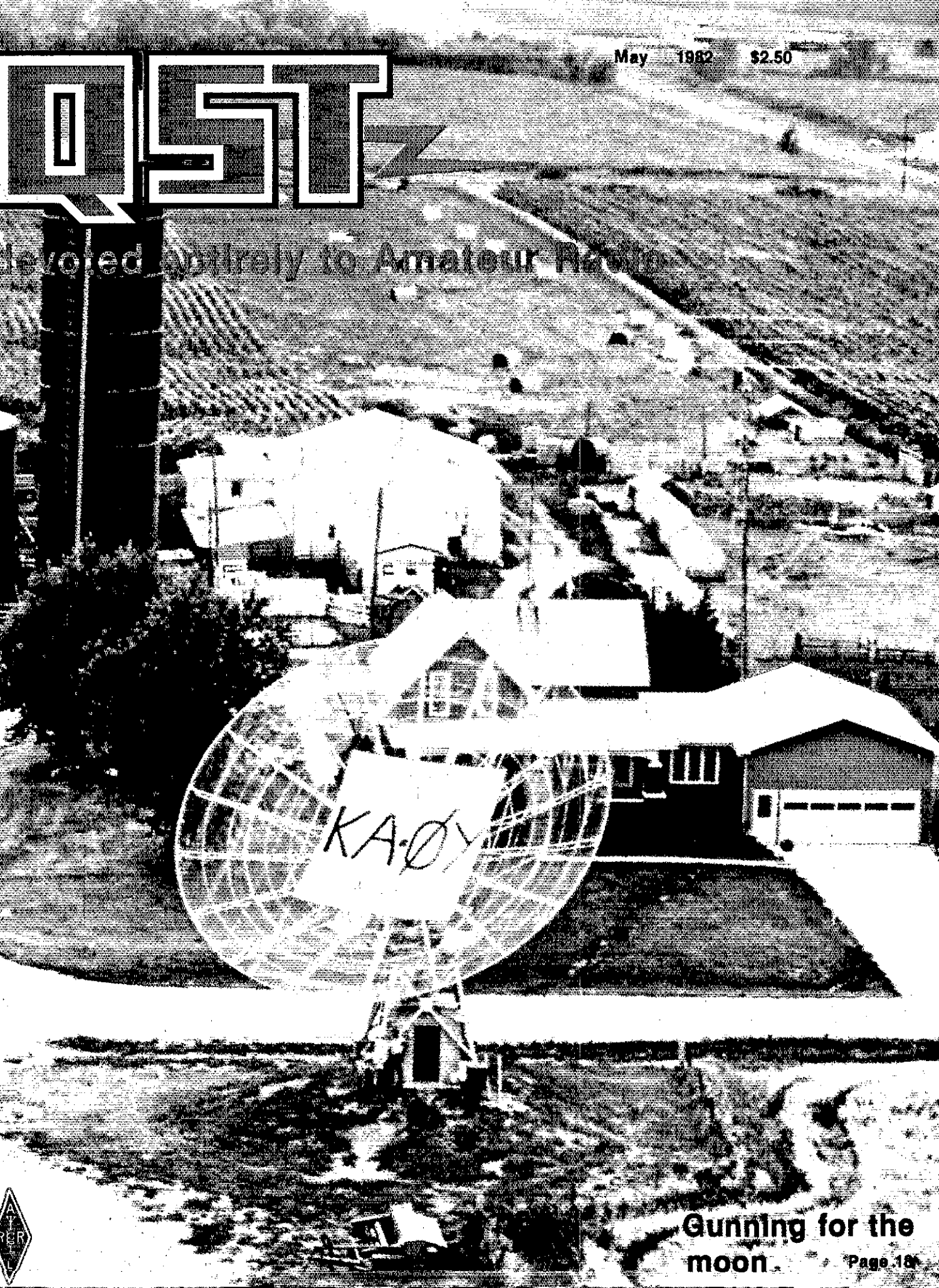


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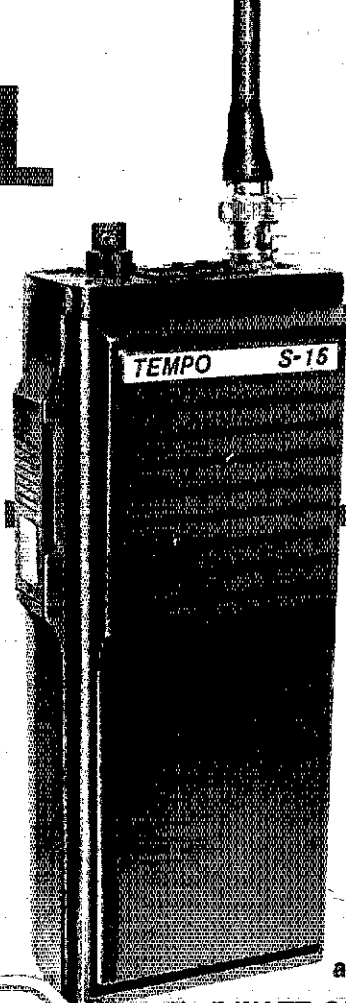
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Gunning for the moon Page 18

the ALL NEW tempo S-15



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**TEMPO'S ALL NEW S-15 SYNTHESIZED
HAND HELD OFFERS IMPORTANT
FEATURES AT A PRICE THAT DEFIES
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Enables you to use 220 MHz repeaters throughout the U.S.. The S-2 is thoroughly field tested and offers a long life of dependable service. A good way to get into 220 MHz operation if you're not on yet and with the addition of a Tempo power amplifier you can build a small base station or a powerful mobile rig. \$289 S-2T...\$319

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- * SPEAKER/MICROPHONE CONNECTOR
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- * LOW PRICE...\$289

S-15 with touch tone pad...\$319

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Rubber antenna • Standard charger • Ear phone • Instruction manual • 450 ma/HR battery (quick charge type)

OPTIONAL ACCESSORIES:

1 hour quick charger (ACH 15) • 16 button touch tone pad (S15T) • DC cord • Solid state power amplifiers (S-30 & S-80) • Holster (CC15) • Speaker/mike (HM 15)

Available from Tempo dealers and

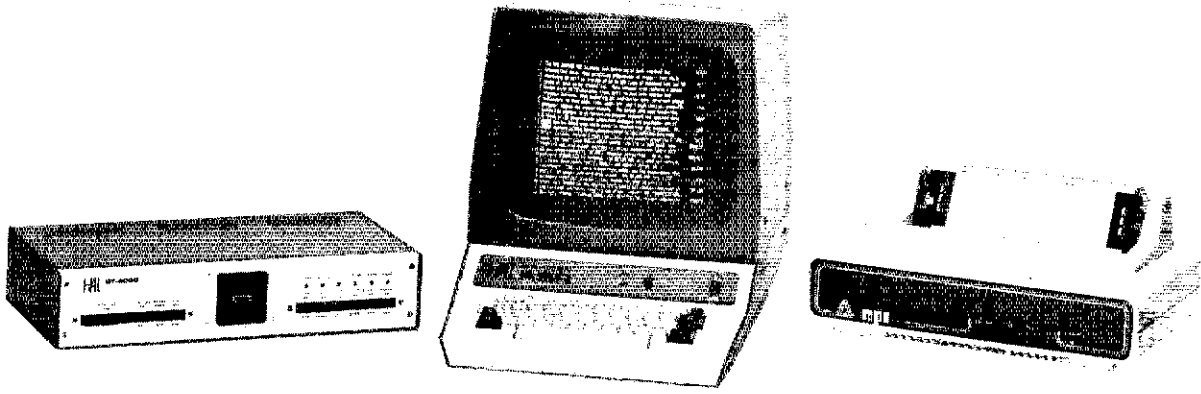


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- Crystal controlled RTTY transmit tones
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IC-720A. ICOM's Top of the Line HF System.

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ICOM Phone Patch. Works directly with IC-701, IC-720A or IC-730...FCC certified.

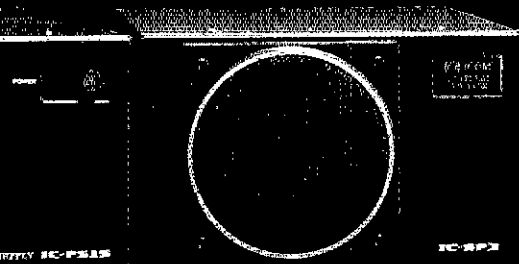
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IC-730. ICOM's Affordable Portable HF Xcvr. Ideal for mobile/portable use with features found in no other unit in such a compact size:

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- 2 VFO's built-in standard.

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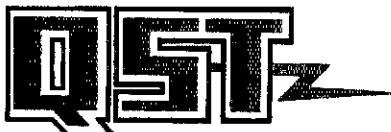


IC-730 - 8 Band Mobile/Base Xcvr



IC-AH1 - Automatic Bandswitching HF Mobile Antenna





May 1982 Volume LXVI Number 5

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THE COVER

Take 1300 sq. ft of 1-in. aluminum. Add 14,000 POP rivets. Plant a 10-ton gun mount. Hire a crane. The result: instant EME antenna! (photo courtesy KA9Y)



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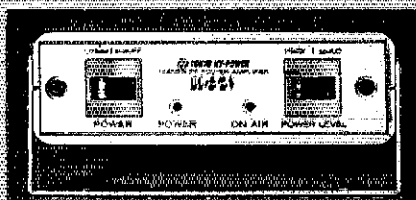
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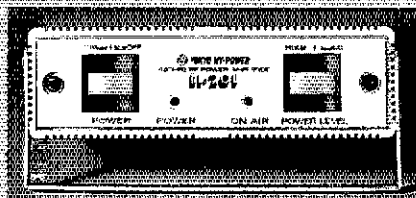
HL-32W—This Little Beauty is the first of our compact, low profile amplifiers for use with handheld radios. For VHF operations, this unit produces 10W to 25W output with drive from your 0.5W to 3W handheld. Excellent for mobile use in your car.

Turn it on with the convenient front panel controls, including Power LED and Transmit LED, or slip the package under the seat out of sight and out of mind.

Low insertion loss on receive and selectable power level design provides low VSWR to the transceiver.

Use with any talkie from 0.5W to 3W for 10W to 25W output.

The HL-32W operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only \$89.95 suggested retail. At your favorite dealer now!



HL-20U New Product Preview—Another super compact from Tokyo Hy-Power Labs . . . This one is for UHF and it's beautiful, with the controls on the brushed metal face panel to make operation as easy as touch-and-go.

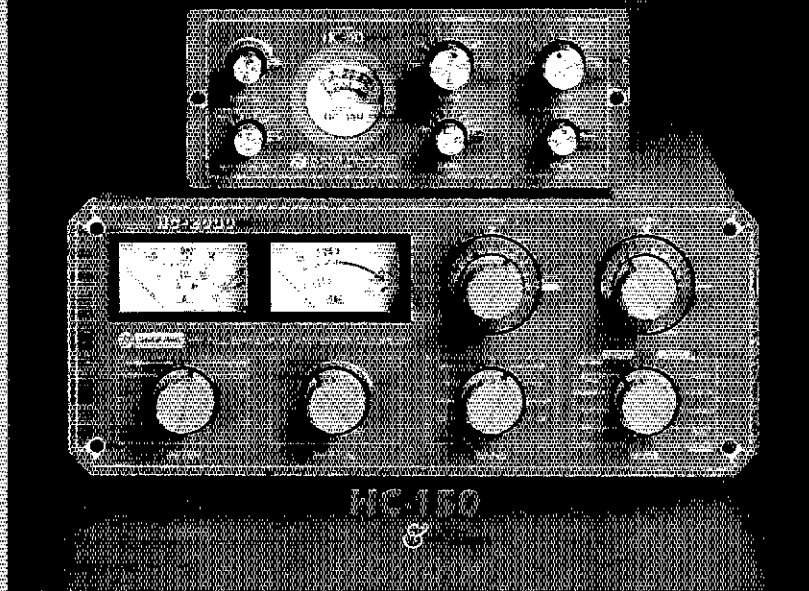
The ultra compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to produce a big 20W output signal.

Your UHF handheld operations have never experienced anything like this surprising little amplifier from Tokyo Hy-Power Labs. Price and availability of the HL-20U will be announced soon.

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The next time you want to make a lumpy line flat or to make a long line perform as it should, use a quality built, quality performing Tokyo Hy-Power Labs antenna coupler.

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CONTEST WINNING ANTENNAS

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3 BAND VERTICAL
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Only 14 ft., 4.26 m. height
Low priced
Easy to use

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5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
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Capacitive X-hat



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4 BAND YAGI
10-15-20-30 / 40 METERS

NEW 30 METER
WARC BAND WITH
A3 OR A4

A3

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R3

3 BAND VERTICAL
10-15-20 METERS
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The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.

For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3
Broadband, excellent gain and f/b ratio. 2 kw power rating direct 50 Ω feed. Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m., weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1 1/4 in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

A4
Broadband, excellent gain and f/b ratio. 2 kw power rating, direct 50 Ω feed, boom 18 ft., 5.48 m., longest element 32 ft., 9.7 m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1 1/4" to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.



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CORPORATION

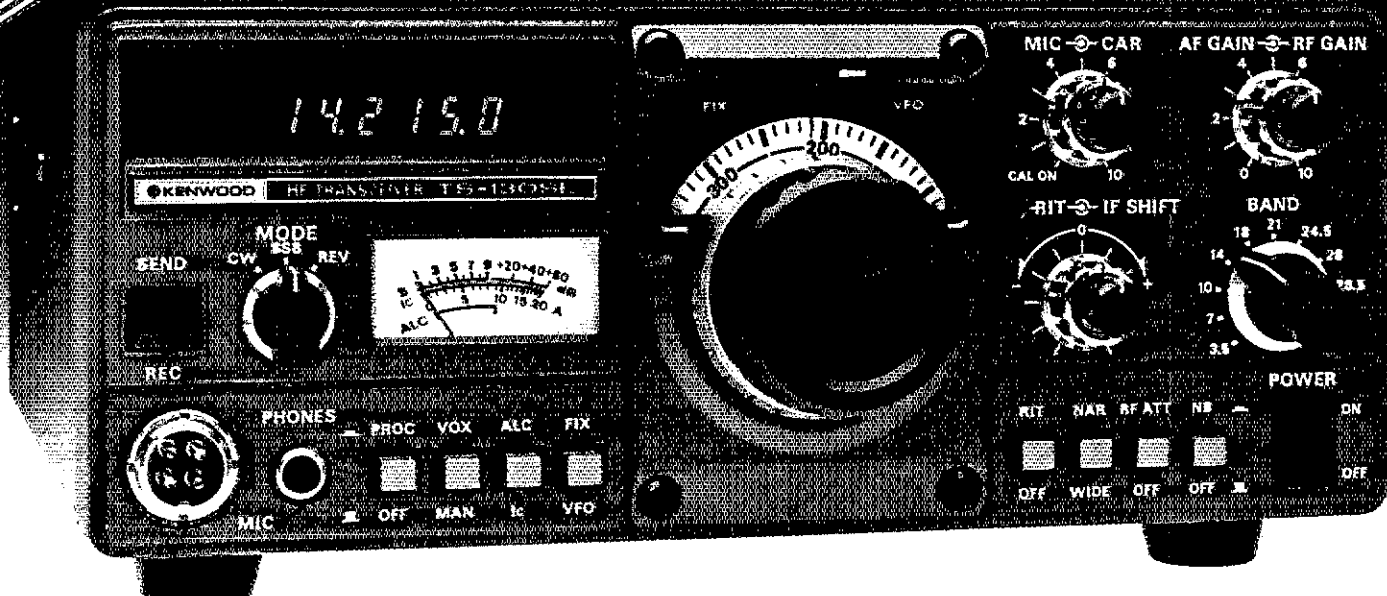
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THE CHOICE,
A FAVORITE
FOR DX-PEDITIONS



NEW

Small talk.



Processor, IF shift, N/W switch, affordable

TS-130SE

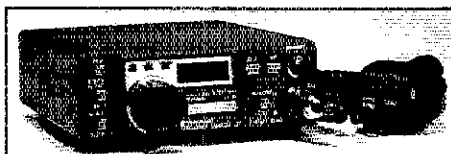
An incredibly compact, full-featured, reasonably priced, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands) and features digital display, IF shift, speech processor, and narrow/wide filter selection on both SSB and CW.

TS-130SE FEATURES:

- **80-10 meters, including three new bands**
Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.
- **Two power versions...easy operation**
TS-130SE runs 200 W PEP/160 W DC on 80-15 meters, and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning; receiver wideband RF amplifiers eliminate preselector peaking.
- **Digital display built-in**
Six-digit green fluorescent tube display indicates operating frequency to 100 Hz, external VFO or fixed-channel frequency, RIT shift, and CW transmit-receive shifts. Analog subdial back-up.
- **Built-in Speech Processor**
Increases audio punch and average SSB output power.

- **IF shift circuit**
Very effective in eliminating interfering signals, by placing them outside the IF passband.
- **CW narrow/wide selection**
"N-W" switch allows selection of wide or narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
"N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
LSB on 40 meters and below; USB on 30 meters and above. SSB REVERSE position on MODE switch.
- **RF Attenuator, built-in**
Allows optimum rejection of IM distortion.
- **Single conversion PLL system**
Provides improved stability and spurious characteristics.
- **Protection circuit for final amplifier.**
For maximum reliability, the final amplifier is protected by circuitry that monitors VSWR and temperature. (TS-130V, VSWR only.) Output power is reduced when abnormal operating conditions occur. If especially severe operation is anticipated, optional cooling fan, model FA-4, may be added. Model TS-130S, with FA-4 installed, is also available.

- **Effective noise blanker**
Eliminates pulse-type noise.
- **Compact and lightweight**
Only 3-3/4 H x 9-1/2 W x 11-9/16 D (inches) weight 12.3 lbs.
- **Other important features include:**
VOX for SSB, CW semi break-in with sidetone, one fixed channel, and 25 kHz marker.



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

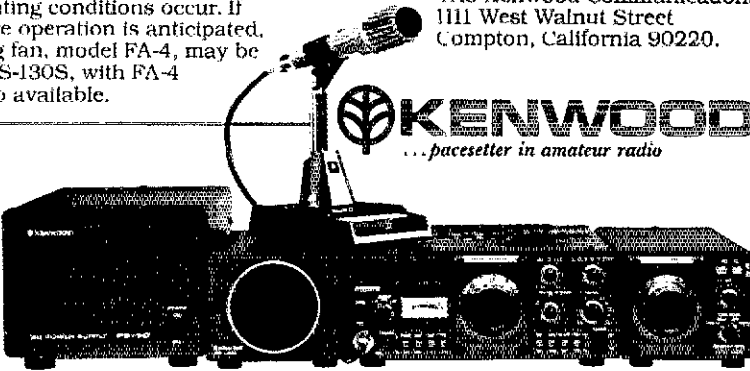
More information on the TS-130 Series is available from all authorized dealers of Trio-Kenwood Communications
1111 West Walnut Street
Compton, California 90220.

Matching accessories for fixed station operation:

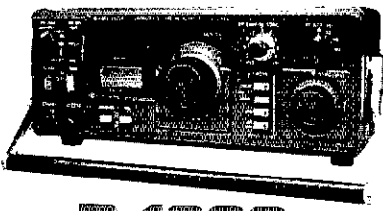
- PS 30 base station power supply (remotely switchable ON or OFF with TS-130SE power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

- FA-4 fan unit for TS-130SE
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AF-130 compact antenna tuner (80-10 meters, including 3 new bands)
- MB-100 mobile mounting brackets
- KPS-21 base station power supply (also for TS-130SE)
- TL-922A linear amplifier
- PS-20 base-station power supply for TS-130V
- PC-1 phone patch
- HC-10 world digital clock
- MC-30S and MC-35S noise cancelling hand microphones
- MC-60 deluxe desk microphone
- SP-40 compact mobile speaker
- HS-4, HS-5, and HS-6 headphones



Specifications and prices are subject to change without notice or obligation.

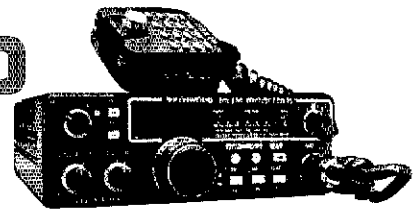


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\$30.00 OFF

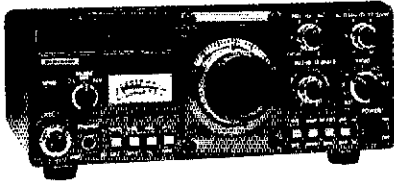
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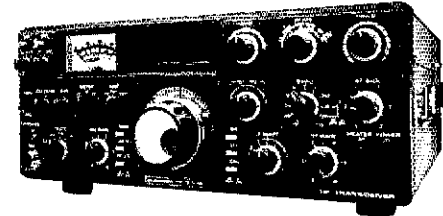


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Conley Radio Supply
Billings, MT 59101
(406) 259-9554
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Lincoln, NE 68508
(402) 476-7331

NEVADA
Amateur Electronic
Supply*
Las Vegas, NV 89106
(702) 647-3114
NEW HAMPSHIRE
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Elect. Supply
Hudson, NH 03051
(603) 883-5005
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Harrison Radio Corp.
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Reynoldsburg, OH 43086
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The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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

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Phone Expansion

Few issues stir the passions of radio amateurs as much as the question of how the high-frequency bands should be subdivided by mode. This is especially true of the subbands available for U.S. phone operation. The Federal Communications Commission is now addressing this issue in Docket 82-83; because of the widespread interest in the subject, this month we are carrying the complete text of the Commission's Notice beginning on page 51.

The Commission's Notice is divided into two parts. In the first, a specific change in the 20-meter phone subband is proposed. Although the amount of expansion is the same in each case, 50 kHz, the FCC proposal differs in detail from the ARRL position that was adopted at the July 1980 meeting of the Board and reaffirmed at the meeting just concluded in March. The most significant difference is that in the League's proposal, 25 of the 50 kHz would be used to establish an Extra Class phone subband on 20 meters for the first time. Comments on this issue should be filed with FCC by the deadline of July 1.

In the second part of its Notice, the Inquiry portion, the Commission asks several questions pertaining to phone subbands which have much broader implications. Because these questions deserve careful study by the amateur community, the League is requesting a 45-day extension of time for the filing of comments on the Inquiry portion of the Notice. We believe this request will be granted. At the present time there is no "League position" on the inquiry, because members have not yet had the opportunity to study the questions and provide guidance to their elected representatives. The timetable for developing the League position is as follows:

May and early June: Members communicate their opinions by writing to the ARRL Plans and Programs Committee, 225 Main St., Newington, CT 06111, with a copy to their own Director if they wish.

Mid-June: The Plans and Programs Committee, with the assistance of Counsel and the staff, develops recommendations consistent with the members' desires and prepares a report for the July meeting of the Board.

July 21-22: The Board either adopts or modifies the committee's recommendations.

Early August: Counsel files the League's comments with FCC.

From this, it should be clear that you have an opportunity to influence the position your League takes on phone expansion. Let's hear from you now!

Unless you've been licensed for a long time, the rationale for the U.S. phone subbands being as limited as they are may be a bit of a mystery. A quick review of history may be helpful. Early amateur operation was almost entirely by Morse code. When phone first began to be popular, it was useful only for

local communication; there was a feeling that "serious" amateur work should be protected from interference caused by crosstown chats, so limited subbands were designated as being available for phone operation by U.S. amateurs. As techniques improved, in the 1930s it became possible to work DX on phone; but by this time, the narrow segments designated for phone operation in the U.S. were crowded with a-m signals and it was difficult to hear the weak DX signals amid the heterodynes. The solution was for the DX phone stations to transmit *outside* the U.S. phone bands, and to listen for calls from U.S. stations *inside* the U.S. bands. Thus, U.S. operators, who then greatly outnumbered their overseas counterparts, actually *benefited* from the so-called "foreign phone bands," because they provided a place to listen for DX signals relatively free of local interference.

This situation continued until the 1960s, when the popularity of the single-sideband transceiver (with what the FCC calls "a common transmit and receive tuner") made split-frequency operation the exception rather than the rule. Today we find that U.S. amateurs derive very little benefit from the "foreign phone bands"; instead, overseas operators use them as a private preserve where they can operate free of interference from U.S. stations. Our friends overseas are understandably reluctant to surrender this private preserve, although one must bear in mind that things are much different today than they were 20 or more years ago: U.S. hams now make up only one-third of the worldwide total, and stations with big antennas and amplifiers are common in many countries other than the U.S.

A factor which must not be overlooked is that phone subbands in most countries are established by the voluntary agreement of the amateurs themselves, and are not enforced by the licensing administration. Would expansion of the U.S. phone subbands trigger widespread abuse of the voluntary band plans which are now observed in other countries? One certainly would hope not, because cw activity continues at a high level throughout the world and interest in RTTY is increasing steadily; it would be the height of irresponsibility for foreign phone stations to try and justify violations of longstanding agreements by pointing to changes in FCC rules, as long as those rule changes are consistent with the agreed band plans. Still, the possibility of phone-vs.-cw/RTTY confrontations should not be ignored.

Where the League goes from here depends on *you*. Think about the questions posed by the FCC; share your thoughts with the League's Plans and Programs Committee; talk it up at club meetings or among your friends. Finally, if you *don't* take the time to tell us what you think, don't say you weren't asked! — *David Sumner, K1ZZ*

League Lines...

The FCC has dismissed ARRL's petition, RM-3855, which sought to establish operating privileges for amateurs in the new 10-MHz band. (See April 1981 QST, page 67, for details on the League's proposal.) According to the chief of the FCC Private Radio Bureau, who dismissed the petition under delegated authority, the Commission will not consider various plans for operating privileges on the WARC bands until the United States Senate ratifies the WARC Treaty. The bureau chief also dismissed three other petitions filed by two individuals and one Amateur Radio club who sought early FCC action on the WARC bands. The ARRL Board of Directors directed the League's staff to file a petition immediately for reconsideration or review of this action by the full Commission.

FCC is in the process of revising the Phase Three call sign rules so that the one-year grace period will apply to transferring call signs from secondary to primary station licenses. Details were not available at press time; however, we hope the ARRL Membership Services Department will have full information by the time you read this. If you think this may apply to you, send a stamped, self-addressed envelope to ARRL-MSD, Newington, CT 06111 marked "Secondary" in the upper-left-hand corner.

The Massachusetts Department of Public Health has postponed a public hearing on its proposed regulations governing radiofrequency emitters until sometime this fall. Details about the proposed regulations can be found in this month's "Happenings."

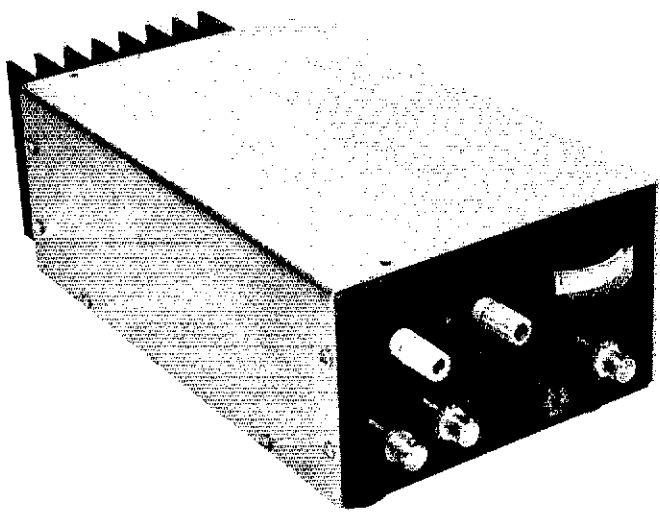
A bill has been introduced into the Pennsylvania legislature that seeks to exempt Amateur Radio antennas from municipal regulations except for reasons of safety. Pennsylvanians, especially, should see the item in "Happenings" that discusses H.B. 1779.

ARRL has filed an amicus curiae (friend of the court) brief in the United States District Court for the Western District of Oklahoma in support of Charles M. Guschke, N5SW. Guschke has sued the City of Oklahoma City because it has denied him permission to maintain a 78-foot high antenna. Guschke needs to exceed the city's 50-foot height limit because nearby topographical obstacles would impair effective communications from a lower antenna. The League filed its brief because of the potential for precedent being established in a federal court which could be valuable to Amateur Radio in general.

The 1982-83 edition of the Net Directory has a registration deadline of June 1. Form CD-85 is available from Headquarters for an s.a.s.e., but anything can be used to register the nets as long as the net name, frequency (input and output if a repeater is used), meeting days and times, and the manager's call are included.

Recent publicity about the U.S. Over-the-Horizon Radar, which some press reports are calling "The American Woodpecker," has alarmed some amateurs who visualize another massive QRM generator similar to the "Russian Woodpecker." It shouldn't be that way at all -- dig out your April 1980 QST and reread "Over-the-Horizon or Ionospheric Radar," by Oswald G. Villard, Jr., W6QYT.

Help spread the word about ham radio! Call 203-666-1545, day or night, and give us the details of your good deeds. If your story merits it, we'll contact the wire services and national media. Or we may feature you in an issue of Amateuradio, our newsletter sent to government officials. Call 203-666-1545 anytime -- an answering machine takes calls if we are out.



A Solid-State 6-Meter Linear Amplifier You Can Build

Does your 6-meter signal need a little more punch? This amplifier will solve your problem — without breaking the bank!

By T. Tammaru,* WB2TMD

The new breed of 8- to 10-W, solid-state vhf transceivers offer compactness and relative freedom from TVI. However, there are times when 10 W will not do the job. This amplifier can correct that situation. I used it during the September vhf QSO party and was able to work every station I heard, except one.

The transistor used in the amplifier is a Motorola MRF-492, which is designed for use as an fm amplifier in the "vhf low" public-service band. In this service, the nominal output is rated at 75 W with a 12.5-V collector supply. The manufacturer's data sheet shows a maximum output of 120 W at 16 V. Hence, in ssb service, I felt it would be safe to operate at the 100-W PEP level from a 13.5-V supply. Although no numbers are given, the MRF492 is claimed to have "load mismatch capability at high line and rf overdrive."

Circuit Description

The amplifier schematic diagram is shown in Fig. 1. Since I do not believe in "reinventing the wheel," the output matching network was taken directly from the Motorola data sheet. This network, incorporating L2 and L3 in the signal path, should provide excellent harmonic rejection. The network transforms the 50-Ω load impedance to the optimum tran-

sistor load of $0.6 + j1.0 \Omega$. Note that this unit, like most rf amplifiers, does not have a 50-Ω output impedance. We simply adjust the output network to obtain the rated power into a 50-Ω load. Fig. 2A is an amplifier output spectral display. While the harmonic suppression is good, additional filtering is required before using the unit on the air. A simple, 5-pole, low-pass filter was placed at the amplifier output, and the resulting spectrum is shown in Fig. 2B. The low-pass filter circuit is given in Fig. 3.

Because the data sheet does not give values for input impedance in Class B service, the input circuit was derived basically by trial and error (the second version worked). The T matching network transforms the highly capacitive input impedance of approximately 1Ω to a 50-Ω nonreactive load for the exciter.

In a Class B amplifier it is necessary to forward bias the base-emitter junction. There are basically two ways of doing this: the shunt diode method, and the emitter-follower method. The latter method undoubtedly results in lower intermodulation products, but I have destroyed too many transistors using that method to try it with a \$20 device. Forward bias is achieved by using the shunt regulator diode D1. This diode must be connected to the same heat sink as the MRF492, Q1. The voltage across D1 is adjusted to give a Q1 collector current of 100 mA with no drive applied. Do not attempt to set the bias point by measuring the base voltage

of Q1 — use a milliammeter in the collector supply lead. I used an unmarked, surplus, 15-A rectifier diode for D1. Almost any diode will work, including power Zeners. I prefer a stud-mounted diode because it is easy to place in contact with the heat sink. Just be sure the polarity is such that the cathode is connected to the case. Several Motorola application notes specify a 1N4997 for this application. Unfortunately, this is a press-fit device. In any case, the heat sink must be grounded.

Parts Procurement

All parts, with the possible exception of an adequate heat sink, are readily available. The MRF492 has recently been advertised by Westcom² and Semiconductor Surplus.³ RFC1 is a Nytronics shielded ferrite choke, designed to reduce coupling between the base and collector circuit. The J. W. Miller 9250-682 should be as good. A toroidal inductor of 1 to 10 μH would also be suitable, since it is across an impedance of 1Ω . Arco trimmers should be available from your local jobber. I used a surplus heat sink, measuring $3\text{-}1/2 \times 4\text{-}1/2 \times 1\text{-}3/4$ inches, which is quite adequate for ssb.⁴ Anything much smaller will require a fan. Remember, it must be flat on one side. A replacement heat sink for any of the 80- to 100-W 2-meter amplifiers would be ideal.

The Circuit Board

All the components shown in Fig. 1

*Notes appear on page 14.

*58 Fish Hawk Dr., Middletown, NJ 07748

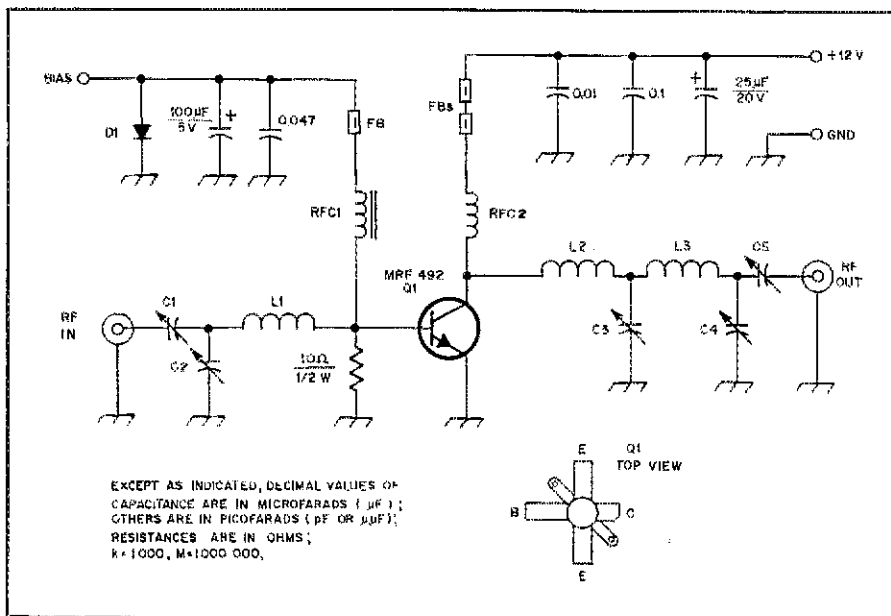
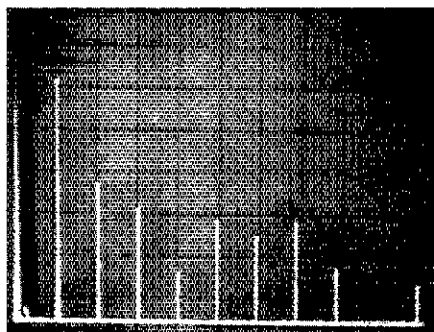


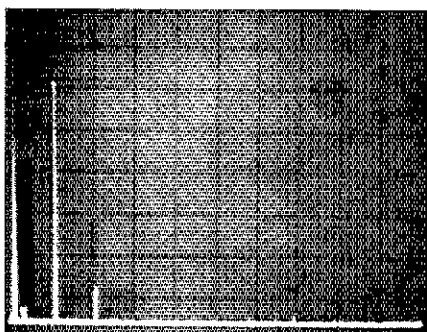
Fig. 1 — The schematic diagram of the amplifier circuit board. Decimal value capacitors are disc ceramic and polarized capacitors are electrolytic. Resistors are 10% carbon type.

- C1 — 9- to 180-pF mica compression trimmer, Arco 463 or equiv.
- C2, C4, C5 — 50- to 380-pF mica compression trimmer, Arco 465 or equiv.
- C3 — 80- to 480-pF mica compression trimmer, Arco 466 or equiv.
- D1 — 15-A, 50-V rectifier diode (see text).
- Fb — Ferrite bead, Radio Shack 273-1571 assortment or equiv.
- L1 — 2 t. of no. 14 bare copper wire, 13/32-inch ID, 3/16-inch long.

- L2 — Half loop of no. 14 bare copper wire, 19/32 inch high, 13/32 inch long (see photograph).
- L3 — 2 t. of no. 14 bare copper wire, 13/32-inch ID, 1/4-inch long.
- Q1 — Motorola rf power transistor, MRF492.
- RFC1 — 6.8 μH , Nytronics SWD 6.8 or equiv. (see text).
- RFC2 — No. 16 enameled wire, close wound over full length of a 330- Ω , 2-W carbon resistor.



(A)



(B)

Fig. 2 — The amplifier output matching network provides some harmonic suppression (A). To further reduce harmonics, a simple low-pass filter should be used (B). With the filter, all harmonics and spurious signals are more than 60 dB below the carrier, thus meeting current FCC spurious emission requirements for commercial equipment. In these displays, the carrier level has been reduced by means of a notch filter to avoid analyzer overload. Vertical divisions are each 10 dB and the horizontal divisions are each 50 MHz. These measurements were made in the ARRL lab.

mount on, or through, the circuit board (Fig. 4). Use double-sided glass epoxy board and cut away narrow channels to separate the various land (foil) areas. To form the channels, use a steel ruler and a sharp utility knife to cut through the foil. Next, pull a hot soldering iron along the strip of foil to be removed. You should see it curl up and away from the board. Start at one end, and pry up with the knife if it gets stuck. You will have to drill two holes, slightly more than 1/2 inch in

diameter, through the board to provide clearance for Q1 and D1. Use a small round file to make the two clearance areas for the flanges of Q1. Connect the ground foils on the top and bottom of the board together by placing short lengths of wire through holes drilled in the board. Place the wires close to the transistor emitter tabs and near each corner of the board. Use pieces of the same type of wire you used to make the inductors, and drill the holes just large enough to pass the wire.

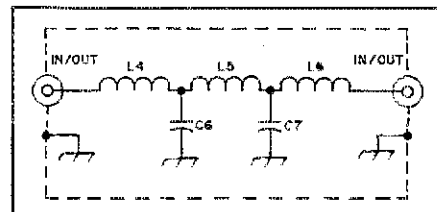


Fig. 3 — A simple low-pass filter for use with the 8-meter amplifier. The design information for this filter was taken from the 1982 ARRL *Radio Amateur's Handbook*. If the filter is mounted outside the amplifier cabinet, it should be enclosed in a metal box for shielding.

- C6, C7 — 82-pF, 1000-V silver-mica capacitor.
- L4, L6 — 4 t. of no. 14 enameled wire, 3/8-inch ID, 3/4-inch long with 1/8-inch leads (approximately 0.1 μH).
- L5 — 6 t. of no. 14 enameled wire, 3/8-inch ID, 1/2-inch long with 1/8-inch leads (approximately 0.2 μH).

Solder the wire on both sides.

Assembly

Make sure you have all the parts on hand before you solder anything to the board. This will ensure that everything fits properly. To keep the inductors in place, I drilled holes through the board and stuck the ends of the wire into the holes. You will have to remove the foil from around these holes on the bottom of the board to keep from shorting the inductors to ground. A large drill bit works fine for this. Center the board on the heat sink, and drill the mounting holes for Q1 and D1. Although you may be able to use screws and nuts to attach Q1 and D1 (depending on the heat sink design), a better method is to tap the holes for the desired screw thread. Mount the board to the heat sink near the corners, shimming it with washers to the same depth as the Q1 mounting flange. Drop Q1 in from the top of the board. The tabs of Q1 should rest just above the top of the board when the flange is in contact with the heat sink. Do not put any upward pressure on the transistor tabs. Never cut or file an rf power transistor body — they contain berillium oxide. It is highly toxic in powdered form and could be inhaled or absorbed through the skin.

Fasten Q1 to the heat sink before soldering it in place. Use thermal grease when mounting Q1 and D1. Be sure to solder the full length of the tabs to the board, right up to the body of the transistor. This is especially important for the emitter tabs, because nanohenrys of inductance here translate to decibels of gain loss.

Break off the little tabs on the sides of the mica compression trimmers. Bend the ends of the mounting terminals with pliers to aid in soldering the trimmers to the board. In doing this, be sure the adjusting screw will not touch the board when it is all the way down. C2, C3 and C4 should be oriented so that the screw is connected

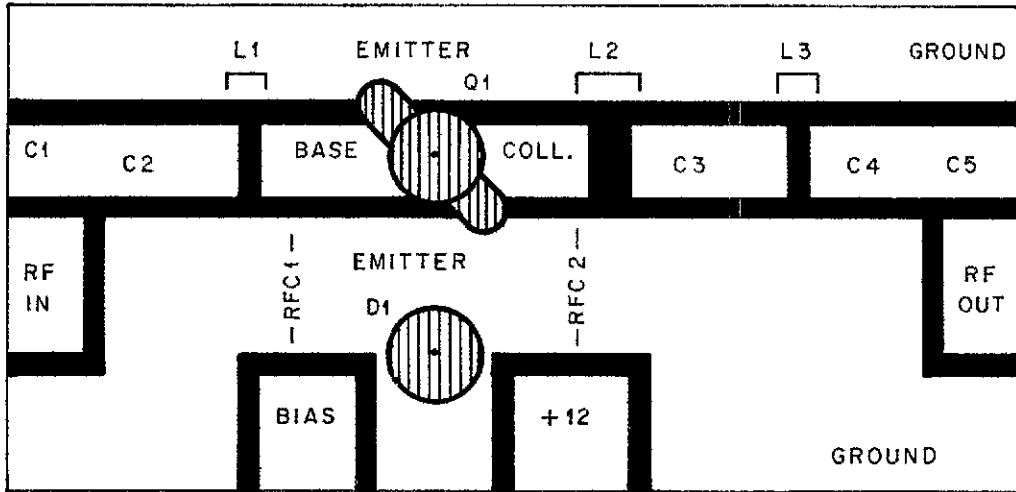


Fig. 4 — Full-scale circuit-board pattern and parts-placement guide for the 6-meter amplifier. Black represents those areas where copper has been removed by cutting or etching. The 10-ohm base resistor is connected between the base and ground foils, and is positioned next to RFC1.

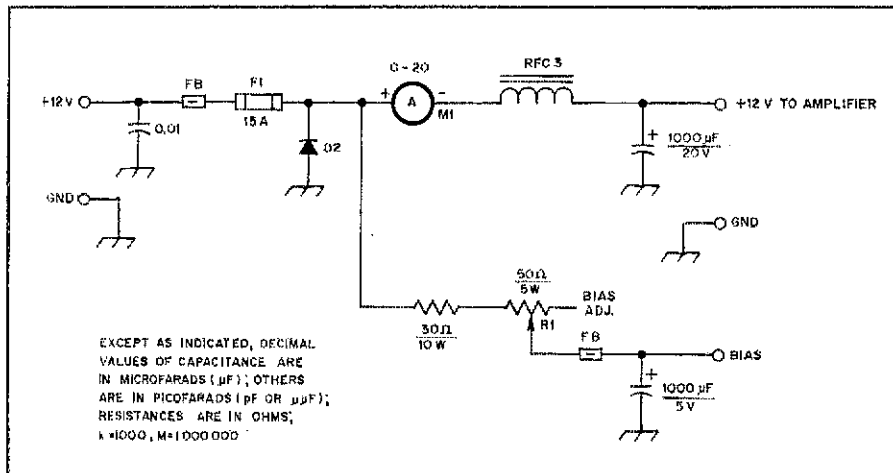


Fig. 5 — Schematic diagram of the bias-adjust circuit and other components not mounted on the circuit board. Decimal-value capacitors are disc ceramic, and polarized units are electrolytic type. Resistors are wire-wound type.

D2 — 20-A, 50-V rectifier diode.

RFC3 — One turn of wire through a TV balun

core (part of Radio Shack 273-1571 assortment or equiv.).

to the ground end of the capacitor. For C1 and C5 let the screw end be the 50-Ω side.

Putting It All Together

I installed the circuit board and heat sink on the back wall of a 3-1/2 × 6 × 10-inch Minibox. This is much larger than necessary, but does provide room for relays and a receiving preamp for an eventual remote installation. I usually discard the top (plain U-shaped) half of these boxes and bend up a new piece that fits over the other half, instead of sliding into it.

Fig. 5 shows the biasing circuit and other chassis mounted parts. Control schemes for use with a transceiver are described by Kapplin³ and Ridpath⁴ (also see the ARRL *Radio Amateur's Hand-*

book). D2 does not have to be heat sunk. It only has to last long enough to blow the fuse in case the wrong supply polarity is inadvertently applied. On the other hand, the 50-Ω bias adjust control (R1) gets quite warm, and should be mounted to the enclosure. In wiring the bias circuit, attach one wire from R1 to D1 and another wire from D1 to the bias point on the circuit board; all other connections are made to the circuit board. If R1 were connected to the circuit board, with a strap going to D1, you would almost certainly damage the transistor if the strap to D1 broke.

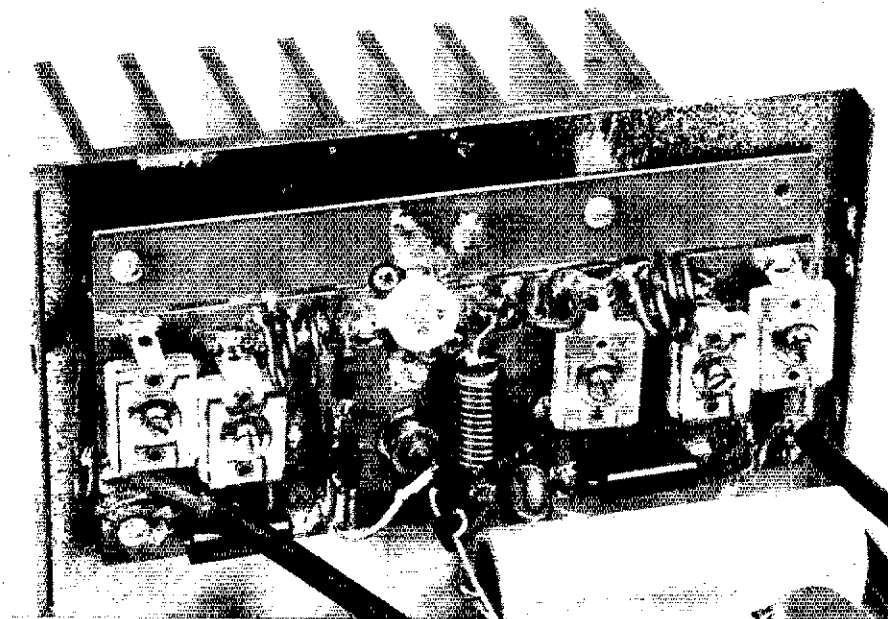
Alignment

It is necessary to set the bias before aligning the rf circuits. For an initial

check, disconnect the wire between D1 and the circuit board (R1 is connected to D1). Apply power and measure the voltage across D1. It should be possible to lower it to 0.65 V, or less, by varying R1. Set R1 for the lowest voltage and connect the wire from D1 to the circuit board. Now reduce the resistance of R1 until the collector current is 100 mA. Be sure you are measuring collector current and not total supply current (you have about 300 mA flowing into D1).

For aligning the trimmers you will need, at least, an SWR indicator and a 50-Ω dummy load. You will, of course, not know how much power you are getting unless you also have a wattmeter. Connect the amplifier output to a dummy load and apply about 1 W of drive to the input through the SWR indicator. Adjust C1 and C2 for an SWR of 1:1. With C5 snug, but not tight, adjust C3 and C4 for minimum collector current. With the SWR indicator or wattmeter connected between the output and the dummy load, adjust all the trimmers for maximum output. If more than one setting gives the same power, pick the one that corresponds to the lowest collector current. Slowly bring up the drive and keep readjusting all the trimmers. With 8 W of drive you should get an output of 100 W. The collector current will be approximately 15 A. Readjust the input for a 1:1 SWR at full power. This may, or may not coincide with maximum gain and you may have to compromise.

During testing you might consider using a harmonica to generate a multitone signal to reduce the average power dissipation (keep the speech processor off). If at any time the heat sink gets so hot you cannot hold your hand on it for five seconds, let it cool off. As a rough indication of power output, I found that at 100 W, a Drake



Interior view of the 6-meter amplifier showing the parts arrangement used by the author. The input matching network is at the right of the photo.

DL 300 dummy load become too hot to hold after two minutes of key-down operation. To prevent rf burns, do not touch the dummy load while rf power is applied.

To maintain linearity, adjust the output circuits for 100 W, even if you are going to operate at 75 or 80 W. I evaluated the amplifier linearity by making two-tone IMD measurements with a spectrum analyzer. At a PEP output of 100 W, the third-order products were 25 dB below the PEP. At 80-W PEP they were down 30 dB. In over 100 contacts, I have not received any adverse comments on the signal quality. □

Notes

- ¹Motorola Inc., *Motorola Rf Data Manual*, 2nd ed. (Phoenix, AZ: Motorola Inc., 1980), p. 6-15.
- ²Westcom, 1320 Grand Ave., San Marcos, CA 92069.
- ³Semiconductor Surplus, 2822 N. 32nd St., No. 1, Phoenix, AZ 85008.
- ⁴mm = inches \times 25.4.
- ⁵S. Kapplin, "Boots for QRP Rigs," *QST*, July 1981, pp. 15-20.
- ⁶I. Ridpath, "T-R Switching with PIN Diodes," *QST*, March 1981, pp. 19-21.

New Books

□ *Apple II User's Guide*, by Lon Poole with Martin McNiff and Steven Cook. Published by OSBORNE/McGraw-Hill, Berkeley, California. Soft cover, 6 \times 9 inches, 321 pages plus appendices and index, \$7.95.

Anyone familiar with the Apple II computer knows about the outstanding documentation supplied with the machine at purchase. Unfortunately, this information is scattered throughout three books, with still another necessary if a Disk II floppy disk drive is used. The writers of this book have compiled the best of the information from these books and put it in one place. This book is the one reference that contains the information needed to get the most from the Apple II computer.

Chapter 1, entitled "Presenting the Apple II," contains an entry-level explanation of how information enters and leaves the Apple II. Pictures as well as brief explanations of the many available external device controller cards are used to introduce the reader to the various peripherals available for use.

Chapter 2, "How to Operate the Apple II," introduces the prompt character, which tells the user which BASIC (the Apple has two) the machine is using. The computer keyboard is also presented as a

means of communication with the machine, with all nonstandard typewriter keys and their special uses explained in an easy-to-understand format. Use of the cassette interface to load a program into memory is discussed, along with the operation of the Disk II floppy disk drive. Disk Operating System (DOS) topics include initialization of diskettes and transferring DOS commands from the diskette to the computer memory, sometimes called "booting" a diskette.

The "meat" of the text begins in Chapter 3, "Programming in BASIC." The available programming modes of the Apple II are introduced, and the reader is instructed in performing simple calculations on the computer. Since every programmer makes mistakes at one time or another, error message codes are also listed along with their meanings. Program execution and editing techniques are discussed, giving the reader an understanding of how the machine will act upon the commands it is given.

Once several BASIC commands and statements are introduced, the reader is well on the way to writing simple software. Commands and functions are added one at a time in appropriate places to build one's self-confidence in pro-

gramming skills. By this time, the reader will be prepared for Chapter 4, appropriately labelled "Advanced BASIC Programming."

As the text continues through the remainder of its eight chapters, the user becomes intimately familiar with the DOS, graphics and sound, and the use of the Apple machine language monitor, which enables the user to communicate directly with the 6502 microprocessor used in the Apple II.

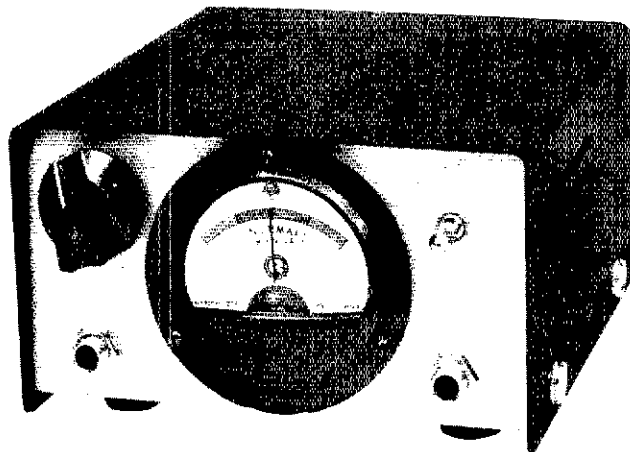
Chapter 8 is a "Compendium of BASIC Statements and Functions." All Apple II statements and commands are listed with their operations and proper usage (syntax). This chapter is an excellent reference to use while programming.

The 12 appendices occupy the final 65 pages of the book, with charts and other very useful information (such as derived functions and memory maps, among others). It should be noted that while this information is available in the documentation supplied with the machine, the reviewer has never seen it presented previously in one book. The appendices alone make this book a worthwhile investment for the experienced programmer and the casual operator who would just like to learn more about the machine. — *Michael B. Kaczynski, WIOD*

Updating the Double-Ducky Direction Finder

Add these simple modifications to your DDDF and you'll be hard to beat on the next fox or turkey hunt.

By David T. Geiser,* WA2ANU



The Double Ducky Direction Finder (DDDF) has drawn considerable mail asking where you can get the PIN diodes, how the proper null is chosen, what is suggested for the right-left indicator, and what's the easiest way to combat jamming attempts? Here are some answers to those questions.

Diode Supply

Rogers² pointed out that if you were not planning to transmit through the array you can use 1N914 or 1N4148 computer diodes instead of the PIN diodes. This also works with the DDDF. These computer diodes sell for approximately 10/\$1 or less.

Hewlett-Packard does have a group of authorized distributors for the PIN diodes, and Microwave Associates is presently setting one up.³ There is no reason other brands of PIN diodes having about a 100 nanosecond carrier lifetime and approximately 1 Ω of forward resistance won't work.

Sense Modification to the DDDF

All the information needed to tell which is the proper null is available from the DDDF. The oscilloscope photographs⁴ tell whether the right or left antenna is nearer to the hidden transmitter, but oscilloscopes are expensive and awkward to use.

While a synthetic third antenna may be made with a delay line, it is hard to duplicate. I added a third antenna in my

final design (Fig. 1). First, I get a null with antennas 1 and 2, and then switch to antenna 3 instead of antenna 2. If antenna 3 (as sketched) is now closer to the transmitter, I have a left error indication, and if antenna 3 is farther away, there is a right error indication. I located the third antenna halfway between the existing antennas and 3 inches (76 mm) off of the center line joining them. This gives about a 30° error indication. If some audio from either pins 5 or 8 of the 567 IC (depending on your receiver) is subtracted from the receiver audio, the result will be different for the front and rear nulls. (I haven't tried this, preferring to use the right/left indicators described later.)

As long as I was modifying the DDDF switcher, I decided to add switching at both ends of the coaxial cable, eliminating frequency sensitivity from the half-wave lines. This is done with diodes D4 through D7, the 1-k Ω resistors, and the separate equal-length lines going to the switcher. Switching S2 to the right connects antennas 1 and 2, and to the left connects antennas 1 and 3. At the same time I added another phono jack for the 0° audio from the 567 IC pin 8 to accommodate the W9MKV right/left indicator.

Note that since the sense antenna (no. 3) has a fixed relation to the position and null of antennas 1 and 2, the receiver tone from antennas 1 and 3 will always be a fixed magnitude if the ground plane is kept in the position of the antennas 1 and 2 null. This keeps the audio or meter sense indication constant and easier to repeat.

Antenna Position and Transmit Mode

It is important to hold the ground plane

level and the whips or "duckies" vertical to suppress spurious horizontal reflections that may confuse the true null direction. Always paying attention to the vertical null saves much hunting.

The DDDF phase-modulates any signal on the channel, whether it be a-m, fm, ssb, steady carrier, cw or noise. With an fm or phase detector you can DF on any of them.

Right-Left Indicator

The right/left indicator (R/L) is made up of two identical af amplifiers, a phase-shifter (which may or may not be needed) and a synchronous detector. The audio amplifiers each use one LM386 IC, two capacitors, a resistor and a gain control. The phase shifter uses a center-tapped audio transformer, a capacitor and a potentiometer. The ring-modulator synchronous detector uses two more of the same transformers and four 1N914 or 1N4148 diodes feeding a zero-center microammeter.

The receiver headphone output is fed into the phase shifter input (Fig. 2), and the "90° Audio" from the switcher unit is fed into the lower amplifier. Balanced modulators work best when one of the input levels is much greater than the other. As the "90° Audio" is constant, I adjust the gain of the lower amplifier into clipping, giving a square wave input to the synchronous detector. This is done most easily with the power switch on BAL and monitoring one end of the lower transformer output to ground with an oscilloscope. (It helps to have the pitch of the switcher high because lower frequencies have more trouble with RC time con-

¹Notes appear on page 16.

*ARRL TA, RD 2, Box 787, Snowden Hill Rd., New Hartford, NY 13413

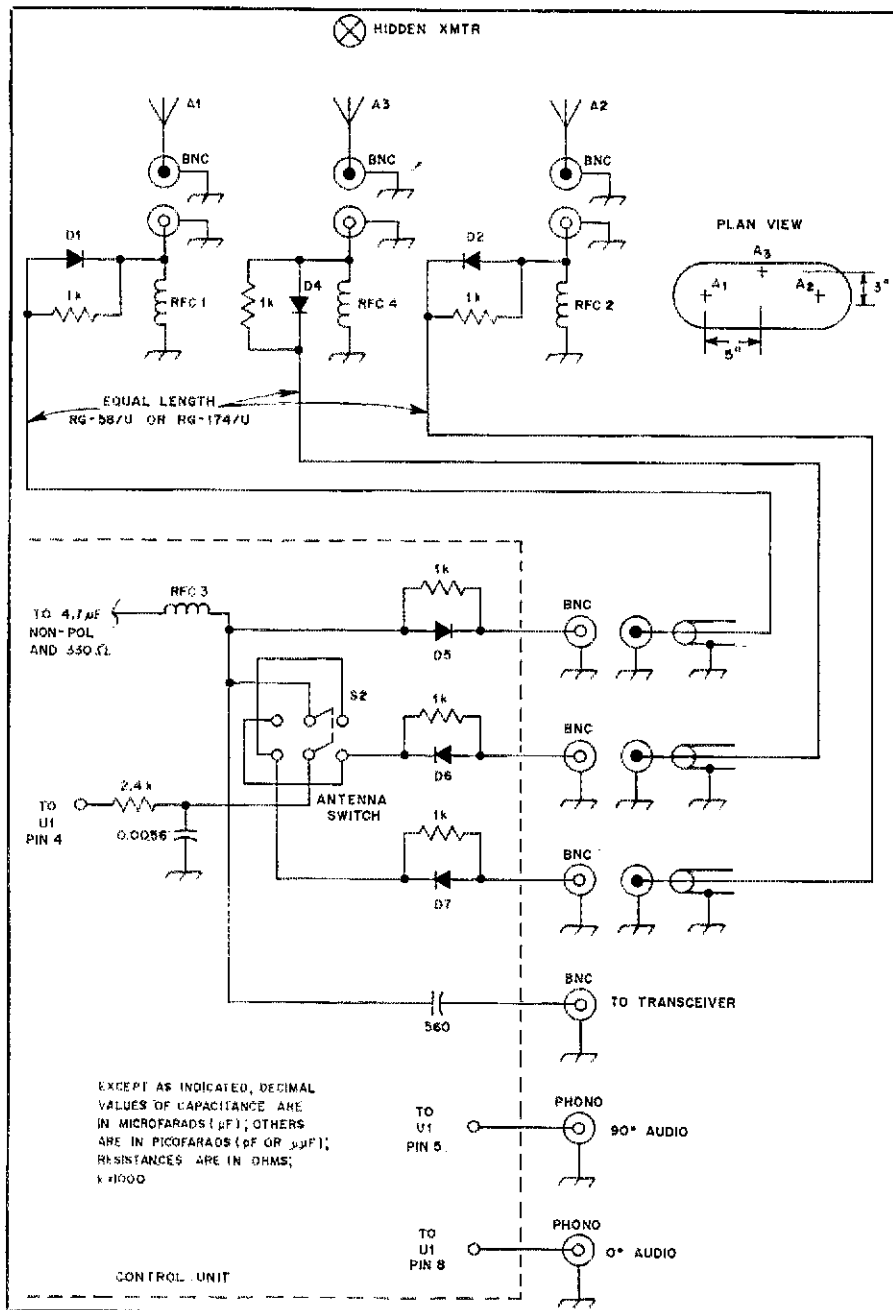


Fig. 1 — Modification of the DDDF to make sensing the proper null easier and to minimize frequency effect. D4-D7, inclusive, are the same type as D1 and D2. See text and original article (Note 1) for discussion of diodes, rf chokes and antennas. S2 is a dpdt slide switch (Radio Shack 275-403 or equiv.).

stants and transformers.) Balance the 1-kΩ potentiometer for zero meter reading.

With the power switch ON, adjust the upper amplifier gain control for the desired meter sensitivity. (The receiver audio can be monitored through phones or an external speaker plugged into the external speaker jack on the R/L.)

Using a 100-0-100 microammeter, I get sensitivity adjustment ranging from 10° half-scale to 90° half-scale without any difficulty. I see no reason why almost as good results shouldn't be possible with even the more rugged 500-0-500 microammeters.

The phasing control is used only to adjust for equal angular sensitivity on each side of the antenna null position. Phasing may not be needed with some transceivers.

I used two batteries to avoid coupling from one amplifier to the other by way of the power supply. (My early designs used lab power supplies.) Use of voltage regulators should minimize this problem. The LM386 amplifiers should be more reliable with a 6-V dc supply.

Sensing with the R/L

The R/L allows the meter to indicate the true null when the sense direction

A Transformerless Phase Detector

When I built the DDDF, my local Radio Shack store didn't have all the parts I needed. I designed a transformerless version of the phase detector. It is sensitive and, except for the meter, costs less than \$5 for parts. Another advantage is it uses only one battery.

Opposite switches in the CD4066 (Fig. 3) make and break simultaneously, acting like four diodes in a ring modulator. Signals at the switching frequency are rectified, giving a steady positive (or negative) meter indication for the antennas aimed to the right of null, and opposite for left indication. All other audio is bypassed by C1.

The sensitivity depends on the receiver audio output, and possibly could be increased with an additional external audio-amplifier stage; I did not find it necessary.

— Frank Reid, W9MKV

changes. "Forward" will kick the meter in one direction, while a true null position behind will drive the indication in the other direction.

Anti-Jam and Easy Nulling

The first thing a user will notice with the R/L is that nulling is much easier. On high-sensitivity settings the null will occupy less than a degree of antenna rotation with a tone practically unnoticeable by ear. Second-harmonic and jamming tones have very little effect on the null. The transmitter operator may be screaming or wailing into the microphone without causing much meter disturbance.

The R/L reacts only to its own chopping frequency or tones so close (1 or 2 Hz) that the meter can respond. (Bandwidth can be narrowed further by shunting the meter with nonpolarized electrolytic capacitors.) Most accidentally successful jamming can be eliminated by slight adjustment of the switcher pitch. The jack is provided so an external meter or even an antenna rotator can be operated from the R/L.

Other Bands

The system may be used on any band for which an fm receiver is available. Clegg, for instance, makes an up-converter that translates 10 Hz-30 MHz to 144-148 MHz, allowing the use of a 2-meter receiver. Of course, other antennas or diodes may be needed.

Other modifications could enhance the performance of the DDDF. Of course, some of you may have questions still unanswered. I will be happy to correspond with anyone about this project if they include an s.a.s.e. Good Hunting!

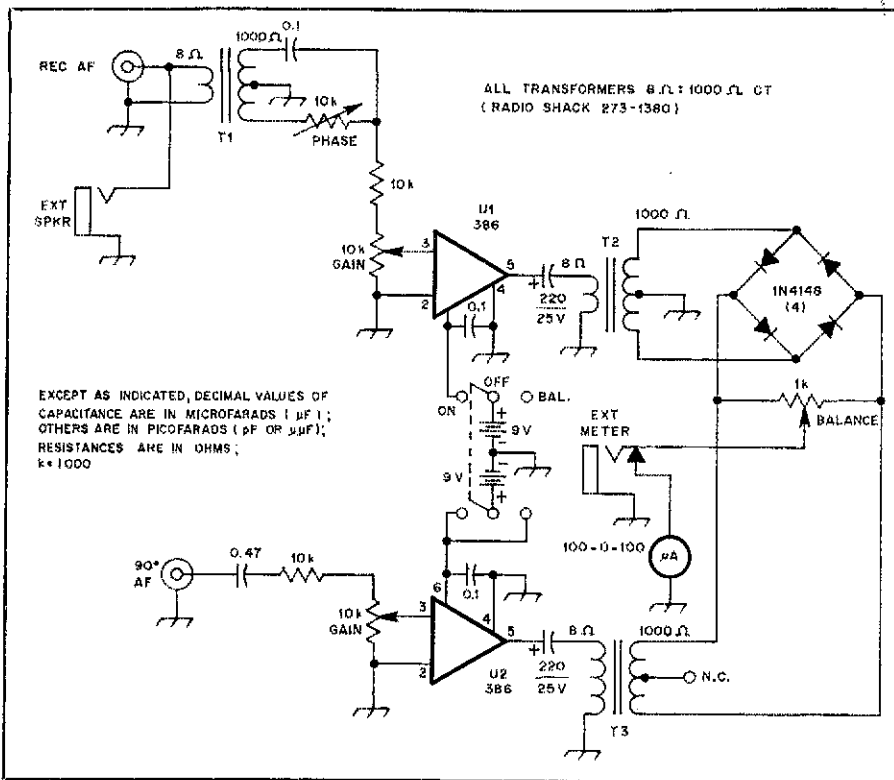
Notes

¹D. Geiser, "The Double-Ducky Direction Finder" *QST*, July 1981, p. 11.

²T. Rogers, "A DoppleScant," *QST*, May 1978, p. 24.

³The closest geographical listings the author has will be supplied for an s.a.s.e.

⁴See Note 1.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICO FARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k=1000

Fig. 2 — The simple circuit of the Right/Left Indicator. Neither the transceiver nor the DDDF have to be modified. Two batteries are used to minimize coupling problems. See text for alignment. Capacitors are disc ceramic except for those with polarity markings, which are electrolytic. Fixed-value resistors are 1/4-watt, carbon-composition types. Potentiometers are 1/4-watt, circuit-board types. See text for discussion of the microammeter.

T1-T3 — Small audio-output transformer, primary 1000 Ω ct, secondary 8 Ω, Radio Shack 273-1380 or equiv.

U1, U2 — Low voltage audio power amplifier IC, 250 mW, type LM386 or equiv.

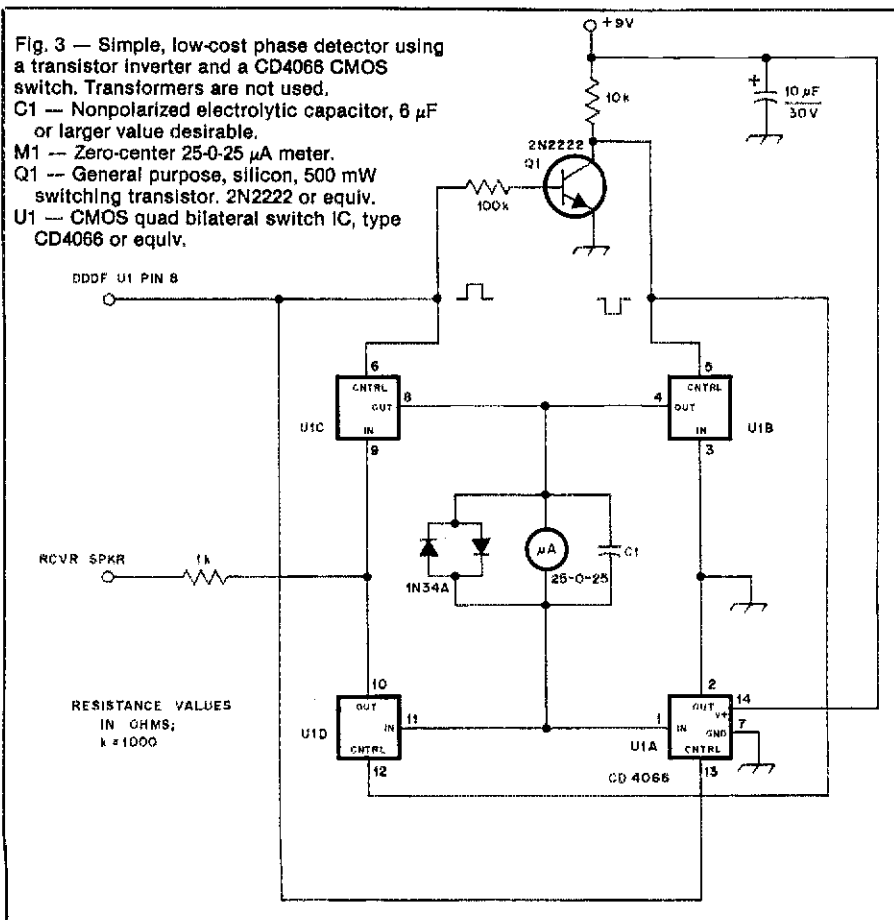


Fig. 3 — Simple, low-cost phase detector using a transistor inverter and a CD4066 CMOS switch. Transformers are not used.

C1 — Nonpolarized electrolytic capacitor, 6 μF or larger value desirable.
M1 — Zero-center 25-0-25 μA meter.
Q1 — General purpose, silicon, 500 mW switching transistor, 2N2222 or equiv.
U1 — CMOS quad bilateral switch IC, type CD4066 or equiv.

RESISTANCE VALUES IN OHMS; k=1000

TIS DO'S AND DON'TS

The ARRL Technical Information Service is offered free to members. Although we are eager to help newly licensed amateurs and others with technical problems, in fairness to members we cannot respond to continuing requests for assistance from those who choose not to join the League.

For us to respond promptly to your inquiries we must have:

- (1) your name
- (2) your amateur call and license class (tell us if you're not licensed)
- (3) your membership expiration date
- (4) a stamped, *business-size* envelope bearing your mailing address for our reply (IRCs acceptable from outside the U.S.).

When writing, we ask that you observe the following guidelines so we may provide the best possible service to the greatest number.

1) Before writing for technical assistance, search your files of *QST* and other ARRL publications. The answer you need may be there, available immediately. Consult the annual index of articles in each December issue.

2) Please do not ask for comparisons among commercial products. Choice of equipment is largely a matter of personal preference. Consult Product Review information in *QST*; compare manufacturers' specifications in their brochures.

Do not ask for information on articles published in other magazines. Write to the editor or author of that article.

Do not request custom designs for amateur gear.

Do not ask advice on nonamateur matters. We cannot respond to questions about CB, marine radio, hi-fi, etc. (unless they concern interference caused by amateur gear).

3) Use a typewriter when possible; otherwise, write or print *clearly*. Please be reasonable in the number of questions you ask; try to limit your questions to three per letter.

4) When writing, please come right to the point, and be sure to share with us whatever experience you have had with the problem in question. This will avoid our reply covering ground you've already been over.

5) Address all technical questions to: Technical Information Service, American Radio Relay League, 225 Main St., Newington, CT 06111. — *Mike Kaczynski, W1OD*

I would like to get in touch with . . .

collectors of antique radios. Ed Best, AK4W, 2004 University Dr., Durham, NC 27707.

EME — Iowa Style

How to be a "Big Gun."

By Rod Blocksome,* KØDAS

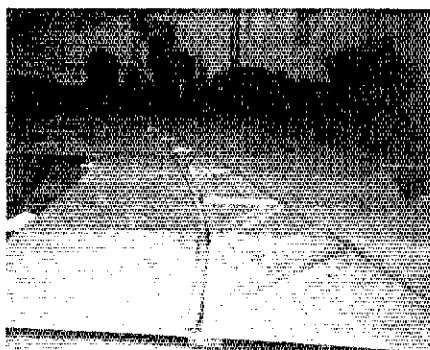
It is well known that large antennas are required for EME or "moonbounce" QSOs. My friend, Ken Kucera, KAØY, has accomplished the dream of many vhf DXers. He constructed a fully steerable, 42-foot, parabolic dish antenna. The major construction steps are briefly outlined here. Specific details may be obtained by sending an s.a.s.e. to Ken.¹

Ken used a plywood fixture (photograph A) to shape each of the 18 ribs to a parabolic curve. Rib construction required 1300 feet² of 1-in. square extruded aluminum, 14 drill bits and 14,000 POP rivets. Each rib is fastened to a hub (photograph B) to form the dish. The dish is lined with 1-in. poultry netting (photograph C). Aluminum sheet covers the center. This supports Ken when he works on the feed system.

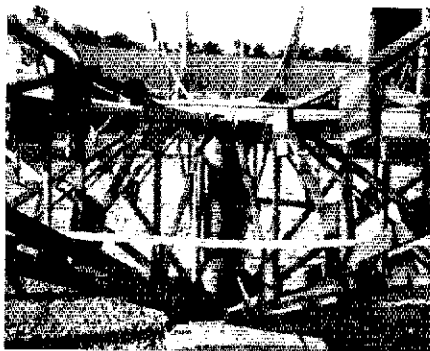
A 10-ft support tower, constructed of 5- × 1/4-in. angle iron, was built on a large mound of earth. It is anchored in 14 cubic yards of steel-reinforced concrete (photograph D). A surplus 5-in. naval gun mount, weighing 20,000 lb (that's right, 10 tons), is used to steer the dish. The gun mount is modified to accept a piece of 12-in. OD, 1/2-in. wall steel pipe and a 3500-lb counterweight. A large crane lifts the behemoth to the tower top (photograph E). The completed tower and gun-mount assembly (photograph F) was given a coat of white paint. At this point, many a passerby inquired about Ken's intentions with his "big gun."

A 150-foot crane (hired) was used to mount the dish to the "gun barrel" (photograph G). The project was completed by adding the feed antenna and polarization rotator to the small pipe. Photograph H shows the completed antenna in the "stowed" position. The building under the tower contains motor controls, power supplies, preamps, and T-R relays. Finally, 1-5/8 in. pressurized coaxial line and control cables were buried between the ham shack and the antenna.

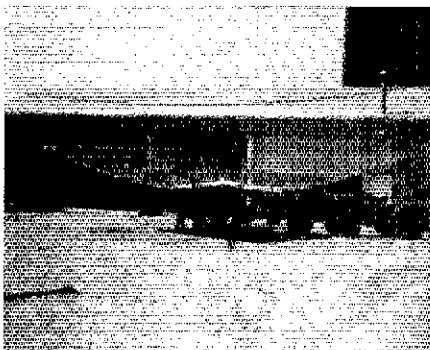
Since May 1980 when the antenna became operational, Ken has logged 121 QSOs on 432-MHz EME (10 were on ssb). Recent operation on 220-MHz EME has



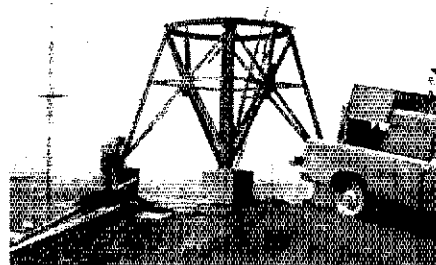
(A)



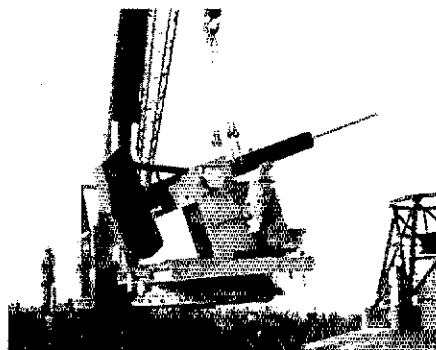
(B)



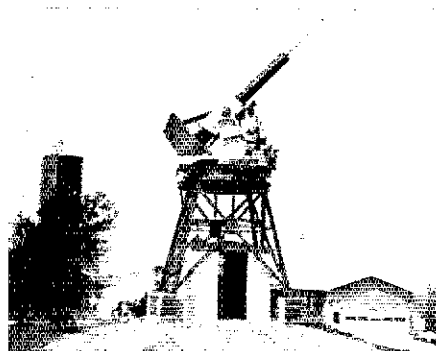
(C)



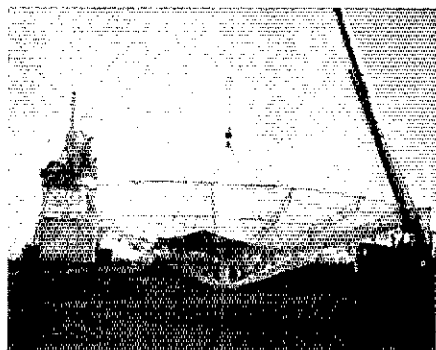
(D)



(E)




(F)



(G)



(H)

netted 6 QSOs, one of which was the first ever ssb EME QSO on 220 MHz when Ken worked Louis Anciaux, WB6NMT. Using sun-noise measurements, the approximate antenna gain is judged to be 24.5 dB on 220 MHz and 31 dB on 432 MHz, relative to a dipole. 

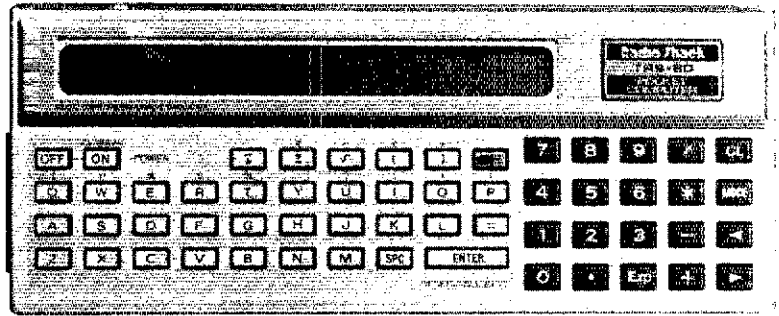
Notes

¹Ken Kucera, KAØY, Rte. 2, Box 52A, Riverside, IA 52327.

²m = ft × 0.3048, mm = in. × 25.4, m² = yd² × 0.7641, kg = lb × 0.4536.

*690 Eastview Dr., Robins, IA 52328

Pocket Directory



Got a short memory for names and call signs? Let the TRS-80® Pocket Computer do the work for you!

By Robert L. Martin,* WB2KTG

Anyone who has attempted to write while driving a car (a dangerous practice) can attest to the fact that only hieroglyphics are more resistant to later interpretation! The problem of keeping track of the local repeater users' names was quite a chore for me until the Radio Shack TRS-80® Pocket Computer came to the rescue. With the computer, the programs presented here provide complete editing and memory management functions, enabling you to keep track of 65 sets of call signs and names simultaneously.

Some Pocket Computer Basics

Four modes of operation may be selected: user DEFInable, RUN, PROGRAM and RESERVE. The capitalized letters correspond to the legends shown on the LCD panel. These modes are set by pressing the MODE key and are defined as follows:

User DEFInable: A program or program segment called is defined by the placement of a label (a letter) as the first character of that program or program segment. Pressing the SHIFT and appropriate letter keys causes the computer to perform an implied GOTO and EXECUTE with only two keystrokes. For example, SHIFT A begins program execution at line 10, SHIFT D at line 30, etc. (See Table 1.)

RUN mode: Manual calculations may be performed or previously entered programs run in this mode.

PROgram: Programs are written, edited and listed.

RESERVE: Short program blocks or other data may be entered and recalled in either the PROgram or RUN modes. This

feature can save many keystrokes when entering repetitive data or commands.

All the programs are written to be used in either the normal RUN mode or the powerful DEF (user defined function) mode. In the RUN mode, each program is run by typing R,NN where NN is the line number of the first statement of the program. In the DEF mode, each program is run by pressing SHIFT A, D, G, J or L, cor-

responding to the appropriate user-defined key. (Recall these letters as being the first entry in each program after the line number.) These keys were chosen to minimize potential error in a mobile environment.

Program Descriptions

The first program (lines 10 through 24) provides for DATA ENTRY AND DUPLICATE CHECKING of call sign/name combinations. The computer prompts with INPUT CALLSIGN. You respond by keying in the call sign and press ENTER. The next prompt is NAME. You enter the amateur's name. The computer then checks the entered call sign against all others stored in memory and either puts the information in memory or returns with DUPLICATE if the call sign has already been stored in memory. If you wish to enter more data after DUPLICATE has been displayed, press the ENTER key; that will return the prompt INPUT CALLSIGN. To terminate this mode, press BREAK or SHIFT (letter) to execute another program.

Lines 30 through 40 comprise a NAME AND CALL SIGN SEARCH routine. This program returns the name corresponding to the call sign that is entered. When a name is not found or a duplicate exists, the call sign and NOT FOUND or DUPLICATE is displayed.

The INVENTORY program (lines 50 through 56) will scan all data, displaying each call sign/name combination for approximately 0.85 seconds. A number (N) will also be displayed. This number corresponds to the array element A\$(N) containing the call sign. The storage location of the corresponding name is in array element A\$(N + 1).

