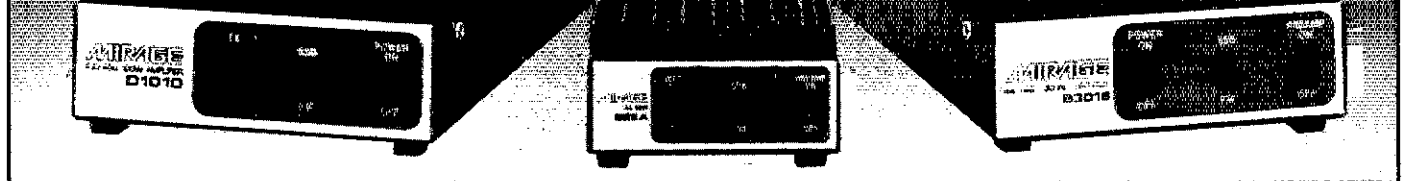

A1015—6 Meter Amplifier
10 Watts In—150 Watts Out
All Mode Operation with Rx Preamp
Remote Keying

B23A—2 Meter H/T Amplifier
2 Watts In-30 Watts Out
All Mode Operation with Rx Preamp
compact Size (3½"x 2"x 7")

B108—2 Meter Dual Purpose Amplifier
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B1016—2 Meter Dual Purpose Amplifier
10 Watts In—160 Watts Out
2 Watts In—60 Watts Out
All Mode Operation with Rx Preamp

B3016—2 Meter Amplifier
30 Watts In—160 Watts Out
Operates with 2 to 50 Watts Input
All Mode Operation with Rx Preamp

C22A—1¼ Meter H/T Amplifier
2 Watts In—18 Watts Out
Compact Size (3½" x 2" x 7")
All Mode Operation with Rx Preamp

C106—1¼ Meter Dual Purpose Amplifier
10 Watts In—60 Watts Out
2 Watts In—23 Watts Out
All Mode Operation with Rx Preamp

C211—1¼ Meter Amplifier
2 Watts In—110 Watts Out
High Power H/T Amplifier
All Mode Operation with Rx Preamp

C1012—1¼ Meter Dual Purpose Amplifier
10 Watts In—120 Watts Out
2 Watts In—40 Watts Out
All Mode Operation with Rx Preamp

C3012—1¼ Meter Amplifier
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2 Watts In—40 Watts Out
All Mode Operation with Rx Preamp

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Optional "N" Type Connectors

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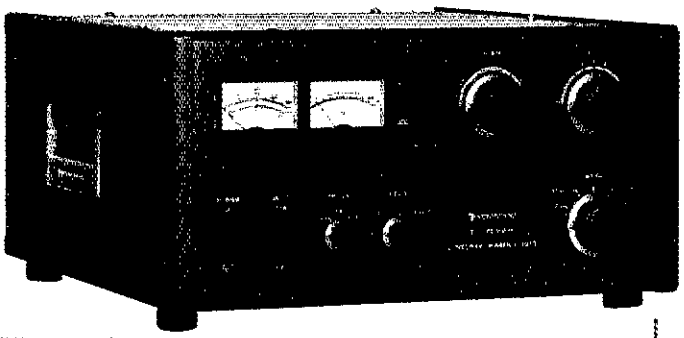
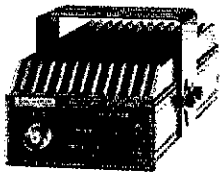


TL-922A 160-15 m 2 KW PEP/1 KW DC Input Linear Amplifier. Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

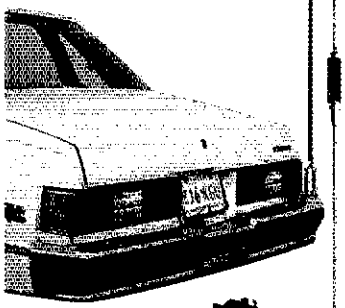
PC-1A Phone Patch (FCC Part 68 registered).

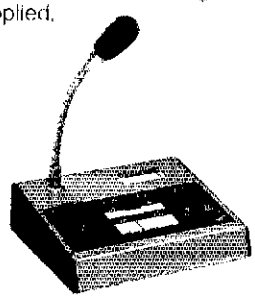
MA-5 80/40/20/15/10 meter mobile antenna. All resonators supplied. 200 W PEP max., VSWR 1.5:1 or less. Easily adjustable for center frequencies.

VP-1 Bumper mount for above.

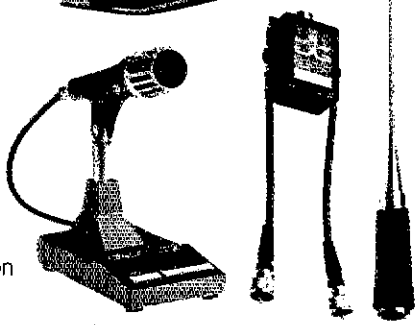


VB-2530 25 W RF Power Amplifier (for TR-2600A). BNC-BNC cable, and mounting bracket supplied.

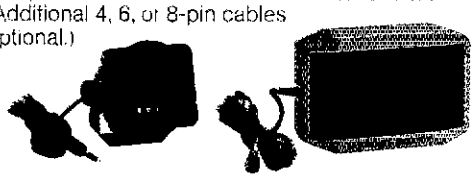




MC-85 (8-pin) Multi-function desk-top microphone (8-pin) 700 Ω unidirectional electret condenser mic. Built-in audio level compensation with output and tone control, meter, and UP/DOWN switch. Selector switch for up to three transceivers. (Additional 4, 6, or 8-pin cables optional.)

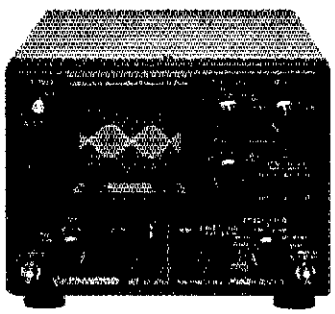


MC-60A (8-pin) Deluxe desk-top microphone. Pre-amp built-in, PTT, LOCK and UP/DOWN switches. Hi/Lo Z selector switch.



SP-40 Compact mobile speaker.

SP-50 Mobile speaker.



SM-220 Station monitor/10 MHz oscilloscope Pan display capability with optional BS-8 (for TS-940S, TS-830S). Monitor transmitted waveforms and/or received signal waveforms. Built-in 2-tone generator.

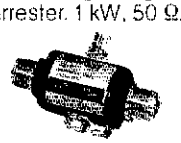
HS-5 Deluxe headphones.

HS-6 Lightweight headphones.

LF-30A Low pass filter. 1 kW, 50 Ω. Insertion loss: less than 0.5dB at 30 MHz.

MA-4000 2 m/70 cm dual band mobile gain antenna. Duplexer supplied. Ideal for use with the TW-4000A "Dual Bander" and TM-211A/TM-411A. (Mount not supplied.)

AL-2 Lightning and static arrester. 1 kW, 50 Ω.



Not Shown:

MC-50 Desk-top microphone. Hi/Lo Z. 4-pin connector.

MC-80 Desk-top microphone. 700 Ω unidirectional electret element with flexible boom. Built-in mic. pre-amp and UP/DOWN switch, with lock. (8-pin).

MC-48 Hand microphone with 16-key DTMF pad and UP/DOWN switches. (8-pin).

MC-46 As above, but with 6-pin connector.

MC-42S Hand microphone with UP/DOWN switches. (8-pin).

MC-35S Noise cancelling hand microphone, 50 k Ω (4-pin).

MC-30S As above, but 500 Ω.

PG-4A Microphone cable for MC-60A. Converts MC-60A to 4-pin connector.

PG-4B As above, but 6-pin.

PG-4C As above, but 8-pin, as supplied with MC-60A.

PG-4D Extra 4-pin cable for MC-85.

PG-4E As above, but 6-pin.

PG-4F As above, but 8-pin.

HS-7 Micro-headphones.

KPS-7A 13.8 V DC, 7.5 A intermittent DC power supply.

RA-3 2 m, ⅜ λ telescoping antenna with BNC connector.

RA-5 2 m ¼ λ 70 cm ⅝ λ telescoping antenna with BNC connector.

RA-8B 2 m StubbyDuk™ with BNC connector.

RA-9B As above, for 220 MHz.

RA-10B As above, for 440 MHz.

RD-20 Dummy load, 50 Ω DC-500 MHz 20 W continuous, 50 W intermittent.

PG-3A DC line filter for mobile use.

Service manuals are available for all Kenwood transceivers and most accessories.

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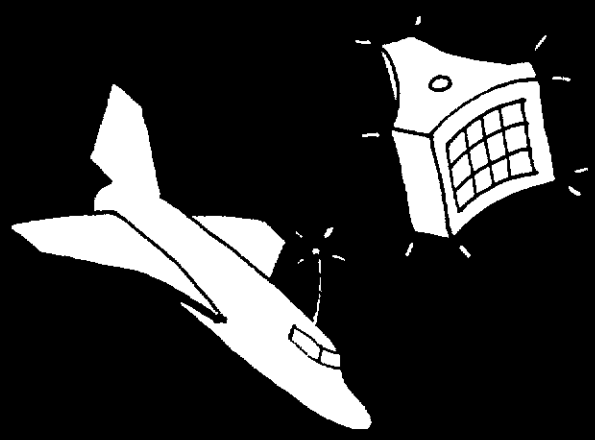

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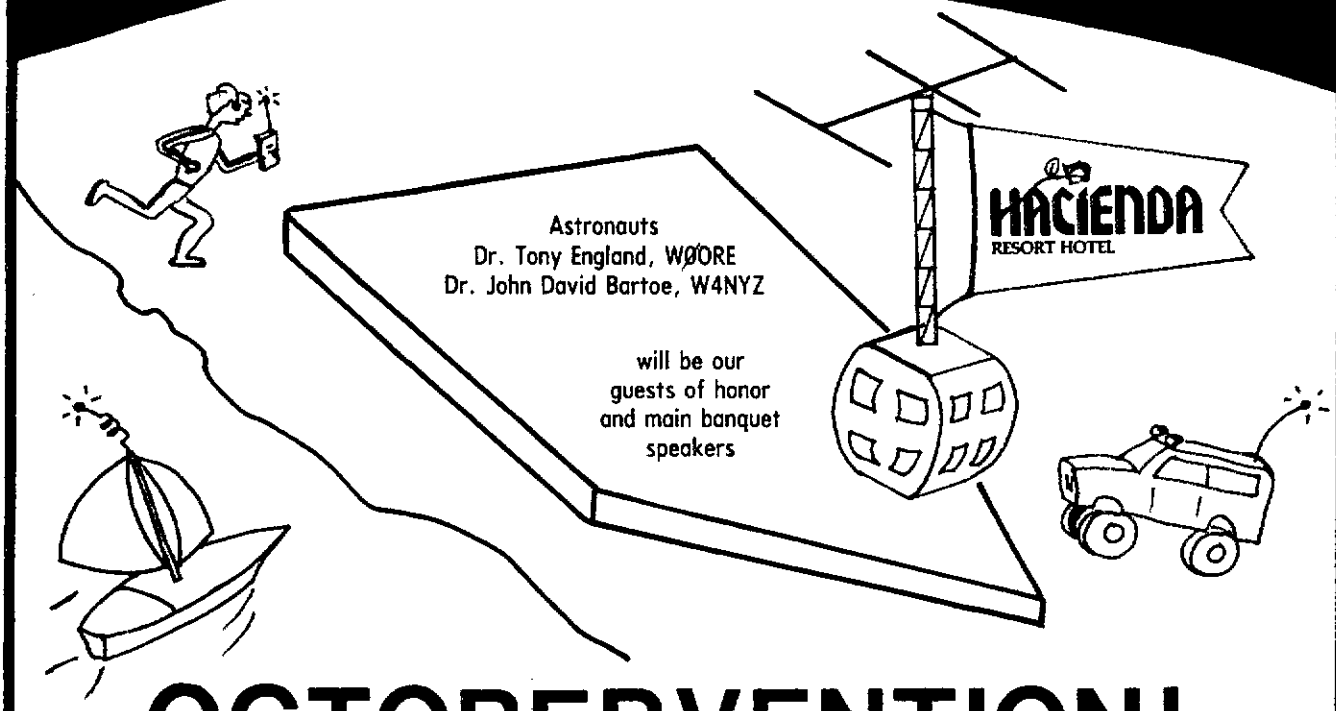

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WANTED SPEAKER Horn K4NBN "No Bad News".

WANTED: MCINTOSH and Marantz tube-tupe audio equipment, parts, accessories and literature, for personal collection. 100% reply. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385, 414-475-5356.

FOR SALE: Hallicrafters SX-100 Communication Receiver. Collectors item. Good condition. $99 F.O.B. W4NEX, G.E. Nemetz, 8202 Beechwood Drive, Lynchburg, VA 24502, 804-239-7789.

MINT CONDITION Hallicrafters HT32B SSB/CW Transmitter, with junk HT32A for parts. Both $175. National NC300 160-10 Receiver, speaker $75. Everything with Cables, Relay and Manuals $225. WA9TXB, 319-351-2046.