A SINGLE ENTRY DELETE program (lines 60 through 74) allows you to delete call sign/name entries one at a time by entering the appropriate call sign. In addition, this program shifts all higher address

Table 1
Program Listing for The Pocket Directory

```

10: "A"INPUT "IN
    PUT CALLSIGN
    ":A$
12: INPUT "NAME:
    ":B$:F=0
14: FOR E=8TO <C
    -2)STEP 2
16: IF A$=A$(E)F
    =1
18: IF F=1PRINT
    "DUPLICATE:"
    :A$:GOTO 10
20: NEXT E
22: A$(C)=A$:A$(
    C+1)=B$:C=C+
    2
24: GOTO 10
30: "D"INPUT "FI
    ND NAME?":A$
    :F=0
32: FOR E=8TO <C
    -2)STEP 2
34: IF A$=A$(E)F
    =1
36: IF F=1PRINT
    A$:A$(E+1):
    GOTO 30
38: NEXT E
40: PRINT "NOT F
    OUND":A$:
    GOTO 30
50: "G"FOR E=8TO
    <C-2)STEP 2:
    F=E+1
52: PAUSE E:" ":
    A$(E):" ":A$
    (F)
54: NEXT E
56: END
60: "J"INPUT "DE
    LETE":A$:F=
    0
62: FOR E=8TO <C
    -2)STEP 2
64: IF A$=A$(E)F
    =1
66: IF F=1LET A$
    (E)=A$(E+2):
    A$(E+1)=A$(E
    +3)
68: NEXT E
70: IF F=1LET C=
    C-2
72: IF F=0PRINT
    "NOT FOUND:"
    :A$:GOTO 60
74: GOTO 60
80: "L"INPUT "CL
    EAR ALL? (EN
    TER YES)":A$
82: IF A$="YES"
    GOTO 86
84: GOTO 84
86: FOR E=8TO <C
88: A$(E)=" "
90: NEXT E
92: C=C-8
94: END
    
```

*45 Salem La., Little Silver, NJ 07739

data downward to prevent wasting memory space.

Lines 80 through 94 will CLEAR ALL DATA from memory. To the prompt CLEAR ALL? a YES must be entered. Any other entry will cause program termination and a return to the USER mode. This feature makes accidental data loss all but impossible.

Other Applications

Each entry, name or call sign, is stored as a string variable, A\$(N). The string variable length limitation is seven characters. Telephone numbers, by coincidence, also have a seven character length if the area code is ignored. Three program lines (see Table 2) modify the original program to turn it into a Micro-Phone Directory. Before running the directory program for the first time, it is necessary to set C=8, as with the call letter program. The variable "C" is a memory pointer. It points to the next location available for

Table 2

Program Listing for The Micro-Phone Directory

```
10: "A" INPUT "IN
    PUT NAME: " :A
    $
20: INPUT "PHONE
    #:" :B#:F=0
30: "D" INPUT "FI
    ND PHONE# ?"
    :A#:F=0
```

call sign storage. Location "C + 1" is the next available for corresponding name storage.

At initial program start, it is necessary to set C=8 to allow room for the variables used during program execution. This allows variables A(1) to A(7) (A through G) to be used by the main program for housekeeping, etc. If the com-

mand is given to CLEAR ALL, the program automatically sets C=8. During program data modifications, the value of C is adjusted automatically. It is possible to modify the program to take care of all "C" manipulations, but this method minimizes program length.

These programs can access any seven-character string by entering any other seven-character string. The examples shown are merely representative of many applications handled easily by the versatile TRS-80® Pocket Computer.

Conclusion

During the many months in which these programs have been in use, no problems have arisen. The only obvious improvement would be to speed up the search routine using a less primitive technique. For the intended purpose, these programs are quite satisfactory and a pleasure to use. I hope you will find them useful, too.

Strays

TA PROFILES

We amateurs are fortunate to have the professional advice offered by ARRL Technical Advisor Brian Wood, W0DZ. The ARRL extends its thanks! His areas of expertise are RTTY, microprocessor control, digital design, plus software and firmware for computers.

In 1966, while attending Saguaro High School in Scottsdale, Arizona, Brian received his first Amateur Radio license. The same year, he became acquainted with Rick Olsen, N6NR (now an ARRL TA for microwave circuits). During his high school years Brian was active in the TWN net and in the local radio club, participating in many public-service activities. He was a member of the Arizona Mountain Moguls (a prestigious Field Day group), which was often in the race for

first place in the four-transmitter class.

One of Brian's most memorable experiences with Amateur Radio occurred at the 1968 ARRL Convention in Phoenix, where he was involved in the induction of Barry Goldwater, K7UGA, into the Royal Order of the Wouff Hong. Cw, DXing, RTTY and microwave circuits are his main interests in Amateur Radio.

Brian earned his BSEE degree at the University of Arizona. He now resides in Loveland, Colorado, and is employed by Hewlett-Packard, Inc., where he designed a hefty amount of the digital logic in the HP 3060A Board Test System. Other hobbies Brian enjoys are skiing and handball. — *Marian Anderson, WB1FSB*

PARTS SALES ON DECLINE

□ Resistors, capacitors and other so-called passive electronics parts accounted for only 10% of all electronics parts sold last year, according to Arthur D. Little, Inc., a Massachusetts consulting firm. This figure, down 6% from four years before, will probably continue to drop, the company said, as more and more of these separate parts are replaced by integrated circuits.

I would like to get in touch with . . .

□ other ZX81 computer owners. Respond NTS. Terry Isenhour, WA4OPO, Rte. 2, Box 653, Lincolntown, NC 28092.



TA W0DZ at his favorite spot, the ham shack.

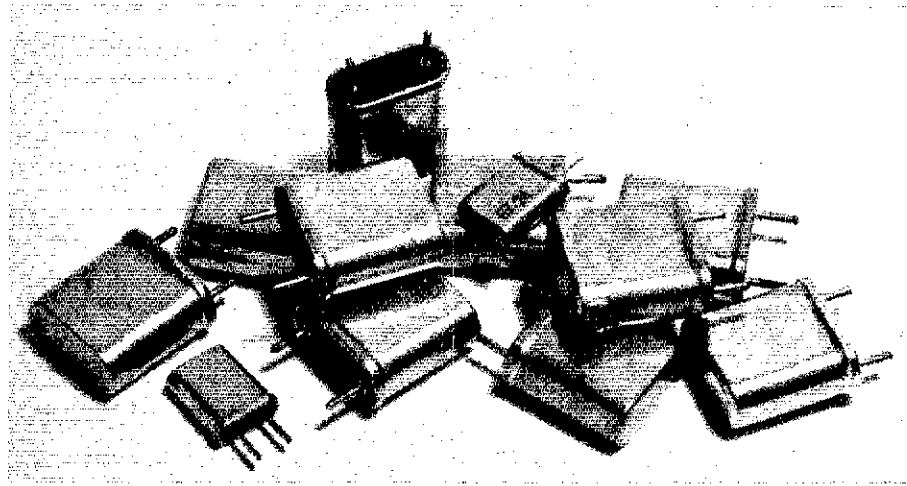


This 1925 photo shows 6CPW's (now W6CPW, Darrell Teachout, of Burlingame, California) transmitter on the left side of the table and three-tube receiver on the shelf above. The transmitter-tube dc came from slop-jar rectifiers with a power transformer, choke coil and filter condensers. The receiver filaments were powered with 6 volts of an 8-volt submarine battery, while the plates used "B" dry cells. (photo by W6CPW)

A Unified Approach to the Design of Crystal Ladder Filters

Have you turned away from a construction project because of high-cost crystal filters? Why not build your own?

By Wes Hayward,* W7ZOI



The design of crystal ladder filters has been treated in the professional literature¹ and amateur journals.² However, the design methods are specific — they treat crystal filters as a special field with isolated methods. Actually, the same design methods for L-C bandpass filters may be applied directly to crystal filters. Such a unified design method should be more pleasing to the designer, and will allow more flexibility in the resulting filters.

The amateur's interest is primarily one of economics. Crystal ladder filters are easily designed and built with readily available components, yielding great savings for the builder. Television colorburst crystals are attractive for ladder filters. These are at 3.579 MHz in the U.S., while European crystals are at 4.433 MHz. The latter are popular with the many builders in the G-QRP-Club.

This paper addresses a number of goals. Simple methods are presented for the crystal evaluation and measurements needed for the design of filters. The accuracy is adequate for most amateur filter designs. Also, a simple set of design equations is given, which allows the measured data to be used in the design of filters. Tables are presented for Butterworth and

0.1-dB ripple Chebyshev filters.

Finally, some design subtleties are presented to aid in the construction and tuning of rather precise filters. These details may be ignored for many simple amateur-built filters, but should be of interest to the exacting designer. The results of the more exact methods are compared with the simplified ones.

All of the design may be done with a hand-held scientific calculator. Detailed analysis of filter frequency response may be done with sophisticated programmable calculators, such as those offered by Hewlett-Packard or Texas Instruments. All of the analysis reported by the writer was done with an HP-41CV calculator.

Some Filter Fundamentals

Fig. 1A shows a traditional LC-coupled resonator filter. This circuit uses two coupled, parallel-tuned circuits. Many more resonators (tuned circuits) may be used to obtain a steeper skirt response. Filter bandwidth and response shape are determined by the loading caused by the end terminations (the source and load resistances) and by the coupling between resonators.

There is no reason to restrict the filters to those using parallel resonators. Series-tuned circuits are just as viable. This type of L-C filter is shown in Fig. 1B, the exact duplicate of that using parallel resonators. Design of multielement filters of both types is covered in the literature.³

A detail that is not generally appreciated is the relative freedom available to the filter designer. For example, a 5-MHz L-C filter with a 100-kHz bandwidth could be designed with inductors of less than $1 \mu\text{H}$, with inductors greater than $10 \mu\text{H}$, or with anything in-between. Some values might be more practical, but this is not a fundamental restriction. Once an inductor is chosen, the rest of the filter components are determined. This applies to both filters of Fig. 1.

Another overlooked detail can be the termination of the filters. Any filter *must* be terminated at both ends in the resistance for which it was designed. The filters of Fig. 1 are doubly terminated with equal resistances at each end. This is common, but not mandatory. It is not proper, however, to design a filter for a given load at each end, such as 50 ohms, and then to expect the same response from that filter with other terminations.

Fig. 2A shows the equivalent circuit for a quartz crystal. This is a model — a circuit that shows the same response as a real crystal. The components of the model may not be practical, but this is of no significance for design work. For example, a 5-MHz crystal used in some filters built by the writer had a motional inductance of $L_m = 0.098$ and a motional capacitance of $C_m = 0.0103$ pF. The loss resistance was $R_s = 13.4$ ohms, and the parallel capacitance was $C_p = 5$ pF.

The parallel capacitance, C_p of Fig. 2A,

*Notes appear on page 27.

*7700 S.W. Danielle, Beaverton, OR 97005

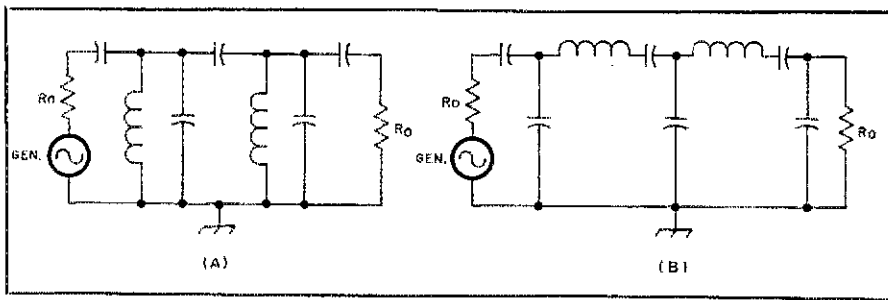


Fig. 1 — Double-tuned circuits with equal termination at each end. Parallel resonators are used at A; series-tuned circuits are used at B.

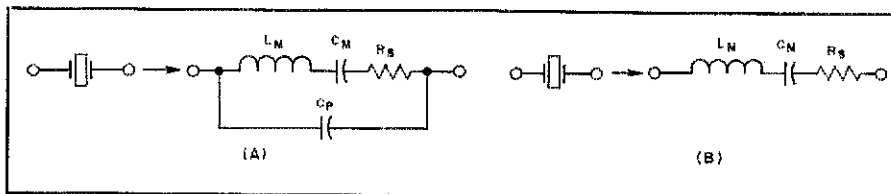


Fig. 2 — Equivalent circuit for a quartz crystal. L_m and C_m are "motional" components. Parallel capacitance, C_p , is included at A while it is ignored at B.

is rarely more than a few picofarads and may often be ignored for a design. This leaves the equivalent circuit of Fig. 2B. This is nothing more than the series-tuned circuit, exactly like that used in the L-C filter of Fig. 1B. Realizing this, the same methods may be used for the design of an L-C or crystal filter — one is no more complicated than the other.

Crystal Measurements

If the methods of LC-filter design are transferred to the design of crystal filters, it is mandatory that the vital inductance and capacitance values in the crystal, L_m and C_m , be known. It is not reasonable to substitute an arbitrary crystal of "proper" frequency into an existing design and expect it always to work. This will be illustrated later.

The crystal parameters are measured indirectly, but easily, with lab-quality instrumentation. A suitable measurement may also be done with equipment available to most amateur experimenters, and with a special test set constructed from ordinary components.

The nature of the measurements is understood with reference to the simplified crystal equivalent circuit of Fig. 2B. The crystal is placed between a source of known characteristic impedance and a detector, also of well-defined impedance. The generator is adjusted until a peak response is found. Then, the reactances of L_m and C_m cancel, leaving the result dominated by R_s . This is evaluated easily by replacing the crystal with a small-value variable resistor that is adjusted for the same response in the detector. The potentiometer is then measured with an ohmmeter, providing a value for R_s .

Next, the crystal is reinserted in the signal path and the generator is tuned to both sides of center frequency. The two frequencies where the response is down by 3 dB are noted. The difference is the loaded bandwidth in the test circuit. This is used to calculate a loaded-Q value. But, this is directly related to L_m . Using the condition for resonance, C_m is then calculated. C_p may be measured, but is not vital to the design of the filters described in this paper. Instead, we have assumed that $C_p = 5$ pF for all examples.

Fig. 3 shows the test set that is used to perform the measurements. The first element is a signal generator. It should have an adjustable output level (up to about -10 dBm or more) and should have excellent stability and good bandwidth. Remember that we may be measuring frequency differences of only 100 Hz or so. A suitable generator is described in Chapter 7 of *Solid State Design*.⁴ The output of the signal source is applied to a frequency counter and to the test set. The counter should have a 1-Hz resolution.

The generator output is attenuated with a 20-dB pad and then applied to the crystal. The high attenuation ensures that low power is delivered to the crystal and provides a 50-ohm termination for the crystal. Output from the crystal under test drives an amplifier with a 50-ohm input resistance. The signal is amplified by four gain stages and then applied to a diode detector, D1. The dc output drives a high-impedance voltmeter. The test set should be operated with output voltages of 2 or less to prevent overdrive of the amplifiers. Q4, the related components, and the detector may be eliminated, if desired. Then, the output from Q3 is routed to an

oscilloscope with a 50-ohm terminator.

Amplifier gain is switchable with S1. With S1 open, the net gain is somewhere around 40 dB. Closing S1 changes the emitter degeneration in Q2, causing the net gain to increase by 3 dB.

A batch of crystals may be evaluated easily for filter applications with this test set. A crystal is inserted and the generator is tuned for a peak response in the voltmeter. That response is carefully noted. The crystal is then removed and replaced with the potentiometer. This is adjusted to obtain the same voltmeter response as was obtained with the crystal. The "pot" is then removed from the circuit and measured, providing a value for R_s .

The crystal is now reinserted in the circuit, with S1 open. The generator is tuned again for a peak response. Both the series-resonant frequency, F_o , and the meter response are carefully noted. S1 is then closed to produce an increase in output. The generator is tuned to the two sides (above and below F_o) until the meter reads the same as it did earlier. The two frequencies are noted and the difference is recorded as Δf , a parameter used for later calculations. Note that there is no need for amplitude calibration anywhere in this system.

This procedure is repeated for a reasonable sampling of the crystals on hand. The work that the writer has done would suggest that the values for F_o , R_s , and Δf may be averaged for later calculation as long as the spread is not excessive. One batch of 20 surplus TV color-burst crystals showed an average R_s value of 20.78 ohms, with a standard deviation of 7.2 ohms. The average series-resonant frequency was 3577.257, with a standard deviation of only 67 Hz.

The designs which follow are based on having all crystals in a filter at the same frequency. Hence, frequency matching is required. A rule of thumb is that the deviations should be less than about 30% of the bandwidth of the filter. The center frequency measured in the test set will be the series-resonant value. This is not necessarily the value that would come from an oscillator. A simple oscillator is shown in Fig. 4. It may be used for matching the crystals. This circuit operates at a frequency slightly higher than the series-resonance. It is still suitable for frequency matching. It will serve also for BFO applications. The operating frequency may be increased further by insertion of a variable capacitor in series with the crystal.

Simplified Filter Design

Now that data is available on existing crystals, filter design may commence. See Fig. 5. A few approximate equations may be used. They require additional data and normalized filter parameters. These are presented in Tables 1 and 2, respectively,

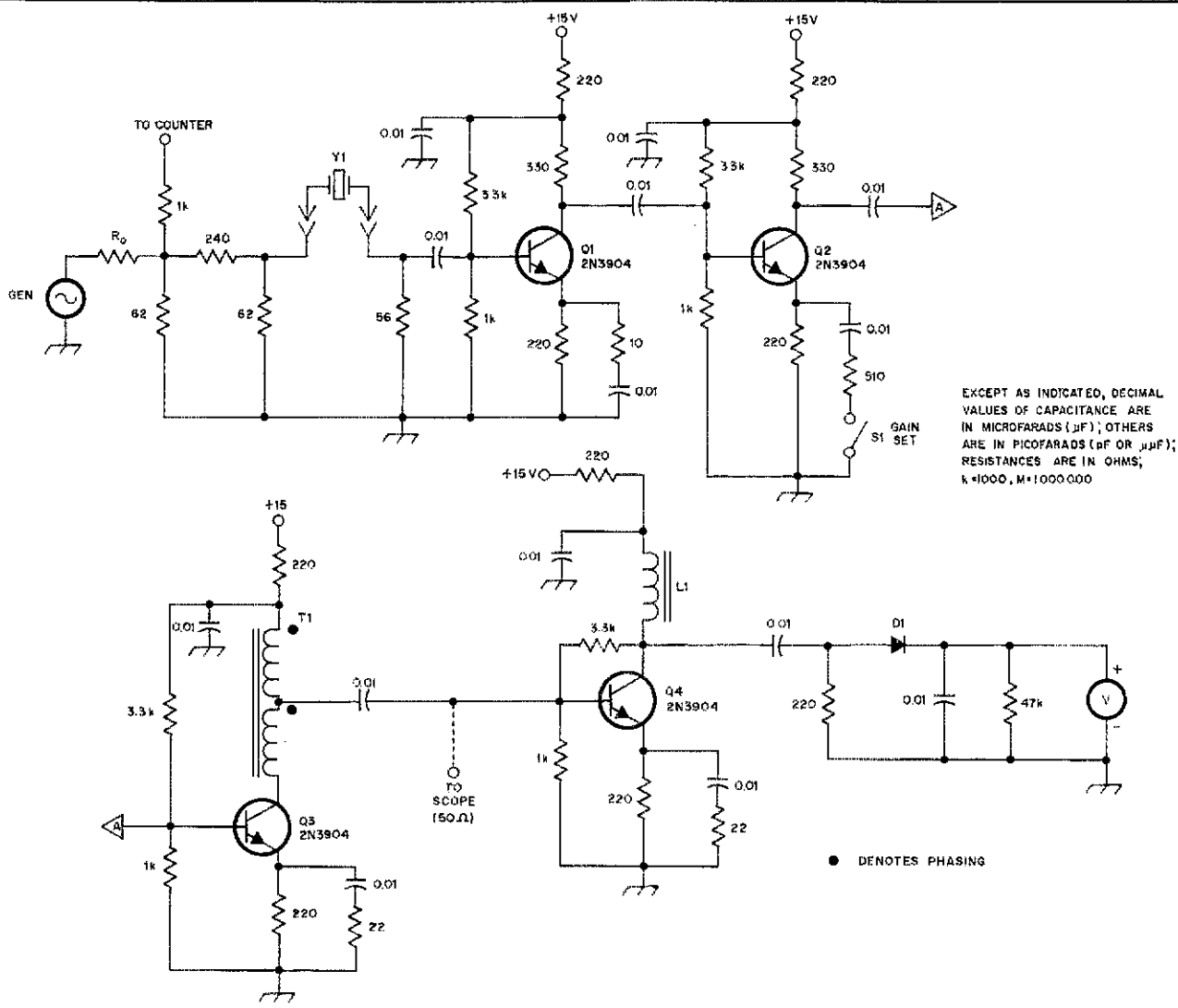


Fig. 3 — A simple test set for the evaluation of crystals to be used in filters. Construction is not critical.

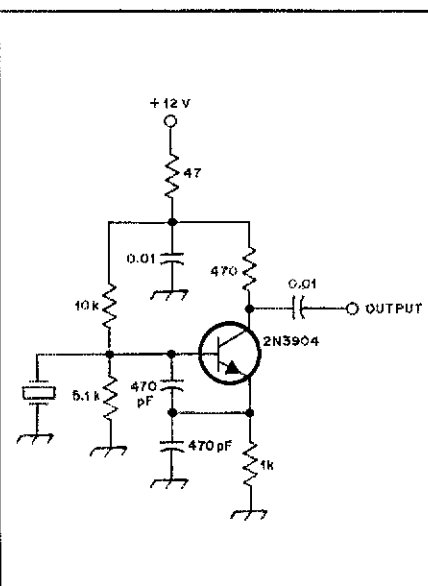


Fig. 4 — A simple crystal oscillator that may be used for crystal frequency matching. The 470-pF capacitors may be ceramic, mica or polystyrene. This circuit will function with crystals from 1.8 MHz to over 10 MHz.

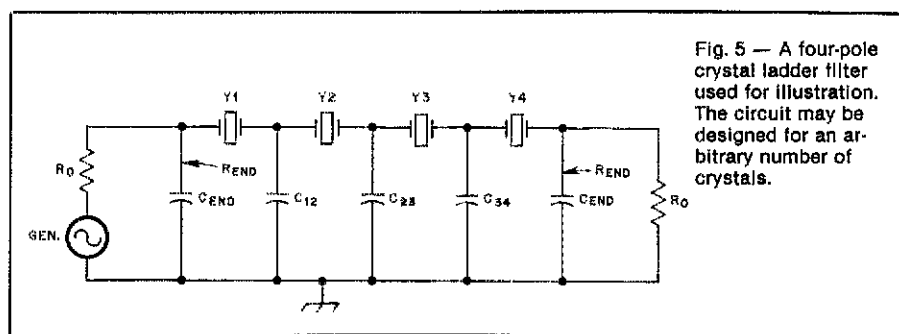


Fig. 5 — A four-pole crystal ladder filter used for illustration. The circuit may be designed for an arbitrary number of crystals.

Table 1
Normalized k and q Values for a Butterworth Response Without Predistortion

N	q	k_{12}	k_{23}	k_{34}	k_{45}
2	1.414	0.7071			
3	1	0.7071	0.7071		
4	0.7654	0.8409	0.4512	0.8409	
5	0.6180	1	0.5559	0.5559	1

Table 2
Normalized k and q Values for a 0.1-dB-Ripple Chebyshev Filter Without Predistortion

N	q	k_{12}	k_{23}	k_{34}	k_{45}
2	1.6382	0.7106			
3	1.4328	0.6618	0.6618		
4	1.3451	0.685	0.5421	0.685	
5	1.3013	0.7028	0.5355	0.5355	0.7028

for the Butterworth and the 0.1-dB ripple Chebyshev filters. More exacting designs may be done with the exhaustive tables presented by Zverev.¹ His work considers the effects of response-shape distortion, a consequence of loss in filter elements. The Zverev tables are termed "predistorted."

The motional crystal components, L_m and C_m , have been factored into the equations and need not be calculated. Equations are given for them, though. An equation is also given for the unloaded crystal Q (Q_u). This parameter is not needed directly for filter design, but should be evaluated, nonetheless. The Q_u value should exceed the filter Q by a factor of 10 or more to allow simple filters to be built. Filter Q is defined by $F_{\text{center}} + \text{bandwidth}$, where both are in hertz. Some surplus crystals may have a Q_u value that is too low for filter applications. The parameters are defined with respect to Fig. 5 as:

- Δf = bandwidth measured in test fixture (Hz)
- B = filter bandwidth in Hz
- R_o = end termination to be used (must be greater than R_{end})
- R_{end} = end resistance required to terminate the filter without matching capacitors
- C_{end} = matching end capacitor (pF)
- C_m = crystal motional capacitance (F)
- L_m = crystal motional inductance (H)
- F_o = crystal center frequency (MHz)
- R_s = crystal series-loss resistance as measured in test set
- C_{jk} = coupling capacitor (pF)

- C_p = crystal parallel capacitance (assumed to be 5 pF in all equations)
- k_{jk} = normalized coupling coefficient, given in Tables 1 and 2
- q = normalized end-section Q, given in Tables 1 and 2
- N = number of crystals to be used in the filter

The simplified design equations are

$$C_{jk} = 1326 \left[\frac{\Delta f}{B k_{jk} F_o} \right] - 10 \text{ (pF)} \quad (\text{Eq. 1})$$

$$R_{\text{end}} = \left[\frac{120 B}{q \Delta f} \right] - R_s \text{ (ohms)} \quad (\text{Eq. 2})$$

$$C_{\text{end}} = \left[\frac{1.59 \times 10^5}{R_o F_o} \right] \times \sqrt{\frac{R_o}{R_{\text{end}}}} - 1 - 5 \text{ (pF)} \quad (\text{Eq. 3})$$

Additional equations not mandatory for simple designs are

$$Q_u = \frac{1.2 \times 10^8 F}{\Delta f R_s} \quad (\text{Eq. 4})$$

$$C_m = 1.326 \times 10^{-15} \left[\frac{\Delta f}{F_o^2} \right] \text{ (farad)} \quad (\text{Eq. 5})$$

$$L_m = \frac{19.1}{\Delta f} \text{ (henrys)} \quad (\text{Eq. 6})$$

The design process will be illustrated with an example. Note that the equations use the units given in the list of parameters. Assume that a small group of crystals is frequency matched and found to have the average parameters $f = 294$ Hz, $\Delta F_o = 3.577$ MHz and $R_s = 23$ ohms. This data is typical of inexpensive TV color-burst crystals. These crystals will be used to design a 3-pole Butterworth crystal filter with a 250-Hz bandwidth. We eventually would like to terminate the filter in 50 ohms, but will not pick a termination, R_o , just yet.

The normalized coupling and loading values are found in Table 1 with $N = 3$. We see that $k_{12} = k_{23}$. Hence the coupling capacitors (Fig. 5) will be equal. The capacitor value is evaluated with Eq. 1.

$$C_{12} = C_{23} = 1326 \times \left[\frac{294}{250 \times 0.7071 \times 3.577} \right] - 10 = 606.5 \text{ pF} \quad (\text{Eq. 7})$$

The end resistance needed to terminate the filter is given by Eq. 2.

$$R_{\text{end}} = \left[\frac{120 \times 250}{1 \times 294} \right] - 23 = 79 \text{ ohms} \quad (\text{Eq. 8})$$

A value for R_o may now be picked. It may be any resistance greater than 79 ohms. A value of 200 ohms is chosen, and an end-

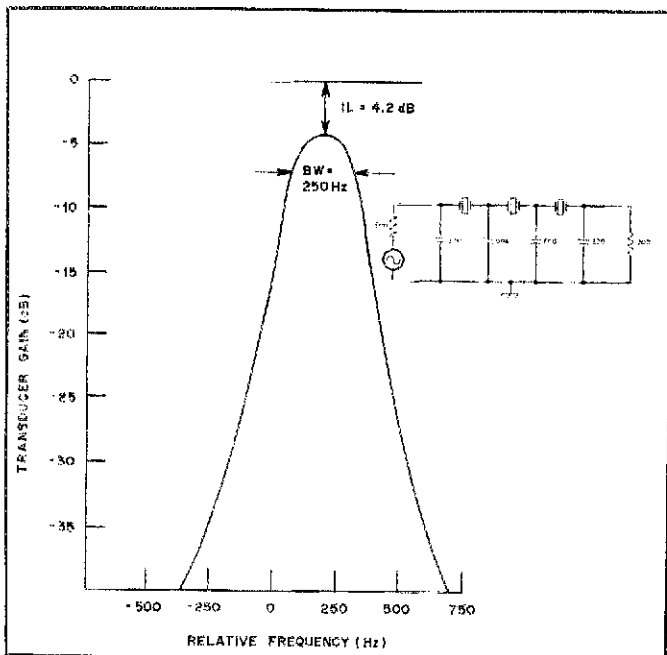


Fig. 6 — Circuit and calculated response for a 3-pole crystal filter at 3.577 MHz with a 250-Hz bandwidth. The design is based on measurements on surplus TV color-burst crystals.

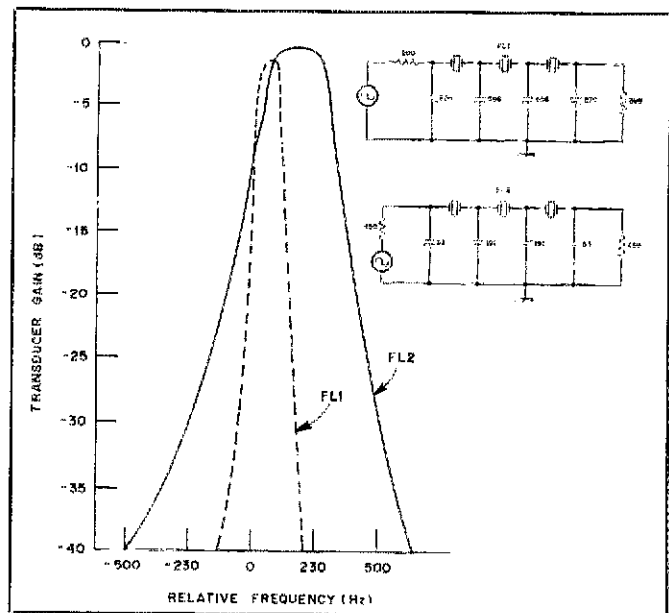


Fig. 7 — The response curves show the effect of using the wrong crystals in a design. The narrow response uses the circuit of Fig. 6 (FL1) with high-quality crystals. The wider response uses the circuit shown (FL2), designed on the basis of measurements on the crystals. Crystal data: $F_o = 3.579$ MHz, $R_s = 6.2$ and $Q_u = 721,000$.

matching capacitor is calculated from Eq. 3.

$$C_{\text{end}} = \left[\frac{1.59 \times 10^5}{200 \times 3.577} \right] \times \sqrt{\frac{200}{79} - 1} = 270 \text{ pF} \quad (\text{Eq. 9})$$

The final circuit is shown in Fig. 6. The calculated response is also shown. These calculations were done using the Ladder Method,⁶ and accounted for the 5-pF C_p value.

The 200-ohm resistance levels may be transformed to 50 ohms with ferrite transformers. This may not be needed in a circuit application, but is certainly useful for measurements.

Note that the filter has an insertion loss of 4.2 dB. This results from the crystal loss with a relatively low crystal Q ($Q_u = 63,000$), evaluated with Eq. 4. The bandwidth is very close to the desired 250-Hz value, but the peak shape is much more rounded than would be expected from a Butterworth filter. This is also a result of crystal loss.

Consider now the effect of using the circuit of Fig. 6 with other crystals. A group of high-quality 3.579-MHz crystals were measured in the test set. The results were very different than those found with the surplus crystals. The Δf was 96 Hz, and R_s was only 6.2 ohms. The calculated Q_u was 721,000 — over 10 times that of the surplus crystals. L_m was also much different.

The filter of Fig. 6, designed for the low- Q surplus crystals, was evaluated with the parameters of the high- Q crystals. The

result is shown in the narrow response of Fig. 7. The bandwidth is much narrower than the desired 250-Hz value, and would be nearly useless in a cw receiver, owing to excessive ringing.

A filter was then designed around the measured crystal parameters. This response is also shown in Fig. 7, as is the circuit, FL2. This filter has a low insertion loss of only 0.4 dB and a shape like that expected of a Butterworth design. A comparison of Fig. 6 and Fig. 7 illustrates the effects of shape distortion.

The data in Figs. 6 and 7 are calculated. An obvious question regarding any experimental pursuit is how well do calculated curves compare with measured data? This comparison is presented in Fig. 8 for a 5-MHz, 250-Hz bandwidth filter. The three-pole circuit is also shown in the figure. The comparison between calculation and measurement is very good. The offset in center frequency is of no significance — it resulted from using 4.999 MHz for F_0 during the calculation, rather than a more accurate value. The measurements were done with the writer's receiver synthesizer as a signal generator, followed by a step attenuator and then the filter. This was followed by a broadband amplifier and a 50-ohm-terminated oscilloscope. Similar results have been obtained with filters at 3.579 MHz.

The experimental curve of Fig. 8 is marked with a BFO frequency. This would be the proper frequency to provide a 700-Hz beat note and to ensure good suppression of the opposite sideband. This filter would be very practical in a

simple superhet receiver for cw application, especially if it were supplemented with an R-C active low-pass audio filter. This scheme has been used very successfully by the writer in a portable Field Day transceiver.⁷

A simple three-pole filter is also practical for some ssb applications. Such a filter at 5 MHz is shown in Fig. 9. Measured and calculated frequency-response curves are also shown. Note that the filter shape is lacking in symmetry. Indeed, this is an illustration of why this type of circuit is termed a "lower sideband ladder." This also justifies the position of the BFO in Fig. 8. In spite of the poor attenuation slope on the low-frequency side, the filter of Fig. 9 would be practical for a simple ssb exciter. This passband ripple may be eliminated by tuning, a detail shown in the figure and covered in the following section.

Filter Tuning

The method presented so far has assumed that all crystals are exactly at the same frequency. This simplification is sufficient for many applications, especially with narrow-bandwidth filters. It is not adequate for critical designs. Additional tuning is required if we want to design filters with an exactly predicted bandwidth, achieve a desired shape more accurately, or build wide-bandwidth filters with more than 3 or 4 crystals.

Modern filter theory has been used to calculate coupling and end-matching capacitors. The detail that we have ignored is that the individual crystals have

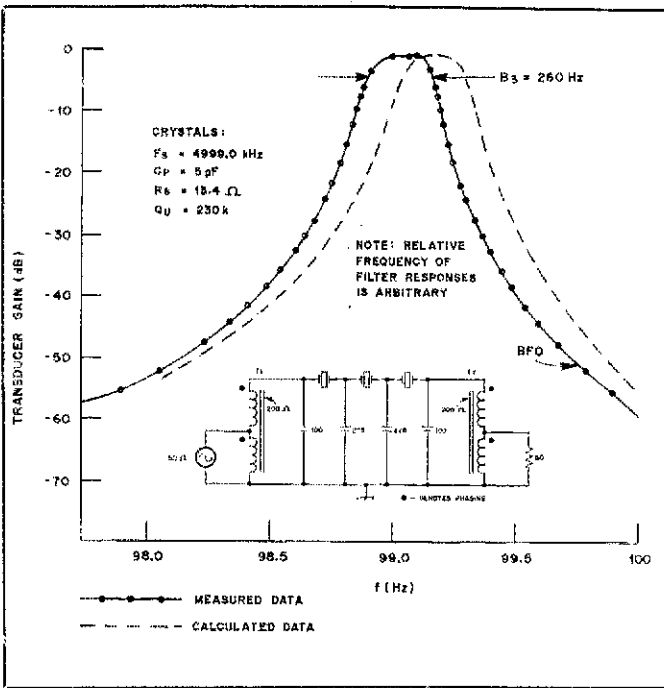


Fig. 8 — Comparison of calculated and measured results on a 5-MHz cw filter. The crystals had $F_0 = 4.999$ MHz, $C_p = 5$ pF, $R_s = 13.4$ ohm and $Q_u = 230,000$. A proper BFO frequency is marked. See text for discussion.

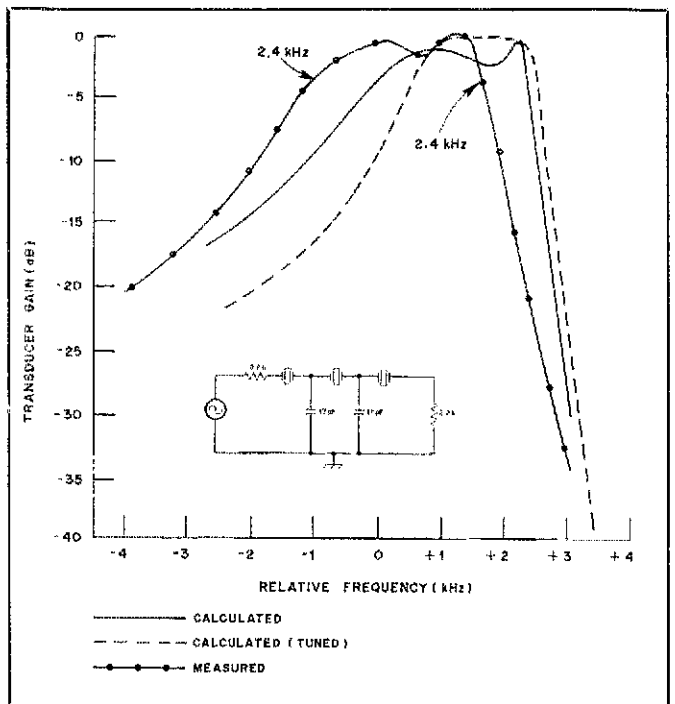


Fig. 9 — Measured and calculated (with and without tuning) results for a wider bandwidth filter for use in a simple ssb exciter. Crystals are the same as used for the filter of Fig. 8.

been detuned by the shunt capacitors. The detuning may be "fixed" through proper choice of crystal frequencies or with the insertion of additional capacitors in the circuit.

Fig. 10A shows one end of a crystal filter. The crystals have been replaced with the simplified equivalent circuit without loss resistance. All crystals are assumed to be at the same frequency, which implies that all L_m and C_m values are the same throughout the filter.

Filter theory states that each loop in this circuit should be resonant at the same frequency when that loop is considered alone. Adjacent loops are open-circuited during this evaluation. Consider the interior loop shown in Fig. 10B. The crystal resonance is determined by L_m and C_m . However, the resonant frequency of this loop is determined by L_m and the series equivalent of the three capacitors, C_{12} , C_{23} and C_m . The loop will resonate slightly higher than the crystal frequency. The actual frequency is easily calculated with standard formulas and a hand calculator.

Analysis of end-section resonance is slightly more complicated. The end resistance and the related parallel capacitance must be resolved into a series equivalent, shown in Fig. 10C. The series capacitance is given by

$$C_s = \frac{\frac{1}{R_o^2} + \omega^2 C_{end}^2}{\omega^2 C_{end}} \quad (\text{Eq. 10})$$

where $W = 2\pi F_o \times 10^6$.

The resonant frequency of the end loop is then calculated from L_m and the series combination of C_s , C_m and C_{12} .

Consider an example, a 4-pole ssb filter. This circuit, shown in Fig. 11, was designed for a 0.1 dB Chebyshev response using the k and q values from Table 2 and

crystals with $F_o = 3.577$ MHz, $R_s = 23$ ohms and $Q_u = 63,000$. Assume for the present that the two 96-pF capacitors are shorted. The filter is symmetrical, so only two frequency calculations must be done — one for the ends and one for the interior loops. The end loops are resonant 1220 Hz above F_o , while the inner two loops resonate 1790 Hz above F_o .

Two methods may be used to tune this filter, to force all loops to resonate at the same frequency. One method requires that the F_o of the crystals in the end sections be increased 570 Hz over that of the inner loops (570 = 1790-1220). This difference is small compared with the filter bandwidth, so we would not expect a dramatic difference in response shape.

The other method places capacitors in series with crystals in those loops requiring a frequency increase — the end sections of Fig. 11. This is the circuit shown in the figure. A value of 96 pF was found to be necessary for the 570-Hz shift. The addition of series capacitors allows more design flexibility, especially when working with surplus crystals. On the other hand, it may be convenient to use stagger-tuned crystals if the batch on hand has the proper frequency spreads. It is, of course, possible to use a combination of the two methods.

The frequency response of the four-pole filter is shown in Fig. 11 for the cases with and without tuning. The center frequency is raised with tuning, and pass-band ripple is reduced to near the desired 0.1-dB level. Either filter would be practical for amateur applications.

The bandwidth of the ssb filter of Fig. 11 was 2.2 kHz. It was designed for a 2.5-kHz bandwidth. The difference results from simplifying assumptions used to derive the critical equations and using the k and q values from Table 2, where the effect of filter loss is ignored during

design. Improved accuracy is obtained with the Zverev tables to supply the k and q values. Suitable amateur filters may be designed by increasing the design bandwidth slightly over the desired one, while using the Table 1 or 2 data.

The effects of shape distortion are more dramatic with narrow-bandwidth cw filters, for the losses are higher with decreased bandwidth. The Butterworth data of Table 1 provide a good starting point for design. As losses increase, the shape of a narrow-bandwidth filter evolves toward one with a more rounded peak shape, approaching something like a Gaussian response. This rounded shape is desired for narrow-band application, for it offers an improved time-domain characteristic with less filter ringing. Chebyshev filters should not be used for cw applications.

The effects of filter tuning were examined experimentally in the filter of Fig. 12. This was a 250-Hz wide design using the 5-MHz crystals applied in other filter experiments. A 5-pole design was chosen. The measured responses with and without tuning are also shown with the circuit. Without tuning, the attenuation slope on the high-frequency side of the response was poor. Tuning the filter improved the shape and reduced the insertion loss. The shape was still not the Butterworth response predicted. This was traced to variations in the crystal frequencies that had not been taken into account during the design. This filter is destined for use in a multiband portable transceiver.

Conclusions and Applications

Home construction of crystal filters is very practical, especially for the experimentally inclined amateur with the usual amount of instrumentation. Laboratory-grade equipment is definitely not needed. It is important, however, that the filters be carefully designed, and that the designs be based on the crystals to be used. Measurements are performed easily in the home lab to obtain the needed crystal parameters. None of the filter circuits presented in this paper is suitable for exact duplication.¹

Filter tuning may or may not be required, depending on the filter to be built. An interesting filter that would never require tuning is a two-pole circuit. This results from symmetry. Any detuning would be the same in both crystals. Improved stopband attenuation may then be obtained with a cascade of several filters with isolating stages of gain between them.

Another interesting special case is the three-pole filter with all crystals at the same frequency. The terminating resistance, R_o , may be set equal to the calculated R_{end} . There will then be no shunt capacitors at the ends. This filter may be tuned by placing series capacitors

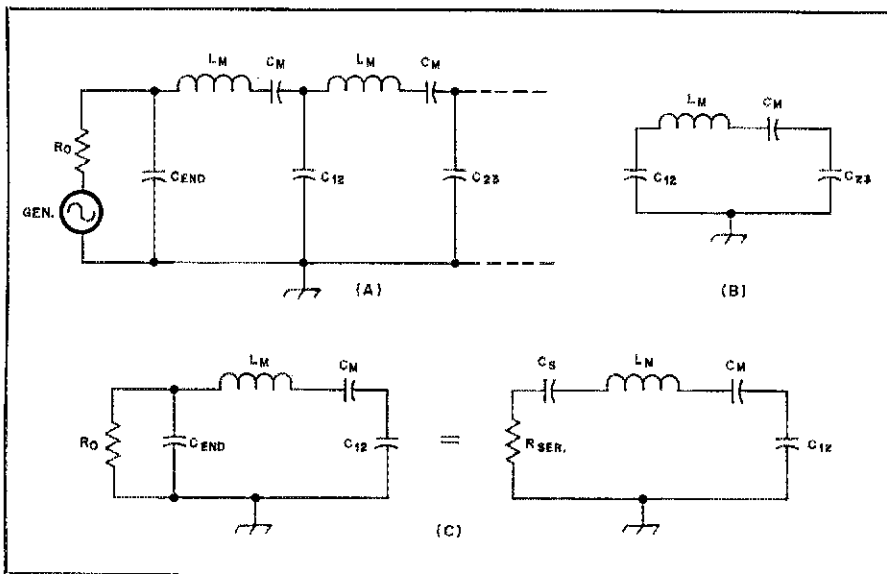


Fig. 10 — Partial filter circuits used in evaluation of tuning of individual loops. See text for details.

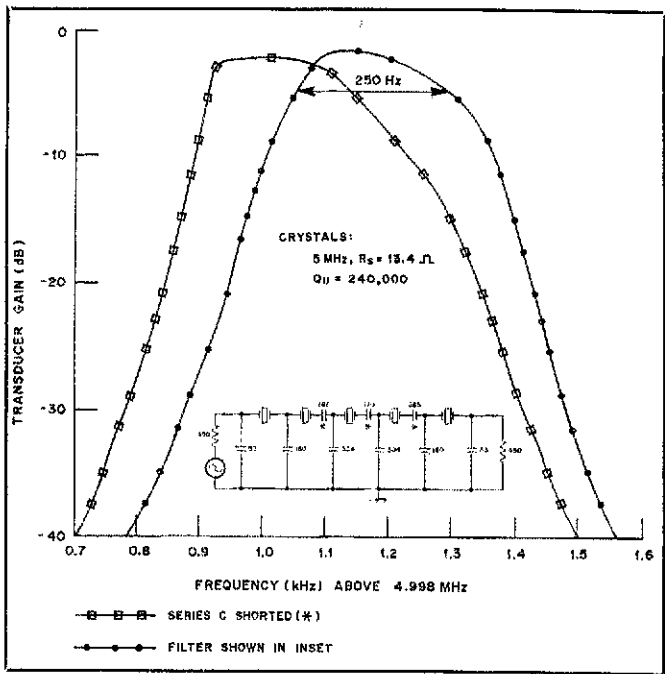
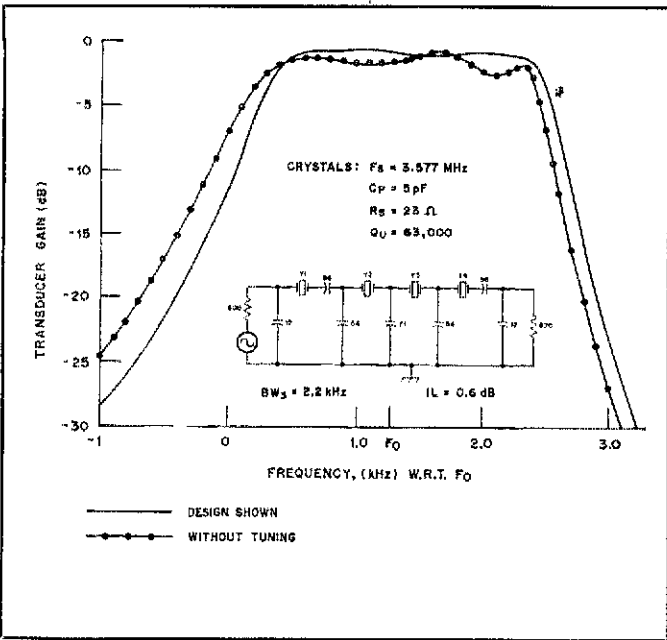


Fig. 11 — Calculated response for the 4-pole ssb filter shown. Surplus color-burst crystals were used for the design. The two response curves show the effects of filter tuning.

Fig. 12 — Measured response curves for a 5-pole, 5-MHz cw filter. The two curves show the effects of tuning a filter with series capacitors.

in the end loops, which have a value equal to the coupling capacitors. An example of this is the ssb filter shown earlier in Fig. 9. The tuning was realized with the addition of 17-pF capacitors in series with the two outside crystals. Variable capacitors may be used, of course, in any of the circuits shown. Instrumentation must then be built for alignment.

The 3.58-MHz TV color-burst crystals offer an attractive possibility for a simple cw receiver. A single local oscillator could be built at approximately 10.5 MHz. This will then allow both the 40- and 20-meter cw bands to be received with no band switching in the LO. This scheme is not

well suited to an ssb receiver, for harmonics of the BFO appear at 7.16 and 14.32 MHz. This harmonic relationship could also lead to spurious responses in a two-band cw transceiver.

Examination of the design procedure reveals some interesting subtleties. Careful choice of termination, R_0 , could lead to filters requiring no tuning. Useful filters *can* be built from poorly matched crystals, although the design may get messy. Excessive tuning with series capacitors will increase the loss of the filter. Finally, careful choice of termination resistance will allow the construction of filters with a switched bandwidth. EET

Notes

¹A. I. Zverev, *Handbook of Filter Synthesis* (New York: John Wiley and Sons, 1967), Chapter 8.

²J. A. Harcastle, "Ladder Crystal Filter Design," *QST*, Nov. 1980, pp. 20-23.

³W. Hayward, *Introduction to Radio Frequency Design* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1982). Both filter types are covered in detail in Chapter 3.

⁴W. Hayward and D. DeMaw, *Solid-State Design for the Radio Amateur* (Newington: ARRL, 1977), p. 171.

⁵See note 1, pp. 341-379.

⁶See note 3.

⁷See note 4, p. 214.

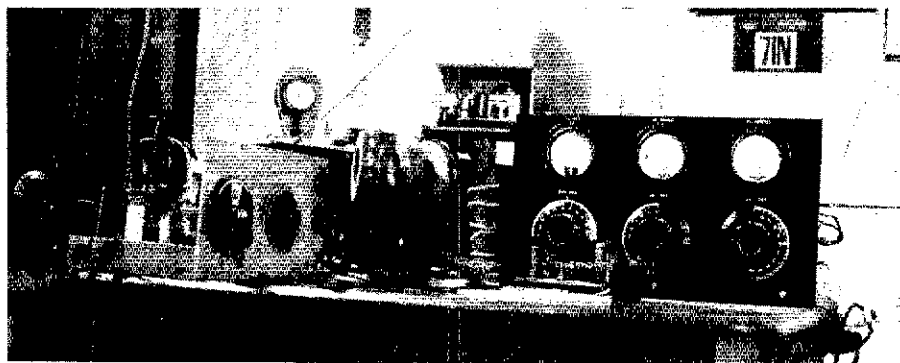
⁸The author has made arrangements to supply crystals at a variety of frequencies that have been characterized for filter applications. Interested readers should send an s.a.s.e. for a data sheet.

Strays

QST congratulates . . .

□ Retired Army Colonel Fred J. Elser, KH6CZ, of Honolulu, on receiving a PhD in American Studies from the University of Hawaii. His doctoral thesis was entitled "Amateur Radio — An American Phenomenon."

□ Ira Bechtold, W6NCP, on receiving the Los Distuidos Award from the La Habra Heights (California) Improvement Association for 10 years of outstanding service to his community.



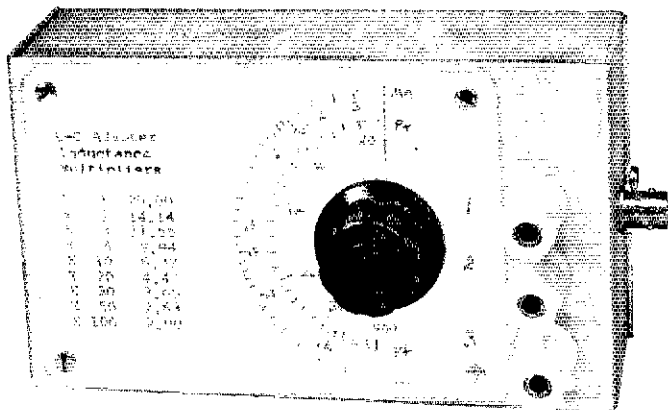
Bill Staiger, W7IN, of Portland, Oregon, came across this photo while going through an old box buried in his attic. The honeycomb coil receiver (left) was used for arc reception around 15,000 meters and also for i-f reception on 800 meters (500 kHz) with different plug-in coils. The transmitter (right) was a TPTG back-to-back circuit fed with a 60-Hz power supply with a 120-Hz note. The breadboard receiver seemed to work, Bill notes, if he didn't get too close to the coupling unit and disturb the body-capacity effect while tuning. (photo courtesy W7IN)

Measuring Inductance and Capacitance With a Reflection-Coefficient Bridge

Need an inexpensive means of accurately measuring unknown L and C values?

A few well-spent weekend hours and that capability is yours!

By Jack Friedigkeit,* W6ZGN



When constructing tuning coils for a receiver, inductors for an rf filter, or coils and transformers for impedance-matching purposes, it is convenient to have a means of directly and accurately measuring inductance. A reflection-coefficient bridge, useful for measuring an impedance match in terms of reflection coefficient, return loss, or VSWR on a transmission line,¹ can be adapted to measure inductance.

Described here is the construction and calibration of a simple LC adapter that can be used with a reflection-coefficient bridge to measure inductance values from 0.2 μH to 200 μH , and capacitance values from 5 pF to 400 pF. Depending on the care taken during calibration, the resulting accuracy can be comparable to that of an expensive Q meter.

Circuit Theory and Operation

Fig. 1 shows the LC adapter as a simple series circuit consisting of a calibrated capacitor, C1, the unknown inductance, L_X , and a 51-ohm resistor, R1. At resonance, the capacitive reactance of C1 cancels the inductive reactance of L_X , leaving R1 to terminate the coaxial cable

connecting the LC adapter to the reflection coefficient bridge. Thus, a sharp dip is seen on the bridge receiver S meter as C1 is tuned through resonance.

The value of L_X at resonance is calculated easily, as both the frequency and the value of C1 are known.

$$L_X = \frac{10^6}{(2\pi f)^2 C1} \quad (\text{Eq. 1})$$

where f is in MHz and C1 is in pF.

Mathematical calculations are not required if a dial is attached to the shaft of the variable capacitor and calibrated in terms of capacitance and inductance values for a specific operating frequency, f_0 . The capacitor calibration is independent of frequency. So, multipliers for the inductance scale can be realized by selecting different operating frequencies according to the relation:

$$f_m = \frac{f_0}{\sqrt{M}} \quad (\text{Eq. 2})$$

where

f_0 is the calibration frequency for the $\times 1$ multiplier

f_m is the new operating frequency

M is the inductance scale multiplier ($\times 2$, $\times 5$, etc.).

For example, the inductance scale is multiplied by a factor of 5 when the operating frequency is reduced by a factor of $\sqrt{5}$.

Table 1 shows some multiplier factors that can be had when a general-coverage receiver is used with the bridge. Table 2 provides multipliers for use with a ham-bands only receiver. An operating (or $\times 1$) frequency above 20 MHz is not recommended because of possible resonances within the LC adapter.

Construction

An adapter constructed by the author is shown in Fig. 2. This one is mounted in an LMB model 138 box which measures 3-1/2 \times 6-1/4 \times 2-1/8 inches (mm = inches \times 25.4). To minimize lead length and internal inductance, the location of the binding posts (J1 through J3) and the BNC connector (J4) relative to the terminals of the variable capacitor is important. The adapter shown is self-resonant at 32 MHz with the inductance terminals shorted and C1 set to maximum capacity. This indicates an equivalent internal inductance of 0.06 μH , which limits the minimum inductance that can be measured.

C1 is the most important component of

¹Notes appear on page 29.

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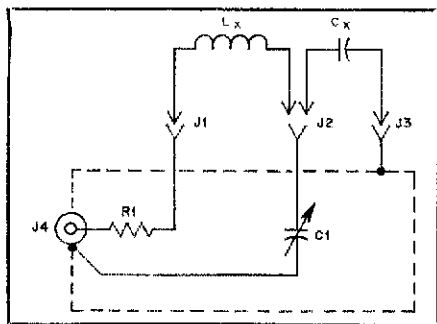


Fig. 1 — Schematic diagram of the LC measuring adapter. Short interconnecting leads should be used.

- C1 — 465 pF variable (see text).
- CX — Capacitor to be measured.
- J1-J3, incl. — Binding post, Voltex 35N844 or equiv.
- J4 — Female BNC chassis connector.
- LX — Inductor to be measured.
- R1 — 51 Ω, 1/2-watt, 5% carbon composition.

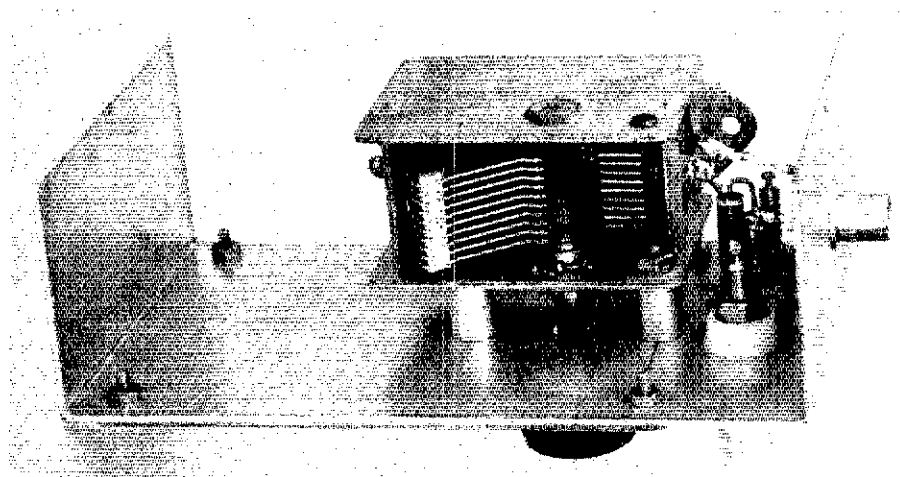


Fig. 2 — An inside view of the LC adapter constructed by the author. Short, heavy leads connect the capacitor to the binding post (J2) and to a grounding lug secured beneath the BNC connector (J4) mounting nut.

Table 1
General-Coverage Receiver Multipliers

Multiplier	Operating Frequency (MHz)
X1	20.00
X2	14.14
X3	11.55
X5	8.94
X10	6.32
X20	4.47
X30	3.65
X50	2.83
X100	2.00

Table 2
Ham-Band Receiver Multipliers

Multiplier	Operating Frequency (MHz)
X1	14.140
X4	7.070
X16	3.535
X50	1.999

the adapter; the capacitor chosen for C1 should be one of good quality. A mechanically sound capacitor ensures smooth operation and reliable calibration. An ideal capacitor would be a single-section, 465-pF, straight-line frequency type with ceramic or glass insulation. Such capacitors were frequently found as World War 2 surplus items, and a few may be still resting quietly at the bottom of some junk boxes.

One section of a dual, 465-pF-per-section capacitor of the type used in early four-tube TRF and superheterodyne bc radios is a good second choice. These capacitors have phenolic insulation and are equipped with a small padder capacitor. The padder should be removed, as it will limit the minimum capacitance

setting and could change the dial calibration if the adjusting screw were to move. A single-section capacitor of this type was used to construct the adapter shown in Fig. 2. Miniature tuning capacitors salvaged from transistor radios are of questionable value because of their low capacitance range and poor mechanical quality.

Calibration

Access to a reliable low-frequency capacitance bridge or a Q meter that has a resolution of a few picofarads^{2,3} is required to calibrate the LC adapter. A calibration frequency of less than 100 kHz should be used to minimize the effects of the inductance of the test leads connecting the adapter to the capacitance bridge. Be sure, however, to compensate for the capacitance between these test leads, as it will be on the order of 10 to 20 pF and will result in appreciable error if it is not taken into account.

First, calibrate the capacitance scale. Then select the operating frequency for the × 1 multiplier, and calculate the location of the inductance values relative to the calibrated capacitance scale. For example, to locate the 1-μH calibration mark when f₀ is chosen as 20 MHz, the value of the resonating capacitance is:

$$C = \frac{10^6}{(2\pi f_0)^2 L} = \frac{10^6}{(2\pi \times 20)^2 \times 1} = 63.3 \text{ pF} \quad (\text{Eq. 3})$$

The 1-μH calibration mark should be located opposite 63.3 pF on the calibrated capacitance scale. If f₀ were chosen to be 14.14 MHz, the 1-μH mark would be opposite 127 pF on the capacitance scale.

Repeat the foregoing procedure for the other values to be located on the inductance scale. Remember — the accuracy of

the LC adapter depends on the accuracy of calibration.

Measuring Inductance and Capacitance

To measure inductance, select an operating frequency for the desired inductance-scale multiplier, and tune the signal generator and bridge receiver to this frequency. Connect the inductance to be measured to terminals 1 and 2 of the LC adapter, and adjust C1 for resonance, as indicated by a dip in the S-meter reading of the bridge receiver. Read the value of inductance from the calibrated scale.

For capacitance measurements, select an inductance and operating frequency such that the coil can be resonated with C1 near mid-range. Connect the coil to terminals 1 and 2, and note the capacitance value of C1 at resonance. Now connect the capacitor to be measured to terminals 2 and 3 of the adapter, and adjust C1 again for resonance. The unknown capacitance value is the difference between the initial and final readings on the capacitance scale.

Remember that the calibration of the capacitance scale is independent of frequency. Thus, for unknown capacitance values that may approach 400 pF, the operating frequency during measurement should be lowered so that the initial value of C1 is near maximum capacitance.

Spend a couple of hours assembling this inexpensive adapter. It will provide you with a means of making accurate measurements of unknown L and C values — a worthwhile addition to your workbench.

Notes

- ¹J. Priedigkeit, "A Reflection Coefficient Bridge — Impedance Matching Measurement the Easy Way," *QST*, October 1981, p. 18.
- ²Hewlett-Packard model 4260A CRL Bridge or equivalent.
- ³Hewlett-Packard model 4342A Q Meter or equivalent.

Calibrate Your 2-Meter Synthesizer With Only a General-Coverage Receiver

Short on test equipment and money? Need to align your 2-meter synthesizer? Be innovative! Do it with a general-coverage receiver!

By L. H. Cantwell,* WA9KKR

Are radio amateurs always inventive? Usually, but there are gaps where just a little additional innovation would yield surprising results. The tuning of frequency synthesizers (common in 2-meter fm equipment) is one of these areas. Does your synthesizer need tuning?

One popular method of tuning a synthesizer relies on a frequency counter. A less popular method requires a general-coverage receiver. The principle of this (my) approach is "zero beating." The results of the two methods are the same; but I didn't have to buy a frequency counter with my technique!

Historical Perspective

This procedure has roots in the history of ham radio. Until the advent of ssb transceivers, zero beating was used almost universally to match the transmitter frequency with the receiver frequency. If there are two carriers within the passband of an i-f amplifier, they produce a beat note that is equal in frequency to the difference of the two carriers. In the "good old days," if one of these carriers came from a station we wished to talk with, and if the other was leakage from our VFO, we simply adjusted the VFO in a manner that would reduce the frequency of the beat note to zero.

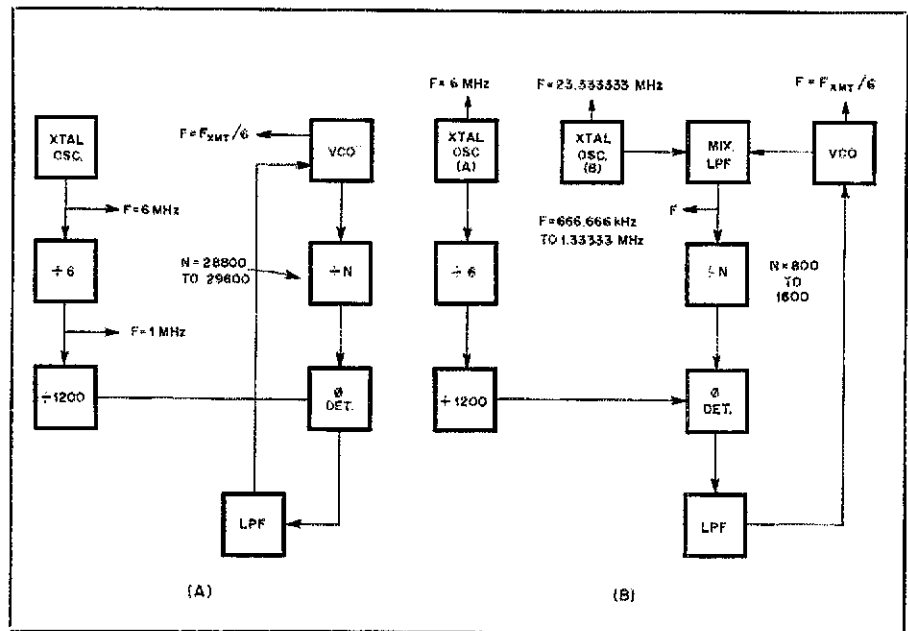


Fig. 1 — At A, simplified block diagram of a basic synthesizer. At B, a block diagram of a more complex synthesizer that employs an offset oscillator.

Before the beat-note frequency reached zero, it would be too low to be readily audible. Fortunately, at that point, a visual fluttering would appear on the receiver S meter. We adjusted the VFO to make the meter flutter slower and slower until the movement stopped. At this

point, the two carriers were equal in frequency.

Basic Synthesizer

This technique still has value for calibrating crystal oscillators, and it is the method I use to check my 2-meter syn-

thesizer. Let's look at the basic divide-by-N synthesizer (Fig. 1A). It has the advantage of using only one crystal oscillator. Once this oscillator is properly calibrated, the synthesizer is on frequency for any setting. This scheme is not without drawbacks; a divide-by-N counter must be capable of high-speed operation (on the order of tens of MHz). This can generate objectionable spurious frequencies. A complex switching scheme is required to translate the dial setting to the proper N during reception and offset transmission. Nonetheless, practical circuits have been developed using this method.

Referring again to the technique of zero beating, we must have two carriers within the audio passband of a general-coverage receiver. The standard frequency we select will be one of the transmit frequencies of WWV. Most likely, it will be either 5, 10 or 15 MHz. Our other carrier will be related to the synthesizer reference oscillator. It can not be the reference-oscillator frequency, because 6 MHz is not harmonically related to any WWV frequency.

We look to the reference oscillator divider chain to see if a useful frequency is produced. After the divide-by-six counter, the output frequency is 1 MHz. Harmonics of this frequency are equal to our WWV choices. All synthesizers do not employ this scheme. Some dividers are binary, making it more difficult to uncover a portion of the circuit having a harmonic relationship to WWV. You might find frequencies as low as 10 kHz useful, if you reference them to the 5-MHz WWV transmission. If you are referencing to the higher WWV frequencies, you should not use a carrier frequency lower than 100 kHz.

Connect a capacitor (between 10 and 100 pF) to the output of the divide-by-six counter. Attach the other end of this capacitor to a wire that is placed near the terminals of a communications receiver. Tuning the receiver to WWV, you should hear a beat note. Adjust the frequency of the crystal oscillator to zero beat with WWV. This completes the calibration of the reference oscillator.

Offset Synthesizers

Offset synthesizers are more complex (Fig. 1B). Our representative circuit has a second offset oscillator, which must be properly adjusted, in addition to the first oscillator. Instead of the divide-by-N circuit counting the VCO frequency, it counts the difference frequency of the VCO and a second oscillator known as the offset oscillator (Table 1). This results in a VCO frequency that is the sum of the divide-by-N-counter and the offset oscillator frequencies. Many disadvantages to the simple synthesizer are overcome, but at the expense of a loss of simplicity as well as some sacrifice of frequency stability. Two oscillators, rather

than one, are now controlling the VCO frequency. Should they drift in the same direction, both will add to the VCO frequency error.

Our adjustment of the offset oscillator is not as simple as that of the reference oscillator. The offset crystal frequency is 23.333333 MHz. I assure you that looking for some harmonic relationship to a standard frequency is pointless. We can take a "back-door approach" to adjusting this oscillator with great success. Let's assume this oscillator is on frequency and the synthesizer is operating properly. Examining the VCO frequency, we find it to be one-sixth the operating frequency, or 24.000000 to 24.666667 MHz for a transmitting frequency of 144.000 to 148.000 MHz, respectively.

Although 24 MHz is not harmonically related to any WWV frequency, we are not out of luck. Remember, the divide-by-six counter produces an output of 1 MHz

from our 6-MHz oscillator. Since it is a square wave it will be rich in harmonics. Because we have calibrated this oscillator to WWV — just as we did with the simple synthesizer — it will become our new standard for adjusting the VCO frequency. Setting the synthesizer dials to 144.000 MHz, and placing the transceiver in the transmit (simplex) mode, causes the VCO to operate at 24 MHz.

For this stage of the alignment we use the test set-up depicted in Fig. 2. Attach the wire from the 100-pF capacitor to the receiver antenna terminal, and then tune the receiver to 24 MHz. (Note: If the 100-pF capacitor seems to load down the output of the divide-by-six counter, reduce the value to one that does not, e.g. 10 pF or so.) Connect a second wire to the receiver terminal and route the other end near the VCO. Enough rf energy from the VCO and the 24th harmonic of the 1-MHz output should be present at the antenna terminals of the receiver to produce an audio beat note. If the offset oscillator is exactly on frequency, the VCO will be exactly 24 MHz and no beat note will be heard. Adjusting the offset oscillator while following the zero-beat procedure will bring the offset oscillator on frequency.

We now have adjusted the offset frequency for simplex operation only. We can adjust the -600-kHz offset by setting the synthesizer to the -600 mode and the transceiver to receive 144.60 MHz. This puts the VCO frequency at 24 MHz during transmission. Repeat the zero-beat procedure for this offset oscillator. We can align the +600-kHz offset oscillator in the same manner, except we set the transceiver frequency to 143.400 MHz. [Editor's Note: Some circuits will require extensive modification to enable coverage of this frequency.]

Adjusting the receiver offset is a bit more tedious. First of all, the frequency range of the VCO must be determined. My transceiver uses a 10.7-MHz i-f, resulting in a VCO frequency of 22.216667 to 22.883333 MHz for reception of 144.000 to 148.000 MHz, respectively. Several multiples of 100 kHz occur in this range, offering one method of alignment. With my radio I can take a simpler approach. I set the transceiver frequency for 142.700 or 148.700 MHz to provide a VCO frequency of 22.000 or 23.000 MHz, respectively. Tune the communications receiver to 22 or 23 MHz, corresponding to the transceiver setting, and zero beat. This completes the zero-beat method of alignment.


Although I used a specific synthesizer as an example, the technique is general. After spending some time with a calculator and the block diagrams of most of the common schemes, I determined that variations of this approach would work with any of them. Are you inventive? What other gaps can you fill? 

Table 1
Transmit and Receive Frequency Formulas for Offset Synthesizers

VCO Transmit Frequency

$$\frac{F_d + F_o}{M} = F_{VCO}$$

where

- F_d = synthesizer dial frequency
- F_o = transmit offset frequency (simplex, ± 600 kHz, etc.)
- F_{VCO} = VCO frequency
- M = transmitter multiplication factor ($M = 6$ in text)

VCO Receive Frequency

$$\frac{F_d + F_{i-f}}{M} = F_{VCO}$$

where

- F_d = synthesizer dial frequency
- M = transmitter multiplication factor
- F_{i-f} = frequency of first i-f amplifier (treat as a positive number if high-side injection is used, and as a negative number if low-side injection is used)

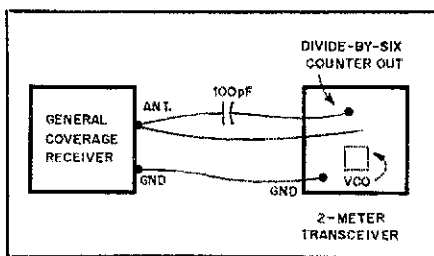
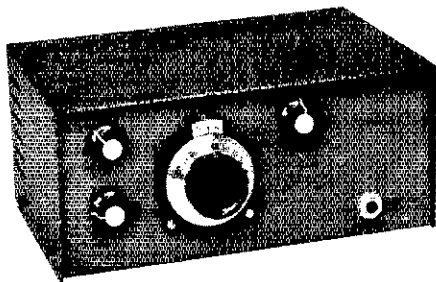


Fig. 2 — Hook-up diagram for aligning an offset synthesizer that uses only a communications receiver.



Getting Started on VHF: A Tunable I-F for VHF Converters

Part 2: This project provides a solid foundation for your 6-meter receiving setup.

By George Collins,* KC1V

Does successful vhf operation demand an adequate receiving system? Yes, and fortunately the vhf newcomer can put together a satisfactory receiving setup without having to forego a second car or the children's education! One of the simplest options available is also one that can provide high performance at low cost — a crystal-controlled converter followed by a tunable i-f (intermediate-frequency) unit.

Most commonly, the i-f unit is the regular station receiver operating at 10 meters. A 6-meter converter, for example could be used to convert signals between 50 and 52 MHz to the 28- to 30-MHz range. Any 10-meter receiver or transceiver could then be used as the tunable i-f. The 10-meter band is often chosen as the i-f because of the wide frequency coverage (28 to 30 MHz) provided on most receivers. If your interest is in only a small part of the vhf band, other hf bands can be used as the i-f.

This type of system has several advantages. First, if you have a suitable receiver available for use as the i-f unit, the cost of this approach can be very low. You need only buy or build the converter portion of the system. In addition, the overall system selectivity and stability are nearly the same as that of the tunable i-f receiver. The major disadvantage of using your hf receiver or transceiver as the i-f unit is that you must disconnect the converter when using the hf bands and reconnect everything before you can listen to the vhf band. The experienced vhf operator knows that he will be doing a lot of listening. A separate vhf receiver is far more convenient and allows you to monitor the vhf calling frequencies while using your hf equipment for normal operating. It should be noted that some current transceivers have provisions for the use of vhf transverters (a combination receiving and transmitting converter). These

transceivers make convenient i-f units.

A 10-MHz Tunable I-F

The receiver described here serves well as a tunable i-f unit and, as a "plus," you can use it to listen to the new 10-MHz band! A 6-meter receiving converter, using 10 MHz as the output frequency, is being developed for use with this receiver. It will appear in an upcoming Beginner's Bench installment.

This receiver, originally called the Mini-Miser's Dream, was designed by Doug DeMaw, W1FB, as a portable 40-meter receiver.¹ It is a superheterodyne design using a crystal filter to provide good selectivity. Integrated circuits (ICs) have been used in the mixer, i-f amplifier and audio amplifier stages to reduce the number of components. As an aid to simplicity, agc (automatic gain control) has not been included. A front-panel potentiometer serves as a manual i-f gain control.

To change the receiver tuning range from 40 meters to 10 MHz, only two circuits require modification. The mixer (U1) input circuit is tuned to 10 MHz by changing the number of turns on T1 and retuning C1. To cover the 10.0- to 10.3-MHz range, the VFO (variable-frequency oscillator) must tune from approximately 6.7 to 7.0 MHz. This is accomplished by changing the oscillator tank circuit components (L2 and the associated capacitors). The buffer amplifier (Q3) output filter is also changed to the new frequency.

To make the receiver more compatible with the 6-meter VXO transmitter,² a muting circuit, audio-frequency gain control and sidetone input have been added to the original circuit. All of these modifications have been incorporated in Fig. 1.

Circuit Highlights

Mixer U1 converts the incoming 10-MHz signals to the i-f of 3.3 MHz. L1

and C2 tune the mixer output to the i-f, where FL1, a single-crystal filter, provides the selectivity. A phasing capacitor, C3 is used during alignment to adjust the filter for best selectivity. Following the filter is an IC i-f amplifier, U2. The amplifier output is tuned by T2 and C4 to the i-f. T2 also provided the necessary impedance match between the mixer and the two-diode product detector. Beat-frequency oscillator (BFO) injection voltage is provided by means of a crystal-controlled oscillator (Q1). After detection, the audio signal is amplified in U3. Approximately 300 mW of audio is available to drive headphones or an 8- Ω speaker.

The VFO section contains two transistors. A JFET (junction field effect transistor) is used as the oscillator. The circuit configuration used here is known as a series-tuned Colpitts. A buffer amplifier (Q3) is used to isolate the VFO from the mixer. Voltage regulation for the oscillator is provided by U4, a three-terminal regulator.

Construction Notes

Receiver assembly is simplified by using an etched-circuit board.³ All components except the panel-mounted potentiometers and switches are contained on the single board. Component placement is shown in Fig. 2.

The VFO section is enclosed in a compartment made from double-sided circuit-board material. The compartment measures (HWD) 1-3/8 \times 1-5/8 \times 2-3/4 inches.⁴ To form the enclosure, first cut the sections of board to size. Then carefully tack solder the pieces together, using a small drop of solder at each inside corner of the box. Make sure the box is square, then tack solder the outside seams. Now flow a bead of solder along each seam. With care, this can be done with a 27-W soldering iron, but a 40-W iron will make the job easier.

Place the finished shield compartment on the circuit board, using the component

*Assistant Technical Editor

¹Notes appear on page 34.

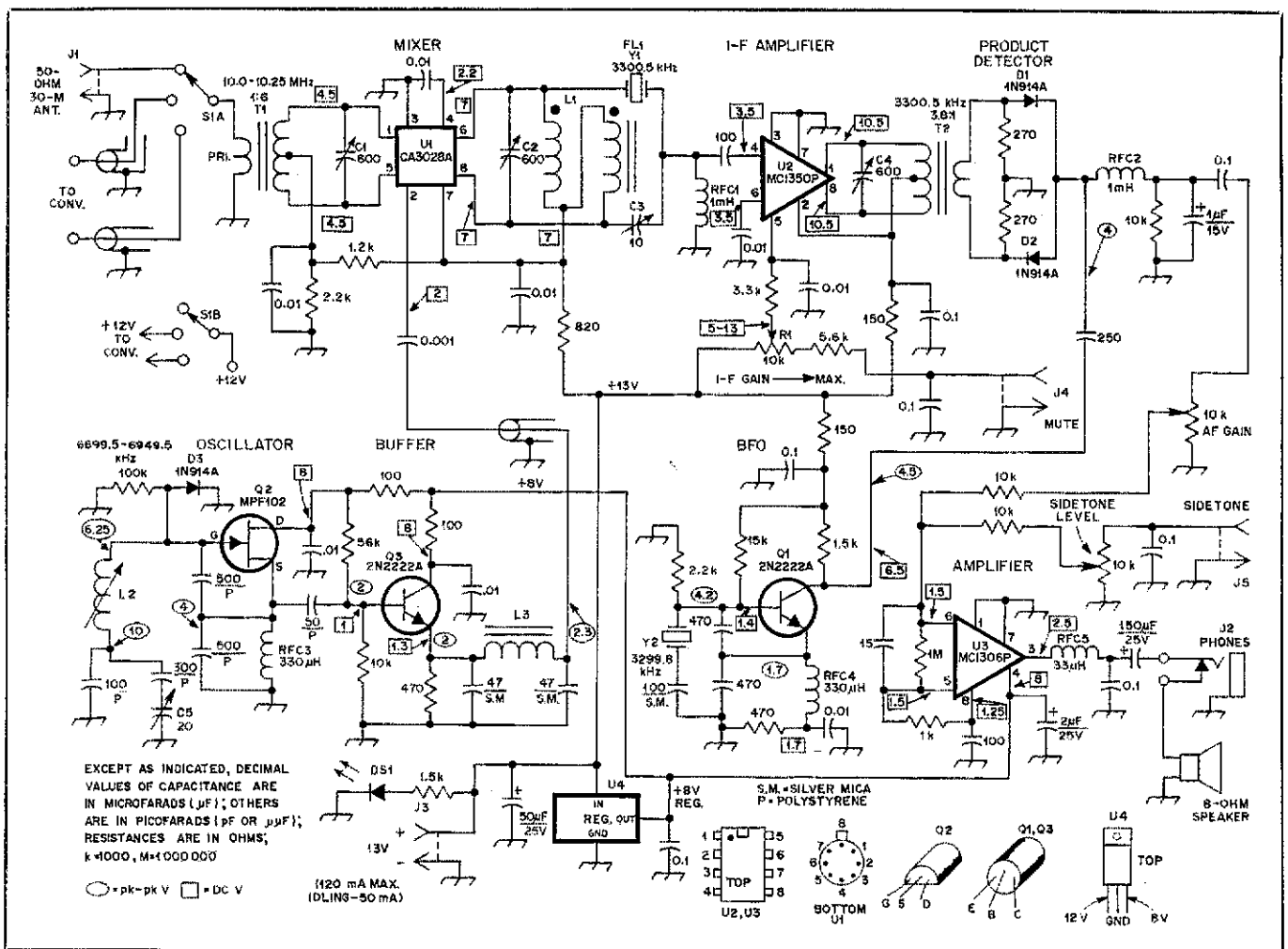


Fig. 1 — Schematic diagram of the Mini-Miser's Dream, modified to operate at 10 MHz.

- C1, C2, C4 — 170- to 600-pF mica trimmer (ARCO 4213).
 C3 — 10-pF miniature trimmer. Ceramic or pc-mount air variable suitable.
 C5 — Miniature air variable, 2 to 20 pF.
 D1-D3, incl. — High-speed silicon switching diodes, 1N914 or equiv.
 J1, J3-J5, incl. — Single-hole-mount phono jack.
 J2 — Closed-circuit phone jack.
 L1 — 8 bifilar turns of no. 28 enameled wire wound on an Amidon FT37-61 ferrite core (L = 5.8 μ H).
 L2 — Slug-tuned inductor, 5- μ H nominal inductance. Miller 42A686CBI (3.6 to 8.5 μ H)

- or equiv.
 L3 — 12 turns of no. 26 enameled wire wound on an Amidon FT50-61 ferrite core.
 R1 — 10-k Ω panel-mount control, linear taper.
 R2 — 100-k Ω panel-mount control, audio taper.
 R3 — 10-k Ω pc-mount control.
 RFC1, RFC2 — Miniature 1-mH rf choke (Millen J302-1000 or equiv.).
 RFC3, RFC4 — Miniature 330- μ H rf choke (Millen J302-330 or equiv.).
 RFC5 — Miniature 33- μ H rf choke (Millen J302-33 or equiv.).
 S1 — 2-pole, 3-position rotary switch.
 T1 — Toroidal transformer. Primary has 2 turns of no. 24 enameled wire. Secondary has 12

- turns of no. 24 enameled wire on an Amidon, Palomar or RadioKit T50-2 core.
 T2 — Toroidal transformer. Primary has 9 turns of no. 26 enameled wire (center-tapped). Secondary has 3 turns of no. 26 enameled wire on an Amidon FT37-61 ferrite core.
 U1 — RCA IC. Bend pins to fit 8-pin dual-in-line IC socket.
 U2, U3 — Motorola IC.
 U4 — Three-terminal 8-V regulator IC.
 Y1, Y2 — Surplus crystal in HC-6/U holder or International Crystal Co. type 433115. Specify exact frequency when ordering crystals. International Crystal Manufacturing Co., 10 North Lee, Oklahoma City, OK 73102.

mounting holes in the VFO area as a guide. Be sure the front of the box is parallel to the edge of the circuit board. Tack solder the compartment to the board, check the alignment and then flow solder along the seam between the compartment and the circuit board. Make a similar shield, 1/4-inch high, and attach it to the bottom side of the board, opposite to the top partition. Finish the shielding by making a U-shaped metal cover for the compartment. The shielding will keep the VFO energy from straying into circuits where it doesn't belong.

Polystyrene capacitors are recommended for use in the VFO tank circuit. After the receiver has been assembled and

tested, secure these capacitors to the circuit board with a small drop of hobby cement. This will prevent frequency shifts caused by capacitor movement. Be sure to use small-diameter coaxial cable, such as RG-174/U, when wiring S1 to the receiver board, antenna jack and converter (when it is added).

The receiver shown in the photographs is housed in a metal cabinet measuring approximately 3-1/2 x 8 x 6 inches. This is larger than necessary for the receiver, but the extra space can be used for mounting the vhf converter and other accessories. The circuit board is fastened to the cabinet bottom by using 1/2-inch spacers. If you don't have suitable spacers

available, 3/4-inch long screws and nuts can be used to hold the board at the proper height. To prevent the board from flexing (causing backlash) when C5 is rotated, you should use six mounting screws. Four are located at the board corners and one is placed at the center of the front and rear edges of the board.

Alignment and Operation

Before you begin aligning the receiver, check the dc and rf voltages shown in Fig. 1. This will give you a good indication as to whether or not all stages are functioning correctly. The audio stage can be checked by applying a sidetone signal to J5. Sidetone volume should not be af-

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

PORTABLE OR MOBILE REMOTE MICROPHONE

□ Soon after I acquired an IC-2AT 2-meter, hand-held transceiver, I was in the market for a remote microphone for mobile use. ICOM offers a remote speaker/microphone combination, but this did not suit my particular need — occasionally operating mobile from a motorcycle, where I desired to listen through a small earphone worn inside the helmet. This would not be possible with the speaker/mike combination.

I happened to have a "retired" dynamic microphone, complete with a dpdt push-to-talk switch. The microphone output was of high impedance, and the level was relatively low — not compatible with the low-impedance input of the hand-held.

A friend suggested I look into the electret microphone elements that are available at Radio Shack stores — a very good suggestion, since the IC-2 has a built-in electret condenser microphone. Radio Shack presently offers two different electret elements, one with omnidirectional characteristics and the other with unidirectional characteristics. I purchased the unidirectional element, to obtain better rejection of wind and motor noise while biking. This element requires a supply potential of from 2 to 10 volts at approximately 0.5 mA, and has a 600-Ω output impedance. At home, with some temporary connections, I determined that the output level and the impedance were indeed quite compatible with the IC-2. I'm sure that ideas from my microphone conversion can also be applied to rigs other than the IC-2.

The microphone originally used three conductors in a heavy coil cord: the PTT line, audio line and common. The IC-2, and perhaps other hand-held rigs, require only a two-wire connection: audio and common. A dc closure on the audio line (20 kΩ to 30 kΩ) keys the transmitter. I replaced the original coil cord with another of about half its diameter, taken from a surplus telephone. After affixing the

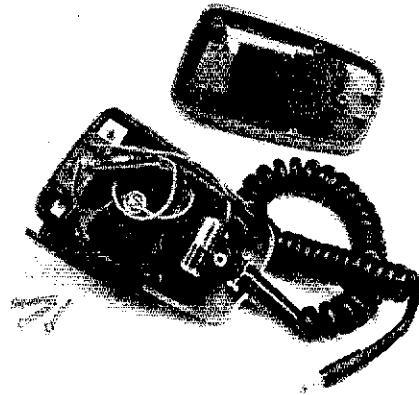


Fig. 1 — The completed microphone after converting to an electret element. The new element is the small, circular object in the approximate center of the case. R1 is enclosed in spaghetti tubing and runs parallel to C1 from the switch lug. Foam insulating material holds everything in place when the case is assembled.

subminiature plug at the end, I reinforced the mechanical connection with a 1-1/2 inch length of heat-shrink tubing over the plug and cable (mm = inches × 25.4). This can be seen in Fig. 1. The shrink tubing is somewhat flexible, and is by far the best approach I've found to providing a maintenance-free connection for these tiny plugs.

The original dynamic element was large, approximately 1-3/4 inches in diameter. In addition, the microphone case contained a small impedance transformer. With these removed, there was far more room than required to house the electret element (approximately 3/8-inch diameter by 1/2-inch long) and a small 6-V battery. The electret element was taped in place, and the extra space was taken up with several pieces of adhesive-backed foam. These pieces were cut to fit from a strip sold in hardware and department stores as insulating material. This may also be seen in Fig. 1.

The diagram I used in wiring the electret element is shown in Fig. 2. I retained the original PTT switch, S1. All other parts shown in the diagram were added. R1 provides the dc closure for keying the rig. Instructions with the electret element call for 10 μF at C1, but I found such a large value to be unsatisfactory. If left connected in series with P1, i.e., unswitched, its leakage current was sufficient to key the transmitter continuously. If wired as shown and switched, it introduced audio distortion for several seconds after I keyed the mike, while charging to the 5-V potential present on the audio line. I determined experimentally that 2.2 μF was about the optimum value for avoiding these problems without noticeable loss of audio quality or level. I elected to include the battery in the microphone case, rather than to attempt to draw from the voltage present on the audio line. Prolonged battery life for the hand-held and higher audio output from the remote mike were my considerations.

I've been using the converted microphone for several months now, and am well pleased with its operation. The audio level is not quite that of the built-in microphone, but is quite satisfactory. The battery and mike element cost approximately \$7, and I had all other parts on hand. I consider it money well spent. — Jerry Hall, KITD, ARRL Hq.

EXTERNAL MICROPHONE FOR A HAND-HELD TRANSCEIVER

□ I wanted to use an external microphone with my ICOM IC-2AT, but did not want to buy the speaker microphone for the radio. Two important reasons are that the electret microphone has a very high frequency response and a high sensitivity. These characteristics are poor for mobile use because of the high ambient noise level in the car.

My decision was to use a dynamic microphone with high impedance (50 kΩ) and a frequency response in the normal "communications" range. The next problem was to interface the mike with the IC-2AT.

*Assistant Technical Editor

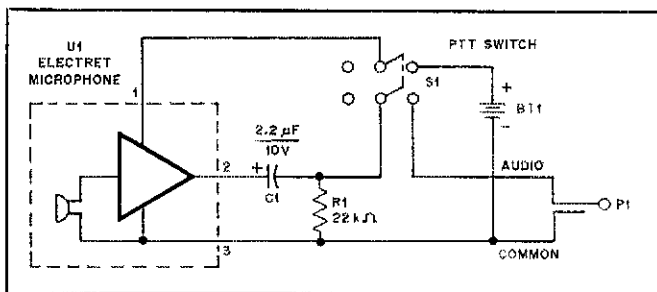


Fig. 2 — Diagram for wiring the electret element. Components not listed below are identified for text reference.

BT1 — 6-V photo battery, A544 or similar.
C1 — 2.2-μF, 10-V electrolytic.
P1 — Subminiature phone plug.
U1 — Unidirectional electret microphone element, Archer 270-091.

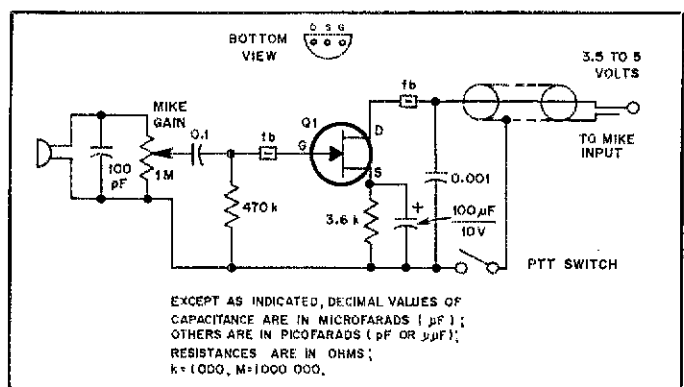


Fig. 3 — Schematic diagram of an external-microphone circuit that allows the use of a high-impedance microphone with an IC-2AT. Q1 is an MPF102 transistor.

Measurements indicated a voltage of 4.97 V at the mike jack in the receive mode and 2.78 V during transmit. This voltage is used to provide power to the circuit shown in Fig. 3. The dynamic microphone and preamplifier provide a flat audio response and 17 dB of gain. This arrangement simulates the load conditions of the internal electret microphone.

Required parts can be built into the case of a hand-held microphone. The PTT switch is used to key the transmitter by completing the ground side of the external audio circuit.

A 33-kΩ resistor is wired in parallel with the internal mike element. The purpose of this resistor is to ensure that the transmitter remains keyed during peak audio swings. I did not have this problem with the external mike, but if you do, a 33-kΩ resistor can be added in parallel with the 0.001-μF capacitor. This would also require changing the source resistor on Q1 to 5.6 kΩ to maintain the 2.78 V on the Q1 drain. — *Thomas Nolan, KO2G, Wrightstown, New Jersey*

EASY CURE FOR FREQUENCY DRIFT

□ My Drake TR-7 drifted as much as 1.8 kHz over an operating period of several hours. It drifted at least 1 kHz during the first hour from a cold start. While this is within factory specifications, I found it to be quite annoying. A Drake representative blamed the problem on humidity, but had no specific suggestions for a remedy.

A check with my dealer and other TR-7 users indicated the problem was widespread. Some were placing a small dial lamp or a resistor inside the cabinet near the VFO enclosure. This would raise the temperature and lower the humidity. I tried this solution and found that it did decrease the drift by about half, still not satisfactory to me.

I placed four heat strips on the outside bottom of the cabinet. I purchased these strips from Herbach & Rademan¹ at a cost of four for \$10. These are very thin strips with a self-adhesive backing and are rated at 12 watts, 117 V ac. I wired the four in series/parallel, so the total draw is 12 W. Electrofilm, Inc.² also has a catalog with many kinds of heat strips.

Maximum frequency drift from a cold start is now 200 Hz, which makes operating during the first hour a pleasure. Electric power is applied to the strips continuously. The lower humidity in the cabinet may also have a beneficial effect in preventing component corrosion. I estimate the cost to be about 50 cents per month at my power rates. — *Hal Price, KR4R, Satellite Beach, Florida*

KEYBOARD-KEYER VARIABLE-CHARACTER SPACING

□ I built the Al Helfrick, K2BLA, unbuffered keyboard.³ It has served well both on the air and in the classroom. For classroom use, I wanted to be able to vary the time between characters independent of keyer speed. This will allow a slow overall word speed, while the character speed is maintained at about 15 wpm (Farnsworth method). A gated oscillator and

flip-flop (Fig. 4) perform this function.

The heart of this keyer is the counter, U8, which is clocked by the oscillator U3A/B. When a character and the space following is completed, the line from U5 pin 3 to U3 pin 6 goes high. This enables the oscillator and starts the counter for the next character. The circuit of Fig. 4, inserted in this line, controls the rise of U3 pin 6 by using the rising edge of U5 pin 3 as a trigger.

When pin 3 of U5 goes low at the start of a character, the character-space oscillator, U15A/B, is stopped. Flip-flop U16 is reset, driving and holding U3 pin 6 low to stop the counter oscillator. When U5 pin 3 rises at the end of a character, U15A/B is started with a low output condition. The rising edge of the first timed pulse clocks the flip-flop, driving and holding U3 pin 6 high to start the counter oscillator. Fig. 5 shows a logic timing diagram.

The values shown for R1 and C1 give a slow speed of about 2.5 wpm and a fast speed sufficient that the U3C/D oscillator assumes control of both character and word speed again.

I added an LED to U3 pin 6 to indicate a "keyboard ready" condition. It pulses momentarily during normal word transmission and stays on if the operator pauses.

I also connected the space bar between pins

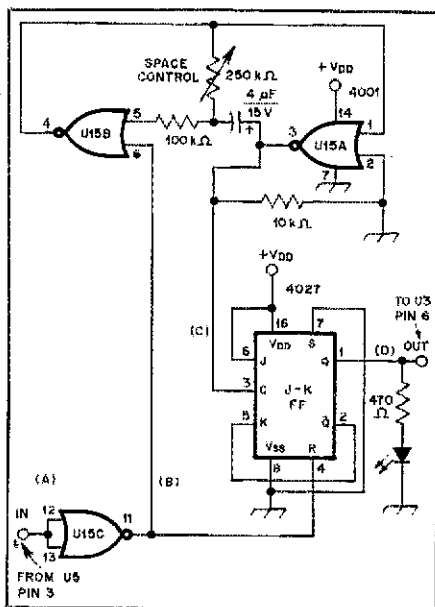


Fig. 4 — Schematic diagram of a circuit to add variable character spacing to the K2BLA keyboard. The letters A, B, C and D refer to the timing diagram traces of Fig. 5.

A7 and B6. This gives about a two-character space between words, which I judged to be about right for a standard word space. — *David McClune, WB0ZID, Boulder, Colorado*

ADDING MEMORY TO THE K2BLA BUFFERED KEYBOARD

□ The buffered Morse keyboard that appears in the 1981 and 1982 editions of *The Radio Amateur's Handbook* has no provision for a storage memory. A *QST* article⁴ describes an add-on memory for the unbuffered keyboard.⁵ It turns out that no circuit changes are required to adapt this modification for use with the buffered keyboard design.

Only two connections are required to interface the units. Pin 12 of U2D on the memory board connects to pin 6 of U15 on the keyboard, and pin 1 of U3A on the memory board connects to pin 4 of U18 on the keyboard. Remember that the 2102 memory chips require a 5-V supply. — *Gerry Hull, AK4L, ARRL Hq.*

LOW-COST ACTIVE AUDIO FILTER

□ This active audio filter can be built in a few hours, and parts should be available at the local Radio Shack store. The filter is unique in that the center frequency may be varied approximately 10% by adjusting R2 (Fig. 6). Changing R1 will not disturb any of the other filter parameters. With R2 at mid resistance,

¹A. Helfrick, K2BLA, "A Memory for the K2BLA CMOS Keyboard," *QST*, Dec. 1980, p. 33.

²See note 3.

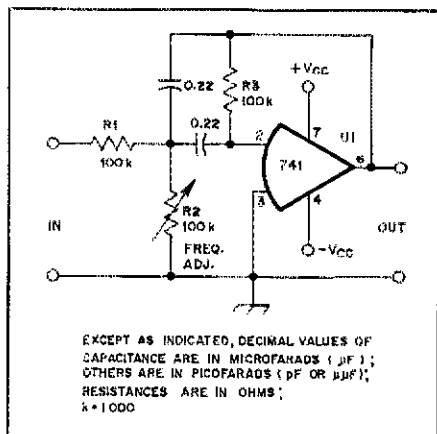


Fig. 6 — Circuit diagram of the active audio filter. R1 and R3 are 5%, 1/4-watt types. U1 is a 741 op amp.

¹Herbach & Rademan, 401 E. Erie Ave., Philadelphia, PA 19134, part no. TM21K837.

²Electrofilm, Inc., 7116 Laurel Canyon Blvd., North Hollywood, CA 91605.

³A. Helfrick, K2BLA, "An Inexpensive Morse Keyboard," *QST*, Jan. 1978, p. 24.

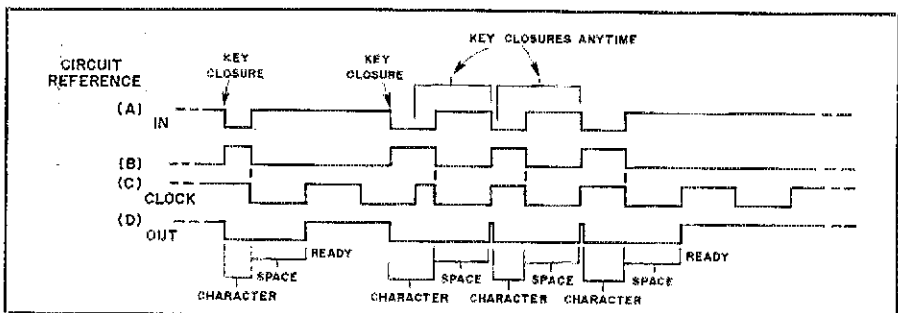


Fig. 5 — Logic timing diagram for the variable character-space circuit.

the center frequency was found to be approximately 400 Hz.

This filter will provide a worthwhile improvement in cw selectivity. For better performance, two filters can be cascaded.

With the indicated values, the voltage gain is 1, the Q is 20 and the passband center frequency is 400 Hz. Power for the unit is provided by two 9-V transistor-radio batteries. — *Howard Weinberg, WA6JCH, Montebello, California*

OSK WITH VOX CIRCUITS

For several years I had operated a cw station with full break-in capabilities. When I moved up to a "state-of-the-art" transceiver I never felt comfortable using the VOX circuit for cw. The VOX delay had to be set long enough to keep the transmitter from dropping out between words, but this caused me to miss the beginning of the next transmission.

I decided to short the R-C network capacitor in the VOX circuit at the end of my transmission. This capacitor can be found by tracing the wiring from the VOX delay control. The control is wired across the R-C capacitor. I used a "spare" jack on the rear panel of my transceiver, connecting the R-C capacitor across the jack. I connected 0.01- μ F disc capacitors across the lines to bypass stray rf to ground. Then I cemented a Micro Switch to my keyer paddle, connecting it to the jack with a piece of RG-58/U coaxial cable.

When I become impatient with the VOX delay, I simply depress the Micro Switch, putting my transceiver into the receive mode immediately. — *John Werner III, WB8IPG, Warren, Michigan*

TRANSMITTER-KEYING INTERFACE

Radio amateurs have an interesting and enjoyable variety of ways to generate Morse code. Keyboards and computers share air time with straight keys and bugs. But interfacing the newest equipment with a transmitter may not be an easy task. Many of these new code generators are not specifically designed for transmitter keying.

The circuit shown in Fig. 7 can be used between any code generator that produces an audio signal and virtually all transmitters. New parts will cost about \$10. This unit was originally built for the N4DR 10-MHz beacon, and it interfaces a tape-recorded cw message with the beacon transmitter.

U1A is a conditioning amplifier, which sets the level of the incoming signal. C1, C2, R4 and R5 allow the interface to operate from a single-polarity power supply. D1, D2, C3 and R6 form a rectifier circuit that changes the ac voltage into a dc voltage that varies with the envelope of the incoming ac voltage. U1B is wired as a Schmitt trigger. Voltage from the rectifier will cause the trigger output to go from low to high, lighting the LED and closing the reed relay.

Construction is straightforward. Use the maximum level setting that will allow the LED to flicker with the cw signal. It should be decreased only if the background noise level falsely triggers the interface.

An additional use of the interface is to key a transmitter that does not have a sidetone. Simply use a code-practice oscillator to drive the interface circuit. — *Tom Cook, N3AXN, Pittsburgh, Pennsylvania*

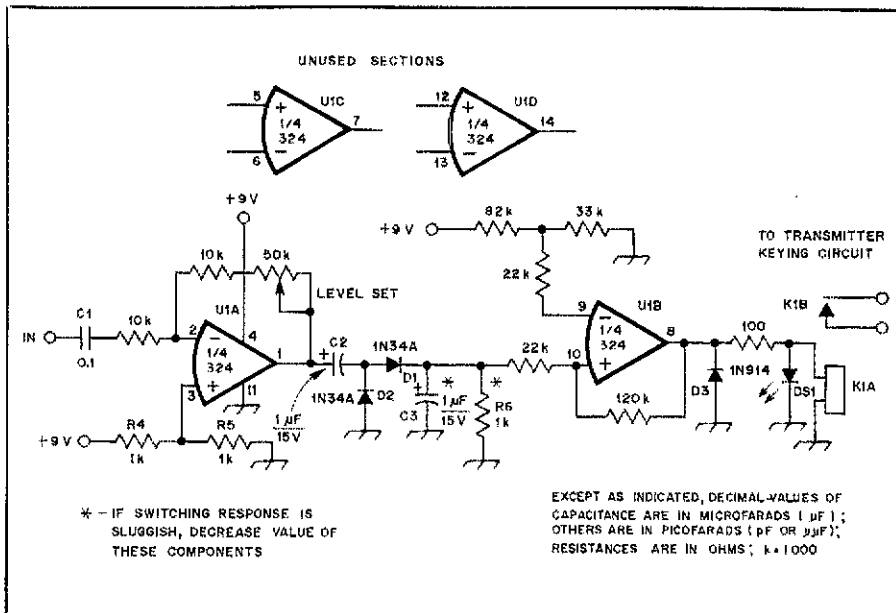
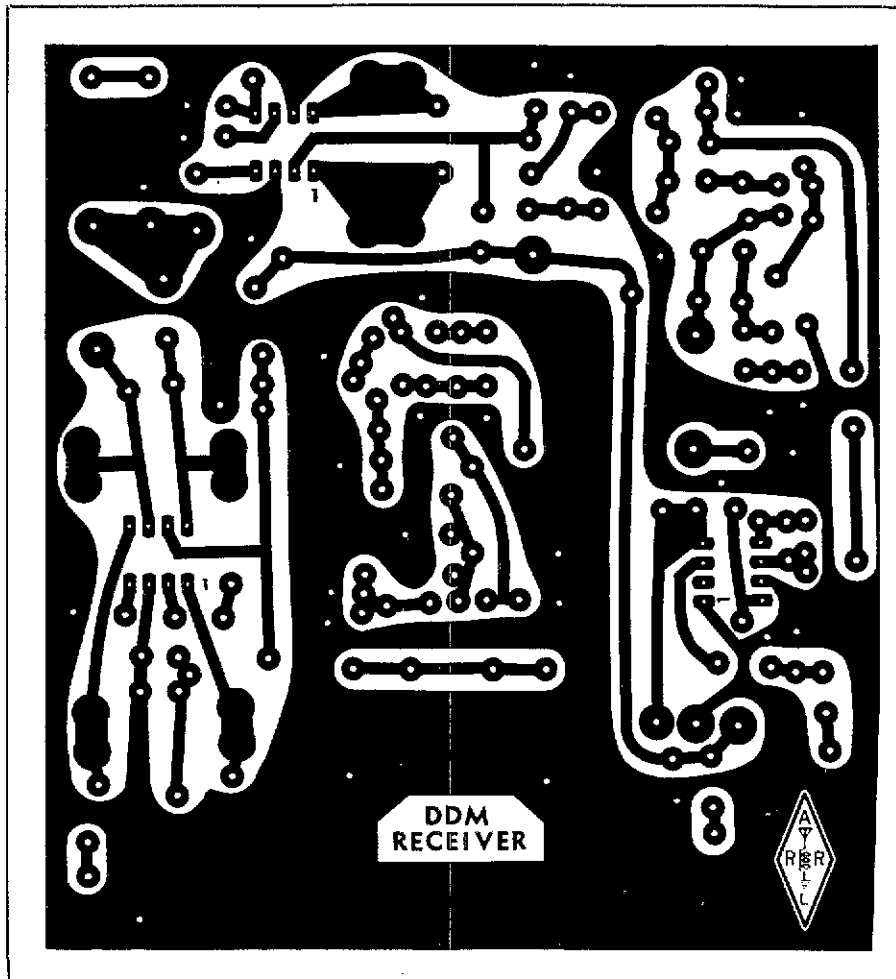


Fig. 7 — The schematic diagram of a simple transmitter-keying interface. K1 — Reed relay (RS 275-229). U1 — 324 quad op-amp.



Etching pattern for the 10-MHz Mini-Miser's Dream. The black areas represent unetched copper viewed from the foil side of the board. Parts-placement guide appears on page 34.

Kenwood TR-7730 2-Meter FM Transceiver



□ I don't "do" fm these days, having sworn off during the era of political mayhem and repeater wars some years ago. But when N1FB said he needed a reviewer for the TR-7730, I volunteered. It seemed worthwhile to acquaint myself with the features of modern fm equipment: The earlier experience was with surplus land-mobile gear and new-to-the-market American 2-meter fm equipment. The TR-7730 offers features and performance that were only dreamed of a few years ago. Furthermore, it is compact and delivers 25 watts of power output. The countless features available in the transceiver should answer the needs of most 2-meter fm operators.

Some Features

The unit contains 15 ICs, 46 transistors, 7 FETs and 91 diodes. It has a frequency synthesizer, a five-channel memory, scanning circuit and digital readout for frequency. The size? Well, the entire works are contained in a 5-3/4 x 2 x 7-3/4 inch (WHD) cabinet. Synthesizer resolution is selectable at 5 or 10 kHz from the front panel. A high-low power switch permits the operator to use 5 or 25 watts of rf output.

The memory (for frequency-pair storage) will retain the data programmed into it as long as the transceiver remains connected to a +13.8-V power source. The operator can add the optional TK-1 battery back-up unit externally (rear-panel connector) if he or she does

not want the memories to be erased when the transceiver is disconnected from the primary power source (such as when taking the rig out of the car).

Front-Panel Controls

A memory-selector switch (M. CH) provides for selection of five stored channels. Position 5 allows the storage of odd frequencies (splits), whereas channels 1 through 4 can be used only for standard repeater pairings (600 kHz).

Push-button switch M is used to program the memories in accordance with the frequency displayed on the digital readout. The MR switch is depressed when the operator wishes to recall the frequencies stored in the memories. When MR is not depressed, the transceiver operates on the frequency indicated on the digital display, which is chosen by means of the main tuning knob.

A busy indicator lamp will light when the receiver squelch is open, thereby indicating that a channel is in use. This feature is useful when the scan circuit is actuated, and when the receiver audio is turned off. There is also an on-the-air light, as well as lamps that indicate the transmitter-offset state (plus or minus the receive frequency).

The transmitter offset switch (- S +) places the transmit frequency 600 kHz below the receive frequency when set in the minus (-) position. In the plus (+) position the offset is 600 kHz above the receive frequency. Simplex operation can be carried out when the switch is set on S.

Memory scan is initiated when the M.S. switch is depressed. Scanning of the entire range from 144.0 to 148.0 MHz takes place

when the SCAN button is pushed in. Adjacent to this button is the HOLD button, which when pressed, stops the scanning action. The microphone push-to-talk (PTT) switch can be depressed to stop scanning action, also. I found the scanning from 144 to 145 MHz an annoyance, since there is no repeater activity in that part of the band for this area. It lengthens the total scan time by an appreciable amount, which is not desirable. The HI-LOW power switch and 5-kHz/10-kHz resolution button are also on the front panel for easy access. Two other controls are on the front panel of the unit. They are the on-off/volume (POWER/VOL) and SQUELCH controls.

A sequential LED bar indicator is used to monitor relative power output and received signal strength. It is located to the right of the digital-display block.

Main tuning is accomplished by means of a rotary click-type control. Frequency coverage in 5- or 10-kHz increments is continuous from 144.0 to 148.0 MHz. A TONE switch is included for those who wish to add the Kenwood tone generator for use with repeaters that require tone access.

Other Comments

The instruction book appears to be complete, and I found it easy to comprehend when learning how to operate the transceiver. Complete instructions for mobile and fixed-station installation are given in pictorial form. An adjustable mobile-mounting bracket is supplied with the TR-7730, as is the standard push-to-talk mike. Those wishing to use the rig with autopatch facilities can obtain the MC-46 accessory mike, which has a TT pad built into it.

*Assistant Technical Editor

Kenwood TR-7730 2-Meter FM Transceiver, Serial No. 2011236

Manufacturer's Claimed Specifications

Frequency coverage: 144.0 to 147.995 MHz.

Readout: Digital

S-meter sensitivity: Not specified

Receiver sensitivity: Better than 0.5 μ V for 30 dB S/N.

Squelch threshold: 0.16 μ V

Spurious response: Better than -60 dB from peak power output.

Receiver spurious (birdsies): Not specified.

Receiver audio output: More than 2 W at 10% distortion (8 ohms).

Transmitter output power: 5 W (adjustable) and 25 W (minimum).

Current drain: Receive, 0.4 A; transmit (low), 3 A; transmit (HI) 5.5 A.

Operating voltage: +13.8 V dc.

kHz per turn of main tuning knob: Not specified.

Size (HWD): 2 x 5-3/4 x 7-3/4 inches.[†]

Weight: 3.3 pounds.

Color: Black.

[†]mm = inches x 25.4; kg = pounds x 0.454

Measured in ARRL Lab

143.900 to 148.990 MHz.

As specified; four 1/2-inch LED blocks.

LED sequential bar type.

S1 = 0.9 μ V; S5 = 2.1 μ V;

S9 = 4.5 μ V.

For 20-dB quieting, 0.38 μ V.

0.8 μ V

See Fig. 1

None observed.

1.2 W maximum (8 ohms).

5 W and 30 W.

Approx. as specified.

As specified.

50 or 25 kHz, at 5-kHz and 10-kHz resolution, respectively.

has been designed specifically for base station use and has a built-in power supply and metering circuit.

The '1180 is an "all-mode" (fm, cw or ssb) amplifier designed for use with any transmitter or transceiver capable of providing 1 to 10 watts of driving power. With about 10 watts of drive, the power output of the '1180 is rated at a nominal 75 watts.

Automatic T-R switching is accomplished by a built-in relay and rf sensing circuit. The drop-out delay is selected by means of a jumper wire on the circuit board. When the jumper is grounded, the amplifier relay will remain energized for approximately one second. This prevents relay chatter when ssb VOX operation is being used.

Construction and Circuit Description

It took me almost seven hours to construct the '1180. No problems were encountered during assembly. There are two circuit boards in the amplifier: an antenna transfer circuit board and the amplifier circuit board. The antenna-transfer board contains the T-R relay switching components and a low-pass output filter. A Darlington amplifier transistor is used to operate the dpdt relay when the amplifier is in use. When the amplifier is switched off, the relay is prevented from being energized, and the exciter rf energy is fed through the normally-closed relay contacts and the low-pass filter to the antenna.

The amplifier board uses strip-line construction, but also employs four air-wound inductors, three of which are adjusted during tune-up. Assembly of the board requires the insertion of 47 rivets to ensure proper bonding between the ground foils on opposite sides of the board. The amplifier transistor and biasing diode are thermally bonded to the heat sink through holes in the board. This arrangement provides bias voltage tracking, ensuring linear operation at all operating temperatures.

Heath supplies small-diameter Teflon coaxial cable for making the required internal connections and for use as a 1/4-wave transmission-line section. The latter acts as a

audio quantity and quality I first experienced. I highly recommend this speaker to anyone who operates mobile. It is small, but it has a big voice! Distributed in the USA by Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220. Price class: TR-7730 and MC-46 Touch-Tone microphone, \$349; SP-40 speaker, \$25.95. — *Doug DeMaw, W1FB*

HEATH VL-1180 2-METER AMPLIFIER

If you're looking to put a little more "punch" into your mobile 2-meter signal, this little box of watts may be the answer. Of course it isn't limited to mobile-only use; it's at home at the base station, too. The VL-1180 and VL-2280 are basically similar, but the VL-2280

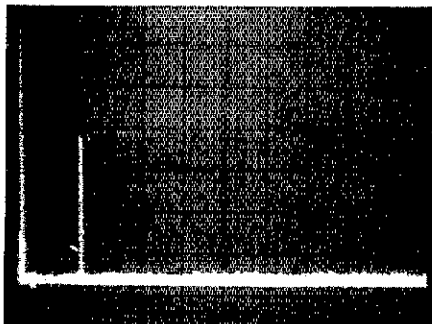


Fig. 1 — Spectral display of the Kenwood TR-7730. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 30 watts at a frequency of 146.52 MHz. The fundamental has been reduced in amplitude approximately 33 dB by means of notch cavities; this prevents analyzer overload. The TR-7730 complies with current FCC specifications for spectral purity.

The mike also has up-down switching for changing the transceiver frequency — a definite advantage while driving the automobile.

Performance in my car over a two-month period (hot and cold weather conditions) was without mishap. If I were to criticize the transceiver, I would mention that the frequency display is useless in bright daylight. How nice it would be if one could read the digital displays of mobile equipment in bright-day periods! Most rigs fail in this regard.

Another problem I encountered was inadequate undistorted receiver audio level when the ambient noise in the car was high. This is a common malady with many mobile transceivers, owing to the speaker pointing toward the floor instead of outward toward the operator. A quick and satisfactory fix resulted when I added the Kenwood SP-40 external speaker. I attached it to the ash tray in the center of the dashboard (mag-mount), pointed it toward my face, and eliminated the poor

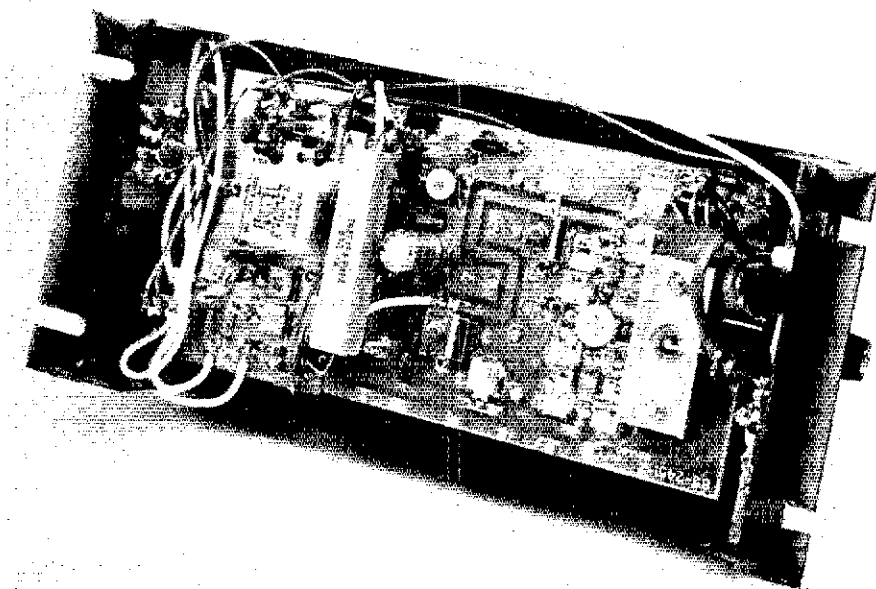


Fig. 2 — An inside view of the VL-1180. The bias diode is immediately to the right of the output transistor, supported by the metal bracket.

Heath VL-1180 2-Meter Amplifier

Manufacturer's Specifications

Frequency range: 144 to 148 MHz.
Power output: 75 W (nominal) at 13.6 V dc with 10 W drive.
Input VSWR: 2:1 maximum
Spurious and harmonic output: -60 dB or better.
Third-order distortion: -30 dB referenced to cw power.
Size: 2-3/4 x 4-3/4 x 10-3/4 in. (HWD).[†]
Weight: 3-1/4 lb.

[†]mm = inches x 25.4; kg = lb x 0.454

Measured in ARRL Lab

As specified.
82 W, 144 to 147 MHz;
80 W, 147 to 148 MHz.
Less than 1.2:1.
-64 dB (see Fig. 3).
Limited by test equipment capability.

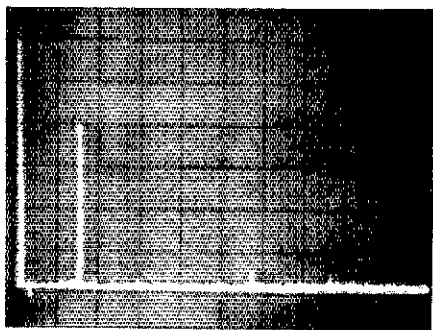


Fig. 3 — Spectral display of the Heath VL-1180. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 82 watts at a frequency of 146 MHz. The fourth harmonic is just visible at approximately 64 dB below peak fundamental output. The fundamental has been reduced in amplitude approximately 30 dB by means of notch cavities; this prevents analyzer overload. The VL-1180 complies with current FCC specifications for spectral purity.

half-wave stub at the second harmonic of the desired output frequency, thereby providing harmonic energy attenuation. With the lead lengths involved, the Teflon properties of the cable are welcome. If a standard type of cable were used, you'd probably wind up with a melted dielectric and/or shorted cables. Caution should be observed when cutting the transmission-line trap to ensure the proper length is maintained. Otherwise, a deterioration of the second-harmonic suppression will occur.

Good quality components are used throughout. The power-amplifier transistor is an MRF247 — a rugged device. If you can remember what a tube is (those things that look like bottles that glow), you'll marvel at that little piece of silicon being able to generate over 75 watts of output power at 2 meters! You'll find no VSWR protection circuit in the amplifier; the MRF247 doesn't need it. It is rated to withstand an SWR of 30:1 at full power input at all phase angles! That should make it just about "klutz proof."

Tune-Up

Initial tune-up and testing can be accomplished in a matter of minutes. Although a voltmeter can be used as an output indicator during the tune-up procedure, to be sure a minimum SWR exists between the exciter and the amplifier, a wattmeter or VSWR indicator

should be employed. A dummy load capable of dissipating the amplifier power output and an exciter capable of providing 1 to 10 watts of output power are also needed.

For me, all went well until the power output was measured. Lo, only 72 watts. Because the power output level was below that specified by Heath, the factory was contacted and the problem explained. Another MRF247 was shipped, installed (that took a bit of doing!), and when the output power was measured again, the wattmeter showed 82 watts being delivered from 144 to 147 MHz and 80 watts at 148 MHz, well above that specified by Heath.

Spectral purity and third-order IMD tests were run in the ARRL lab. Because of the limits imposed by the test equipment used, the third-order IMD figures specified by Heath could not be verified.

Summary

During construction of the antenna-transfer circuit board, you are asked to decide whether or not ssb operation is intended. If so, the jumper wire mentioned previously is connected to the ground foil. This adds a capacitor to the relay driver circuit, which then acts to delay T-R relay drop out during ssb VOX operation. It would be a simple matter to mount an spst switch on one amplifier end panel to allow external switching of the jumper. This would eliminate having to make an internal change should you wish to use the amplifier for all-mode operation.

If you have a base station power supply capable of supplying 13.6-V dc at 12A, you can turn the VL-1180 all-mode amplifier into an all-purpose amplifier as well. This little black box of watts may be just what you need to make your presence known on the 2-meter band. For further information, contact Heath Company, Benton Harbor, MI 49022. Price class: \$138. — Paul K. Pagel, N1FB

THE HY-GAIN V-2 2-METER ANTENNA

□ It is possible to improve the old tried and true 2-meter vertical, you ask? You bet it is, and Hy-Gain has done just that! The model V-2 antenna solves a problem not considered until recently — that of radiation-pattern distortion.

Back in the "good ol' days" we simply put up a 1/4 λ or collinear vertical for 2-meter fm work and accepted the performance. Just how could you improve the omnidirectional vertical, anyway? Eliminate the pattern skewing, for one! Fact is, the typical 2-meter vertical suffers from a less than ideal radiation pattern.

If the coaxial feed line and supporting mast are not properly isolated from the antenna, interaction results. This may cause a number of problems, including unwanted lobes of high-angle radiation, along with a horizontally polarized component. Keep in mind that for the majority of 2-meter fm and repeater work the ideal antenna would provide only vertically polarized radiation, and aim it entirely at the horizon. After all, the horizon is where distant repeaters and mobile stations are lurking, not up in space somewhere!

The Hy-Gain V-2 is an omnidirectional collinear antenna consisting of two 5/8-λ vertical sections in phase, as can be seen in Fig. 4. It utilizes two sets of 1/4-λ radials to decouple the lower 5/8-λ radiating section from the mast and feed line. According to the manufacturer, the resulting isolation allows the V-2 to provide a clean radiation pattern, and concentrate the power along the horizon where it is needed most.

Construction

The V-2 comes supplied as an easy-to-assemble kit. All components are pre-cut, drilled and made of the highest quality materials. The aluminum used is of the 6063-T832 variety, and all hardware is rust-proof, plated steel. A screwdriver, adjustable wrench and pliers are the only tools necessary for construction, which took approximately one hour. The instructions supplied are complete and easy to understand. A chart is provided so that the antenna length may be adjusted to the desired frequency. An interesting feature is the feed arrangement, where the coaxial cable is positioned *inside* the bottom

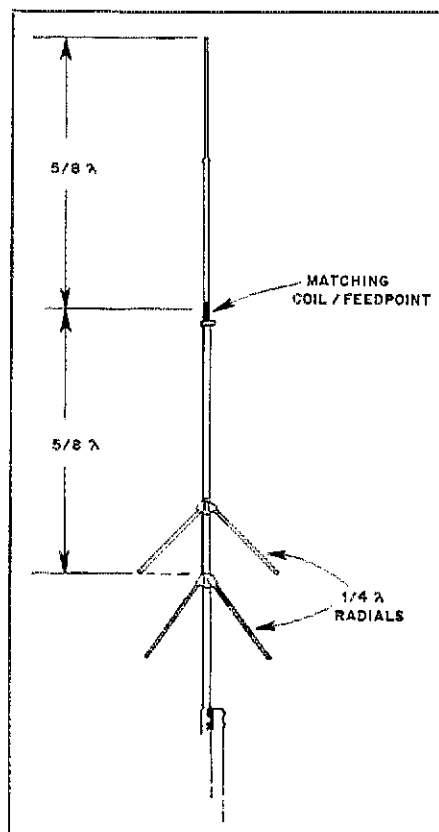


Fig. 4 — Physical configuration of Hy-Gain V-2 2-meter antenna.

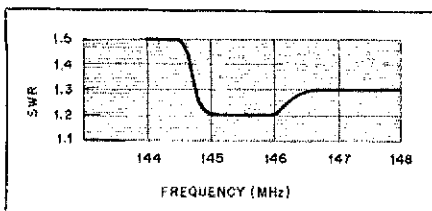


Fig. 5 — SWR curve for Hy-Gain V-2 antenna. Resonance was adjusted to 146 MHz.

half of the antenna to mate with a centrally located, 200-watt matching coil. The feed system places the entire antenna at dc ground, providing a degree of lightning protection. This arrangement also provides excellent weather-proofing for the coaxial connectors and feed point. Total antenna height is 122 inches,³ and wind loading is a mere 0.67 square feet.

Performance

Although the V-2 may be fine-tuned for any frequency between 138 MHz and 174 MHz, I learned quickly that the exact choice of frequency is not critical. The manufacturer specifies a 2:1 VSWR bandwidth of at least 7 MHz! Our antenna was set for 146 MHz, and checked for SWR. The results can be seen in Fig. 5. As specified, the V-2 was found to provide an extremely broadband match. It was time to try out the antenna.

Perched 50 feet high on top of the Hq. building, the V-2 has provided very good performance. Using only 10 watts output at WIINF, the Hq. Operator's Club station, literally dozens of repeaters in southern New England and New York state were accessed within an hour. Signal reports were always good — including full quieting through the Mount Greylock, Massachusetts, repeater — located a mere 85 miles to the north! Need more be said?

The Hy-Gain V-2 is an excellent choice for the operator who wishes to catch those distant repeaters and still retain omnidirectional coverage. Price class — \$39.95. For more information contact the Hy-Gain division of Telex Communications, Inc., 9600 Aldrich Ave. So., Minneapolis, MN 55420 — *Dennis J. Lusis, W1LJ*

HEATHKIT μ MATIC MEMORY KEYS, MODEL SA-5010

Microprocessors are "taking over the world." It seems that almost every major piece of electronic equipment being introduced these days has a microprocessor in it. Sometimes the design is defective or the internal programming is inadequate, resulting in a piece of equipment that just doesn't meet the potential. I am happy to report that such is not the case for the Heathkit μ Matic Memory Keyer.

One of my co-workers points out that the Heath designer was smart enough to use "big computer" techniques on a "little computer." What does that mean? Let's take a look at the features of the SA-5010.

Characteristics

The SA-5010 uses a custom 3870 microprocessor IC to perform all the main functions of the keyer. Such an approach

should provide the user with tremendous flexibility — and it does! Most of the operating parameters are set with the 20-key pad located on the top of μ Matic. The user can choose any speed between 1 and 99 wpm. If the operator desires, the spacing between characters may be increased to provide a "fast code" effect, which can be useful when building code speed. Weighting is also variable (five light, five heavy settings and normal, i.e., a dash is three times as long as a dot).

Heath has provided 10 memory buffers in the SA-5010. A total of 240 character spaces are available for the memory. The user can load as many or as few characters into any memory (soft partitioning) as desired. Command strings can also be stored in the memory buffers. When room for 20 or fewer characters remains in memory, the sidetone pitch drops noticeably as a warning. A pause may be programmed into any memory (e.g., for inserting an RST report). The memory automatically repeats up to nine times.

A left-handed user may reverse the paddles by making the appropriate entry. A battery (three "watch" cells) retains the memory when the μ Matic is not connected to a power source. Each time the keyer is turned on, the microprocessor initiates a diagnostic program to ensure all is well. If the test fails, all the LEDs light and the sidetone sounds constantly. While turned off, the SA-5010 retains the last entered speed and other operating parameters.

Heath has given consideration to the operator who wants to practice copying code. The user selects alphabetic characters, alphanumeric characters, alphanumeric character and common punctuation, or alphanumeric characters and all punctuation. The keyer has over 6000 different practice sequences available. As with normal keyer operation, the user can vary the speed, spacing and weight. Also, the code practice keys the output stage.

The μ Matic output is solid state. Two jacks, located on the rear panel, provide for positive (250 V at 100 mA) or negative keying (–200 V at 40 mA). The user has access to the sidetone volume and pitch controls through two holes in the case bottom.

Heath has included built-in paddles. Unlike the more common mechanical variety, these paddles operate on a proximity principle instead of a switch closure. When the user presses a finger against the metal paddle, his body capacitance is added to that of the circuit. This causes a transistor to conduct. Sensitivity controls for the paddles are located on the circuit board and are accessible through two holes in

the case bottom.

I've been using mechanical paddles for years and found it difficult to adjust the paddle sensitivity to accommodate my fist. This probably would not be a problem for most operators — particularly those not already accustomed to mechanical paddles. The user can attach external mechanical paddles through a rear panel jack. If you have paddles that you are comfortable with, use them; if not, you may not need to spend \$20 to \$50 or more for paddles!

Using the Memories

Probably the most revolutionary concept in the SA-5010 is the ability to handle command strings. What is a command string? Suppose MEMORY 1 has "CQ" programmed in it. MEMORY 2 has "DE" and MEMORY 3 has "KB1N." MEMORY 0 can then be programmed to repeat MEMORY 1 nine times at 20 wpm with normal spacing and weight. The program continues with MEMORY 2 sent once, and concludes by sending MEMORY 3 twice at 18 wpm, heavy weighting and 15-wpm spacing. Sending MEMORY 0 causes the keyer to produce 10 CQs followed by one DE (all at 20 wpm with normal spacing and weighting) followed by three KB1Ns. However, the KB1Ns will sound different because the dots, dashes and intra-character spacing will be generated at a 15-wpm rate. Additionally, the weighting will be different. MEMORY 0 is an example (albeit, somewhat contrived) of a command string.

Creative operators could store a complete QSO (Novice style) in the memory and still have a couple of buffers and several characters left over. All they would have to do is load the other station call sign into a buffer at the beginning of the QSO and push buttons. Users can make operation as simple or as complex as they choose. That's what my co-worker meant about the designer being smart enough to use "big computer" techniques on a "little computer."

Construction

The SA-5010 is a moderately easy-to-assemble kit. Heath describes it as a two-evening kit. I clocked about six hours of actual construction time. The instructions are clear, precise and easy to follow — just what I expect from Heath! Other kit manufacturers would do well to mimic the Heath style. I found only one problem in the instruction manual. Pictorial 2-6 details the installation of a single-in-line-package socket. The builder positions the socket by locating the side with the slot and orienting to one side of the circuit board. The pictorial reminds me of optical illusion drawings that I've seen in puzzle books. I installed the socket — backwards! When I tried to plug the ribbon from the keyboard into the socket, I discovered my mistake. Because I destroyed the socket removing it from the board, I had to wait a few days for a replacement. If you are building the SA-5010 and are confused by Pictorial 2-6, flip ahead in the construction manual and assure yourself that the socket is oriented properly.

The keyer has performed flawlessly on the air while keying a TS-130S transceiver driving a kilowatt amplifier. I am delighted with it! Oh, yes, the SA-5010 even turns itself off if the operator forgets to do so!

Price class for the μ Matic and matching ac power supply is \$110. More information may be obtained from Heath Company, Benton Harbor, MI 49022. — *Peter O'Dell, KB1N*



¹mm = ln. \times 25.4; ²m² = ft² \times 0.0929.

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

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

NOTES ON PATH-LOSS ANALYSIS

□ Some readers of the excellent article by Brown in December *QST*¹ may have been a bit skeptical of his claims of 3000-mile DX on 50 MHz while running 100 mW to an attic-mounted dipole. However, a quick analysis of the loss in an ideal single-hop, F2-layer propagation path shows that solid contacts could be made with much less power. Now that amateurs are familiar with the idea of receiver sensitivity being expressed in terms of noise floor,² such an analysis should be within the capabilities of anyone who understands the concept of the decibel. Path-loss analysis is common in moonbounce and microwave³ work, but a great deal can be learned from its application to other forms of propagation.

The unit of power measurement which is best suited to path-loss analysis is the decibel relative to 1 milliwatt, or dBm. That is, 1 mW = 0 dBm. Thus, the 50-MHz transmitter at W6HPH delivers an rf output of +20 dBm. Here's what happens to that rf as it wends its way across the continent to a receiver 4000 km away in New England:

Transmitter output	+ 20 dBm	(100 mW)
Feed-line loss	0 dB	(If transverter is mounted at the antenna)
Antenna gain, relative to isotropic	- 5 dB	(Loss assumption based on poor performance of low dipole at low radiation angles)
Free-space loss over 4000-km path at 50 MHz	- 139 dB	(Assuming perfect reflection from F2 layer)
Receiving antenna gain relative to isotropic	+ 12 dB	(Typical installation)
Feed-line loss	- 2 dB	(Typical installation)
Signal at receiver antenna terminals	- 114 dBm	

Taking ambient noise into consideration, the usable noise floor of an ssb receiver on 50 MHz during a band opening is probably on the order of -135 dBm. Thus, assuming that the propagation is via a single-hop F2 path, with no absorption and with perfect reflection, our 100-mW signal will be 21 dB above the noise at

a receiver 4000 km away. In reality of course, we don't see perfect reflections from the ionosphere; the F2 layer is in a constant state of flux, which introduces fading and losses not accounted for here. However, when the maximum usable frequency is at or slightly above the operating frequency, those losses may be considerably less than 21 dB. This is shown by the fact that the experiences of W6HPH are not unique; reports can be found in the pages of *QST* of instances where even lower transmitter powers were used successfully.^{4,5}

The important lesson isn't that DX can be worked with very low power; hams have been doing that for many years (with the help of good operators, and good receivers, at the other end!). The significant point is that we now have all the information we need to make our own path-loss measurements for virtually all propagation paths. We can measure transmitter output power and feed-line loss; we can determine with reasonable accuracy the gain of an antenna at a given radiation angle; we can express receiver sensitivity in terms of dBm. All that's lacking is the self-discipline to make accurate measurements and reports of incoming signal strengths, or to adjust transmitter output power to determine the point at which the signal disappears into the noise.⁶ If we're willing to take that single extra step, we can teach ourselves a great deal about what happens to our signals once they leave the transmitting antenna. — David Sumner, K1ZZ, ARRL Hq.

THEORY FOR LONG-RANGE PROPAGATION

□ I wish to present a theory for long-range radio-wave propagation that is different from all others I have seen. Conventional propagation theory states that the radio wave leaves the antenna and travels beyond the horizon to the downward curving, spherical shell of the ionospheric F layer, which is situated approximately 200 miles above the earth. The wave is then reflected back to the ground, toward the horizon, ahead of this reflection point, or area. It is then said to bounce off the earth and back up to the ionosphere, where the cycle is repeated as often as required to reach the reception point — several thousand miles away. By laying out the earth and its ionosphere on a scale drawing, it is found that to reach the other side of the earth, the energy would have to reflect off the earth's surface several times. (See Fig. 1.)

After doing some experimentation on 20-meter cw with low power (0.1-watt output), I feel that there would be too much attenuation

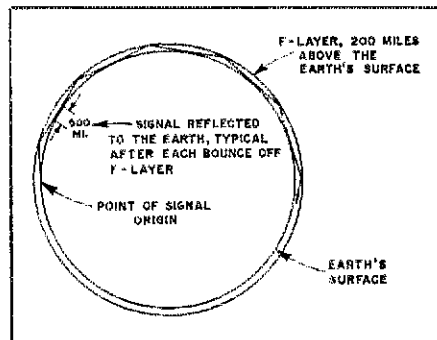


Fig. 1 — Illustration of how radio waves propagate according to conventional ionospheric theory.

of the rf energy during the bounces to allow the signal to be detected. Thus, I believe there is another mechanism that readily explains the long-range radio-wave propagation observed by hams for so many years. It can be described as follows.

RF energy is radiated from the antenna and travels to the ionospheric F layer, where it is reflected downward toward the horizon ahead. The wave passes above that horizon where it continues on toward the F layer, where it reflects toward the horizon again. The process is repeated several times without the earth's surface coming into play to attenuate the signal. In addition to this mode, a smaller part of the rf energy is reflected toward the ground and arrives as a signal to be received. This component would be produced with each reflection off the F layer. This theory explains a propagation mode that offers much less attenuation to a long range path. — S. B. Mackenzie, K8IRY, Rootstown, Ohio

MORE ON THE W2EA COLLINEAR ARRAY

□ Except for the directors, the antenna described by Schmidt in December *QST*, page 32, is essentially the design of the late Oliver Wright, W6GD. This antenna has been used extensively here in W6 land on all vhf bands for many years, and has consistently provided excellent performance. A large-scale version often wins the West Coast antenna-measuring contests.

When W6GD designed this antenna in the late 1940s, he did a great deal of experimenting to optimize the performance. One important finding was that directors of any length would lower the gain. This result might be contrary to theory, but it has been confirmed many times by other researchers, including myself. If the W2EA antenna is built without the directors, it will yield a higher gain, and lower wind resistance as well. — Fred Brown, W6HPH, Lake San Marcos, California

DTMF DECODER ALTERNATIVES

□ I enjoyed the DTMF decoder article in the

¹F. Brown, "An Introduction to the Bilateral Transverter," *QST*, December 1981, pp. 34-38.

²*The Radio Amateur's Handbook*, ARRL, 1982 edition, p. 16-40.

³"The New Frontier," *QST*, December 1980, p. 74.

*Assistant Technical Editor

⁴In "The World Above 50 MHz," January 1980 *QST*, p. 84, W3IP reported working a W6 while running 20 milliwatts to a dipole.

⁵In "The World Above 50 MHz," February 1980 *QST*, p. 90, W4ATC reported working K6PXT while running 50 microwatts to an unspecified antenna.

⁶For example, see Troster, et al., "The WB6ZNL Beacon," *QST*, January 1980, pp. 57-58.

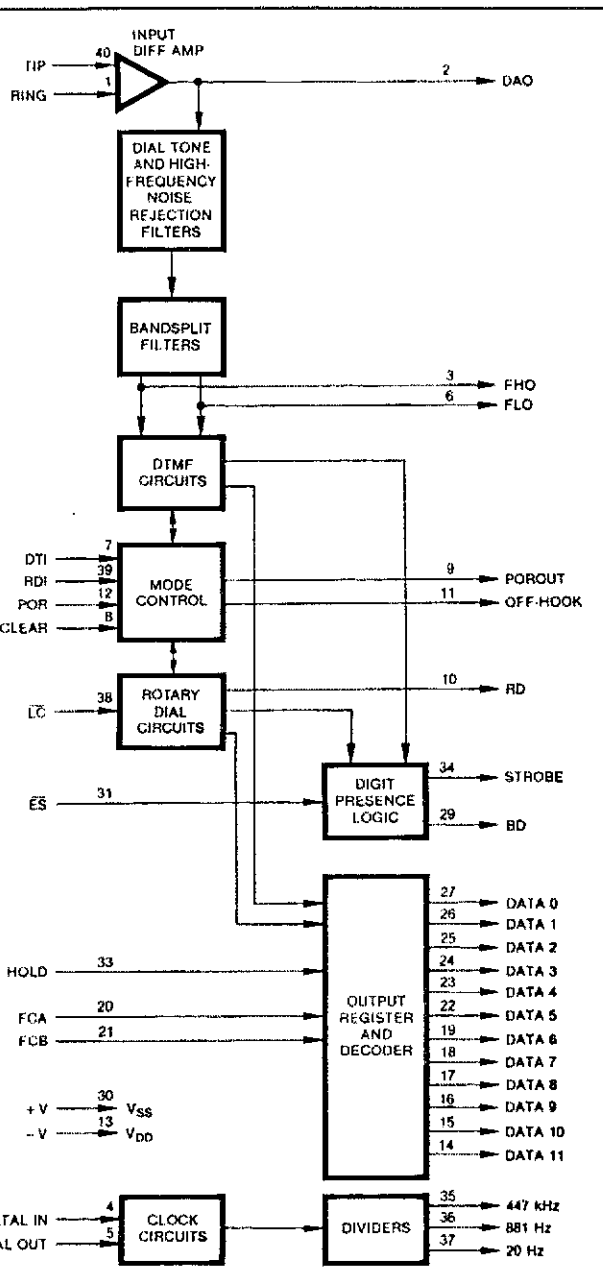


Fig. 2 — Block diagram of the Teltone M-927 DTMF receiver.

January 1982 issue of *QST*, and strongly agree with the author's statements concerning the limited capabilities of a 567 PLL based decoder. An alternative, however, is a decoder manufactured by the Teltone Corporation.'

The M-917 decoder is a small module (approx. 2.5 × 3.5 inches) that contains all necessary circuitry including the band-split filters. This decoder is of central-office quality and has performed well in our local repeater for over a year.

Teltone has recently introduced an even smaller decoder, the M-927, which is housed in a standard 40-pin DIP package. (See Fig. 2.) It also includes band-split filters, but requires the use of an external 3.579-MHz crystal. The single-quantity price of the M-927 is \$75. — Bob Witte, KB0CY, Loveland, Colorado

AID FOR THE DIGITAL CAPACITANCE METER

□ In reference to the article "A Digital Capacitance Meter" in the December 1981 *QST*, I feel that the project described is a bit out of date and impractical. The inability of the meter to measure capacitance in the picofarad range makes it useless for values most often used in rf circuits. Capacitors in the nanofarad range generally have a broad tolerance and do not require accuracy in their application.

A large number of articles have appeared describing meters that will measure in the picofarad range. The adapter unit described in August 1977 *QST* will operate in the less than 10-pF range by subtracting the residual reading from the indicated value. The addition of a simple counter such as the 74C925 or the MCI4553-14543 combination will make a complete meter with minimal power consumption. There are many refinements applicable to the circuit. A CMOS version of the 555 (7555) will provide a higher input impedance, resulting in higher accuracy at low capacitance values. A constant current source to supply the charging current is helpful; an LM334 can be used, or a JFET and one resistor will suffice.

Suppressing the residual component requires some additional circuitry. If the counter is presettable, a value equal to the residual reading can be set in. If counters such as the 7490, 74LS90 and 74C90 are used, they can be preset to nine instead of zero. For example, in a four-digit readout, the two most significant digits can be reset to nine — resulting in a reading of 9900. This will suppress up to 100 pF of stray capacitance. A small air-variable capacitor across the input can then be used to set the reading to zero. An adjustable one-shot circuit and gate can do the same task.

David Dage described an auto-ranging meter in *Popular Electronics* for February 1978. I duplicated his boards and built this unit some years back. It is stable and the residual capacitance can be suppressed. *Radio-Electronics* published a design in September/October 1978 of a meter that will measure capacitance from 1 pF to 9999 μF.

I have built a number of meters of this sort, both digital and analog. One word of caution — it is essential that the unit be completely shielded. All ICs should be bypassed and a low-ripple power supply used. As the voltage on the capacitor rises to the trigger voltage, a very small transient in the measuring circuit can cause premature triggering with a resultant loss of accuracy. — Warren H. Clark, W6COK, Balboa, California

P.O. Box 657, 10801 120th Ave. N.E., Kirkland, WA 98033



Feedback

□ In Fig. 1 of "Refining the SB-104," March 1982 *QST*, a ground symbol should be added to the junction of the base and emitter resistors and emitter bypass capacitor of Q702. Also, the 0.1-μF bypass at the collector end of R721 should be moved to the opposite (dotted line) side. (Thanks to Ulrich Rohde, DJ2LR.)

□ The i-f of the Kenwood TS-530S was incorrectly stated to be 8.895 MHz in the March 1982 *QST* Product Review. The correct frequency is 8.83 MHz.

□ Greg McIntire, author of "Designing a Microprocessor-Based RTTY Speed and Code Converter" (January 1982 *QST*, p. 18), advises

that he has incorrectly shown S1 as a 3-position switch in Fig. 1. S1 should have 4 positions. The additional position should be open on both sections to select mode 3 (110-baud ASCII). Q3 was also omitted from Fig. 3. It can be located near Q1 and Q2 in the lower corner of the board.

□ Two resistor values are reversed on the parts-placement diagram of the af/rf signal injector (Fig. 6B, February 1982, p. 44). The 2.2-kΩ, Q2 collector resistor is shown as 22 kΩ, and the 22-kΩ, Q3 collector resistor is shown as 2.2 kΩ on the placement diagram. Thanks go to Dick Abeles, W2LMR, for pointing out the switch.

□ David Abramson, General Electric Marketing Specialist, informs us that GE is not able to sell transient voltage-suppression devices directly from the factory, as indicated in the February 1982 *QST* article, "Protect Your Equipment from Damaging Power-Line Transients." Readers interested in purchasing the GE devices should contact any authorized GE electronic distributor.

An additional source of these units is Cramer Electronics, 85 Wells Ave., Newton, MA 02159.

□ John Christopher's call sign (Stray, March *QST*, page 77) is (this time we're positive) KE6CB.



A New Era for the ARRL

At a historic meeting, the ARRL Board selects a new president and general manager, heralding what is bound to be a new direction for the League.

Harold M. Steinman,* K1FHN

Anticipation was high at the start of the first 1982 meeting of the ARRL Board of Directors. A new slate of officers is elected every other year, but this year things were different. Harry J. Dannals, W2HD, League president since 1972, had previously announced his intention to step down. In addition, the ARRL's secretary and general manager, Richard L. Baldwin, WIRU, had announced his retirement. Who would the successors be?

The Board chose not to prolong the tension and uncertainty and changed the order of the agenda to carry out the elections first. And soon it was over; the decision made. Victor C. Clark, W4KFC, was elected

*Manager, Membership Services, ARRL

Vice President Larry Price, W4RA, Board Parliamentarian, makes a point.



Southwestern Division Director Jay Holladay, W6EJJ, deliberates with newly elected President Victor C. Clark, W4KFC.

president, and David Sumner, K1ZZ, general manager. For more information on the new president and general manager, and the entire slate of officers, see "Happenings," page 53, this issue.

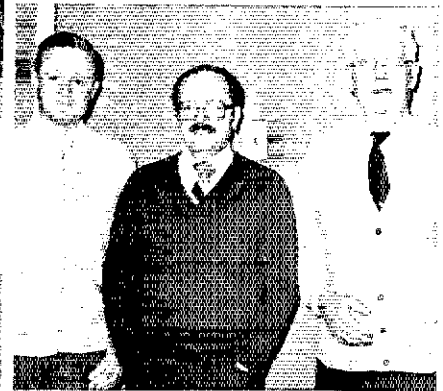
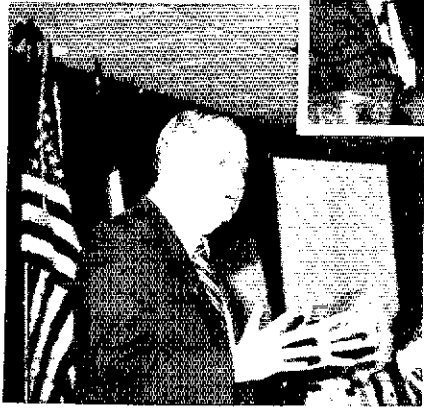
FCC Matters

The necessary housekeeping ac-

Ray Wangler, W5EDZ, chairman of the Management & Finance Committee, takes his job seriously. Here he is looking over the expense accounts of President Vic Clark, W4KFC, and outgoing President Harry J. Dannals, W2HD. (all photos courtesy Doug DeMaw, W1FB)



New Dakota Division Director Tod Olson, KØTO, poses with new General Manager David Sumner, K1ZZ.



The Canadian contingent: Associate Counsel Bob Benson, VE2VW, Canadian Division Director Mitch Powell, VE3OT, and outgoing International Affairs Vice President Noel Eaton, VE3CJ.



Roanoke Division Director Gay Millus, W4UG, and Delta Division Director Clyde Hurlbert, W5CH, in a candid moment.

completed, the Board turned its attention to other important matters. One point of much discussion was the FCC's proposal in Docket 82-83 to expand the 20-meter phone band by allocating 14.150-14.200 MHz to General, Advanced and Extra Class hams. The Board directed that comments be filed with the FCC recommending that the 20-meter phone band be expanded according to the following scheme:

14.150-14.175 MHz Extra Class only
14.175-14.225 MHz Extra and Advanced only
14.225-14.350 MHz Extra, Advanced and General

Docket 82-83 also included an inquiry (not a rulemaking proposal) into the subject of expanding hf phone bands other than 20 meters. The League will request a 45-day extension of time in which to file comments to this inquiry portion.

The Board also chose to file an application for review of the FCC dismissal of the League's petition for rulemaking, RM-3855, requesting early allocation of the 10.1-10.15 MHz band to U.S. amateurs. In other FCC matters, the League will seek assistance from its committee on the Biological Effects of RF Energy to prepare a response to the Commission's notice of proposed rulemaking in Docket 79-144, dealing with the biological effects of rf energy, and will petition the FCC seeking changes in the Amateur Radio rules to permit the use of transmissions in accordance with CCIR Recommendation 476-2; e.g., AMTOR. (Minute 56). The Board reaffirmed the League's position strongly opposing the creation of any amateur license with no requirement for a knowledge of the Morse

code (Minute 110).

Operating Matters

Moving on to operating matters, even though U.S. amateurs are not yet allowed to operate on the 10-MHz band, the Board established the policy that the League shall not award credits for operating activities, or sponsor any operating activities for awards or competition on that band (Minute 57). The Board also adopted the 23-centimeter and 6-meter band plans recommended by the Plans & Programs Committee at Minutes 69 and 82. Matters referred for study include the operational effectiveness of the Intruder Watch (Minute 66), possible changes in the Official Bulletin program (Minute 80), the creation of a contest code of ethics (Minute 85), and a preferred alerting technique for notification of emergency situations when normal monitoring is minimal (Minute 97).

New Advisory Committee Structure

As a result of Minute 58, the structure of League advisory committees will be changed to allow each division to be represented on each committee. Each director will be able to have a "division cabinet" to provide advice on affairs in his or her division. This represents another step in the implementation of recommendations of the ARRL's Long Range Planning Committee intended to bring the League closer to the members.

New Student Membership


With the goal of encouraging youth to join the League, the Board created a new class of membership for licensed amateurs under 18 years of age at Minute 34. The

special annual dues rate will be 80% of the normal rate.

Other Matters

Other highlights of the meeting include a \$10,000 contribution to the ARRL Foundation satellite fund on a matching-fund basis (Minute 106), the establishment of new criteria for the determination of funding for individual RFI or antenna litigation cases (Minute 72), and a directive to place additional emphasis on educating the public on the true nature and causes of RFI and TVI (Minute 98). The general manager will explore the possibility of seeking assistance from the membership in writing a sequel to Clinton B. DeSoto's *200 Meters and Down* (Minute 60). Among items referred for study are the policy on publishing obituaries in *QST*, formal agreements between the League and national youth organizations (Minute 81), ARRL policy regarding mailing labels (Minute 83), the feasibility of publishing other special-interest journals on the order of *QEX* (Minute 86), a possible segment in the upper end of the 10-meter band for Technician class use (Minute 102), and the League's requirements for legal counsel (Minute 105).

The Nitty Gritty

We've only been able to give you a hint of what went on at the March Board meeting, a scant look at the high points. The fine print on the pages that follow contains the details, everything you ever wanted to know but were afraid to ask. You have a right to know; indeed, as a League member, you have an obligation to know. 

Moved and Seconded

MINUTES OF EXECUTIVE COMMITTEE MEETING NO. 398 MARCH 17, 1982

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 9:30 A.M. on Wednesday, March 17, 1982, at the headquarters offices of the League in Newington, Connecticut.

Present were President Harry J. Dannels, W2HD, in the Chair; First Vice President Carl L. Smith, W0BWJ, Directors Gar Anderson, K0GA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present for various portions of the meeting were Vice Presidents Noel B. Eaton, VE3CJ, and Larry E. Price, W4RA; Honorary Vice Presidents Robert York Chapman, W1QV, and Victor C. Clark, W4KFC; Directors Jesse Bieberman, W3KT, Frank M. Butler, W4RH, Lys Carey, K0PGM, Paul Grauer, W0FIR, Jay Holladay, W6EJJ, Clyde Hurlbert, W5CH, Mary Lewis, W7QGP, Edmond Metzger, W9PRN, Gay Milius, W4UG, and Leonard Nathanson, W8RC; Vice Directors Kenneth A. Ebneter, K9EN, Mel C. Ellis, K7AOZ, Mrs. Evelyn Gauzens, W4WYR, Jettie B. Hill, W6RFF, John C. Kanode, N4MM, Peter F.

Mathews, WB6UIA, Tod Olson, K0TO, Marshall Quiat, AG0X, and Hugh Turnbull, W3ABC; Christopher D. Imlay, N3AKD, of the General Counsel's office, and B. Robert Benson, QC, VE2VW, Canadian Counsel; Harold Steinman, K1FHN, Manager, and W. Dale Clift, WA3NLO, Deputy Manager, Membership Services Department; and Assistant General Manager David Sumner, K1ZZ.

On motion of Mr. Powell, the Committee recognized the names of 17 individuals who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Stevens, the Committee approved the affiliation of the following clubs: Boeing Employees ARS of Wichita (BEARS/0), Wichita, KS; Brooklake School ARC, Florham Park, NJ; Central California DX Club, Delano, CA; Central Pennsylvania DX Club, Harrisburg, PA; Chehaw Amateur Radio Society, Albany, GA; Fort Monmouth Amateur Radio Club, Ft. Monmouth, NJ; Mt. Beacon Amateur Radio Club, Wappingers Falls, NY; St. Stanislaus High School ARC, Bay St. Louis, MS; San Antonio Chapter #38 QCWA, San Antonio, TX; Shawnee Amateur Radio Club, Shawnee, OK; South Mountain Repeater Assn., Carlisle, PA; Sperry Univac Roseville ARA, Roseville, MN; Swift Creek Amateur Radio Society, Colonial Heights, VA;

Thompson Amateur Radio Club, Thompson Manitoba, Canada; Tri-State International DX Association, Memphis, TN. (With the above action, there are now 1741 Category 1 clubs, 9 Category 2 clubs, and 228 Category 3 clubs, for a total of 1978.)

On motion of Mr. Zak, approval was granted for the holding of the following ARRL conventions: North Florida Section, August 7-8, 1982, Jacksonville, FL; Georgia State, September 11-12, 1982, Warner Robins, GA; Southeastern Division, February 5-6, 1983, Miami, FL; Missouri State, April 9-10, 1983, Kansas City, MO; Midwest Division, March 30-April 1, 1984, Kearney, NE.

Additionally, as part of the same motion, the Committee approved the change from a Delta Division Convention to a Louisiana State Convention of the Convention scheduled for August 7-8, 1982, Shreveport, Louisiana.

On motion of Mr. Stevens, the Committee, based on a poll of the members in that county, and noting that no change in division was involved, voted unanimously to transfer Lake County, California, from the East Bay section to the San Francisco section.

In accordance with a Standing Order of the Board, the General Manager reviewed actions directed by the Board at its September meeting, noting that action

had been completed on all items except those outlined in Minutes 20, 50, 63, 77 and 83, and that in those five instances action was in progress. Furthermore, it was noted that Minute 41 relating to DXCC Single Mode was being held in abeyance for further action by the Board.

Mr. Imlay reviewed at some length matters of litigation involving members, specifically the so-called Karagozian and Kron cases. Mr. Imlay also reviewed at great length a number of items pending before the Federal Communications Commission, including the expansion of radiotelephony subbands, low-power TV, a codeless amateur license, possible allocation to the amateur service of the band at 10.1-10.15 MHz, CATV interference, bio effects and cordless telephones.

During the course of the meeting the Committee discussed, without formal action, the following matters: the award of plaques for fifty years of ARRL membership, the availability of lists of ARRL members, and the July National Convention in Cedar Rapids.

In his closing remarks, the Chairman commented on the evolving philosophy of the Executive Committee over the period of the past ten years and, starting even before that, the gradual shift in the voting strength of the Committee.

There being no further business, the meeting was adjourned at 11:27 A.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

Life Membership Applicants
March 16, 1982

Richard G. Abshier, WA9ZYG; John H. Ault, WB9AJB; Steve Bense, WA4OLE; Thomas R. Carter, WIBHZ; Shew Yick Chin, KA2GPS; Elmer E. Clark, KR8U; Walt Del Conte, WD6EKR; Irving M. Felder, WA4YCD; Marilyn Joy Funkhouser, WB7ULT; Marty Gregor, K6YOR; Paul W. Hales, K7SDN; Thomas J. Matason, KA3FKA/4; Norman C. McCourt, AC0N; Carl R. Nolte, KA9AXD; Timothy C. Riley, WB9GUY; David L. Smith, ND4Y; Gladys M. Trower, KA6GAI.

MINUTES OF THE 1982 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC. MARCH 18-19, 1982

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Civic Center Holiday Inn, in Hartford, Connecticut on March 18, 1982. The meeting was called to order at 9:30 A.M. with President Harry J. Dannals, 2ZHD, in the Chair, and the following directors present: Garfield A. Anderson, K8GA, Dakota Division; Jesse Bieberman, W3KT, Atlantic Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, K8PFGM, Rocky Mountain Division; Paul Grauer, W6FIR, Midwest Division; Jay A. Holladay, W6EJJ, Southwestern Division; Clyde O. Hurlbert, W3CH, Delta Division; Mary E. Lewis, W7QGP, Northwestern Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Milius, Jr., W4UG, Roanoke Division; Leonard M. Nathanson, W8RC, Great Lakes Division; A. Mitchell Powell, VE3JOT, Canadian Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Raymond B. Wangler, W5EDZ, West Gulf Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Carl L. Smith, W0BWJ, First Vice President; Larry E. Price, W4RA, Vice President; Noel B. Eaton, VE3CJ, International Affairs Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following vice directors: Richard P. Beebe, K1PAD, New England Division; Kenneth A. Ebnetter, K9EN, Central Division; Mel C. Ellis, K7AOZ, Northwestern Division; Linda S. Ferdinand, N2YL, Hudson Division; Evelyn Gauzens, W4WYR, Southeastern Division; Jettie B. Hill, W6RFF, Pacific Division; John C. Kanode, N4MM, Roanoke Division; Peter F. Matthews, WB6UIA, Southwestern Division; Tod Olson, K0TO, Dakota Division; Marshall Quait, AG0X, Rocky Mountain Division; Hugh A. Turnbull, W3ABC, Atlantic Division; and George S. Wilson, III, W4OYI, Great Lakes Division. There were also present Honorary Vice Presidents Robert York Chapman, W1QV, and Victor C. Clark, W4KFC; Treasurer James E. McCobb, Jr., K1LLU; Counsel Chris Imlay, N3AKD; Counsel Bruce Lutsik; Assistant General Manager David Sumner, K1ZZ; Technical Department Manager Doug DeMaw, W1FB; Communica-

tions Department Manager John Lindholm, W1XX; Membership Services Manager Harold M. Steinman, K1FHN; and Washington Area Coordinator Perry F. Williams, W1UED.

2) The assembly observed a moment of silence in recollection of past Director Harry A. McConaghy, W3SW; past treasurer David H. Houghton; past Communications Manager F. E. Handy, W1BDI; past Vice Director Don Morris, W8JM; Roy Stevens, G2BVN, of the Radio Society of Great Britain; General Counsel Robert M. Booth, Jr., W3FS; the father of Vice Director C. Richard Dyas, W0JCP; and other members who had passed away since the previous meeting of the Board.

3) The Chair welcomed new Director Clyde O. Hurlbert, W5CH and new Vice Directors Jettie Hill, W6RFF and George S. Wilson, III, W4OYI, to the meeting. A letter from former Director and Honorary Vice President John Griggs, W6KW, giving greetings to the assembly was read. Regrets for non-attendance were expressed by the President on behalf of Vice President Max Arnold, W4WHN, and for late attendance on behalf of the Canadian Counsel B. Robert Benson, QC, VE2VW.

4) The Board next considered the agenda for the meeting. It was moved by Mr. Anderson, seconded by Mr. Nathanson, that present agenda item 3 becomes agenda item 3(a); agenda item 3(b) will be the report of the Management & Finance Committee concerning candidates for the office of General Manager; item 12 will become item 3(c), election of the General Manager; item 8 and 9 will become respectively items 3(d) and 3(e). Moved, by Mr. Sullivan, seconded by Mr. Grauer, that the motion is amended to read that agenda items 8 to 12 become agenda items 3(a) through 3(e) in order. It was moved by Mr. Nathanson, seconded by Mrs. Lewis, that the amendment be laid on the Table. It was ruled, by Mr. Price as Parliamentarian, that the effect of the action would be to table the entire motion; whereupon, Mr. Nathanson, with the consent of his second, withdrew the motion to Table. A roll call vote on Mr. Sullivan's amendment being requested, the question was decided in the negative, 7 votes in favor to 9 opposed. Messrs. Butler, Grauer, Holladay, Metzger, Sullivan, Wangler and Zak voted aye, Messrs. Anderson, Bieberman, Carey, Hurlbert, Mrs. Lewis, Messrs. Milius, Nathanson, Powell and Stevens voted opposed; so the motion to amend was LOST. The question then being on the original motion, a roll call vote again being requested, the matter was decided in the affirmative, 10 votes in favor to 6 opposed. All of the directors voted aye except for Messrs. Grauer, Metzger, Milius, Sullivan, Wangler and Zak, who voted in the negative; so the agenda was amended. On motion of Mr. Anderson, seconded by Mr. Stevens, the agenda as amended was unanimously ADOPTED.

5) At this point, 10:02 A.M., First Vice President Smith took the Chair; President Dannals and the Headquarters personnel in attendance departed from the meeting. Mr. Price was appointed as Secretary. Mr. Wangler, as Chairman of the Management & Finance Committee, acting in its capacity for the screening of candidates for General Manager, clarified selection procedures for the office. On motion of Mr. Zak, seconded by Mr. Holladay, it was VOTED at 10:14 A.M., 10 votes in favor to 6 votes opposed that the Board of Directors resolve itself into a Committee of the Whole for the purpose of discussing the report of the Management & Finance Committee relative to the selection of a General Manager. Mrs. Lewis, Messrs. Stevens, Nathanson and Anderson requested to be recorded as voting opposed. At 11:22 A.M. the Committee rose and reported to the Board.

6) Nominations were declared open for appointment as General Manager. Mr. Holladay nominated David Sumner, K1ZZ. On motion of Mr. Anderson, seconded by Mr. Powell, it was VOTED that nominations be closed and that a unanimous ballot be cast for Mr. Sumner. (Applause.) During the course of the above, at 10:20 A.M., Mr. Benson joined the meeting. The Board was in recess from 11:25 to 11:38 A.M. at which point the Headquarters staff rejoined the meeting. Mr. Dannals resumed the Chair, and Mr. Baldwin resumed as Secretary.

7) On motion of Mr. Milius, seconded by Mr. Nathanson, it was unanimously VOTED that the Board express its thanks to the Management & Finance Committee for its work as a screening committee.

8) The Chair announced the opening of elections for the office of president and appointed Messrs. Ellis and Matthews as Tellers. Mr. Milius nominated Mr. Clark. Mr. Butler nominated Mr. Price. On motion of Mr. Metzger, seconded by Mr. Sullivan, it was unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: Mr. Clark received 13 votes, Mr. Price received 3. Accordingly, Mr. Clark was declared elected as President. (Applause.)

9) The Chair announced the opening of nomina-

tions for First Vice President. Mr. Carey nominated Mr. Smith. Mr. Butler nominated Mr. Price, but Mr. Price withdrew his name. On motion of Mr. Powell, seconded by Mr. Butler, unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: 15 votes for Mr. Smith, with 1 vote blank. Accordingly, Mr. Smith was declared elected as First Vice President. (Applause.)

10) The Chair announced the opening of nominations for an additional Vice President. Mr. Holladay nominated Mr. Price. Mr. Metzger nominated Mr. Zak. On motion of Mr. Butler, seconded by Mr. Milius, unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: Mr. Price received 10 votes, Mr. Zak received 6 votes. Accordingly, Mr. Price was declared elected as a Vice President. (Applause.)

11) The Chair declared nominations in order for an additional Vice President. Mr. Metzger nominated Mr. Zak. Mr. Carey nominated Mr. Anderson. On motion of Mr. Sullivan, seconded by Mr. Bieberman, unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: Mr. Anderson received 12 votes, Mr. Zak received 4 votes. Accordingly, Mr. Anderson was declared elected as a Vice President. (Applause.)

12) The Chair announced the opening of nominations for Vice President, International Affairs. Mr. Powell nominated Mr. Eaton, but Mr. Eaton withdrew his name. Mr. Grauer nominated Mr. Baldwin. Mr. Bieberman nominated Mr. Charles Dorian, W3JPT. On motion of Mr. Powell, seconded by Mr. Sullivan, unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: Mr. Baldwin received 11 votes, Mr. Dorian received 5 votes. Accordingly, Mr. Baldwin was declared elected as Vice President, International Affairs. (Applause.)

13) The Chair announced the opening of nominations for Secretary. Mr. Baldwin nominated Mr. Sumner. On motion of Mr. Stevens, seconded by Mr. Holladay, unanimously VOTED that nominations are closed. The Tellers announced the results of balloting: 14 votes for Mr. Sumner, with 2 blank votes. Accordingly, Mr. Sumner was declared elected as Secretary.