COLLINS WANTED: Pre-WWII transmitters - 45 series, 20R, 202A, 30FXR, 30FXC for personal collection. Also want to find a nice HRO Sr. with all coils and manual, in good condition. Please contact AC1Y c/o ARRL Hq. or call 203-667-2494 days 8-4.

WANTED: B&W 50W grid coils Type 15JCL and 10JCL. N7EB, 12802 Sun Valley Dr., Sun City, AZ 85351.

WANTED: OLD KEYS for my collection. Looking for each make and model of pre-1935 bugs. Vibroplex, Martin, Albright, Dunn, Boulter, Thomas, etc. Also need spark keys, Cricket, Omnigraphs, and pre-1900 landline (Keys, Sounders, Pocket Sets, etc.) Visitors welcome. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

MAKE OFFER Plus Postage: QST's 1927 on. M. Blomquist, Rt. 2, Box 2287, Hartwell, GA 30643.

SELLING OUT my collection of Vintage radio magazines, books, tubes, telegraph, ham and broadcast radios, etc. Pay my fair price or make offer. Everything will be sold. Send for list in your area of interest. Large SASE please. W2GHF, 45 Allen Dr., Woodstock, NY 12498.

WANTED: RCA 44BX, velocity studio microphone, or similar, in good condition. Stand also wanted. Also want: National TV-7 and RCA-630. Sam Thompson, W6HDU, 1031 San Antonio Ave., Alameda, CA 94501. 415-521-1429 evenings.

WANTED: Type 148-C1 NBFM Adapt. for Collins 75A3 Rcvr. State price. L. Hance, 224 Brookvalley Rd., Towaco, NJ 07082.

HALLICRAFTERS SX62 with R46. SASE KA5PGA for details.

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WANTED - MANUAL for Gonset GSB-100 Transmitter. WA2EHV, 617-235-3303.

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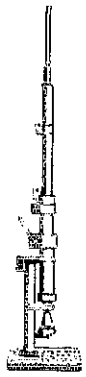

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MA-850	85'	23'6"	5	1295	3"sq.	10"	$3695.00*	
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TX-455	55'	22' "	3	700	12½"	18"	$1395.00*
TX-472	72'	22'8"	4	1175	12½"	21⅝"	$2295.00*
TX-489	89'	23'4"	5	1650	12½"	25⅝"	$3995.00*
TX-489MD*	89'	23'4"	5	1980	12½"	25⅝"	$5995.00*

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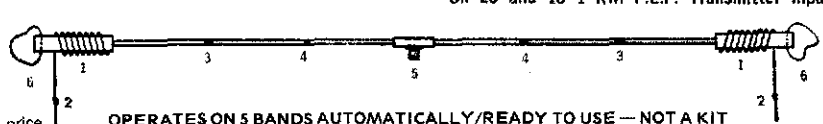

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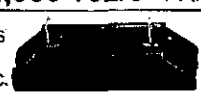

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KENWOOD

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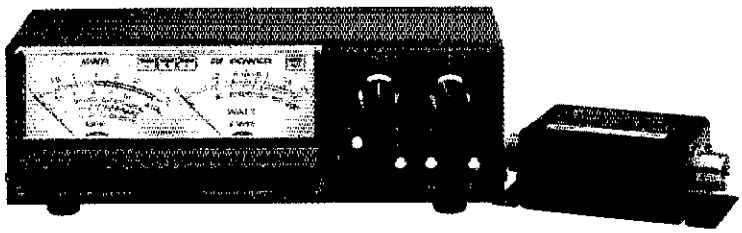
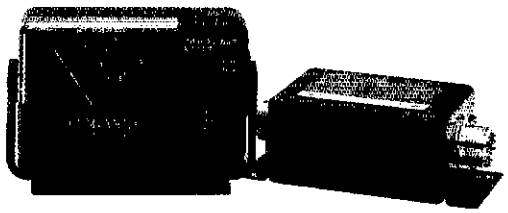
SWR/Power Meters





SW-200A/SW-200B/SW-2000

Base station SWR/power meters

SW-200A supplied with SWC-1, SW-200B supplied with SWC-2, SW-2000 supplied with SWC-3

Selectable Peak-reading/RMS, SWR/POWER meters cover 1.8–150 MHz (SW-200A), 140–450 MHz (SW-200B), 1.8–54 MHz (SW-2000) in range of 0–20/200 W (SW-200A/B), 0–200/2000 W (SW-2000) full scale for base station use

SPECIFICATIONS

• Impedance: 50–52 Ω • Frequency range: 1.8–150 MHz (SW-200A), 140–450 MHz (SW-200B), 1.8–54 MHz (SW-2000) • Power measuring range: 0–20/200 W (SW-200A/B), 0–200/2000 W (SW-2000) • Accuracy: Less than ± 10% of full scale • Sensitivity: Less than 2 W (SW-200A/B), 20 W (SW-2000) • Power supply: 12 VDC 100 mA • Dimensions: 193 (7.6) W x 62 (2.4) H x 79 (3.1) D mm (inch).

SW-100A/SW-100B

Compact SWR/power/volt meters

1.8–150 MHz (SW-100A), 140–450 MHz (SW-100B) in range of 150 W full scale for mobile use

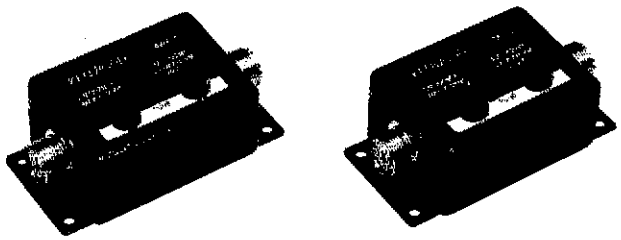
SPECIFICATIONS

• Impedance: 50–52 Ω • Frequency range: 1.8 - 150 MHz (SW-100A), 140–450 MHz (SW-100B) • Power measuring range: 0–150 W • DC VOLT meter: 0–70 V • Accuracy: Less than ± 10% of full scale • Meter illumination: 12 V 50 mA • Dimensions: display 92 (3.6) W x 64 (2.5) H x 36 (1.4) D mm (inch), coupler 62 (2.4) W x 50 (2.0) H x 30 (1.2) D mm (inch)

SWC-1/SWC-2/SWC-3/SWC-4

Optional couplers

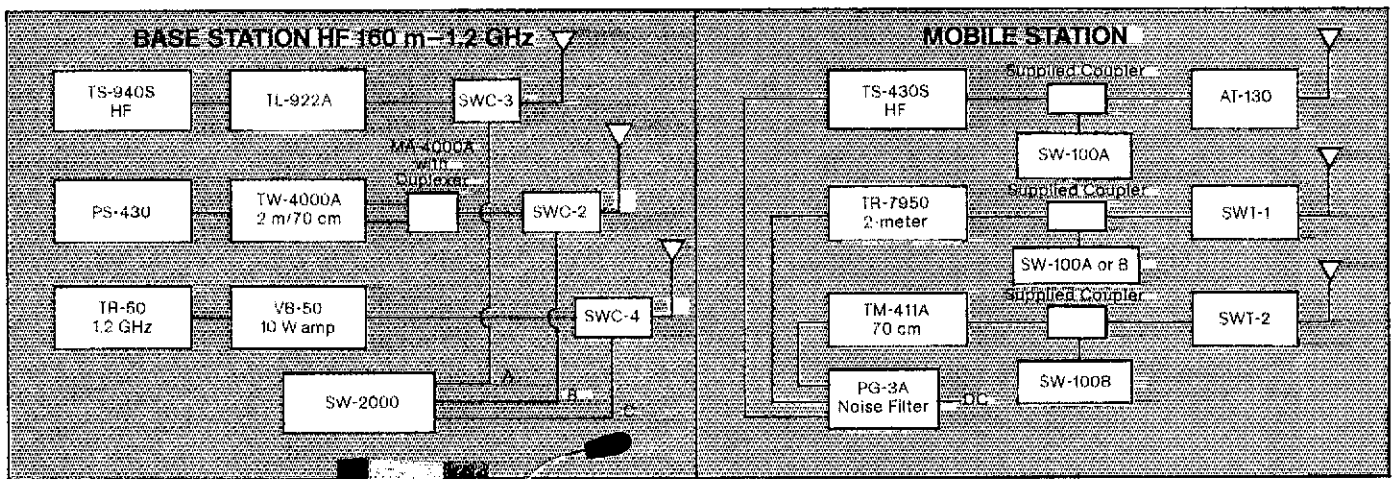
SWC-1 (1.8–150 MHz): Coupler for SW-200A/B, SW-2000
SWC-2 (140–450 MHz): Coupler for SW-200A/B, SW-2000
} SO-239 connectors
SWC-3 (1.8–54 MHz): Coupler for SW-2000
SWC-4 (1200–1300 MHz): Coupler for SW-200A/B, SW-2000—Type N connectors

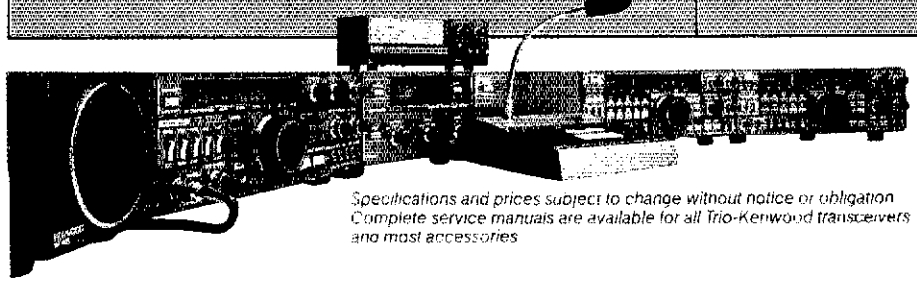


SWT-1/SWT-2

Compact antenna tuners

• Frequency Range: SWT-1 (144–148 MHz), SWT-2 (430–450 MHz) • Input Impedance: 50 Ω (unbalanced) • Output Impedance (Matching range): 25–100 Ω (unbalanced) • Insertion Loss: Less than 0.3 dB • Max. Input Power: FM/AM 100 W, SSB 200 W (PEP) • Connector: SO-239 • Dimensions: 68 (2.68) W x 32 (1.26) H x 50 (1.97) D mm (inch) (Projections not included).





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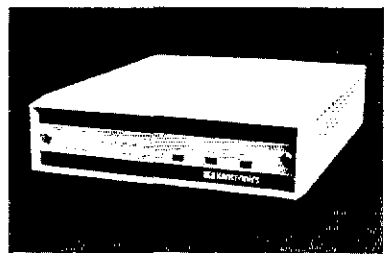

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GOOD OLD

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MU
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Just plug the Morse University* cartridge into your Commodore 64™ or C 128 computer, choose one of the five routines from the MU* menu and the fun begins!

The LEARNING ROUTINE teaches individual characters. Each character is sent at 20 WPM, but with 3 seconds between characters so you will learn the code by sound. Let's suppose you have progressed to session 5. The new letter that you will be learning is "T". Select "groups of 1" and the program sends: "T T T T T T....." Select "groups of 2" and random 2-letter groups are sent consisting of "T" and any 1 of 4 previously learned letters: "TK BQ QT FB TQ TF....." Select "5 letter groups" and the program sends at random all 5 letters that you have learned in 5 letter groups: FKBQT BQFKT TBQKF BTFBK QBFTK..... The number of times the new character appears can be selected so that it is sent all of the time, half of the time or at random.

The PROFICIENCY ROUTINE sends a random sequence of characters with options as to practice duration, start speeds and finish speed. For example, you can start at 5 WPM and the speed will gradually increase to 20 WPM over a 10-minute period.

The SENDING ANALYSIS ROUTINE analyzes character formation and spacing.

In the RECEIVING GAME, a series of thunderclouds passes over the ham antennas in a small town. After the characters have been sent, a lightning bolt is released. If you correctly type in the characters that were sent, you zap the lightning bolt. If not, or you are too slow, the bolt will knock down one of the antennas. The game is over when 19 antennas are down.

You can compose your own code practice for other students using the MORSE KEYBOARD. The characters may be stored in a buffer until sent.

The menu also allows you to select the tone and also color if you have the proper monitor.

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- Variable bandwidth tuning (VBT). Varies IF filter passband width.
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- Noise-blanker threshold level control.
- IF shift (passband tuning).
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
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- SSB monitor circuit.
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- RIT and XIT (transmitter incremental tuning).

Optional accessories:

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- SP-230 external speaker.
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- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.

TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

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- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.
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- Adjustable noise-blanker, with front panel threshold control.
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- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
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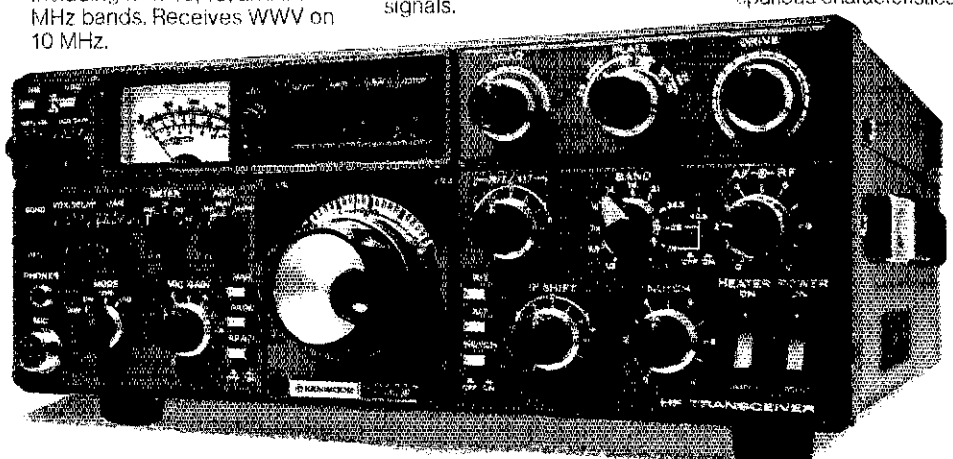
- YK-88SN (1.8 kHz) narrow SSB filter.



More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.

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

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P50VDG	50-54	<0.5	24	+12	GaAsFET	$79.95
P144VD	144-148	<1.5	15	0	DGFET	$29.95
P144VDA	144-148	<1.0	15	0	DGFET	$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	$79.95
P220VD	220-225	<1.8	15	0	DGFET	$29.95
P220VDA	220-225	<1.2	15	0	DGFET	$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	$79.95
P432VD	420-450	<1.8	15	−20	Bipolar	$32.95
P432VDA	420-450	<1.1	17	−20	Bipolar	$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	$79.95
Inline (rf switched)						
SP28VD	28-30	<1.2	15	0	DGFET	$59.95
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SP50VDG	50-54	<0.55	24	+12	GaAsFET	$109.95
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SP144VDA	144-148	<1.1	15	0	DGFET	$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	$109.95
SP220VD	220-225	<1.9	15	0	DGFET	$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	$109.95
SP432VD	420-450	<1.9	15	−20	Bipolar	$62.95
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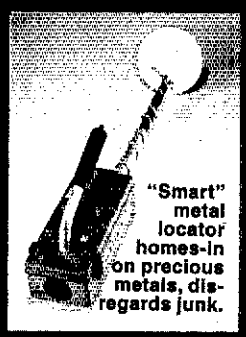
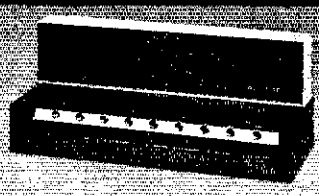
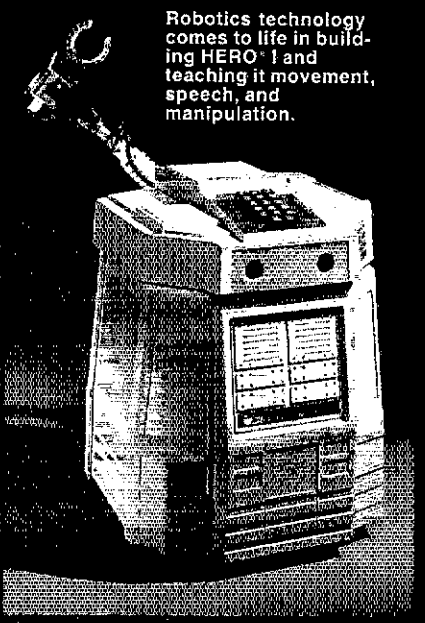


"Smart" metal locator homes-in on precious metals, disregards junk.

Build IBM-PC compatible Heathkit computer and save, or buy assembled.



Computerized weather station "remembers" weather to aid in forecasting.



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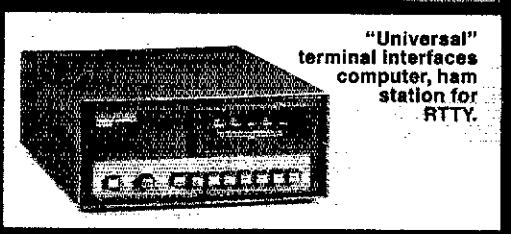

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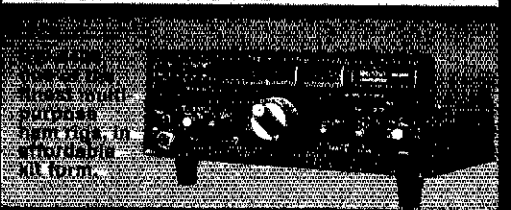

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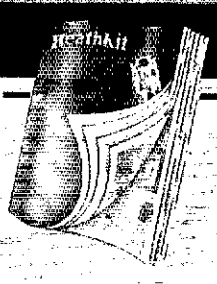

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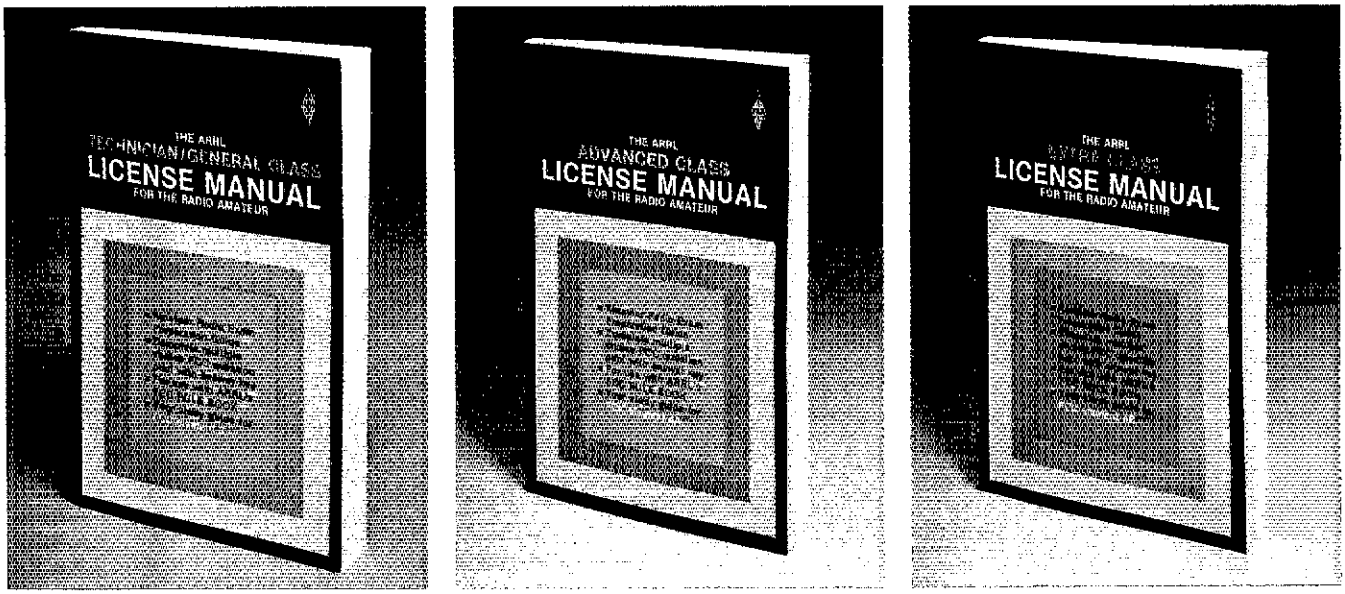

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- **NEW EXTRA CLASS LICENSE MANUAL**
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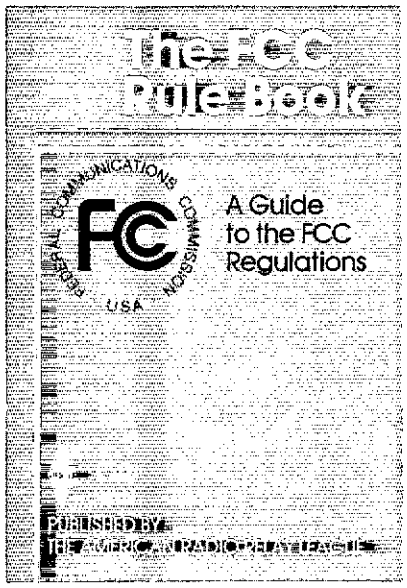
The ARRL publications pictured on this page are just what you need in order to pass the various amateur exams. Beginning with **Tune in the World with Ham Radio** for the Novice and progressing through the new and critically acclaimed **ARRL License Manual Series** for the Technician through Extra Class; you will find passing each exam element a snap! There are accurate text explanations of the material covered along with the FCC question pools and answer keys. The **new** *4th Edition* of **The FCC Rule Book** is invaluable as a study guide for the regulatory material found on the exams and as a handy reference. *Every* amateur needs an up-to-date copy of **The FCC Rule Book!**



Tune in the World with Ham Radio $8.50.
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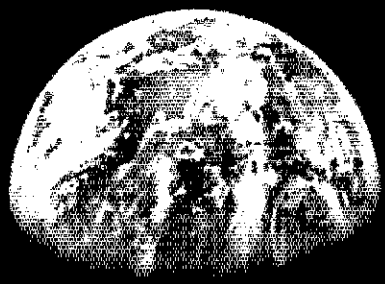

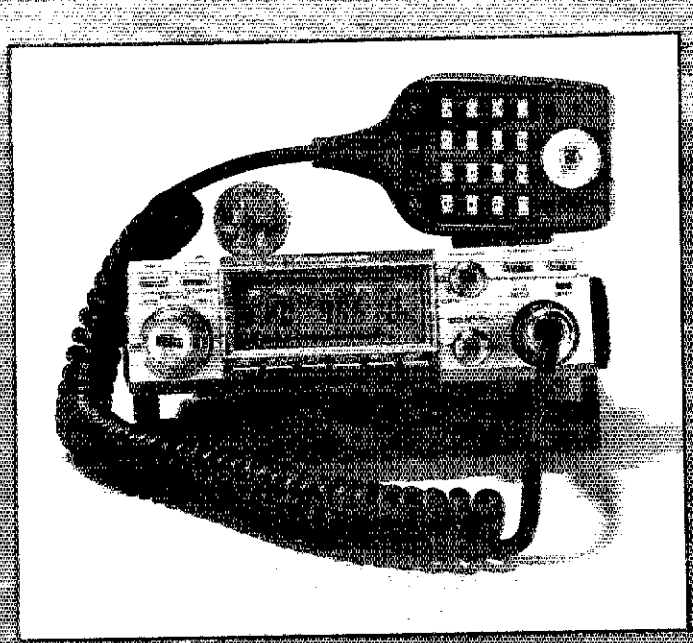

KDK FM-240

2M - 25 WATT FM TRANSCEIVER

- Superior features, simpler to use for 2 meters, MARS, CAP
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- 16 fully programmable memory channels, plus priority call channel, plus 2 VFOs for today's use
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- Speech synthesis option for voice VFO
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- 16 button speaker/mic with UP/DN lock-out switch

This radio does every single thing we asked the design staff to make it do, and it does it in an easy to use, simple manner. It is truly spectacular to operate such a radio in the 2 meter band. For example, the FM-240 has two VFO modes—one called VFO, the other QSY. So if you are on your favorite channel and want to QSY, simply push QSY and tune the main knob to the new frequency. To return, simply push QSY again. The entire radio follows this simple but spectacularly effective engineering formula.

ONE BUTTON + ONE KNOB, SIMPLY SPECTACULAR SIMPLICITY.

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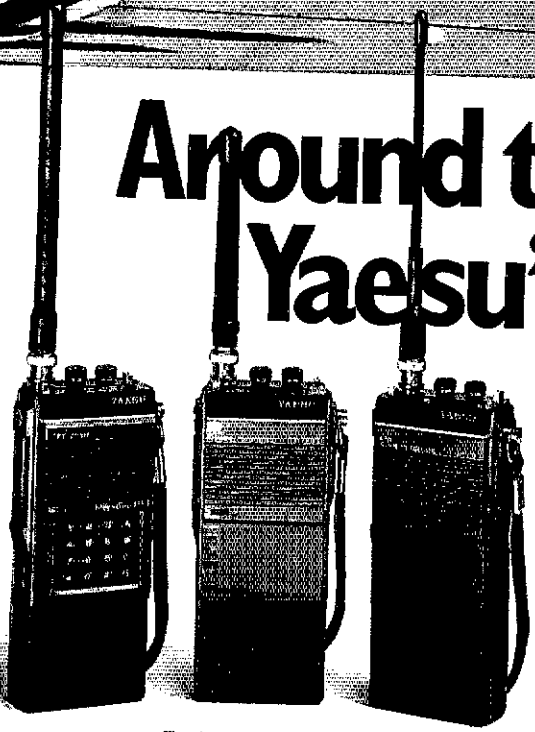
Around the corner Yaesu's VHF/UHF



Whether it's for working your favorite repeater or working an exotic land, Yaesu's got the choice in VHF and UHF radios that you need.

In fact, you'll discover that our VHF/UHF line is as diverse as your operating needs.