14) The Chair announced the opening of nominations for Treasurer. Mr. Sullivan nominated Mr. McCobb. On motion of Mr. Stevens, seconded by Mr. Metzger, it was unanimously VOTED that nominations are closed. The Tellers announced the results of the balloting: Mr. McCobb received 16 votes. Accordingly, Mr. McCobb was declared elected as Treasurer.

15) The Chair announced the opening of nominations for the election of four directors to the Executive Committee for the ensuing year. Mr. Anderson nominated Mr. Stevens. Mr. Holladay nominated Mr. Powell. Mr. Sullivan nominated Mr. Zak. Mr. Grauer nominated Mr. Metzger. Mr. Metzger nominated Mr. Grauer. Mr. Butler nominated Mr. Holladay. On motion of Mr. Wangler, seconded by Mr. Sullivan, unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: Mr. Powell with 14 votes, Mr. Holladay and Mr. Stevens with 11 votes and Mr. Grauer with 10 votes were elected. Mr. Metzger received 8 votes and Mr. Zak received 6 votes.

16) The chair announced the opening of nominations for Parliamentarian. Mr. Sullivan nominated Mr. Price. Mr. Grauer nominated Mr. Sullivan, but Mr. Sullivan withdrew his name. On motion of Mr. Anderson, seconded by Mrs. Lewis, unanimously VOTED that nominations are closed and that the Secretary cast a ballot electing Mr. Price as Parliamentarian for 1982. The Board recessed for lunch at 12:35 P.M., reconvening at 1:30 P.M. with all persons hereinbefore mentioned present.

17) The Chair recognized President-elect Clark, who read the following statement: "The Constitution of the International Amateur Radio Union provides that the President, First Vice President and Secretary of the member society elected to serve as the Headquarters of the Union shall serve in their respective capacities as officers of the Union during their society's term as Headquarters. The Constitution further provides that any officer of the member society elected to serve as the Headquarters shall have the option of declining to serve in a similar capacity for the Union and may recommend another qualified and responsible official of its society for the post subject to the affirmative vote of a majority of the member societies. Experience has clearly demonstrated that the presidential responsibilities of ARRL and IARU are such as to require the full time attention and energies of separate individuals. These functions have been performed by separate incumbents for the past 10 years with a history of success. Therefore, my decision is not to serve as IARU President."

18) On motion of Mr. Smith, seconded by Mr. Eaton, VOTED that the ARRL Vice President for In-

ternational Affairs, Richard L. Baldwin, WIRU, is the ARRL official to be recommended for President of IARU, and that his candidacy be referred to the membership of IARU for vote as specified in the IARU Constitution. Mrs. Lewis requested to be recorded as voting opposed.

19) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the Minutes of the 1981 Second Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

20) Reports of the Officers were presented here. The President's report touched on the opening of the new 30-meter band to amateurs in a few countries; the awaiting of action which would permit amateurs in Canada and the United States to join them; the effects of inflation on ARRL which resulted in a dues increase last year; a major increase in postal rates for the mailing of QST; recollections of the Silent Keys recognized at the outset of the meeting; travel for purposes of membership contact over the past 10 years which covered all 50 states, Canada, the Canal Zone and Puerto Rico and totalled more than 500,000 miles; his testimony before the House Subcommittee on Telecommunications in support of changes to the Communications Act; his visits with FCC Chairman Mark Fowler, Commissioner Mimi Dawson and Commissioner Henry Rivera; Washington area representation for ARRL; litigation on the local level involving amateur antennas; the work of volunteers in ARRL; Amateur Radio in space; recommendations of the Long Range Planning Committee; future areas of growth for Amateur Radio; and thanks for the associations of the past 10 years.

21) First Vice President Smith presented his report, which covered club and convention travel; an international communications conference in Denver at which distinguished foreign visitors were present; work with various ARRL committees; the Interference Task Force; Washington representation for ARRL; activities and aims of the International Amateur Radio Union; and the restructuring of that organization to take place later in 1982. In brief oral extension of his remarks, Vice President Smith commended the Board for its choice of a nominee for President of IARU.

22) Vice President Price presented his report, touching on activities of the Long-Range Planning Committee, the Membership Affairs Committee and the challenges facing ARRL for the future.

23) The report of Vice President Arnold was placed in the record, covering convention travel, work with the Management & Finance Committee, chairing ad hoc committees, and the problems needing future attention by the Board of Directors concerning Life Membership, finances, Washington representation, the recruiting of new amateurs, and club activities.

24) Mr. Eaton, Vice President for International Affairs of ARRL and President of IARU, summarized activities in the Union; reported on the possibility of amateur operation in the People's Republic of China; expressed concern about the expansion of the 20-meter phone band as seen from the international viewpoint; and described forthcoming regional conferences and executive committee meetings. In brief oral amplification, Mr. Eaton expressed his delight that Naoki Akiyama, JH1VRQ, would soon join the ARRL Headquarters staff, primarily to handle IARU matters.

25) The General Manger presented an oral report which showed that the general fund balance at the end of 1981 was good; over the long term, there would be need for new sources of funds; the dues increase had caused a membership drop, but less than predicted; the computer has been installed, financial records are stored thereon, and membership records are in the process of being added; QEX, the Experimenter's Exchange Newsletter, now has enough material on hand to switch to monthly publication from bi-monthly; IARU restructuring will probably take place along lines presented in the April QST editorial; and the annual report in printed form is in publication and will be available soon.

26) Treasurer McCobb reported on cash flow, current investment policies, and recent securities transactions.

27) The written report of Office of General Counsel was presented by Mr. Imlay. It covered ARRL's extensive activities seeking amendment of the Communications Act to extend amateur license terms, permit volunteer assistance in examination, licensing and monitoring, revision of the secrecy provisions of Section 605 and, we hope, authorization for FCC to set minimum RFI standards for home electronic devices. Activities before FCC included filing comments in the "Plain Language" matter; implementation of WARC-79; requests for early allocation of 10 MHz; expansion of the 20-meter phone band; the Quiet Zone matter in Virginia and West Virginia; cable interference; radio frequency interference; sharing of 420 MHz by spread spectrum radiolocation equipment; and Docket 20990 concerning wireless security

alarm devices. The report also covered local antenna and radio frequency interference cases, headquarters assistance to amateurs with these problems, revision of the legal kits, and several miscellaneous matters. A brief additional oral report stressed the need to arrive at a consensus on the desirability or lack of it for a no-code license, since there seems to be renewed interest in this subject at FCC. New ARRL procedures and guidelines are needed for those rare cases in which ARRL can offer financial assistance to amateurs in litigation.

28) Associate Counsel for Canada Benson presented an oral report on changes in the tariffs for amateur equipment, trademark protection of the name Canadian Radio Relay League, and membership contact.

29) Mr. Powell, as President of the Canadian Radio Relay League, presented a written report covering the current officers of CRRL; cooperation with the Radio Amateur du/of Quebec in translating League material; the Canadian Intruder Watch; the tariff changes; CRRL publications; contact with the Department of Communications to develop a new syllabus and to make changes in Canadian regulations; third party and reciprocal operating agreements with other countries; contact with the International Amateur Radio Union; liaison with the Canadian Radio Technical Planning Board; and appointment of VEGCO to handle WAC awards applications for Canadian members. Orally, Mr. Powell reported on the forthcoming National Emergency Radio Conference to be held in Ottawa.

30) Mr. Chapman, as President, presented the written report of the ARRL Foundation, Inc., covering the current directors of the ARRL Foundation; the 20th Anniversary Amateur Satellite Fund Drive; distribution of \$56,115 to the Radio Amateur Satellite Corporation (AMSAT); scholarship awards; work with the International Year of Disabled Persons and the Courage Center HandiHam System; and the Foundation's financial reporting methods.

31) Mr. Bieberman, as Chairman, presented the report of the Plans and Programs Committee concerning a motion it would offer later in the meeting for handling the 15-kHz splinter channels on the 144-MHz band; its decision not to recommend deletion of propagation charts from QST, even on an occasional basis; and preparation of band plans for 6 meters and 23 centimeters to be presented later in the meeting. Mr. Bieberman's oral remarks stressed the fact that not much input is received by standing committees from the general membership of ARRL, despite publicity in QST on the studies which are underway.

32) Mr. Sullivan, as Chairman, presented the report of the Membership Affairs Committee recommending that the League produce ARRL emblem jewelry for female members and spouses; Life Membership matters; changes to be proposed in the Board's Advisory Committees so as to implement recommendations of the Long-Range Planning Committee; elections and balloting procedures; formation of the Director's Cabinet in each division; study of QSL bureau matters; election matters and By-Law 15; opposition to credit for awards and to contest activities in the new 10-MHz band; club affiliation matters; additional forms of recognition for loyal service to the League; changes in the License Manual; and the continuation of the moratorium on the ARRL Hall of Fame. Several motions will be presented later in the meeting.

33) Mr. Wangler, as Chairman, presented the report of the Management & Finance Committee. Topics were: budgets; publication sales; liability insurance for affiliated clubs; life insurance policies of individuals with ARRL as beneficiary; Life Membership matters; the search committee activities for a new General Manager; a proposed student membership; and bumper stickers.

34) Moved by Mr. Grauer, seconded by Mr. Wangler, that By-Law 6 be amended by adding the words "who has not reached the age of 18 or" so that the By-Law would then read, "A licensed Amateur Radio operator who has not reached the age of 18 or who has reached the age of 65 may request an annual membership rate equivalent to 80% of the prevailing fee as set forth in By-Law 4." After extended discussion, it was moved by Mr. Stevens, seconded by Mr. Milius, that the matter be laid on the Table. A roll call vote being requested, the question was decided in the negative, 5 votes in favor to 11 opposed. Those voting in the affirmative were Messrs. Carey, Milius, Stevens, Sullivan, and Zak. All the other directors voted in the negative, so the motion to table was LOST. The question then being on the original motion, a roll call vote being required, the question was decided in the affirmative, 13 to 3. All of the directors voted aye except Messrs. Stevens, Sullivan, and Zak, who voted nay. Accordingly, the By-Law was AMENDED. During the course of the above, the Board was in recess from 2:55 to 3:35 P.M.

35) It was moved by Mr. Metzger, seconded by Mr.

Milius, that By-Law 1(c) concerning Life Members be amended to delete the words "or associate" so that the section would read: "A paid up Life Membership in the League shall be available to any Full member, other than a Family member . . ." However, after discussion, Mr. Metzger withdrew the motion with the consent of his second.

36) Mr. Butler, as liaison, presented the report of the VHF Repeater Advisory Committee concerning 2-meter splinter channels, the 6-meter band plan, and the new band plan for 23 centimeters.

37) Mr. Olson, as liaison, presented the report of the Contest Advisory Committee concerning the desirability of a "Code of Ethics" for contest operators.

38) Mr. Kanode, as liaison, presented the report of the DX Advisory Committee covering lists and DX nets, deletion of Kamarin Island, VS9K, from the DX Countries List, the changes proposed by the Long-Range Planning Committee in advisory committee membership, and a study of international operating activities. Oral remarks added to the report covered recent cases of DXCC fraud and the need to broaden participation of amateurs in general in the DX programs.

39) It was moved by Mr. Wangler, seconded by Mr. Sullivan, that the DX Advisory Committee review the present practices for DX nets and DX list-taking and, where appropriate, revise and define the procedures for DX nets and lists, this updated procedure then to be included in the present DX operating procedures and guidelines. After discussion, on motion of Mr. Stevens, seconded by Mrs. Lewis, VOTED that the matter be laid on the Table.

40) Mr. Sullivan, as liaison, said that there would be no report of the Emergency Communications Advisory committee. Work continues, however, on an emergency communications workbook.

41) Mr. Zak, as liaison, presented the report of the Public Relations Advisory Committee concerning development of a portable exhibit to promote Amateur Radio, and incentive awards for good public relations performance among the ARRL membership.

42) Mr. Holladay, as liaison, presented a brief oral report of the VHF/UHF Advisory Committee, expressing its support for the 6-meter and 23-centimeter band plans presented by the Plans and Programs Committee. During the course of the above, Mr. Olson sat in for Mr. Anderson at the Board table, ending at 4:30 P.M.

43) Mr. Clark, as Chairman, presented the final report of the ARRL Long-Range Planning Committee. The report began with a brief history of the committee and its activities, notably including the 1980 survey of opinion within the amateur community. The report also covered progress in implementing portions of the Long-Range Planning Committee's reports as concerns the field organization and affiliated clubs.

44) Mr. Holladay, as Chairman, presented a brief oral report of the Amateur Satellite Service Council, covering the launching in the past year of UoSAT/OSCAR 9 and six Radio Sport Satellites from the USSR; planned launch of the Phase III-B satellite in July 1982; opportunity for a geosynchronous orbit in 1984; and OSCAR education programs.

45) Mr. Anderson, as Chairman, presented the report of the Interference Task Force, concerning training material for instructors on proper operating practice; the new handbook for local interference committees; the Happy Flyers Radio Direction-Finding Manual; a library of articles at Headquarters on the subject of malicious interference; future articles for QST; liaison with FCC which brings egregious cases to the Commission's attention and the resulting increased evidence of prosecutions as reported in QST; the bills pending in Congress which would allow greater use of volunteers in monitoring; and in accordance with all this, the recommendation that ITF has fulfilled its work and should now be discharged. Accordingly, on motion of Mr. Anderson, seconded by Mr. Sullivan, unanimously VOTED that the Interference Task Force is discharged and the staff is directed to continue the fight against malicious interference in the spirit of the program established by the ITF, and all directors and officers are encouraged to continue their support of the program.

46) Mr. Turnbull, as liaison, presented the report of the Radio Frequency Interference Task Group, covering the success of the RFI assistance list, compiled by Harold Richman, W4CIZ; the editorial in September 1981 QST concerning FCC's course of action with respect to RFI; the League's petition for reconsideration in Docket 20990 concerning radio control devices in the amateur vhf bands; and reports of interference involving cable television.

47) Mr. Wangler, as Chairman, presented the report of the ARRL Committee on the Biological Effects of RF Energy. On motion of Mr. Wangler, seconded by Mr. Holladay, unanimously VOTED that the Board of Directors authorize the Biological Effects of Radio Frequency Energy Committee to prepare: (a)

a response to FCC's Notice of Proposed Rulemaking in Docket 79-144, for review and filing by Counsel; (b) a follow-on article for *QST* on the biological effects of radio frequency energy; and (c) a position statement concerning the utilization of radio frequencies by Amateur Radio operators.

48) Mr. Sullivan, on behalf of Mr. Arnold, presented the report of the Ad Hoc Committee to Study Changes in Board Procedures. It was moved by Mr. Sullivan, seconded by Mr. Grauer, to accept and implement the changes put forth in the minutes of the Ad Hoc Committee to study changes in Board procedures dated February 5, 1982, such procedural changes to become effective at the close of the March 1982 meeting. However, after discussion, on motion of Mr. Grauer, seconded by Mr. Zak, it was unanimously VOTED to lay the matter on the Table.

49) On motion of Mr. Zak, seconded by Mr. Powell, unanimously VOTED to accept the reports of the officers and directors.

50) At this point the following committee appointments were announced:

Plans & Programs Committee: Mr. Bieberman, Chairman, Mr. Butler, Mr. Milius, Mr. Olson, Vice President Anderson.

Membership Affairs: Mr. Sullivan, Chairman, Mr. Carey, Mrs. Lewis, Mr. Nathanson, Vice President Price.

Management & Finance Committee: Mr. Wangler, Chairman, Mr. Hurlbert, Mr. Metzger, Mr. Zak, Vice President Smith.

Mr. Kanode will be liaison to the Contest Advisory Committee and Mr. Bieberman to the DX Advisory Committee.

51) Proceeding with the election of directors to the ARRL Foundation, on motion of Mr. Grauer, seconded by Mr. Stevens, unanimously VOTED that the Secretary cast one ballot for the election of Mr. Sullivan, F. George duPont, WAISVY, and Irvin Emig, W6GC.

52) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the General Manager in cooperation with the Membership Affairs Committee is instructed to continue development of the procedure for implementation of the Long-Range Planning Committee recommendations for establishment of a new category of local club affiliation employing the benefit of continuing input from the membership and to present the plan to the Board of Directors at its July 1982 meeting.

53) The Board was in recess for dinner at 3:40 P.M., reconvening at 8:26 P.M. with all persons hereinbefore mentioned present.

54) On motion of Mrs. Lewis, seconded by Mr. Sullivan, unanimously VOTED that the General Manager be instructed to provide for sale a League emblem the size and color of the standard membership pin, for use by female members or the spouses of male members. This emblem shall have a ring through the upper half for attachment to necklaces and bracelets.

55) It was moved by Mr. Stevens, seconded by Mr. Anderson, that the first sentence of By-Law 14 be changed to read: "On any date not later than noon of the 20th of August of any election year in any division" A roll call vote being required, the question was decided in the affirmative, with all of the directors voting aye, so the By-Law was AMENDED.

56) On motion of Mr. Milius, seconded by Mr. Stevens, unanimously VOTED that the General Manager is instructed to file, on behalf of ARRL, a petition to the Federal Communications Commission seeking changes in Section 97.69 of the Regulations to permit the use by radio amateurs of transmissions in accordance with CCIR Recommendation 476-2; e.g., AMTOR. Mr. Powell abstained.

57) On motion of Mr. Carey, seconded by Mr. Sullivan, it was VOTED that the American Radio Relay League shall not award credits for operating activities conducted on the 10-MHz (30-meter) band and shall not sponsor any operating activities for awards or competition on this band.

58) It was moved by Mr. Holladay, seconded by Mr. Sullivan to delete the existing language in the rules and regulations concerning advisory committees appearing in the By-Laws of the ARRL and to substitute therefor the following:

Rules and Regulations Concerning Advisory Committees

The following rules and regulations provide for the establishment of national advisory committees, composed of qualified amateurs, to undertake studies, review proposals, and to communicate advice, recommendations and expertise in various specialty areas of concern to the League from the League's membership to its management. Each ARRL Division is represented on each advisory committee. The division representatives to the national advisory committee also serve as special advisors to the Division Director.

1. Authority for establishing, terminating, or modifying the terms of reference of any advisory committee rests with the Board of Directors.

2. Any proposal to the Board for the establishment of an advisory committee shall outline the purpose of the committee

and the proposed scope of its activities, and shall explain why its objectives cannot be satisfied through existing mechanisms in the ARRL structure.

3. The membership of any advisory committee shall consist of one Full Member of the League from each division who possesses special expertise in the committee's field of endeavor. Committee members are appointed by the respective division directors for terms concurrent with that of the director; thus, League members interested in serving on advisory committees should make themselves known to their director. The advisory committee members serve at the pleasure of the director and shall be responsible to him for the proper performance of their duties.

4. Each year, the President shall designate one member of each advisory committee as chairman for the ensuing year. Chairmen will serve in that post for no more than two one-year terms consecutively. Each chairman shall designate a vice chairman to assist him and to assure continuity in the committee's operations.

5. One director, officer, or vice director of the League shall be designated by the President as a non-voting member of each advisory committee, to act as liaison between the committee and the Board. One member of the headquarters staff shall be designated by the General Manager to act as liaison between the committee and the Headquarters, and to provide staff assistance as required.

6. Advisory committee studies may be initiated in the following ways: (a) By request of the Board of Directors; (b) between meetings of the Board, by request of the Executive Committee or the President; (c) at the committee's own initiative; or (d) in matters relating to Headquarters administration, at the request of the General Manager. The directors shall be advised of any assignments made in this way. Committee recommendations shall be made in a timely manner to the Board or to the staff, as appropriate, and shall be advisory in nature. Unless otherwise specified, and insofar as possible, reports and recommendations shall be submitted for consideration at least 30 days prior to the next regular meeting of the Board.

7. Members wishing to express their opinion on a matter being studied by, or within the terms of reference of, an advisory committee, are encouraged to communicate with their division representative. To this end, the names and addresses of committee members shall appear in *QST* at least annually. Space in *QST* and other League publications shall be available to the committees, as appropriate.

8. Members of advisory committees serve on their respective division cabinets. Incidental expenses are reimbursable according to guidelines adopted by the Board. Travel expenses normally are not reimbursable. Additionally, advisory committee members are entitled to the privileges accorded Assistant Directors.

A roll call vote being required, the matter was decided in the affirmative, 15 in favor to 1 opposed. All of the directors voted aye, except Mr. Grauer who voted nay. So the Rules and Regulations were ADOPTED.

59) On motion of Mr. Wangler, seconded by Mr. Holladay, it was unanimously VOTED that the Membership Affairs Committee review the current policy concerning obituaries in *QST*. This review is to generate guidelines for insertion in *QST* recognition of any radio amateur who has exhibited extraordinary service and devotion to ARRL and Amateur Radio, without regard to position status in ARRL. This recognition should be with the concurrence of the director from the division of residence.

60) On motion of Mr. Bieberman, seconded by Mr. Anderson, unanimously VOTED that the General Manager is instructed to explore the possibility of obtaining assistance from the membership in developing a sequel to Clinton B. DeSoto's book "200 Meters and Down" so as to bring the history of Amateur Radio up to date.

61) On motion of Mr. Metzger, seconded by Mr. Zak, unanimously VOTED that the Management & Finance Committee in cooperation with the President review the current position description for the officers, the general manager and the general counsel, and submit any recommendations for changes to the Board at its July 1982 meeting.

62) Moved, by Mr. Anderson, seconded by Mr. Powell, that By-Law 36(b) be amended at paragraph 6 to read "On an annual basis and with the collaboration of the General Manager, reviews and approves the operating budget for the coming year and forwards to the Board of Directors for ratification." A roll call vote being required, the question was decided in the affirmative, 14 in favor, 1 opposed, with 1 abstention. All of the directors voted in the affirmative except Mr. Wangler who voted opposed and Mr. Metzger who abstained. So the By-Law was AMENDED.

63) Moved, by Mr. Nathanson, seconded by Mr. Powell, that there be referred to the Management & Finance Committee the task of investigating liability insurance to indemnify directors while they act in that capacity. However, upon information that such insurance was in place, Mr. Nathanson withdrew the motion with consent of his second.

64) Moved, by Mr. Grauer, seconded by Mr. Wangler, that any adverse deviation from a division director's budget as allocated at the annual meeting each year shall be approved by the Executive Committee or the Board only after a review and recommendation by the Management & Finance Committee. A roll call being requested, the question was decided in the affirmative, 10 votes in favor to 6 opposed. All of the

directors voted aye except Messrs. Bieberman and Carey, Mrs. Lewis, Messrs. Milius, Nathanson, and Stevens, who voted opposed, so the motion was ADOPTED. The Board was in recess at 10:02 P.M., reconvening the following morning at 8:30 A.M. with all persons hereinbefore mentioned present except Messrs. Baldwin and Chapman, and Mrs. Gauzens.

65) On motion of Mr. Price, seconded by Mr. Sullivan, unanimously VOTED that the Board create the position of "Director Emeritus" in recognition of those members of the Board that have served the League with superior performance and distinction. Recognition shall be in the form of a certificate, suitable for framing, citing the number of years of notable service and the offices held. There shall be no limit to the number of Directors Emeritus nominated or elected, and Board members only are to be considered regardless of length of service. The Director Emeritus candidate may have his name placed in nomination at a Board meeting provided each Director shall receive a written statement of intent to nominate accompanied by the qualifications of the nominee. The elected Director Emeritus shall be suitably recognized in *QST*.

66) On motion of Mrs. Lewis, seconded by Mr. Holladay, unanimously VOTED that the Plans and Programs Committee is instructed to undertake a study of the role and operational effectiveness of the ARRL Intruder Watch Program, consulting in the process with the General Manager, Intruder Watch leadership personnel and IARU representatives, and to recommend any changes that should be made in ARRL policy or supporting services with respect to this program.

67) On motion of Mr. Stevens, seconded by Mr. Sullivan, the following resolution was ADOPTED:

WHEREAS, the Federal Communications Commission has acknowledged the serious overcrowding on 14.2-14.35 MHz and the need to expand the telephony subband to at least 14.15-14.35 MHz, and

WHEREAS, the availability of the additional frequencies for telephony operation to the various license classes as proposed in FCC Docket 82-83 is not as proposed in the League's petition for rulemaking, RM 3860, it is VOTED that the General Manager is directed to prepare and through Counsel file comments in response to the FCC's Notice of Proposed Rulemaking, affirming the League's proposal to expand the 14-MHz telephony subband, and to allocate that subband among the various license classes as follows: 14.150-14.175 MHz — Extra Only; 14.175-14.225 MHz — Extra & Advanced; 14.225-14.350 MHz — Extra, Advanced & General. Mr. Powell requested to be recorded as voting opposed. The Board was in recess from 9:49 A.M. until 10:15 A.M.

68) It was moved by Mr. Milius, seconded by Mr. Anderson, that By-Law 6 be further amended by adding, after the words, "By-Law 4" the words, "This special rate shall not apply to Life Memberships." A roll call vote being required, the question was decided in the affirmative, with all directors voting in favor, so the By-Law was AMENDED.

69) On motion of Mr. Holladay, seconded by Mr. Milius, unanimously VOTED that the 23-cm band plan, attached to the report of the Plans and Programs Committee, be adopted.

Segment	Use	Notes
1215-1240 MHz	General	Expected to be lost as a result of WARC
1240-1246	ATV Channel 1	Video Carrier at 1241 MHz
1246-1252	FM relay & links #1	Vestigial sideband filtering required (standards under dev.)
1248-1258	ATV Channel 2	Video carrier-1253 MHz
1258-1264	FM relay & links #2	(standards under dev.)
1260-1270	Satellite uplink	Reserved per WARC '79
1260-1270	ATV Channel 3	Video carrier-1265 MHz
1270-1276	FM relay & links #3	(standards under dev.)
1272-1282	ATV Channel 4	Video carrier-1277 MHz
1282-1288	FM relay & links #4	(standards under dev.)
1284-1294	ATV Channel 5	Video carrier-1289 MHz
1294-1295	FM relay & links	(standards under dev.)
1295-1297	Weak sig guard band	1296.0 calling freq.
1297-1300	FM relay & links	(standards under dev.)

70) Moved by Mr. Bieberman, seconded by Mr. Anderson, that the Headquarters staff study the possibility of eliminating most of the personal remarks in the "Section Activities" portion of QST, and making the space gained available to other activities, such as club news, etc. But after discussion, the motion was LOST.

71) Moved by Mr. Metzger, seconded by Mr. Wangler, that By-Law 1(c) be changed to read: "A paid up Life Membership in the League shall be available to any Full or licensed Associate member, . . ." After discussion, a roll call vote being required, the question was decided in the AF-FIRMATIVE, with Directors Carey, Nathanson, and Stevens voting opposed, and all others voting in favor of the motion. At this point, at 11:06 A.M., Mr. Hill took the chair for the Pacific Division.

72) On motion of Mr. Anderson, seconded by Mr. Powell, unanimously VOTED that the General Manager and Counsel develop an updated list of specific criteria to be utilized in determining whether individual cases involving RFI/antenna litigation meet the criteria for direct financial assistance. Such list is to be submitted for Board consideration at its next meeting. Mr. Stevens returned to the chair for the Pacific Division, at 11:12 A.M.

73) On motion of Mr. Hurlbert, seconded by Mr. Holladay, unanimously VOTED, with Mr. Powell abstaining, that the General Manager, the Executive Committee, and Counsel are directed to prepare and file an application for review of the action of the FCC taken under delegated authority which dismissed the League's Petition RM-3855, requesting early allocation of the 10-MHz band to the amateur service. Such application shall further request issuance of an order permitting immediate temporary amateur use of these frequencies pending ratification by the U.S. of WARC-79, on a secondary, non-interference basis. By this motion, Counsel, the Executive Committee, and the General Manager, are mandated to take such immediate and positive action as in their discretion may effectively obtain the earliest possible use of the 10-MHz band by U.S. amateurs.

74) On motion of Mr. Nathanson, seconded by Mr. Carey, unanimously VOTED that the General Manager continue to report on Project Goodwill and its implementation. Further, that the report be submitted to the Board by the July 1982 Board meeting. This report is to list the number of units shipped and update the financial report of funds received and spent. The Board was in recess from 11:48 A.M. until 11:56 A.M.

75) On motion of Mr. Zak, seconded by Mr. Nathanson, unanimously VOTED that the Plans and Programs Committee is instructed to review the several recommendations contained in the Long Range Planning Committee Phase I and Phase II reports in order to identify those items for which appropriate proposals for action should be offered at future meetings.

76) On motion of Mr. Sullivan, seconded by Mrs. Lewis, unanimously VOTED that the staff planning report arising from the Long-Range Planning Committee recommendations for restructuring of the ARRL field organization is accepted and the General Manager, in cooperation with the Membership Affairs Committee, is instructed to continue with the refinement of this plan; further, that implementation of the plan proceed on a measured basis, and that dialogue with the membership be maintained in order to facilitate acceptance and support of the individual steps involved. The Board was in recess for lunch from 12:27 P.M. until 1:22 P.M., reconvening with all hereinbefore mentioned present except Messrs. Baldwin and Chapman, and Mrs. Gauzens.

77) On motion of Mrs. Lewis, seconded by Mr. Milius, unanimously VOTED that the Communications Department study the possibility of initiating a program to put WIAW on the air regularly, during the normal silent hours of WIAW, by using volunteers from the local radio clubs.

78) Moved by Mr. Stevens, seconded by Mr. Wangler, that the General Manager study the matter of establishing minimum standards for the operation of U.S. and Canadian QSL bureaus for incoming DX QSL cards. This study shall include input from the volunteer QSL managers in the field. A report shall be submitted to the Board at its July 1982 meeting. After discussion, on motion of Mr. Sullivan, seconded by Mr. Grauer, VOTED that the matter be laid on the Table.

79) On motion of Mr. Milius, seconded by Mr. Stevens, unanimously VOTED that the Membership Affairs Committee in cooperation with the General Manager, study and develop specific recommendations for ARRL action that will serve to raise the general level of maintenance and repair by amateurs of factory-built Amateur Radio equipment.

80) On motion of Mr. Holladay, seconded by Mr. Wangler, unanimously VOTED that the Membership Affairs Committee in cooperation with the Communications Manager is instructed to review the

preparation and disbursement of news and information to the membership via the official bulletin program and to recommend any changes or improvements that may be needed.

81) On motion of Mr. Wangler, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee investigate the possibility, desirability and costs of entering into a formal agreement with national youth organizations such as Boys/Girls clubs, Boys/Girls Scouts, for the League to provide, through its affiliated club organization, a specially designed package that would act to make the youth and their leaders aware of Amateur Radio and its merits.

82) On motion of Mr. Bieberman, seconded by Mr. Anderson, unanimously VOTED that the 6-meter band plan presented in the report of the Plans and Programs Committee is adopted, and is considered as a tentative plan, subject to possible modification at a later date.

50.000-50.080	CW and Beacons
50.080-50.100	CW only
50.100-50.600	SSB and A-M as follows:
50.110	SSB International calling frequency
(Note: Suggest	QSY up for local and down for long distance)
50.400	A-M National Calling Frequency
50.600-51.100	Experimental & Special Mode as follows:
50.700	RTTY Calling Frequency
50.800	R/C 50-1
50.820	R/C 50-2
50.840	R/C 50-3
50.860	R/C 50-4
50.880	R/C 50-5
50.900	R/C 50-6
50.920	R/C 50-7
50.940	R/C 50-8
50.960	R/C 50-9
50.980	R/C 50-10
51.000-51.100	South Pacific SSB DX window
51.100-52.000	FM Simplex
52.000-52.050	South Pacific SSB DX Window
52.050-54.000	FM Repeater and simplex

(This section needs the structural inputs of VRAC)
(Note: Current R/C frequencies of 53.1, 53.2, 53.3, 53.4, and 53.5 MHz will require three to five years to be vacated after plan adoption. Restricted usage by other services will be appreciated)

83) On motion of Mr. Powell, seconded by Mr. Nathanson, unanimously VOTED that League policy regarding labels, as promulgated in paragraph 7, be studied by the Membership Affairs Committee, and that the Committee report its recommendations to the Board by the July 1982 meeting, with recommendations reflecting changes in technology. Further, that the study include the feasibility of allowing any amateur who is a League member to request labels that could be furnished upon payment of the charges for production.

84) On motion of Mr. Metzger, seconded by Mr. Butler, unanimously VOTED that the application for an ARRL state convention sponsored by the Indianapolis Amateur Radio Association of Indianapolis, Indiana on Sunday, July 11, 1982, is approved by the ARRL Board of Directors.

85) On motion of Mr. Anderson, seconded by Mr. Wangler, unanimously VOTED that the Contest Advisory Committee, in conjunction with the Headquarters staff, study the advisability of adopting an ARRL "Contest Code of Ethics" and convey to the Board their findings, including, if so indicated, a draft proposal for such a code prior to the 1983 Annual meeting.

86) On motion of Mr. Nathanson, seconded by Mr. Sullivan, unanimously VOTED that the General Manager is directed to investigate the feasibility of producing other supplemental special-interest journals on the order of QEX including, but not limited to, contesting, DXing, RTTY, OSCAR activity, ATV and Novices.

87) On motion of Mr. Zak, seconded by Mr. Grauer, unanimously VOTED that the 1984 ARRL National Convention shall be held on July 20, 21, 22, 1984, in New York, New York.

88) On motion of Mr. Sullivan, seconded by Mr. Stevens, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1982 in the proper administration of ARRL affairs in their respective divisions, up to the amounts as follows: Canadian Division, \$9000; Atlantic Division, \$9000; Central Division, \$7500; Dakota Division, \$3500; Delta Division, \$8500; Great Lakes Division, \$9500; Hudson Division, \$4000; Midwest Division, \$5000; New England Division, \$7000; Northwestern Division, \$9000; Pacific Division, \$9000; Roanoke Division, \$9500; Rocky Mountain Division, \$4200; Southeastern Division, \$8000; Southwestern Division, \$8000; West Gulf Division, \$7000.

89) On motion of Mr. Zak, seconded by Mr. Milius, unanimously VOTED that the General Manager is hereby authorized to reimburse the following committees of the Board, for expenses incurred by them during the year 1982 in the proper execution of their duties, up to the amounts as follows: Biological Effects, \$3500; RFI Task Group, \$2500.

At this point, at 2:20 P.M., Mr. Matthews took the chair for Mr. Holladay, representing the Southwestern Division.

90) On motion of Mr. Stevens, seconded by Mr. Anderson, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1982 a total amount not to exceed \$38,000 under terms prescribed by the Communications Manager, following the general pattern established by the Board.

91) On motion of Mr. Anderson, seconded by Mr. Powell, unanimously VOTED that to continue the Board's policy of reimbursing QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1982 a total amount not to exceed \$4000 under terms prescribed by the general pattern established by the Board.

92) On motion of Mr. Nathanson, seconded by Mr. Butler, VOTED that to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1982 a total amount not to exceed \$15,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

93) On motion of Mr. Butler, seconded by Mr. Milius, unanimously VOTED that to continue the Board's policy of reimbursing National Traffic System officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1982 a total amount not to exceed \$16,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

94) On motion of Mr. Sullivan, seconded by Mr. Bieberman, unanimously VOTED that to continue the Board's policy of reimbursing Section Traffic Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1982 a total amount not to exceed \$15,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

95) On motion of Mr. Powell, seconded by Mr. Bieberman, unanimously VOTED that the General Manager is hereby authorized to reimburse actual expenses incurred in the administration of CRRR Headquarters during the year 1982 a total amount not to exceed \$8000. At this point, at 2:28 P.M., Mr. Turnbull took the chair for Mr. Bieberman, representing the Atlantic Division.

96) On motion of Mr. Sullivan, seconded by Mr. Nathanson, unanimously VOTED to take from the Table the previous motion concerning the report of the Ad Hoc Committee on Board Procedures. Mr. Bieberman returned to the table at 2:32. Moved by Mr. Sullivan, seconded by Mr. Anderson, to strike the text of the previous motion and substitute therefor the following language: "In order to implement the changes in procedure recommended by the Report of the Ad Hoc Committee on Board Procedure, the By-Laws are amended by the adoption of a new By-Law to be inserted between the present No. 24 and 25:

1. All motions are to be submitted to the Secretary forty (40) days prior to the Board meeting. Motions submitted at this time shall not require a second for consideration at the Board meeting.

2. Motions received by the Secretary ten (10) days prior to the Board meeting will be placed on the agenda and considered if a seconding motion is obtained.

3. Motions presented and seconded at the Board meeting will be received, and assigned to the appropriate committee for consideration and study.

4. All committees shall be required to report on assigned motions no later than forty (40) days prior to the next Board meeting.

5. Motions that are deemed important and timely may be presented for consideration at any time during a Board meeting with the consent of 2/3rds of the directors.

At this point Mr. Holladay returned to the table at 2:35 P.M. A roll call vote being requested, the motion to amend was defeated 13 to 3, with Directors Sullivan, Wangler, and Zak voting in favor, and all others voting opposed. Moved by Mr. Price, seconded by Mr. Sullivan, that the motion be amended by striking the text and substituting therefor: to accept and implement the changes put forth in the minutes of the Ad Hoc Committee to Study Changes in Board

Procedures dated February 5, 1982, moved that By-Law 25 is modified by striking the phrase, "these By-Laws," and substituting therefor, "the standing orders of the Board." Moved by Mr. Grauer that the motion to amend be Tabled, but the motion was LOST because of lack of a second. The question then being on the motion to amend, the motion was LOST. The question then being on the original motion, the motion was LOST. The Board was in recess from 3:02 P.M. until 3:32 P.M.

97) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the Emergency Communications Advisory Committee investigate and select a "preferred" alerting technique for use by the amateur community. This technique would serve the purpose of providing a means for notifying amateurs of emergency situations during hours when normal monitoring is minimal or non-existent. A national acceptance of a "preferred" technique is desired. Results of the committee's work will be presented at the first 1983 meeting.

98) On motion of Mrs. Lewis, seconded by Mr. Zak, unanimously VOTED that the League representatives in Washington, D.C., the Public Information Officer, and all elected officials are instructed to furnish additional emphasis and continue to actively pursue and intensify a course of media coverage and exposure to, among many subjects: (1) Instruct the public on true causes of TVI, RFI and CATVI, (2) Instruct the public on the responsibility of correcting RFI and CATVI, (3) encourage public pressure on manufacturers of electronic equipment to produce RFI-proof products.

99) Moved by Mr. Stevens, seconded by Mr. Anderson, that the following language be substituted for By-Law 20:

In accordance with the provisions of Article 7 of the Articles of Association, members of a territorial division may petition for recall of the director of their division. The recall petition, stating reasons for the director's removal, shall be presented to the Secretary no later than June 1st of the second year of the director's term of office. A valid petition shall contain the signatures of not less than 10 percent of the Full members voting in the election at which the director was elected or not less than 10 percent of the Full members resident in the division on the preceding December 31st, if the director was elected without membership balloting. Upon certification by the Executive Committee that the petition contains the required number of valid signatures, the Secretary shall notify the director in writing that a valid petition has been received requesting that he be removed as a director. The notice shall contain the reasons stated in the petition. The director may request a hearing before the Executive Committee by sending a written request to the Secretary within fifteen (15) days of receipt by him of notice of the petition. A meeting of the Executive Committee shall be held within thirty (30) days after receipt by the Secretary of the director's request for the purpose of providing a hearing for the director in accordance with rules adopted by the Executive Committee. Within thirty (30) days after such meeting or, in the event the director does not request a hearing as described above, within forty-five (45) days after sending written notice of the petition to the director, the Executive Committee shall send a notice to all of the full members of the territorial division from which the petition originated containing the following: (a) the reasons for removal as stated in the petition; (b) a statement as to whether the Executive Committee deems that there exists sufficient cause for the director's removal and the reasons therefore and (c) a ballot asking the single question, "Shall the director be recalled, yes or no?" If at least sixty-six and two-thirds percent (66-2/3%) of the votes cast are in favor of a recall, then the director shall cease to be a director and the office of director for that territorial division shall be declared vacant. A director may be removed from office only for malfeasance or misfeasance.

On motion of Mr. Price, seconded by Mr. Anderson, unanimously VOTED that the motion is referred to a special committee appointed by the President to consider whether or not revisions in the recall provision of By-Law 20 are required.

100) On motion of Mr. Stevens, seconded by Mrs. Lewis, VOTED that the Membership Affairs Committee study and/or develop a program in which funds may be contributed to the League by a member or friend for one of the following or additional reasons:
In Honor of (Name)
In Celebration of (Reason) (Also Name)
In Memory of (Name)

Mr. Grauer requested to be recorded as voting opposed.

101) Moved by Mr. Stevens, seconded by Mr. Milius, that the modification of the AMEX credit card arrangement for travel expense announced by the General Manager in Directors' Letter No. 1785 be rescinded. It is further moved that the travel policy of the League is amended on page 4 under the heading

"Submission of Travel Expense Forms" by deleting the first sentence and substituting therefor: "Travel expense forms should be completed promptly, and in no event later than seven days after the completion of any trip." On motion of Mr. Anderson, seconded by Mr. Sullivan, VOTED that the motion is laid on the Table.

102) On motion of Mr. Milius, seconded by Mr. Stevens, unanimously VOTED that the Plans and Programs Committee study the matter of petitioning FCC for establishment of a segment in the upper part of the 10-meter band for use by Technician class amateurs. During the course of the above Mr. Williams left the meeting, at 4:17 P.M.

103) On motion of Mr. Smith, seconded by Mrs. Lewis, unanimously VOTED that Robert B. Thurston, W7PGY, be elected as Director Emeritus of the American Radio Relay League. The Board was in recess from 4:26 P.M. until 4:39 P.M.; at this point Mr. Lindholm left the meeting.

104) On motion of Mr. Butler, seconded by Mr. Grauer, unanimously VOTED that in view of the reorganization of advisory committees which promises to revitalize their operation, Minute 39 of the Second 1980 meeting of the Board is hereby rescinded. The Board extends its thanks to those members who volunteered for service on the 900 MHz Ad Hoc Committee authorized therein. The VUAC is requested to undertake, as appropriate, those actions originally assigned to the Ad Hoc Committee.

105) On motion of Mr. Holladay, seconded by Mr. Butler, unanimously VOTED that the President appoint an Ad Hoc Committee to study ARRL requirements for legal counsel, with recommendations to be made to the Board at its July 1982 meeting.

106) On motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the ARRL contribute to the ARRL Foundation the sum of \$10,000, on a matching fund basis, for support of the Amateur Satellite Program. Mr. Wilson left the meeting at this point, at 4:55 P.M.

107) There was extended discussion concerning the new bumper stickers offered for sale by League Headquarters, and the Legal Defense Fund.

108) On motion of Mr. Holladay, seconded by Mr. Anderson, unanimously VOTED that Ray E. Meyers, W6MLZ, be elected a Director Emeritus of the ARRL.

109) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the Board extends its heartfelt thanks and deep appreciation to Administrative Assistant Donna Frechette and Mailroom Supervisor Ruth Doucette and others of the Headquarters staff for their fine work in arranging the marvelous surprise reception for retiring General Manager Baldwin, and to Miss Frechette in particular for preparing the excellent accommodations for this and previous Board meetings. (Applause.)

110) On motion of Mr. Wangler, seconded by Mr. Nathanson, unanimously VOTED that the ARRL adopt a position strongly opposing the issuance by FCC of any amateur license with no requirement for a knowledge of the Morse Code.

111) Moved by Mr. Bieberman, seconded by Mr. Butler, that the 2-meter "split split" (15 kHz) channels be assigned only straight up, in order to avoid "lock ups" with inverted channels in adjacent coordination areas. After discussion, on motion of Mr. Holladay, seconded by Mrs. Lewis, VOTED that the motion is laid on the Table. Mr. Beebe took the chair at 5:34 P.M. for Mr. Sullivan representing the New England Division.

112) On motion of Mr. Bieberman, seconded by Mr. Sullivan, unanimously VOTED that the Management & Finance Committee study the possibility of offering to incurable individuals who are confined to institutions on a permanent basis a type of membership similar to the present "Family membership," with one individual connected with the institution acting as the Full member, and the other interested patients being "Family members." The board recessed for dinner at 5:40 P.M., reconvening at 8:25 P.M., with all persons hereinbefore mentioned present except Mr. Metzger, Mr. Baldwin, Mr. Beebe, Mr. Chapman, Mrs. Gauzens, Mr. Lindholm, Mr. McCobb, Mr. Williams and Mr. Wilson. Mr. Ebneter took the chair representing the Central Division.

113) President Dannals reported briefly on the forthcoming Region 3 IARU meeting in Manila, The Philippines.

114) Moved by Mr. Bieberman, seconded by Mr. Nathanson, that the motion concerning the DXAC review of present practice for DX nets and DX list taking be removed from the Table. But the motion was LOST.

115) On motion of Mr. Powell, seconded by Mr. Anderson, unanimously VOTED that the ARRL Board acknowledge and express its thanks to Noel Eaton, Vice President for International Affairs, for his long years of dedicated service, positive contributions to the health and growth of the League and his

leadership and direction to IARU. (Applause.)

116) On motion of Mr. Anderson, seconded by Mr. Nathanson, unanimously VOTED to take from the Table the previous motion concerning travel regulations. On motion of Mr. Anderson, seconded by Mr. Stevens, VOTED to strike the text and substitute therefor: "THE AMEX charge card arrangements announced in Directors' Letter No. 1785 are modified to provide that Board members, at their option, may continue to utilize direct charge cards. They are urged to promptly remit all travel expense reports at the earliest possible time." The question then being on the motion as amended, the same was unanimously VOTED.

117) Moved by Mr. Anderson, seconded by Mr. Sullivan, that standing orders of the Board be purged and purified, in accordance with Mr. Baldwin's letter of January 19th concerning obsolete standing orders, to remove numbers 11, 12, 36, 37, 85, 88. On motion of Mr. Sullivan, seconded by Mr. Grauer, VOTED that consideration of standing order #88 be separated from the main question. The question then being on the motion as pertains to standing orders 11, 12, 36, 37, and 85, the motion was unanimously ADOPTED. The question then being on the motion as pertains to standing order 88 only, the motion was LOST.

118) On motion of Mr. Anderson, seconded by Mr. Zak, VOTED that the General Manager be directed to promptly notify directors of any charges against their division budgets, other than those made on expense vouchers that have been submitted for reimbursement.

119) On motion of Mr. Anderson, seconded by Mr. Wangler, unanimously VOTED that, in the light of continuing economic conditions, officers, directors, and staff continue their careful scrutiny of expenditures to keep them at the lowest possible level consistent with prudent management of League affairs. Mr. Olson took the chair from Mr. Anderson, at 9:02 P.M., representing the Dakota Division.

120) On motion of Mr. Hurlbert, seconded by Mr. Olsen, the following resolution was unanimously ADOPTED:

WHEREAS, this Board meeting marks the conclusion of a period of long and faithful service to the Board by one of its Vice Presidents,

BE IT RESOLVED by the Board of Directors of the American Radio Relay League, Inc., in its annual meeting assembled at Hartford, Connecticut this 19th day of March, 1982, that it does warmly thank and heartily commend Max Arnold, W4WHN for his tireless devotion to the cause of amateur radio and to the work of the ARRL and wishes him continued success and good health.

121) On motion of Mr. Hurlbert, seconded by Mr. Carey, unanimously VOTED that Counsel is requested to file a request for extension of time of 45 days for the filing of comments in response to the inquiry portion of the Notice in FCC Docket 82-83:

Further, that the General Manager is directed to publish in the next available issue of QST a request for membership comment on the questions posed therein by the Commission, and to provide comments received to the Plans and Programs Committee;

And further, that the Plans and Programs Committee with the assistance of Counsel and the staff develop recommendations for consideration at the Second 1982 meeting of the Board. In the event the request for extension of time is not granted, the recommendations shall be considered by the Executive Committee.

122) On motion of Mr. Nathanson, seconded by Mr. Stevens, unanimously VOTED that the ARRL Hall of Fame moratorium be continued. At 9:16 P.M., Mr. Matthews took the chair from Mr. Holladay representing the Southwestern Division; Mrs. Ferdinand took the chair for Mr. Zak representing the Hudson Division; Mr. Quait took the chair for Mr. Carey representing the Rocky Mountain Division; Mr. Kanode took the chair for Mr. Milius representing the Roanoke Division; and Mr. Ellis took the chair for Mrs. Lewis representing the Northwestern Division.

123) On motion of Mr. Smith, seconded by Mr. Sullivan, unanimously VOTED that the Board of Directors takes this means to express its deep and sincere appreciation to Harry J. Dannals, W2HD, as he concludes his tenure as ARRL President, recognizing his exceptional dedication and many contributions to the League and the Amateur Radio Service during the past 10 years. (Standing Applause.)

124) All those present were invited to make informal remarks at the close of the meeting. There being no further business, the Board adjourned, *sine die* at 10:27 P.M. Total time in session as a Board: 16 hours, 10 minutes; as a Committee of the Whole: 1 hour, 10 minutes; total direct authorizations: \$229,700.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

FCC Proposal for 20-Meter Phone Expansion

Commission also launches inquiry into expanding other hf phone bands; both ARRL and FCC want your comments!

Editor's Note: Because of its importance, and the interest it has stirred in the amateur community, this FCC Notice is printed here in its entirety except for a section dealing with procedural matters. Anyone wishing to participate in the FCC proceeding may do so by sending the original and five copies of their written comments to The Secretary, FCC, Washington, DC 20554. Your comments should clearly indicate at the top of the first page that they refer to PR Docket No. 82-83, and should reach FCC before the filing deadline of July 1. Sharing your thoughts via the League is easier (only one copy is needed), but you must do it quickly! Please see page 9 of this issue.

Before the Federal Communications Commission Washington, D.C. 20554

In the Matter of) PR Docket No.82-83
Expansion of)
the Telephony) RM-3705, RM-3729,
Segments of the) RM-3734, RM-3778,
High Frequency) RM-3831, RM-3833,
Amateur Radio) RM-3860
Service Bands.)

NOTICE OF INQUIRY AND PROPOSED RULE MAKING

Adopted: February 11, 1982
Released: February 24, 1982

By the Commission: Commissioner Fogarty
absent.

Introduction

1) Notice of Inquiry and Proposed Rule Making in the above-entitled matter is hereby given.

2) The Commission has before it at this time seven petitions for rule making which request that the Amateur Radio Service Rules (Part 97) be amended to provide for the use of telephony operation (emission types A3 and F3) on additional portions of the amateur high frequency (HF) bands — the bands between 3 and 30 MHz. Six of the petitions propose some particular portion of certain bands for additional telephony authorization. Four of the petitions propose that additional telephony privileges be divided among or limited to certain operator classes. The petitions are described in the following paragraphs.

3) RM-3705, submitted by Philip Galasso and received by the Commission on June 18, 1980, requests that the frequencies 3750-3775 kHz, 7050-7100 kHz, 14,100-14,200 kHz, 21,200-21,250 kHz and 28,200-28,500 kHz be added to those authorized for telephony in the

United States. It further requests that these additional telephony privileges only be granted to Amateur Extra Class operators and that power input during such operation be limited to 250 watts. The petition claims that expansion of frequencies for telephony operation is warranted due to congestion on the currently authorized telephony subbands and underutilization by U.S. stations of the frequencies proposed for expansion. Lack of use by U.S. amateurs is attributed to incompatibility between telegraphy operation currently authorized for U.S. stations and telephony operation in common use by foreign stations. Operator class and power restrictions are requested by the petition to help "... assure minimum interference to the existing radiotelephone users of these frequencies ..."

4) RM-3729 submitted by David Novoa and received by the Commission on June 30, 1980, requests that the frequencies 7075-7100 kHz and 14,175-14,200 kHz be allocated for exclusive use by Amateur Extra Class licensees and that telephony operation be authorized on these frequencies. This petition also cites crowding on existing telephony subbands and incompatibility of domestic telegraphy operations with foreign telephony operations as reasons for expanding the telephony subbands. The petition further claims that protection for foreign amateurs from powerful U.S. stations is no longer necessary and that foreign stations, in fact, favor a subband expansion which would enable them to engage in an exchange of telephony communications with U.S. stations on a single frequency.

5) RM-3734, submitted by James Simon and William Bennett and received by the Commission on August 1, 1980, requests that the frequencies 3750-3775 kHz, 7050-7150 kHz, 14,100-14,200 kHz, 21,200-21,250 kHz and 28,400-28,500 kHz be made available for telephony use by U.S. amateurs. This petition again cites overcrowding on currently authorized telephony subbands and lack of further need for protection of foreign stations as reasons for its request.

6) RM-3378, submitted for the Willamette Valley DX Club by Robert Herndon and received by the Commission on October 7, 1980, requests that the frequencies 3750-3775 kHz, 7050-7100 kHz, 14,100-14,200 kHz, 21,200-21,250 kHz and 28,400-28,500 kHz be authorized for telephony operation since, it contends, "the United States no longer has the dominant amateur population and there is little reason to think that the expansion of U.S. amateur (telephony) privileges into previously reserved frequencies will result in undue hardship on foreign amateurs." The expansion is necessary, it claims, to relieve congestion on currently authorized telephony subbands.

7) RM-3831, submitted by Ronald Kramer and received by the Commission on November 7, 1980, petitions the Commission to increase the portion of each amateur frequency band between 1.8 and 30 MHz available for voice (telephony) communication and correspondingly decrease the portion of each band available for telegraphy communications. The petition claims this is necessary since the telephony mode is becoming increasingly popular.

8) RM-3833, submitted by Fred Huntley and received by the Commission on January 13, 1981, requests that "Extra Class Amateur Radio licensees be granted radiotelephone operation privileges between 7.100 and 7.150 MHz" and that "(s)uch operation be authorized a maximum power input of 250 watts." The petition proposes that this additional operation be on a shared basis with existing Novice class operations. Relief of congestion and interference on the existing telephony segment of that band is cited as necessitating this action.

9) RM-3860, submitted by the American Radio Relay League (ARRL) and received by the Commission on March 9, 1981, requests that the frequencies 14,150-14,200 kHz be added to those authorized for telephony use and that operator privileges on the revised telephony portions of the 14 MHz band be changed to the following: 14,150-14,175 kHz, Amateur Extra Class only; 14,175-14,225 kHz, Amateur Extra and Advanced Classes; 14,225-14,350 kHz, Amateur Extra, Advanced and General Classes. The petition cites growing congestion in the present telephony subbands as warranting expansion of the subbands. The operator privilege changes are proposed by the petition in the interest of lessening the impact of telephony subband expansion on foreign amateur operations.

Background

10) The Commission has traditionally designated particular portions of the heavily used HF amateur frequency bands for operation using certain emission modes, while only permitting other modes on different portions of the bands. These designations have served to segregate incompatible operating modes. Since the early days of radio, simultaneous use of incompatible modes on the same frequencies has worked to the mutual detriment of communications using all modes. Placing certain emission modes on different frequencies avoids this type of interference and has the further beneficial effect of indicating to amateur operators where, in the amateur bands, to seek out certain forms of operation.

11) The subband allocations¹ have also been arranged to protect international amateur

radio operations. Foreign operators have consistently, in the past, objected to expansion of U.S. subbands for increasingly popular, wide bandwidth emissions such as telephony.² They have claimed that such an expansion would create a situation where high powered U.S. stations would overrun low power foreign stations and effectively prohibit the foreign stations from using those bands.

12) Protection of foreign stations has also benefited U.S. operators desiring to contact them using telephony. The U.S. operator can listen for the foreign stations in a portion of the band where strong U.S. signals are not present³ and then reply on frequencies within the U.S. telephony subbands. The foreign operators then listen for the U.S. stations in the U.S. telephony subbands.⁴

13) Current regulations permit emission type A1 Morse telegraphy operation on all amateur radio frequencies. This unique universal authorization for that mode results from its character as an efficient and widely recognized communications language that can be employed with the simplest type of equipment. In the amateur 160 meter band (1800-2000 kHz) type A3 telephony operation is currently permitted on all frequencies. In all HF amateur bands roughly half of the band may be used for A3 or F3 telephony emissions. The limitations on telephony operation in most of the HF bands were instituted in order to prevent such operation from overwhelming telegraphy operations as well as to protect international operations. Type F1 digitally coded emissions (radioteletype) are permitted in all portions of the HF bands where telephony operation is not permitted since this type of operation is more harmonious with type A1 operation. The only other modes permitted on the HF bands, emission types A5 and F5 "slow-scan" television operation and emission types A4 and F4 facsimile operation, require a bandwidth approximately equivalent to telephony operation and consequently are permitted in the telephony subbands.⁵ This current state of subband allocation in the HF amateur bands is the result of the Report and Order in the last proceeding dealing with expansion of the telephony subbands.⁶

14) Small portions of the various subband allocations are reserved for Amateur Extra Class and Advanced Class licensees. These portions were set aside to help provide an incentive for amateurs to upgrade their license operator class. This program of reserved operator privileges resulted from the proceeding dealing with incentive licensing and distinctive call signs.⁷

Proposal

15) The Commission proposes to expand telephony privileges in the 14 MHz amateur band by adding the frequencies 14,150-14,200 kHz to those currently authorized for such use. We feel this action is warranted due to the extreme congestion experienced by amateurs on the existing 14,200-14,350 kHz telephony subband. Although the various petitions' requests ranged from a subband that would start as low as 14,100 kHz and extend to 14,350 kHz, to a subband that would start as high as 14,175 kHz and extend to 14,350 kHz, we have selected a starting point of 14,150 kHz to propose as a compromise between competing objectives. We anticipate that our proposal would provide substantial relief to the current overcrowding in the 14 MHz telephony subband while causing only a minimal disturbance to international

operations. The increasing sophistication of equipment used by both foreign and domestic amateur operators leads us to believe that foreign stations should not experience undue interference from U.S. operations and that U.S. amateurs attempting to contact foreign stations should have less difficulty using single frequency operation (as opposed to "split operation") than they have had in the past. We propose retaining the frequencies 14,100-14,150 kHz for traditional weak signal and other international operations by not changing the modes authorized on those frequencies.

16) Since we do not anticipate a significant detrimental impact on international operations from our proposal, and since we desire to provide the maximum relief possible from the current overcrowding, we propose to make all of the additional telephony subband frequencies available to Amateur Extra Class, Advanced Class and General Class operators. To this end, we have specifically proposed to not change any of the operator privileges. However, we invite comments as to whether it would be desirable to delete from General Class operators the privileges between 14,150 kHz and 14,200 kHz, and instead, add privileges between 14,225 kHz and 14,275 kHz to those authorized for General Class operators. In this way, the telephony subbands available to General Class operators will be contiguous. Also, consistent with our action in PR Docket 80-252 to permit the use of television and facsimile on most portions of the HF bands where telephony is permitted, we propose to include the use of type A4, A5, F4 and F5 emissions in the new 14,150-14,200 kHz subband allocation. We are not proposing a stricter power limitation for the additional subband allocation since we do not feel this would make any significant contribution toward avoiding interference.

Inquiry

17) The 14 MHz amateur band has one of the two smallest telephony subband allocations and is, perhaps, the most popular HF amateur band due to its reliability for long distance communications. Because of these factors, we believe that crowding on this band is severe enough to transcend much of the controversy surrounding telephony subband expansion, and for this reason we have set forth a specific proposal for that band. However, we are not proposing expansion of any of the other telephony subbands between 3.5 and 29.7 MHz because we feel the issues involved are too inadequately defined for us to commit ourselves to any particular course of action. Instead, we invite the submission of comments and supporting information with which these issues may be clarified. The Commission recognizes that the existing telephony subbands are often seriously overcrowded. However, we request commenters to weigh the magnitude of this problem against the issues addressed in the following questions:

A) Would expansion of the telephony subbands have a major detrimental impact on domestic telegraphy operations?

B) Do non-U.S. stations still have a legitimate requirement to be protected, on some frequencies, from U.S. telephony operations?

C) Does the current trend toward the use of transceivers (with a common transmit and receive tuner) make the reservation of frequencies suitable for contacting foreign sta-

tions using "split operation" unnecessary or undesirable?

D) Should additional subband allocations for telephony be contiguous with the existing telephony subbands?

E) Would it be appropriate to relocate the existing Novice subbands to new frequencies within the same HF bands in order to make a telephony subband expansion more orderly?

F) Are the current exclusive subbands for Amateur Extra and Advanced Class operators sufficient to meet the goals of our incentive licensing program if all additional telephony frequencies are authorized to General as well as Amateur Extra and Advanced Class operators?

G) How should the recent expansion of the Canadian telephony subband in the 7 MHz band influence proposals for a U.S. telephony expansion in the same band.

18) We also encourage commenters to make specific recommendations as to what frequencies would be best suited to use for additional telephony privileges and the relative occupancy of those frequencies. Comments about related matters not explicitly mentioned above are also invited.

Conclusion

19) NOTICE IS HEREBY GIVEN that it is proposed to amend 47 CFR Part 97 in accordance with the proposal set forth in the attached Appendix. NOTICE IS ALSO GIVEN of inquiry into the matter discussed above.

FEDERAL COMMUNICATIONS
COMMISSION
William J. Tricarico
Secretary

Appendix

It is proposed that paragraph (a) of Section 97.61 of the Commission's Rules and Regulations, 47 CFR 97.61, be revised as follows:

In the table in that paragraph, the row beginning with "14,200-14,350 (kHz)" would be revised by beginning the row with "14,150-14,350 (kHz)" so that the entire row reads as follows:

14,150-14,350.....A3, A4, A5, F3, F4, F5.....

Notes

¹The term "subband" is popularly used to describe a segment of a frequency band where authorized modes of emission or authorized operator class privileges are different from those in other portions of the same band. This term is used throughout the text for the sake of clarity.

²Depending on the specific emission mode employed, telephony operations in the HF amateur bands occupy a bandwidth roughly between 3 kHz and 7 kHz. The more popular telephony modes in use today (principally A3J single sideband) occupy somewhat less than 4 kHz. On the other hand, telegraphy emissions used in the HF bands (both A1 and F1 types) occupy less than 1 kHz.

³This portion of a band, where domestic telephony operation is not permitted and where operators listen for foreign stations to contact, is commonly known as the "DX window."

⁴This form of operation where an amateur transmits to a station on one frequency and listens for the station's reply on another frequency is commonly known as "split frequency operation."

⁵Authorization of emission types A5 and F5 "slow-scan" television operation, along with types A4 and F4 facsimile operation, in entire HF telephony subbands was the subject of the proceeding in PR Docket 80-252. See Report and Order, 47 FR 2872, January 20, 1982.

⁶Report and Order in Docket 19162, 37 FR 21325, October 7, 1972.

⁷Report and Order in Docket 15928, 32 FR 12682, September 1, 1967.

ARRL Selects New Leaders

The ARRL Board elected new volunteer officers at its semiannual meeting in Hartford March 18 and 19. Victor C. Clark, W4KFC, is the new president of the League, replacing Harry Dannals, W2HD, who retired. Carl L. Smith, W0BWJ, and Larry E. Price, W4RA, continue as vice presidents. Garfield A. Anderson, K0GA, fills the additional vice presidency spot vacated by Max Arnold, W4WHN. Richard L. Baldwin, W1RU, is the new vice president for International Affairs, replacing Noel B. Eaton, VE3CJ, who retired. David Sumner, K1ZZ, is the new general manager of ARRL Headquarters and the secretary of the organization — vacancies created by Baldwin's retirement from paid employment at Headquarters.

Vic Clark holds an Amateur Extra Class license and has been an active ham since his first license was issued in 1933. Winner of a number of national cw and phone contests, he served as SCM of two states and held several field volunteer positions and is one of three people to ever receive the Hiram Percy Maxim Award. Vic was the Roanoke Division director for seven years and a vice president of ARRL for six years.

Prior to becoming the League's president, Vic visited and met with officers of other national Amateur Radio societies and government officials in 40 countries during the three-year WARC-79 (World Administrative Radio Conference) preparatory period. He was an ac-



Dick Baldwin, W1RU, retired ARRL general manager and new ARRL vice president for International Affairs. Dick has been nominated by the ARRL Board of Directors to become IARU president.

tive member of the FCC WARC Advisory Committee and the IARU WARC Preparatory Committee. His hard work during this time culminated in the conference itself, which he attended as a member of the IARU team.

At the time of his retirement, Vic had served as the director of the U.S. Coast Guard Electronics Engineering Laboratory in Alexandria, Virginia, for 11 years. Earlier, he had served as the chief of the Federal Aviation Agency's Navigational Aids Office in Washington, DC.

A senior member of IEEE and a Charter Life Member of ARRL, Vic resides with his wife, Hester, WA4PAE, in Clifton, Virginia. He is a member of the Ole Virginia Hams and the National Capitol DX Association, among other clubs.

Carl Smith has served as an ARRL vice president since 1971. Also one of the IARU WARC representatives, he was the Rocky Mountain Division director from 1961 through 1970. Carl is a retired airline pilot. He and his wife, Terri, reside in Denver.

Larry Price has served as an ARRL vice president since 1980. He was the Southeastern Division director from 1973 through 1979, and was vice director of that division in 1972. Larry is the chairman of the Finance and Law Department of Georgia Southern College and resides in Statesboro with his wife, Barbara.

Gar Anderson, a new ARRL vice president, has served as Dakota Division director since 1976 and was vice director of that division in 1975. He served as state radio officer of the Minnesota Department of Civil Defense for 12 years. Retired from North West Bell Telephone after 40 years of employment, Gar resides in Minneapolis with his wife, Dorathe.

Dick Baldwin has served as general manager of ARRL headquarters since 1975. He first

came to work at Hq. in 1948 as an assistant secretary, and in 1956 he became the managing editor of *QST*. Dick has been active in international affairs throughout his career with ARRL, and served on the IARU team at WARC-79, and his new, voluntary post as ARRL vice president for International Affairs will provide Dick with further opportunity to serve the League. Dick and his wife, Phyllis, are retiring from paid employment to Bremen, Maine, where they will enjoy country living and sailing.

Dave Sumner, the new ARRL general manager, has been the assistant general manager of ARRL headquarters since 1976. His full-time employment with ARRL began in 1972 after service to the organization in several volunteer and temporary posts. He was deeply involved in Amateur Radio's successful participation in WARC-79. An active contester and cw enthusiast, he resides in South Windsor, Connecticut, with his wife, Linda, KA1ZD.

Dannals Retires

Harry J. Dannals, W2HD, has stepped down as president of the ARRL after holding the office 10 years. A senior engineer for the Sperry Systems Management Division of Sperry Rand, Harry has long been a volunteer official of ARRL: section communications manager for NYC and Long Island, 1955-1961; assistant director, Hudson Division, 1958-1961; vice director Hudson Division, 1961-1964; and director of the Hudson Division, 1965 through 1971.

The former ARRL president is a director and



Vic Clark, W4KFC, new ARRL president.



David Sumner, K1ZZ, new ARRL Headquarters general manager and *QST* editor.



Harry Dannals, W2HD, retired ARRL president.

past president of the Hudson Amateur Radio Council and is a past vice president of the Single Sideband Amateur Radio Association. He has held numerous other leadership positions with local clubs and organizations.

Harry is a commander in the U.S. Naval Reserve, a Life Member of QCWA and a Charter Life Member of ARRL. He and his wife, Kay, have four grown children and reside in Dix Hills, New York.

Eaton Retires

Noel B. Eaton, VE3CJ, has retired as president of the International Amateur Radio Union (IARU) and vice president for International Affairs of ARRL. He was elected vice president of ARRL and nominated by ARRL to be president of IARU in January 1974. When this nomination was later confirmed by the IARU societies without dissent, he became the sixth president of IARU, the first from outside the United States.

The holder of a Canadian Advanced Class license, Noel has been licensed since 1937. He served two years as president of the Hamilton Amateur Radio Club and was the first president of the Ontario Amateur Radio Federa-



Noel B. Eaton, VE3CJ, retired IARU president and ARRL vice president for International Affairs.

tion, the predecessor of the Radio Society of Ontario. In January 1960 he was elected Canadian Division vice director, and in May he became the director. He has had an extensive involvement in IARU affairs, including heading the IARU team in Geneva for WARC-79. Noel and his wife, Julie, reside in Waterdown, Ontario.

Arnold Retires

Max Arnold, W4WHN, has retired as vice president of ARRL, a position he was elected to in January 1980. From 1970 through 1979 Max served as Delta Division director and as a member of the Executive Committee for the last six of those years. He was vice director of the division from 1966 through 1969.

Max owns and operates the Clarence Sutherland Company in Nashville, Tennessee. He is a WW II veteran and was an Army reservist until 1978. When not on the air or teaching local Amateur Radio classes (with over 1000 graduates to his credit), Max is a dog-handling instructor and a member of the Nashville Dog Training Club. Max resides in Nashville with his wife, Rosemary.

New Dakota Division Director

Tod Olson, Jr., KØTO, is the new Dakota Division Director. Serving as vice director of the Dakota Division since 1976, he was automatically elevated to the director's position when Gar Anderson, KØGA, resigned as Dakota Division director to accept a position as ARRL vice president.

As director of the Optical Recording Program at Control Data Corporation, Tod has had extensive involvement with computer systems, financial analysis and new business ventures at Control Data and previously with General Mills. He has held numerous leadership positions with local and regional radio groups, including SCM of Minnesota. Tod holds degrees from the University of Minnesota and the University of Michigan. He and his wife, Jacquelin, are the parents of five grown children and reside in Long Lake, Minnesota.

PENNSYLVANIA BILL PROPOSES STATEWIDE ANTENNA RELIEF

Pennsylvania State Representative Benjamin H. Wilson, WA3ACB, has introduced legislation which, if adopted, would address that state's amateurs' concern over the growing trend toward local regulation of antennas. House Bill 1779 proposes to amend the Pennsylvania Municipalities Planning Code by adding a section to read as follows:

Section 603.1 Ordinance Excluding Amateur Radio Antennas and Towers Prohibited. No zoning ordinance shall exclude or restrict the erection, location or height of an amateur radio antenna, or the tower supporting such antenna. An ordinance may regulate the construction or maintenance of an antenna tower, but only to the extent as is necessary to protect life or property.
Section 2. This act shall take effect in six months.

The idea for the bill came from Robert N. Wilderman, K3SRO, 19 Glen Rd., Lansdale, PA 19446, who asked Rep. Wilson to introduce the bill after his personal experiences with local antenna restriction litigation. Bob is also working on ideas for drafting two more bills which, with Rep. Wilson's help, will address problems with so-called "private regulations" such as deed restrictions affecting amateur antennas.

The ARRL, with the support of ARRL Atlantic Division Director Jesse Bieberman, W3KT, is in complete agreement with the objectives of H.B. 1779. The League's new general manager, David Sumner, K1ZZ, has written to every ARRL-affiliated club in Pennsylvania, urging League members to support these efforts. League members in Pennsylvania who contact their state representatives should emphasize that effective antennas are essential for providing emergency communications for the state.

LEAGUE FIGHTS 10-METER AMPLIFIER RULES (AGAIN)

The American Radio Relay League, Inc., has responded with comments to the Federal Communications Commission proceeding in General Docket 81-706, the matter of FCC's list of rules to be reviewed during 1981-1982. The Commission has identified five rules in Part 97 to be reviewed at this time; ARRL has commented on each.

The first rule, Section 97.69, pertains to radioteleprinter transmissions. The League referred the Commission to its comments in Docket 81-699 for ARRL concerns about digital transmissions' (see "Happenings," March 1982 QST).

ARRL supports retention of Section 97.73, purity of emissions, because of the FCC's obligation to meet international requirements for the suppression of spurious emissions from transmitters as specified by the International Telecommunication Union. ARRL also recognized that the rule will be modified eventually to conform to new standards that will be specified in Appendix 8 of the ITU Radio Regulations, Edition of 1982.

Considerable attention was given the three remaining rules dealing with use of, and type acceptance standards for, external rf power amplifiers. The League wants Sections 97.75, 97.76 and 97.77 deleted, as such action would be "in the best interests of the Amateur Radio Service and the United States businesses which produce and market legitimate Amateur Radio transmitting equipment." The League pointed out that these rules, which have the effect of prohibiting the manufacturing of 10-meter amplifiers, were actually a "stop-gap measure" to curb illegal use of rf power amplifiers by CBers causing widespread TVI. ARRL said that these rules were imposed on the innocent Amateur Radio Service, and *not* on the CB Service, where the problem originated. The League has strongly opposed the Commission's ban of commercially manufactured amplifiers capable of 24- to 35-MHz operation "because this ban had a serious impact upon legitimate manufacturers of Amateur Radio equipment and upon the amateurs themselves." The ARRL prefers point-of-sale checks to ensure that prospective purchasers have proper Amateur Radio licenses and/or a minimum drive requirement for external rf power amplifiers. These steps would preclude illegal use by CB operators of such amplifiers and would permit legitimate manufacturers to produce a marketable product for amateurs.

"Banning these amplifiers accomplished nothing in terms of reducing CB interference, and placed an unnecessary and unconscionable burden upon the innocent radio amateur community," the League stated. ARRL also noted that the CB "boom" is over, and that suppliers

of low-quality, interference-causing amplifiers to CB operators have sought greener pastures. Furthermore, the Commission's ill-advised type-acceptance requirements have forced from the marketplace manufacturers of small quantities of specialty amplifiers (especially 50-MHz amplifiers), "While the general public has derived no offsetting benefit whatsoever."

The League also said that although the 24- to 35-MHz ban on commercially manufactured amplifiers presently affects only the amateur 10-meter band, the impact of these rules will soon be even greater because of the new 24.89- to 24.99-MHz amateur allocation that will be available to amateurs later in the decade.

Referring to manufacturers that serve the amateur community, the ARRL said that the hf amplifier market is almost unique in the electronics industry because of its domination by U.S. manufacturers. These rules have thus had a chilling effect on the sector of the economy that contributes to a positive balance of payments in international trade. "The manufacturers serving this market are relatively small businesses; for some, high-frequency amplifiers are their only product," the League said. — *Richard Palm, K1CE*

LEAGUE COMMENTS IN SPREAD SPECTRUM DOCKET

The League has filed comments generally supporting the Federal Communications Commission's proposal in Docket 81-414 to allow the use of spread-spectrum (SS) techniques in the amateur bands (see "Happenings," December 1981 *QST*). ARRL's remarks opened with a note of gratitude to the Commission for showing support of the amateur service in proposing spread-spectrum authorization: "It is this type of cooperative encouragement which permits amateurs to remain at the forefront of technology pursuant to Section 97.1(b) of the Rules."

Pointing out that privacy in communications is *not* a desired feature in amateur operation, the League said the major motivation for amateur use of spread-spectrum techniques is "simply the desire to better understand and develop the concepts which make spread spectrum a useful communications medium." Given this reason, ARRL supports authorization for amateur spread-spectrum use, provided appropriate safeguards are implemented. Specifically, precautions should be taken to minimize the possibility of business or other nonamateur communications, and interference to other amateur stations and the users of the radio spectrum.

Noting the primarily experimental interest in spread-spectrum techniques, ARRL said the FCC proposal may be premature. The League points out the possibility that only a small number of amateurs presently are interested in SS experimentation, and that the Commission may assume a lesser administrative burden by simply issuing Special Temporary Authority (STA) on a case-by-case basis rather than undertaking a revision of its rules. Other advantages of the STA include the placing of experiment results in the public record, and the benefit to FCC's field offices by having specific data on the location, frequencies and modulation type of individual spread-spectrum experiments. ARRL would support either means, however.

ARRL supports an expansion of the Commission's proposal to authorize spread spectrum to Advanced and Extra Class licensees to

include Technician and General class amateurs. The League offered that, although Advanced and Extra Class licensees have passed a more difficult technical exam, "this does not in itself ensure that the licensees are more responsible or that they better understand spread-spectrum techniques." Concerning incentives to licensees for upgrading, the Commission itself has noted that slow-scan television and facsimile privileges appeared not to be appropriate incentive devices (see Docket 80-252). Similarly, spread-spectrum privileges may not offer significant motivation for license class upgrading. "There is even less of an argument for exclusivity at vhf, where the scarcity value of the spectrum is less than at hf." ARRL added that the Technician class license was originally created to encourage uhf experimentation, and that "It would serve no useful purpose to deny [Technician class licensees] the opportunity to experiment with spread spectrum should they choose to do so."

Concerning FCC monitoring capability, the League shares the Commission's reservations about any reduction in its staff's ability to monitor transmissions for content, or the amateur's ability to monitor for purposes of self-enforcement. Given the local nature of vhf and uhf propagation, however, the potential for abuse by unscrupulous business users should be minimized. This potential is further reduced by the amateurs' vigor in protecting their bands from intruders.

Concerning station identification, ARRL pointed out a problem with the Commission's proposal to require i-d by telegraphy on the center frequency of the spread-spectrum emission. The problem is that it would be difficult to monitor with a narrow-band receiver to determine the "center frequency." Alternatively, ARRL proposes that no more than two specific frequencies per band be designated for identification, and that either Morse code telegraphy or telephony be permitted. Concerning frequencies for identification, the League prefers language in the rules that would permit designations by commonly accepted band plans to allow greater flexibility, particularly if a selected frequency later proved to be undesirable for some reason not originally anticipated.

Noting that the interference potential of spread spectrum to conventional modes is less than that of co-channel, narrow-band emissions, the League added that there is still some legitimate concern in the amateur community about its effects. There is also concern with respect to the services occupying the bands adjacent to the amateur bands because of the stringent filtering requirements that must be met if broadband emissions are to be confined in-band. The League calls for a stronger interference statement than that proposed by FCC. ARRL's proposed statement would specifically place the burden of avoiding interference on the spread-spectrum operator, because any interference created cannot be avoided simply by selecting another operating frequency in the same part of the band.

In response to proposed spread-spectrum use at the 50-, 144- and 220-MHz amateur bands, ARRL believes it is appropriate to exclude SS from the narrow, exclusive telegraphy segments at 50.0-50.1 and 144.0-144.1 MHz. Such a restriction would place no significant additional limitation on spread-spectrum operation, "as both segments are at the band edge and would have to be avoided in any case to avoid interfering with services in adjacent

bands." The League feels that this exclusion, coupled with its proposed interference statement, "should provide sufficient protection for weak-signal amateur communication which normally takes place in the lowest several hundred kilohertz of each of the three bands."

The League agrees with the Commission's proposed limit of spread-spectrum communication to domestic use, but hopes that the Commission will permit international experimentation, should the U.S. and any foreign administration agree to a limited waiver.

ARRL closed with a reiteration of its support and appreciation of the Commission's efforts to introduce the radio amateur community to spread-spectrum techniques. The League believes that the safeguards described above will protect the interests of other users of the radio spectrum, including amateurs using conventional techniques.

FCC CHAIRMAN FOWLER ON AMATEUR RADIO

A wide-ranging interview with FCC Chairman Mark Fowler carried in the January 1982 issue of *Signal*, the journal of the Armed Forces Communications and Electronics Association (AFCEA), includes the following exchange at page 22 (reprinted with permission):

Q: One of the great strengths of this country has been the amateur radio operator. Is there concern on your part to look at the amateur radio situation, licensing and so forth, and perhaps promote the programming of it?

A: Radio amateurs do a great deal for this country besides perform in times of emergency, which obviously has defense and national security implications. They also do a great deal of experimental work and history illustrates that individuals without large financial resources have introduced technologies as a result of such experimentation. Amateurs are sturdily independent individuals who seem to be able to take different disciplines and weld them together. We need to encourage amateurs to develop new technologies by liberal policies that encourage them rather than repress or restrict them.

Q: The Warsaw Pact nations' amateur radio operators seem to be very well organized and trained at all ages. Yet, in the U.S., it seems there is an ebbing away of this great strength. What can the FCC do about this?

A: I encourage young people to become amateur radio operators. I am not sure what we can do except to make entry as easy as possible, consistent with technical standards. Personally, I believe that we might want to consider relaxing some of the entry standards, the first level of license, to get them "hooked" so to speak, and then as they progress to different levels, bringing those standards up, but making the first entry level easy.

MASSACHUSETTS PROPOSES STANDARDS FOR EXPOSURE TO RF ENERGY

The Massachusetts Department of Public Health has proposed rules regulating exposure to electromagnetic fields in the radio-frequency range of 300 kHz to 100 GHz. The purpose of the regulations, according to Robert T. Watkins, radiation scientist for the department, is to prevent possible harmful effects in human beings from exposure to radio frequency (rf) energy. The draft regulations, entitled "105 CMR 122.000: Regulations Governing Machines Which Generate Radio Frequency Electromagnetic Fields," will regulate any machine, whether stationary, mobile or portable, that generates an rf electromagnetic field within the Commonwealth of Massachusetts

and any person who controls the operation of such machines. However, the draft regulation specifically exempts Amateur Radio transmitters and certain other devices from its provisions.

According to Watkins, these regulations are the first to be considered by any state which establish exposure limits as a function of frequency. The proposed regulations were recommended by the Department of Public Health Ad Hoc Advisory Committee on Non-Ionizing Radiation. The perceived lack of adequate federal standards in this area apparently contributed to the Committee's recommendation.

Members of the ARRL Committee on the Biological Effects of RF Energy drafted comments filed by the League in favor of the Department's planned exemption for Amateur Radio transmitters. According to ARRL, the exemption of Amateur Radio from the proposed regulations is appropriate for the following reasons: (1) Amateur Radio stations are used only intermittently with relatively low power. (2) In general, when Amateur Radio stations are operated, a greater portion of the operating time is spent receiving as opposed to transmitting signals. This practice further reduces the rf energy transmitted by amateur stations. (3) On a time-weighted basis, rf energy generated by amateur stations is small compared with other services. (4) Each amateur installation is unique, which makes the application of any standard to amateur transmitters very difficult. (5) Most amateur licensees would be unable to afford the equipment capable of measuring field strengths over the wide range of frequency bands used by amateur stations.

League officials believe it is unlikely that the proposed regulations will affect amateur operations in Massachusetts, given the proposed amateur exemption. Nevertheless, ARRL filed written comments supporting the exemption and plans to have observers at the public hearing on the proposals.

FLORIDA HAMS FIGHT RECEIVER BILL

The March issue of "League Lines" reported that Florida radio amateurs were trying to be exempted from a bill that would outlaw "... any frequency modulation radio receiving equipment so adjusted or tuned as to receive messages or signals on frequencies assigned ... to police or law enforcement officers. ..." The many radio amateurs who wrote their state legislators opposing the bill, H.B. 129, apparently had an effect. State Rep. Mary Ellen Hawkins (89th district) has amended H.B. 129 so that if enacted into law it would penalize only those people who use radio equipment in the commission of a felony. The amendment satisfies, for now, radio amateurs' concerns that local police might mistakenly arrest ham operators on the belief that amateur equipment would be covered under the original wording of H.B. 129.

According to Billy Williams, N4UF, ARRL section communications manager for Northern Florida, it is still possible for the bill to be changed back to the old language before final passage. However, even the newly worded bill may not make it into law. Florida amateurs are keeping a careful watch on H.B. 129 until the end of the legislative session.

FCC OFFICE UPDATE — DETROIT

Our listing of FCC field offices in March

"Happenings," pp. 60 and 61, contained an error. The correct street address for the Detroit field office is 1054 Federal Building, 231 W. Lafayette St., Detroit, MI 48226. Thanks go to Michigan's sharp-eyed ARRL section communications manager, Jim Seeley, WB8MTD, for catching the typographical error.

PETITIONS DISMISSED

In an order released March 1, 1982, the Commission dismissed a petition for rule making, filed by Joseph Speroni, AH0A, which proposed that Part 97 be amended to specify in detail the frequency privileges by aliens operating in the U.S. under a reciprocal operating permit. Speroni felt that aliens visiting the U.S. use frequencies to which they would not be entitled when operating in their own country or, conversely, do not use authorized frequencies because of the arbitrary and ambiguous nature of the rules. In dismissing the petition, the Commission said that Section 97.311(b) specifies privileges of alien reciprocal operators in the U.S., and that it sees no reason to impose reductions in those privileges granted by the alien's home country, except "that an alien with a United States permit cannot do more than a United States licensee can." Indicating that it feels the rules are clear, the Commission said, "we can find no justification for promulgation of more detailed rules for operation of an amateur radio station in the United States under the authority of a reciprocal permit."

In other action, the Commission dismissed the petition of David Wilner, WA6YOC, in an order released January 19, 1982. The petitioner requested that the Commission adopt a position regarding the use of amateur net operations to settle a dispute between amateurs who favor, and those who oppose, such operations. In its dismissal, the Commission said that it has set forth its policies on net operation in several documents. FCC pointed to Section 97.91(c), which provides that net operations are not considered to be broadcasting, clearly showing that the Commission has no objection to net operations. Furthermore, the Commission dismissed, in 1978, a petition requesting regulation of amateur networks (this earlier petitioner had claimed new rules were necessary to curb certain practices engaged in by nets, including operation for commercial purposes, improper third-party traffic and exclusive continuous occupation of particular frequencies). The Commission noted that rules already existed for all amateur operation, including networks that prohibit commercial usage and improper third-party traffic communications.

The practice of prolonged exclusive use of specific frequencies was thoroughly considered in 1976 (Docket 21033). A section of a proposed rule said, "... Licensees making prolonged use of a particular frequency or frequencies shall cooperate with other licensees in the use of such frequency or frequencies." FCC noted that the "policy we expressed in the proposed rule must be widely observed by amateur radio operators if self-disciplined frequency sharing and selection in the Amateur Radio Service is to continue to be workable."

In 1977, a Commission Public Notice concerning network type operations urged all amateur radio operators to consider the benefits provided by public service nets, especially in emergency situations, and suggested also that nets "... avoid abuses in their operations that might tend to antagonize their fellow amateurs ..."

In view of the above, Wilner's petition was dismissed by the chief, Private Radio Bureau, FCC, acting under delegated authority, stating that the petition does not warrant consideration by the Commission. —Richard Palm, K1CE.

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

Contributions continue to roll in to the ARRL Foundation in response to its call for support of the amateur space program. With a Phase III-B satellite launch scheduled soon, now is the time for active participation on the part of the amateur community. Send your tax-deductible contribution today to the ARRL Foundation Satellite Program, 225 Main St., Newington, CT 06111. Become a part of tomorrow's telecommunications world today! Recent supporters of the amateur space program include: ARRL President Vic Clark, W4KFC; Carlon Faust, WB0ZJO; Edward Radcliff, K7WYO; James Oates, HL9RT/KB7YU; and Robert Ledford, KC4MK. Thank you! —Richard Palm, K1CE, Assistant Secretary, ARRL Foundation.

CLARK C. RODIMON, W1SZ

One of the better-known QST staff members before WW II, "Roddy" died recently in Alpine, California, after a short illness. Managing Editor of QST from 1930 to 1942, he was the epitome of the "balanced" amateur. Equally at home with a Vibroplex or the latest-model microphone, he was an interesting rag chewer to the take-it-easy crowd and a fierce competitor to any ambitious contest hot shot. In the middle and late '30s, when contest participation grew rapidly, League rules had to be changed (Hq. members became ineligible for awards) because Rod almost always led his section or call area. An ardent and clever DXer, he played a large part in the establishment of the DXCC award. QST's during the period testify to his enthusiasm for new tubes and circuits, and unexplored frequencies (28 and 56 MHz). Many activity accounts mentioned the "new" rig at W1SZ, and many construction articles described his pace-setting equipment designs. In a day when the ultimate antenna support was a telephone pole, Rod had two poles, spliced, to give a sky hook 100 feet up. During the 1938 hurricane that wiped out much of the power and communications in the area, by chance Rod was on a power line that was kept open because it serviced a hospital. He found the weak signal from Wilson Burgess, W1BDS, in Westerly, Rhode Island, and was the only link to that hastily erected station in the middle of the disaster area. W1BDS on cw (W1SZ was on 'phone with a quickly organized net) won the Paley award for that year. Rod's many friends rallied to aid him in this outstanding operation, if only to monitor the channel in case they could be of help.

At the start of WW II, Rod was asked by old friend Percy Spencer, W1GBE, of Raytheon (a vacuum-tube manufacturer) to organize a "Field Engineering" department. Utilizing his widespread acquaintance with competent amateurs, Rod put together an organization that was the envy of other companies and made Raytheon microwave radar the most dependable the Navy had.

After the war, Rod stayed on with Raytheon, and Hq. lost a great guy. Now we all have. —Byron Goodman, W1DX

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO



CRRL Officers and Directors

President: A. Mitch Powell, VE3OT
Honorary Vice President: Noel B. Eaton, VE3CJ
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Raymond W. Perrin, VE3FN
A. George Spencer, VE6AW

Counsel: B. Robert Benson, Q.C., VE2VW

CRRL, Box 7009, Station E, London, ON N5Y 4J9

The CRRL-ARRL Midwest Convention

What do hams do when their city is celebrating its 100th birthday? Have a convention, of course!

For many months, Percy Crosthwaite, VESRP, and his hard-working committee have been planning the 1982 CRRL-ARRL Midwest Convention, to be held in Saskatoon, Saskatchewan. Convention dates are July 1, 2 and 3. Thursday, July 1, will essentially be a meet-your-friends and registration day, but if you've got hf gear for the car, bring it along. There will also be a 75-meter transmitter hunt. On Friday, July 2, the main program begins. Forums will feature a wide range of topics. Some names expected to be on the program are Gerry King, VE3GK; Fred Hammond, VE3HC; and, from League Headquarters, Gerry Hull, VE1CER, and Steve Place, WB1EYI. Gerry works in the League's Technical Department; Steve is Club and Training Manager, and an expert on amateur satellite communications. There will also be

DOC and CRRL forums, and a 2-meter transmitter hunt. The day will end with a good old-fashioned western barbecue. Additional programs are being planned for Saturday, July 3, but the main attractions will be the flea market, a threshing demonstration for us easterners who don't know how it's done, and the Saturday night banquet.

All events will take place in the Kelsey Institute, a modern technical college at Idylwyld and 33rd Sts. in Saskatoon. Yes, the swimming pool will be open! There's a good choice of hotels in various price ranges nearby. Camping is also available. Costs for all convention activities are reasonable. Registration is \$5 for each amateur and \$1 for a companion. Children are free. Banquet tickets are \$10 each, \$5 for children under 7. The Friday night barbecue is \$2 for all.

Think you can make it? We hope so! Many fellows in eastern Canada have arranged their vacations so they can be in Saskatoon at con-

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vention time. A few are flying out especially for the big event. That infamous club in Burnaby, British Columbia, will be attending in full force. They'll likely take over the entire floor of one hotel. We'll warn you about which hotel in June QST! If you're coming, you'll need more information than we can give you here. Write to Wally Andrews, VE5IX, at 1485 East Heights, Saskatoon, SK S7J 3B2. You'll receive a prompt reply. See you at the CRRL-ARRL Midwest Convention, this July!

U.S. 20-METER PHONE BAND EXPANSION

In February, the U.S. Federal Communications Commission released a combined Notice of Proposed Rulemaking and Notice of Inquiry concerning expansion of the U.S. phone band on 20 meters, and possible expansion of the U.S. phone bands on 80-10 meters. These notices have been assigned docket numbers 82/83. FCC is accepting comments from amateurs, including Canadian amateurs, until July 1. CRRL is opposed to this kind of expansion and will be saying so in a brief now being prepared. Your input, letters, petitions, even QSL cards with short comments, will be helpful. Please send all material to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

DOC NEWS

DOC has informed CRRL of a new reciprocal operating agreement with Malta. The agreement does not permit mobile operation in Malta.

After every examination, DOC has surplus copies of examination booklets. DOC is forwarding these to CRRL, who will distribute them to Amateur Radio students and instructors on a first-come, first-served basis. If you would find it useful to have a copy of the February or April Amateur, Advanced Amateur or Digital Amateur examination, send a 9 x 12-inch, self-addressed, stamped envelope to CRRL, same address as above.

CRRL NEWS

CRRL has received a letter from R. Michael Warren, president of the Canada Post Corporation, explaining that QST is low-priority third-class mail that is forwarded only as time permits. In actual fact, QST is second-class mail. It costs CRRL members one dollar an issue for postage alone. For this, CRRL members should be receiving first-class service. An appropriate reply has been drafted. Meanwhile, test-

mailings of QST from London, Ontario, on the same dates that QST is mailed from Glasgow, Kentucky, indicate that direct mailing from Canada could speed delivery of QST by up to two weeks.

Each month since the beginning of the year, CRRL has sent cassettes of QST to over 30 blind amateurs across Canada. If you, or someone you know, would like to use this free service, write to CRRL.

Many amateurs have been asking about CRRL name badges and diamond lapel pins. At press time, these were being made, and should be available when you read this. The pins were a real cross-Canada CRRL effort, the joint project of amateurs in London, Edmonton and Burnaby, British Columbia.

Want to copy a good bulletin? Each week, CRRL bulletins are transmitted by over 30 stations across Canada on local and regional nets. But you'll get the news first from VE7QST. VE7QST transmits CRRL bulletins every Sunday, at 1730 UTC on the 14.14-MHz Trans-Canada Net, and at 2200 UTC on 14.075-MHz RTTY. Like to make contact with your CRRL reps and workers? The CRRL Net meets twice each Sunday, at 1730 UTC and again at 2130 UTC, on 14.13 MHz. A London station will normally be on.

NEWS FROM ALL OVER

A new type of cordless telephone is being marketed in the U.S. This telephone operates split-frequency. One channel is on or near the 160-meter band; the other is near the 6-meter band. League Headquarters technical staff have investigated the potential threat to amateur operation. There has already been one report of serious RFI. A New York amateur copied 160-meter signals that "pinned his S-meter." The source was a cordless telephone 1000 feet away. At present these telephones are not available in Canada. It seems inevitable, however, that some will enter the country and cause problems.

Saskatoon is not the only place in Canada with a birthday. Amateurs in Moose Jaw celebrated 100 years of their city by operating with a CG5 prefix in January. To celebrate the 150th year since the completion of the Rideau Canal, Smith Falls ARC will be operating special-event station CZ3SFR between May 22 and June 7. To celebrate the 100th year of Kenora, Ontario, Lake-of-the-Woods ARC will be operating

special-event station CK3LWR between July 23 and August 3.

Congratulations to ONTARS, the Ontario Amateur Radio Service Net. This year, ONTARS celebrates 10 years of continuous operation, 11 hours a day, 365 days a year! ONTARS operates from 7 A.M. to 6 P.M. EST/EDT on 3735 kHz.

A new Scouts Canada Net meets at 0100 UTC on the second Thursday (that's Wednesday evening, local time) of each month. Frequency is 14.135 MHz. QNI VE3SHQ, Scout Headquarters, in Ottawa.

AND FINALLY . . .

Congratulations and best wishes to Scarborough (Ontario) Amateur Radio Club, who will host the 1982 CARF National Amateur Radio Symposium in Toronto on May 28-29. CRRL representatives and workers support this symposium and welcome this opportunity to work with CARF for the benefit of Canadian Amateur Radio.



Mayor Herb Taylor of Moose Jaw, Saskatchewan, speaks to Mayor Jack Smylie of North Bay, Ontario, via ham radio, as part of Moose Jaw's 100th birthday celebration. Looking on, from left to right: VE5AE, VE5MC and VE5ACM. (VE5AE photo)

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[Note: Sponsors of large gatherings should check with League Headquarters 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.]

Alaska: The Arctic ARC of Fairbanks will have a hamfest on June 5 in the Kiwanis AG Hall, at the Tanana Valley Fairgrounds. Doors open 8 A.M. to 5 P.M. Prizes, raffle, pot-luck dinner. Alaska QSL Bureau will be there. For all sellers, the fee is \$5. Further information, contact Herb Walls, KL7JLF, P.O. Box 1625, Fairbanks, AK 99707.

Arkansas: The Northwest Arkansas ARC, Inc. will hold its 2nd annual hamfest/swapmeet on Saturday, May 15, at the Community Building (Old Armory) in Rogers, on U.S. Hwy. 71, from 8 A.M. to 4 P.M. Commercial exhibitor space and flea market tables are free. Doors open at 6 A.M. for setup, to public at 8 A.M. Many prizes, free parking, eating establishments nearby. Programs include MARS, DX, and Skywarn. Tickets are \$ for \$5, or \$2 each. Talk-in on 16/76 or 52 simplex. For more information write to: Mary Webb, KA5HEV, P.O. Box 338, Prairie Grove, AR 72753 or call 501-846-2847.

California: The North Hills RC will hold its 10th annual ham swap on May 2 at the Placer County Fairgrounds, on Hwy. 65 in Roseville. Dealer's displays as well as huge flea market area. Admission is free. Many prizes. Talk-in on 144.59/5.19 and 223.18/4.78.

California: The Fresno ARC, Inc. 40th annual Fresno Hamfest will be held at the Hacienda Inn, Clinton and Hwy. 99, Fresno, on May 21-23. Varied activities; golf tournament, wine tasting, exhibits, swap tables, forums, MARS, technical talks, banquet. For information and reservations, contact Chairman Don Samelson, KA6ITM, tel. 209-255-2912. Talk-in on 34/94.

Colorado: The Rocky Mountain VHF Society will hold the annual spring hamfest on Sunday, May 23, from 9 A.M. to 3 P.M., rain or shine, at the Boulder National Guard Armory, 4750 North Broadway, Boulder. Admission is \$2 per family. Gates open for sellers at 8 A.M. Sellers bring their own table. Prizes, technical demonstrations and seminars, food and drink available. Talk-in on 16/76 and 52. For more information, contact Richard Ferguson, KA0DXM, 1150 Albion Rd., Boulder, CO 80303, tel. 303-499-2871.

Colorado: SUPERFEST 4 will be held on June 5, in the McMillen Building at the Larimer County Fairgrounds in Loveland, from 8 A.M. to 4:30 P.M. Admission is \$3 and includes a swap table. Exhibits, technical talks, code contest, auction and prizes. Special activities planned for nonhams. SUPERFEST 4 is sponsored by the Northern Colorado ARC. For further information, contact Gene Bellamy, WD0DRM, 3124 West 6th St., Greeley, CO 80631. Free parking and refreshments available in Exhibition Building.

Connecticut: The C. Q. ARC of Torrington will hold its annual flea market on June 12 starting at 9 A.M. Table set up at 8 A.M. Reservations in writing before June 6, \$5 per table. Contact Sebastiano Albani, KA1FVM, 76 Pythian Ave., Torrington, CT 06790, tel. 203-489-2945, or Ronald Brook, KA1AFN, 213 E. Pearl St., Torrington, CT 06790, tel. 203-482-2764, for information. Talk-in on 6.25/85, 7.84/24 or 52.

Georgia: The Toccoa, Anderson and Hartwell ARCs will hold the 4th annual Lake Hartwell Hamfest on May 22-23, at the Lake Hartwell Group Camp Ground on Hwy. 29, 4 miles north of Hartwell. Features include free admission, free camping and free flea market space. Fishing, swimming and camping on site. Camp grounds open at 6 P.M. May 21. Talk-in on 19/79, 93/33 and 146.895/295. For info contact Ray Pettit, WB4ZLG, Rte. 1, Dooley Dr., Toccoa, GA 30577.

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Idaho: Kootenai ARS presents Hamfest '82 at the Kootenai County Fairgrounds, north of Coeur D'Alene on old Hwy. 95, Saturday, June 12, from 8 A.M. to 4 P.M. Prizes, flea market, food on premises, no pre-registration. Tables available at no charge. Talk-in on 38/98. For further information, s.a.s.e. to: Avon Anderson, WB7WBZ, N. 1035 Highland Ct., Post Falls, ID 83854.

Illinois: Illiana Repeater System, Inc. presents the 13th Annual Danville Area Hamfest on May 23, at the Georgetown Fairgrounds. Flea market, forums, family entertainment, many prizes. Gates open at 6 A.M. Tickets \$2.50 in advance, \$3 at the gate. Talk-in on 22/82 and 52. For info on tickets or tables, contact Wendell Lyons, KA9AYS, Hamfest Chairman, 930 Polk St., Danville, IL 61832, tel. 217-431-2124.

Illinois: The Starved Rock Hamfest will be held at the Bureau County Fairgrounds, Princeton (via Rtes. 80-6-34-89-26), on June 6, under the sponsorship of the Starved Rock RC. Gates open at exhibit building at 6 A.M. June 6; grounds open at 12 noon, Saturday, June 5. Registration is \$2 in advance, \$3 at the gate. Swap shop, exhibits, demonstrations. Food on grounds, plenty of parking, ARRL information booth. Overnight camping Saturday, nominal fee. Exhibit and/or sales space available for rent to dealers, manufacturers, vendors. Write SRRC (with s.a.s.e.), RFD 1, Box 171, Oglesby, IL 61348, for complete data and registrations. Deadline for advance mail registration is May 20, firm. Talk-in on 12/72, 07/67 and 52 simplex.

Indiana: The Wabash Valley ARA hamfest will be held at the Vigo County Fairgrounds in Terre Haute, from 9 A.M. to 4 P.M. on June 6. Advance admission \$2, at the door \$3. Commercial exhibits, flea market, emergency services forum, computer forum. Talk-in on 75/15 or 25/85. Information and reservations from L. R. Norris, N9BEG, RR 51, Box 661A, Terre Haute, IN 47805.

Indiana: The 13th annual Wabash County ARC hamfest will be held on Sunday, May 16 at the Wabash County 4-H Fairgrounds, Wabash, from 5 A.M. to 3 P.M. Admission is \$2.50 in advance, \$3 at the gate. Plenty of parking, overnight camping Saturday is free (power hookups). Flea market, new dealer display, technical display, bingo. Talk-in on 63/03 and 52. For tickets or info send s.a.s.e. to David Spangler, N9AD0, 45 Grant St., Wabash, IN 46992, tel. 219-563-5923.

Indiana: The 3rd annual MAARC hamfest will be held May 23 at the Ball State University indoor track building in Muncie. All activities are under roof. Set up Saturday from 6 P.M. to 1 A.M., Sunday from 6 A.M. to 7:45 A.M. Refreshments, forums and prizes. Flea market tables \$4 on first-come basis. Tickets \$2 advance, \$3 at door. Hamfest hours are 8 A.M. to 3 P.M. Talk-in on 13/73, 223.10/224.70 and 52. For further information, contact Terry Evans, WD9HQH, 522 S. Brotherton, Muncie, IN 47302, tel. 317-282-0615.

Kansas: The Parsons Area ARC will sponsor a hamfest on May 16 from 12 noon to 4 P.M. at the Parsons Community Center. Talk-in on 90/30.

Kansas: The Chippewa ARC, Inc. 21st annual hamfest will be held on May 22, from 9 A.M. to 4 P.M., in the Community Building, North Park, Garnett. Swap table, bingo, pot-luck dinner. Talk-in on 01/61. Bring covered dish and tableware.

Kansas: The Pittsburg Repeater Organization, Inc., will sponsor the 8th annual PRO-club hamfest and picnic on Sunday, May 23, from 9 A.M. to 5 P.M., at the Lincoln Center, 710 W. Ninth St., Pittsburg. Admission is \$2. Indoor flea market, prizes, picnic (bring pot-luck dish; fried chicken and soda supplied), turkey hunt, playground, miniature golf, park facilities (no charge). Flea market tables \$1. Talk-in on 34/94 and 52. For information, contact K0ES, 505 Karen Dr., Carl Junction, MO 64834 or N0BFFK, 416 N. Pine, Pittsburg, KS 66720, tel. 417-649-6470 or 316-231-1099.

Kentucky: NKARC annual HAM-A-RAMA is Sunday, May 23 at the Burlington Fairgrounds, Burlington, off 2-75 Burlington-Florence exit. Individual ticket \$4, family ticket \$6. Prizes, vendors, flea market, nets and group meetings. Food and drinks available. Talk-in on 19/79 and 86/26. Any

questions, write or call Jack R. Thompson, 637 Wolf Rd., Covington, KY 41015, tel. 606-291-2153.

Louisiana: The Baton Rouge ARC will host its annual hamfest on Saturday and Sunday, May 15 and 16, at Catholic High School, Baton Rouge. Easy access from I-10 and -12. Free general admission. Dealers, displays, forums, swap tables. Motor hotels nearby. Talk-in on 19/79 and 28/88. For further info contact Tom, N5ADP, 1060 Boreas Dr., Baton Rouge, LA 70816 or call 504-272-3736.

Maryland: The 8th annual Easton ARS hamfest is May 16, rain or shine, at 8 A.M. to 4 P.M., in the Easton Senior High School cafeteria, Rte. 50 just south of Easton at mile marker 66. Donation \$2, with additional \$2 for tables or tailgaters. Talk-in on 146.445/147.045 and 52. Write Van Herridge, WB3HGQ, Box J, St. Michaels, MD 21663 or Easton ARS, Inc., Box 781, Easton, MD 21601.

Maryland: The Maryland FM Association annual hamfest will be held on Sunday, May 30 at the Howard County Fairgrounds, West Friendship, about 30 miles west of Baltimore, from 8 A.M. to 4 P.M. Admission, \$3 donation; tailgating \$3. Tables in advance are \$6 each, on day of hamfest \$10 each (limited quantity). Talk-in on 16/76 and 52. For more information, write MFMA Hamfest Committee, Post Office, Harmons, MD 21077. For table info and reservations by mail, contact John Elgin, WA3MNN, 5495 Harpers Farm Rd., Apt. 2, Columbia, MD 21044, tel. 301-596-3741.

Massachusetts: The Hampden County Radio Assn. will hold its annual flea market at the Feeding Hills Congregational Church, Rtes. 57 and 187, Feeding Hills, on May 7 at 8 P.M. Talk-in on 34/94. For more information, contact Larry Langevin, K1GXU, tel. 413-583-8236.

Massachusetts: The SSRA annual flea market, one of the largest ham radio/electronic/computer flea markets in eastern Massachusetts, will take place on Saturday, May 22, at Weymouth South High School cafeteria, 300 Pleasant St., Weymouth. Doors open for sellers at 9 A.M., buyers at 10 A.M. Tables: \$5 in advance, \$8 as available at the door. Admission: \$1 each huyer. Food and refreshments available. Get directions from, or send checks for advance tables to, SSRA, c/o David Newman, P.O. Box 447, Abington, MA 02351.

Massachusetts: The 8th annual Eastern VHF/UHF Conference will be held May 14-16 at the Sheraton Inn and Conference Center, 1-495 at Rte. 111, Boxboro. Friday night hospitality room technical talks by well-known vhfers, "rap-sessions" for the various vhf/uhf bands, banquet, noise-figure and antenna measurements, and other activities. Registration is \$13.50 from K1LOG, Rick Commo, 3 Pryor Rd., Natick, MA 01760 before May 10. Registration at door is \$20. Saturday night banquet \$14, payable before May 10.

Massachusetts: The Eastern Connecticut ARA will hold its 8th annual flea market and auction on Sunday, May 16, starting at 9 A.M., at the Point Breeze Restaurant, Webster Lake, Webster. Point Breeze is located just off exit 1, Rte. 52, at the Connecticut-Massachusetts state line. It will be held rain or shine. Advanced reserved tables available for \$5, or \$7 at the door. Admission is \$1. Auction at 1 P.M. Talk-in on 147.885/285 and 52. Reservations and additional information from Dick Spahl, K1SYI, Lake Parkway, Webster, MA 01570, tel. 617-843-4420 after 7 P.M.

Maine: The Portland AWA and the Southern Maine University RC will hold their annual flea market on May 22, at the Gorham Campus, 8 A.M. to 4 P.M. Admission \$1. Food available. Held inside if it rains. Talk-in on 13/73 and 52. For info call or write John Taylor, N1SD, tel. 207-773-2651.

Michigan: The Independent Repeater Assn. will hold its annual Grand Rapids Festival Swap and Shop on Saturday, June 5, from 8 A.M. to 3 P.M., at the Kentwood Field House, just south of 60th St. on Kalamazoo Ave. Admission is \$3. Eight-foot swap tables for \$7 or \$4 half size. Dealers reserve your tables early. Prizes and refreshments. For information or dealer reservations write IRA Swap, 562 92nd St. S.E., Byron Center, MI 49315, or call 616-455-2926.

Michigan: The Central Michigan Amateur Repeater Assn. will hold its 8th annual hamfest on June 12, from 8 A.M. to 4 P.M. in the "Great Hall" of the

Valley Plaza Complex, just off U.S. Rte. 10, Midland. Tickets are \$3, children under 12 free. Tables are \$6 for 8 ft, 25¢ a ft, bring your own table, and trunk sales will be \$2 in a large designed area. Motel accommodations, RV hookups, swimming, dining, bowling alley, theaters and a picnic area. Talk-in on 07/67 and 52. For additional information, contact Carol Hall, WD8DQG, 4651 Cardinal Dr., Mt. Pleasant, MI 48858, tel. 517-772-0363.

†Michigan: The Chelsea Swap and Shop will be held on Sunday, June 6, at the Chelsea Fairgrounds, Chelsea. Gates will open for sellers at 5 A.M. and for public from 8 A.M. to 2 P.M. Donation \$2 in advance or \$2.50 at the gate. Children and nonham spouses admitted free. Talk-in on 147,855 and 52. For more info, write to William Altenberndt, WB8HSN, 3132 Timberline, Jackson, MI 49201.

Minnesota: The North Area Repeater Assn. will sponsor the state's largest swapfest and exposition on June 5 at the Minnesota State Fairgrounds in St. Paul. Free overnight parking for self-contained RVs on June 4. Exhibits, booths and prizes. Admission \$3. Talk-in on 25/85 and 16/76. For information or reservations, write Amateur Fair, P.O. Box 30054, St. Paul, MN 55175.

Mississippi: Old Natchez ARC (ONARC), will hold its hamfest at the Natchez Convention Center on Sunday, May 23. Doors open at 8 A.M. Free admission and swap tables. Food available on premises. Talk-in on 31/91. For further information, contact S. W. Gates, N5AXV, P.O. Box 203, Natchez, MS 39120.

Missouri: The Indian Foothills ARC will hold its 7th annual hamfest on May 16, at the Sabine County Fairgrounds building in Marshall. Tickets are \$2 each or 3 for \$5 at the door, 4 for \$5 in advance. No charge for tables, but reservations are requested. Registration at 8 A.M.; lunch at 11:30 A.M. For information or advance tickets, contact Jim Little, KB0DA, 405 E. Rosehill, Marshall, MO 65340, or call 816-886-8583 after 5 P.M., or K0BVB at 816-886-2837.

†Missouri: The 7th annual Columbia Hamfest will be held May 22 at the Columbia Ramada Inn. Activities begin at 7 P.M. Friday, May 21, with a banquet at the Ramada. Featured speaker will be Peter O'Dell, KB1N, from ARRL Hq.; Paul Grauer, W6F1R, Midwest Division Director, ARRL, will be an honored guest. Advance reservations for banquet required, tickets are \$12. Hamfest on Saturday will feature commercial displays, forums, women's activities. Large area for tailgaters opens at 6 A.M.; all other activities begin at 8 A.M. Special rates at Ramada are \$32 single, \$39 double. Admission to convention center is \$2.50 advance, \$3 at the door. Reserved-space flea market parking \$1. Ticket orders received after May 10 will be held at door. Talk-in on 16/76. For more information, tickets and Ramada Inn reservations, write to Columbia Hamfest '82, P.O. Box 283, Columbia, MO 65205.

New Jersey: The Fort Monmouth ARC and Chavim are sponsoring the Jersey Shore Hamfest and electronic flea market on June 6, 9 A.M. to 3:30 P.M. at the Jewish Community Center, 100 Grand Ave., Deal. Admission \$3 per person (children under 12 and wives free). Refreshments available, prizes. Table \$5, and tailgating \$2; spaces may be reserved by sending s.a.s.e. and advance payment to Jersey Shore Hamfest, P.O. Box 2078, Ocean, NJ 07712 by May 25. Talk-in on 645/045, 175/775 and 52.

New Jersey: The Bergen ARA is holding a ham swap 'n sell on May 23, 8 A.M. - 4 P.M., at Bergen Community College, 400 Paramus Rd., Paramus. Tailgating only. Bring your own table. Sellers \$3, buyers free. Thousands of spaces. For more info, contact Jim Greer, KK2U, 444 Berkshire Rd., Ridgewood, NJ 07450, tel. 201-445-2855.

†New York: Hamfair '82, sponsored by LIMARC, will be held at the Islip Speedway, Islip Ave., Islip, on May 23 from 9 A.M. to 4 P.M. Admission is \$2. Exhibitors \$5 per car space. ARRL booth, AMSAT info, vhf tune-up clinic, free parking, refreshment stands, free electricity. Further information from Sid Wolin, K2LJH, tel. 516-379-2861 or Hank Wener, WB2ALW, tel. 516-484-4322, night only.

New York: The Putnam Emergency Amateur Repeater League (PEARL) will have its first annual indoor hamfest on Saturday, May 8, from 9 A.M. to 4 P.M. at the JFK Elementary School, Foggintown Rd. (off Farm-to-Market Rd., off Rte. 312), Brewster. General admission 50¢. Exhibitors \$2. For advance table registration and information, contact Frank Konecnik, WB2PTP, RD 1-224C, Carmel, NY 10512. Talk-in on 144.535/145.135 and 52.

New York: The Ebonaire ARS will sponsor a hamfest on June 6 at Southern Queens Park, 119th Ave. and Merrick Blvd., Jamaica. Talk-in on 144.75/145.35 and 52. For information, call Vince at 212-528-0416, Hal at 212-527-3785 or Art at 212-523-2319.

†New York: The Southern Tier ARCs will sponsor the 23rd annual STARC hamfest April 30-May 1, at the Treadway Inn, Oswego. Social get-together at 7 P.M. on Friday; Saturday hours 9 A.M. to 5 P.M., with banquet at 6 P.M. General admission, \$2 at the door only, children under 12 free. Banquet, including general admission, \$12 (advance sales only). Surcharge for flea market dealer parking \$1. Flea market, technical and general-interest seminars on the hour, 11 A.M. to 5 P.M. Motels, camping nearby. Talk-in on 22/82 and 16/76 and 52 simplex. Info and reservations by mail: STARC, P.O. Box 11, Endicott, NY 13760. Make checks payable to STARC.

New York: On Sunday, June 6, the Rome Radio Club, Inc. will present the 30th edition of its annual "Rome Ham Family Day," at Beck's Grove, Oswego Rd., Rome. Activities of interest to ham and nonham alike. Educational and scientific presentations, largest flea market in the area, prizes. Buffet-style dinner. Overnight parking for campers as well as fly-in capabilities. Talk-in on 28/88 and 146.55 simplex.

†North Carolina: The Durham F.M. Assn. annual Durhamfest will be held May 15 at the South Square Mall, U.S. 15-501 south, Durham. Prizes, flea market, free tailgating spaces, overnight parking. Motels, restaurant, facilities, tables, power available. Admission is \$3.50, including dealers. Talk-in on 825/225. For more info, write Durhamfest, Box 777, Hillsborough, NC 27278.

Ohio: The Athens County ARA annual hamfest will be held on Sunday, May 16, at the Athens City Recreation Center, East State St., from 8 to 4. Free flea market for electronics-related items on large paved area; some indoor space available on first-come, first-served basis. Setup at 7 A.M. Food, free parking. Adjacent to Athens Mall, several restaurants and recreation area. Tickets \$1 advance, \$2 at gate. Talk-in on 34/94. For further info send s.a.s.e. to ACARA, P.O. Box 72, Athens, OH 45701 or tel. Joe Follrod, WB8DOD, 614-797-4874.

Ohio: Sandusky Valley ARC is teaming up with the Ottawa County ARC to bring area amateurs and dealers a complete hamfest on May 23 at the fairgrounds at Fremont. Gates open at 8 A.M., dealer setup at 7 A.M. Advance tickets are \$2.50, \$3 at the door. Talk-in on 31/91 and 52. For table reservations and tickets, send s.a.s.e. to John Dickey, W8CDR, 545 N. Jackson St., Fremont, OH 43420.

Oklahoma: The Broken Arrow ARC is having their "Green Country Amateur Radio Swapfest" at a new location. This year's fest will be held at Sequoyah State Park at Western Hills Lodge (35 miles east of Tulsa), on May 22-23. All conveniences and concessions of the State Park available. Large inside display area. Group barbecue and hayride scheduled. Pre-registration fee is \$2.50; table space for two days is \$7.50. Contact BAARC, P.O. Box A, Broken Arrow, OK 74012. Talk-in on 90/30.

Ontario: The 7th annual Central Ontario Amateur Radio Fleamarket, sponsored by the Guelph ARC, will be held on Saturday, June 5, at Regal Hall, 340 Woodlawn Rd. West, corner of Woodlawn and Hanlon Pkwy. (no. 6 Hwy.), Guelph. Admission only \$2, 12 years and under free. Vendors, additional \$3. Doors open for vendors at 6 A.M., public 8 A.M. to 4 P.M. Quantity of tables available (3 x 8) at \$5 each. Commercial displays, surplus dealers, computer software and hardware, prizes, indoor and outdoor displays, no weather problems. For further information, contact Bob Lacombe, VE3IYE, tel. 1-519-843-4618 or Rocco Furfaro, VE3HGZ, tel. 1-519-824-1157. Talk-in on 37/97, 96/36 and 52 simplex.

Oregon: Oregon National Guard Armory, 2515 Centennial, Eugene, will be the scene of the Lane County Ham Fair on July 17-18. Doors open 8 A.M., Saturday and Sunday. Major ham equipment suppliers, swap and shop at \$5 a table, women's activities, computer demos, technical seminars, QCWA. Free parking for RVs, no hookups. Saturday potluck supper, 6 P.M. Buy tickets before July 1 and receive an extra drawing ticket free. Tickets are \$4 each. Checks payable to Lane County Ham Fair. For tickets and more info, write to Eunice Brown, WA7MOK, 2456 Corral Ct., Springfield, OR 97477, tel. 747-7939.

Pennsylvania: The 28th annual Breeze Shooters hamfest is May 23, from noon to 5 P.M. at the White Swan Amusement Park, PA Rte. 60 (Parkway West), near Greater Pittsburgh International Airport. Free flea market, prizes, cw contest, family amusement park. Registration \$2 or three for \$5. Under-cover tables for vendors by advance registration only. Talk-in on 28/88 or 29. Contact Joe Kyler, K3SJD, 4430 Evergreen Rd., Pittsburgh, PA 15214, tel. 412-931-2756.

†Pennsylvania: The Warminster ARC hamfest will be held at the Middletown Grange Fairgrounds, Wrightstown, Sunday, May 16 from 7:30 A.M. to 3

P.M. Admission is \$3, \$2 additional for each seller's space (8 ft). Children and wives free. Pre-registration by May 1, \$2. Talk-in on 690/090 and 52 simplex. For more information, write to WARC, P.O. Box 113, Warminster, PA 18974, or Bill Scott, KA3CHB, tel. 215-249-0568.

Pennsylvania: The annual Tamaqua Hamboree cosponsored by the Anthracite Repeater Assn. and the Tamaqua Transmitting Society will be held Sunday, May 16 at the Tamaqua F.O.P. Grove, one mile south of Tamaqua. Registration begins at 9 A.M. Contests, 2-meter clinic, parts and equipment auction, Novice examinations given by approved examiner. Guest speaker will be Atlantic Division Director Jesse Bieberman, W3KT. Registration fee \$3, wives and children free; tailgaters \$1 extra. Courtesy sale table available for maximum of three items per call. For more info, contact Tony, W3CMA, 164 Spruce St., Tamaqua, PA 18252.

Pennsylvania: The 11th annual MARC (Milton ARC) hamfest will be held on June 6, rain or shine, at the Allenwood Firemen's Fairgrounds on U.S. Rte. 15, 4 miles north of I-80. Hours are 8 A.M. to 5 P.M. Advanced registrations \$2.50, at the gate \$3. No additional charge for sellers. Wives and children free. Flea market, auction and contests. Indoor area available. Talk-in on 37/97, 025/625 and 52 simplex. For further details call or write Jerry Williamson, WA3SXQ, 10 Old Farm Ln., Milton, PA 17847, tel. 717-742-3027. Camping and motels nearby.

Tennessee: The Humboldt ARC will hold its annual hamfest on June 6 at Bailey Park, N. 22nd Ave., Humboldt. Tickets \$2. No additional charge for flea market. Prizes, women's and children's activities. Talk-in on 37/97. For more info contact Ed Holmes, W4IGW, 301 N. 18th Ave., Humboldt, TN 38343.

Texas: The Region Four Air Force MARS annual convention will be held on May 14-16 at the Ramada Inn, Lufkin. Friday night there will be an administrative meeting; on Saturday, a series of presentations, climaxed by a banquet. For details, contact Ed Langston, Convention Chairman, 1123 Sayers St., Lufkin, TX 75901.

†Virginia: The 8th annual Manassas Hamfest, sponsored by the Ole Virginia Hams ARC, Inc., will be held at the Prince William County Fairgrounds, Manassas, on Sunday, June 6 from 8 A.M. to 5 P.M. Admission \$4 per person. Dealer exhibits indoors, 25 acres of flea market, YL programs, crafts, home-improvement demos. Tailgating \$3 per space in addition to general admission. Gates open at 7 A.M. for setup. Talk-in on 37/97 and 52 simplex. Further information and reservations from Manassas Hamfest, P.O. Box 1255, Manassas, VA 22110.

†Virginia: The Roanoke Valley ARC will sponsor "Mayfest '82" on May 30 from 9 A.M. to 4 P.M. at the Roanoke Civic Center. Advance admission is \$3, at the door \$3.50. Flea market, commercial dealers, amateur displays, forums, women's activities. Talk-in on 385/985 and 52. For further information, contact Ben Burch, N4FHL, 923 Curtis Ave., Roanoke, VA 24012. tel. 366-8407 or 366-5680.

Washington: The Amateur Radio Assn. of Bremerton will hold its annual hamfair on May 22 from 10 A.M. to 6 P.M., at the Bremerton Holiday Inn. Prizes, vendor booths, swap tables and exhibits. Admission is \$4; a 6:30 P.M. buffet dinner will be \$10 a plate. For further information, contact ARAB, c/o KA7KGW, 1222 Warren Ave., Bremerton, WA 98310.

†Washington: The 3rd annual Tri-Cities Hamfest and Computer Fair will be held in Richland on May 22-23. Banquet on Saturday night at Cavanaugh's Landing at Columbia Center. Seminars covering a wide range of topics. Pre-registration is \$3, at the door \$4. Motels and self-contained camper space available. For pre-registration and additional information, write to: Ham Fest Council, P.O. Box 1181, Richland, WA 99352.

West Virginia: The Tri-State ARA hamfest will be held at Camden Park (South Side Pavilion), Huntington, on Sunday, June 13. Gates open at 9 A.M. Plenty of parking; overnight space for self-contained RVs (must check in at park's main office before 10 P.M. Saturday.) Flea market, women's and children's activities, commercial exhibits, prizes. Talk-in on WBVA 04/64. For more information, write Box 4100, Huntington, WV 25729.

Wisconsin: The Green Bay Mike and Key Club will hold its 7th annual swapfest on Saturday, May 22, at the Norwood School, on the corner of 9th and Norwood, Green Bay. Admission is \$1.50 in advance, \$2 at the door. Tables \$2 for 2-ft space; for every two spaces bought, free admission for one. Hours are 8 A.M. to 3 P.M. Talk-in on 72/12 and 52. For more information and reservations, please contact Robert Duescher, 1011 13th Ave., Green Bay, WI 54304, tel. 414-497-7880.

Coming Conventions

May 14-15

Atlantic Division/New York State
Rochester

May 15-16

Alabama State, Birmingham

May 22-23

Delta Division, Knoxville, Tennessee

June 4-6

Texas State, Dallas

June 4-6

Southwestern Division, San Diego, California

June 5-6

Oregon State, Seaside

June 12-13

Southeastern Division, Atlanta, Georgia

June 19-20

Kansas State, Salina

July 2-5

ARRL/CRRL Midwest, Saskatoon,
Saskatchewan

July 3-4

West Virginia State, Weston (Jackson's Mill)

July 23-25

Oklahoma State, Oklahoma City

August 6-8

Northwestern Division/Rocky Mountain
Division, West Yellowstone, Montana

August 22

Illinois State, St. Charles

ARRL NATIONAL CONVENTIONS

July 23-25, 1982

Cedar Rapids, Iowa

October 7-9, 1983

Houston, Texas

The convention will be held at Bearden High School in Knoxville, the site of the 1981 Hamfest. The building is fully air-conditioned and has a large exhibit area and both indoor and outdoor flea markets. We also have several incentives for dealers that pre-register. Because of the World's Fair, we strongly suggest that if you need lodging you reserve it early.

For more information about the convention, please write: Delta Division Convention, N4BAQ, 5833 Clinton Hwy., Suite 203, Knoxville, TN 37921 or call 615-688-7771 (day) or 615-687-5410 (night).

TEXAS STATE CONVENTION

June 4-6, 1982, Dallas

The Texas State Convention will be held with Ham-Com '82 on June 4-6, in Dallas at the North Park Inn Convention Center on North Central Expressway. Ham-Com is an all-indoor, air-conditioned convention, with manufacturer and dealer exhibits and a large indoor flea market. The convention gets underway on Friday night with a hospitality room. Saturday the flea market opens at 7 A.M., and the exhibits and programs begin at 9 A.M. Two days of programs will cover just about all subjects of interest to amateurs, including the ARRL forum with West Gulf Director Ray Wangler and an xmtr hunt coordinated by the Arlington Radio Club. Saturday night will feature a western style bar-b-que dinner and a western dance with a genuine "foot stomping" country-western band sponsored by area clubs. Sunday will be another day of exhibits and flea market.

Pre-registration is \$5 for a single or \$7.50 for a family of one ham and up to three nonhams. Indoor flea market table reservations are available at \$8 per table, and bar-b-que tickets are \$11 per person. For further information, write TEXAS STATE CONVENTION/HAMCOM, Box 64, Richardson, TX 75080.

SOUTHWESTERN DIVISION CONVENTION

June 4-6, 1982, San Diego, California

A double-barreled set of programs and exhibits for hams and computerists, HAMCOMP 82 is set for June 4-6 at the beautiful Town & Country Convention Center. Hosted by the San Diego County Amateur Radio Council and the San Diego Computer Society, this gala event promises to keep attendees comfortable and enthralled. Technical sessions for hams, computerists, or both, on the latest in radio and computer technology will be presented all day Saturday. One-hundred and eleven booths will be open for viewing on Friday evening, all day Saturday and Sunday morning.

On Saturday evening, the featured speaker at the banquet will be Roy Neal, K6DUE, an NBC News correspondent. Get your banquet ticket early, for we are limited to the first 200 who sign up. There will be an ARRL forum, a ladies' luncheon, breakfasts on Sunday morning, and fabulous ham and computer sessions eight deep every hour. There will be many prizes and awards. Main prize will be an Osborne 1 Computer donated by Creative Computer Products, San Diego.

Advance registration is \$6. The banquet will be \$14, so for \$20 you can take it all in. After May 15, registration goes up to \$7 and the banquet to \$15. The main pre-registration prize will also be a computer, so be sure to register early. For registration forms, write to HAMCOMP 82, P.O. Box 81537, San Diego, CA 92138.

Also, get your room reservations early by calling the Town & Country Hotel at 714-291-7131. Talk-in will be on 04/64, 75/15 and 222.94/224.54. The final event on Sunday at 1 P.M. will be a T-Hunt on 146.76 MHz. We hope you will plan to spend the weekend in beautiful San Diego and take in the San Diego Zoo, the Wild Animal Park, the Ruben H. Fleet Space Theater, Seaworld or one of many other attractions in San Diego.

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

May 15, 1982, Rochester, New York

The Atlantic Division/New York State Convention combined with the Rochester Hamfest will be Saturday, May 15, at the Monroe County Fairgrounds, Rte. 15A, Rochester. Commercial exhibits will open at 8:30 A.M. The huge outdoor flea market opens at daybreak on Saturday.

FCC exams will be conducted on Saturday, May 15. Application for the exam must be submitted prior to May 1 to FCC, 111 W. Huron St., Buffalo, NY 14204. Indicate "Rochester Hamfest, Rochester, NY" in Section II-B of Form 610.

Programs will include net forums, a League forum and others of general interest. A highlight will be the third annual W2RUF Memorial Code Receiving contest. Women's programs will be presented all day at the hamfest. Transportation will be provided to hotel headquarters and shopping malls.

The annual awards banquet will be Saturday evening at the Marriott Thruway (hotel headquarters). A Friday evening pre-hamfest dinner with entertainment is also scheduled at the Marriott.

Registration is \$4 in advance, \$5 at gate. Banquet \$12. Flea market permits, \$2 per parking space. For tickets, write Rochester Hamfest Tickets, 300 White Spruce Blvd., Rochester, NY 14623. For other information, call 716-424-1100 during business hours.

ALABAMA STATE CONVENTION

May 15-16, 1982, Birmingham

The Birmingham Amateur Radio Club will host the Alabama State Convention this year at its annual hamfest. It will be held May 15 and 16 at the spacious Birmingham-Jefferson Civic Center adjacent to I-59/I-20 in Downtown Birmingham. All events and exhibits will be under one roof.

Features this year include forums covering a wide range of interests such as the ARRL, DX, Antennas, OSCAR satellite communications, trouble-shooting, SSTV and RTTY. Dealers and manufacturers will have displays showing the latest in ham equipment and accessories. A large, indoor air-conditioned flea

market area will be provided. There will be activities for the non-ham, including video games. Our prize list is sure to send several hams home with a dandy addition to the shack. The "Hamquet" Saturday night will be an informal, family affair, followed by a Wouff Hong ceremony.

Parking, lodging and restaurants are available adjacent to the Civic Center. Concessions will be located in the main exhibit floor area. Tickets good for both days are \$3 for hams, \$1 for nonhams; children under 12 admitted free. Flea market tables are \$5 per table per day. Talk-in on 34/94, 16/76 or 28/88 repeaters or 52 simplex. For more information, write BirminghamHamfest '82, P.O. Box 603, Birmingham, AL 35201.

DELTA DIVISION CONVENTION

May 22-23, Knoxville, Tennessee

The 1982 ARRL Delta Division Convention will be held in Knoxville May 22-23, 1982 as part of the 16th annual Knoxville Hamfest. The Knoxville Hamfest has always been one of Tennessee's biggest, and this year we have several attractions that will make it one of the biggest and best in the state. In addition, the 1982 World's Fair will be held in Knoxville from May 1 through October 31. This is a great opportunity to come to the hamfest and stay to visit the World's Fair.

For all amateurs, we will have a forum on the future of Amateur Radio, with Vic Clark, W4KFC, newly elected President of ARRL and Chairman of the League's Long Range Planning Committee. For the DXer, Don Search, W3AZD, head of the ARRL DXCC program, will present a forum on DXCC and will verify QSL cards. Bob May, K4SE, will verify QSL cards for the CQ-WAZ program. Gary Dixon, K4MQG, will present a forum on the CQ 5B-WAZ program. We will have forums on Fast-Scan TV with K4KFD and K4ARC; Computers and Amateur Radio, with a demonstration of Radio Shack's newest computers; an ARRL forum with Clyde Hurlbert, W5CH, ARRL Delta Division Director and several League dignitaries; a technical Q & A session with Dick Frey, K4XU; as well as official meetings of MARS. Representatives of both 4-land QSL Bureaus will attend. Several activities are planned for nonham women, and a shuttle bus to the World's Fair will be offered.



DXCC, "The Way It Was": 1965-1975

This month, our look back at DXCC since World War II continues where the last installment left off — 1965.

1965: San Felix, CE0, became an addition, as did St. Peter and St. Paul Rocks (northeast of Brazil). A change was announced regarding DXCC credits for contacts with stations in Singapore. Sort of a housekeeping move, it meant that Singapore contacts before September 16, 1963, and after August 8, 1965 would be so credited, but the interim period would count as West Malaysia. (Singapore was made a separate British colony in 1946 and a state of Malaysia in the interim period noted above, and became an independent republic in 1965.)

1966: An attempt was made to streamline the mammoth processing job the DXCC had become by returning to the original concept of a single DXCC instead of a plethora of separate awards. Obviously, this move hardly got off the ground. An interesting assortment of additions (which would not remain that way for long) was announced. In January, Spratly Islands, Ebon Atoll and Comoran Reef were added, while July DXCC Notes show the three additions of Desroches, Maria Theresa and Minerva Reefs. Desroches (VQ9) lasted until June 28, 1967. Farquhar, formerly one of the Sechelles, achieved separate status late in the year. It, too, would last just until June 1976.

1967: The 1966 recap alluded to some transient additions to the countries' compendium — Comoran Reef (TI) and Ebon Atoll (HC). The upshot of the whole matter was that both were withdrawn from the list of eligibles. This was done after determination that the maps relied upon for information were inaccurate, that the consuls had mistakenly issued the authorizations, that no checking had been done with the respective home administrations (as had been claimed), and that the two areas were actually within the U.N. Trust Territory and under U.S. Administration. Later it was explained that Ebon (KX6SZ) cards could be credited toward the Marshalls grouping. During the year we discover the 1A6SBO, Bishop's Rock, would not be acceptable for credit (rule 8, concerning land stations), nor would 1B9WNV count (the latter because of inability to establish actual presence on the reef). Credits were deleted at the end of the year concerning several DXpeditions: K1IMP/KC4, Navassa, because of the violation of U.S. Coast Guard rules and policies (which still prohibit presence on the island without permission); VU2WNV, Laccadives, because the Government of India stated that the licensing permission did not include such operation; VQ9AA/C, because of the inability of the licensee to establish that he was actually present on Chagos; PY0XA, St. Peter and St. Paul Rocks, inability to establish presence on the Rocks; and VK2ADY/0, because the Australian authorities stated that the licensee did not authorize such operation and the Department of External Affairs denied permis-

sion to go to Heard Island. As a result of the headaches in particular that year, and Board involvement therewith, Headquarters stated that no future DXpeditions would be credited until evidence was submitted concerning licensing, presence, and so on. Prospective DXpeditioners were urged to keep very full and complete records of pertinent documents, travel logs, receipts, and so forth.

1968: In May we learned that VP2ME cards would not be creditable. Simple reason, really — inquiries revealed that no QSO was necessary to receive a QSL! This prohibition did not affect a VP2ME operation by others on January 25-28, 1966. New rules were effected with regard to endorsements (revealed in the July issue). VS9H, Kuria Muria, and ZC6, Palestine, dropped off the list. After November 30, 1967, Kuria Muria would count the same as contacts with the Sultanate of Muscat and Oman (MP4M, VS9O); and ZC6, the Palestine listing comprised of the U.N. Truce Area bordering on Israel, no longer existed. The eagerly awaited rules for 5BDXCC appear in July, paving the way for contacts to count on or after January 1, 1969. September brought two additions to the list, Blenheim and Geyser Reefs, but indicated that no prefixes would be shown for them since there were no apparent claims by countries to these areas. We'll discover in the '70s that Blenheim would count for Chagos and that Geyser would have just a brief history as a separate entity. In an admittedly arbitrary decision, the VQ8CBN cards (Nelson's Islands) were credited toward Chagos. It was quite confusing in that the status of this island became rather mixed up during the transfer of Chagos to the British Indian Ocean Territories (to the extent that even the Administrator of BIOT stated that such status was not technically clear!).

1969: DXCC Criteria was reiterated in February, pointing out that the general policy had remained substantially the same in the makeup of the list since pre-WW II, and that only specific mileages had been added. The Board got in the act again, and the format for DXCC submissions was altered (covered in July). August contained a photo of the brand new 5BDXCC plaque, whetting the appetites of the faithful. Ifni dropped off the list, joining with Morocco, for contacts on or after May 13, 1969.

1970: The March issue highlighted the first 11 qualifiers for the "impossible" achievement, 5BDXCC: W4QCW, DL7AA, W1EVT, W8GZ, W8BT, W4IC, W1AX, W4BRB, K2BZT, LA7Y and W4AQW. Market Island was a new addition, unique in that it is located exactly on the boundary line between Finland and Sweden (and directly opposite the Åland Islands). More on DXCC documentation and a seemingly innocuous Board mandate requiring checking of all nonhome operation. In about 2-1/2 years over 400 different operations were checked out. Effective May 1970, the rule was modified to permit checking only those about which some question may have arisen. The caution was raised (and still is!) that close atten-

tion be paid to maintaining records so that if documentation becomes necessary questions can indeed be answered.

1971: The Kuwait/Saudi Arabia Neutral Zone (remember 9K3/8Z5?) dropped from the list. New additions appeared with Abu Ail/Jabel At Tair and Annobon. Abu Ail is located in the Red Sea and Annobon is located off the west coast of Africa in the Gulf of Guinea (territory belonging to Equatorial Guinea). By October 1971 well over 100 5-Band DXCC awards had been earned by a worldwide range of qualifiers.

1972: As noted in the 1969 recap, the September issue in 1972 noted the removal of Maria Theresa from the DXCC list. Late in the year Minerva Reefs also disappeared, becoming a deleted country. The Kingdom of Tonga had annexed Minerva Reefs, and with that miniscule body less than 500 miles from Tonga it no longer met the criteria. The October issue announced the addition of Mellish Reef (Australian Territory). With the goings-on that year, the Honor Roll "last position" became 312 deleted. The end of the year hinted at some allegations concerning the Mellish operation that the March 1974 issue would clarify. Yes, indeed, those contacts (VK9JW and VK4FJ/Mellish) were countable.

1973: The Theocratic State of Mt. Athos, unique in its distinctively separate administration with relation to the rest of Greece, joined the ranks of the addable early in the year. A disappearing act (Swan Song?) took place with the deletion of KS4, Swan Island. The deletion was made in view of treaty agreements between Honduras and the United States recognizing the sovereignty of Honduras. In retrospect it is almost amusing to note another attempt to streamline the DXCC with the abolition of the "mode award" (phone). It is often hard to equate administrative practicality with the heartfelt wishes of the membership!

1974: A very brisk year, particularly in terms of proliferation of interest in the 5-Band awards (at year end the total qualifiers for 5BDXCC was close to 400!). The year revealed some details on the attempts at clarification of allegations pertaining to the Mellish 1972 operations. A very thorough review was conducted by the Wireless Institute of Australia and the matter was closed. New DXCC pins were authorized early in the year.

1975: The June issue delineated the first 414 qualifiers for 5BDXCC. A look at the new Honor Roll Number 1 position plaque in the September issue, still available to those who have attained the Number 1 spot in the Honor Roll (that, plus \$25, that is!). The popular cw DXCC was announced in the April issue. The year's only deletion/addition were Sikkim (AC3) and Blenheim Reef. The deletion of Sikkim was made in view of Sikkim becoming an integral part of India (May 1, 1975). The deletion of Blenheim followed after information received indicated that Blenheim came under the administrative jurisdiction of the Commissioner of the British Indian Ocean Territory. The "Blenheim" contacts were

creditable toward the Chagos (VQ9) slot.

The years 1976-1980 will be summarized in a future issue, temporarily bringing us more-or-less up-to-date with the ebb and flow of DXCC since World War II. In this writer's view it is the responsibility of the Journal of a Society to document this type of information — hopefully to forestall future readers from reinventing the DXCC historical wheel.

ANTARCTIC AND SOUTH ATLANTIC DXPEDITION, FEB.-MAR. '82

LU2AH (formerly LU2AFH) operated from the 25th of May Island in the South Shetlands for the major part of a 60-day DXpedition sponsored by the Argentine Radio Club. He returned the end of February after working well over 15,000 stations (and completing 5BWAC). Propagation to Japan and Europe was poor but very strong to the USA. Ten opened very sporadically and for very short durations (about an hour). Pleups were tremendous. On one occasion when propagation was favorable, Ron stayed on for about 25 hours of uninterrupted operations. Toward the end of his tour he had hoped to be able to visit one of the remaining alternative locations (on South Orkney and South Sandwich). Ron used LU5ZR from Duncie Island, and LU5ZE from Bahia Puerto Paraiso, both on the Antarctic Peninsula and LU5ZI from the South Shetlands. He had hoped to use LU5ZA from the South Orkneys (Laurie Island) and LU5ZY from the South Sandwich Islands (Morell Island). Thanks to ICOM, Inc. for supplying the reliable IC-720A and IC-KL. Cards go via LU2A, C.C. 100 Suc. 28, 1428 Buenos Aires, Republic of Argentina.

SMOM

Thanks to K2UFM for reminding us of last November's item in *Parade* about the Sovereign Military Order of Malta, the smallest country in the



9K2KA, Adnan Kazemi, Box 30, Safai, Kuwait, is the most active ham in that remote part of the world. He's on Teletype almost daily on 14,078 in addition to 20 sideband. His station houses a KWM-380, ICOM IC-720A, HAL DS3100/ST6000 demod., and a 5-element Telrex monobander. (Thanks K1FMP)

world. "SMOM is a walled enclave about half the size of a football field. Located in central Rome at the top of the Aventine Hill, it is the only nation in the world small enough to merit a street address.

It came into being in 1048 as the Knights Hospitalers, an order of monks who tended a hospital for pilgrims in Jerusalem. During the first Crusade, the Hospitalers cared for the wounded and accepted generous donations from the wealthier Crusaders. As the assets of the order grew, so did its military might, and the Hospitalers dedicated themselves to killing Moslems as much as to healing the sick. Between 1219 and 1798, the order was known by a variety of names and headquartered successively on the islands of Cyprus, Rhodes and Malta. It turned up at its present digs in Rome in 1834.

Although it remains independent, SMOM is not much of a power these days. Recent estimates give its population as 80 (ruled by a grand master). As in 1048, its principal business is good works — running hospitals, clinics and leper colonies throughout the world.

Drop by SMOM next time you're in Rome. Its big-

gest tourist attraction is the keyhole in the main gate. Peek through it for an exquisitely framed view of the basilica of St. Peters. This is the only keyhole in the world through which you can see three countries at once — Italy, the Vatican and, of course, SMOM." (Reprinted with permission of the authors, David Wallechinsky, Amy Wallace and Irving Wallace.)

UTAH AND THE HONOR ROLL

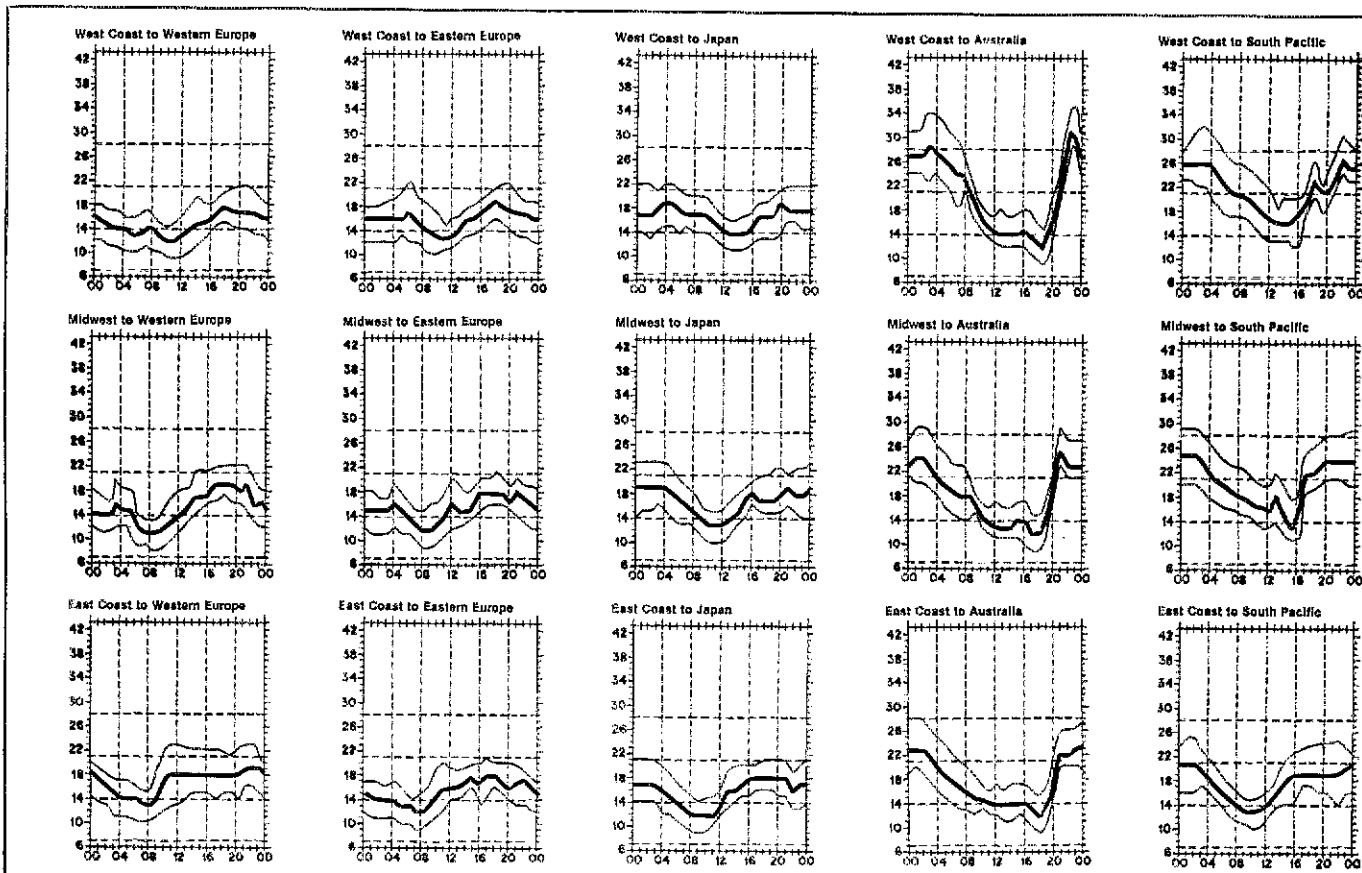
W7TE has experienced propagation from Utah for only 11 years and, comparing it with his recollections of DX propagation to Minnesota and being new to the honor roll, he decided to analyze the last honor roll from a few points of view.

Using the *Callbook* declarations of ham population in the U.S. call district and the count of honor roll types in the various U.S. districts, Gene came up with the following:

District	% Total U.S. hams	% Honor Roll
1	6.7	7.8
2	10.7	13.1
3	6.9	5.4
4	16.0	17.1
5	10.1	8.8
6	13.5	17.5
7	7.8	5.5
8	10.0	8.9
9	8.9	10.4
0	9.2	5.7

W7TE has often thought that Utah is in a propagation hole. There are 38 U.S. "7s" on the honor roll; 82% of them are from Washington, Arizona and Oregon, in that order. Sixty-five percent of the honor roll is continental U.S.; 44 DX countries are represented. Fifty-one percent is represented by six countries, in order: JA, DJ, I, VE, PY, SM. If five more countries were included, 71% of the DX honor roll would be represented by G, F, OH, ON, YV.

Conclusions drawn from the above facts are valid (after one hour in a cocktail lounge, says W7TE). From what this writer has noted over the years, however, it appears that a W7 in Utah has got to be worth at least 6 dB!



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 hp). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

THE CIRCUIT

□ Mid-June will see a Dxpeditio to Lampedusa Island by 10YKN/IG9 and 100CD/IG9. Operation is planned for: 28,600-21,250-14,205-7050. Cards will once again be managed by Sandro Sugoni, 10SSW, Via di Villa Bonelli 22, 00149, Rome, Italy.

□ NIAVL relates a real heartbreaker. In February his home was completely destroyed by fire, including his complete station and records. Any DX readers of this column who can reconstruct NIAVL confirmations are urged to send them to Veri Leighton, NIAVL, Box 669, Wells, ME 04090.

□ Anyone still needing Navassa after the March foray must have been licensed the day after the KP2A/KP1 operation ceased! The mighty crew included KP2A, N6CW, K8CW, WA2MOE, W2IJB, N200, K1MEM, VP2MH, W0DX, WA4SSU and K000. QSL via WB2MSH, Henry O. Feltman, Jr., 20 Progress Ave., Woodbury, NJ 08096. Don't forget to include the necessary s.a.s.e./s.a.e. + 2 IRCs.

□ D4CBC became D44BC during March, and D4CBS became D44BS. Thanks WB2DQC.

□ May 21 to May 30 are the projected dates for the Wiesbaden Amateur Radio Club's seventh annual DXpedition to Liechtenstein, under the call DA1WA/HB0. This year the operating modes will include cw, phone and RTTY; 10-160 meters. American Novice operators will be specially looked for between 1900-2100 EST (some doubt about the time, however, since mainland U.S.A. will be on EDST at that period) — 3.725 and 21.120 MHz. Stateside QSLs, along with an enclosed s.a.s.e., can conveniently go via Stephen Hutchins, Box 4573, APO, New York 09109.

□ Another reminder that cards for VK9ZG and VK9SH should go to Jill Weaver, VK6YL. She is holding logs and will receive future logs where appropriate. She also promises to forward all cards for VK9ZD.

□ IJ7ET will operate from May 28 to June 6 from San Pietro Island, in the Cheradi group in the Ionian Sea; all modes/bands (including OSCAR). The station will be active during the WPX Contest. QSL via I7SOZ or Box 136, I-74100, Taranto, Italy.

□ If you worked V2AMK 160-10 meters in February during the ARRL DX Test you'll be eligible for a unique certificate that will help to commemorate the recent independence of Antigua. K9MK/V2A goes via K9MK/5, Mike Krzystyniak, 6061 Dunson Ct., Watauga, TX 76148; while K9LA/V2A, K9DX/V2A, N9PI/V2A and V2AMK go via Dave Jemerson, 2031 E. Gary, Mesa, AZ 85203.

□ KH3AB's new call is NR4K, and KB7MO is no longer handling QSL requests for KH3AB contacts.

□ W3ICM furnishes some interesting information vis-a-vis "official" prefixes. Fred notes in recent correspondence that prefixes such as M1, 1A and S8 are not in accordance with ITU. He indicates that, of course, nonsignatories may use anything. However, since San Marino is a signatory, M1 shouldn't be used. Looks as if the U.K. should do the complaining to San Marino, using their call sign block!

QSL 4X6FY via KT2D, Box 191, Oakland, NJ 07436 only. Cards sent via the 4X bureau will not be answered. Bob also volunteers to manage cards for additional DXers.

K3BYV manages QSLs for PZ5JR and PZ5DX. Only contacts with PZ5DX during the period June 22-July 3, 1981 are valid. Bob expects to go back to PZ in October. Because of a misunderstanding between the Surinam Radio and Club and the P.O., it is likely that cards sent to PZ5DX via the bureau were lost. If you still need a card for a contact made during the above period please send an s.a.s.e. to Bob Mantell, K3BYV, 224 Stauffer Ct., Severna Park, MD 21146.

QSL MANAGER VOLUNTEERS

KA6FBK
WBJGLH
KA1ERN
KB5ZT
K1NCD
KB2RK
WB8IGY (6 meters only)

"QSL Corner," March 1982, page 71, contains information on the operation of the ARRL Outgoing QSL Service. December 1981, page 84, contains information and addresses for the Incoming Bureaus. For information on bureau operations (Incoming and Outgoing) send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

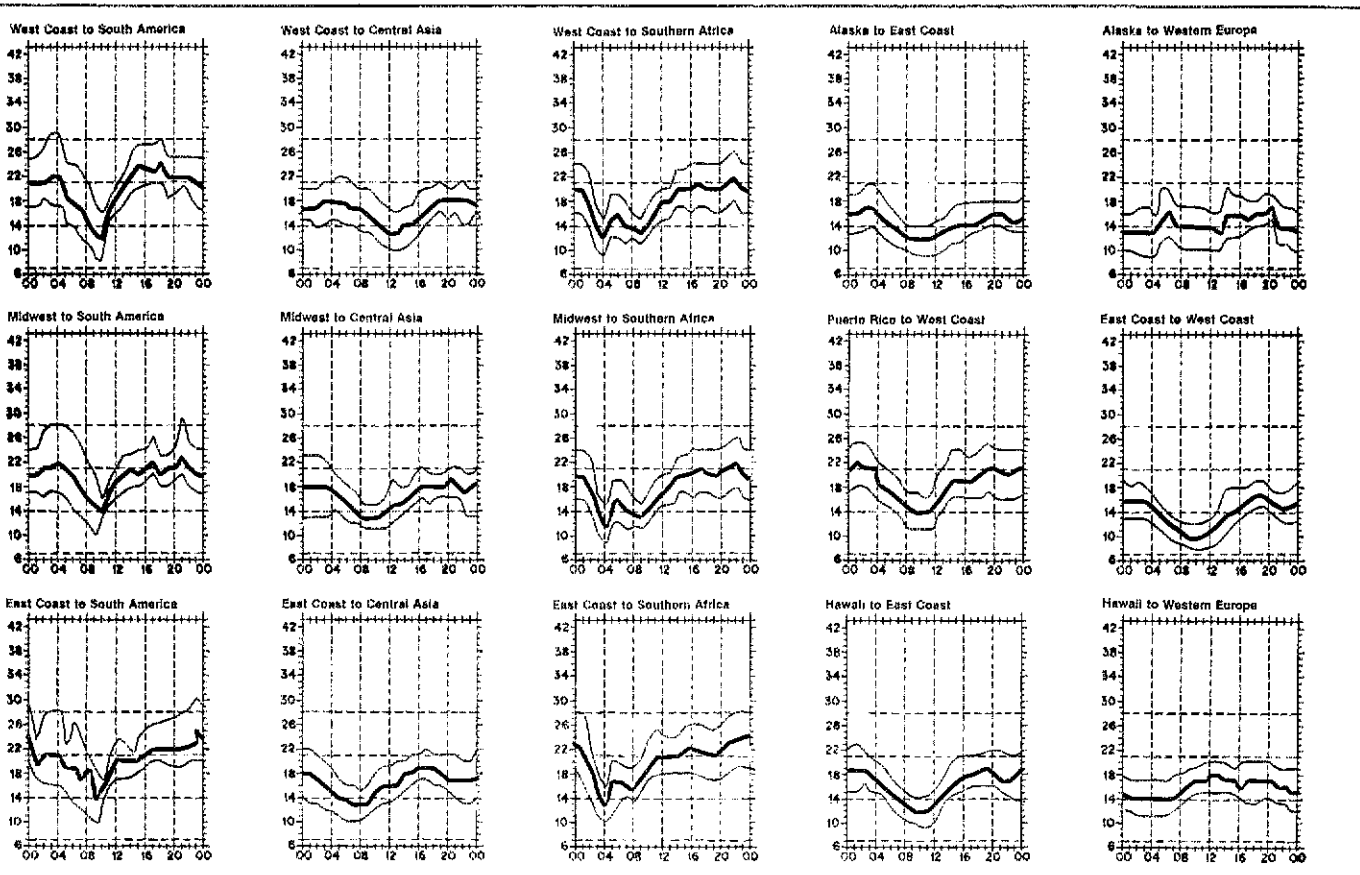
C31XP (DJ7ID)
CP6IM (WB1DQC)
CX4CC (CX3BBH)
DJ01V (ON4UN)
EA4AXW (K5BDX)
EA6BH (DL7FT)
EA8AA Y P.O. 860, Las Palmas, Canary Islands
FK8CR (F6EWK)
FO0PT (DJ0FX)
HK3A (HK3AFD)
HP5FI P.O. 153, Chitre, Rep. of Panama
J73PD P.O. 3, Roseau, Dominica
KN2M/J6L (KA2NIQ)
LA2EX/9L1 P.O. 558, Freetown, Sierra Leone
LU4DTX P.O. 400, Bahia Blanca, Argentina
OE6MBG (WA1OER)
PA0LVB/3A (PA0LVB)
PA0VDV/3A (PA0VDV)
PY1RR (PY1AA)
PZ1AP/1 P.O. 566, Paramaibo, Surinam, S.A.
SV1NN Box 2586, Athens, Greece
T2GMM (PA0GMM)
TG9WB (WB2JVP)
TI2JIC (AG1K)
UO50BE (YO5CT)
VP2ES (K8CV)
VP2EU (K8MR)
VP2EV (K8ND)
VP2MMP (N0DH)
V2AN (KA1JP)
3B8FG (3B8AS)
4X4VE/SNR Box 439, Kano, Nigeria
6W8DY (VE4SK)

QSL Corner

Administered by Joan Becker, KA11FO

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

Mny Tax to AA4MI and W9LNQ for the helpful information.



lowest curve (optimum traffic frequency, or *f_ot*). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for May 15 to June 15, 1982, assume a sunspot number of 110, which corresponds to a 2800-MHz solar flux of 158.