So when you want to make your VHF/UHF operation complete, just look to Yaesu for the solution.

For your hand. We're constantly raising the standards in handheld radio technology. And our 5-watt, 2-meter FT-209RH and our 4-watt 440-MHz FT-709R are no exceptions.

In fact, you won't find a more flexible, easy to use HT design anywhere.

Each rig gives you a battery saver that really helps conserve your battery power.

Two microprocessors make for a wider range of scanning functions. And complete storage capability in each of the ten memory channels.

Even an optional plug-in tone encode/decode module is available.

And best yet, these two high-powered HTs fit very comfortably in your hand, thanks to an ultra-slim and lightweight design.

However, if you're looking for a more basic and inexpensive handheld alternative, we've got your bases covered too.

We give you a choice of three bands of operation: the FT-203R for 2 meters, the FT-103R for 220 MHz, and the FT-703R for 440 MHz.

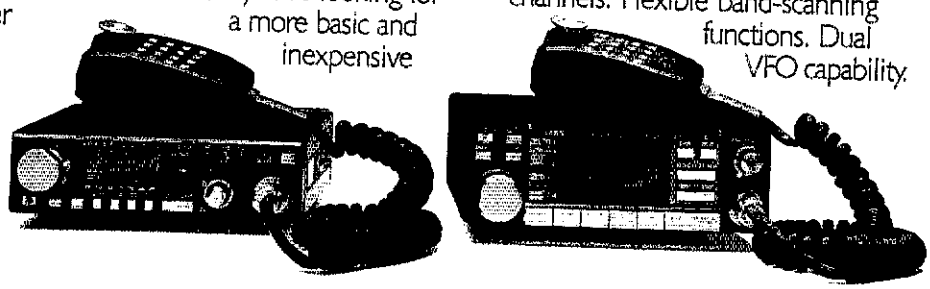
Each of these lightweight rigs features 2.5 watts of power and an optional DTMF keyboard.

Over land. Our two mobiles give you a lot of power in very small packages.

The FT-270RH is a 2-meter, 45-watt rig that conveniently packs its 45-watt punch into just about any small space in your car.

The FT-2700RH is a 25-watt FM dual-bander that lets you operate on 2 meters or 440 MHz. Or combine the two for cross-band, full-duplex, telephone-style operation.

Either way, both rigs are simple to operate. You get ten memory channels. Flexible band-scanning functions. Dual VFO capability.

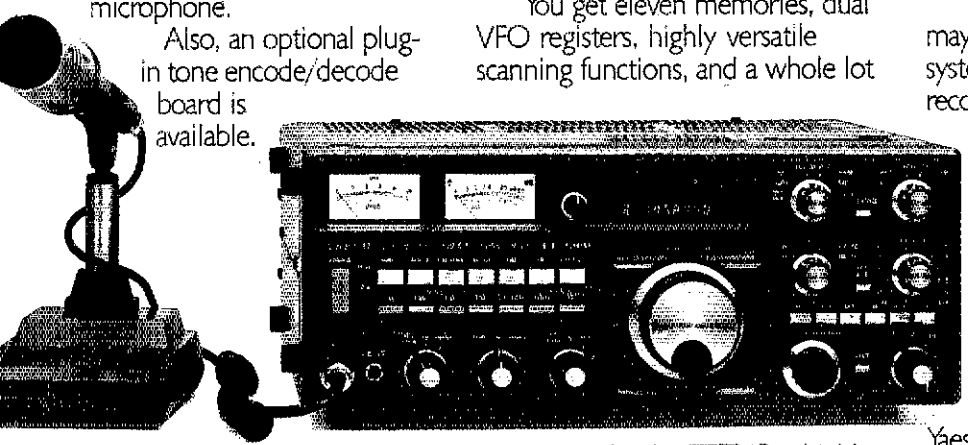


Around the world. ine gets you there.

With a clean, uncluttered LCD display for easy readout.

You don't even have to take your eyes off the road to determine your operating frequency and memory channel. An optional voice synthesizer announces them both at the push of a button on the microphone.

Also, an optional plug-in tone encode/decode board is available.



Across the world. We've got the world's most popular link to OSCAR 10, the triband FT-726R.

And talk about DX. You'll be making worldwide contacts in true 20-meter style. With excellent signal quality too.

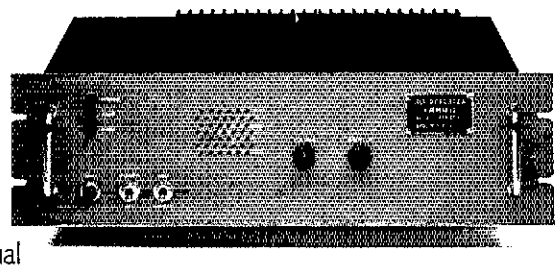
And better, you can work the world from just about anywhere. Including apartments and antenna restricted neighborhoods.

The FT-726R is a 2-meter, 10-watt rig with cross-band capability. To assemble the core of your earth station, simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You get eleven memories, dual VFO registers, highly versatile scanning functions, and a whole lot more to make the FT-726R a highly worthwhile investment.

Tie it all together. Finally, if you're looking for a repeater system, we've got just the repeater and intelligent controller that you need.

We'll help fine-tune your system to fit your individual requirements. No matter what they may be. Just write us with your system specifications, and we'll recommend the required hardware.



What's more, you can rest assured that our repeater system is proven and reliable. In fact, it's been used extensively in both amateur and commercial applications.

Yaesu gets you there. So when you're ready to get out on VHF/UHF, go with Yaesu. You'll discover a new world of innovation.

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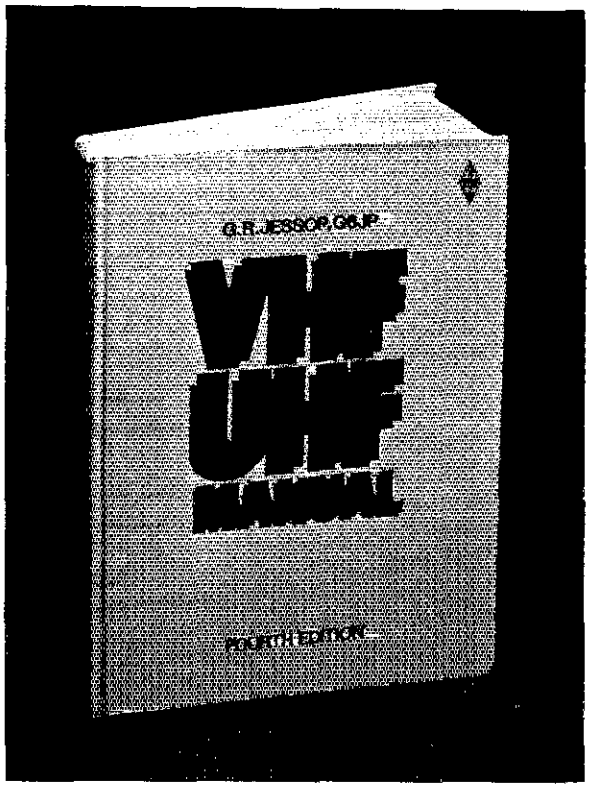
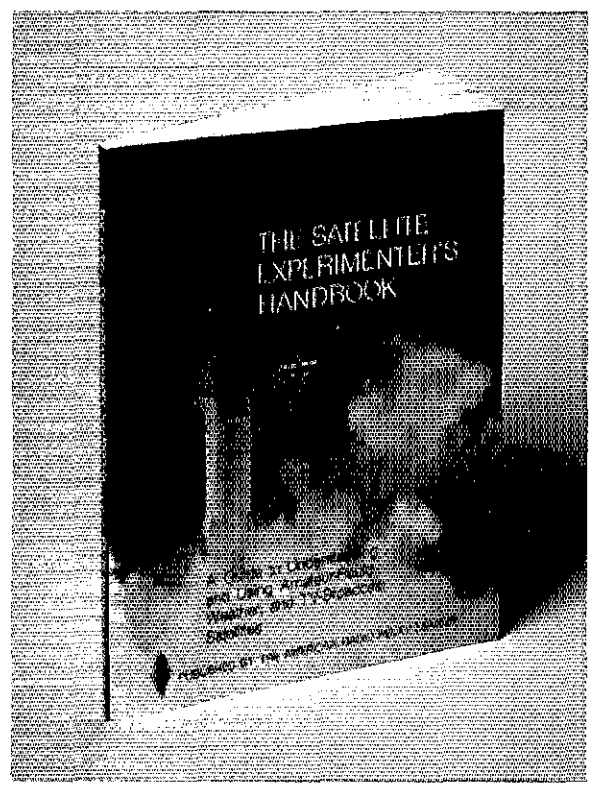


VHF-UHF Manual by G. R. Jessop, G6JP. You will find the new fourth edition of ***VHF-UHF Manual*** jam-packed with practical theory and construction projects for the region above 30 MHz to 24 GHz. The microwave chapter has been expanded to 83 pages; and includes information on: converters, cavity amplifiers, Gunn diodes, waveguides, directional couplers, and antennas. Receivers and transmitters are covered in 181 pages. The balance of the 512-page book contains chapters on propagation, tuned circuits, space communications, filters, test equipment, antennas, and a handy data section. (Since this is a British publication, there is little coverage of the 6-meter band, but many of the 4-meter band projects can be adapted by the experienced amateur for use on 6-meters.) Copyright 1983 Hardbound $17.50

Under one cover, here is all you need to communicate through or pick up the signals from orbiting satellites. Whether your interest is in Amateur Radio, weather or TV-broadcast spacecraft, you'll find what you are looking for in ***The Satellite Experimenter's Handbook, 2nd edition.***

Since the first OSCAR (Orbiting Satellite Carrying Amateur Radio) was launched in 1961, thousands of ham radio operators, scientists, educators and satellite enthusiasts from around the world have used these "birds" for pleasure, education and experimentation. You can join them! And if you're already into satellite communications, you'll find a wealth of practical information on all aspects of these spacecraft—from satellite design to ground-station equipment and antennas. You'll find ***The Satellite Experimenter's Handbook*** to be indispensable. $10 U.S., $11 in Canada and Elsewhere. ARRL 225 Main St., Newington, CT 06111.



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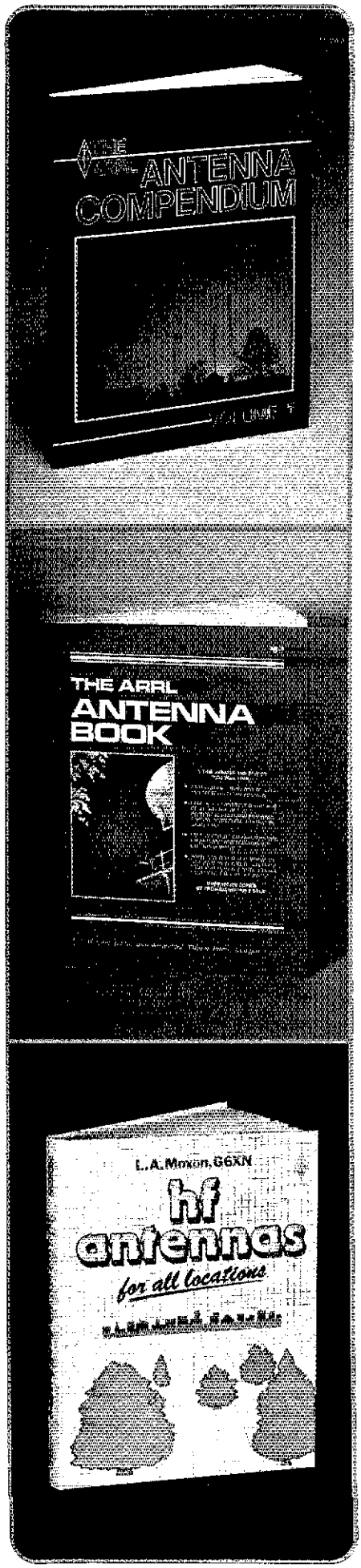

NEW! THE ARRL ANTENNA COMPENDIUM

Because of space limitations in ***QST,*** we don't have room to run all of the good antenna articles that are submitted. The solution to this problem? ***THE ARRL ANTENNA COMPENDIUM!*** You'll find 178 pages packed with new material on quads, loops, log periodic arrays, other beam antennas, multiband antennas, verticals, reduced size antennas, plus such interesting topics as: Mr. Smith's "Other" Chart and Broadband Rigs; Available Power, SWR and Loading; Baluns: What They Do and How They Do It; The Horizontal Dipole Over Lossy Ground; and Antenna Polarization. Copyright 1985. Paperbound: **$10.00** in the U.S., **$11.00** elsewhere.

OTHER ANTENNA BOOKS

THE ARRL ANTENNA BOOK The best and most highly regarded antenna information available. The 14th Edition contains 328 pages of propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Copyright 1982. Paperbound: **$8.00** in the US., **$8.50** elsewhere. Clothbound: **$12.50** in the U.S., **$13.50** elsewhere.

HF ANTENNAS FOR ALL LOCATIONS by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; the Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **$12.00.**

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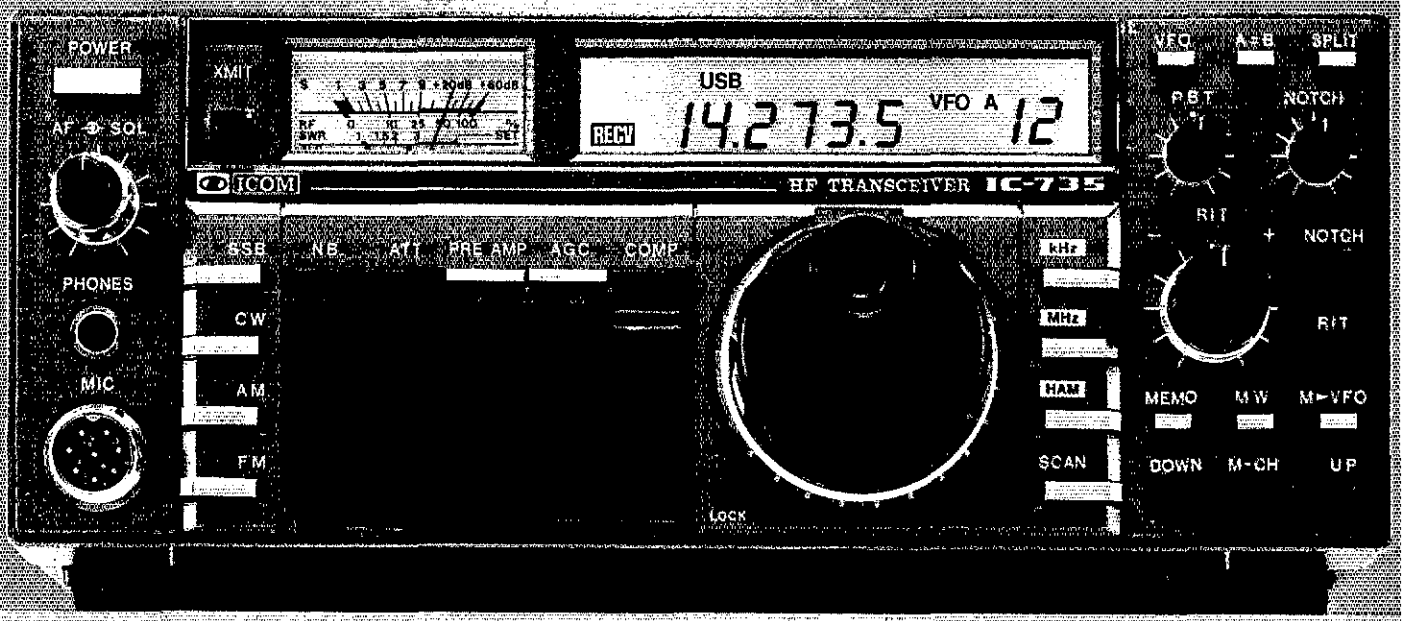
NEW! ICOM HF [illegible] IC-735



Ultra Compact

The new ICOM IC-735 is what you've been asking for...the most compact and advanced full-featured HF transceiver with general coverage receiver on the market. Measuring only 3.7 inches high by 9.5 inches wide by 9 inches deep, the IC-735 is well suited for mobile, marine or base station operation.

Superior Performance

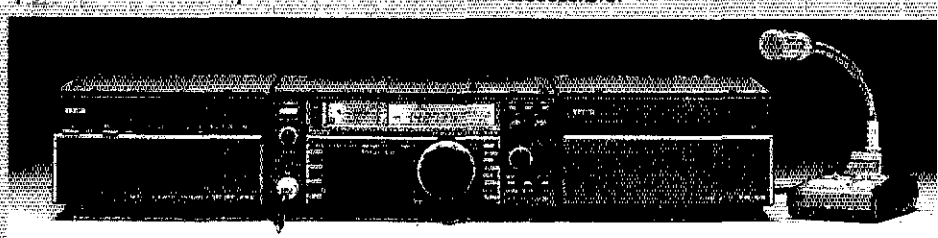
It's a high performer on all the ham bands, and as a general coverage receiver, the IC-735 is exceptional. The IC-735 has a built-in receiver attenuator, preamp and noise blanker to enhance receiver performance. PLUS it has a 105dB dynamic range and a new low-noise phase locked loop for extremely quiet rock-solid reception.

Simplified Fron Panel

The large LCD readout and conveniently located controls enable easy operation, even in the mobile environmer Controls which require rare adjustmer are placed behind a hatch cover on th front panel of the radio. VOX contro mic gain and other seldom used contro are kept out of sight, but are immediate accessible.

More Standard Features

Dollar-for-dollar the IC-735 includes more standard features...FM built-in, an HM-12 scanning mic, FM, CW, LSB, USB, AM transmit and receive, 12 tunable memories and lithium memory backup, program scan, memory scan, switchable AGC, automatic SSB selection by band, RF speech processor, 12V operation, continuously adjustable output power up to 100 watts, 100% duty cycle and a deep tunable notch.



Options. A new line of accessories is available, including the AT-150 electronic automatic antenna tuner and the switching PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 at your authorized ICOM dealer. For superior performanc and innovative features at the right price look at the ultra compact IC-735.

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First In Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 7523

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ICOM 144, 220 and 440MHz

MOBILES

The World's Most Compact Mobiles

ICOM's three ultra compact mobiles...the IC-27A 2-meter, the IC-37A 220MHz and the IC-47A 440MHz... are the smallest mobiles available.

Even in such a small package the 25 watt mobiles contain an internal speaker which makes them fully self-contained and easy to mount.

Size. The ICOM compacts measure only 5½"W x 1½"H x 7"D (IC-47A is 9" deep) which allows them to be mounted in various "compact" locations. Yet the compacts have large operating knobs which are easy to use in the mobile environment.

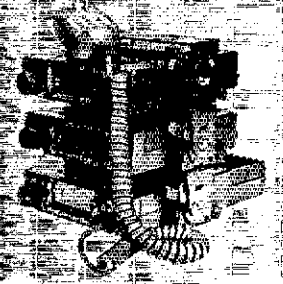
More Features. Other IC-27A/37A/47A standard features include a mobile mount, IC-HM23 DTMF mic with up/down scan and memory scan, and internally adjustable transmit power. An optional IC-PS45 slim-line external power supply and IC-SP10 external speaker are also available.

32 PL Frequencies. The IC-27A/37A/47A come complete with 32 PL frequencies.

9 Memories. The compact mobiles have 9 memories which will store the receive frequency, transmit offset, offset direction and PL tone. All memories are backed up with a lithium battery.

Speech Synthesizer. To verbally announce the receive frequency, an optional UT-16 voice synthesizer is available.

Scanning. The ICOM compacts have four scanning systems...memory scan, band scan, program scan and priority scan. Priority may be a memory or a VFO channel...and the scanning speed is adjustable.



Stacking Mobile Mounts. The IC-27A/37A/47A can be stacked to provide a three-band mobile station. Each band is full featured and will operate even when another band is in use.

The IC-27A/37A/47A provide superb performance in the mobile radio environment. See them at your local ICOM dealer.

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NEW From AMERITRON

HERE IS THE EXCITING NEW AL-80A!

SETTING A NEW STANDARD OF EFFICIENCY IN MODERATELY PRICED KILOWATT AMPLIFIERS.

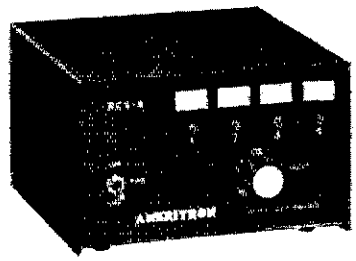
HEAVY DUTY TANK CIRCUIT ALLOWS PLATE EFFICIENCY OF 70% FROM 160 THROUGH 15 METERS.

The Ameritron AL-80A combines the time proven economical 3-500Z with a redesigned heavy duty tank circuit to achieve 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

The AL-80A will provide a signal output that is within ½ "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost. Size: 15½"D. x 14"W. x 8"H. Weight: 52 lbs.

NEW AMERITRON RCS-4 REMOTE COAX SWITCH

Available at your dealer. Send for a catalog of the complete AMERITRON line.



The Ameritron RCS-4 is a remote controlled coax switch that selects one of four antennas by supplying all control voltages through the coax feed line. The elimination of a control cable results in a neat and inexpensive installation.

The indoor control console has bright LED antenna selection indicators.

The remote relay box is tower or mast mounted with a single clamp.

The RCS-4 operates from 120 VAC and covers frequencies from 1.8 through 30 MHz at full legal power.

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The ARRL 1986 Handbook takes over where the 1985 edition left off. . . . . .

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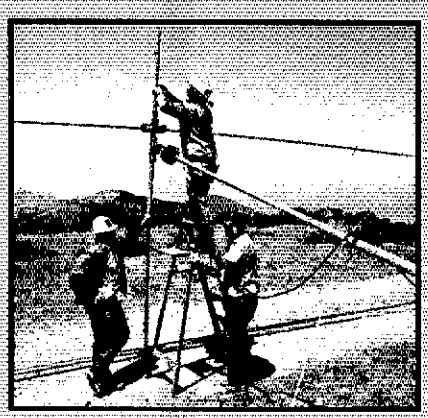
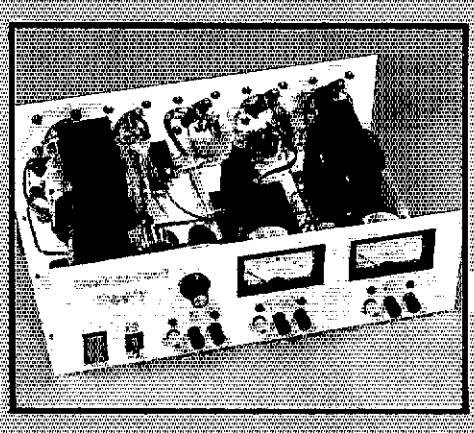
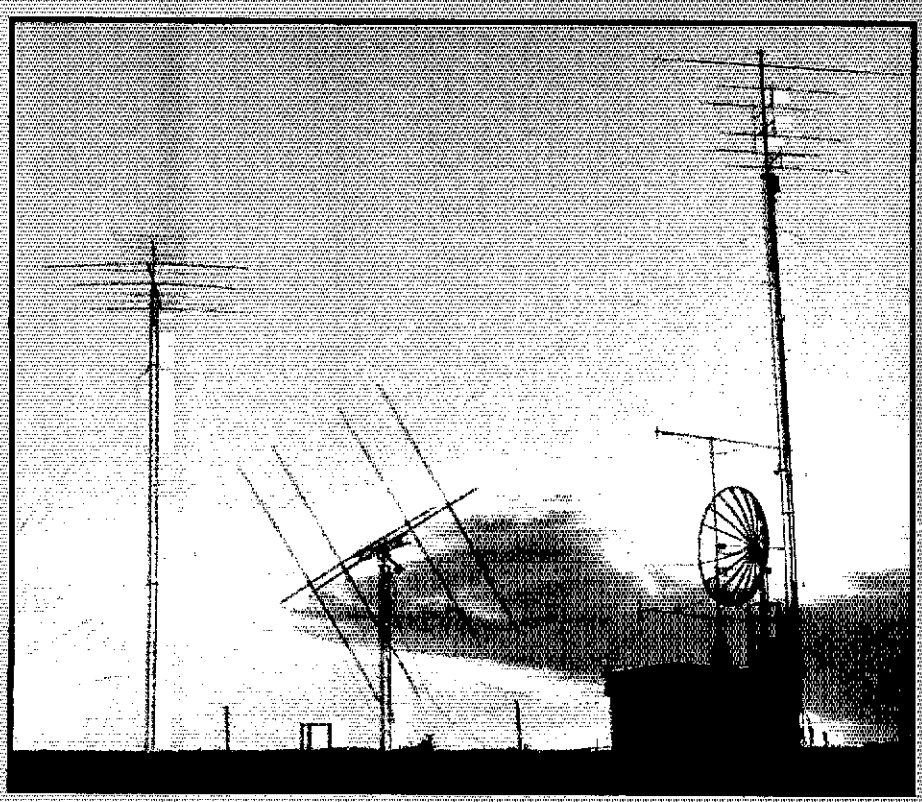
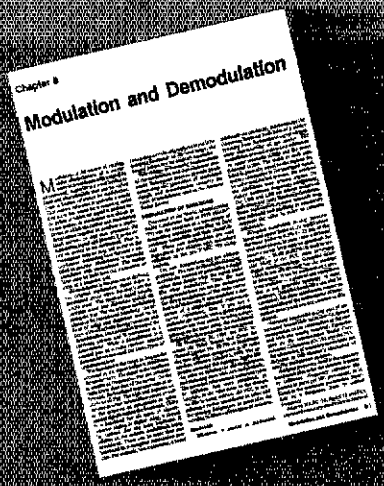


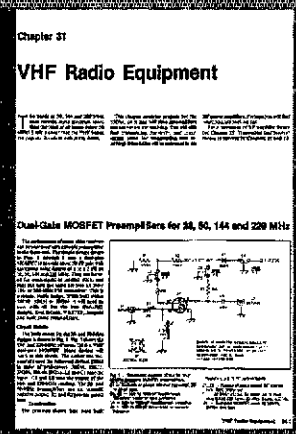


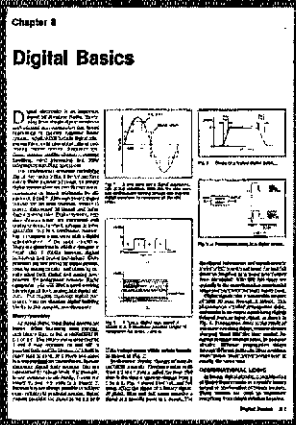
THE ARRL 1986 HANDBOOK

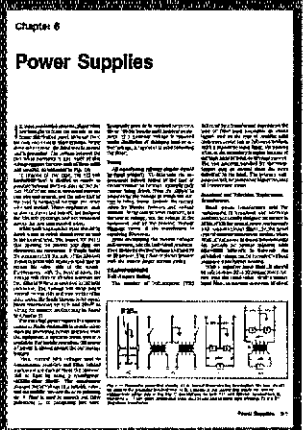
FOR THE RADIO AMATEUR

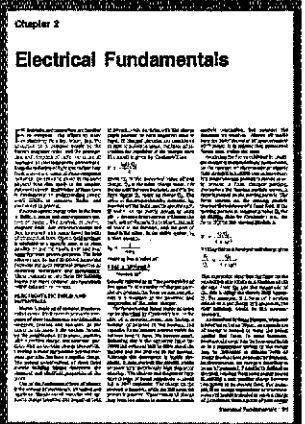










THE PLOT THICKENS!