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 December 28, 1981 through January 25, 1982. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

CX1CO/104 DF3AO/218 DF8MB/104 DH3NAD/105 DJ7EE/106 DJ9RR/120 DJ9RU/106 DK2SR/114 DL3GC/110 DL8IB/183 DL2CC/101 G4HYD/101 KH6QA/100 19MGM/305 1T9FWD/159	JA1DDH/113 JA1GWA/109 JA1RWJ/263 JA1WJ/105 JF1OSL/156 JF1RDC/119 JG1OWV/103 JG1TSF/206 JH1HIK/106 JK1HAM/199 JK1WOC/176 KL1KR/204 JR1BLX/268 JR1MSR/118 JA2IVY/190 JA2JFY/233	JA2MGE/312 JA2OZI/156 JA2THS/191 JA3CJL/121 JA3MPT/225 JA4DEN/157 JA5AQC/294 JH5AUH/175 JA6UW/105 JA6VU/182 JA6OTW/234 JA6OX/200 JEBBMK/125 JA7CII/104 JA7JND/144 JA7XBG/170	JR7IFU/158 JA9ISK/110 JA8EY/104 JA8GPG/130 JA8ORM/130 JA8SOD/102 LA2CF/141 OE3ALW/254 ON8HW/137 ON7CP/100 OZ1CP/104 OZ6JO/263 PY1ZDK/139 PY2CGB/131	SM6EHY/138 VE1AVX/311 VE2AUD/105 VE3MFZ/129 VE3MJ/107 4Z4BS/229 A1Y/103 K1NYK/100 KA1RC/105 N1BUR/109 N1OM/100 W1IC/102 WB1AJG/100 K2ROP/108 KA2DHQ/101 KB2VM/108	KB2VP/151 KE2B/103 KE2N/288 N2BZK/102 W2OOM/110 WB2QUT/100 KA3CTR/100 KA3FUU/100 N3OKL/125 N3BQS/106 N4A0Z/112 K4HMD/135 KC4N/100 KC4QU/107 N4BWO/105	N4DOB/100 WB4SJ/102 WD4BEE/201 WD4JFR/102 K5HQV/102 K5YCP/299 KA5JZF/104 KM5M/100 WB5EZM/272 WD5JBA/106 WB5VM/112 WB5DLK/264 KA7AYN/103 KB7TY/157 K17W/105	W7FPT/109 WB7NVZ/103 WB7VNY/199 N8LP/153 WB8Q/289 WB8M/106 WB8RF/182 WB8RX/100 WB8EZM/272 K9JZT/110 K9QAM/101 KA9FYZ/102 KA9GLB/100 KB9YV/109 KC9BC/102	KC9BT/112 N9AEJ/123 N9AQW/104 N9BKN/120 W9IAL/103 W9LIH/122 WB9ZNB/126 WD9IRO/108 KB9W/137 KC9CG/103 KC9GL/101 KM9Q/100 WA9VZ/102 WA9VHX/107 WB9M/WJ/100
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Phone

CE3CM/205 DF3AO/218 DF50G/124 DL2BK/109 DL4AG/104 EA7OB/104 G3EGG/105 HB8MP/109 19MGM/295 JA1FP/310 JA1RWJ/224 JF1OSL/110 JG1TSF/110	JK1HAM/111 JK1WOC/126 JL1EEI/129 JL1KRT/200 JR1BLX/265 JR1MSR/102 JA2IVY/119 JA2JFY/225 JA2JRG/103 JA2THS/191 JA2ZL/106 JA3CJL/106 JA3NPT/110	JH5AQC/287 JH5AUH/156 JA6BU/109 JA6OTW/234 JA7CJL/164 JA7FWR/102 JA7XBG/132 JR7IFU/158 JA8WBW/226 JA8EY/104 JA8GPG/130 JA9ISK/110 JA9ORM/130	OE3ALW/251 OZ5QU/125 4Z4BS/127 5B4AC/102 K1KOB/181 K1NMZ/112 KA1RC/105 W1IC/102 W1MXI/126 KB2DX/130 KB2VM/103 KE2N/250 N2AMI/160	N3JM/108 W3LJG/108 W3LYE/101 WA3ZTE/121 W3NQA/176 W3WYP/109 WB3TH/103 K4HMD/119 K4JLD/244 KB4RT/112 KC4IR/101 K4OYV/278	KB4YX/102 N4BLV/100 N4Y/151 WA4CF/103 WANOM/102 WANXM/105 WAWKQ/102 WA4XC/102 WD4JEQ/120 WD4RBK/104 AFB/126 K5ENA/102	KB5NI/100 N5JR/154 WB5LBR/100 WD5HY/112 KDBMV/107 W8CZJ/128 WBZNL/103 K7GM/126 K7JF/106 K7PGS/105 KB7TY/150 KB7V/102	WA7NNH/104 WB7VNY/182 KBURB/107 K8BCU/172 K8I/102 WB8CJ/102 WB8HO/182 WB8TO/107 WB8MAK/100 WB8M/105 WB8EZM/235 KA9GLR/159	KB9K/161 KB9YV/108 N9BKN/114 N9BLR/129 N9CCU/109 WB9SYF/290 KB9W/137 K9B/105 N9BZE/101 N9CJ/101 WA9VHX/106 WB9M/WJ/100
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CW

DL3QT/109 DL8AF/100 19MGM/109 JA1DDH/113 JA1EOD/180 JA1IF/262 JA1PS/151	JA1RWJ/154 JA1VN/229 JF1HEF/140 JF1OSL/102 JG1NBD/206 JG1TSF/117 JH1HIK/104	JH1FUP/106 JK1HAM/107 JA2EK/245 JA2IVY/120 JA2MGE/263 JA3MPT/117 JH3QFY/100	JA4DEN/145 JA6AUH/105 JA6SSM/259 JA8BU/109 JA8OX/150 JA7CII/104 JA7FWR/102	JA7JND/119 JR7KND/102 JA9LX/111 JA9AFD/176 JA8SOD/102 LA1VL/101 PY1ZDK/125	PY2CGB/102 SM6CTQ/179 SM6EHY/131 K1JQ/242 K1ST/163 WB2SBO/106 W3EKN/220	W3QG/219 WA3EPT/123 AA4QZ/104 K4AEB/108 K4BCQ/105 K4JLD/157 K4YXJ/143	N4Y/110 WA4ACTA/182 W6ZPA/250 W6ZGD/100 WB7C5M/100 WB8O/245	W8BZM/120 W9BLV/108 K9HLL/107 K9LXA/170 W9LIH/143 W9GAX/124
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RTTY

W5HEZ									
5BXCC									
K5UC	GM3WTS	13EVK	DJ5VJ	UB5AAF	OK1TA	UK3AA	K5TSQ	WA2SON	
K4NYV	WA4QBX	KA5V	JA1PMN	UQ2QC	W3OG	EA7PW	JA4LB	KTJA	
DL7QS	DL7XS	N2MF	VE3BHZ	PT7WA	UB5WCW	YU3VR	VE2FOU	K6YRA	
W1KSZ	KA5W								

Endorsements

Mixed

DF8BD/135 DJ4SO/232 DJ6IO/309 DJ5VO/331 DJ7ZG/341 DJ8CR/323 DJ9LX/231 DK1HO/163 DK6N/269 DK6OP/187 DL1TH/143 DL3RK/358 DL7AA/382 DL7CS/325 DL7EG/365 DL7NB/306 DL7HU/349 DL7HZ/348 DL8AK/212 DL8VN/252 DL9TJ/277 F3AT/350 F8RU/332 F9RM/349 G2FOM/292 G3AAE/359 G3AAE/P/157 G3GIC/335 G3HTA/329 G3LQP/327 G4EXD/158 G8RC/336 HB9ANM/200 HB9ANP/199 HB9AQW/320 HB9G/228 HB9HT/291 H8LC/300 IX2IP/289 IY3TQ/287 18AMJ/359 JA1DIO/164 JA1OND/283 JA1WSA/251 JA1W8B/299 JA1AGU/281 JA2APU/300	JA2JRG/212 JA3MNF/317 JR6LKG/126 JA7AB/274 JA8BIO/318 JA8BOZ/279 JA8BMS/157 JL8DJX/365 NL7J/225 OE2EGL/333 OE2EVL/294 OH2LU/311 OH2QV/345 OH3SR/332 OH4NC/391 ON4NS/340 ONSKL/328 OZ2RP/310 PA6FX/355 PY2CK/364 PY5ATL/326 SM4EMO/293 SM5AZU/337 SM8CMU/314 SM6DHU/332 SM7QY/347 SM9CCM/290 SM9KY/345 SP6FR/208 SP8RT/320 TU2DF/206 VE2FEX/258 VE2JQ/248 VE2QJ/200 VE3BGX/252 VE3JG/133 VE3WV/336 VE3XK/300 VE7IG/333 V01GA/251 XE1OW/281 XE1OX/281 YS15A/184 YU3QD/285 YU3JG/294 YU4YBR/252 YU7BPQ/297	YV1TO/225 ZL1AJU/343 4Z4DX/308 4Z4YB/155 9H4G/315 AK1N/188 K1KOB/201 K1OXD/177 K1ITS/164 K1RM/333 K1WVX/186 KA1CMP/201 KA1HO/224 KA1IQ/132 N1ACW/299 N1AKX/256 N1CQ/202 W1AB/336 W1AFF/347 W1AXA/355 W1BWS/254 W1CCKA/351 W1DK/359 W1DQH/315 W1DYH/277 W1ELR/338 W1EW/325 W1FTX/340 W1HI/352 W1HSR/290 W1MXI/133 W1OO/340 W1SE/180 W1VH/292 W1WLW/316 WA1VY/202 WA1ZLK/266 WB1FPF/151 K2AJO/289 K2FJ/357 K2LE/339 K2NT/261 K2QF/270 K2ZCD/255 K2ZGC/174 KC2CO/227	KF2F/201 KM2V/317 N2ABW/148 N2BI/178 N2CFE/189 N2CW/133 W2AG/361 W2AYJ/358 W2GA/318 W2IFK/270 W2KHQ/155 W2L/335 W2QHH/361 W2SE/300 W2SY/324 W2TOC/354 W2VJN/337 WA2KG/1127 WA2MT/280 WA2OVG/152 WA2PY/188 WB2KPE/283 KB2RZ/252 E3A/319 KA3V/339 K3LYK/125 K3MO/354 KB3OQ/281 N3ARK/280 N3BK/151 N3AS/226 W3BTX/321 W3DQ/270 W3VIG/175 W3NKM/358 W3SOH/260 W3XOX/304 WA3DMH/271 WB3EPT/321 WB3GX/154 W3HJ/352 W3JUP/151 AA4NA/291 AA4S/226 AC4U/200 K4AIM/346	K4AVU/234 K4CEB/333 K4ELK/280 K4EZ/347 K4JLD/257 K4KH/285 K4KY/155 K4MOG/343 K4NT/205 K4PDV/358 K4RPK/348 K4TXJ/270 K4VT/273 K4XG/330 K4YYL/341 K4YVW/156 KB4VJ/176 KB4PY/182 KN4F/206 KQ4M/228 N4AY/287 N4CIS/202 N4EY/150 N4IB/270 N4JF/330 N4LX/310 N4XJ/327 N4A0Z/275 WA4ST/321 W4BQY/363 W4FH/175 W4IF/351 W4JD/327 W4MGN/346 W4OM/362 W4OMY/208 W4PZV/323 W4TL/232 W4WVK/125 W4XQ/252 WA4CCP/225 N6FX/348 WA4OXD/192 WA4SYA/246 WA4ZBK/208 WA4ZMM/260	WB4HOK/305 WB4PUD/262 AF5M/297 N5DZ/334 K5ENA/201 K5OS/329 K5Y/337 K5XI/227 KA5BLM/237 KA5ELC/149 KA5Q/276 WB4TJ/199 KB5M/236 KC5M/250 N5A/300 N5FJ/111 N5IH/282 WB5EDX/330 WB5OJ/348 W5IO/359 WB5B/316 W5PQA/359 W5TZN/199 W5ZNN/150 WA5IEV/331 WA5YTX/177 WA8KZ/132 WB5UFR/179 WB5WQJ/211 AA6AA/305 AC6V/284 W5OJ/215 KN4F/206 W5IO/359 WB5B/316 W6USJ/316 W6UJ/280 W6Y/336 W6YQ/336 WA6GFE/339 WA6DUG/332 WB6KZ/278 WB6TLJ/252 WN6CND/202 K7ABV/337 K7EG/291 KB7JF/131 WB7MD/209 K7E/263 K7G/225 K7G7P/133 N7AYK/207 W7ALZ/224 W7BGH/344 W7CG/354 W7DAA/255 W7DAZ/259 W7IR/360 N6ST/289 N6WJ/131 W6M/368	WB6JH/320 WB6SY/355 WB6VM/358 WB6CT/278 WB6U/287 WB6KW/183 WB6T/353 WB6JF/340 WB6FL/343 WB6K/343 WB6KH/351 WB6KT/359 WB6NLG/281 WB6PT/358 WB6REH/347 WB6RK/355 WB6RON/270 WB6R/358 WB6SN/346 WB6SS/260 WB6TFO/359 WB6USJ/316 WB6UJ/280 WB6YQ/336 WB6YQ/336 WB6GFE/339 WA6DUG/332 WB6KZ/278 WB6TLJ/252 WN6CND/202 K7ABV/337 K7EG/291 KB7JF/131 WB7MD/209 K7E/263 K7G/225 K7G7P/133 N7AYK/207 W7ALZ/224 W7BGH/344 W7CG/354 W7DAA/255 W7DAZ/259 W7IR/360 N6ST/289 N6WJ/131 W6M/368	W7OF/358 W7ORH/326 W7QK/352 W7ZHZ/304 K8AC/221 K8EJ/339 K8IA/311 K8LJG/321 K8NA/310 K8VY/300 K8BAC/278 K8BS/288 K8CC/220 KM8Y/280 KN8P/251 KOBJ/274 KQB8/202 W8CJL/159 W8BI/302 W8B/330 W8YD/382 WB8M/332 W8USJ/316 W8UJ/280 W8YQ/336 W8YQ/336 W8IEC/150 W8KBZ/271 W8KPL/255 W8LKH/360 W8MFW/276 W8NK/200 W8OK/350 W8QF/326 W8RT/359 W8YD/382 WB8YR/186 WB8SCD/252 WB8TXG/125 WB8CRY/266 WB8CP/154 AA9M/300 AG9V/145 K9AWK/334 K9AYK/155 WB9WQ/312 K9CJ/300 K9HQM/350	K9IUF/325 K9KKA/315 K9TI/274 K9TMM/177 K9ZO/290 K8BDE/228 K8YH/212 KB9M/138 K8N/260 K8VY/300 K8BAC/278 N8AIB/225 W9DC/336 W9DWO/354 W9EJZ/229 W9GIL/358 W9NLD/250 W9QLD/341 W9RCJ/353 W9RF/330 W9UJ/339 W9YK/303 W9ZAT/317 WA9MA/225 WB9LL/150 WB9KH/160 WB9PH/266 WB9SEJ/300 WB9TJ/182 WD9BL/203 WD9DK/209 WD9IX/283 AA9C/125 K9DEW/177 K9YS/300 N9H/127 WB9SCD/252 W9ELX/384 WB9GJ/357 W9PT/333 W9QG/357 W9UBT/224 WA9JV/290 WA9OMA/299 WB9HC/153 WB9HW/253 WD9BW/156
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Radiotelephone

Table with multiple columns listing call signs and numbers under the Radiotelephone section. Includes entries like CE3GN/281, CT1A1F/24, DF2TG/142, etc.

CW

Table listing call signs and numbers under the CW section. Includes entries like DF8ZH/204, DJ5JQ/235, DJ5VQ/202, etc.

DXCC NOTES

DXCC country deletion: The ARRL Awards Committee has accepted the recommendation of the DX Advisory Committee to delete Kamanar Island, 70/V98K, from the current DXCC list by virtue of undergoing a significant change in administration, thus no longer meeting any DXCC criteria for separate country status. This deletion was made effective on March 11, 1982.

Honor Roll

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 309 countries of the 318 current countries on the DXCC list.

Large table listing call signs and numbers under the Honor Roll section. Includes entries like W1HH/351, W1HX/360, W1HZ/358, etc.

Silent Keys

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

W1BJ, Archie L. Deane, Sedgwick, ME
W1ERX, Frank M. Herrington, Stamford, CT
WB1GLJ, Matthew C. Lambert, Winslow, ME
W1LUK, Ralph A. Scott, East Boothbay, ME
W1ODI, Loring C. White, Reading, MA
K1PKA, Raoul E. Hebert, Manchester, NH
K1YFH, Lucien H. Wante, Woonsocket, RI
K1ZIM, Robert R. Jones, Ayer, MA
N2BGS, Eugene H. DuVal, Wayne, NJ
N2CM, Charles A. Martin, Hightstown, NJ
W2FEA, Carl T. Schultz, Elmwood Park, NJ
W2GTH, French H. Willis, Mendham, NJ
W2JYK, Louis G. Grabner, Jersey City, NJ
KAZMVM, Anthony J. Meluch, Schenectady, NY
N2PM, Paul Mazer, Flushing, NY
WA2PZF, Stanley E. Wagman, Pomona, NY
W2QME, Joseph A. Weiss, Beachwood, NJ
WA2RPN, Dorothy J. Cohen, Oceanside, NY
W2SPU, Robert L. Richards, Aurora, NY
W2SSJ, Edward G. O'Connor, Niagara Falls, NY
WA2VEH, Thomas N. Kahrs, Long Lake, NY
W2YQ, Ambrose H. Hardwick, Orange, NJ
N3AJJ, Darrel G. Coz, Barto, PA
W3CBX, Forrest L. Hicks, Union City, PA
K3CE, David S. Little, Cambridge, MD
W3IOE, Ernest C. Wood, Gettysburg, PA
W3KD, George Hautenschild, Holland, PA
W3MON, Charles H. Winradler, Butler, PA
W3OMA, Walter P. Remele, Pittsburgh, PA
ex-W3YLL, Henry C. Jung, Pennsauken, NJ
WA4BFN, Lon Henson, Jr., Albertville, AL
W4CR, R. Maynard Cleveland, Jonesboro, GA
WA4DIV, Sherman W. Pettit, Mineral, VA
W4EQH, Michael Vitkauskas, Orlando, FL
W4GA, Lester G. (Kelly) Rodefelf, College Park, GA
WD4IOJ, Thomas D. Rose, Chapel Hill, NC
K4IT, Richard R. Ross, Marco Island, FL
WA4ORT, Frank D. King, Bonaire, GA
WA4OZD, Wilson L. Teal, Chesterfield, SC
K4RMI, Cecil E. Jackson, Pinson, AL
K4RS, James D. Barker, Arlington, VA
WA4VKS, Daniel W. Sawyer, Jr., Greenville, SC
K4WHD, Edmund D. Baydush, Norfolk, VA

W4WN, Jack F. Wynne, Cape Coral, FL
W4YTZ, Edwin S. Wilkinson, Richmond, VA
N5AXB, Joseph W. Alexandravice, San Antonio, TX
WD5FLM, Harry E. Saunders, Zwolle, LA
WA5OKF, Francis R. Fendlason, Clinton, MS
W5ORK, Eugene P. Hill, Marble Falls, TX
W5QKZ, Albert M. Sprague, El Dorado, AR
K5SMS, John T. Myers, Roseland, LA
W5TFP, Ray A. Thacker, Farmers Branch, TX
W5TJY, Lyle S. St. Amant, Hammond, LA
WA6AGS, Lloyd F. Van Fossen, Visalia, CA
W6APP, O. D. Packard, Pacheco, CA
W6BZ, Melvin D. Whiteman, Alameda, CA
W6CUA, Peter Haar, Sanger, CA
K6DYM, Alva N. Hotchkiss, Turlock, CA
WA6HWE, Howell Hunter, Sr., Walla Walla, WA
WA6IWW, Jules E. Mallory, Clovis, CA
W6JFA, Sherman A. McDevitt, Oakland, CA
W6KPS, Robert C. Couger, Santa Maria, CA
WB6MUN, Robert F. Bilon, Santa Cruz, CA
W6MXQ, Oliver A. Nelson, El Cerrito, CA
ex-WB6OXR, Zanville M. Raffel, Santa Monica, CA
W6QHN, Francis M. Ramsey, San Diego, CA
WB6SKX, William L. Sibert, Fremont, CA
W6TON, Lewis D. Chilson, Imperial Beach, CA
WB7DPT, Elmer F. Gardner, Gold Beach, OR
WA7GMX, Patricia L. Smith, Mt. Vernon, WA
W7HUW, Roland W. Ure, Salt Lake City, UT
KA7LAY, Don Stafford, Spokane, WA
K7MGX, Charles J. Jellison, Jr., Columbia Falls, MT
WB7OR, Andrew G. Sharp, Tucson, AZ
W7RXH, Floyd Brooksbank, Dayton, WA
WB7TUP, Cecil F. Brackett, Yakima, WA
W8BJJ, Norman L. Borchers, Piqua, OH
K8ERO, Robert F. Palmer, Warren, MI
W8FKP, Eugene J. Kingsbury, Willoughby, OH
W8IUV, Wilbur E. Wright, Fairfield, OH
W8KMD, Harold E. Beard, Columbus, OH
K8YMY, Felix E. Wilberg, Conneaut, OH
W8ZBU, Glenn G. Marley, Evert, MI
WA9AMY, Dale E. Remley, Connorsville, IN

K9AQ, Andrew W. Reichert, Rhinelander, WI
WA9BBP, Edwin B. Hassler, Northbrook, IL
W9EKL, Cyrus Rohrer, Jr., Champaign, IL
W9HAV, Walter C. Schug, Geneva, IN
W9HH, Frank G. King, Gravette, AR
*WA9HKE, James A. Reeves, Anderson, IN
WD9JLT, Rudolph H. Tinker, East Enterprise, IN
W9OU, Al Gatwood, Evansville, IN
K9QHK, Edward W. Reinsch, Cherry, IL
W9VCQ, Clarence D. Billburg, Park Ridge, IL
K0ABO, Roger H. Larson, Gowrie, IA
N0AEZ, Phillip D. Reinke, Des Moines, IA
WB0BTD, Charles M. Royer, Davenport, IA
KA0DDS, Jack T. Reagan, Deadwood, SD
W0ELR, Harry C. Drake, Kirkwood, MO
ex-WA0EVI, Earl Grove, Bloomfield, IA
WD0EWE, Kenneth M. Starkweather, Hedrick, IA
KA0GEM, Martin B. Hauser, Brookfield, MO
W0KRH, Edwin C. Pearson, Duluth, MN
ex-W0TIP, Wallace V. Rockefeller, Wood River, NE
W0TVS, D. Raymond Taylor, Lincoln, NE
W0UGC, William F. Kotchain, Omaha, NE
VE2EK, Arthur Kemp, Montreal, PQ
VE4JE, William H. Burton, Winnipeg, MB
CE3PY, Jorge Browne V. Santiago, Chile
DF4FX, Werner Volkner, Kassel, West Germany
PP5QA, Egon Schaufert, Santa Catarina, Brazil
6Y5AA, Leslie B. Fletcher, Montego Bay, Jamaica

*Life Member

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be 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

May 1932

- K. B. Warner's editorial reports that the mail examinations for unlimited phone privileges are being withdrawn. After April 15, applicants must appear in person at the examining points. The "sporting types" who freely passed on the questions (and answers) to new applicants have made it necessary for the Radio Division to change the rules, which makes it tough on those who can't afford (physically or financially) to make the trip. Hq. is working on solutions for Chair Warner Club members and others who can't possibly get to an examining point.
- "A Compact Receiver" by George Grammer, W1DF, is a description of a completely self-contained battery-powered 3-tube receiver. The detector-and-two-audio unit uses the new '30 triodes; it covers 80, 40 and 20 with its plug-in coils. In another article, Grammer reports on "New Tubes for Class B Audio." These are the '46 amplifier and the '82 rectifier. The amplifier tube has two grids; when the outer grid is connected to the plate, the tube is a low- μ triode, a good Class-A driver tube. When the grids are tied together, a zero-bias Class-B audio tube is obtained, and two in push-pull will deliver up to 45 watts at 400 plate volts. The '82 is a full-wave mercury-vapor rectifier that will improve power-supply regulation, so necessary with Class-B audio.
- S. L. Seaton, OA4U, at the Huancayo Magnetic Observatory in Peru, tells about "Investigating the Directive Properties of an Amateur Antenna." Measurements on 20 meters of the pattern of a 60-meter long end-fed wire 10 meters above ground show remarkable directivity off the open end.
- In his description of "A Linear Electronic Voltmeter," author J. L. McLaughlin recounts the advantages of a v.t.v.m. properly used (our italics). High resistance in the cathode circuit of the one-tube meter is the secret of the linearity over the 2- to 100-volt range.
- "The Bloomfield Radio Club's 'Five-Meter' Field Day" is reported by Leroy Spangenberg, W2AIP-W2ZZBP. The New Jersey club, inspired by QST accounts of 5-meter work, obtained permission from the

N.J. Department of Conservation to operate from state forest fire-lookout towers over the Washington's Birthday weekend. Battery- and dynamotor low-power rigs were used, with vertical 8-foot dipoles. A DX record of 41 miles was set. (The list of participants looks like an excerpt from "Who's Who.")

- Frank Gunther, W2ALS, of REL, describes "A Portable 56-Mc. Transmitter-Receiver," a neat 'phone unit with push-pull '01-As in the transmitter. The receiver is a 3-tube super-regen. Either dry-battery or dynamotor-and-storage-battery power can be used.
- The "Five-Meter Airplane Tests Overwhelmingly Successful" article tells how Joe Lyman's W10XB's aeronautical-mobile experiment was conducted. Over 200 stations were on watch for the 3-hour flights from Boston to New York and back. Going to NYC at an altitude of 2500 feet, best DX was 60 miles. On the return flight the next day, at 4000 to 8000 feet, best DX was W2AOE, 115 miles.
- Ev Batty reports the first W-VE QSO Contest a big success. Highest-scoring VE during the 54-hour event was VE3GT (114 stations in 35 sections). Top W was W9BVI (30 VEs in 5 of the 7 sections).

25 Years Ago

May 1957

- The editorial quotes the oft-repeated view that nowadays amateur radio can make no technical contributions because it cannot compete with the multi-bucks giants in industry. The author then spells out just three of the many projects where hams can and are contributing.
- One is "Operation Smoke-Puff." As authors O. G. Villard Jr., W6QYT, and R. S. Rich, W6OPX, point out, this U.S. Air Force attempt at temporary ionization of portions of the E layer can use all the help it can get from hams on 20 down to 2 meters. Rockets from southern New Mexico will release gas at about 70 miles altitude, and amateurs can monitor the results by reporting signals over paths in the southwestern U.S. The five-page article tells what might happen and how to participate.
- V.H.F. Editor Ed Tilton, W1HDQ, gives some "Single-Side-Band Ideas for the V.H.F. Man" who

wants to try the mode on 50 and 144 Mc. Emphasis is on modifying or adding to commercial h.f. rigs.

- A slightly less technical project is "Putting the Heathkit AT-1 on 50 Mc." Author Mearl Rogers, K9AOB, shows how it can be done in about an hour.
- "Mechanical Considerations in the Construction of Beams and Towers," by William Nighman, W4ZSH, considers details such as strength and corrosion-inhibition of aluminum and steel elements, booms and towers. Wind loading is not overlooked.
- The final portion of Grammer's three-part series, "Simplified Design of Impedance-Matching Networks," treats complex circuits like the pi-L and various baluns.
- Hallicrafters' HT-32 transmitter is reviewed under *Recent Equipment*. This sideband/c.w./a.m. rig has a pair of 6146s in the output and covers 80 through 10 meters (including 11). Among the technical innovations are a bridged-T balanced modulator and a VFO that can be set (at the factory) for the best thermal stability.
- Bob Jones, W9DWD, describes "A 'Juicy' 2-Meter Antenna," his adaptation of the popular low-frequency beer-can vertical principle. The antenna is a stacked coaxial array described by WIDBM some years back; fruit-juice cans are used for the skirts because they have the right length for the frequency and beer cans don't.
- "An S.W.R. Indicator for Transmission Lines," by James Whitaker, W6KRZ, is a two-tube crystal-controlled signal generator with four-band output and a built-in resistive s.w.r. bridge. A.c.-powered, it can easily be adapted to battery operation for portable work.
- Advertising Manager "Pete" Morrow, W1VG, takes pen and camera in hand to hold forth about "QSL Cards." This active certificate chaser gives some of his ideas on how best to obtain the necessary evidence in this competitive age.
- "The Careless Consumer" is a three-page collection of entertaining anecdotes garnered from manufacturers about complaints by amateurs that would have been unnecessary if only the customer had read the instruction book before writing or telephoning the manufacturer. (No mention is made by author John Huntoon if a personal experience prompted the article.) — *Byron Goodman, W1DX*

YL News and Views

Conducted By Jean Peacor,* K1IJV

YL Clubs Just Evolve

The increasing number of licensed YLs in the world is in direct proportion to the increase in inquiries as to how to form a YL club. There is no steadfast answer; rather, YL clubs seem to evolve. A simple statement such as, "Let's get together for lunch," can often be the start of bigger things. All you need are people with a common object. YLs in Amateur Radio provide the common object, and many is the YL club that has been formed as a result. Chix-on-Six and TYLRUN are but two of many.

Chix-on-Six

Around 1958, 6 meters was a very active and popular band. While driving alone near Cleveland, Ohio, one evening, and talking with another YL on her 6-meter mobile rig, Shirley Rex, K8MZZ, conceived the idea of the Chix. A short while later, three YLs gathered for lunch and as a result Chix-on-Six was born.

The response to their plans for a 6-meter YL net brought forth a few more YLs, and the group gradually grew in number. Today they have about 30 active members. The 6-meter net no longer exists, but the club does. They have four business meetings a year plus additional gatherings during the summer and at Christmas time.

Chix-on-Six sponsor a club certificate that may be earned by working four members for non-Ohio stations (or Ohio stations south of Rte. 40), or, for other Ohio stations, by working 10 members. Log data to: Margie Blose, 159 Thistlewood Dr., Mentor, OH 44060.

TYLRUN

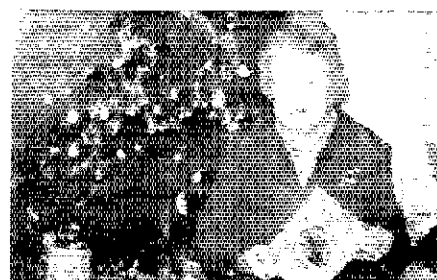
The Texas Young Ladies Round-Up Net (TYLRUN) was formed in 1954. Texas' State Fair honored October 10 that year as "Amateur Day," and W5WXY, W5SYL, W5RYX, W5VXK, W5SLQ, W5YKE and W5DEG chose that day to meet and organize a Dallas YL club. Shortly thereafter, they established a YL net to meet Thursdays at 1 P.M. on 3885 kHz. By December, the net was named the Texas YL Round-up Net by W5YRT. In order to create more YL participation, membership certificates were awarded to any member who took part in the net for five consecutive weeks. Charter membership was determined by those who had met with the net for five consecutive weeks. In order to give all equal chance, January 13, 1955 was the first date for certified membership to begin. Five weeks later, Charter membership certificates (designed by W5LGY) were issued to 14 members.

At the end of 1981, TYLRUN's membership numbered 263. Regular YL check-ins are from Texas, Oklahoma, Louisiana, Arkansas, Missouri and, sometimes Michigan. The TYLRUN net now meets Thursdays at 1400 UTC on 3942 kHz.

*Country Club Dr., Monson, MA 01057



TYLRUN's 1982 president, Wanda Clark, KJ5C, and her OM, W5SISN



Eila Russell, WA8EBS

TYLRUN sponsors three certificates. The membership certificate is earned by making four consecutive check-ins and paying annual dues of \$2. The second, a YL-OM certificate is issued to anyone working 10 TYLRUN members who are Full Members (dues currently paid) at the time you work them. The third, a YL-OM 10CC certificate is issued to any licensed YL who works 1000 licensed OM amateur operators. Further details may be obtained by writing: Linda Thompson, W5DFMP, 2503 Vernon, Greenville, TX 75401.

How do you form a YL club? All you need are a few YLs who agree to get together for lunch. YL operators already have the common bond; club names, rules, by-laws and certificates will all follow as your YL club evolves.

EILA RUSSELL, WA8EBS

Eila Russell, WA8EBS, of Fairview Park, Ohio, will serve as President of the Chix-on-Six again this year. She also served in this capacity in 1979. As Eila and her OM, Jim, W8BU, celebrated their 59th wedding anniversary last fall, the Buckeye Belle newsletter referred to her as "Eternal Spring."

For many years, it never occurred to Eila to get her Amateur Radio license. Her avocation was music; Jim's was Amateur Radio. Jim was among the first American group of amateurs logged overseas by Godley in the transatlantic test in 1921. He was then 8BU. Eila was a soloist in church choirs from age 15 until 75, and choir director part of the time. Three children occupied her time, along with her many activities in church organizations, Eastern Star, PTA, the city's School Board and the National School Board, to name but a few. In 1957, Eila was voted "Citizen of the Year" for the city of Fairview Park.

After WW II, the Amateur Radio Technician class and 6 meters became popular. Some of Jim's friends who had learned about radio while in the service, formed radio clubs and taught their wives. Mixed groups began to flourish. They invited Jim to attend one of their meetings suggesting that he "bring the little woman along." So, in 1962, Eila went along, except that being a nonconformist wife, she was relegated to the kitchen during the meetings. As they drove home, she waited in the car while Jim visited a few radio shacks enroute. While waiting, she found a piece of paper with the Morse code written on it. In 1914, Eila had learned the code in Girl Scouts.

She proceeded to check herself out on how much she remembered while waiting for Jim. The die was cast, and in May 1962, she was first licensed as a Novice. By October, Eila was a Technician.

YLRL held a convention in Cleveland in 1962. Their 25th Silver Anniversary Convention was held in Columbus in 1964. The desire to be able to talk on the air with the many YLs she met at the conventions prompted Eila to upgrade to General class in 1969, and to Advanced the following year. In 1973, she became vice president of YLRL.

Eila's contributions to Amateur Radio are many. She was the recipient of ARRL's Public Service Award for her services in emergency communications from their cottage on Kelley Island when a storm washed out the Norwalk reservoir, flooded the Vermillion River, and cut off roads as well as communication, except for her radio. In 1980, the Buckeye Belles Founders presented her with the Buckeye Belle Achievement Award. She has two Proclamations by Governor Rhodes, dated 1976 and 1977, obtained when she served as president of the Buckeye Belles.

Eila enjoys DXing, and has her 125 countries-worked cards, all sorted out, saving them until she next visits ARRL Headquarters. This year's president of Chix-on-Six is a remarkable lady. She is "Eternal Spring."

RESULTS, OCTOBER YL ANNIVERSARY PARTY

YLRL's Corcoran Award is presented to YLRL members only, within an ARRL section, for having the highest combined cw and phone score in the YLAP contest. Diane Haigh, N1YL, is the recipient of this award for the second consecutive year. DJ2YL's highest score in the phone portion is also a feat she has accomplished for the second year in a row.

Winners

CW	Phone	Combined Phone and CW
N1YL Gold Cup	DJ2YL	N1YL Corcoran Award
N7YL 2nd Place	DJ0EK	VK3KS DX Worldwide Hager Award
IIMQ 3rd Place	DF9YY	No entries for NA/CA Hager Award

Top 15 cw scores: N1YL, 1749; N7YL, 1365; IIMQ, 1350; W8YL, 920*; WA8FSX, 825*; WD4NKP, 725*; VE3KTX, 641*; DF2SL, 558; VK3KS, 420*; W3CDO, 408; WA2NFY, 384; N4DDK, 338*; WA4EPM, 280*; WB7DZX 260*; KA5BHM, 244*.

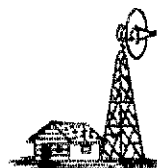
Top 15 phone scores: DJ2YL, 19,665; DJ0EK, 18,176; DF9YY, 16,900; N1YL, 16,502; DJITE, 14,094*; LXISM, 13,163*; LX1XX, 12,919*; WD4NKP, 11,100*; WA8FSX, 9702; N7YL, 9211; G4GAJ, 8688*; N5CKX, 8415; VP2MNB, 8213*; VK3KS, 7860*; W2GLB, 6656.

*Denotes low-power multiplier.

The World Above 50 MHz

An Opportunity

Conducted By William A. Tynan,* W3XO



The 6-Meter DX Standings box published with this column illustrates the excellent long-haul conditions we have been enjoying since last fall, as well as over Cycle 21 in general. Examination of the box reveals that 18 listed stations have worked 50 countries or more. The number of WACs completed is also very impressive. Comparison of this update of the box with the one published in the November 1981 issue is very striking in terms of additional countries worked and WACs accomplished since that list was compiled last September. The 6-Meter DX Standings box illustrates well the worldwide nature of the 50-MHz band. This is especially impressive when one realizes that 6-meter F2 DX began to be worked in this cycle four years ago and we are probably not through yet. It is hoped that the authorities will consider the now-better-known propagation characteristics of this band at the "crossroads of the radio spectrum" when they are assessing what services to allocate to this area. It is an intriguing part of the spectrum to amateurs and an interesting one for propagation scientists, but it's not very good for anyone else, especially where reliable communication and freedom from interference are important objectives. These attributes certainly describe almost all services other than amateur.

Although WARC-79 is long over, and it did not result in any changes to the 50-MHz allocation picture, other frequency conferences are coming, and assignments in the area of 50 MHz are in a state of flux in several European countries. The TV systems occupying this part of the spectrum in both the U.K. and France are quite old and do not provide color. Rumor of the impending demise of the British 405-line

system have been rampant for years. So, it may not be too late to work for some 6-meter amateur privileges, at least in a few countries. To this end, a number of British amateurs have banded together to form the "Six Metre Group." Their aim is to collect material to be used in making presentations favoring 50-MHz operation for U.K. hams to their government licensing authorities. EI2W is working toward similar ends in Ireland, and an active group of PAOs has been in touch with the Netherlands authorities.

We, who are more fortunate in having a 6-meter allocation, should give all the help we can to these endeavors. One thing we can do is provide tangible evidence demonstrating the extent of 6-meter ionospheric propagation, be it by F2, TE or Es. Publication of the 6-Meter DX Standings box is one way of providing such evidence. But, to produce a valid record of what the hand has produced, your inputs are necessary. Unfortunately, I cannot read minds, so I have no way of knowing your totals if you do not send them in. I feel that I have taken all reasonable steps to make the box an accurate snapshot of accomplishments as of early March 1982. Although reports do not have to be on the forms prepared for the purpose, it is easier for me and probably for you if they are. The same goes for the forms for reporting standings on the higher bands as well. So, drop me an s.a.s.e. and I will forward a couple of blank forms to list your standing for the next time the box appears. This will probably be in November. To meet that column deadline, I must have the completed forms back by early September. Make sure you specify which form you want. Anything that anyone can do to help get information from 6-meter operators out-

side the U.S. and Canada will be greatly appreciated.

Another way we can assist others trying to secure 50-MHz operating privileges is to help produce the data they need to present to their authorities. A complete, well-documented, concise history of propagation during this solar cycle would certainly be a great help. To produce such a study will require a person or group with professional research ability who is willing to collect and compile the mass of raw data available into a useful form, with particular emphasis on displaying propagation patterns and trends. To further this end, I have retained all reports I have received if they looked even vaguely as if they would be useful in supporting such a research effort. I will be happy to forward them to anyone seriously interested in taking on this task. In addition, SMIRK has a lot of data contained in Newsletters published over the past few years that should prove useful as well. It is conceivable that a project such as this might serve as a basis for an advanced degree thesis.

Remember, our overseas friends are dealing with their government people who are, by and large, not hams and may not be particularly sympathetic toward hams. If we are to have a positive effect, the material provided must be of the quality expected by such people. Here we have another opportunity to demonstrate that amateurs can contribute knowledge useful to other users of the radio spectrum. In this instance, we can be helping our own cause in two ways. We may be contributing to getting more countries active on 6 meters while enhancing the image of Amateur Radio as a source of useful scientific data.

CONFERENCES

It's spring and a vhf ham's fancy turns to thoughts of improved DX, putting up better antennas and, yes, vhf conferences. They are starting in the month of May, so now is the time to make plans to attend. Coming up first is the West Coast Conference, which will be held May 7 and 8 at the Vacation Village Hotel in San Diego. Featured will be talks on 902-MHz equipment and spread spectrum. Antenna gain and noise-figure events will be held. For full information, contact Louis Ancaux at Lunar Electronics, 2785 Kurtz St., Suite 10, San Diego, CA 92110 or at tel. 714-299-9740.

The eighth annual Eastern VHF/UHF Conference will be held May 14-16, 1982 at the Sheraton Inn and Conference Center, I-495 at Rte. 111, Boxboro, Massachusetts. The program will include a Friday night hospitality room, technical talks by well-known vhfers, "rap-sessions" for the various vhf/uhf bands, a banquet, noise-figure and antenna measurements, and other activities of interest to the serious vhf'er. Registration is \$13.50 from Rick Conno, K1LOG, 3 Pryor Rd., Natick, MA 01760, before May 10. The price for registration at the door is \$20. The Saturday night banquet, featuring roast sirloin of beef, costs \$14, payable before May 10.

ON THE BANDS

6 Meters — The last half of February and the first half of March brought the normal seasonal changes to 6-meter F2 conditions, but the band didn't collapse as

some had feared it might. On the other hand, "the grand alignment" didn't produce a super band opening anymore than it signaled an end to the world. In fact, on March 10, the day generally considered to be the occurrence of the lineup of the planets, conditions were only moderate. This conductor and several other East Coasters did hear the ZS6DN beacon on 50.054 quite weakly for a few minutes about 1320Z. At this time of year, one can expect that F2 conditions in North America will shift to favor the western and southern parts of the country, and with that shift you hear those of us in the eastern and northern sections once again complain about being in "the black hole." K2MUB supplies a little encouragement, however. Mario notes that he worked LU9MA as late as May back in 1961, and everyone knows that cycle was not nearly as good as this one.

The first weekend in March brought the western states several good openings to ZL. KH6IAA came up with another new country, this time in the form of ZD7BW, St. Helena. That station has done well indeed. After receipt, about February 20, of a Gonset Sidewinder from ZD8TC, Jerry had, as of mid-March, worked 10 countries on five continents. The Caribbean has accounted for a number of them, but other calls such as 5Z4CS, ZB2BL, PY2XB and S2ZDH, in addition to KH6IAA, also grace his log. He has also heard the Hong Kong beacon, VS6SX 50.075. One of his toughest but most gratifying contacts was with his benefactor, ZD8TC, only about 1200 miles away. As of this writing, he has yet to work a U.S. station. ZD7BW certainly got on at the right time of year for his part of the world, as the equinoctial period has certainly produced some fine conditions in the vicinity of the equator. Late in the evening of March 10, S2ZDH, the special experimental station in Athens, worked into LU and PY. The following evening, ZD8TC was reportedly knocking off JAs at a

rapid rate. Ted also contacted VK2DDG via a 6-to-10 crossband, but he was unable to hear Tom on 52 MHz. The 13th, beginning at about 1600Z, brought a surprise opening to Ecuador for us in the eastern part of the country, with HC1BI widely worked and the HC1JX beacon on 50.036 heard quite well. But this was just a tantalizing tidbit compared with what happened in more southerly climes. At about the time we were working into Ecuador, Texas and New Mexico stations were hearing 9Y4 and YV. Beginning a few hours later, W5UWB in south Texas reported working nine ZLs including all call areas except ZL4. John's signal was also reported to have been heard by VK2. WA5IYX San Antonio, 150 miles to the north of W5UWB, also reported ZLs but only the 1st and 2nd call areas. It is also understood that the West Coast was having a field day with the South Pacific as well. The Caribbean also got in on this opening, with ZLs working a number of stations in that part of the world. 9Y4LL and 9Y4JW worked ZL2KT to add to their country totals and then turned their beam around and hooked up with 5Z4CS in Kenya for another new one for each of them. The afternoon of the 14th brought LUs into Texas for three hours. Among them was LU7DZ, who was running 3 wats to a vertical whip on a motor home. He was worked by a number of Texas stations, including KSZMS.

The Es season should be about on us by the time you read this. With all of the interest in 6 meters that has been generated by F2, we could be in for some exciting times from the E clouds. Don't forget last summer's openings to Argentina and Gibraltar. Whatever kind of propagation it was, it was very exciting. We don't even need this extra-long-haul propagation to produce interesting results, however. With so much activity in the Caribbean, there is a good chance of working some good DX on single- or double-hop E. So, stay with the band. You could be

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-8736 to record late-breaking information.

Results, 48th Annual ARRL November Sweepstakes

If I can work a Clean Sweep, Yukon too!

By Mark Wilson,* AA2Z and Bill Jennings,** K1WJ

The 1981 running of the ARRL November Sweepstakes will probably be remembered as the contest when it was relatively easy to get a clean sweep; on phone, at least. For one thing, we had a clean sweep. We received entries from every ARRL section on both modes; in fact, we received at least two logs from every section except VE7 on phone and VE4 and 5 on code. One quarter of the phone entrants, 323 in all, worked all 74 sections. Pretty impressive, huh? On cw, things weren't quite so good. Count yourself lucky if you were among the 55 ops (5%) who made it on code.

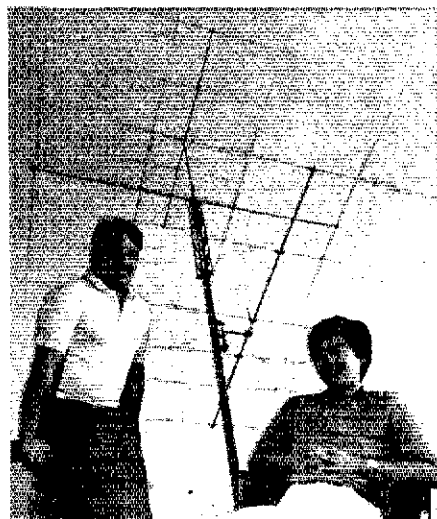
Now for some numbers. We received 2372 official entries this year, up slightly from 2344 last year. Of these, 1285 were for phone and 1087 for cw; compared to last year, the phone entries were up slightly and the cw entries down.

The top scores also reflected a higher activity level. On phone, the average top-ten phone score is up by 9.5% (25,396 points) to 292,551, while the average top-ten cw score is up by 5.7% (9526 points) to 175,320. Pretty healthy increases on both modes! The top low-power phone scores reflect a 6.3% increase, but the top low-power cw scores are down about 2%.

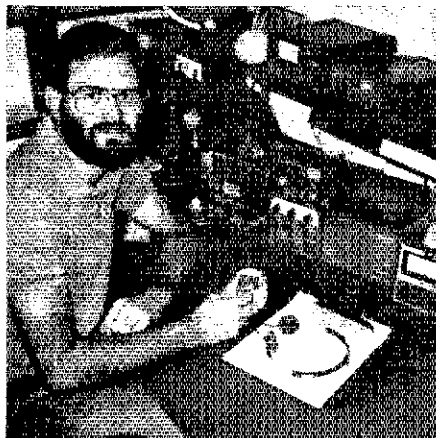
Competition on cw this year was close, but

that's what makes the Sweepstakes such an exciting contest. Note the high power cw scores. Leader N5AU at 1246 QSOs is only 55 ahead of number 10, K6LL. That's a difference in score of 2.29 QSOs per hour — enough to make you think twice about leaving the rig for a few minutes to stretch or get a drink. The top low-power scores were close on code, with 82 QSOs separating numbers one and 10.

Phone competition was not as close, with



The phone and cw operators of K7RI — K7SS (l) made it to number six on phone and W7WA (r) turned up as number nine on cw.



Walt, W0CP, no. 2 low power score on phone and no. 3 on cw.

Top Ten

Phone		Cw	
KV4FZ (WA6VEF)	327,820	N5AU (K5ZD)	184,408
K0RF (W0UA)	313,612	N6TR	182,780
WA7NIN (W6OAT)	305,324	K0RF (W0UA)	182,484
N5AU (K5ZD)	303,548	KV4FZ (N6OP)	175,380
K6MYC (N6IG)	292,152	W2YV (N2NT)	174,196
K7RI (K7SS)	288,896	N6RO	172,426
K8BI (N6TR)	280,608	K7GM	171,098
WSWUMU	274,244	K3LR	170,820
AA5B	270,248	K7RI (W7WA)	170,496
W2PV (K1AR)	269,064	K6LL	169,122

Top Ten Low Power

Phone		Cw	
W5MYA	218,300	W2TZ	135,780
W0CP	184,472	N6NO	133,590
WA6DIL	191,660	W0CP	131,720
WB7BNP	180,264	KB7G	131,424
K7MX (KB7G)	179,620	KJ0W	130,086
KB4I (K2PO)	176,660	K4XU	128,448
WD0EWD	175,972	K0LUZ	128,316
K0AB (WB0IWL)	172,080	K0EU	128,380
K5QQ	171,532	WA7UEC	126,290
KD6PY	162,356	KT5X	125,504

Top Ten Multitop

Phone		Cw	
K0WA	254,284	N5DKG	154,512
K0UK	242,572	WB8JBM	154,322
WA0AW	222,740	W0YB	149,628
K1CC	214,886	W2VJN	148,336
WA1TFE	210,012	K9NO	145,008
N5DKG	209,420	K0WA	144,596
K5RX	209,124	K8ND	141,044
WB8IP	206,904	KB7G	130,378
WB0CMM	205,130	K0FVF	130,086
WB8JBM	202,464	KC0D	129,648

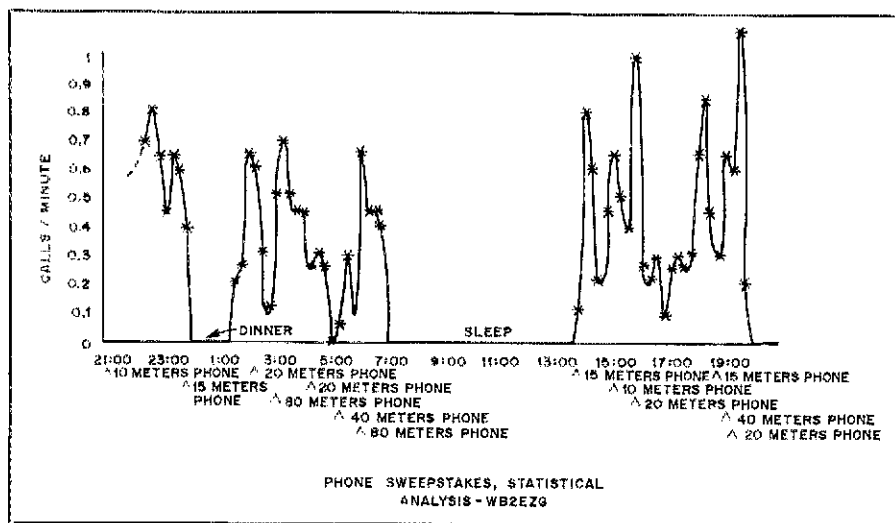
*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL



Three generations of the Dankert family participated in the N6EGC phone SS multitop effort. From the left are W6RII, N6EGC and Danny, who handled the dupe sheet.



Everything clicked for Randy, K5ZD, as he keyed N5AU to a first place, single-op finish on cw.



Division Leaders — Phone

Division	High Power	Low Power	Multioperator
Atlantic	K3UA	K3TW	W2OW
Central	K9RS	KJ9W*	KGNO
Dakota	KM0W	K0FRP	K0TG
Delta	WSWU*	W5WG	W6SED
Great Lakes	K8LX (WA8ZDT)	K8EE*	WB8JBM
Hudson	W2PV (K1AR)	WA2STM*	WA2LQO
Midwestern	AB0I (KB0X)*	WD0EWD*	K0WA
New England	K1OX (K1RX)	K1WB	K1CC
Northwestern	K7RI (K7SS)*	WB7BNP	KB7SE
Pacific	WA7NIN (W6OAT)	WA8DIL*	W6BIP
Roanoke	WD4AXM	WA4DAX (K0EJ)	W4QAW
Rocky Mountain	K0RF (W0UA)*	W0CP	K0UK
Southeastern	KV4FZ (W6VEF)	KB4I (K2PO)*	N4KG
Southwestern	KB8I (N6TR)	KV6I	N6DJW
West Gulf	N5AU (K5ZD)*	W5MYA*	N5DKG
Canadian	VE1YX (AA2Z)	VE5BBD	VE5QM

*Indicates new division record.

Division Leaders — CW

Division	High Power	Low Power	Multioperator
Atlantic	K3LR	W2TZ*	K3CR
Central	K9KM*	KJ9W*	W9YB
Dakota	K0ZZ	N0NO	K0TG
Delta	K5GO	K4XU	WA4UIH/5
Great Lakes	K8NZ	N8EA	WB8JBM
Hudson	W2YV (N2NT)	W2CS	W2VJN
Midwestern	K4VX (KB0RC)	K0LUZ	K0WA
New England	K1KI	W1PH	KB1H
Northwestern	K7RI (W7WA)*	KB7G	W7JYW
Pacific	N6RO	WA7UEC	W6BIP
Roanoke	N8II	KC8C	K2BA
Rocky Mountain	K0RF (W0UA)	W0CP	KC0D
Southeastern	KV4FZ (N6OP)	N4UF	KA4MGQ
Southwestern	N6TR*	N7CW	N6CYL
West Gulf	N5AU (K5ZD)*	N5JB	N5DKG
Canadian	VE5DX	VE3JTK	

*Indicates new division record

Clean Sweep — Both Modes

K1BW, K1RX, K1ZM, K3AO, W3XU, K4BAI, K4FU, WB4JLG, K5WA, K5ZD, KG5U, KN5H, N5CDO, N5DKG*, N6IG, N6KB, N6TR, NF6H, K7GM, K8AC, W8LT*, K9BG, K9UWA, W9YB, K0LUZ, K0WA*, K0D, W0CP, W0UA

*Multioperator

397 QSOs between top-scoring KV4FZ and 10th-place W2PV. However, 'PV still had to average 75.75 QSOs per hour to attain his spot in the top ten. That performance is 7.21 QSOs per hour better than last year's number 10 phone man.

The top-ten cw scores this year came from all

Throughout the contest Gary was hounded by George, W0UA, at K0RF, Rusty, W6OAT, at WA7NIN, and Randy, K5ZD, at N5AU, who all broke 300 kilopoints. The West Coast almost engineered a "clean sweep" of the top positions on phone again this year. However, John, K1AR (at W2PV) found a burst of energy in the last hour, caused in part by close competition from K2TR, and snuck in. On low power, it was Mike, W5MYA, by a large margin, with a score not achieved by many high-power entrants.

Competition among the multiops were especially fierce on cw between N5DKG and WB8JBM, with 'DKG winning by a few points. The Midwest made an especially fine showing in this class, with all stations except W2VJN and N5DKG being from the eighth, ninth or 10th call areas. On phone, the Kansas group that took top multiop honors last year operated K0WA to victory this time around. Nice job, fellows! Other top phone multis were spread around the country.

Last year's analysis of the equipment needed to make top ten in the high power class brought some requests for a similar analysis of the top low power stations. Before that, however, here are a few tidbits from the high power list. K7RI's station made the top ten both modes with stacked tribanders and a 40-meter beam. AA5B on phone and K7GM and K6LL on cw made it with single tribanders at 40-60 feet and dipoles. Guess operator ability still counts for something!

Among the low-power stations, tribanders were the norm, rather than the exception. Out of the top ten on both modes, 11 had triband beams, seven had monoband beams and two had triband quads. They were fairly well equipped on 40, however, as 11 had beams of some description, ranging from wire arrays to 4-element rotaries at 100 feet. All used dipoles or verticals for 80. The value of 40 meters is evident.

This year's club competition looked entirely different from last year's. For the first time since 1974, the Potomac Valley Radio Club swept to victory with an outstanding showing in the unlimited class. PVRC decided to really try for top spot this year; just look at all those high scores in Maryland and Virginia. Farther down the list, at the top of the medium-class pack, you'll find the group that traditionally wins the unlimited class -- the Northern California Contest Club. Exhausted from their tremendous efforts in the fall DX contests, NCCC could only manage 50 entries for SS. Not far behind was the Texas DX Society, last year's winning group. The local class gavel was won this year by a club from New Mexico, of all places, the Albuquerque DX Assn. Led by veterans AA5B and K5TA, this group won by more than 300,000 points. Congratulations to the winners, and also to all of the clubs for helping foster such a good turnout this year.

New to this year's writeup is a table showing how the high-power division leaders were doing at various times during the contest. Find the leader in your area and see how you were doing compared to him. Did you get off to a slower start? Did you fall behind in the late evening or on Sunday? Did you take too many breaks, or not enough? A little study might help you to pinpoint those times during the contest where you need improvement, be it more sleep, less sleep, a better choice of bands, or a better antenna for the band that's open when you fall behind.

Last, this writeup would not be complete

SOAPBOX

I was set up at the Boston City Morgue — yep, that's right — half way between two autopsy rooms on the fourth floor. I even slept for four hours there. It was quite an experience (K1KZL). I must confess that the phonetics are colorful — K8 Mother Nature, WA2 Little Orbiting Satellite, KA2 French Fried Shrimp and K7 Fat Rat. But alas, in that I missed VE4 thus the sweep on the phone, the most applicable for my effort was — N6 No Dice (W9GXR). Been hamming since 1959 and this is my first SS entry. What a blast (WA6GFR). First time I'd tried duping during the contest — and it worked! Post-contest log checking yielded only one had QSO (AA5B). Does everyone find it as amusing as I do to listen to the guys on 20 meters with 25-kHz-wide signals complain that the kid who is running 50 watts, trying to work a VE8 "too close to his frequency," thus wiping out the hour long rag chew with the other 5 kW station across town? How come the low-power ops can't ever be heard by the station that they're calling, but can always wipe out one of the "owners" of 20 meters? (W1HAF). The W8LT/W9LT mix-up still exists. It must have cost each about 100 QSOs (W9LT). Where was the Maritime-Newfoundland Section? (K4KZZ). [I was there for 1695 QSOs — Ed.]. We did discover a new part of Murphy's Law — When two or more stations call you at once, the one you answer is always a dupe (KK5I). Moved the station to the work QTH — first SS ever with no TVI (W9PL/5). A VY1 called me — wow! (KA5GJO). What luck! My first 74 QSOs were all 74 sections! (N3JT). Many thanks to N7DF for his trip to VY1. Can't say that I recommend running low power in the SS. The walls cave in too often (KSHM). Will be curious to see if anyone broke 1200 Qs on cw. Heard lots of stations well over 1100 in the final hour (K1ZX/4). [Three stations did — N5AU, N6TR and K0RF — Ed.]. Still have some QSLs from the 1934 SS hanging on the wall (W4RHZ). Why do the "big guns" leave their calls out of the exchange? Is it to double their QSO rates? (KC5IG). Murphy clobbered the computer at the office. Got rich on overtime — got poor on SS score (KW4T). Make it like Field Day with more points for low power (W0LSD). I was thrilled with my first hour of "barefoot" operation. Had 108 QSOs and 33 sections (KM0W). My wife, who has a Novice License, found the VY1 which gave

us a clean sweep (K9KB). My one negative comment concerns the number of people who came back to me on ssb by saying "Roger, thanks for Utah" and then QSYing before they could be corrected. Give them no mercy; they deserve to miss VY1 for not listening carefully. Of course, in retrospect, I will have to admit that Yukon and Utah do sound a bit alike. And, after all, who would expect the DragonFly to light in the Yukon? (N7DF/VY1). Stopped running stations with 10 minutes of operating time left in order to find a VE6 for a sweep. Found one with three minutes to spare. In my elation, I didn't even bother to use up the last three minutes (K7GM). I moved since last year. New shack is still in the planning stages so had to operate from the dining room table. At least I was in the right place for mealtimes (WB4FOT). Always seems like a regular SS family reunion with a few new members each year. Enjoy making these brief acquaintances annually and hope to work many of them again next year (WB8DQP/WB8JBM). This year WB2JSJ joined the list of roving "hired guns" as he travelled to southern Vermont to operate at arch rival KTIK's station (if you can't beat 'em — join 'em) . . . Duping took nine minutes and 30 seconds per page (100 QSOs). To do the total log of over 1500 QSOs, it took two hours and 22 minutes. Where do I sign up for one of "them thar computers?" (WB2JSJ/K1IK). Whatever happened to asking if a frequency is in use before plopping down and calling CQ? Had a great deal of trouble with that sort of thing this year. I would tell them that the frequency was in use after their first CQ and they would usually QSY, but I missed a number of QSOs due to this (N6IG). My first contest since the 1964 SS, when, as a Novice, I blew a fuse — and I had no spare (WASKGS). To the slave doing the logs: Greetings (and my condolences) (K8DO). [What do you mean by slave, Dennis? If I could get these chains off my leg and get to the phone, I'd give you a call and tell you that being elevated to slave status would be a promotion — Ed.]. The lack of a 75th section points out another reason why we shouldn't have given away the Canal Zone. . . SS — electronic warfare for the civilian. . . 141 dupes — next year I'm getting a computer. . . It's a good thing that SS, like Christmas, only comes once a year. . . I'm surprised that I didn't wear out the heads on my tape deck. I must have played my CQ tape 5000 times. . . True electronic masochism (WD5GSL/WB0TEV).



The number seven single operator cw score belongs to former ARRL Contest Administrator K7GM.



1981 was a year of rebuilding at the University of Florida ARC station, W4DFU. Kurt (I), WA9YNE, went single op on phone and Paul, WB6ZEC, went at it alone on cw.



WB3FAA, the number two phone scorer from the Eastern Pennsylvania Section, teamed up with WB3CAI on cw to take the EPA multiop honors.

CW — Division Leaders QSO Breakdown by Time

Cumulative Number of QSOs at:

Call	2200Z	0000Z	0300Z	0900Z	1500Z	2100Z	0300Z	Off times
K3LR	85	229	443	756	834	1018	1186	7
K9KM	60	174	347	684	806	959	1106	5
K0ZZ	66	194	364	592	716	906	1047	8
K5GO	76	209	374	653	767	971	1155	6
K8NZ	71	208	380	680	772	928	1080	5
W2YV (N2NT)	94	239	437	753	853	1047	1191	8
K4VX (KB0RC)	88	179	340	627	717	892	1034	7
K1KI	82	243	437	683	823	986	1123	10
K7RI (W7WA)	95	254	458	732	751	972	1212	2
N6RO	88	247	448	761	870	1042	1200	8
N8II	54	162	318	559	634	837	1006	4
K0RF (W0UA)	91	239	462	778	862	1037	1237	4
KV4FZ (N6OP)	80	235	444	677	756	1009	1203	4
N6TR	100	262	494	762	886	1055	1248	8
N5AU (K5ZD)	100	280	451	783	876	1080	1263	7
VE5DX	65	187	375	620	679	918	1135	3

Phone — Division Leaders QSO Breakdown by Time

Cumulative Number of QSOs at:

Call	2200Z	0000Z	0300Z	0900Z	1500Z	2100Z	0300Z	Off times
K3UA	130	308	592	984	1133	1378	1579	7
K9RS	116	312	631	904	1195	1423	1671	6
KM0W	109	262	396	580	602	874	1088	3
W5WJU	138	392	756	1128	1226	1709	1972	5
K8LX (WA8ZDT)	94	247	475	896	1039	1309	1560	5
W2PV (K1AR)	136	380	611	1087	1261	1627	1942	8
AB0I (KB0X)	126	312	611	1078	1219	1588	1834	3
K1OX (K1RX)	131	343	554	923	1070	1448	1804	4
K7RI (K7SS)	168	423	713	1151	1216	1624	2058	5
WA7NIN (W6OAT)	144	416	747	1214	1248	1716	2162	3
WD4AXM	111	270	492	800	945	1283	1526	2
K0RF (W0UA)	167	461	853	1291	1409	1787	2167	5
KV4FZ (WA8VEF)	163	397	706	1289	1483	1901	2337	9
KB6I (N6TR)	148	425	748	1201	1311	1753	2056	6
N5AU (K5ZD)	171	442	771	1200	1355	1743	2084	6
VE1YX (AA2Z)	147	336	524	611	953	1438	1745	3

without a word of praise for the hams who brought you that elusive VE8/VY1 multiplier. Thanks on code to VY1DD and VY1BQ for getting on to complete those rare sweeps. And thanks on phone to Lee, N7DF, and his brother John, K0HGW, who spent considerable time and money to travel to the Yukon with beams, towers, rigs and amplifiers. We know their efforts were appreciated from the number of soapbox comments about the availability of VY1. Thanks also to Peter, VY1CJ, for a fine single-op effort. Lee left a tribander and tower with the fellows up there, so look for more participation in future contests.

Club Competition

Unlimited Category	Score	Entries	Phone Winner	CW Winner
Potomac Valley RC	11,761,452	131	WD4AXM	W3LPL
Yankee Clipper Contest Club	7,082,944	79	W2PV	W2YV
Medium Category				
Northern Calif. Contest Club	5,827,214	50	WA7NIN	N6RO
Texas DX Society	5,583,806	43	N5JJ	N5JJ
Murphy's Marauders	4,318,381	41	W1WEF	K1TO
North Texas Contest Club	3,715,798	33	N5AU	N5AU
Mad River RC	3,468,844	30	K8LX	K3LR
Ill. Wind Contesters	3,285,196	31	K9RS	K9KM
Colorado Contest Conspiracy	2,262,218	16	K0RF	K0RF
Rubber Circle Contest Club	1,785,258	14	K7RI	K7RI
Kansas City DX Club	1,771,916	13	AB0I	AB0I
Eastern Iowa Dx Assn.	1,377,842	13	K0LUZ	N4RR/0
South Jersey Radio Assn.	1,247,124	35	W2AMK	K2ZY
Frankford RC	1,201,018	13	N3AD	N3AD
Murgas ARC	1,055,878	23	WB3FAA	KA3A
Northern Ohio ARS	961,130	17	K8AC	AA8S
Point Radio Operators Society	947,244	11	K3UA	K3UA
Penn Wireless Assn.	784,748	14	WB3DJF	AA3B
RC of Tacoma	825,742	28	W7BUN	W7LKG
Saginaw Valley ARA	777,113	23	K8DO	N8RW
Fort Wayne RC	761,188	13	K89MO	K9UWA
Robbinsdale ARC	521,082	11	K80PM	WB0HRX
Eastern Mich. ARC	515,296	13	K8DD	K8DD
Wisconsin Valley RA	504,728	17	W9NA	K9NNM
Central Mich. ARC	470,748	15	K8BCL	WBVPC
Gloucester Co. ARC	336,526	11	N2BCF	K2HPV
Ramapo Mountain ARC	304,802	11	N2AAZ	W2LVT
L'Anse Creuse ARC	191,752	12	N8AOE	W8QAF
Long Island DX Assn.	166,752	3	.	.
Local Category				
Albuquerque DX Assn.	1,413,198	10	AA5B	K5TA
Southern Calif. Contest Club	1,089,798	10	K86I	N6TR
Lincoln ARC	875,350	9	K8SCM	.
Overlook Mountain ARC	856,030	10	W2XL	W2XL
Fraternal Order of Radio Contest Enthusiasts	828,272	7	WA8VQR	N8NO
River City Contesters	805,076	8	KV6H	K8SG
Western ARA	791,416	9	.	K6CYX
Central Florida DX Assn.	735,562	7	.	N4WW
Northern Florida ARS	727,434	8	N4UF	W7NI
Williamette Valley DX Club	712,974	5	.	K3FR/7
Utah ARC	662,178	9	N7RR	K7FR
Western Washington DX Club	544,302	10	WB7BNP	.
United Radio Amateurs Club	511,302	6	K16Z	.
Binghamton ARA	502,716	6	N8IN/2	.
Mississippi Valley DX and Contest Club	502,132	7	K9BGL	.
Columbus ARA	501,876	9	W8LNO	W8LNO
Central Arizona DX Club	472,614	3	.	.
Eastern Conn. ARA	465,950	8	.	K1YRP
Machine Contest Club	464,736	4	.	.
Sevier Co. ARC	421,428	5	KF4H	.
Orange Co. Contest Soc.	413,106	4	.	.
Schaumburg ARC	407,998	6	KA9FUG	K9LW
Schenectady ARC	399,138	10	W2ARQ	AG2X
Texas Assn. of Contest Oprs.	382,434	4	.	.
Motor City RC	364,818	5	K8SIA	K8SIA
Northwest Arkansas ARC	339,256	5	.	K5GO
Rochester DX Assn.	332,918	6	W2HPF	.
Northrop RC	323,440	6	W8CN	.
Providence RA	321,848	8	WA1TAQ	KA1AWS
Ventura County ARC	314,050	5	WA6DJS	.
Montrose ARC	302,408	4	K0GAS	.
Lynchburg ARC	302,392	8	AA4FF	AA4FF
Wireless Institute of the Northeast	296,232	4	.	K2SX
Southeastern DX Club	293,444	3	.	.
Redwood Empire DX Assn.	279,880	8	.	.
Canton ARC	277,738	3	K18D	N8BM
Poughkeepsie ARC	275,586	4	WB2KMY	.
Dayton ARA	274,306	5	N8BJQ	.
Fork ARC	269,696	3	KM0W	.
Long Island Contest Klub	267,794	4	.	.
AR Transmitting Soc.	262,028	3	.	.
Mitre-Bedford ARC	258,924	5	.	W1FM
Long Island Mobile ARC	253,084	8	K2AU	.
Mid Ohio Valley ARC	245,340	5	KC8JH	.
Reading RC	241,674	7	N3CHL	.
Harlan Co. ARC	223,744	4	ND4Y	.
Conn. Wireless Assn.	222,156	4	.	.
Minneapolis RC	213,314	3	.	.
OH-KY-IN ARS	212,972	8	.	N8FU
Massillon ARC	208,400	10	K88LH	.
Flyweight DX Group	204,444	3	.	.
Hazleton ARC	193,030	4	KB3WQ	.
Rockford ARA	192,456	4	AK9N	.
Grumman ARC	158,728	8	WB2FMP	K2GMV
Rip Van Winkle ARS	154,988	5	.	W2DW
Everglades ARC	153,206	6	KD4BU	K4QE
Valley RC of Eugene	152,330	5	A17W	.
Splitrock ARA	148,840	4	.	K2BLA
Wichita ARC	147,376	6	WA0HWH	.
Montgomery ARC	146,984	5	KA3DXZ	.
Fresno ARC	143,734	6	WB6ITM	KS8C
Boeing Employees ARS	131,110	10	K7GZO	W7LUR
Utica ARC	127,566	7	KJ2J	K2XU
Lockport ARA	125,724	7	WB2SWL	AE2T
IBM Owego ARC	109,928	3	.	K2MQY
Hughes Fullerton Employees Assn. ARC	107,178	4	KA6ISX	.
Cuyahoga Falls ARC	85,356	6	W8DXT	W8DXT
Intercity ARC	70,254	3	.	W8KKN
Chicago Radio Traffic Assn.	63,256	4	.	.
Rowan ARS	63,130	3	N4UH	.
Northern VA RC	52,640	5	WD4KQJ	.
Kettle Moraine Radio Amateurs	52,522	3	.	N9EZ
Larkfield ARC	46,700	3	KK2E	.
West Park Radiops	43,990	3	.	.
Boulder ARC	36,900	3	.	.



KM0W, Stu, was the top single op scorer from the Dakota Division on phone and went multioperator with KE0A for the cw weekend.



The operators of the top multioperator station in the phone SS, not to mention a FB number 6 finish on cw, are (l to r): AB0S, WA0TKJ and K0WA. The call used was K0WA, and the guys attribute their success to K0WA's station building ability with a healthy assist from Coors.



Ken, KM5H, went low power on both modes from Oklahoma for a total of over 250 kilopoints.

FEEDBACK

Please refer to pages 83-92 of May 1981 QST for the following corrections to the 1980 Sweepstakes Results.

In the cw listings, KA1CLV should have been listed in the Eastern Massachusetts Section, not Connecticut.

In the phone Top Five Multioperator Box, AB0S with a score of 233,988 should have been listed as the winner, and K1IK with a score of 208,236 should have been listed in the number five position.

Correct the call sign of the phone multiop winner from Southern New Jersey to WB2YOF, not WB2YDF.

The multiop phone winner in the Atlantic Division is W2OW not WB3EPC.

K8AAZ is the phone club certificate winner for the Westpark Radiops.

AH6BL's cw score was left out of the listings by mistake. Guy's linescore should read 68,018 - 479 - 71 - 20 - A, thus making him the cw winner from the Pacific Section.

WB8MZZ should have been listed as the operator of AD8P, the top phone station from Ohio.

Connecticut

Table listing radio stations in Connecticut with call letters, frequencies, and power levels.

Eastern Massachusetts

Table listing radio stations in Eastern Massachusetts with call letters, frequencies, and power levels.

Maine

Table listing radio stations in Maine with call letters, frequencies, and power levels.

New Hampshire

Table listing radio stations in New Hampshire with call letters, frequencies, and power levels.

Rhode Island

Table listing radio stations in Rhode Island with call letters, frequencies, and power levels.

Vermont

Table listing radio stations in Vermont with call letters, frequencies, and power levels.

Western Massachusetts

Table listing radio stations in Western Massachusetts with call letters, frequencies, and power levels.

Eastern New York

Table listing radio stations in Eastern New York with call letters, frequencies, and power levels.

New York City - L.I.

Table listing radio stations in New York City and Long Island with call letters, frequencies, and power levels.

Northern New Jersey

Table listing radio stations in Northern New Jersey with call letters, frequencies, and power levels.

Southern New Jersey

Table listing radio stations in Southern New Jersey with call letters, frequencies, and power levels.

Western New York

Table listing radio stations in Western New York with call letters, frequencies, and power levels.

Table listing radio stations K2QR, KACZDJ, WA2GXE, W2CXM, W2TEQ, W2BSJG.

Delaware

Table listing radio stations in Delaware with call letters, frequencies, and power levels.

Eastern Pennsylvania

Table listing radio stations in Eastern Pennsylvania with call letters, frequencies, and power levels.

Maryland - D.C.

Table listing radio stations in Maryland and D.C. with call letters, frequencies, and power levels.

South Carolina

Table listing radio stations in South Carolina with call letters, frequencies, and power levels.

Southern Florida

Table listing radio stations in Southern Florida with call letters, frequencies, and power levels.

Tennessee

Table listing radio stations in Tennessee with call letters, frequencies, and power levels.

Table listing radio stations W3YI, W3G5B, W3RE, W3WAXN, W3VX, W3VJK.

Alabama

Table listing radio stations in Alabama with call letters, frequencies, and power levels.

Georgia

Table listing radio stations in Georgia with call letters, frequencies, and power levels.

North Carolina

Table listing radio stations in North Carolina with call letters, frequencies, and power levels.

Northern Florida

Table listing radio stations in Northern Florida with call letters, frequencies, and power levels.

Virginia

Table listing radio stations in Virginia with call letters, frequencies, and power levels.

Table listing radio stations N4XD, KC4FD, W4LW, N4NW, W4EZ, KHEI, W4DEK, K2GWNW, KC4UQ, N4JQ, N4LU, K4BWT, K4GL, W4GF, K4IGQ, K4UK, W4UQ, K4AUF, K4RZ, N4RA, K2BA, W4Y (AFAT), W4RDV, W4PAP, K4QJ, W4LYN.

West Indies

Table listing radio stations in the West Indies with call letters, frequencies, and power levels.

Arkansas

Table listing radio stations in Arkansas with call letters, frequencies, and power levels.

Louisiana

Table listing radio stations in Louisiana with call letters, frequencies, and power levels.

Mississippi

Table listing radio stations in Mississippi with call letters, frequencies, and power levels.

New Mexico

Table listing radio stations in New Mexico with call letters, frequencies, and power levels.

Northern Texas

Table listing radio stations in Northern Texas with call letters, frequencies, and power levels.

Southern Texas

Table listing radio stations in Southern Texas with call letters, frequencies, and power levels.

Oklahoma

Table listing radio stations in Oklahoma with call letters, frequencies, and power levels.

Southwestern Texas

Table listing radio stations in Southwestern Texas with call letters, frequencies, and power levels.

Alabama

Table listing radio stations in Alabama with call letters, frequencies, and power levels.

NSWWW 32,619-263-62-6-A
KSTU 26,748-214-66-8-A
W5NR 31,773-191-57-10-B
KSHOU 17,820-165-54-6-B
WDBLJK/J 14,080-110-64-24-A
WBDN 13,760-100-43-8-A
N5DKG (+KSLZ) 15,451-2-1044-74-8-B
K5VWW (MULTIP) 10,736-769-72-23-B
NSDNY (+K5ZT, WA5EJ) 96,134-677-71-24-B
W5YG (AGSE, K5B5M, W5BUCL, W5D5JH, ops) 35,370-215-59-24-A

6

East Bay

N6RO 172,426-1171-73-24-B
N6KR 120,916-81-74-24-B
N6PBJ 105,120-730-73-23-A
K5G4 91,576-44-61-10-A
W65ZEP 71,898-521-69-24-A
A4AKH/W 66,240-480-59-11-A
K6A TV 64,844-480-77-19-A
N6R 53,524-394-68-24-A
K6B5T (K6GSL, opr.) 49,408-386-64-10-A
K6KO 39,712-475-73-24-B
W6AC TA 27,000-252-30-8-A
K5GQ 15,584-37-21-9-A

Los Angeles

W6AM (N61J, opr.) 160,892-1102-73-24-B
N6E1 719,584-842-71-24-A
W6UL (+A667, ops) 116,946-801-73-24-B
N6PN 107,136-744-72-23-A
W6S3 94,520-695-68-18-B
K6GFA 94,508-699-70-15-B
K6YCB/b 37,926-301-63-10-A
N6AA 8712-84-44-13-A
W6AHQ 7392-84-44-13-A
N6CY (+W6AJ, ops) 114,594-807-71-24-B
W6VIO (N2YQ, N65 MP, NO, ops) 99,400-710-70-24-B
K6AA (KE6BB, ops) 94,806-687-69-24-A

Orange

NC6T (N6FH, opr.) 156,880-1060-74-24-B
K6AHLX 106,120-730-70-24-B
K6GFA 94,508-699-70-24-B
K6CYX (N6CCL, opr.) 75,210-545-69-22-B
K6NEC 95,754-457-61-20-A
K6GRT 82,681-425-61-10-A
K6GP 39,106-231-63-14-A
N6CF 8800-100-44-10-B
W6A6F H 736-23-18-4-A
K6AHNY (FW6B, ops) 90,508-414-61-17-A
K6AGCJW (+K6GS, W6MRM) 15,402-115-51-24-A

Pacific

K6HPU 74,180-195-62-8-A
Sacramento Valley
W6TPH 138,700-950-73-24-B
K6SG 116,203-897-72-24-B
A16V 112,608-816-69-24-B
N6JW 110,522-777-73-24-B
N6HGG 103,630-720-72-18-B
W6KFN 92,400-607-72-18-B
K6V6H 79,100-565-70-24-B
W6GEX 45,560-340-67-10-A
K6BPS 18,480-168-85-13-A
K6BA 13,180-131-80-8-B
W6GVR 8000-100-40-7-A
N6ZIN 3762-57-33-8-A
N6JIM 3200-50-32-8-A
K6BQXG 1564-34-23-9-A

San Diego

K6NA 154,070-1085-71-24-B
N6CW (K1LL, opr.) 146,488-1017-73-24-B
N6ND 11,082-802-73-24-A
A16EE 77,494-234-99-7-B
K6KT 72,000-200-59-24-A
K6RN 66,819-172-54-3-B
W6JKA 14,896-152-49-16-A
W6AUF Y 14,280-140-51-8-B
K1JLY (+K6GS, LAH, PSZ, FTB) 8098-97-44-8-A

San Francisco

K6ANP 96,760-660-73-24-B
W6AUL 61,770-435-71-24-A
A16DXX 29,768-244-61-7-A
K6LRN 29,312-229-64-12-A
W6B1P (+W6A1J) 123,540-870-71-21-B
San Joaquin Valley
W6B1ON 141,840-985-72-24-B
N6G3 128,138-866-74-23-B
A16W 88,974-482-71-24-A
W6MYP 53,460-405-66-14-A
K6C6 48,300-350-69-18-A
W6B1TM 47,524-318-59-13-A
K6R 48,992-233-59-16-A
W6AYB 4254-33-12-10-A
N6EJG 336-14-12-14-A
N6AVV (+N6QY) 371,300-255-63-17-B

Santa Barbara

N6TR 182,780-1235-74-24-B
N6MW 182,740-557-70-12-B
W6C66 60,702-453-67-14-A
W6OU 47,610-345-69-12-B
K6MFKL 15,800-156-50-9-A
W6JANN 2852-46-31-6-A
Santa Clara Valley
N61G 167,684-1133-74-24-B
W6M5T (W6G5V, opr.) 150,358-1016-74-24-B
A16W 139,460-405-66-14-A
A16V 130,260-859-70-23-A
N6MG 118,944-826-72-24-B
N6Z6 104,888-777-71-19-B
N6R 89,992-618-72-24-A
A16E 67,134-501-67-17-B

Santa Clara Valley

N61G 167,684-1133-74-24-B
W6M5T (W6G5V, opr.) 150,358-1016-74-24-B
A16W 139,460-405-66-14-A
A16V 130,260-859-70-23-A
N6MG 118,944-826-72-24-B
N6Z6 104,888-777-71-19-B
N6R 89,992-618-72-24-A
A16E 67,134-501-67-17-B

Santa Clara Valley

N61G 167,684-1133-74-24-B
W6M5T (W6G5V, opr.) 150,358-1016-74-24-B
A16W 139,460-405-66-14-A
A16V 130,260-859-70-23-A
N6MG 118,944-826-72-24-B
N6Z6 104,888-777-71-19-B
N6R 89,992-618-72-24-A
A16E 67,134-501-67-17-B

W65ZN 63,410-487-65-9-B
K6CMB 41,180-359-59-11-A
W6OKK 40,164-313-64-10-A
N6EZA 27,940-254-55-8-A
K6MCO 26,112-204-64-9-A
W6NDD 25,110-204-64-9-A
K6E6H 23,296-208-56-24-A
N6BSU (K6ALAF, opr.) 18,762-177-53-10-B
W6KJZ 17,840-170-53-10-B
N6NF 16,800-186-30-4-B
K6AYH 10,530-117-45-12-A
K6AJLT 7040-40-44-19-A
K6G5 5304-68-35-3-A
W6HAD 2452-88-25-14-A
K6SPZE/N 1023-35-22-16-A

Alaska

KL7G.YV 19,980-185-54-12-B
KL7KE (+K17K) 23,780-205-58-23-A

Arizona

K7G.M 171,088-1156-74-24-B
K6LL 169,122-191-71-24-B
N7CW 121,410-855-71-24-A
W7ZMD 104,974-719-72-19-A
K7L 67,400-67-67-6-A
N45L/7 87,408-607-72-20-B
W7ANXL 29,500-250-59-11-A
W7EP 23,770-295-57-8-A
W7FK 48,540-45-41-10-A
K7H7H 7064-86-24-24-A
N7CSC (+K7JIN) 76,644-628-69-24-B

Idaho

K7NHV 162,352-1127-73-24-B
W7FA R 52,740-591-70-24-B
W7ZRC 52,688-608-68-19-A
K7GD 74,906-559-67-14-A
K7X 73,432-548-67-12-A
K7JV 31,476-268-61-9-A

Montana

K9PP/7 75,900-675-66-22-B
W7JYW (+K7QV1) 91,022-641-71-24-B

Nevada

K7CA 167,388-1131-74-24-B
W7ANIN (W6DAG, opr.) 166,970-1188-70-24-B
W7JUEC 126,290-865-73-24-A

Oregon

W7NI 155,782-1067-73-24-A
W7WHO 116,014-817-71-24-A
W7TC 88,010-675-65-24-A
W7YAO 77,532-946-71-21-A
A17B 64,740-498-65-11-B
K7M 53,342-473-67-20-A
K7D 42,204-372-66-21-A
K7DVB 31,600-280-60-19-A
W7WLF 29,264-248-59-22-A
N7DQ 26,400-200-66-12-B
K7WPC 11,004-131-42-5-B
W7XN 10,440-116-45-2-B
K7GDN 5780-85-34-9-A

Utah

N7DF 155,206-1093-71-24-B
K7CPC 87,312-642-68-24-B
K7E R/7 60,826-454-57-23-A
K7FA 56,328-429-66-19-A
K7M 54,924-499-66-22-A
W7KGM/W 19,942-169-59-18-A
W7APG/M/7 8000-100-40-7-B

Washington

K7RI (W7WA, opr.) 170,496-1152-74-24-B
AG7M 144,144-1001-72-24-B
K7BG 131,474-888-74-23-A
K7QEW 120,274-847-71-24-B
K7F 118,400-800-74-24-A
K7FR 99,084-718-69-24-A
W7LKC 92,584-652-71-24-B
K7LXC 88,328-640-69-24-A
K7M 80,948-607-72-24-A
W7BUN 69,350-610-88-18-B
K7NY 68,728-484-71-24-A
N7YAG 56,876-451-63-19-A
N7DQ 49,560-413-60-14-A
W7JWF/7 47,454-349-68-20-A
K7C1 32,376-284-57-13-A
W7BYK 29,862-237-63-12-A
N7DQ 21,700-171-64-10-A
K7SS 10,658-7-73-6-A
A17N 8990-115-43-8-B
N7C1 7304-83-44-6-A
W7IEU 6888-82-42-6-A
W7BQM 5254-71-37-7-A
N7DZY 5040-70-36-23-A
W7B7R/Q 3088-59-26-7-A
W7DRA 2842-49-29-14-A
W7DRA 1376-44-27-10-B
W7GCI 1564-34-23-4-A
K7RS 1050-29-21-6-A
W7LW 79-9-2-2-A
K7QLC 198-11-9-4-A
W7SFT 8-2-2-2-A

Wyoming

K0G40 80,640-560-72-20-B
K7M 70,992-527-68-24-A
W7HRM 7110-179-45-5-B

Michigan

150,480-1045-72-24-B
147,852-999-74-24-B
K8SS 127,538-999-74-23-B
W6ARRR 126,438-860-73-20-B
W6B7R 141,358-841-69-24-B
K8DD 118,748-797-73-24-B
108,664-794-68-24-A
N8E A 103,660-730-71-24-A
W6VJL 84,000-612-73-24-B
W6TJ 85,844-607-71-24-A
K8MM 84,870-615-69-24-A
W6B7Y 82,880-592-70-24-B
W6MPP 75,776-564-72-24-A
W6BMD 68,952-507-66-23-A

Illinois

K9KM 156,816-1089-72-24-B
K9RF (K9GL, opr.) 148,920-1020-73-24-B
131,276-869-73-24-B
K9JW 130,086-891-73-24-A
W9RW 123,580-835-71-19-B
AG9A 120,700-850-71-19-B
K9RS 116,928-812-72-16-B

K85A 68,904-522-66-11-B
K8RA 57,850-445-69-19-A
W8RQAF 53,200-477-64-10-A
W8JUK 52,042-377-53-24-B
K8CX 54,658-427-64-18-A
K8RI 43,898-402-67-22-A
W8R6W 42,910-600-63-8-A
N8RW 40,950-315-65-15-A
N8LA 35,200-275-64-13-A
N8R1 34,472-278-62-13-A
K8CY 33,044-260-63-8-A
K8BU 33,356-267-64-24-A
W8JUS 30,678-247-62-19-A
W88AA 27,432-237-58-12-A
K8D9 25,200-200-63-8-A
K8OI 24,168-212-57-12-A
W8GJD 24,200-220-55-21-A
W8EG 23,000-200-85-8-A
W8VEB 22,808-184-56-6-A
A8W 18,126-171-53-6-B
W8TAQ 18,800-175-48-5-A
K8AJBK/N 16,536-196-53-18-A
N8CI A 14,760-130-53-12-A
N8CQA 12,836-132-49-17-A
W8DM 11,800-118-50-3-A
K8SAK 11,992-126-46-10-A
N8CI A 11,800-118-50-3-A
N8BK 9108-99-46-24-A
W8BNM 8648-94-46-7-A
N8CY 8640-108-40-12-A
N8CP 8428-96-43-8-A
W8JUP 6970-85-41-6-A
N8DE 5016-68-38-9-A
K8KM 4818-73-33-8-A
N8BN/W 4216-62-34-9-A
K8B 340-0-0-0-A
K8BLP 2214-41-27-7-A
N8RME 264-28-14-6-A
K8N (HPIL, K8AKH, K8CES, K8R1, N8DB, W8D9A, W8G, W8K, ops) 64,740-438-65-24-A
A18U (+A18C) 87,040-460-62-19-A

Indiana

K9UWA 131,868-817-74-24-B
A87L9 (+W89WV, opr.) 131,161-814-72-24-B
W8NRC 129,888-828-72-24-B
W8GFB 111,300-795-70-24-B
K9E1 100,864-756-72-24-B
W8JOC 71,824-536-67-24-A
K9JL 65,684-520-67-24-B
K9KB 41,884-328-64-15-B
K9T1S 40,950-329-63-8-B
N952 29,862-237-63-8-A
K9BMQ 29,862-237-63-8-A
K9AFK 17,066-161-63-70-A
K8LXL/9 6,956-34-11-1-A
N9VB (DFACK, K9AL, K9W9, N9COP, N9S, RC, W9SST, ops) 149,628-1011-74-24-B
N9BSZ (+N9AYC) 71,260-520-69-24-A
W89SZ (+W89C1) 80,744-252-61-70-A

Wisconsin

K9N1C 117,072-813-72-24-B
W9P 107,520-768-70-24-B
K9GDF 106,674-733-69-20-B
W2WOF/8 88,872-644-69-23-B
K9Y7 85,874-633-67-14-A
AK9Z 78,926-551-65-15-A
W9GX R 76,782-573-67-24-B
K9N9M 59,976-476-63-20-A
N952 59,976-476-63-20-A
W9SM (W8EJE, opr.) 53,300-410-65-18-A
N9C1G 45,760-392-65-12-A
W8EJE 45,760-392-65-12-A
N911 47,334-343-69-18-A
W9HRD 45,560-400-67-19-A
N9E 35,478-237-57-7-A
K9LJN 29,919-59-20-7-A
W9SQN 24,860-226-55-8-A
K89W 23,780-209-56-9-A
W8E 17,296-188-46-5-A
N9GDF 15,968-11-43-2-9-B
W9D1U 9348-11-41-3-B
N9KS 9348-11-41-3-B
K9ALNU 3484-46-27-10-B
N9GDF 3484-46-27-10-B
K9KLV 828-23-18-8-A
K9KLV 600-20-18-8-A
W8PCTAL9C, K9AZK, W8W1, W89PYE, ops 76,344-853-74-24-B

Colorado

K9RT (W8UA, opr.) 282,484-1233-74-24-B
W8YK 182,078-1078-73-24-B
W8PC 131,720-890-74-24-B
K8E1U 126,880-890-71-24-A
K8E1U 127,434-827-71-21-A
N8DV 13,780-17-24-8-A
K8BN 73,712-542-68-23-A
A8CS 72,624-534-68-18-B
K8E1U 66,660-456-64-13-A
W8RSR 56,960-445-63-13-A
A8DO 53,760-420-64-14-A
A8DO 40,446-321-63-15-A
W8X 36,456-264-66-13-A
W8YK 36,680-289-60-16-A
W8SS 26,098-223-63-12-A
W8SS 22,256-204-57-11-A
W8EDRT 22,256-204-57-11-A
K8D (K8BERU, K8BY, W8S, BLQ, UJO, ops) 129,646-913-71-24-B
W8GCR (K9JG, N8S CNV, CTQ, W7XG, ops) 91,080-660-69-24-B
W8NT (+A8PP, K860V, W8LW, W8DHU) 44,038-416-64-24-A

Iowa

N4RR 144,144-1001-72-24-B
N8QA 142,272-988-72-24-B
K9FH 138,992-992-73-24-B
K9MM 126,930-915-71-24-B
K9JUZ 127,434-827-71-21-A
N8DV 13,780-17-24-8-A
K8BN 73,712-542-68-23-A
A8CS 72,624-534-68-18-B
K8E1U 66,660-456-64-13-A
W8RSR 56,960-445-63-13-A
A8DO 53,760-420-64-14-A
A8DO 40,446-321-63-15-A
W8X 36,456-264-66-13-A
W8YK 36,680-289-60-16-A
W8SS 26,098-223-63-12-A
W8SS 22,256-204-57-11-A
W8EDRT 22,256-204-57-11-A
K8D (K8BERU, K8BY, W8S, BLQ, UJO, ops) 129,646-913-71-24-B
W8GCR (K9JG, N8S CNV, CTQ, W7XG, ops) 91,080-660-69-24-B
W8NT (+A8PP, K860V, W8LW, W8DHU) 44,038-416-64-24-A

West Virginia

N81I 141,408-982-72-24-B
K8C 118,408-811-73-21-B
K8B 769,700-70-24-B
K8DG 98,832-696-11-19-B
W8PCK/Y8 97,056-674-72-24-A
K8MM 82,600-590-70-16-A
W8JUZ 76,032-607-73-24-A
K8BFJ 33,902-253-67-13-A
W8UT 29,892-245-61-9-A
K8LWX 14,796-17-34-8-A
W8NHN 4896-12-34-8-A

Minnesota

N8NO 133,950-915-73-24-A
K8JL 102,098-716-71-24-A
K8RG 98,328-723-68-24-A
W8YCR 98,328-723-68-24-A
K8FZ 34,320-620-68-24-A
W8WT 84,820-620-68-18-B
K8GNT 82,880-592-70-23-A
W8T 70,000-420-65-14-A
W8SRH 58,906-531-63-19-B
W8TQ/T 52,952-51-66-19-B
K8M 50,792-447-68-19-B
K8MHP 46,980-420-68-18-B
W8GWW 34,574-293-59-19-A
W8MN 10,744-258-81-24-A
W8AGC 29,648-218-68-14-A
K8RVW 29,648-218-68-14-A
W8YHE 24,976-225-56-10-A
K8ND 23,142-203-87-14-A
W8WDEL 21,658-221-49-12-A
W8BQJ 4086-60-34-8-A
W8BQJ 2958-49-21-8-B
W8ZHE/1 1975-43-23-4-A
K8MHW/N 1748-38-23-4-A
K8CP 40-5-4-1-A
K8TG (+K8TO, N8BG) 130,738-893-73-24-B
K8FV (+K8E, W89B) 130,086-891-73-24-B
A8QM (+N8BBS) 49,148-646-69-19-B
W8G5NP (+K8E, W89B) 48,292-542-63-11-B

Missouri

K8VX (K8BRC, opr.) 147,456-1024-72-24-B
A8V1 (K8ML, opr.) 138,960-468-72-24-B
K8RWL 102,098-716-71-24-A
N8RT 105,384-431-78-24-A
N8AX 87,120-605-72-24-A
W8WWS 86,940-621-70-22-A
W8RRG 64,560-604-70-20-A
W8BNE 16,950-160-53-12-A
W8SKG 11,600-109-53-12-A
W8DARX 11,200-112-50-19-A
K8B 8200-19-29-8-A
K8P 4200-60-35-2-A
K8MR (+W8ALT) 33,408-761-64-18-B

Nebraska

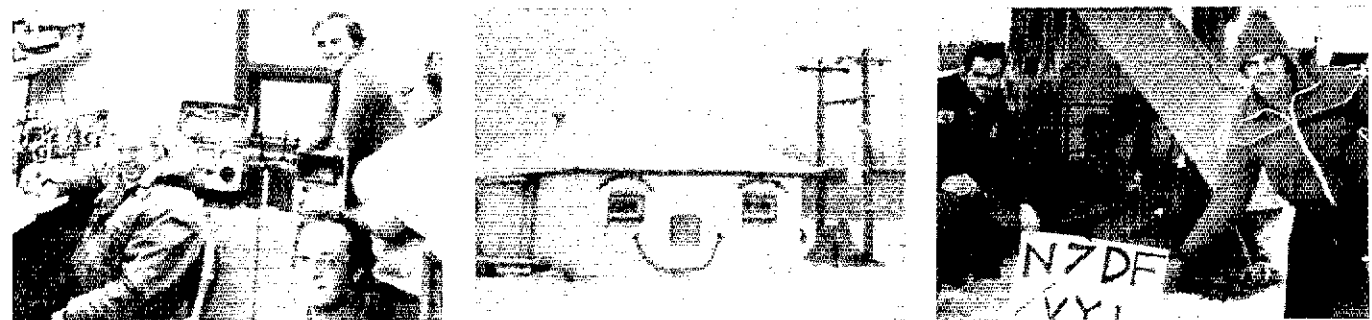
K8SCM 46,918-293-63-11-B
N81 21,728-194-56-12-A
K8DI (+K8NE) 127,458-873-73-23-B

North Dakota

K8BT 65,746-498-66-18-A
K8TA 58,074-411-67-13-B
K8W (+K8GA) 83,214-603-69-23-B

South Dakota

K8ZZ 149,538-1023-73-24-B
K8ECP 70,272-181-56-18-B
K8CAV 19,562-188-52-71-A
K8OR 2160-40-27-4-A



The reason for all of those "clean sweeps" on phone came out of VY1 land. From left VY1DD, VY1AD, VY1CJ and VY1CC set up operations at the forest service radio shop. The ministry of Transport Beacon Site north of Takhini, Yukon Territory, was the site of the N7DF/VY1 and KØHGW/VY1 operation in the phone SS. KØHGW (I) and N7DF tend the power plant.

PHONE	New Hampshire	Rhode Island	Vermont	Western Massachusetts	Southern New Jersey	Eastern New York	Maine	New York City - L.I.	Massachusetts	Northern New Jersey	Delaware	Eastern Pennsylvania	Western Pennsylvania	Alabama	Georgia
KIWA	139,564-943-74-24-A	WA1IAQ	86,284-583-74-10-A	WA1IAJ	128,760-870-74-20-B	W2PV (KIAR, opr.)	141,189-328-92-10-A	KQ2M	96,986-683-71-13-B	W2EZG	62,700-475-66-13-B	W3XU	138,528-936-74-15-B	K3UA	118,000-800-74-21-A
KIWA	139,268-941-74-21-B	KIWAJ	78,736-532-74-21-B	K1BW	126,888-856-74-16-B	K21R	269,084-1818-74-24-B	K2DE	157,554-115-74-14-B	KR2B	55,308-419-66-14-A	W3YU	138,528-936-74-15-B	K3UW	160,432-1084-74-24-B
KIWA	116,654-799-73-24-B	WA1ICV	71,426-503-71-16-B	N1TZ	132,480-769-74-18-B	W2VJL	99,160-670-74-22-A	K2DF	172,356-647-74-24-B	K2AJ	48,440-346-70-18-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	114,700-775-74-14-B	WA1IYI	73,024-152-56-8-A	W2JAM	13,200-475-74-21-A	W2WJL	77,226-531-73-17-A	K2DF	172,356-647-74-24-B	N2GQ	18,200-160-57-15-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	105,672-714-74-24-B	KIWAJ	42,484-302-71-10-A	N1SR	11,620-295-62-12-A	W2WJL	64,540-461-70-22-B	K2DF	172,356-647-74-24-B	N2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	96,986-683-71-13-B	KIWAJ	35,600-220-9-12-A	K1AI	216,672-1464-74-24-B	KR2A	51,336-373-69-15-A	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	92,956-622-74-24-A	WA1ITF	210,312-1419-74-24-B	W1LQ	75,072-532-68-14-B	KR2B	48,300-350-69-14-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	84,840-606-70-16-B	WA1IWA	86,284-583-74-10-A	KD1R	90,228-122-37-11-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	76,870-489-71-11-A	KIWAJ	78,736-532-74-21-B	W2VJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	67,452-462-73-24-B	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	59,220-423-70-18-A	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	52,784-224-63-4-B	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	20,768-176-98-5-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	15,928-181-44-7-A	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	13,622-139-49-4-A	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	10,184-134-38-3-A	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	9,300-50-30-4-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	106,726-731-73-16-A	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	86,284-583-74-10-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	78,736-532-74-21-B	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	71,426-503-71-16-B	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	67,452-462-73-24-B	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	59,220-423-70-18-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	52,784-224-63-4-B	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	20,768-176-98-5-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	15,928-181-44-7-A	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	13,622-139-49-4-A	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	10,184-134-38-3-A	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	9,300-50-30-4-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	106,726-731-73-16-A	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	86,284-583-74-10-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	78,736-532-74-21-B	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	71,426-503-71-16-B	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	67,452-462-73-24-B	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	59,220-423-70-18-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	52,784-224-63-4-B	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	20,768-176-98-5-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	15,928-181-44-7-A	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	13,622-139-49-4-A	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	10,184-134-38-3-A	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	9,300-50-30-4-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	106,726-731-73-16-A	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	86,284-583-74-10-A	KIWAJ	78,736-532-74-21-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	78,736-532-74-21-B	WA1ICV	71,426-503-71-16-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	71,426-503-71-16-B	WA1IYI	73,024-152-56-8-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	67,452-462-73-24-B	KIWAJ	42,484-302-71-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	59,220-423-70-18-A	WA1ITF	210,312-1419-74-24-B	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV	87,308-598-73-23-B	K3UW	160,432-1084-74-24-B
KIWA	52,784-224-63-4-B	WA1IWA	86,284-583-74-10-A	W2WJL	99,160-670-74-22-A	W2WJL	47,580-366-68-11-B	K2DF	172,356-647-74-24-B	W2KZ	14,996-151-48-10-B	W3ZV</			

WA4GL (KD4RB, WA4S KXY, YSJ, WB3FOH, WD801 D, ops.) 145,928-986-74-24-B	AI2C/4 WADI NAM0 K41QH K4FJ W4KFC K40D WAFOA N4MM W4R9 K4RZ W4YD K4FNE W4FFP W4XD N4XD N4EBU N4DWH WB8WMB KA4IUM W4LVN W4DKQJ KC4H K404L K403L W4BZPF W4R9R N4FNMW KA1GR N3JT W4EJLJ K4UK K4K W45XK W4QAW (+K3EST)	101,032-692-73-22-B 93,980-635-74-18-B 39,040-636-70-20-B 77,964-534-73-20-B 76,650-525-73-12-B 76,464-531-72-7-B 69,856-472-74-10-B 66,528-462-72-15-A 69,860-445-74-24-B 59,640-426-70-23-B 57,084-402-71-18-B 52,824-372-71-16-A 49,034-317-71-15-A 45,824-332-66-12-B 39,652-309-64-11-B 35,136-244-72-16-A 34,968-282-67-24-A 33,400-334-50-7-B 30,464-238-64-24-A 24,400-200-62-6-B 22,680-189-60-9-A 22,444-196-57-8-B 21,012-206-51-11-B 20,976-152-69-15-B 18,422-151-61-11-B 16,830-189-59-24-A 11,808-123-48-1-A 10,952-74-74-9-B 10,656-111-48-9-B 6,636-79-42-3-A 3,834-71-27-4-A 1,900-38-25-3-A 1,216-32-19-2-A	222,740-1505-74-24-B 198,172-1339-74-23-B 122,840-830-74-24-B W4PAY (KY4K, WA4FDY, ops.) 30660-51-30-2-B WD4LYN (+K4FD) 3000-60-25-4-B	West Indies KV4FZ (WA6VEF, ops.) 327,820-2215-74-24-B WB3CZK/KV4 3080-55-28-24-A	5 Arkansas KA5FZM W4BVLG KM5S KW5GB/S W452X WJCC (+ADSM, KA40EK, KA15, KNO, KBSL, KC5ZY, N6, ARW, CMA, CMB, CGD, CQE, DEV, W5V, W5W, W5S, DV, A, GFA, HKK, LRP, W5E, BZ, LHM, M)	108,172-1039-74-17-B KMSH KBSZQ K5BJ K5GMY K5ZJ (+KKSJ, N7CW, WA4BPY) 169,944-164-73-21-A K5CM (+N5KY) 122,830-865-71-12-B KC5WZ (+KESJ) 108,184-731-74-19-B	Oklahoma WTFG KMSH KBSZQ K5BJ K5GMY K5ZJ (+KKSJ, N7CW, WA4BPY) 169,944-164-73-21-A K5CM (+N5KY) 122,830-865-71-12-B KC5WZ (+KESJ) 108,184-731-74-19-B	Southern Texas N5JJ N5DU K5WA K5RC (K5GN, opr.) KNSH W5RRR (K5GJ, opr.) N5CDD W5SWHR W5ASP K5GJO K5GB K5TM (WN4KK, opr.) W5HNS K5Z KNSA W5PAAW W5BDDI N5CME W5AABR W5SYXK K5PFE W5UFA N5RA K5DC K5TU W5DOKJ/S W5DBEP W5SG N5DQK (+K5LZ, K5LSH) K5IY (+W59K) N5X K5FU (+KUS), N5AF, W5BLV/L 170,792-1154-74-24-B K5KG (+K4AM, opr.) W5A2PRB/S (+W5ASZUP) 160,284-1083-74-18-B W5YG (W5H, K5SMU, W5S, PKN, DCL, W5JH, ops.) 36,708-266-69-21-A W5BDPWS (+K5SLVH, W5STX) 24,888-204-61-16-B	6 East Bay N6RD WA6DIL WB6ZP W5BSY W5BACR K5EH KA1JR/6 265,956-1797-74-24-B 191,660-1295-74-23-A 127,280-860-74-24-A 129,060-845-74-22-B 101,616-608-73-24-A 78,480-549-74-22-B 44,712-324-69-21-B	Los Angeles N6HC KVBI W5AN KABMVK N6AQX N6PMD W5AKS/6 K6V6 A6GRX W5GNFD N6PN K16Z W5BBJE W5PFE W5AQ5 W5UWY A18A/6 N6AA W5VIO (N6MP, W5G8W, ZP, ops.) 184,428-1111-74-24-B N6HE (+K6E8B) 118,257-799-74-23-A K16E (+K6ML) 71,568-504-71-16-B N6COG (+N6HC) 2754-51-27-1-B	Orange N6BT (N6FH, opr.) 194,324-1313-74-24-B W5UCB (K6GF, opr.) 191,844-1314-73-23-B K6G1X A6BR N6SUJ N6SUG WA6GP WA4HYF K1UP W5GFR N6DJW (+K6E5, W5GAW, ECA, FBT, FM, W6S, JBR, JBT, W5GQB) K6AA (K6NG, W5BHE, ops.) 180,664-1018-74-24-B N6BU (+K6S, KTS, RDB, K6OPX, K6DWF, W5BSKE, W5GNN) N6CH (+K6AFJ, N6CY, W5B8M) 140,156-947-74-22-B K6HRT (+N6RLH) 131,138-953-73-24-B N6EGC (+W6R11) 99,900-675-74-23-A W6ESA (+K6G0F, N6DEF, W5G8H) 61,322-446-71-24-A K6ABJ (+K6S, W5W, MRM) 48,642-363-67-24-A W5GVR (+K6AK, K5, K6BH, K6GF) N6S, CQ, LU, N6D, W6K2, 1, W6HAB) 29,210-217-69-14-A	Sacramento Valley A16V K6V6H K6S2 N6BG K6FA N6WR N6EZN N6JM W6BRV 200,836-1357-73-23-B 159,840-1080-74-24-B 146,816-892-74-22-B 129,648-876-74-24-B 56,684-354-74-14-B 52,998-363-73-24-A 37,936-272-69-19-A 60,890-80-43-3-B 3762-57-33-3-A	San Diego K16V K6ND A6GU W6UZY W5JKA K6EF K6X1 235,616-1582-74-24-B 229,993-155-74-23-B 109,872-763-72-10-B 29,648-216-68-10-B 14,248-137-52-12-A 618-18-18-2-A 300-19-10-2-A	San Francisco W5B6NR W6AUE K6ANP N6NF K6LRN (+W6ETK) 32,708-221-74-17-A W5BIP (+W6S, DJ, PNY) 206,904-1398-74-24-B	San Joaquin Valley W561ON K6S6W N6BZ W561TM 237,540-1605-74-24-B 180,580-1085-74-22-A 98,271-85-74-21-B 36,156-262-68-9-A	Santa Barbara K6CZ W5YAB W5X W5RLG K5NE N6BVP (+N6EY, W5ATBL) 141,912-972-73-24-A	Santa Clara Valley N6SH N6BZC N6BT (N6KB) K6GPV N6S5J K6MB K6KH K6GVW W5WZV W5G8H N6COV W5A5L K6AHDK W5G8H K6BGT K6YA (A6G, K6S, MA, YE, K6S, L7J, MPR, K6S, HX, N, K7W, W5BPA, W5BWS, W5VAL, YZ1, ops.) 161,912-1094-74-24-B W5OKK (+W5B15V) 126,096-852-74-13-A	Pacific K6HMD A6HP A6HJ K6HPU K6HJ 45,786-647-74-13-B 73,440-510-72-23-A 72,940-571-70-18-A 25,310-189-63-9-A 7-1-1-B	7 Alaska K71EH K71GJ W76Z/KL7 K71U K71/KL (+K71K) 47,468-591-74-18-B 71,576-186-88-11-A 145,566-140-52-10-B 2160-48-24-5-A 33,692-331-66-20-A	Arizona K6LL K7GM W7FGT W7ZMD W7KJ K7XN K7AHX K7K7 (K6S, KZ, LK, LN, K7LN) K7RUF (K6B7S, W5BPA, ops.) 47,336-351-68-14-B 257,116-1747-74-24-B 209,116-121-74-17-B 112,184-758-74-19-B 63,492-428-74-18-A 161,364-125-74-19-A 11,800-118-50-5-B K7AHX 285-13-11-8-A K7K7 161,364-125-74-19-A K7RUF (K6B7S, W5BPA, ops.) 47,336-351-68-14-B	Idaho K67NP K7J W61RN/7 K7JR K67GJ W7KKA K67X (+W67WIA) 74,862-547-73-7-B 49,700-380-71-11-A 45,380-419-72-19-A 42,604-247-66-6-B 9682-103-47-10-A 1678-38-22-3-A	Montana K67NP W61RN/7 K7JR K67GJ W7KKA K67X (+W67WIA) 153,624-1038-74-21-B 26,440-246-70-14-A K67SE (+K67S) 191,698-1313-73-24-B W7JYW (+K67WIA) 177,244-1214-73-23-B
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KA3GSN, low power operator, both modes from Maryland.

Larry, WB8WIM (I) and Dan, WB8GUS, at the controls of the WB8GUS multioperator station during the phone SS weekend in Michigan.

Western Pennsylvania's KA3FJM tried a little low-power cw operation in the 1981 SS.

Nevada

WA7NIN (W6GAT, opr.)
305,324-2063-74-24-B
KB7YX 81,844-553-74-15-B
WB7VVH 39,468-286-69-20-B

Oregon

WN1 227,358-1523-73-24-B
W7YAG 88,842-677-73-22-A
W7TTL 77,088-528-73-23-A

Utah

N7RH 133,644-903-74-24-A
N7SM 94,714-667-71-10-A
W7JPG 64,548-489-66-11-A

Washington

K7RI (K7SS, opr.)
288,896-1982-74-24-B
W7RM (W7WA) 255,200-1748-73-24-B

Wyoming

K1PA/D7 137,196-97-74-74-4-A
N7CZ 85,856-572-74-15-A
W7YZY 75,280-250-70-18-A

Michigan

KBLX (WA8ZDT, opr.)
72,522-1504-71-24-B
KC8EK 123,836-1107-74-24-B

K8KUH 15,912-153-62-9-B
KB8TL 15,000-150-90-9-B
K1400 141,460-61-10-A

Illinois

K9RS 231,916-1567-74-24-B
K9RF (K9GL, opr.)
22,088-1406-74-24-B

Ohio

K8ND (WB8M7, opr.)
217,412-1469-74-24-B
K8MN 204,832-1384-74-24-B

Indiana

AB7L/S (WA9WE, opr.)
132,880-235-74-24-B
W9DF 195,508-131-74-24-B

Wisconsin

W5YT (W9WL, opr.)
154,068-1041-74-24-B
K9GDF 92,460-624-71-13-B

WB8JAW (+KA8JJA) 11,988-111-54-8-A
KF8Q (+W8SKV) 7242-86-42-6-B
West Virginia
N811 217,686-1491-73-24-B

Kansas

K9ISW 151,552-1024-74-24-A
W9BVT 42,556-398-61-16-A
K9JBU 38,836-266-73-6-A

Minnesota

K9DD 152,736-1032-74-24-B
K9FRP 140,304-948-74-21-A
K9BC 38,160-920-74-23-B

British Columbia

VE7ZB 80,352-558-72-23-A
VE7YJ 23,920-182-47-2-A
VE7ZC 28,728-266-54-24-A

Yukon - N.W.T.

YV1CJ 36,920-284-65-10-A
YV1DF/YV1 (YV1S AB, BC, CC, DD, KH9WH) 132,904-898-74-21-B

WB9LAI 22,892-194-59-7-A
KB9Q 6880-80-43-6-B
KC9F 9600-100-28-3-A

Colorado

AD9Q 140,600-950-74-24-A
K9EU 140,306-961-73-21-A
KB3E 130,252-892-73-24-A

Iowa

K9LJZ 191,512-1294-74-24-B
N9GA 189,736-1282-74-24-B
W9EWD 76,072-518-74-18-A

Kansas

K9ISW 151,552-1024-74-24-A
W9BVT 42,556-398-61-16-A
K9JBU 38,836-266-73-6-A

Minnesota

K9DD 152,736-1032-74-24-B
K9FRP 140,304-948-74-21-A
K9BC 38,160-920-74-23-B

Missouri

AB9I (KB9C, opr.)
25,264-1718-74-24-B
K4VX (KB9RC, opr.)
248,492-1679-74-24-B

Nebraska

K9SCM 175,232-1184-74-23-B
K9BQF 34,456-292-59-17-A
K9OYI 8640-96-45-7-B

North Dakota

K9M9W 159,396-1077-74-24-B
W9M9X 124,400-1027-73-23-B
K9FA 97,674-669-73-18-A

South Dakota

W9M9W 148,444-1003-74-19-B
WA9RZ 56,760-430-66-14-A
W9DCX 53,660-412-65-9-A

Maritimes - Newfoundland

VE1YX (AA2Z, opr.)
250,860-1695-74-24-B
VO1AW 4216-62-34-6-B

Quebec

VE2GBZ 25,728-201-54-12-A
VE2VA 18,560-145-64-6-A

Ontario

VK3VA/VE3 169,312-1144-74-24-B
V13GP 89,644-614-73-21-A
VE3FEA 128,400-300-67-23-B

Alberta

VE6AT 72,312-584-69-22-A
VE6YB 28,728-266-54-24-A
VE6CY 7900-90-40-7-B

Check Logs

K1DW, KA1EB, W1VD, WA1STO,
K2Q, WA2STO, WB3CW, K4DHB,
K5C, NS5C, AH6BK, W6CPE,
WB7VH, WB8CCL

Disqualifications

CW
K1NYK, W3MH, N3AL,
WB4PU, KB5U (+K1J5),
NS5AF, WB5LV, WB5WHR,
WB5XK call sign/exchange
errors: W9N call applications
WB9U - unconfirmed contacts

PHONE

KN8P - call sign/exchange
errors; KN8R - duplicates

Rules, June VHF QSO Party

This summer's June VHF QSO Party, to be held the weekend of June 12-14, will be a little different from previous years. There are a couple of rules changes made on the recommendation of the ARRL VHF/UHF Ad Hoc Committee for contesting. This committee is studying all aspects of the ARRL vhf/uhf contest program, attempting to revise it to better meet the needs and objectives of the vhf/uhf community. The changes for June are only the first step; there are more on the horizon.

The first change is under Rule 3. The single-operator entry category has been broken into two parts: multi-band entries and single-band entries. The intent of this rule is to encourage activity by stations with limited capability (e.g., only one or two vhf/uhf bands) that otherwise would not enter the contest if forced to compete in the multi-band category with stations equipped for four or more bands. Stations choosing a single-band entry class are encouraged to make as many contacts on as many other bands as possible to help bolster overall activity. Such contacts will not in any way affect a single-band entry class. A contest entrant may also choose to operate on all bands and then, after the contest is over, designate the entry as "single-band" on the particular band chosen. Likewise, a contest entrant may start the contest on one band and, because of changing propagation or other reasons, switch to another band and designate the entry as "single-band" on the band chosen.

Rule 9, Awards, has been changed to comply with the new entry classes. Awards will be issued to the top single-operator station in each ARRL section. In addition, awards will be issued to the top scorer on each band in each ARRL section if competition or effort warrants. The band winners will be taken from *all* entries in the section, multi-band and single-band, and the top scorer will earn the award. Thus, a multi-band entrant *may* win single-band achievement awards. The three-entry clause in the multioperator awards rule has been dropped, allowing the top multiop station in each section to win an award if significant effort is shown, regardless of the number of multiop entries from that section.

The other major change is under Rule 6, FM Restrictions. All contest activity on 146.52 MHz is prohibited. Stations may not conduct or solicit contest QSOs on 146.52. The intent of this rule is to protect the national calling frequency from contest monopolization, leaving it open for emergency and other communications and minimizing interference to non-contest stations. Along similar lines, soliciting contest QSOs on repeaters or repeater frequencies is prohibited. Conversely, the four-hour time limit on the use of 223.50 MHz has been *totally lifted*, thus encouraging further fm activity on that band.

Please note that these modifications project neither a pro nor con stance by the Committee regarding the contest use of the fm mode. The objective of promoting contest activity (including fm) is recognized, but so is the "unique" status of .52 requiring direct attention. The larger questions of QSO point value related to distance, and a more equitable multiplier scheme, are now being addressed by

the Committee for future implementation.

The revised entry classes make it *essential* that all contest entrants use the official ARRL summary sheets (CD-68, R482) for this contest. These forms are available for an s.a.s.e. from ARRL Hq.

These changes are on a trial basis. Please let us know how you like them, and by all means pass along suggestions for improvement. The Committee will consider all ideas on making the contest program better for you.

Rules

1) **Object:** To work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

2) **Contest period:** Begins 1900 UTC Saturday, June 12 and ends at 0600 UTC, Monday, June 14. Operate no more than 28 out of the 35 hours. Off time must be in increments of 30 minutes or more. Listening time counts as operating time.

3) Categories:

(A) Single Operator: one person performs all operating and logging functions.

(1) Multi-band.

(2) **Single-band:** Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) Multioperator. Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Name of section. Must be acknowledged by both operators for credit by either. A one-way exchange does not count.

5) Scoring:

(A) Score 1 point for 50 or 144 MHz QSOs; 2 points on 220 or 420 MHz; 3 points for higher uhf bands. Multiply the sum of these points by the total number of different ARRL sections plus different DXCC countries (*not* included in an ARRL section) worked *per band*. Note that KP4, KP2/KV4 and KG4 are in the West Indies section; KH6, KH2, etc. are in the Pacific section. Crossband QSOs do not count. Aeronautical mobile stations may not be counted for section multipliers.

(B) Stations may be worked once per band, regardless of mode. Example: W6XJ (San Diego) works A16V (San Joaquin Valley) on 50, 144 and 220 MHz. This gives W6XJ 4 points (1 + 1 + 2) and also three section multipliers. W6XJ may contact other SJV stations on these bands for contact points, but no additional section multipliers.

(C) Foreign stations may only work stations in ARRL sections, giving their country name in the exchange.

6) FM restrictions:

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted.

(B) Only these recognized simplex frequencies may be used: 144.90 to 145.10; 146.49, .55

and .58 and 147.42, .45, .48, .51, .54 and .57 MHz. This restriction prohibits use of all repeater frequencies, including 146.76 and .94. Contest entrants may not transmit on repeaters or repeater frequencies for the purpose of soliciting contacts.

(C) Use of the national calling frequency 146.52 MHz is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting contest QSOs. The intent of this rule is to protect the national calling frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

7) Miscellaneous:

(A) Fixed, portable or mobile operation under one call from one ARRL section only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(B) Only one signal per band (6, 2, 1-1/4 etc.) at any given time is permitted, regardless of mode.

(C) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least a mile).

(D) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(E) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician Class or higher using coherent radiation on transmission (e.g. laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest.

9) Awards:

(A) Single Operator

(1) Top single operator score in each ARRL section.

(2) Top single operator on each band (50, 144, 220, 432, and 1296 and up categories) in each ARRL section where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WB1FVS has the highest single-operator all-band score in the Connecticut section and his 50- and 220-MHz scores are higher than any other CT single op's, he will earn a certificate for being the single-operator section leader, *and* endorsement stickers for 50 and 220 MHz.

(B) Top multioperator score in each ARRL section where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

10) **Disqualifications:** See January *QST*, page 92.

Field Day Rules

Rules

1) **Eligibility:** Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and NWT). Foreign stations may be contacted for credit but are not eligible to compete.

2) **Object:** To work as many stations as possible and in so doing, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed upon skills and equipment developed to meet the challenge of emergency preparedness and acquaint the public with the capabilities of Amateur Radio.

3) **Dates:** June 26-27, 1982.

4) **Field Day Period:** From 1800 UTC Saturday until 2100 UTC Sunday. Class A and Class B (see below) stations who do not begin any setting-up operations at the Field Day site until 1800 UTC Saturday may operate the entire FD period of 27 hours. Others must begin their setup no earlier than 1800 UTC Friday, and may operate no more than 24 consecutive hours; i.e. once on-the-air FD operation has started it must end 24 hours from that point.

5) **Entry Categories:** Field Day entries are classified according to the maximum number of transmitted signals simultaneously on the air during the FD period, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Switching devices prohibited.

(Class A) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call sign (except when the Novice/Technician position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position (Novice bands only) without changing its basic entry classification. This station (including antennas) should be set up by Novice and Technician licensees and should use the call sign of one of the Novice/Technician operators. The Novice position may only be used for QSOs in the Novice bands and operated only by Novice/Technician operators, who must keep their own log and check sheets.

(Class B) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One- and two-person Class B entries

Send For Your FD Package

Send Hq. a 9 x 12-in. self-addressed envelope with 3 units of first-class postage for the official Field Day Entry Package. This package includes 1 Publicity Kit, 1 Field Day Summary Sheet, 1 large dupe sheet with instructions, and a check list to ensure that your entry is complete. If you require more dupe sheets, indicate in your request and affix 1 unit of additional first-class postage to your s.a.s.e. for each two additional dupe sheets requested.

W1AW Field Day Bulletin Schedule

In addition to the regular bulletin schedule detailed on page 84 of April QST, extra cw bulletins will be run at 1400 UTC (10 A.M. EDT), and extra phone bulletins at 1500 UTC (11 A.M. EDT) both Saturday and Sunday mornings.

will be listed separately in the results.

(Class C) Mobile: Stations in vehicles capable of operation while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

(Class D) Home station: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

(Class E) Home stations — emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D or E.

6) **Exchange:** Stations in any ARRL section will exchange their Field Day operating class and ARRL section (see page 8 in any QST). For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." If it turns out that you don't get all three transmitters on the air, or you get an extra one going, feel free to change your exchange to 2-A or 4-A if necessary. Foreign stations send RS(T) and QTH.

7) Miscellaneous rules:

a) Operators participating in FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated.

b) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. Family stations are exempted.

c) Each phone and each cw segment is considered as a separate band. All voice contacts are equivalent, and RTTY/ASCII is counted as cw. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. No repeater contacts.

8) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and cw

contacts count two points each. Power multipliers: If all contacts are made using a dc input power of 10 watts (20 W PEP) or less (or 5-W dc output/10-W PEP output) and if a power source other than commercial mains or motor-driven generator is used (e.g. batteries, solar cells, water-driven generators, etc.), multiply by five. If any or all contacts are made using a dc input power of 200 watts or less on cw and 400 watts PEP or less on ssb, multiply by two. Multiply by one if any or all contacts are made using an input power over 200 watts dc (400 W PEP). Batteries may be charged while in use for Class C entries only. For other classes batteries charged during the FD period must be charged from a power source independent of the commercial mains.

a) **Bonus points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

1) **100% emergency power:** 100 points per transmitter classification for 100% emergency power. All equipment and facilities at the FD site must be operated from a source independent of the commercial mains.

2) **Public relations:** 100 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (example: a shopping center). Evidence must be submitted in the form of a clipping, a memo from a bc/TV station stating that publicity was given or a copy of material that was sent to news media for publicity purposes.

3) **Message origination:** 100 points for message origination. A message must be originated by the club president or other FD leader, addressed to the SCM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the FD period, and a fully serviced copy of it must be included with the FD report. The message must be in standard ARRL message form, or no credit will be given.

4) **Message relay:** 10 points for each message received and relayed during the FD period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the FD report.

5) **Satellite QSO:** 100 points can be earned by completing at least one QSO via satellite during the FD period. The repeater provision of rule 7c is waived for satellite QSOs. A satellite station does not count as an additional transmitter. On the summary sheet show satellite QSOs as a separate "band."

6) **Natural power:** FD groups making a minimum of five QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane, grain alcohol, etc. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate

list of natural-power QSOs should be enclosed with your entry.

7) **WIAW Message:** A bonus of 100 points will be earned by copying a special ARRL FD bulletin sent over WIAW. Bulletins will be broadcast periodically over WIAW on its regularly announced frequencies just before and during FD (see chart). This message can be received directly from WIAW or by any relay method. The important concept is to "get the

message." An accurate copy of the received message should be included in your FD report.

9) **Reporting:** Entries must be postmarked by July 26, 1982. No late entries can be accepted. A complete entry consists of a summary sheet and a list of stations worked on each band/mode during FD plus bonus proof. Incomplete or illegible entries will be classified as checklogs. A copy of FD logs should be kept by your FD group but are *not* required to be

sent in unless specifically requested later by ARRL.

10) **Conditions of entry:**

a) Each entrant agrees to be bound by the provisions of this announcement, by regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

b) **Disqualifications:** Criteria for disqualifications are found on page 92 of January 1982 QST.

Rules, 1982 IARU Radiosport Championship

The Radiosport enjoys very good participation around the world, and many very hard-to-work countries are often QRV for this one. To run up a big score, you'll need to strike a balance between a large QSO total and a large multiplier total. While 10 meters doesn't have the best propagation in July and 80 and 40 meters are often very noisy with QRN, patience and good operating there will reward you with some extra multipliers.

For those not familiar with ITU zones around the world, a map of ITU zones is available from ARRL/IARU Hq. Send an s.a.s.e. or one IRC for the proper forms (including the map) early so you'll have them in time for the contest. Good luck!

Rules

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs in as many parts of the world as possible using 1.8 through 148 MHz.

3) **Date:** Second full weekend of July (July 10-11, 1982).

4) **Contest period:** 0000 UTC Saturday until 2400 UTC Sunday, with single-operator stations operating a maximum of 36 hours.

5) **Categories:**

A) **Single Operator:** Phone-only, cw-only and mixed-mode sections. One person performs all operating and logging functions. Use of spotting nets is not permitted. Off times

must be at least 30 minutes long. A guest operator must observe the limits of his license class at all times.

B) **Multioperator:** Single transmitter, mixed mode only, must remain on a band at least ten minutes at a time.

6) **Contest Exchange:** All stations send signal report and ITU zone. The *complete* exchange must be logged for each valid QSO.

7) **Valid Contact:** The same station may be worked once per frequency band. Cross-mode, cross-band and repeater QSOs do not count.

8) **QSO Points:**

A) Contacts within your ITU zone count one point.

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** ITU zones worked on each band.

10) **Scoring:** Multiply total number of QSO points by the sum of ITU zones worked on each band for the final score.

11) **Reporting:**

A) All entrants are encouraged to use forms available from IARU/ARRL Hq. (s.a.s.e. or one IRC).

B) Logs should indicate times in UTC, bands, calls, complete exchange. Multipliers and off times should be clearly marked in the log. Cross-check sheets (dupe sheets) are required if more than 500 QSOs are made.

C) Entries must be postmarked within 30 days after the contest (by August 11, 1982). Any entry received after mid-October 1982 may not be in time to be included in the printed results.

12) **Awards:** A certificate will be awarded to the high-scoring cw-only, phone-only, mixed-mode and multioperator entrant in each ARRL section, each ITU zone and each DXCC country. In addition, achievement-level awards will be issued to those making at least 250 QSOs (1000-QSO sticker also) or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each country's IARU society.

13) **Conditions of entry:**

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his licensing authority and by the decisions of the IARU/ARRL Awards Committee.

B) **Disqualifications:** An entry may be disqualified if the overall score is reduced by more than two percent. Score reduction does not include correction of arithmetic error. An entry will be disqualified if more than two percent of duplicates are left in the log, or if the log shows excessive operating time (single-operator stations). A penalty of three QSOs will be assessed for each duplicate QSO found during ARRL/IARU log checking or for each miscopied call sign. See January 1982 QST, page 92, for complete details.

Prefix/ITU Zone

A2	57	EI	27	HL, HM	44	KH1	61, 62	S9	47	UF6, UK6F/	VK0	60	YU	28	5A	38	
A3	62	EL	46	HP	11	KH6	61	SM	18	O/Q/V	V3	11	YV	12	5B, ZC	39	
A4	39	EP	40	HR	11	KJ/KH3	61	SP	28	UG6	VP2E	11	YV0	11	5H	53	
A5	41	ET	48	HS	49	KL	01	ST	48	UK6G	V2A	11	ZA	28	5N	46	
A6	39	F	27	HV	28	KM/KH4	61	SU	38	UH8	VP2V	11	ZB	37	5R	53	
A7	39	FB6Z	68	HZ, TZ	39	KP4	61	SV	28	UK8H	VP2M	11	ZD7	66	5T	46	
A9	39	FB8W	68	I, IT	28	KP8/KH5	61, 62	T2	65	UJ8, UK8	VP2K	11	ZD8	66	5U	46	
AP	41	FB8X	68	IS	28	KV/KP2	11	T32	62	UJ8	VP5	11	ZD9	66	5V	46	
BV	44	FC	28	J2	48	KW/KH9	65	TA	39	UK8J/R	VP8	16	Z2	53	5W	62	
BY 33, 42, 43, 44	FG	11	J3	11	KX	65	TF	17	47	UL7, UK7	VP8	73	ZF	11	5X	48	
C2	65	FH	53	J5	46	KY	11	TG	11	UM8	VP9	11	ZK1	62, 63	5Z	48	
C3	27	FK	56	J6	11	LA	18	TI	11	UK8M, N	VQ9	41	ZK2	62	60	48	
C5	46	FM	11	J7	11	LU	14, 16	TI9	11	UC5	VR6	63	ZL	60	6W	46	
C6	11	FO	62, 63	J8	11	LX	27	TJ	47	UK5O	VS5	54	ZM	62	6Y	11	
C9	53	FP	09	JA	45	LZ	28	TL	47	IJP2	VS6	44	ZP	14	70	39	
CE	14, 16	FR	53	JD	45	OA	12	TN	52	UK2B/P	VS9	41	ZS	57	7P	57	
CE0A	63	FS	11	JT	32, 33	OB	18	TO	52	UQ2	VS9K	39	ZS3	57	7Q	53	
CE0Z	14	FW	62	JW	18	OD	39	TR	47	UK2G/Q	VU	41	1S	50	7X	37	
CE0X	14	FY	12	JX	18	OE	28	TT	47	UR2	VU7	49	3A	27	8P	11	
CM, CO	11	G	27	JY	39	OH	18	TU	46	UK2R/T	VU7	41	3B6, 7	53	8R	12	
CN	37	GD	27	W1	08	OJ0	18	TZ	46	VE1	09	XE	10	3B8	53	8Z4	39
CP	12, 14	GI	27	W2	08	OK	28	UA, UK,	19, 20	VE2	04, 09	XF4	10	3B9	53	9A(M)	26
CR9	44	GJ	27	W3	08	ON	27	UV, UW1,	29, 30	VE3	04	XT	46	3C	47	9G	46
CT	37	GM	27	W4	08	OY, XP,	05	3, 4, 6		VE4, 5	03	XU	49	3C0	52	9H	28
CT2	38	GU	27	W5	07	OX	18	UA2, UK2F	29	VE6, 7	02, 03	XV	49	3D2	56	9J	53
CT3	38	GW	27	W6, 7	06	OZ	18	UA, UK, UV,		VE8	02, 03	XW	49	3D6	57	9K	39
CX	14	H4	51	W8, 9	08	P2	51	UW9-0	20-35	VK1, 2, 3,	04, 75	XZ	49	3V	37	9L	46
D2, 3	52	HA	28	W0	07	PJ	11	UB, UK,		5, 7	55	YA	40	3Y	47	9M6, 8	54
D4	46	HB	28	W0	07	PJ	11	UT, UY5	29	VK4, 8	55	YB	54	4S	41	9N	42
D6	53	HC	28	W0	07	PK	13, 15	UC2, UK2A/		VK6	58	YI	39	4U1TU	28	9Q	52
DJ	28	HC	12	KC4	67, 69, 70, 71, 72, 73	PK	13	C/I/L		VK	60	YJ	58	4U1UN	08	9U	52
DU	50	HC8	12	KC6	65	PK	13	O/S/W	29	VK9	60	YK	39	4W	39	9V	54
EA	37	HH	11	KC6	64	PK	13	U/S/W	29	VK9	60	YN	11	4X, 4Z	39	9X	52
EA6	37	HI	11	KG4	11	PZ	12	U/S/W	29	VK9	60	YO	28			9Y	11
EA8	36	HK	11, 12	KG6/KH2	64	S2	41	U/S/W	29	VK9	60	YS	11				
EA9	37	HK0	11, 12	KH0	64	S7	53	C/D/K	29	VK0	68						

Public Service

Conducted By Robert J. Halprin,* K1XA

The Three Seasons of January

It all started on January 2 when the National Weather Service (NWS) began telling us in Alabama of an approaching cold front pushing a broad band of severe weather ahead of it. This front had already spawned tornadoes and flash flooding in the western and mid-south states. Late on the afternoon of the third, NWS began to issue tornado and flash flood watches for the middle third of the state, as a line of thunderstorms began to enter Alabama from Mississippi. The storms contained the expected high winds and heavy rains; conditions were favorable for tornadoes. All across the state, Amateur Radio Emergency Service (ARES) groups began to bring their local nets into standby status. The section net, Alabama Emergency Net "M," was activated and liaison was established with the local nets. Contact was made with NWS, civil defense and other agencies. Everyone sat and waited for the onslaught of Mother Nature.

First came the rains. Heavy, blinding rains. Amateur Radio mobile units began to report cars stopping on the side of the road, unable to continue because the drivers couldn't see. Then, the dreaded tornado. Reports of touchdowns were picked up from police-band scanners and relayed to NWS. Warnings went out. Still more reports came in, as small to medium twisters began to slash paths across the central part of the state. On at least two occasions, a warning would be lifted for an area only to be reestablished minutes later, as a second twister would follow nearly the same path as its predecessor.

It is not known for sure how many twisters passed through Alabama that afternoon and evening. Oftentimes, at the request of NWS, amateur mobile units were dispatched to verify reports of touchdowns in remote areas.

At 11:30 P.M., as the last watches were being lifted, another small twister dropped from the sky in Chilton County. Amateurs remained on duty until the early morning hours, watching to see if anything else was going to develop. Finally, NWS radar indicated all clear for Alabama, with nothing new developing. We went home. The storms had caused considerable property damage but, thanks to early warning, very little personal injury was reported.

During the next week, Alabama's weather was like a speeded-up time-lapse photography sequence, with the seasons changing daily. One day the temperature would be in the high seventies, only to plunge into the teens within a matter of hours. During the weekend of the ninth and 10th, "ole man winter" sent the mercury dipping to all-time record lows for the state. Little did we know that he was only setting the stage for his big show to come.

On the 10th, NWS began to tell us of more trouble on the way. Heavy snow was blanketing the midwest and would soon be here. "Snow in Alabama — Ha!" NWS had already threatened us with snow several times, only to have to eat their words. On Monday, their threats became more ominous. "This

could be the worst we've ever had," they said. On Tuesday, the threats became warnings — winter storm warnings! Sleet and freezing rain were entering the state from the west and would soon be here. By mid-morning, sleet mixed with snow began to fall in the Birmingham area. As it hit the frozen ground, a treacherous film of ice began to form. The city panicked, and a mass exodus began, but too late. Motorists, trying to get home, found massive traffic jams at the base of an incline. Cars, ill-equipped to travel under these conditions, soon turned the streets into giant parking lots as the drivers abandoned them and tried to walk to safe shelter.

By mid-afternoon, the sleet became "thick rain," the ground, frozen hard, turned it into a 3-inch layer of ice. Then our troubles really began. The temperature dropped to just below the freezing mark. The thick rain began to cling to trees, power lines and telephone lines. Alabama's main timber crop is pine. Pine trees exhibit the unusual characteristic of having all of their foliage at the top. Within a couple of hours, these ice-laden trees began to bend their heavy heads toward the ground, and toward power lines and telephone lines. As the trees contacted the power, the union was marked by a brilliant shower of sparks, lighting up the crystalline sky with an eerie green flash that could be seen for miles. NWS first reported these flashes as thunderstorms, only later to retract their statement. Following the flash, subdivisions and housing complexes would be plunged into a deep, cold darkness. Before it was over, nearly a quarter of a million homes would be without power or heat. Some would not have power restored for a week.

The governor of Alabama acted quickly. He activated civil defense offices throughout the state and ordered National Guard armories open to provide shelter for stranded motorists and those without power and heat. Amateur Radio once again responded to the call. Civil defense emergency operations centers were manned, and contact was made with other agencies. During the first few hours of the storm, literally hundreds of messages were relayed via Amateur Radio for these agencies, as the telephone system began to falter under the heavy calling load.

By early Wednesday morning, the skies began to clear. The temperatures during the night, however, had dropped into the teens, cementing ole man winter's death grip on the state.

All major thoroughfares were closed to vehicles, and many secondary roads were impassable because of fallen trees and dangling power lines. High atop Shades Mountain, near Birmingham, a lone pine tree snapped at about the 30-foot level. As its top fell, it found the guy wires of the 150-foot tower that held the Birmingham Amateur Radio Club repeater, W4CUE/R, the civil defense uhf repeater, and the station antennas of W4BJG. The tower fell across W4BJG's home in a mass of twisted steel and tangled transmission lines. Within the hour, a volunteer crew of amateurs was forming, and by late afternoon, the salvageable



This is the wreckage of the tower holding the Birmingham Amateur Radio Club repeater, W4CUE/R, after a tree fell across the guy lines. WA4JUM (on the tower) was one of a crew of volunteers who put W4CUE/R back on the air. (photo courtesy of N4DMA)

parts of the tower had been re-erected, and W4CUE/R and the civil defense repeater were back on the air. Because of the shortened tower height, W4CUE/R lacked the range to cover the hilly Alabama terrain. The local net, Alabama Emergency Net "X," moved to WA4DOJ/R, with WA4CYA/R as an auxiliary input.

All over the state, vehicular traffic was at a standstill. Many life-and-death situations began to arise. Outpatients who needed daily treatment at local hospitals found that even ambulances were unable to move. Civil defense offices around the state began to put out pleas for volunteers with four-wheel-drive vehicles to transport these people. As volunteers arrived, they were paired with a ham, and Amateur Radio was used to dispatch them to where they needed to be. These vehicles were used to transport needed relief to hospital staffs and other places that had to continue to supply life services.

On Wednesday afternoon, NWS began to tell us of more trouble on the way. Heavy snow was falling in Mississippi, and it was headed our way. By late evening, the storm was moving slowly across the state, blanketing the layers of ice with four inches of snow. More trees fell, knocking out more power in areas that thought they had been spared. The four-wheel-drive volunteers and their ham partners worked throughout the night transporting families to warm shelter and hot food, and taking others in need to wherever they needed to be. During the height of the snow, the auxiliary input to WA4DOJ/R failed. Two hams, WA4JUM and the repeater owner, WA4CYA, left the safety of their homes and braved the ice-covered roads and the minus-20 wind-chill factor on Double Oak Mountain to reestablish the needed repeater coverage.

Thursday brought very little melting of the snow and ice. Most major roads remained closed, and travel on secondary roads was even

*Deputy Communications Manager, ARRL

Newsline Has New Number

In the April 1977 issue of QST (p. 50), we announced a new service for Amateur Radio — the Ham Newsline. If you are involved in a newsworthy event, phone in the details, day or night, and we will attempt to spread the word about your good deeds. The new phone number for the newsline is 203-666-1545. Be prepared to give your name, phone number, call sign and a short synopsis of your story. If you call us quickly enough and have a really good story, you may make the wire services. Let's get the publicity that you deserve and that ham radio deserves! — Peter O'Dell, KB1N

more hazardous. An army of volunteers from every walk of life worked tirelessly throughout the day and night, maintaining the necessities of life for those in need. Friday dawned, and the mercury finally began to creep above the freezing mark. Still, most major roads remained closed until late afternoon. Hams throughout the state remained on duty at EOCs and shelters until such time as the directors deemed they were no longer needed. They then went home to their families, many of which had been without heat or light since Tuesday evening.

Storms of this severity occur in Alabama only every 30 or 40 years. Our local governments are ill prepared to handle the dangerous situations these storms bring. Only because of the public spirit of hams and many others who volunteered their services was the state able to function. Many acts of near heroism and dedication beyond the call of duty will go unheralded. These acts were not done for glory or praise, but because the need was there. Alabama amateurs carried on in the tradition of a proud heritage of public service. I have heard many say that Amateur Radio operators are losing sight of why they exist. To those I say, "You should have been in Alabama during the spring, summer, and winter of January 1982." — Carl Weaks, N4DMA, ARRL section emergency coordinator, Alabama

PUBLIC SERVICE DIARY

□ Ontario, New York — January 25. A nuclear power plant, approximately 20 miles east of Rochester, was shut down and evacuated because of a leak in the generator system. The alarm system went off shortly before 9:30 A.M. when a pressure drop in the primary system was detected. An alert-level emergency was immediately declared, and shortly before 11 A.M. it was upgraded to an on-site emergency situation. Ontario County RACES was requested to establish an emergency radio communications center at the local state police troop headquarters, to assist the Monroe and Wayne County emergency operating centers in handling emergency communications during the crisis. Amateurs established and maintained communications for 17 hours before the situation was resolved. (KB2TT)

□ Auburn, New York — March 6. While driving home in the midst of a blinding blizzard, WB2IPX was flagged down by a young man whose vehicle had overturned. WB2IPX checked the other occupants' condition and then placed an urgent call over WA2QYT/R and was answered by W2ILQ and WA2REE, who notified the state police. WB2IPX stayed at the accident site until help arrived. (WB2IPX)

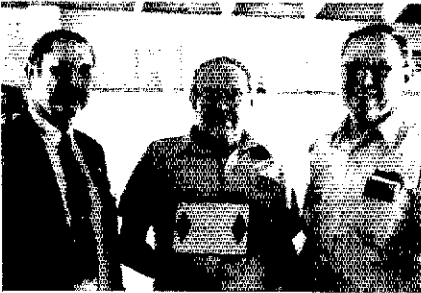
AMATEUR RADIO EMERGENCY SERVICE REPORTS

□ Oil City, Pennsylvania — January 31-February 4. Members of ARES/RACES were called upon by the Pennsylvania Emergency Management Agency of Venango County to provide assistance in monitoring Oil Creek, a tributary of the Allegheny River, for signs

of ice jamming and flooding in the Oil City area. On the morning of February 1, the worst flooding in the city's history occurred, filling the business district with water and large chunks of ice, inflicting millions of dollars worth of damage. Amateurs with mobile units and hand-held transceivers accompanied firefighters and police to provide communications for cleanup, traffic control and security against vandalism. This activity continued for three consecutive nights until the flood waters subsided. (WA3TDF, EC Venango County)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

□ For February, 40 SEC reports were received denoting a total ARES membership of 21,569. Sections reporting were: AL, AB, AZ, CO, CT, ENY, EPA, GA, IL, IN, KS, KY, ME, MI, MN, MO, NE, NH, NC, NTX, OH, OK, ON, ORG, RI, SV, SDG, SJV, SCV, SK, SC, SFL, STX, TN, UT, WV, WMA, WNY, WPA and WI.



A special plaque was presented to N5BT in recognition of his excellence in the management of the Texas Cw Net. From left: ARRL West Gulf Division Director W5EDZ, N5BT and West Gulf Vice Director N5TC. (WD5GKH photo)

REPEATER LOG

According to reports received between February 21 and March 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Public Safety	Search and Rescue	Fire	Power Failures	Drills/Alerts	Total
W1ABI									1	1
K1FFK									1	1
W1KOO									1	1
KG1O									1	1
K1TFX								1		1
W1XJ									4	4
K1ZJH									1	1
KC2CY									1	1
K2QJ									4	4
W2VL										20
WB2ZII								1		4
N3AIA									1	1
K3JSZ									3	15
W3UER									4	1
WA4BKF									1	1
NN4M									1	1
WB4QES									4	1
WA4SFW									2	4
KB5CY									1	1
W5RVT									1	1
K5XY									1	1
WD6AWP									1	14
WA6EJZ									5	5
W6IYV									5	10
W6RHC									1	3
K7CC									1	55
KC7FA									4	8
WB7TPY									1	4
W7WGW									7	9
WR8ADO										8
WR8ARF									1	5
N8ARE										1
K8DDG									1	3
WA8ULB									3	3
W9KXQ									4	5
WR0AFS									1	1
WB0CMC									1	12
W0MME									2	2
Total	12	5	6	87	8	3	64	80	6	251

NATIONAL TRAFFIC SYSTEM

WB7WOW presented WB7OEX with a Certificate of Merit for her superb performance as acting manager of RN7/c2 during WB7WOW's leave of absence. CAN/c4 certification (annual issuance in parentheses): K4QCQ (12) W9CXY (12) W9QLW (12) W0HI (12) W0AM (11) K5RG (8) W9EI (7) W4ZJY (6) W5RB (6) W0YLS (5) N5TC (4) W9JLJ (4) W5SBE (2) N5BB (2) K0SI (2) NG4J (1) N5BT (1) KB5W (1) KSTL (1).

February Reports

	1	2	3	4	5	6	7
Cycle Two							
Area Nets							
EAN	28	1611	57.5	1.033	99.4		
CAN	28	1131	40.4	.723	100.0		
PAN*	55	920	16.7	.546	98.2		
Region Nets							
1RN	56	722	12.9	.600	89.0	100.0	
2RN	56	717	12.8	.500	97.1	100.0	
3RN	28	239	8.5	.452	93.0	100.0	
4RN	56	1382	24.6	.712	85.0	100.0	
RN5	28	967	23.8	.540	95.1	100.0	
RN6	84	808	9.6	.303	76.0	98.4	
RN7	84	684	8.1	.833	100.0	96.4	
8RN	56	534	9.5	.554	74.4	100.0	
9RN	56	515	9.2	.404	100.0	100.0	
TEN	28	518	18.5	.431	79.0	100.0	
ECN							96.4
TWN	54	289	5.4	.385	58.6	96.4	
TCC							
TCC Eastern	108 ¹	640					
TCC Central	81 ¹	451					
TCC Pacific	96 ¹	575					
Cycle Four							
Area Nets							
EAN	28	2450	87.5	1.859	97.0		
CAN	28	1203	43.0	.998	100.0		
PAN	28	1480	52.9	1.432	99.4		
Region Nets							
1RN	56	961	17.2	.633	91.1	96.4	
2RN	84	1157	13.8	.725	95.7	92.9	
3RN	56	451	8.1	.587	98.8	96.4	
4RN	56	962	17.2	.632	94.1	100.0	
RN5	56	914	16.3	.629	89.5	100.0	
RN6	56	948	16.9	.513	100.0	100.0	
RN7	56	906	16.2	.992	98.5	100.0	
8RN	55	523	9.5	.500	93.0	96.4	
9RN	56	641	11.4	.637	100.0	100.0	
TEN	56	403	7.2	.445	91.7	100.0	
ECN							96.4
TWN	56	579	10.3	.503	97.5	98.2	
TCC							
TCC Eastern	113 ¹	750					
TCC Central	51 ¹	506					
TCC Pacific	107 ¹	943					
Sections ²	6178	38,148	6.2				
Summary	7602	66,328	8.7				
Record	7378	59,689	24.3				

*PAN operates both cycles one and two.

¹TCC functions not counted as net sessions.

²Section and local nets reporting (222): AENB AEND AENH AENJ AENK AENQ AENR AENV AENW ATNM (AL), ABN ACN ASN SSN (AK), ATEN HARC (AZ), NCN NCTN (CA), CN NVTN RSN WCN (CT), FAST FMSN FMTN FPON FPTN GN MEN NFPN PEN OFN QFNS SBEN SPARC SWFTN TPTN (FL), ILN (IL), ICN ITN QIN (IN), ICGN ITEN TLON (IA), KPN K5BN KWN QKS QKSSS (KS), 3ARES 5ARES 6ARES 11ARES 13ARES BARES CARN CGEN KEN KNTN KPON KRN KSN KTN KYN MKPN PAEWTN PAWN SEKEN TSTMN WARES (KY), LAN (LA), MEPN MMN MTN WRIN (MB), AEN CMEN MP5N MSN PTN SGN SP5N (ME), EM2MN EMRI EMRIPN EMRIS HHTN NEEP (MA/RI), MACS MITN MNN OMN UPN (MI), MSN MSPN MSSN MSWX (MN), MTN (MS), MNARES NCHN NE40 NE75 NE160 NMPN NSN NTTN PARC2MN PVTN WNN (NE), GSFM GSPN NHH N5SN (NH), JSARS MCN NJN NJPN NJSN NVN NWNJVN OBTN SJVN SOCTN TCETN (NJ), NSN (NV), CDRN CNYTN EPN HVN NLIPN NYS OCTEN SDN STAR WDN (NY), 4CARES CFARS CMN CN CNCTN CNR JF M2MEN PCRN RARS THEN (NC), BN BRTN COARES FRCN HCARES LCNWARES OBMN OSN OSSBN OSSN TATN (OH), OTWN (OK), KTN LN OLN OPN OSND OSNE (ON), OHARES OSN SOFMM WCN (OR), CCARES D3ARES D5SEN EPA EPEAFTN LCARES MTGARES PFN PTTN WARCVTN (PA), WVUARES (PQ), BR2MN GPD2MN LC2MN SCNTN SCSSBN Y2MN (SC), TNCW TNPN TNVN T5RN (TN), BEN DFV HATN TEX TSN TTN (TX), BUN UCN (UT).

VLN VN VNTN VSBN VSN (VA), VTN (VT), EWTN NTN
 VWSSB PSTS SCARES WARTS WSN (WA), BEN BWN
 NWTN WIN WRN WSN WSN (WI), WVFN WVHN
 WVN WVNN (WV), WTN (WV).

1 — NET
 2 — SESSIONS
 3 — TRAFFIC
 4 — AVERAGE
 5 — RATE
 6 — % REP.
 7 — % REP. TO AREA NET

Transcontinental Corps

	1	2	3	4	5
Cycle Two					
TCC Eastern	112		94.8	1284	640
TCC Central	84		96.4	715	451
TCC Pacific	112		85.7	1168	575
Summary	308		92.3	3167	1666
Cycle Four					
TCC Eastern	125		99.0	1500	750
TCC Central	56		91.1	962	506
TCC Pacific	112		95.5	1856	943
Summary	293		95.2	4318	2199

1 — AREA
 2 — FUNCTIONS
 3 — % SUCCESSFUL
 4 — TRAFFIC
 5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (February) Cycle Two — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, AH2M, K2s KIR PH, KB2HM, KO2H, N2s CER YL, W2s, CS XD ZQJ, WB2s IQJ MCO, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE1WF, VE3s GOL HTL, Central Area (W9JUU, Director) — K4VM, K44MZ, W4OGG, WD4HIF, W5c CTZ KLV TFB, N5s AMH AMK EFG, WA5EQQ, KB5TC, WB5GZU, YDD, K5s BNH KJN, W9s JUJ NXG, WB9WGD, Pacific Area (W0HXB, Director) — KV5U, KN6C, KT6A, KU6D, N6FTQ, W6JGS, WB6EIG, KF7R, W7s DZG GHT TGU VSE, WA7WQE, WB7s TQF WOV, K0DJ, KB0MB, KJ0G, N0ACW, W0s EJD HXB, W0BMTA, W00AIT, VE6CHK, Cycle Four — Eastern Area (W2CS, Director) — W1s EFW NJM QYY, K1s BA GN, N1s BHH NH, WB1CPF, W2s CS FR GKZ MTA RQ XD, N2YL, AH2M, KO2H, WA2SPL, W3s ATO FAF PQ YQ, WB3GZU, WA4U, KZ4K, N4KB, AB4V, WA4s CCK STO, WB4s PNY UHC, W8PMJ, KBJQ, N8XX, AF8V, WB8s MTD WTS YDZ, VE1WF, Central Area (W5GHP, Director) — W4s WXH ZJY, W5s RB SBE, N5s RB TC, K5s GM TL, W9s CXY NXG, WB9UYU, W0s AM HI, K0EZ, Pacific Area (K0DJ, Director) — W5KH, N6FTQ, W6s EOT OA YZT, KN6C, KT6A, K7s HLR KSA, KN7B, KD7L, W7s DZG EP GHT LYA VSE, WA7GYQ, WB7NHR, N7AKX, K0s BN DJ, KC0D, W0s HXB LQ OGH, W00AIT, VE7ZK.

Independent Nets (February 1982)

	1	2	3	4
Amateur Radio Telegraph Society	28	1047	290	
Central Gulf Coast Hurricane Clearing House	28	184	2678	
Early Bird	28	137	329	
Empire Slow Speed	28	329	1320	
Hit and Bounce Slow	28	77	356	
Hit and Bounce Traffic (MRA)	28	160	355	
Midwest RTTY	28	832	666	
Mission Trail	27	645	1270	
New England Novice	28	30	287	
New England Teleprinter	28	254	1321	
North American SSB	12	180	223	
Pico All Day Watch	158	259	2470	
Southwest Traffic	28	116	1329	
20-Meter ICSB	26	1814	435	
75-Meter ICSB	28	902	1132	
7290 Traffic	44	780	3304	

1 — NET
 2 — SESSIONS
 3 — TRAFFIC
 4 — CHECK-INS

Public Service Honor Roll February 1982

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 SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to

a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

762	108	WB1GXZ	73
KA9CPA	KA2GSL	W6NTN	W4LXB
457	N7BGY	VE3WM	W4SME
W6ASH	K3JSZ	N1NH	KA3DTE
245	107	89	KA4JGG
KZ4K	WB7DZX	KB0MB	WA4LXP
199	W2MTA	WA0TFC	W60GH
WB3GZU	K11M	N2BNB	W6CPB
193	106	KB8MX	72
KA1ON	W4NWMM	WB2IDS	WB9WGD
192	WD9ESZ	KA7JEX	KB2KW
W2AHV	WD8RHU	KA4MYZ	VE2EOD
174	WB1HHH	KS6T	WA4EYU
105	174	N7CSP	71
K5CXP	N16A	88	71
167	N2CER	K4IWW	WB2OMZ
WA7LGN	WB8SYA	KB3XO	K2HNW
163	KA1EMQ	KFBJ	WD9FRI
WB4FVV	104	N6AED	WB3HWX
K4VWK	87	WB4TZR	VE3HTL
161	103	VE2PJ	70
KA3CDQ	KT6A	KA4ASZ	N9AZI
157	KB5W	N2APB	WA2SPL
WB2MCO	W4GPL	AD7G	W1E0F
155	WD4COL	W1RWG	W6LVO
W1E0F	KA0AID	K1JHC	VE3GOL
149	WB2BNY	KA5CXW	W1KK
AA4WJ	102	86	69
147	W9DM	WB8YDZ	KA4IUM
KY4K	WA3WIY	WA4SRD	WB4NTW
146	W7VSE	W7GHT	KA5DJ
WA4PFK	101	W4OGG	W3VA
144	WD4CNQ	85	WB8PIM
KB2HM	K4EV	WA4CCK	K04PJ
N1BHH	W1UD	W9NXG	KT6D
100	KA9HPQ	KA8IWW	N3ADU
K2VX	W2XD	W2AET	KS2G
KB3LF	AK1W	W00AIT	84
WB7WOW	WB5MMI	VE2GAG	KA4ERP
141	99	K5TL	K6JFC
WD8LRT	WA4QXT	83	KC6FJ
140	98	KB3UL	KA2JMH
W2ZOJ	W00TF	N9BYK	KA1EHR
WD4ALY	AG9G	N9ATP	N2ARD
138	W2GLH	WA4EIC	KA3CDV
KA8CPS	W5TFB	WB4AID	KA2NMA
134	N6FTQ	KC55F	KA2GFU
W9JUU	W4ANK	82	KA2N
WA1TBY	97	K8OZ	67
WA2SPL	N7AMK	W5KLV	KG9B
133	W7LNE	N5TC	W8BMO
AG2R	N1ARI	81	WB2OWO
K3CR	KA4GFU	66	66
131	96	W4HON	W9HOT
NG4J	KD5P	W00UD	WB2MCO
KA2KVZ	WB8MTD	KK9N	KA8CPS
129	K1OSM	KB3UD	K4TH
WD4HIF	VE3DPO	N5BT	N2CER
126	K9BVE	W5GKH	NG4J
N1BPD	NT4S	65	W2ZOJ
125	WB2PKG	W2H2DU	KT6A
K2GCE	WA3OFD	N2BLX	WA6AUX
124	KA1BJY	N2XJ	W8MIO
WB5YDD	94	KA2GSX	K9BVE
123	KA9IKR	K3QXC	W4DVO
K4SCL	N4BZH	W8GMT	WB6EIG
W9YCV	WB8JGW	KA1TBU	WD9ESZ
121	W8HGHH	64	0
N4EDH	KA8DEZ	VE3XKB	K3JSZ
120	K7GXZ	VE3JRT	KB2HM
WB1CPF	N2CON	WB9YFY	WB2IDS
KB4WT	93	N4UF	K4SCL
119	W7EP	WB3KUZ	W2AET
KB3DT	W2BIW	N5RB	WB7WOW
WB4WYG	W9UMH	W8B1Y	WA4QXT
WD4AWN	N3CJP	63	8
W1TN	WA8QCA	W9QBH	W5TFB
115	K3JL	AK2E	KA2KVZ
AF8V	KY4U	N2BDW	WB4PNY
KV5X	92	KA4BBA	N4EFB
114	WB0QAM	WA8DHB	WD4CNR
WB2EAG	N4EEB	WA2KOJ	W0ZWL (Jan.)
KM9B	N84I	WB8QBZ	0
113	NBBQK	76	0
KC5NN	K8KQJ	KA5AZK	6522
112	KA2BHR	WB4NVO	118
KA3DLY	KN6C	WA3EHD	6545
W4WXH	WB1CGK	WDBRNQ	67
111	91	N1ALM	1343
K4JST	NW4O	N4DZV	648
K6YD	KA0CUF	W11DK	44
WA5RVT	W4CKS	WB5ELG	1391
110	WB7OGA	VE3KK	
W7FJZ	KA1T	61	
W00YH	KB5NX	75	
109	WA2ARC	W5WZ	
KC9CJ	N2AKZ	WP4AOH	
WA4JDH	90	KC0T	
AC3N	K0EZ	WA5QFD	
	WBGGX	N8AUH	
		WB7TQF	
		KA4CBM	
		74	
		WB0HOX	
		W6RNL	
		WA4PZ	
		W9QLW	
		WB5LBR	

KC4LA	45	43	KA4SAA/N
49	N8DAD/T	40	KA9GBG/N
KA2GTE/T	44	42	KA5MSP/N
48	KA5KRI/T		KA2DBD/T
KA5IWF/T			N2CPX/T

Brass Pounders League February 1982

BPL Medallions (see April 1979 QST, page 77) have been awarded to the following amateurs since last month's listing: KA1BJY WB2ICJ KA3DTE VE3HGJ N4AET WD4CNU WD4CNR WA4EIC VE4PG W4WXH AB4V KB5W N7AKX WA7LGN K8OZ W9FC.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

	1	2	3	4	5	6
W3CUL	380	4320	4216	21	8937	
W3VYR	231	1220	1379	9	2839	
N9BQP	50	1379	215	751	2393	
KA8CPA	40	1112	201	708	2061	
WA3WQP	0	935	890	13	1838	
WA2SPL	491	370	870	33	1764	
W1E0F	3	817	852	59	1731	
K8NCV	25	801	813	11	1646	
W9JUJ	10	749	734	33	1526	
W7DZX	9	747	750	11	1517	
N3ADU	1	673	651	10	1335	
WA4JDH	2	675	637	3	1317	
WA0HJZ	28	715	30	435	1208	
VE3BSY	40	606	593	8	1197	
W3ATQ	1	532	496	26	1055	
WB3GZU	73	421	407	101	1007	
WB4FVV	6	474	437	62	979	
WB8MZZ	345	151	460	4	960	
KS6T	42	418	414	46	920	
W4SIZ	9	433	425	17	884	
W0ZWL	22	371	0	427	820	
KF2T	1	404	402	3	810	
AF8V	6	396	397	17	809	
W7VSE	3	403	378	13	797	
W0ACH	28	357	383	2	770	
WA4STO	2	343	373	0	718	
WA1TBY	4	326	342	33	705	
KB3LF	19	294	327	53	692	
WD4HIF	6	321	332	33	692	
AA4WJ	5	338	300	43	686	
N4PL	9	331	317	20	676	
WA7LGN	13	303	245	105	666	
WB5YDD	5	309	277	65	656	
KZ4K	3	319	182	144	649	
WB2EAG	5	317	280	13	615	
W9HOT	29	287	282	5	603	
WB2MCO	0	312	239	51	602	
KA8CPS	46	254	228	68	596	
K4TH	9	276	189	113	587	
N2CER	1	275	278	21	575	
NG4J	21	329	201	21	572	
W2ZOJ	4	256	252	56	568	
KT6A	2	273	272	14	561	
WA6AUX	0	279	275	2	566	
W8MIO	54	221	257	20	552	
K9BVE	2	276	252	21	551	
W4DVO	4	39	473	34	550	
WB6EIG	17	264	261	3	548	
WD9ESZ	0	220	232	2	546	
K3JSZ	0	304	324	7	544	
KB2HM	19	230	251	43	543	
WB2IDS	10	249	247	30	536	
K4SCL	4	284	228	17	533	
W2AET	2	240	289	1	532	
WB7WOW	3	264	227	26	525	
WA4QXT	7	244	247	21	519	
W5TFB	8	250	247	14	519	
KA2KVZ	21	230	234	30	515	
WB4PNY	0	293	214	3	510	
N4EFB	7	171	319	5	502	
WD4CNR	0	257	244	0	501	
W0ZWL (Jan.)	0	0	517	560	1077	

Multipointer stations:

W4DUG	6522	118	6545	3	13,188
K4KDJ	1216	67	1343	30	2656
K3CR	555	144	648	44	1391

BPL for 100 or more originations plus deliveries:

WD6FEM	157
W9YCV	132
WB7RKK	128
K8UYK	112
N4EDH	110
KY4K	109
WA4HXU	108
KA7ELI	107
WD4COL	103
KA1ON	102
KA8CPS	102
W1TN	100
K6UYK (Jan.)	152

Multipointer station:

WD4HO	240
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1 — CALL
 2 — ORIG.
 3 — RCVD.
 4 — SENT
 5 — DEL.
 6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

SCM ELECTION NOTICE

To all ARRL members in the Southern Florida, North Dakota, West Indies, Oklahoma, Minnesota, Connecticut, Idaho, Western New York and Ohio sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

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

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 4, 1982.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, 1982, returns counted August 24, 1982, and SCMs elected as a result of the above procedures will take office October 1, 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October QST, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

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

John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the South Dakota section as a result of notices in the October and November QST, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning April 1, 1982:

Balloting Results: In the Sacramento Valley Section, Norman A. Wilson, N6JV, received 247 votes and Ron Menet, N6AUB, received 142 votes. Mr. Wilson is declared elected.

In the Virginia Section, Phillip Sager, WB4FDT, received 504 votes, Claude Feigley, W3ATQ, received 472 votes, A. Ray Massie, K3RZR, received 278 votes and David A. Lee, K4Y4K, received 212 votes. Mr. Sager is declared elected.

The following were elected for a two-year term of office beginning July 1, 1982:

Uncontested: East Bay — Bob Vallio, W6RGG; Illinois — David E. Lattan, WD9EBQ; Indiana — Bruce Woodward, W9UMH; Manitoba — Peter Guenther, VE4PG; Maine — Clevis O. Laverty, W1RWG; Northern Florida — Billy F. Williams, Jr., N4UF; Oregon — William R. Shrader, W7QMU; Santa Barbara — Robert N. Dyruff, W6POU; Wisconsin — Roy Pedersen, K9FHI.

WIAW NOTE

The complete WIAW summer operating schedule appears in April QST, page 84. A WIAW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of QST for times and dates of WIAW Code Proficiency Runs.

*Communications Manager, ARRL

Amateur Radio Satellite Schedule

Date (UTC)	AMSAT-OSCAR 8				Soviet RADIO 5		Soviet RADIO 6		Soviet RADIO 7		Soviet RADIO 8	
	Ref. Orbit	Time (UTC)	Long. W.	Time (UTC)	Long. W.	Time (UTC)	Long. W.	Time (UTC)	Long. W.	Time (UTC)	Long. W.	
1 May	21,170J	0028	77	0033	20	0140	38	0048	25	0013	15	
2 May	21,184J	0032	78	0028	20	0125	38	0038	24	0010	18	
3 May	21,198A	0037	80	0022	21	0109	34	0028	23	0007	17	
4 May	21,212A + J	0041	81	0017	21	0054	31	0019	22	0005	17	
5 May	21,226X	0046	82	0012	21	0038	29	0009	21	0002	19	
6 May	21,240A	0050	83	0006	21	0023	27	0159	50	0159	48	
7 May	21,254A + J	0055	84	0001	21	0008	24	0149	49	0156	50	
8 May	21,268J	0059	85	0155	52	0151	52	0139	48	0153	51	
9 May	21,282J	0104	86	0150	52	0136	50	0130	47	0150	52	
10 May	21,296A	0108	88	0144	52	0120	47	0120	46	0147	52	
11 May	21,310A + J	0112	89	0139	52	0105	45	0110	46	0145	53	
12 May	21,324X	0117	90	0134	52	0049	43	0101	45	0142	54	
13 May	21,338A	0121	91	0128	53	0034	40	0051	44	0139	55	
14 May	21,352A + J	0126	92	0123	53	0019	38	0041	43	0138	58	
15 May	21,366J	0130	93	0118	53	0003	36	0032	42	0133	57	
16 May	21,380J	0135	94	0112	53	0147	63	0022	41	0130	57	
17 May	21,394A	0139	96	0107	53	0131	61	0013	40	0128	58	
18 May	21,407A + J	0000	71	0102	53	0116	59	0003	39	0125	59	
19 May	21,421X	0005	72	0056	54	0100	56	0152	58	0122	60	
20 May	21,435A	0009	73	0051	54	0045	54	0143	58	0119	61	
21 May	21,449A + J	0014	74	0046	54	0030	52	0133	57	0116	61	
22 May	21,463J	0018	76	0040	54	0014	49	0124	56	0113	62	
23 May	21,477J	0022	77	0035	54	0158	77	0114	65	0111	63	
24 May	21,491A	0027	78	0030	55	0142	74	0104	64	0108	64	
25 May	21,505A + J	0031	79	0024	55	0127	72	0055	63	0105	65	
26 May	21,519X	0036	80	0019	55	0111	70	0045	62	0102	66	
27 May	21,533A	0040	81	0014	55	0056	67	0035	61	0059	68	
28 May	21,547A + J	0045	82	0008	55	0041	65	0026	60	0056	67	
29 May	21,561J	0049	83	0003	56	0025	63	0016	60	0054	68	
30 May	21,575J	0054	85	0157	88	0010	60	0008	59	0051	69	
31 May	21,589A	0058	86	0152	88	0153	88	0156	88	0048	70	
1 June	21,603A + J	0102	87	0147	88	0138	86	0146	87	0045	70	
2 June	21,617X	0107	88	0141	86	0122	83	0137	86	0042	71	
3 June	21,631A	0111	89	0136	87	0107	81	0127	85	0039	72	
4 June	21,645A + J	0116	90	0131	87	0052	79	0117	84	0037	73	
5 June	21,659J	0120	91	0125	87	0036	76	0108	83	0034	74	
6 June	21,673J	0125	93	0120	87	0021	74	0058	82	0031	74	
7 June	21,687A	0129	94	0115	87	0005	72	0049	81	0028	75	

Orbit predictions by K1HTV, KA1GD and W9KDR. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or the AMSAT nets. Tuesday — East Coast and Mid States at 9 P.M. and West Coast at 8 P.M. local time on 3850 kHz. Saturday — International at 2200 UTC on 28,878 kHz. Sunday — International at 1800 UTC on 21,280 kHz and 1900 UTC on 14,282 kHz. OSCAR 9 orbits are no longer listed — because of its low altitude, long-range predictions are not always accurate. Use W1AW and AMSAT Bulletins for weekly updates. 08 modes of operation are Monday and Thursday — Mode A, Tuesday and Friday — Modes A + J. Wednesday is reserved for authorized experiments or recharge of the batteries. Do not operate through the OSCAR or RADIO satellites on Wednesday UTC. Do not use more power than is needed to operate through the OSCAR or RADIO satellites. Your downlink signal should never be stronger than the satellite's telemetry beacon. Reduce your uplink power to prevent overload causing 10 dB attenuation of received signals. Advise operators whose signals are stronger than the telemetry beacons.

Exact orbit numbers have not been determined for the Radio satellites.

Satellite	Period (min.)	Increment (deg.)	Inclination (deg.)	Height (km)
OSCAR 8	103.1741	25.7957	98.79	919
RADIO 5	119.5555	30.0157	82.95	1682
RADIO 6	118.7174	29.8061	82.95	1632
RADIO 7	119.1968	29.9260	82.94	1654
RADIO 8	119.7640	30.0679	82.95	1681

RADIO 3 and RADIO 4 orbital data will not be listed because these satellites are for Soviet experiments. QSLs and telemetry reports should be sent to Box 88, Moscow.

Spacecraft Frequencies

	Uplink	Downlink	Beacon
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz
RADIO 5	145.910-145.950 MHz	29.410-29.450 MHz	29.330/450 MHz
RADIO 6	145.910-145.950 MHz	29.410-29.450 MHz	29.410/450 MHz
RADIO 7	145.960-146.000 MHz	29.460-29.500 MHz	29.340/500 MHz
RADIO 8	145.960-146.000 MHz	29.460-29.500 MHz	29.460/500 MHz
RADIO 5 ROBOT	145.826 MHz	29.331 MHz	
RADIO 7 ROBOT	145.835 MHz	29.341 MHz	

RADIO 3 and RADIO 4 are for experiments only to be announced by USSR.

OSCAR 9

Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry. Interspersed with a carrier or continuous carrier.

Vhf Beacon — 145.825 MHz nbfm ± 5 kHz. ASCII, Baudot, voice, afsk and Morse.