The ARRL 1986 Handbook for the Radio Amateur takes over where the 1985 Edition left off. Each of the 40 chapters has had some revision, and there are more than 500 new or revised figures. The new edition will contain 1184 pages — way up from last year's count of 1024. Many key chapters with "hot" topics among today's radio amateurs have been completely revised and rewritten. In fact the new material represents 532 text pages.

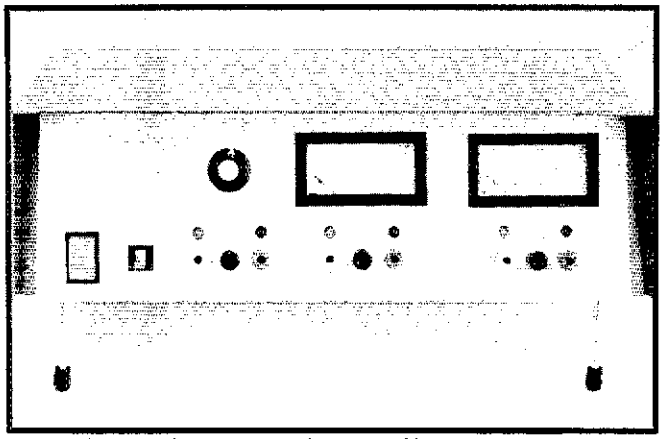
An understanding of digital electronics is a must these days since such circuitry has so many practical applications in station control, frequency synthesis, telemetry, word processing and other information-handling systems. The Digital Basics chapter will help you to understand what is going on in everything from simple keyers to sophisticated microcomputers. Packet-radio enthusiasts will find the most up-to-date information available in the Digital Communications chapter. There are new sections on data interfacing and modems, 50 new and revised figures, plus an expanded bibliography and glossary.

The Special Modulation Techniques chapter has the latest on spread-spectrum. On the fun side, we've added a new section on remote control of model aircraft and vehicles.

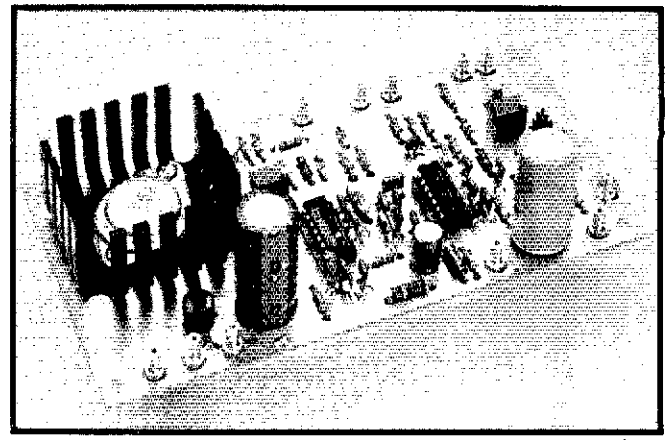
On the practical side, you will find many of the 27 new projects described on the next page. There are new power amplifiers for 1.8, 50, 144 and 1296 MHz, plus preamplifiers and transverters for the VHF/UHF enthusiast. The new digital PEP Wattmeter - SWR Calculator will be one of the most popular projects.

We've only scratched the surface in describing what is in the standard manual of RF communication. Over 5.7 million copies of *The Handbook* have been published in 63 editions since 1926. The new edition will be available in early November. It is must reading for today's radio amateur!

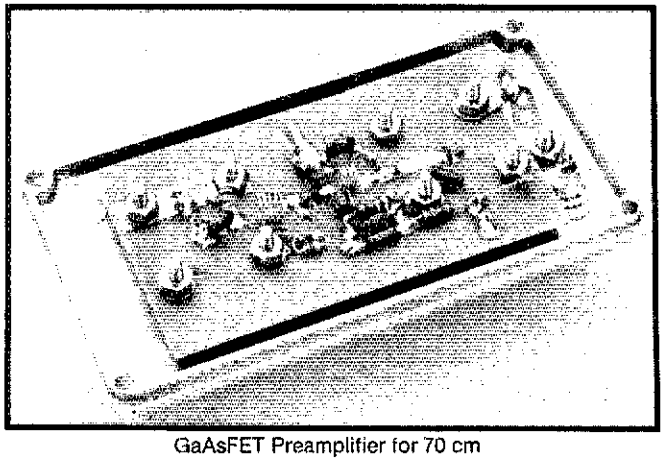
The *1986 Handbook* will be available in November. Paperbound prices are $18.00 in the U.S., $19.00 in Canada and elsewhere. Cloth prices are $27.00 in the U.S. and $29.00 elsewhere. Prices in U.S. funds. Foreign remittance should be in the form of an international money order or a check drawn on a bank account in the U.S.



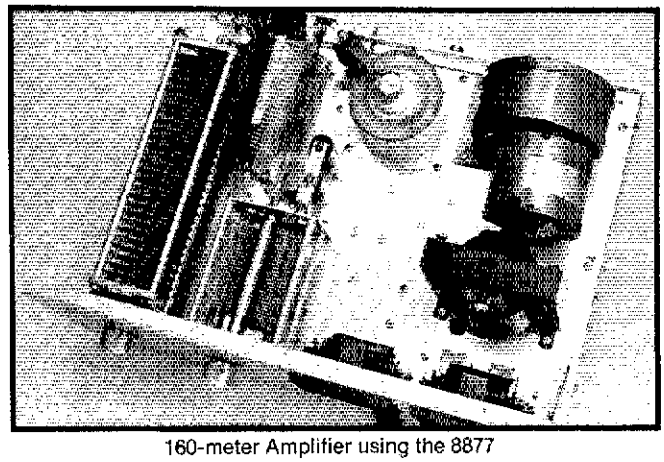
New supply covers a wide range of low dc voltages



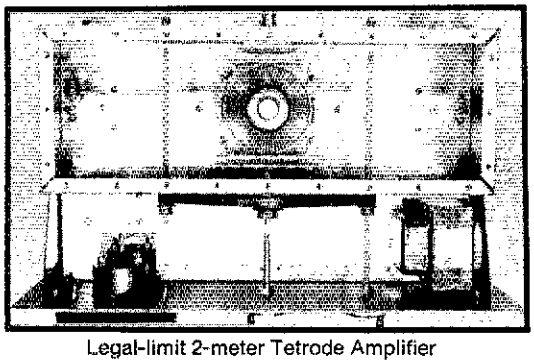
RF-proof regulator board in the new high current power supply



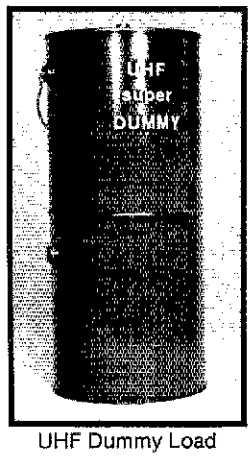
GaAsFET Preamplifier for 70 cm



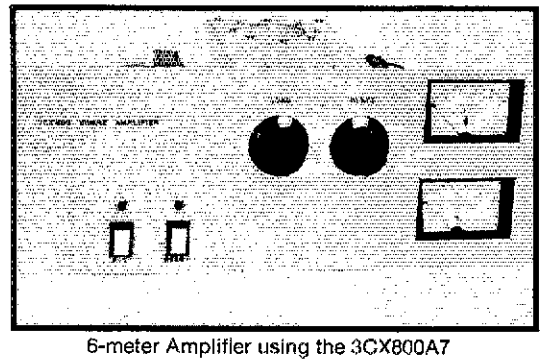
160-meter Amplifier using the 8877



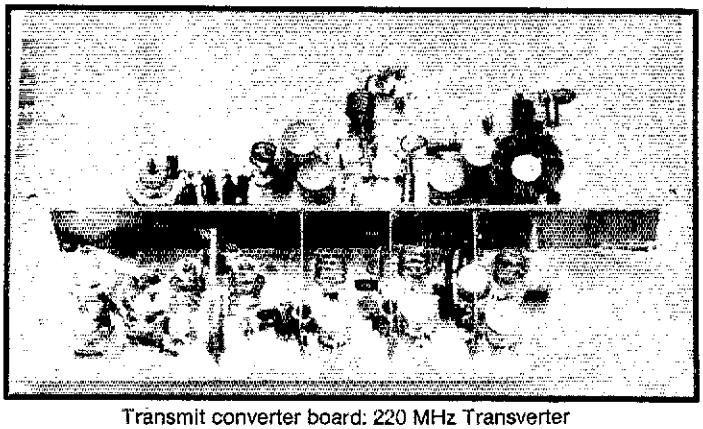
Legal-limit 2-meter Tetrode Amplifier



UHF Dummy Load

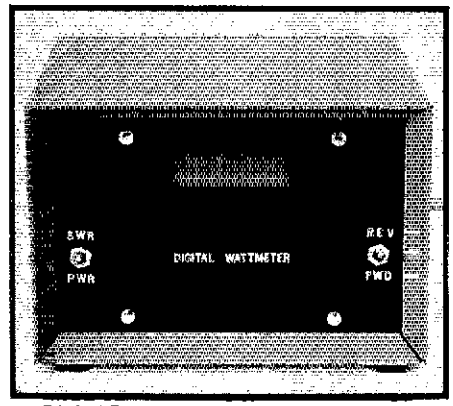


6-meter Amplifier using the 3CX800A7



Transmit converter board: 220 MHz Transverter

New for '86



Digital PEP Wattmeter-SWR Calculator

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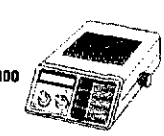

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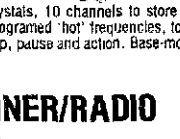

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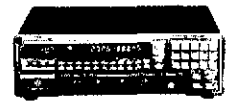

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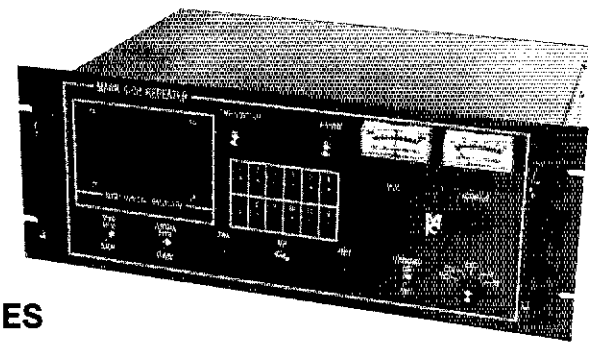

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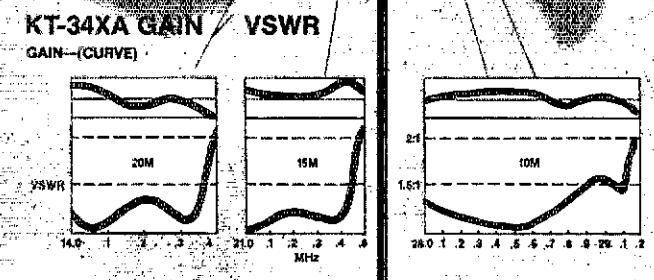

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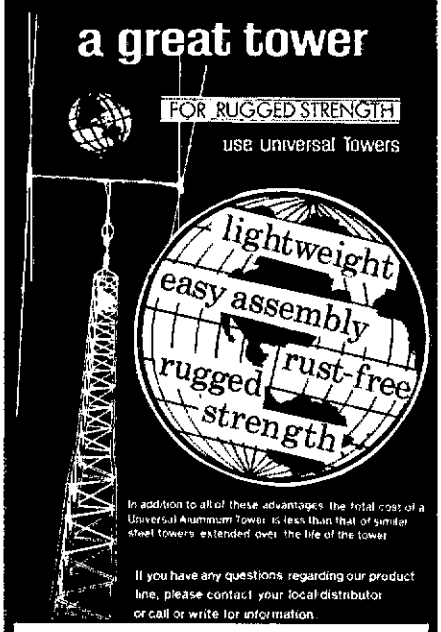

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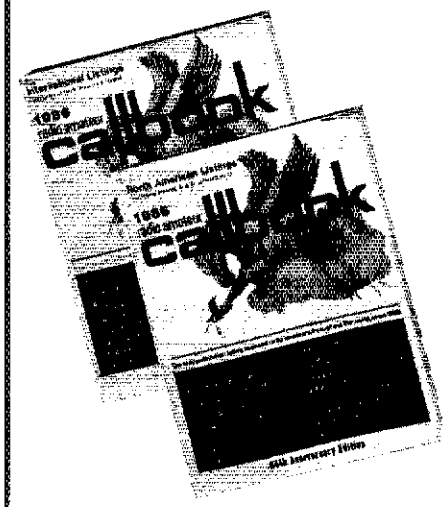

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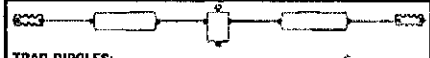

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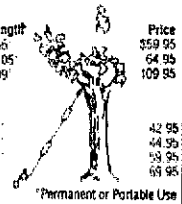

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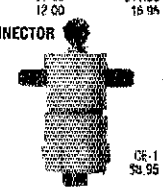

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KENWOOD WANTED: TS-430S transceiver. Contact: G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

COLLINS KWM-380 N.B., Key Pad, 1.7 kHz Filter, all mods, like new $2,750. Kenwood TS-520 $300. K4BOK, Dwight 205-979-6005.

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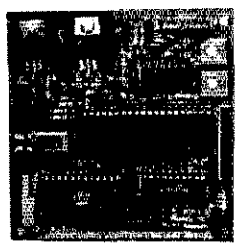

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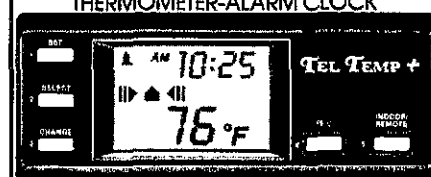

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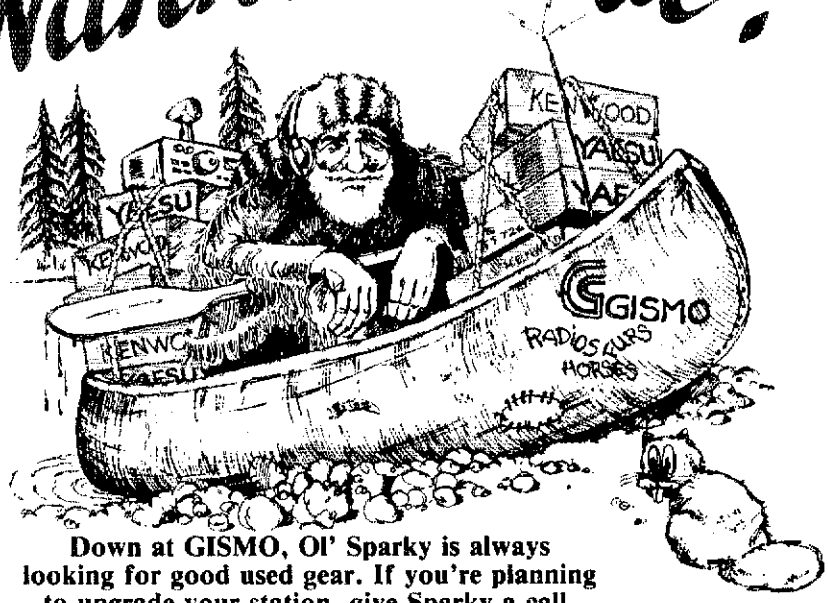

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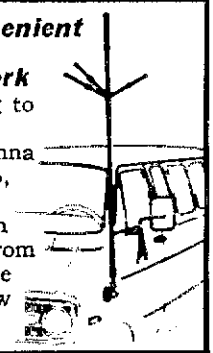

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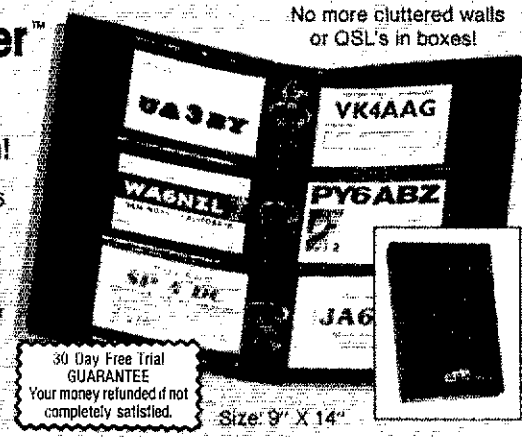

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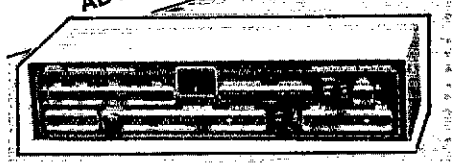

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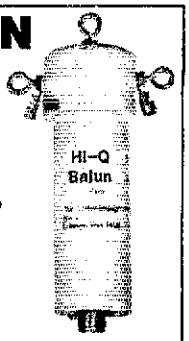

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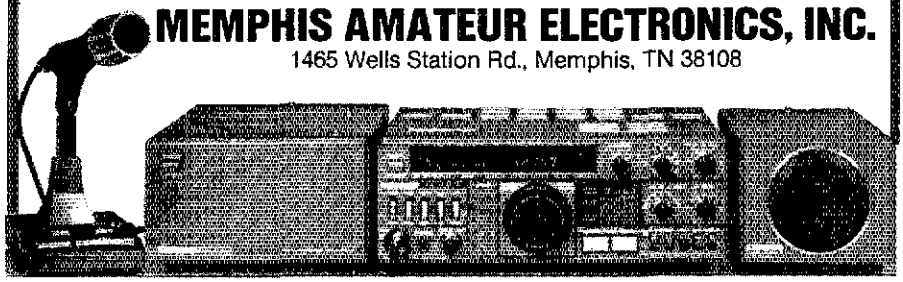

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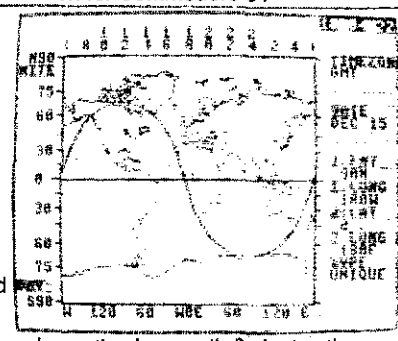

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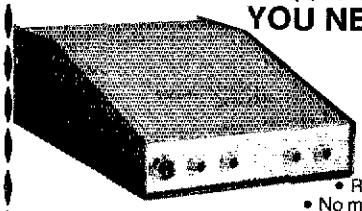

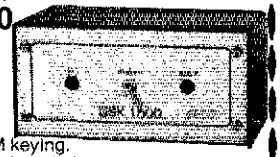

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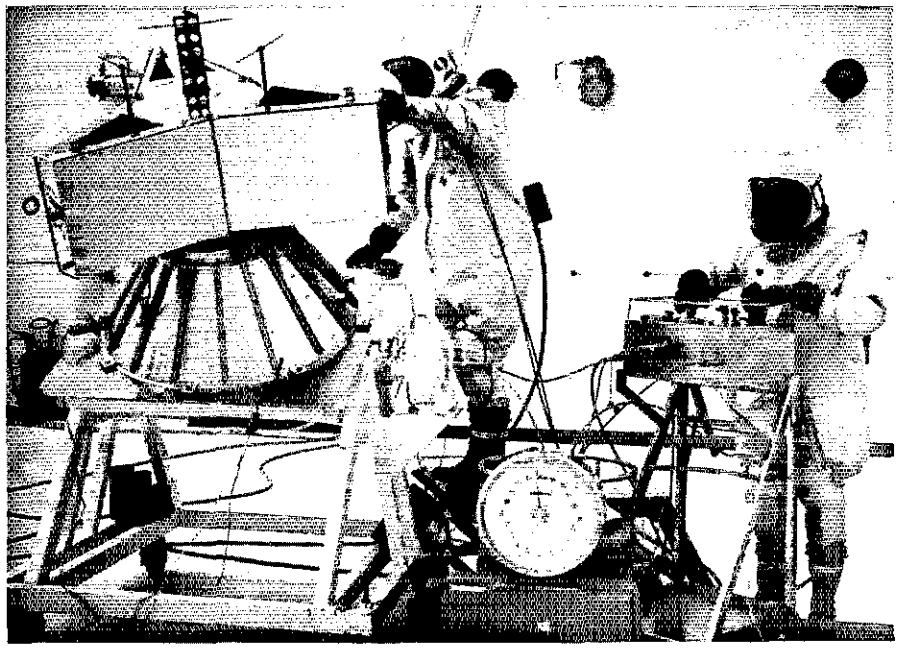

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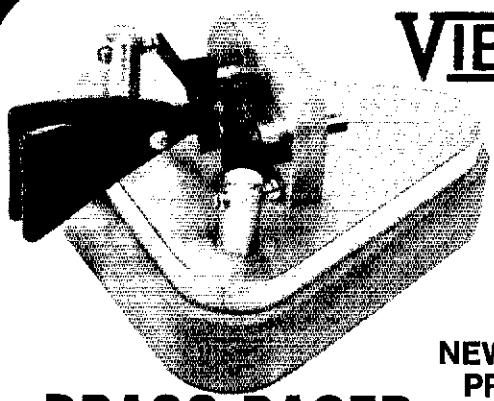

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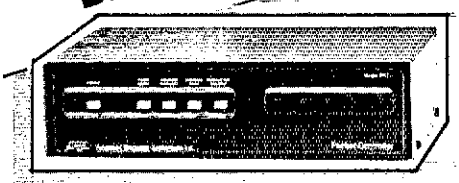

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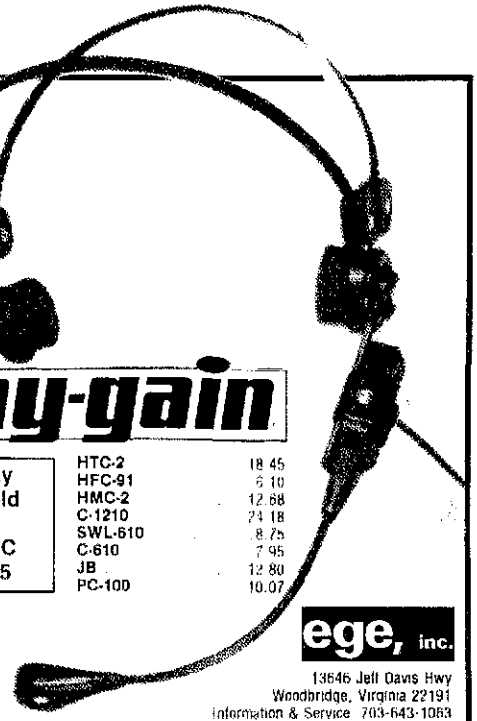

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TS-130S, SSB filter, Fan, Manual, rarely used, $450. VFO-120, $100. K7LJQ, 4220 Olympic Way, Salt Lake City, UT 84124. 801-278-8550.

ROSS $$$$ USED October Specials: (Over 200 used items in stock). Kenwood TS-130S $419, TS-830S $599.90, TS-180S $359 to $499.90, TR-9500 $439, TS-820S/DG1 $459.90, TS-820S $479.90. Yaesu FT-101E $429.90, FT-301D $369.90, FT-620B $279, ICOM IC-751 $999.90, IC-730 $469.90, IC-701 $389.90. If this month's special is not what you are looking for send SASE, Call Letters, name & phone # for used list. Also 7,500 NEW ham-related items in stock. Mention ad. Prices cash, FOB Preston. We close at 2:00 on Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

YAESU FC-757AT, remote antenna switch (unused), $230. Late HW-101, HP-23B, mike, $195. FOB K1LEC, 802-886-8121.

HEIGHTS ALUMINUM Free-Standing Towers Hinge-Bases 5 - 26 sq/ft Wind Load Capacity. Fold-Over-Kits. Completely new brochure! 205 Dewey Street, Royal Oak, MI 48057, 313-545-8299.

KENWOOD Antenna Tuner Model # AT230 $160. Mint condition. Will ship K2MYW, Dr. Mort Solomon #4 Atkinson Rd., Rockville Centre, NY 11570, 516-536-2104.

WANT A.C.-400 Pwr. Supply for Galaxy GT-550. Call collect. Art, WA4HXS, 615-753-5593.

DRAKE TR7/W.A.R.C., PS7, MS7, RV7, MN7. Drake Desk Mike. Package only. $800. Firm. WB3BDQ, 301-679-4125.

SWAN CYGNET, AC/DC, model 270, with VOX accessory, manual, cables, $215. K3LVO, 814-238-2326.

CRYSTALS - BUILD Something! QRP, quick and easy with inexpensive FT-243 crystals. All bands FT-243's 160M to 2M made to order. FT-243 General, Novice - 4001 to 8700 kilocycles, $2.50. minimum five $1.95. 30M fundamentals 10100 - 10150 .01% $2.95, five $2.70. 3500 - 4000 $2.95, five $2.50. 160M $3.95, five $2.95. Overtones 10000 - 25000, $3.95. Sockets 60¢. Postage-Airmail 30¢ per crystal. Crystals Since 1933. Stamp or long SASE for 1700 - 60000 kilocycles, listings-circuits. C-W Crystals, Marshfield, MO 65706.

KENWOOD TS930S/AT930. Guaranteed mint. Minimal use due medical condition. Factory boxed. Ship. $1,000. KD6LY, 818-887-6829.

ROSS $$$$ NEW Specials (October only): If you don't see what you want, send Call Letters, name & phone # for personal price quote. Over 6500 ham-related items in stock. Callbook US or Foreign $14. ICOM # IC-735 $729.90, IC-45A $287.90, IC-745 $768.90, IC-04AT $295.90, IC-701 $529.90, Kenwood # TS-940S/WAT $1699.90, TH-21AT $194.90, TR-7930 $303.90, TR-7950 $356.90, TS-430S $689.90, TM-211A $299.90, TR-8400 $349.90, TW-4000A $494.90, TS-660 $759.90, Yaesu # FC-102 $239.90, FT-757GX $698.50, FRG-7700 $369.90, FRG-8800 $589.90, FRG-9600 $486.90, FT-230RT $279.90. All major lines stocked, L.T.O. Mention ad. Prices cash, FOB Preston. We close at 2:00 on Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

AMATEUR RADIO EQUIPMENT. Selling off my three generations of Amateur Radio equipment due to a work relocation. All equipment is either brand new, like new, or restored to new or better. Yaesu FT980 Transceiver in sealed box $1000. FT902DM $625. Kenwood TS930S sealed carton $950. Brand new National HRO500, LF-10 Preselector brand new $1000. Dentron Clipperton QRO Linear new model 4X572B tubes $549. GLA1000C $338. MLT 2500 Roller Inductor Tuner $299. Collins KWM380 new $2000. Drake C-Line factory sealed cartons, complete, never used $900. Note: I have most of the matching accessories like Speakers, Microphones, etc., All have manuals. I will take offers. I will also answer all inquiries as well as export. Send for list. Mark Paulson, P.O. Box 0280, Baldwin, NY U.S.A. 11510.

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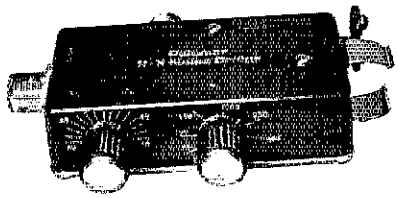

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- **Adjust it to your operating frequency quickly and easily.**

If there is one place in your station where you cannot risk uncertain results it is in your antenna.

The Palomar Engineers R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this in one measurement reading. And it works just as well with ham-band-only receivers as with general coverage equipment because it gives perfect null readings even when the antenna is not resonant. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals. No station is complete without this up-to-date instrument.

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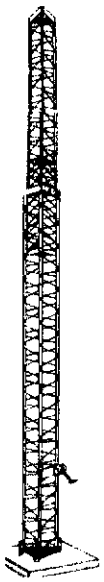
Index of Advertisers

ANTENNA/TOWER SALE!



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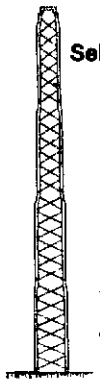
All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN
Self Supporting Towers On SALE!
FREIGHT PREPAID

- All Steel Construction—Rugged
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- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	$329
HBX48	48 ft	10 sq ft	303	$429
HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

Tri-Ex®

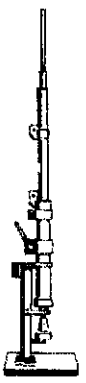
These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$899
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$3199
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

US TOWER
CORPORATION
Formerly Tristao Tower Co.



MA-40
40' tubular
Regular $745
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MA-550
55' tubular
Will handle 10 sq. ft. antennas at 50 MPH winds.
Regular $1245
SALE! $899

IN STOCK FOR IMMEDIATE DELIVERY
CALL FOR INFORMATION ON ALL OTHER MODELS

RG-213U
$ 29/ft $279/1000 ft
Up to 600 ft via UPS
- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials
- Guaranteed Highest Quality!

RG-8X
$.19/ft $179/1000 ft
- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™
Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket $.79/ft
½" LDF4-50A w Heliax ™ $1.69/ft
⅞" LDF5-50A w Heliax ™ $3.99/ft
select connectors below

HARDLINE & HELIAX ™ CONNECTORS

Cable Type	UHF	FML	UHF	MALE	N	FML	N	MALE
½" Alum	$19		$19		$19		$25	
½" Heliax ™	$22		$22		$22		$22	
⅞" Heliax ™	$49		$49		$49		$49	

AMPHENOL CONNECTORS
Silver PL259 $1.25
UG21B N Male $2.95 UG23D N Female $2.95

Antenna Wire & Accessories
Copperweld Antenna Wire (steel core, copper coated)
Solid 12 ga. $ 12/ft 14 ga. $ 10/ft
Stranded 14 ga $ 10/ft 16 ga $ 09/ft
¼ mile 18 ga copper-clad steel wire $30
6 inch heavy-duty end insulator $2.00/ea
Dog-bone insulator $ 79 Coax seal $2.50

Van Gorden
1:1 Balun $11 Center Insulator $6
Dipole Kits DB0 $31/DB40 $28
Short Dipole Kits SDB0 $35/SDB40 $33
All-band Dipole w/ ladder line $29
Eavesdropper SWL Antenna $64

ALPHA DELTA
DX-A 160-80-40 Sloper $49

CUSHCRAFT

A33 6-el Tribander Beam	$209
A743 30/40mtr Kit for the A3	$75
A4 4-el Tribander Beam	$269
A744 30/40mtr Kit for the A4	$75
R3 20, 15, 10mtr Vertical	$259
AV5 80-10mtr Vertical	$99
D40 40mtr Dipole	$149
40-2CD 2-el 40mtr Beam	$279
A50-5 5-el 6mtr Beam	$79
215 WB NEW 15-el 2mtr Beam	$75
3219 19-el 2mtr Beam	$89
220B 17-el 220MHz Beam	$89
424B 24-el 432MHz Beam	$75
ARX2B 2mtr Vertical	$39

hy-gain

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER SPECIAL	
QK710 30/40 mtr Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
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23BS 3-el 2mtr Beam	
25BS 5-el 2mtr Beam	
28BS 8-el 2mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

Limited Quantities purchased at old prices. Call for current prices.

HUSTLER

6BTV 80-10 mtr Vert	$129	5BTV 80-10 mtr Vert	$109
4BTV 40-10 mtr Vert	$89	G7-144 2-mtr Base	$119
G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
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Bumper Mounts - Springs - Folding Masts in Stock!

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HF6V $129 Delivered (Cont. USA)
- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
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Free Shipping On Butternut Accessories Also When Purchased With Antenna

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KT34XA 6-el Broad Band Triband Beam	$489
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m-22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna W/CS-2	$119
432-16LB 16-el 432 MHz Beam	$89
435-40CX 435 MHz Satellite Antenna w/CS-2	$159

MOSLEY

TA-33 3-el Tribander	$239
TA-33JR 3-el Tribander	$189
PRO 37 7-el Tribander Beam	$469
S-403 3-el 40-mtr Beam	$699

MINI-PRODUCTS HQ-1 $159

ROTORS

Alliance HD73 (10.7 sq ft rating)	$119
Alliance U110 (3 sq ft rating)	$49
Telex HAM 4 (15 sq ft rating)	$229
Telex Tailtwister (20 sq ft rating)	$279
Telex HDR300 Heavy Duty (25 sq ft rating)	$539
KLM EL-3000 Moon Tracker Elevation Rotator	$369
Kenpro KR400 Azimuth Rotator	$129
Kenpro KR500 Heavy Duty Elevator Rotator	$159
Kenpro KR600 Azimuth Rotator	$199
Kenpro KR2000 Heavy Duty Azimuth Rotator	$379
Kenpro KR5400 AZ/EL Rotor Package	$259
Kenpro KR5600 Heavy Duty AZ/EL Rotor Pkg	$329

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Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
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10 ft Stack Sections

20G $39.50	45G $112.50
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All 20G, 25G, 45G and 55G Accessories in Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	$899
	FK2558	58 ft	13.3 sq ft	$949
	FK2568	68 ft	11.7 sq ft	$999
	FK4544	44 ft	34.8 sq ft	$1199
	FK4554	54 ft	29.1 sq ft	$1299
	FK4564	64 ft	28.4 sq ft	$1399
	25G Foldover Double Guy Kit			$219
	45G Foldover Double Guy Kit			$249

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

TOWER/GUY HARDWARE

3/16 "EHS Guywire (3990 lb rating)	$.15/ft
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1/4 "CCM Cable Clamp (1/4 " Cable)	$.55
1/4 "TH Thimble (fits all sizes)	$.45
3/8EE (3/8 " Eye & Eye Turnbuckle)	$6.95
3/8 "EJ (3/8 " Eye & Jaw Turnbuckle)	$7.95
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1/2 "EJ (1/2 " Eye & Jaw Turnbuckle)	$10.95
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9902LB Cable End (for 6700 cable)	$8.95
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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$59	$79
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(Antenna/tower product prices do not include shipping unless noted otherwise)

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TS-930S Top of the Line HF Transceiver

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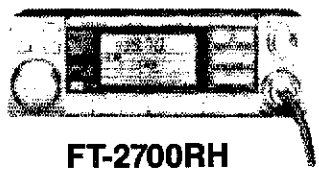
Compact General-Coverage Receiver

• General-Coverage Receiver • USB/LSB/CW/AM/FM • Dual VFOs • Memory/Band Scan • Speech Processor • CW Filter and CW Keyer included

YAESU



FT-2700RH

Dual Bander

• VHF FM • 144/430 MHZ • 25 WATTS

YAESU

FT-209RH

• 5 Watts • 10 Memories • LCD • Compact

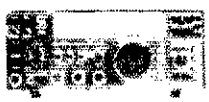
YAESU

FT980

CAT SYSTEM—ComputerAided Transceiver

• Wide Dynamic Range • General Coverage • Low Noise Front End • 10 Hz Digital Readout • All Mode Transceive—CW/SSB/AM/FM/FSK!

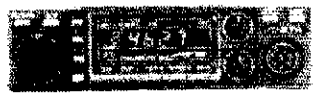
ICOM



IC-745 HF Base

All ham band HF transceiver. 16 memories. 100KHz to 30 MHz general coverage receiver and adjustable noise blanker and AGC

ICOM



IC-27A Compact Mobile

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ICOM

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ICOM

IC-R71A General Coverage Receiver

The IC-R71A 100KHz - 30 MHz superior-grade general coverage receiver features keyboard frequency entry, 32 memories, SSB/AM/RTTY/CW, selectable AGC and noise blanker, and wireless remote controller (optional)

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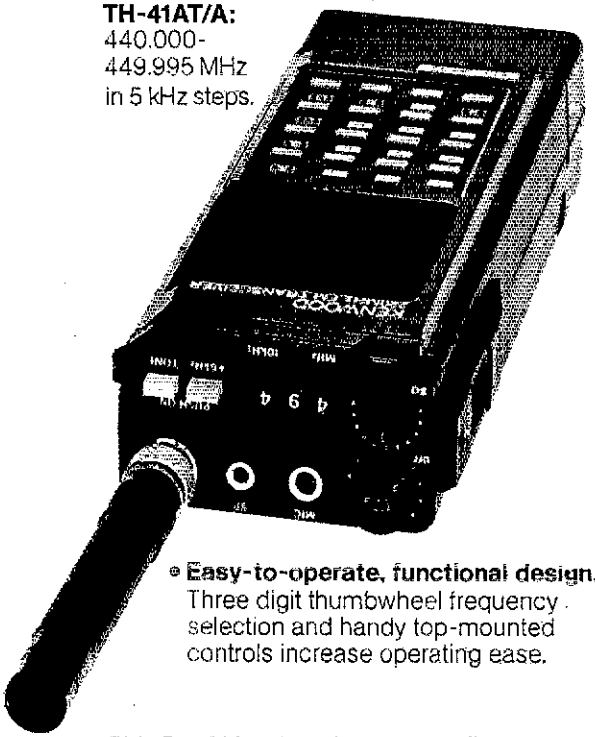

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