Uhf Beacon — 435.025 MHz nbfm ± 5 kHz. ASCII, Baudot, voice, afsk and Morse.

S-Band Beacon — 2401.0-MHz nbfm ± 10 kHz. ASCII, Baudot, voice, afsk and Morse.

X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use Ithcp.

Mode J Club: Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with \$3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXX, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL: To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with s.a.s.e., to ARRL Hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The all-new OSCARLOCATOR package is now available: \$7 U.S., \$8 elsewhere.

Special Events

Conducted By Mark Wilson,* AA2Z

Knoxville, Tennessee: Tennessee Wireless Assn. will operate a station at the World's Fair from *May through October*. The station will operate all modes on 160-2 meters. Guest ops welcome. For details, contact: Jerry Goodchild, K4DZR, 3701 Warner Dr., Apt. 213, Knoxville, TN 37912.

Hastings, Nebraska: Hastings ARC will operate W0WWW from Red Cloud, the birthplace of Willa Cather, *1400-2359Z May 1*. Frequencies: phone — 3.982 7.282 14.300 21.395; cw — 7.125. Special QSL card for s.a.s.e. to: P.O. Box 128, Hastings, NE 68901.

Talladega, Alabama: Calhoun Co. ARA will operate NN4R *1300-0000Z May 1 and 2* during the Winston 500 NASCAR race. Frequencies: phone — 3.965 7.280 14.280 21.380 28.580. Certificate for large s.a.s.e. to: P.O. Box 1624, Anniston, AL 36202.

Killeen, Texas: KA5ACT will operate from *May 1-15* to mark the centennial of the home of Fort Hood. Frequencies: 28.730 on Sat., Sun., Mon.; 21.410 after 0000Z Tues.-Fri. Special QSL for s.a.s.e. to: KA5ACT, 1212 Bonnie Dr., Killeen, TX 76541.

Louisville, Kentucky: Amateur Radio Transmitting Soc. will operate W4CN to commemorate the 1982 Kentucky Derby from *2200Z May 7* until *0400Z May 8* and *1400-2330Z May 8*. Frequencies: phone — 7.240 14.285 28.700 147.72/12; cw — 21.045. Certificate for large s.a.s.e. to: P.O. Box 7391, Louisville, KY 40207.

Cape Canaveral, Florida: Indian River ARC will operate W4NLX/4 completely from solar power during the Sun Day exercise at the Florida Solar Energy Center from *1300-1400Z and 1400-2000Z May 7 and 8*. First hour 7.250-7.275; second operating period 21.350-21.375 MHz. Certificate for large s.a.s.e. to: Sun Day, 300 State Route 401, Cape Canaveral, FL 32920.

Hackensack, New Jersey: Meadowlands ARA will operate N2BMN from the *USS Ling* from *1500-2100Z May 8*. Frequencies: phone — 7.250 14.310 28.650 144.100; Novice — 7.115 28.110. Certificate for large s.a.s.e. to: 154 Redneck Ave., Little Ferry, NJ 07643.

Fairfield, Connecticut: Greater Fairfield ARA will operate WB1CQO from the Dogwood Festival from *1300-2200Z May 8*. Frequencies: phone — 3.975 7.235 14.330 21.420 28.710 146.55. Special QSL for s.a.s.e. to: 248 Euclid Ave., Fairfield, CT 06432.

Lakehurst, New Jersey: Lakehurst Amateur Radio Operators will operate N2CIW starting at *1400Z May 8* to mark the 45th anniversary of the crash of the *Hindenburg*. Operation in the General-class subbands 80-10 meters. Certificate for large s.a.s.e. to: 25 Fays Lane, Lakehurst, NJ 08733.

Holland, Michigan: Holland ARC will operate K8DAA and other stations from *May 12-16* to celebrate the Netherlands-American Bicentennial. Operation in 80-10 meter phone bands; possible cw operation. Certificate for contact with K8DAA or two other participating stations. QSL with large s.a.s.e. to: HARC, P.O. Box 92, Zeeland, MI 49464.

Outer Banks, North Carolina: Rockingham Co. ARC will operate W4JF from the Cape Hatteras Lighthouse, the tallest brick lighthouse in the country, on *May 15 and 16*. Frequencies: 30 kHz up from 80-10 meter General-class phone and cw segments. QSL via W4JF Callbook address.

Chehalis, Washington: Chehalis Valley ARS will operate KA7EOV to commemorate the Mt. St. Helens eruption. Frequencies: phone — 3.955 14.305 21.405

28.605; cw — 7.135 21.120. Certificate for large s.a.s.e. (include contact number) to: CVARS, P.O. Box 775, Chehalis, WA 98532.

Madison, Wisconsin: Four Lakes ARC members will operate from *0000Z May 15* until *2400Z May 16* to contact amateurs interested in earning the FLARC award. Exchange signal report, name and state. Frequencies: phone in the General subbands; cw in the General and Novice subbands. Certificate for contacts with 10 FLARC members (DX stations need 5 contacts). Send log info and large s.a.s.e. to: WB9NOV, 23 Walworth Court, Madison, WI 53705.

Timbuctoo, California: Yuba-Sutter ARC will operate N6DDP from this historical Gold Rush town from *1700Z May 15* until *0100Z May 16*. Frequencies: phone — 14.310 28.620; cw — 21.150. Special QSL for s.a.s.e. to: Y-S ARC, P.O. Box 1169, Yuba City, CA 95992.

Yakima, Washington: Yakima ARC will operate W7AQ from *1800Z May 16* until *0200Z May 17* to commemorate the second anniversary of the Mt. St. Helens eruption. Frequencies: phone — 25 kHz up from lower General-class band edge; cw — 25 kHz up from lower Novice band edge and 14.050. Special QSL for s.a.s.e. to: YARC, P.O. Box 9211, Yakima, WA 98909.

Bath, Michigan: WD8OEV will operate from *1500-2400Z May 18* from the site of the Bath School Disaster of 1927. Frequencies: phone — 7.240 the first 40 mins. of each hour; 28.590 the last 20 mins. of each hour. QSL with s.a.s.e. to: 5220 Clark Road, Bath, MI 48808.

Molokai, Hawaii: Maui ARC will operate from the leper colony here, located in the rarest U.S. county, from *0300Z May 21* until *2400Z May 23*. Frequencies 10-15 kHz above ssb county hunter's nets, 20-10 meters. Some cw and 40/80 meter operation planned. QSL via KM7Z.

Montrose, Colorado: Montrose ARC will operate W0INS and KJ0G from *0000Z May 21* until *2400Z May 22* during the centennial celebration. Frequencies: phone — 7.250 14.300 21.375; cw — 7.050 14.050 21.050. Special certificate for large s.a.s.e. to: W0INS, P.O. Box 703, Montrose, CO 81401.

Golden Valley, Minnesota: WB0EQO will be active from Camp Courage during the annual Handi-Ham May Convocation on *May 22*. Frequencies: General-class phone bands 80-10 meters. Certificates to the first 200 stations. Send large s.a.s.e. to: 3915 Golden Valley Rd., Golden Valley, MN 55422.

Groton, Connecticut: Tri-City, SCRAMS and RASON radio clubs will operate WB1CPF, KA1BB and N1ANY aboard the *USS Croaker* from *1400Z May 22* until *0200Z May 23* and *1400Z May 23* until *0200Z May 24* to celebrate the submarine's 39th birthday. Operation on 80-15 meter phone and cw within 50 kHz of lower General-class band edge. Special QSL for s.a.s.e. to: P.O. Box 686, Groton, CT 06340.

Vancouver, Washington: Clark Co. ARC will operate W7AIA from *0001Z May 22* until *2359Z May 23* to mark the second anniversary of the Mt. St. Helens eruption. Frequencies: phone — 3.895 7.230 14.280 21.360 28.505; cw — 3.705 7.105 21.105 28.105. Certificates available from: CCARC, P.O. Box 1424, Vancouver, WA 98668.

Philadelphia, Pennsylvania: Cruiser Olympia Assn. will operate from the cruiser, Admiral Dewey's flagship of 1898, from *1300Z May 22* until *2000Z May 23*. Frequencies: phone — 3.890 7.235 14.285 21.360 28.600; cw — 3.590 7.050 14.050 21.090 28.150. Some Novice and vhf operation also planned. Certificate for 2 units of first-class postage to: Olympia ARC, P.O.

Box 928, Philadelphia, PA 19105.

Memphis, Tennessee: Memphis Radio Relay Club will operate from *1200-2000Z May 22* and *1200-1800Z May 23* during the 6th annual Memphis in May festival. Frequencies: phone — 7.280 14.305 21.400 28.650 146.52; cw — 7.125 14.180. Certificate for large s.a.s.e. to: N4ERU, 2071 Victoria, Memphis, TN 38116.

Seattle, Washington: Offshore Radio Cruising Assn. will hold a marine mobile field day from *1700-2100Z May 23*. First hour cw on 21.100-21.200; remaining time phone on 21.350-21.450. Certificate for 3 contacts with club members (2 for Novices) and large s.a.s.e. to: KA7GJB, P.O. Box 17385, Seattle, WA 98107.

Little Rock, Arkansas: Metropolitan ARC will operate WB5HXX from the annual Riverfest from *1800-0400Z May 28-30*. Operation in General-class phone bands and Novice cw bands. Special QSL for s.a.s.e. to: MARC, P.O. Box 9050, Little Rock, AR 72219.

Billings, Montana: Yellowstone RC will operate K7EFA from *1500-0300Z May 29-31* to celebrate the city's centennial. Frequencies: phone — 3.950 7.260 14.330 21.330 28.650; cw — 3.650 7.110 14.150 21.225 28.225; Novice — 3.725 7.125 21.150 28.150. Certificate available from: YRC, 640 N. 15th #3, Billings, MT 59101.

New River Gorge, West Virginia: Tri-County Ham Radio Club will operate W8WVA from the site of the world's longest steel-arch bridge from *1400Z May 29* until *1400Z May 30*. Operation on all hf bands, cw and phone. Certificate for large s.a.s.e. to: Box 764, St. Albans, WV 25177.

Neffs, Ohio: Neffs Area Amateurs will operate WBRTQG, the smallest ham shack in the city, from *1600Z May 29* until *2200Z May 30*. Frequencies: phone — 3.965 7.265 14.340 21.410 28.610 146.46; cw — 20 kHz up from lower Novice band edge. Certificate for large s.a.s.e. to: P.O. Box E, Neffs, OH 43940.

Cary, North Carolina: Cary ARC will operate NB4L from the Cape Hatteras lighthouse from *1300Z May 29* until *1600Z May 30*. Frequencies: phone — 3.988 7.288 14.288 21.388 28.588; cw — 3.552 7.052 14.052 21.052 28.052. Certificate for large s.a.s.e. to: 304 Atchison St., Garner, NC 27529.

Port Jervis, New York: Orange Co. ARC will operate WB2TSA to celebrate the club's 10th anniversary and the city's diamond jubilee from *1400-2200Z May 29* and *1400-2000Z May 30*. Frequencies: 10 kHz up from lower General-class phone band edge. QSL to: P.O. Box 434, Cornwall-on-Hudson, NY 12520.

Bishop, California: Bishop ARC will operate KA6AMT from the mule capitol of the world on *May 31* during the annual Mule Days celebration. Frequencies: phone — 3.905 7.240 14.295 146.34/94. Certificate for large s.a.s.e. to: BARC, P.O. Box 1024, Bishop, CA 93514.

Cleveland, Ohio: Northern Ohio ARS will operate K8KRQ from the *USS Cod* each weekend *May 29-Sept. 5*. Operation in the lower part of the 80-10 meter General-class subbands. Certificate for 3 units of first-class postage to WD8RZG.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by June 15 to make the August issue.

*Assistant Communications Manager, ARRL

Strays

TALK ON LOCAL NETWORKS TO BE AIRED

□ Another in the series of experimental programs linking the NY-NJ-CT metropolitan on 2-meter fm is scheduled for May 12 at 8:30 P.M. Robert Barden, president of Broadband Systems, Inc., of Holbrook,

New York, will discuss current trends in Local Area Networks (LANs) on the IEEE/LIMARC Technical Network on 147.375 MHz. The net will suspend operation during the summer months.

For more information, contact Ed Piller, W2KQPQ, net control, at 516-349-3530.

FIELD DAY '82 SLIDE SHOW

□ While making up the list of equipment and materials for your Field Day expedition, why not include a 35-mm camera and some color slides? The

ARRL Club and Training Department would like to assemble a new slide show, "Field Day 1982." We would like to include scenes from many different locations so hams in New York, for instance, can see what Field Day is like in Arkansas and vice versa. Pick out your best shots, include a brief description, anecdote, or soapbox for each slide (give call signs where they apply), and submit them to the ARRL Club and Training Department for possible inclusion in the new slide show. We will acknowledge receipt of your slides with a post card and we will return them whether they are used in the show or not. — Karl Townsend, Film Librarian, ARRL

Contest Corral

A Roundup of Upcoming Operating Events



Conducted By Mark Wilson,* AA2Z

MAY

1-2

ARRL EME Contest, part 2, March QST, page 82.

10-Meter RTTY Contest, April QST, page 86.

County Hunters SSB Contest, April QST, page 86.

Georgia QSO Party, April QST, page 86.

Seville World Wide Contest, April QST, page 86.

5

West Coast Qualifying Run, 10-35 wpm at 0400Z May 6 (9 P.M. PDT May 5). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

8-9

World Telecommunications Day Contest, phone, sponsored by Liga Amadores Brasileiros De Radio Emissao (LABRE), from 0000-2400Z May 8 (cw 0000-2400Z May 15). 80-10 meters. Single and multioperator/club categories. Work stations once per band. Exchange signal report and ITU zone. Contact your own country for zone credit, no QSO points. Count one point for same zone, different country; three points for different zone, same continent; five points for different zone, different continent QSOs. Multiply by total ITU zones worked (not per band). Mail by June 30 (include s.a.e. and 5 IRCs for results) to: LABRE, UIT Contest Unit, P.O. Box 07-0004, 70,000 Brasilia, DF, Brazil.

10

W1AW Qualifying Run, 10-35 wpm at 0200Z May 11 (10 P.M. EDT May 10). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See May 5 listing for more details.

15-16

Armed Forces Day. This year marks the 33rd anniversary of communications tests between the Amateur Radio fraternity and the military communications system. Special commemorative QSL cards will be awarded to amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Those who receive and accurately copy the Armed Forces Day cw and/or RTTY message from the Secretary of Defense will receive a special commemorative certificate.

Crossband Radio Contacts. The military-to-amateur crossband operations will be conducted from 1300Z May 15 until 0245Z May 16. Military stations will transmit on military frequencies and indicate which part of the amateur band he/she is receiving on. Limit contacts to 3 minutes. The following stations will be active: NAV, HQ Navy-Marine Corps MARS station, Cheltenham, MD: (RTTY) transmit 7385 kHz, receive 7090-7100 kHz; (SSTV) transmit 13,975.5 kHz, receive 14,225-14,250 kHz, NMF, USCG station, Alexandria, VA: (cw) tx 4040, rx 3500-3650 kHz; (lsb) tx 7346.5, rx 7150-7300 kHz; (RTTY) tx 14,440, rx 14,080-14,100 kHz; (usb) tx 20,937.5, rx 21,270-21,450 kHz. NPG, U.S. Naval Comm. Stn., Stockton, CA: (lsb) tx 4008.5, rx 3800-4000 kHz; (cw) tx 4010, rx 3650-3750 kHz; (cw) tx 6970, rx 7025-7150 kHz; (lsb) tx 7301.5, rx 7250-7300 kHz; (cw) tx 7365, rx 7025-7150 kHz; (RTTY) tx 13,827.5, rx 14,080-14,100 kHz; (cw) tx 13,927.5, rx 14,025-14,075 kHz; (usb) tx 14,470, rx 14,200-14,350 kHz; (cw) tx 20,950, rx 21,000-21,200 kHz; (usb) tx 20,998.5, rx 21,360-21,450 kHz. NPL, U.S. Naval Comm. Stn., San Diego, CA: (RTTY) tx 7380, rx 7090-7100 kHz; (SSTV) from 1600-2400Z, tx 14,385, rx 14,225-14,250 kHz. NZJ, Marine Corps Air Stn., El Toro, CA: (RTTY) tx 7375, rx 7090-7100 kHz; (usb) tx 14,480, rx 14,275-14,350 kHz. AIR, 2045th Comm. Group, Andrews AFB, Washington, DC: (lsb) tx 4025, rx 3800-4000 kHz; (cw) tx 6995.5, rx

7025-7150 kHz; (lsb) tx 7313.5, rx 7225-7300 kHz; (cw) tx 13,997.5, rx 14,025-14,075 kHz; (usb) tx 14,390.5, rx 14,275-14,350 kHz. WAR, Hq., U.S. Army, Washington, DC: (lsb) tx 4018.5, rx 3775-4000 kHz; (cw) tx 6997.5, rx 7000-7150 kHz; (RTTY) tx 14,403.5, rx 14,080-14,100 kHz from 1300-1500, 1900-2100 and 0100-0300Z; (cw) tx 14,403.5, rx 14,025-14,075 kHz from 1500-1700 and 2100-2300Z; (usb) tx 14,403.5, rx 14,200-14,350 kHz from 1700-1900 and 2300-0100Z; (usb) tx 20,995.5, rx 21,270-21,450 kHz.

Cw Receiving Test. Conducted at 25 wpm. The text will be a special Armed Forces Day Message from the Secretary of Defense. A 10-minute callup will start at 0300Z May 16, followed by the text at 0310Z. The following stations will transmit the message on the indicated frequencies: NAM, U.S. Naval Comm. Area Master Stn., Norfolk, VA: 4005, 7645, 14,400 kHz; NPG, U.S. Naval Comm. Stn., Stockton, CA: 4010, 7365, 13,927.5 kHz; NAV, Hq. Navy-Marine Corps MARS Stn., Cheltenham, MD: 7385, 13,975.5 kHz; WAR, U.S. Army Radio Stn., Fort Meade, MD: 4030, 6997.5, 14,403.5 kHz; AIR, 2045th Comm. Group, Andrews AFB, Washington, DC: 6995.5, 13,997.5 kHz.

RTTY Receiving Test. Transmitted at 60 wpm. AIR will use 850-Hz shift; all others will use 170-Hz shift. A 10-minute callup will begin at 0335Z May 16, followed by the text at 0345Z. Stations and frequencies are the same as for the cw test (see above).

Submit cw and RTTY test messages as received. Include time, frequency and call letters of the military station copied. On the same page as the message text, include your name, call sign and full mailing address. Entries must be postmarked no later than May 22. Stations copying NAM, NAV or NPG submit to: Armed Forces Day Test, HQ, Navy-Marine Corps MARS, 4401 Massachusetts Ave., NW, Washington, DC 20390. WAR entries go to: Armed Forces Day Test, Commander, 7th Signal Command, ATTN: CCN-PO-OR, Fort Ritchie, MD 21719. AIR entries go to: Armed Forces Day Test, 2045th CG/DONJIM, Andrews AFB, DC 20331.

Florida QSO Party, sponsored by Florida Skip, from 1400-1900Z May 15 and 0001-0500Z and 1500-2300Z May 16. Separate phone and cw contests. Two entry classes for FL stations: (A) portable or mobile using emergency power running 200 W or less outside home county, (B) everybody else. Keep separate phone and cw logs. Work stations once per band and mode. No crossmode or crossband contacts. FL to FL QSOs for QSO point credit only. Exchange signal report and QTH (county for FL stations; state, province or country for others). Suggested frequencies: phone — 3.945 7.279 14.319 21.379 28.579 50.200 146.52; cw — 55 kHz up from lower band edge. FL stations count one point per QSO. Multiply by sum of states (49 max., not incl. FL), provinces (12 max.) and DX countries (27 max.). Max. multiplier 88. Others count 2 points per FL QSO and multiply by total FL counties worked (max. 67). FL class A stations multiply score by 1.5. Mail entries by June 17 (include large s.a.s.e. for results) to: Florida Skip Contest Committee, P.O. Box 501, Miami Springs, FL 33166.

Michigan QSO Party, sponsored by the Oak Park ARC, from 1800Z May 15 until 0300Z May 16 and 1100Z May 16 until 0200Z May 17. Phone and cw. Work stations once per band and mode. Work mobiles/portables again as they change county. Exchange signal report, serial number and QTH (county for MI stations; state or country for others). Count 1 point per phone QSO, 2 points per cw QSO. MI stations multiply by total of states, countries and MI counties. KH6 and KL7 count as states, VE as a country. Max. multiplier 85. Others multiply by MI counties worked (max. 83). VHF-only entries may add multiplier per band for total; no repeater QSOs; 5 points per OSCAR QSO. All stations count 5 points per contact with W8MB. Suggested frequencies: phone — 3.905 7.280 14.280 21.380 28.580 50.125 145.025; cw — 1.810 3.540 7.035 14.035 21.035 28.035; Novice — 3.725 7.125 21.125 28.125. Mail logs by June 30 (include large s.a.s.e. for results) to: Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

World Telecommunications Day Contest, cw, see May 8 listing.

23-24

Rocky Mountain QSO Party, sponsored by the

Arapahoe RC, from 1800Z May 23 until 2400Z May 24. States in the Rocky Mountain (RM) Division are: Colorado, New Mexico, Utah and Wyoming. Non-RM stations work RM stations only. Work stations once per band and mode. Work mobiles again as they change county. No repeater contacts. Try phone on odd hours Z, and cw on even hours. Exchange signal report and state, province or country. RM stations also send county. Suggested frequencies: phone — 3.900 7.270 14.300 21.370 28.570; cw — 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count 1 point per phone QSO, 2 points per cw QSO. RM stations multiply by total states, provinces and RM counties worked. Others multiply by total RM states and RM counties worked. Mail logs within 30 days to: Dan Broadbooks, KB0YU, 1027 South Tennyson, Denver, CO 80219.

27

W1AW Qualifying Run, 10-35 wpm at 2000Z (4 P.M. EDT). See May 10 listing for more details.

29-30

CQ WW WPX Contest, cw, March QST, page 88.

Ibero-American Contest, sponsored by the Union de Radioaficionados Espanoles (U.R.E.), from 2000Z May 29 until 2000Z May 30. 160-10 meters, phone only. Work stations once per band. Exchange signal report and serial number. Work the following Iberoamerican countries: CE CO CP CR CT C9 CX C31 DU EA HC HI HK HP KP4 LU OA PY TG TI XE YN YV ZP 3C. Count 1 point per QSO, multiply by sum of Iberoamerican countries worked per band. Mail logs by July 15 to: URE, Box 62, Mollet del Valles, Spain.

JUNE

1

West Coast Qualifying Run, 10-35 wpm, at 0400Z June 2 (9 P.M. PDT June 1). See May 5 listing for more details.

5-6

New York State QSO Party, sponsored by SUNY-Buffalo, from 1300Z June 5 until 0100Z June 6. Work stations once per band. Count 5 points per QSO (mobiles count 10 points per QSO). NY stations multiply by total states, provinces and countries worked. Others multiply by total NY counties worked. Exchange signal report and QTH (county for NY stations; state, province or country for others). Mail logs within 30 days (include large s.a.s.e. for results) to: Scott Bauer, WA2LCC, 816 East Fillmore Av., East Aurora, NY 14052.

8

W1AW Qualifying Run, 10-40 wpm, at 0200Z June 9 (10 P.M. EDT June 8). See May 10 listing for more details.

12-13

ARRL June VHF QSO Party, this issue, page 80.

World Wide South America CW Contest, sponsored by *Electronica Popular Magazine*, from 1500Z June 12 until 1500Z June 13. 80-10 meters, cw only. Single-operator multi band or single band; multioperator single-transmitter classes. No crossband contacts. South American stations contact stations in other continents. Exchange signal report and serial number starting with 001. Contact stations once per band. Count 2 points per SA QSO and multiply by the number of SA prefixes worked per band. Mail logs by July 31 to: WWSA Manager, P.O. Box 18003, 20772 Rio de Janeiro, RJ, Brazil.

19-20

Summer SMIRK Party

All Asian Contest, phone

22

W1AW Qualifying Run

26-27

ARRL Field Day, this issue, page 81.

*Assistant Communications Manager, ARRL

Section Activities

A-1 OPR X EC X DXCC X RCC X WAS X STM X OES X ORS X NM
 SCM X ARES X OVS X SEC X OBS X TCC X OO X NTS X WAC X CP X

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SEC: VE6XC. ASCM: VE6AMM, STM, NM-ATN, ANM-APNS: VE6ABC. The AARCS (ARES) net for Alberta has finally accomplished one of its aims and that is to encourage local ADS directors to use our radio net to communicate with ADS Hqs. VE6BHC, an ADS director at Barrhead, spoke over Elsie's station, VE6YV to Hqs via a patch through VE6ABC. To encourage the timid directors, it is suggested that hams get these people to visit the shack and just listen as we have planned more of the same. Traffic: VE6CHK 141, VE6ABC 24, VE6XC 6.

BRITISH COLUMBIA: SCM: H. E. Savage, VE7FB — British Columbia Public Service net 3755 kHz again reports active month. High 193, low 115, total 4553. VE7AGL is in hospital; fell down. VE7HW spending some time in Vancouver for medical. VE7ZK received FB certificate from the IARU annual DX contest. Nice to see VE3CJ's signature on it. Dogwoods QGWA breakfasts end of month saw 35 OMs and XYLs out. Traffic: VE7ZK 102, VE7FB 89, VE7COA 22, VE7BLO 18, VE7CDF 12, VE7BNI 6.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: JP. STM: RO. SEC: HK. NMS: VJ. NM: VE4CX. We regret the passing of VE4IF and VE4AC. VE4HK will be buried this month with an extra SET. Both VE4ACX and VE4AJE have been very active on the nets, and we can all use some of their energy. MFPN QNI 496, QTC 49, sess 28. MTN QNI 225, QTC 111, sess 28. MMN QNI 446, QTC 32, sess 28. WRIN QNI 258, QTC nil, sess 8. Traffic: VE4ACX 124, VE4AJE 77, VE4RO 66, VE4PG 43, VE4ALX 40, VE4JA 40, VE4TE 26, VE4AAD 13, VE4FK 13, VE4AEJ 9, VE4LB 7, VE4AAT 5, VE4NE 5, VE4AAU 4, VE4AFO 4, VE4B 4, VE4T 4, VE4EE 3, VE4HA 3, VE4CF 2, VE4SD 2, VE4AEA 1, VE4AES 1.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. ASTM: VE3GT. Because of business pressures, VE3QL had to resign as STM. Thanks for all your help and good luck. New members of QCWA include: VE3S AAL JMI, AOX RF DTB BR. Five members of the Bruce Co. ARES group were active in the Bruce nuclear power development simulated emergency test. VE3EYV and members of the Algoma ARC recently enjoyed a fine dinner social. With the addition of new members VE3S NCU CYE HBA and LWI, Burlington ARC membership stands at 101. Tower casualties include VE3MFA and VE3MFW. Ottawa Valley Mobile ARC members celebrated their 25th anniversary with a wine and cheese party at the home of VE3FNS. Congrats to Advanced upgrades VE3MUD and VE3MZF. VE3ASH held a computer demonstration meeting for the Bruce ARC, Ottawa ARC sponsoring the National Capital Award Stations in Canada and the lower 48 states of the USA. ARES contacts at all others 10. The already long list of "snow birds" appears to have grown longer this year. National Scouting Headquarters, Ottawa, VE3FHQ is now on the air every Saturday at 0100Z/2000 EST. Next DCO exam dates are June 16 and October 20 and candidates are to register one month in advance. Peterborough ARC members VE3S MEW KQH FQZ IQZ BAU NBO KXB AFP KBT MCD MCC IRW provided communications for the Kawartha Nordic ski tour. With the increase in postage have you supplied the QSL bureau with extra stamps or cash? Regrettably this month I must report that VE3BNW, VE3GV and VE3EHR have become Silent Keys. Dates for the special awards station CZ5SFR will be May 22 to June 7 on hf and 2 meters. Large sase to Box 215, Smith Falls, Ont. K7A 4T1 will bring your QSL. New amateurs are VE3MOV and VE3NLB. The White Cane recently celebrated their 15th anniversary. The 8th Annual Ontario Hamfest will be held at Milton on July 10. Are your Field Day plans finalized? Traffic: VE3KK 431, VE3GOL 234, VE3CVR 162, VE3HTL 158, VE3WG 147, VE3CYR 136, VE3GNW 124, VE3DPO 120, VE3BZ 112, VE3WM 82, VE3LOK 81, VE3JRT 80, VE3CKZ 80, VE3GT 76, VE3BV 61, VE3AW 54, VE3KB 40, VE3DVE 38, VE3FP 32, VE3AYZ 26, VE3FP 26, VE3LS 24, VE3DUK 23, VE3FX 21, VE3AN 15, VE3AJN 12, VE3DZH 10, VE3KLS 5, VE3LNV 5, VE3XB 4 (Jan.) VE3GFQ 108, VE3GN 81, VE3JAW 25, VE3FGV 18, VE3FX 10, VE3DZH 3.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMS: VE2PJ. VE2FA. New appointment: VE2EAB now OBS. Change call: VE2EAB now VE2JO, and VE2FMH now VE2PD. Congrats to VE2FOU, who now has 170 countries (cw) confirmed. The QSN is on daily on 3648 kHz at 0000Z and 0300Z. The "FORUM" net on Sunday on 7080 kHz at 1530Z. Le 25, 26 et 27 février, le club Sherham (Sherbrooke) a donné démonstration de Radio Amateur, dans un centre commercial. Des stations étaient en sss, cw et rty. Avec la collaboration de VE2EYV, EVX, AOT et autres, le public a eu l'occasion de avoir une très bonne représentation de notre "hobby". Traffic: VE2PJ 239, VE2EJO 116, VE2FA 50, VE2BP 43, VE2EC 35, VE2EKC 26, VE2AG 14. (Jan.) VE2FA 19.

SASKATCHEWAN: SCM, W. C. (Bill) Munday, VE5WM — STM: VE5QY. SEC: VE5LI. NMS: VE5DC. VE5HG. VE5OI. VESMP. Thanks to the efforts of the father and son team of VE5SC and VE5AFM a 3rd production on Amateur Radio will soon be released on CATV. Congrats to VE5AAA VE5ABT and VE5AEJ on their work with gifted children in the public and separate schools in Regina. A reminder to keep the dates July 1, 2 & 3 open for the CRR/LARRL Midwest convention to be held at Kelsey Institute in Saskatoon. Traffic: VE5KS 48, VE5HG 40, VE5BAF 16, VE5KS 11, VE5WM 7, VE5AA 5, VE5TT 5, VE5EA 1.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WY — STM: W3DKK. SEC: W3PQ. PSHR: WA3WY. K3JL. With the assistance of several "Eimers" from the Kent ARC, Jim Treasday, blind since birth, has passed the Novice test and received the call Z3AO. The OAR is going to upgrade the WDEL and the Del. QSO Party certificates. Congrats to DARC members K3B and KAZONA on upgrading. AWARE is planning a trip to League Hq. this

spring or fall if enough interest is shown. The SEN just completed a course on traffic handling, taught by W3WD. Thanks. DTN QNI 337, QTC 75. DEPN QNI 60, QTC 18. SEN QNI 35, QTC 7. DSSN QNI 32, QTC 6. Traffic: W3PQ 192, W3QD 143, WA3WY 120, W3DUG 103, K3JL 88, WA3DUM 63, N3AKC 50, WB3GX 30, W3WD 11, N3AXH 8, K3ZXP 6, WA3PWT 5, KA5D1 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: K3JSZ. DECS: AA3C K3QXC N3BFL N3CJP W3EEK W3YWZ
 Net Freq. Time QNI QTC Sess. Mgr.
 EPAETN 3917 6 P.M. Dy 556 377 28 WA3EHD
 EPA 3610 7 P.M. 554 373 56 AA3B
 PN 3950 6 P.M. Dy 388 002 28 WA3WQP
 PN 3610 6:30 P.M. 213 81 3 K3JSZ

New appointments: AA3C & K3QXC to DEC: N3BAY to EC/OBS: WN3KNU to OBS/OVS. BPL: K3JSZ KB3LF WA3WQP. OBS reports: K3RDT KB3XO K3CB W3FAF W3GVR. OBS reports: K3EBZ KB3VW W3ID W3VA WB3FVJ. OVS reports: N3BHS W3GOA WA3KFT. PSHR: K3JSZ K3QXC KA3DYL KA3GJT KB3LF KB3UD KB3XO KE3U N3CJP W3VA WA3EHD WA3OFD WA3WQP WB3FKP WB3FYT WB3KUZ. Recent upgrades: KA3CAS (y) to Extra: KA3GMG KA3GNH to Gen; KA3FRO KA3HMC to Tech; KA3ISF new Novice in Hazleton area. Congrats to K3BLF for making BPL for first time. K3LEF is sporting a new IC2AT. WA3WQP reports PFN QNI with annual File. State Fair which originated 6500 messages. WA3CKA looking for some books on ATV; sez it sounds interesting. KB3QV advises bulletins are available via teletype on the 10/70 RTTY repeater in the Scranton/Wilkes Barre area. Congrats to K3QXC upon appointment to DEC for District 1, which consists of Bucks, Chester, Delaware, Montgomery & Phila. Cos. and to AA3C to DEC for District 2 which consists of Dauphin, Lancaster & Lebanon Cos. Also to N3BAY as EC for Pike Co. Please give these new officials all the help and cooperation you can to make their jobs easier. The section has openings for DECS in Districts 4, 7, 8 & 9. Anyone interested is urged to contact WA3PZO or this office. K3JSZ reports new PTTI training course certificate will be issued upon completion of course. K3BLF and K3JSZ worked on this project. New officers for the Anthrifice RA: K3JL, pres.; K3BS, v.p.; KA3CAT, treas.; W3TI, secy.; K3JSZ, trustee. Local and vhf nets reports: (QNI), QTC, sess) D3ARES 185, 38, 4; D5EN 85, 21, 5; Carbon Co AREC 31, 1, 4; LCARES 11, 27, 8; Mtg Co AREC 15, 0, 4; SWOTN 51, 0, 4; WARCVTN 51, 33, 4. Lots of clubs in the section are making plans to operate in the up coming VHF QSO Party and Field Day in June. Looks like EPA will be well represented in these events. K3JSZ busy planning for the annual EPA section picnic this summer. Let him know dates in July or August that would be available to you so that he can pick a date suitable for the majority to attend. Our thanks to WA3EHD for the fine EPAETN net bulletin/newsletter. Traffic: WA3WQP 1838, KB3LF 652, K3JSZ 544, W3IPX 208, WA3EHD 183, KB3XO 162, KB3UD 142, KA3GJT 135, W3FAF 125, W3DP 119, W3VA 114, WA3OGM 107, WB3KUZ 105, KA3DYL 98, W3YVZ 86, N3CD 78, K3QXC 76, AA3B 69, W3ADE 54, WB3FVJ 49, W3TWV 44, W3AVJ 43, KE3U 38, WA3OFD 30, N3CJP 29, WA2WXM/3 28, W3AQN 21, WA3CKA 19, KA3FJL 17, W3CL 14, KA3FJL 11, W3EEK 8, W3ID 8, W3PTM 7, KB3VJ 7, KB3QW 6, WB3FYT 5, K3EBZ 5, WB3FVJ 5, K3KW 5, N3AKC 6, AF3Z 2.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Morrow, W3FA — SEC: WA3TA, K3EF. W3CN. WA3BM. N4ECC KB3CO. K3H N3ALR. WA3TNQ. W3GMS. W3SQG. WB3LTH. N3BEK. WB3JFR. KA3CTR. W3CYO. AD33. W3EXP. N3RFL. KB3FO. KA3DXZ. KC3K. N4DK. WB3JA. and N3BLA were commended thru WB3LTA EC Montgomery County by the Weather Bureau for the Feb 17 weather net alert. Congrats to all. After YLUCW/WAS W3CDD takes on YLUCW/WAC, but first a vacation in Florida! At great personal peril and much roof climbing KC3D repaired his dipole. W3ZNV is busy trying to beat daylight saving time. Son KA3GX8 is disguised as PZ5JR and manages schedules with Dad K3BYV who is getting added DX with his Windom antenna. W3COY, NMD's manager, is helped by K3JFB. W3ECC who's W3DFW is his portable zero-land job! Spoke too soon; WB3KJT is still awaiting the new rig. The old one became louder! W3FZY worked QCWA and YL/Om parties as did W3CDD. They almost ORM each other. W3LDD gets a leg up on K3BNL and W3HTB in the DX department. WA3VPL fills the Pasadena void and W3HVS the Gaitersburg void. KA3CDD is our busy MEPN secretary doing travel for the company. N4DR is still testing 30-meter propagation. W3UT keeps MDD alive on 3RN. K3ORW is operating from a horizontal position recovering from back surgery. K33WL is almost a pioneer from westernmost Maryland. KA3T manages to surface from a busy University schedule. KA3E is happy notes says Spring is just around the corner. WB3GZU is back to earning a living full time. W3CVE has WB3IVL sending high speed code practice. With the nets: Net/manager sessions/traffic/QNI average: MDC PNN/W3SOY 47/22.5; WR PNN/WB3BFK 20/19/19; MFPN/WB3LDO 31/22/288. Toppers: WB3BFK W3FA W3HTB W3LDD. Others were: KA3AMK (Fla.), KA3CDD, WA3IHW, K3ONU and WA2YFM (NY). MTN and MDD are looking for cw ops. Traffic: WB3GZU 1007, W3CVE 252, W3FA 185, KA3CDD 155, W3UT 120, KB3WL 65, W3DQL 58, K3ORW 26, W3FZY 22, WB3KJT 21, WB3BFK 18, KC3D 14, KA3T 13, WA3V 13, AK3X 11, W3LDD 10, K3BNL 10, W3HVS 10, N4DR/3 10, W3ZNV 6.

SOUTHERN NEW JERSEY: SCM, Bill Luskemmann, WB2LC. STM: WB2LC. SEC: WB2LC. PSHR: K3RS. What is it? The Amateur Radio Emergency Service consists of hams who register themselves to provide back country comm service in the event of disaster when all other means are disrupted or overburdened. How does it work??? Our section emergency coordinator, W2HOB, appoints emergency coordinators for each county in NJ. Each EC is responsible for the ARES operation, in its entirety. Operators interested in becoming involved in emergency communications should contact the EC of their respective county. I don't know who my EC is, how

do I find out??? Contact the SEC, W2HOB, or myself for this info. Do all counties have active ECs??? No, recent times have seen a decline in the number of active ECs. Currently Atlantic, Cumberland, Ocean and Salem counties could use good, able, persevering leadership. Hey, I live in one of those counties and wouldn't mind contributing to the betterment of Amateur Radio. How do I apply for the EC position??? Easy, contact myself or W2HOB for an application and instructions. It's a lot of work, but can be fun and enjoyable and, if done correctly, will leave an everlasting impression on you. Won't you help??? Traffic: N2CEH 573, KA2GSL 168, W2BPKG 150, WA2ZHEB 44, KM2E 42, KA2GTE 31, WB2GFM 19, WB2LCC 10.

WESTERN NEW YORK: SCM, William W. Thompson, W2MFA — SEC: W2ZHB. STM: N2APB. ASCM: W2GLH. DECS: WA2AIV KA2BHR WA2DHZ WB2NAO. Appointments: EC — N2BQV Madison, N2EH Monroe; OES — KA2BHR W2PHO K2OIU; OBS — N2BLX. Many thanks to: K2OIU for past leadership as EC for Monroe Co; WA2CAM WB2CZC WB2HEH WB2ID WB2ODH W2XJ K2ZUT W2ZYQ and WA2AIV for efforts Jan. 25. 59th Ginn emergency; Broome and Chenango operators on ice jam flood watches. Sorry to report WB2GUF became a Silent Key. Congrats to K2RLV four years of Central NY Ham Highlights radio show. Certificates of Merit to WA2VAM and WB2JWD and their ARES groups in Cortland and Tompkins Cos. Hatching Novices: K2BYI K2LZL Newark Valley; SVARA and N2DE: K2OP: Ogdensburg ARC and N2COG WA2RQO CVARA and WA2IPL PSHR: W2AET N2ARD KA2BHR N2BLX KA2BDL W2GLH WB2IDS WA2KOJ W2MTA WB2WQO W2ZOJ. BPL: W2AET WB2IDS W2ZQJ. Reports: OVS — K2OR observed 7 days solar/geomagnetic effects 2M; OO — W2AET 9, WB2MMB 2, N2NW 5. Club officers: Orleans ARC - WA2QDV N2UCU N2CFE, OARC - K2VTT WA2QEV KA2JBE KA2NSU; JCARC - WA2TYO KA2IWO KA2GCP WA2YCA; ARATS - WB2WUB KA2CJS K2QB. LAST CALL Southern Tier Hamfest Owego May 1, New York State Convention Rochester May 14-15, Rome Ham Family Day, Beck's Grove June 6, Field Day June 26-27, Batavia Hamfest July 11, Rawny Picnic July 18, RAGS Picnic Aug 1, Traffic: Picnic at Newark Valley Aug 14.

Net	Freq.	Time/Day	QNI	QSP	QND
NYS1*	7077	1000M/Sn	120	107	23
NYS2*	3677	1000/Sn	40	17	4
THIN	3913	1600/Sn	49	—	—
NYPON*	3913	1700/Dy	—	—	—
NYSPTEN	3925	1800/Dy	736	137	28
ESS	3590	1800/Dy	356	77	28
QCTEN*	3494	1830/Dy	589	136	26
Q Net	3191	1830/Dy	406	6	28
STAR/E*	9939	1830/Dy	74	65	23
WDN/E*	6477	1830/Dy	363	203	26
NYS3*	3191	1900/Dy	345	395	27
SLVARES	3191	1930/Sn	45	0	4
JCARCN	10/70	2000/Dy	368	12	28
OARCN	25/85	2000/W	72	0	4
WIN	04/64	2000M	SKYWARN	—	—
WNYECN	3955	2000/3Sn	ARES	157	28
CNYTN*	90/30	2115/Dy	436	32	21
STAR/L*	325/925	2130/Dy	59	32	21
WDN/L*	04/64	2130/Dy	780	201	28
NYS/3*	3677	2200/Dy	263	362	24

*NTS nets. Traffic: W2ZOJ 568, WB2IDS 536, W2AET 532, W2MTA 466, K2OHZ 263, WB2WQO 234, K2GWN 179, KA2BHR 164, WB2OIX 147, AF2K 141, N2APB 136, N2BZ 12, KA2DH 11, KA2CLT 106, KG2D 83, W2GLH 80, W2FR 74, N2ARD 63, WA2KJ 56, WB2SGI 46, KB3RG 44, WA2NAD 42, KA2NHW 39, WA2SMZ 37, N2ABA 34, WA2RQO 32, WB2NAO 22, KA2BDL 19, WB2PID 16, W2RFQ 17, K2RNL 15, KA2HCB 8, WA2DHZ 4, K2QR 3, W2PHQ 2. (Jan.) N2APB 165, K2GWN 131, AF2A 8, WA2DHZ 8.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM & STM: N3EE. NMS: AC3N N3ADU. W3NEM W3MML. SEC: AB3Q. DECS: WB3JDI WBSEFO WB3KUH N3ADU.
 Net Sess. QNI QTC kHz T/D
 WPACW 28 369 335 3585 7:00 P/D
 WPA2TN 28 698 386 3983 6:15 P/D
 WPA2MTN 28 423 267 146.28/88 8:00 P/D
 WNP2A2MTN 28 388 1002 3958 5:00 P/D

It is with deep regret I must announce the following Silent Keys: K3EDV K3SNC W3NRR. We extend our sympathies to their families. New calls, K3IC was K3BPY, N3CPM was KA3DGT. Upgrades: to Extra-K3GX3 (ex-KB3WH), WA3YLN and KA3GGH; to Advanced-WB3JWJ WB3ICC WB3ERD; to General-KA3BLJ. Congrats to all. The major event in this section was on Feb. 17th when a simulated Nuclear Accident was to have occurred at the Beaver Valley Nuclear P/S in Shippingport PA. The State EMA and the NRC requested that the Radio Amateur Civil Emergency Service provide communications for the drill. As amateurs here are members of both ARES and ARES, it was a combined operation. Beaver Co. was the risk county and Allegheny, Butler, Washington were host counties. In Beaver Co. 41 stations operated and Allegheny Co. had 17 amateurs involved. From all reports the state and NRC were well pleased. Traffic: K3CR 1391, N3ADU 1335, AC3N 434, W3IQD 269, W3EGJ 200, N3FM 196, KB3ZT 176, KA3CVD 135, W3IWI 118, W3SMM 114, KB3NV 95, K3SMB 94, W3KMY 93, W3MML 88, WA3ONT 79, W3IA 59, W3KUN 56, W3OKN 48, WA3JUN 45, W3RUL 43, K3IC 41, K3LTV 39, KA3BGC 38, WB3GUK 36, KA3ETC 35, W3NEM 35, K3QV 33, K3HCT 32, WB3EFC 30, KB3JZO 24, W3NGO 23, W3AHH 16, N3CKR 15, N3BKV 13, AB3F 13, W3TTN 11, WA3GXG 11, N3BKU 10, W3EXC 10, WB3IAB 10, WB3KJH 8, N3KB 8, W3SN 5, W3LOD 1.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran K9ORP — SEC: W9QBH. STM: WB9JR. ASCM: WD9EB.
 Net Freq Times/Days QTC Sess.
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 IEN 3940 1400 Sn

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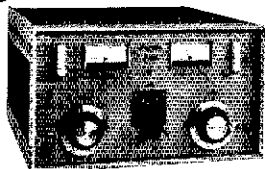
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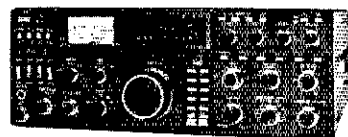
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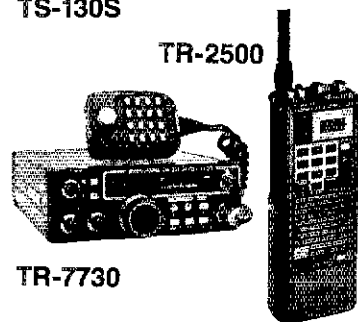
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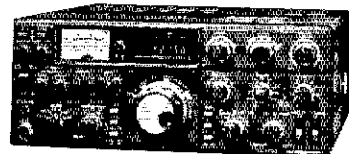


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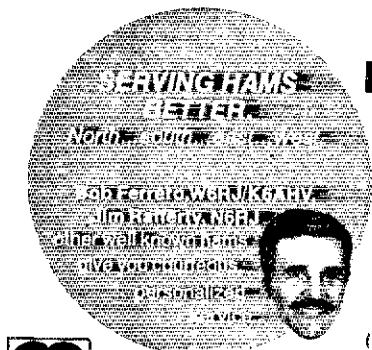
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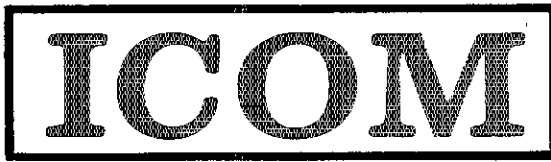
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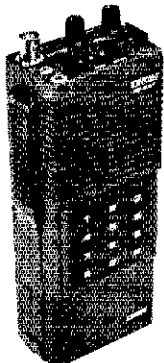
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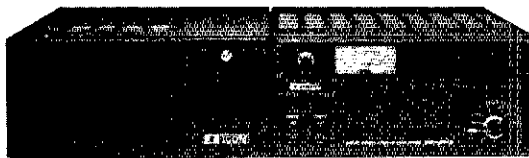
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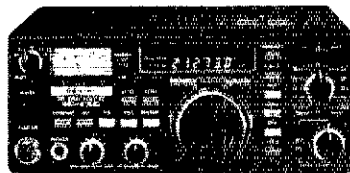
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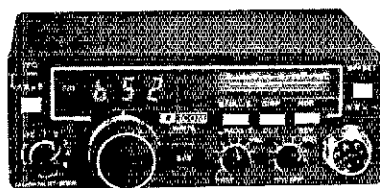
IC-730 MOBILE TRANSCEIVER



Small! Only 3.7"H, 9.5"W, 10"D. Fits most mobile operations • 10-80M coverage including new WARC bands • Tuning speed selectable, 1kHz, 100 Hz or 10 Hz • Dual VFO system • One memory per band. Store favorite frequency • RIT • 200W pep input SSB, CW, 40W out, AM • Digital readout • Speech processor • I-F shift tuning • Receives WWV • Fully solid state • Automatic, final protection under high SWR conditions.

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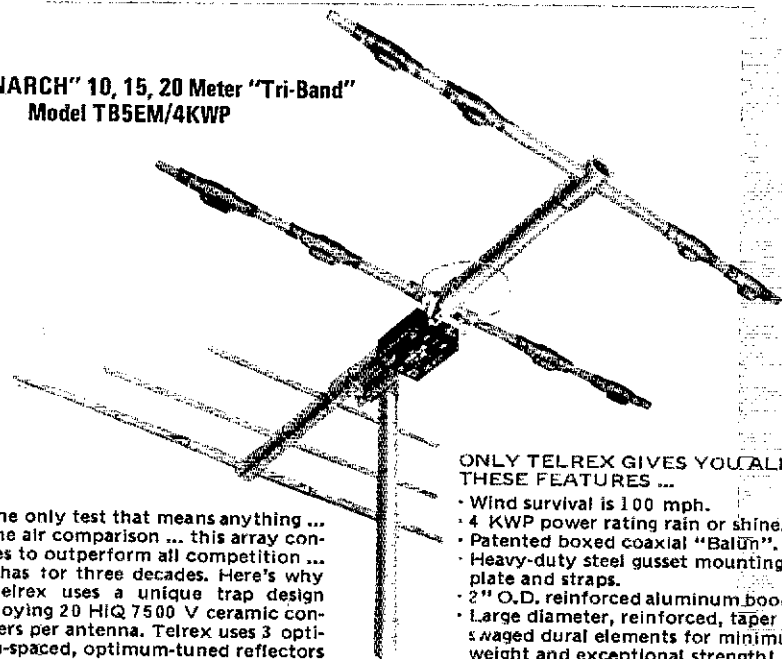
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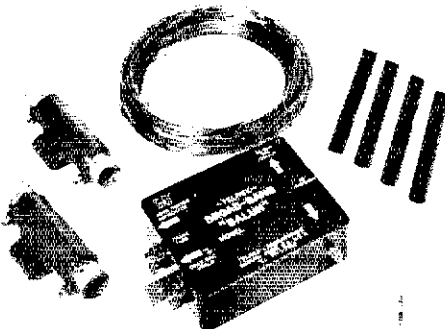


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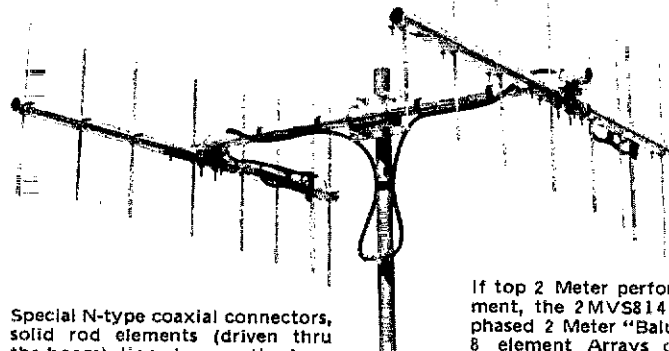
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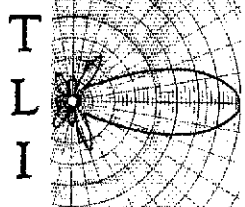
ITN 3705 1900 local Dy 84 28
D9RN 100% stations: W9NXG WB9WGD W9HOT
W9TKL DRN9 100% stations: W9HOT W9NXG
WB9WGD N9AJE W99ODN. W9VEY memorial station
had 8 QTC in 4 sessions. The Central Illinois RC held its
annual Cherry Pie and Ice Cream Social on February 22,
celebrating Washington's Birthday. Officers for 1982
are: K9BMZ, pres.; NV4X9, v.p.; K9ZLZ, secy/treas.;
WA9MFP, exec board mbr. The Chicago Radio Traffic
Assn. is close to its 59th year. They affiliated with ARRL
in May of 1923. Officers for 1982 are: K9JQ, pres.;
W9USS, v.p.; W9HPG, secy.; W9AYL, treas. The new of-
ficers for the Hamsters RC are: W9BIA, pres.; KA9FOX,
1st v.p.; N9BUT, 2nd v.p.; KA9IDB, secy.; N9BHV, treas.;
KA9BUK, sqt-at-arms. The new meeting place is at the
Crestwood Community Center, 139th and Kostner in
Crestwood. The Hamster of the year is WA9EKA. The
Macon County ARC's 1982 officers are: KD9D, pres.;
WD9MUT, v.p.; WA9TEC, secy/treas. The club meets at
the Red Cross Bldg. at Broadway and Lake Shore Drive
at 7:30 Tuesdays in Decatur. Congrats to the new
Novices: KA9MFM KA9MGO KA9MFY. At the Jan
meeting of the Sterling-Rock Falls ARS, there was an of-
ficer the Sterling police and an officer from the State
Police who gave a run down on what area hams should
observe any report via the autopatch when they come
across an accident or other situation that requires the
attention of law enforcement officials. Officers for 1982
are: WD9EHM, pres.; KA9DUS, v.p.; WA9PBS, treas.;
KA9HHD, secy.; KA9GNR, act. mgr. The 3494 repeater
at Mt. Carmel now has emergency power. Southern
Cook County's Tri-Town Club has a weekly net with non-
commercially powered units only (146.49 Mon. 7:45 P.M.
CST). The Starved Rock RC Hamfest in June will have
AJ2I, the assistant training editor, man the ARRL booth.
The Macon County ESDA was activated at the end of
Jan during the blizzard, and several club members were
on hand to help relieve some of the load. The ESDA of-
fice was very impressed with the job the amateurs did
and this will only help solidify our presence when we are
needed during emergencies and disasters. Approxi-
mately 32 WIARC members were present in 10* wx Feb 6
at the installation of two permanent antennas at the
Quincippi Mall. The BPL recipients are: K9BVE W9HOT.
Bulletins: WD9EBQ (232) Traffic: W9HOT 603, K9BVE
551, W9NXG 351, WB9WGD 243, K9BX 194, W9HLX 147,
N9AJE 101, KN9BAM 81, W9OK 80, W9RJV 53, W9QBH
42, KA9BYB 34, W9LNO 32, WB9VAS 28, W9KR 25,
WD9HZF 14, W9KSU 11, W9SSP 8, WD9EBQ 4, KA9GJN
3, WD9CJB 1. (Feb.) W9NXG 324, W9RJV 80.

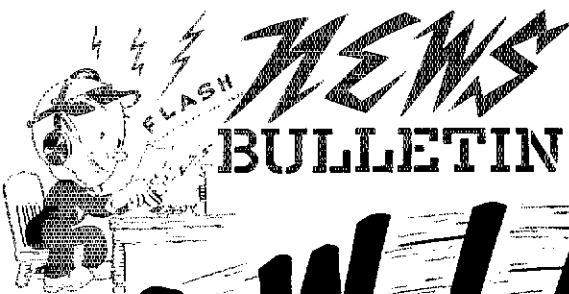
INDIANA: SCM, Bruce Woodward, W9UMH — SEC:
W9UMH. STM: W9JUU. NMS: ITN:W9QYV. QIN:
WD9GXW. ICG:WD9CSZ. VHF:W9PMT. IWN:K9DCX;
IPN:W9DLF

Net	Freq	Time/UTC/Dy	QNT	QTC	QTR	Ess.
ITN	3910	2300	221	374	2021	56
QIN	3856	1430/0100/0400	710	421	1928	83
ICN	3708	0015	105	18	327	27
IPN	3910	2130	115	165	817	28
IWN	3910	1310	1383		407	28

Hoosier vhf Nets: QNI 4619, QTC 296, QTR 15068,
bulletins 30 for 25 nets. D9RN 100%, 515 QTC in 56 sess.
Ind. stns W9JUU K9CGS W9URQ W9QLW WB9MIK KJ9J.
CAND 100%, 1131 QTC in 28 sess. Ind. stns. W9JUU
W9QLW K9CGS KJ9J W9UMH. 9RN 100%, 841 QTC in
1006 minutes. Ind. stns W9JUU W9QLW W99YU W9HZ
WD9GXW K9VWJ W9E1 KJ9J K9XK WA9QCF W9XD. Ap-
pointments: QIN NM — WD9GXV; DEC for Floyd, Jeffers-
on, Clark, Orange, Crawfords, Washington, Harrison and
Scott Cos. — N9AST; ECA Lawrence Co. — W9QW, Gibson
Cass Co. — KA9HGH, DeKalb Co. — W9QW, Gibson
Co. — WA9DBK, Huntington Co. — K9DMH, Noble Co.
— WA9UGP, Union Co. — WB9QKK, Vigo Co. — W9MJL.
OBSS WD9DWD N9AZP, Silent Key W9ESQ. Thanks to
the Porter Co. "STRAIGHT KEY" it was a pleasure to
honor the memory of Herb Brier W9AD (W9EGQ). N9CQD
reports that AREA 1 INCERT coordinator Trooper Bob
Burrows is now studying for his amateur license. It was
a pleasure to attend the AREA 111 meeting and to meet so
many of the southwest Indiana hams and listen to your
good work. Congrats and thanks to W9MJL and the Vigo
Co. hams WD9GQH WD9YB Washington, Harrison and
N9BRN WB9QBR WB9XIK KA9JUX N9BOG and
WA9SGA for work in the snow emergency and flooding
Congrats and thanks to KA9YJ and the Grant Co. hams
WB9EAP WD9ZA KA9BFK K9GZ W9MRE WD9HLU
WB9FDC W9CUC W9BZS WD9GBH AG9I for their work
in the snow emergency. We are pleased by the reports that
W9IOH is making progress with his very serious ill-
ness and hope he will be back with us on the air soon. It
is good to hear W9DLF checking in on the 2130 net. Ac-
cording to W9EGG, K9FX is an expert on canoeing. I
know she is a fine traffic handler. Traffic: W9JUU 1526
WB9CJL 240, W9JUU 220, KJ9J 208, K9GX 196, W9E1
175, W9FC 172, W9QYV 16, W9UMH 107, W9AB 105,
WA9QCF 97, W9WKM 97, W9URQ 82, K9BHH 70,
W9PMT 68, W9BAWI 69, K9GN 53, K9NR 52, K9DCX 49,
K9WWJ 34, W9MIK 33, WA9OKK 25, WD9ART 21,
WA9OHX 18, W9JZV 17, W9RTH 17, WB9YAY 17, K9BK
14, N9PS 14, N9BLK 12, W9RVN 12, K9GK 10, K9FVN 9,
WA9JNC 9, K9CGS 8, WD9DWD 8, KA9FFO 8, W9BDP 6,
W9DKP 6, N9AST 5, K9WVI 5, WD9CIV 4, W9WEI 3,
K9SBW 3, W9JUP 3, KA9DHL 2, W9YEW 2, WD9EPU 1,
WD9EXI 1, K9OUP 1. (Jan.) KA9DHL 30.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC:
W9QAK. STM: K9UTQ. BWN 3984 1215Z QNI 1048, QTC
1282. W9B9Y. BEN 3985 1800Z QNI 597, QTC 228
W9BESL. W9BESL 3985 2300Z QNI 1010, QTC 420
WD9ESL. IWN 3723 2000Z QNI 216, QTC 53. KA9HPQ.
WSSN 3645 0030Z QNI 199, QTC 31. N9E 3682
0100Z QNI 399, QTC 233. W9YCV. WINL 3682 0400Z QNI
320, QTC 155. K9LGU. XPO 3925 1831Z QNI 307, QTC 41
W9AKY. NWTN 34794 0030Z QNI 514, QTC 62. W99YPY.
Gr. Bay 72/12 0030Z QNI 8, QTC 1. W9B9NRK. WCWNT
31/91 0030Z QNI 330, QTC 100. N9AUG. KA9GEO KA9-
JRN N9CGS from Eau Claire area are now Advanced.
WIN-E certificate to KA9GYD. NWTN certificates to
KA9BHL KA9BHK W9IAL K9RNM W9ZZM W9ZZZ
W99YPY K9BTP N9BDL K9DXR K9GTQ K9BGO
WA9GGH N9BPM KA9BHN KA9BHM. New affiliated
clubs Flambeau ARC, Northland ARC. Congrats. Don't
forget the ARRL convention in Cedar Rapids, IA, WNA
picnic slated for Sept. 1. Watch for details later.
W9KVV, formerly W9NXS, from Reedsburg became
Silent Key, W9QZA, age 85, has WAS. Congrats Evelyn,
KA9KYZ & N9CPW have Advanced tickets. Wild River
ARC provided comms for Birke-Belner from Hayward to
cable with 15 stations to Telemark. Nice going fellas,
KA9JFK has Tech. WD9IUX has Extra. BPL to W9YCV
WD9ESZ & KA9CPA. Traffic: KA9CPA 201, WD9ESZ
546, W9YCV 449, WA9WYS 311, W9CXY 269, W99YPY
260, K9GDF 218, K9FHI 200, N9AUG 167, K9GK 158,
WB9ICH 127, W9UCL 128, N9AZI 102, KC9CJ 100,





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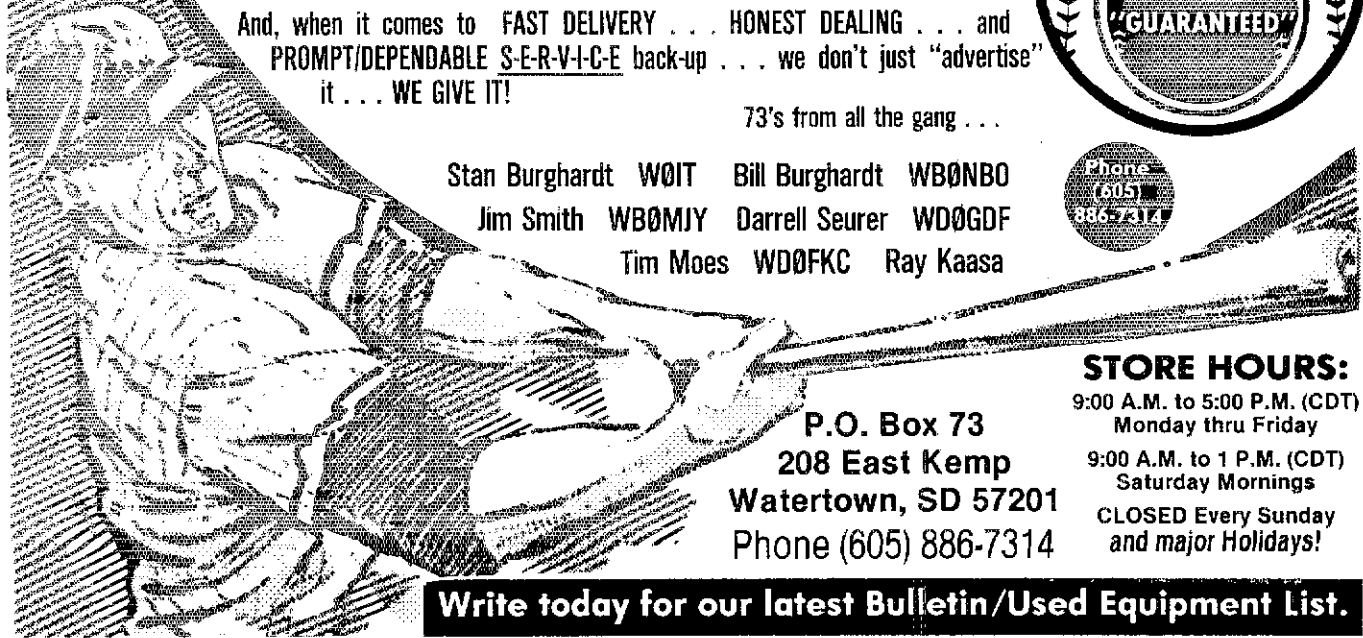
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- Stan Burghardt W0IT Bill Burghardt WB0NBO
- Jim Smith WB0MIY Darrell Seurer WD0GDF
- Tim Moes WD0FKC Ray Kaasa

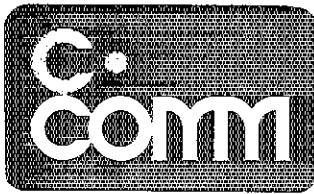
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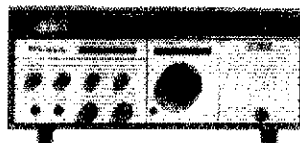


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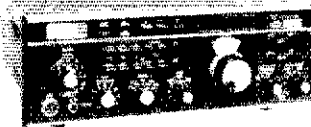
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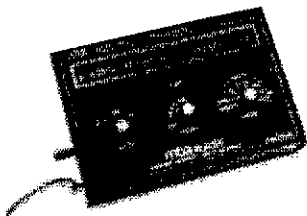
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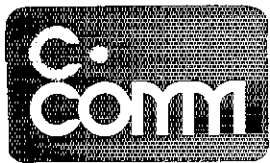
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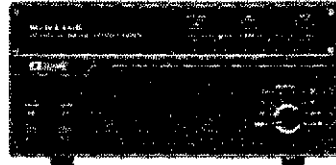
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IC-720A HF TRANSCEIVER

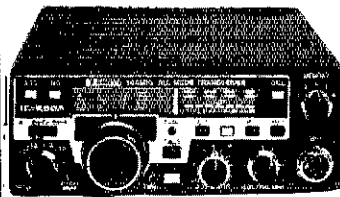


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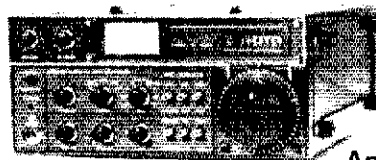
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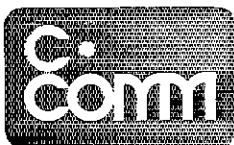


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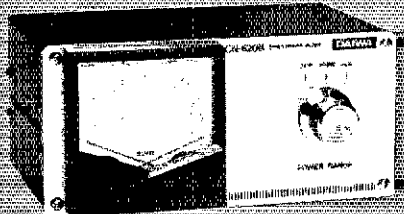
Prices and specifications subject to change without notice or obligation.

DAIWA Communications Essentials

Simultaneous SWR/Forward Power & Reflected Power Readings

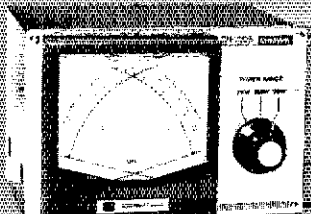
Tolerance: $\pm 10\%$ Full scale
 Input/output Impedance: 50 Ohms
 Connectors: SO-239

Model CN-620B (New 2-Kw Scale)

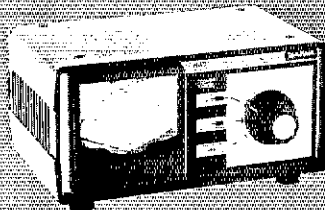


Frequency Range: 1.8—150 MHz
 SWR Detection Sensitivity: 5 Watts min.
 Power: 3 Ranges (Forward, 20/200/2000 Watts)
 (Reflected, 4/40/400 Watts)
 Dimensions: 165 x 75 x 97 mm;
 6.5 x 3 x 4 in.

Model CN-720B (New 2-Kw Scale)



Frequency Range: 1.8—150 MHz
 SWR Detection Sensitivity: 5 Watts min.
 Power: 3 Ranges (Forward, 20/200/2000 Watts)
 (Reflected, 4/40/400 Watts)
 Dimensions: 180 x 120 x 130 mm;
 7 x 4.75 x 5 in.



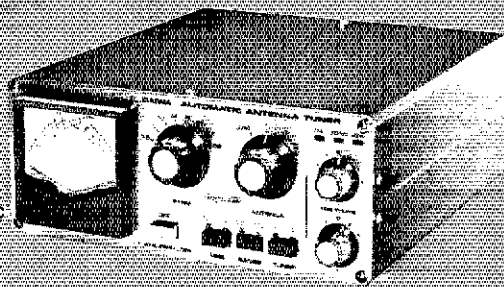
Model CN-630

Frequency Range: 140—450 MHz
 SWR Detection Sensitivity: 5 Watts min.
 Power: 2 Ranges (Forward, 20/200 Watts)
 (Reflected, 4/40 Watts)
 Dimensions: 180 x 85 x 120 mm;
 7.12 x 3.37 x 4.75 in.

Automatic Antenna Tuner

Model CN-510

Frequency Range: 3.5—30 MHz
 (WARC & Amateur Bands Only)
 Power Rating: 500 Watts PEP
 Internal Dummy Load: 50 Watts/
 1 Minute
 Impedance Matching: 15-250 Ohms
 to 50 Ohms Resistive
 Input Power Required for Automatic
 Tuner: 1, 5 or 10 Watts (Set by rear
 panel switch)
 Tune-up Time: 45 Seconds Max.
 Power Requirement: 13.8 VDC/2 Amp

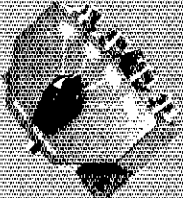


Coaxial Switches

Power Rating: 2.5 kW PEP, 1 kW CW
 Impedance: 50 Ohms
 Insertion Loss: Less than .2 dB
 VSWR: 1:1.2
 Maximum Frequency: 500 MHz

Isolation: Better than 50 dB at 300 MHz;
 better than 45 dB at 450 MHz;
 adjacent terminal
 Unused terminals grounded
 Connectors: SO-239

4 Position/
 Model CS-401



2 Position/
 Model CS-201



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KA9HPO 91, KA9AKG 89, N9BYK 82, WB9PKL 79, K9EC
 75, KC9KJ 65, KA9IKR 64, WB9ESM 62, W9LDO 62,
 WD9FRI 61, W9KTG 61, W9SO 58, N9ATP 53, K9LGLU 53,
 KB9NG 52, K9GB 51, K9UTQ 50, N9BDL 45, AG9G 43,
 WA9ZTY 42, N9BCX 41, K9ANV 36, KA9GT 36,
 WB9NRK 35, KB9FA 34, KA9GYD 33, K9HDF 33, W9DND
 31, WB9LSW 30, WB9RGO 30, KB9GO 29, WA9DXW 28,
 KC9GW 28, WB9JGA 26, W9FDY 23, WB9BKT 22, W9SFL
 22, K9UL 14, KA9EM 13, W9D1M 13, W9LW 13, KE9C
 12, W9HW 11, KA9MFV 11, KA9HR 8, KB9W 8, KB9FM
 6 (Jan.) WA9DXW 18.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB0HOX. STM:
 AD9S, ASCM: KC0T. SEC: KN0J. Congrats to the following
 upgrades: Extra-N9BRC WB9RMG; Advanced-KC0NB
 KC0NA KA0MOH KA0DEG; General-KA0MNP
 Technician-KA0JZT KA0JZU WB0YEE; Novice-KA0NCS
 KA0NCW KA0MZJ KA0NCV KA0NB. OHS endorsements to
 AEM and W9GRW. Tks to Hibbing ARC for 2M comms
 for sled dog races Feb 6 & 7 by WB9AKS
 WD9AKT WB9ZGZ and W9DUW. A VY SPECIAL TKS to
 Robbinsdale ARC for a super HAMFEST Feb 27.
 Over 100 attended. The new section appointees would like to
 say tks to all of you for making us feel welcome.

Net	Freq	Time	QNT	QTC	Mgr
MSWX	3929	0030Z	513	393	WD0CGM
MSPN/E	3929	2330Z	1018	233	KC0T
MSPN/N	3945	1810Z	498	47	W9AIN
MSN/1	3685	0030Z	316	95	WB9DM
MSN/2	3685	0400Z	178	95	K9JCF
MSSN	3710	2315Z	95	14	WB9WXU

Traffic: KB0MB 546, WA0TFC 525, WB0HOX 288, W9JZU
 203, KA9WF 73, WB9YSC 168, KA9JY 135, W9DPM
 114, WB9WF 121, KA9S 119, KA9S 107, DJB 107,
 W9DFX 95, W9GRW 73, K9JCF 70, WB9ZNB 67, WB9SW
 54, N9CLB 47, W9WRL 46, KN9J 41, KC9F 34, W9AIN
 26, KC0Z 25, WB0HDD 24, WB9FMI 18, W9DUW 17,
 KC0SE 12, A9EM 12, K0DEG 10, N9JP 10, KMVF 10,
 KA9JGO 9, WB9VYE 8, N9BRC 7, W9PNE 7, K0BDD 6,
 WD0BGS 4, W9AYD 2.

NORTH DAKOTA: SCM, Lois Jorgensen, WA0RWM —
 Net Time Freq QNT QTC Sess Mgr
 Goose F. 1500 Sn 1990 66 2 4 W9CDO
 D.A.T.A. 0030 Dy 3996.5 325 29 28 WA0CRH
 YLWX 1330 Dy 3996.5 297 274 28 WA0RWM
 Congrats to KA0LHN, new Novice to those who
 upgraded, WB9WSG to Extra, N9CMC to Adv. The State
 Licensed officers for the year: WB9DAF, pres.;
 KA9BOA, v.p.; WB9HFK, secy/treas. The Three Rivers
 ARC officers are: WA0RWM, pres.; WB9QHC, v.p.;
 WB9RMS, secy; K0TNI, treas. The FCC will be in Fargo
 June 8 and in Bismarck Sept. 8. I have 610 forms if you
 need them for tests or renewal. WB9BAY moved to
 Alaska and his new call is KL7RL. KA0FXI has moved to
 Jamestown. We extend our sympathy to the family of
 W9CFU as Silent Key. Traffic: WA0RWM 168, W9CDO 66,
 WA0CRH 29, KA0PSM 29.

SOUTH DAKOTA: SCM, Erwin Heimbock, K0OTZ —
 Sorry about no news last month. Time got away from
 me. The SD hamfest and picnic will be in Rapid City this
 year on July 10 & 11. Plan to be here. The big news in the
 hills is the new 76 machine on Terry Peak. Irv site, and
 it really covers. It is again linked with Rapid City, and the
 link equipment works well. I still have a problem getting
 news from the other end of the state. Let's get the info
 coming this way. I hope to see you this summer. Nets
 have been very active with reports received from NJO,
 SD Even net, Lawrence/Harding County Emer. net, and
 the WX net. Traffic: W9ZWL 820, W9HOJ 69, W9KJZ 68,
 WA9VRE 67, WA9UEN 66, W9MZJ 48, N9BVV 26 (Jan.)
 W9ZWL 1077, WA9VRE 127, W9HOJ 78, W9MZJ 50,
 WB9OMF 30, N9BVV 26.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC:
 W5JGF, Searcy. It is with a sad heart that we report the
 Silent Key of K5IKA, of Calico Rock. He passed away
 Wednesday 3-3-82 after a long illness. He was a long
 time ham, first licensed in 1958. He checked in on most
 Arkansas nets, attended most hamfests and was a
 friend to all. We all extend our sympathy to his wife and
 his family. WA4ZJ, WB5GQH, KA5JM, W5YCM, W5DFCE,
 N9CAQ and W5CYN made Arkansas 100% on DRN5 this
 month. OZK net 182 checkins, 13 QTC, 350 mins.
 Razorback Net, 1264 checkins, 70 QTC, 701 mins. Ark.
 Phone Net, 435 checkins, 33 QTC, 695 mins. Mock-
 inbird Net, 839 checkins, 45 QTC, 740 mins. Traffic:
 WA4ZJ 70, W5CFU 45, WB5GQH 41, W5JAU 22, W5BBD 2.
 LOUISIANA: SCM, John J. Meyer, N5JM — ASCM:
 KC5SF, STM: W5GHP. Nice spring weather should mean
 a nice turnout at the Baton Rouge Hamfest May 15th
 and 16th. League materials will be on sale; hope to see
 everyone there. New appointees are OSAN, NM for
 LTN; WA5NUK, W5LVX and K5EOA, all OOH; Congrats.
 Recently elected officers at 8ARA are: KC5DA, pres.;
 KC5JM, v.p.; W5DGLJ, secy.; W5LVE, treas. At ARCOS:
 WA5KBS, pres.; W7RVU, v.p.; N5CDB, secy.; W5WE,
 treas. Down in New Orleans the MTA welcomes
 W5DWP, pres.; K5HAN, v.p.; KA5EQ, secy.; W5IOE,
 treas.; W5DHO, W5WQM, K5SXZ, KA5CSJ, KB5VC,
 board members. Public service duties were handled by
 the NOVHF again this year with their excellent coverage
 of the Mardi Gras marathon's 23 mile run across the
 Ponchartrain Causeway. The gang at GNOARC ducked
 Zulu coconuts while assisting the Red Cross with
 parade route comms. The ARRL's public service an-
 nouncements are being beamed abroad by WRNO, a
 new 1.2 megawatt ERP shortwave commercial station
 near New Orleans. WA5HSI is the owner and WA5UUD
 of six-meter fame handles engineering.

Net	Freq	Time	Mgr
LAN	3615 kHz	7 & 10 P.M. Dy	K5TL
LTN	3910 kHz	6:30 P.M. Dy	N5ANH
LSN	3700 kHz	7:30 P.M. W-F	W5GHWK

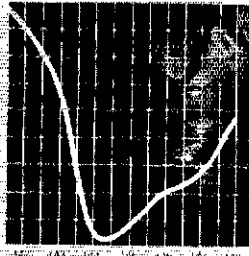
Traffic: K5TL 227, W5LDO 182, KC5SF 136, W5GHP 105,
 W5LBR 80, N5BFV 80, W5VMY 56, N5RB 54,
 WA4MUW/5 34, AC5R 19, N5ANH 7, WA5YIU/5 2 (Jan.)
 N5RB 61, N5ANH 4.

MISSISSIPPI: SCM, Paul Kemp, KW5T — STM: KB5W,
 SEC: WB5FXA, Freq. Coord. W5DCC, Anyone interested in
 a DX net on 75 meters contact N5FG. Congrats to
 upgrades: KA5EDW, W5JUZ, Extra; KA5GGG, General;
 W5DDCF, Tech with new call N5EHT. WB5ZAG new asst
 EC for Winston Co. We all need to encourage non-
 members to join the ARRL. Let them know of the ser-
 vices they would have available to them. W5GH
 operated from WIAW during his recent visit to the
 League. Over 60 contacts in Ms. on 75 meters. CAND
 (W5KLV) sess 28, QTC 1131, DRN5 (W5YDD) sess 28,

1981 MIDWEST VHF CONFERENCE
220 MHz AND 432 MHz
ANTENNA MEASURING CONTEST
BOOMER BEATS ALL COMMERCIAL ANTENNAS

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6 and 2 meter High Performance Yagis



Two Meter Boomers

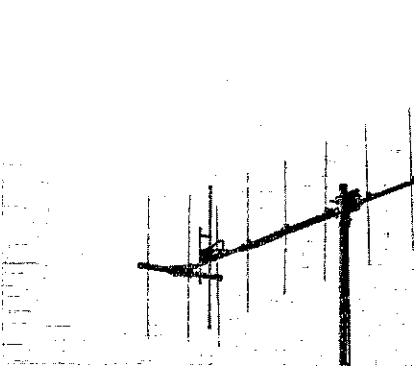
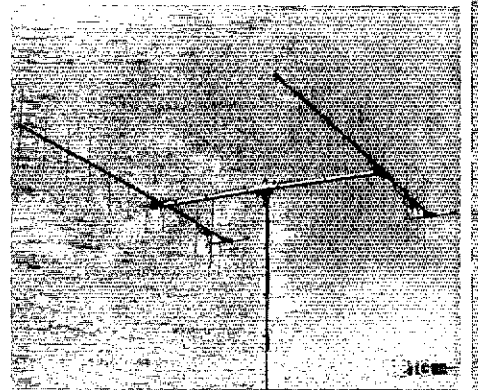
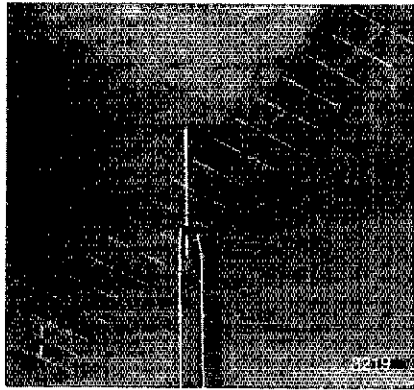
Whether you have the space for the 3.2 λ 32-19 or the compact 2.2 λ models, two meter Boomers are your best choice. They offer the maximum gain available for their boom length (See NBS no. 688). They feature trigon reflectors for maximum front-to-back ratio and clearer patterns. All stainless steel hardware and heavy gauge heat treated aluminum are used throughout. Whatever your choice of two meter amateur activity, the Boomer will fill your needs. For FM use the 228FB or 214FB. For CW/SSB on the low end use 32-19 or 214B, in EME, DX or just reliable QSOs Boomer will perform for you.

Six Meter Boomer

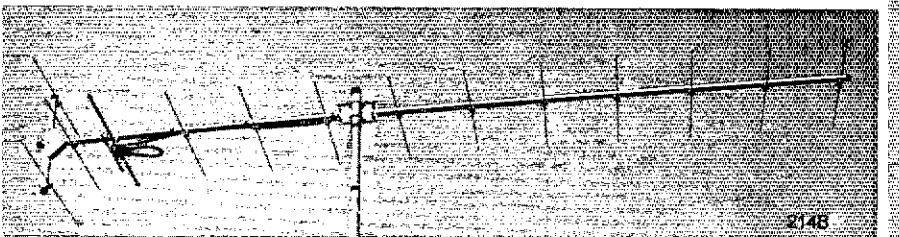
The new six meter Boomer offers more boom and more gain from its new element spacing. The six meter Boomer has Cushcraft's typical attention to detail, including T match feed with balun, and extra heavy duty mechanical construction. The key to this Boomer's super performance and relatively lightweight is special element spacing and boom length.

Specifications

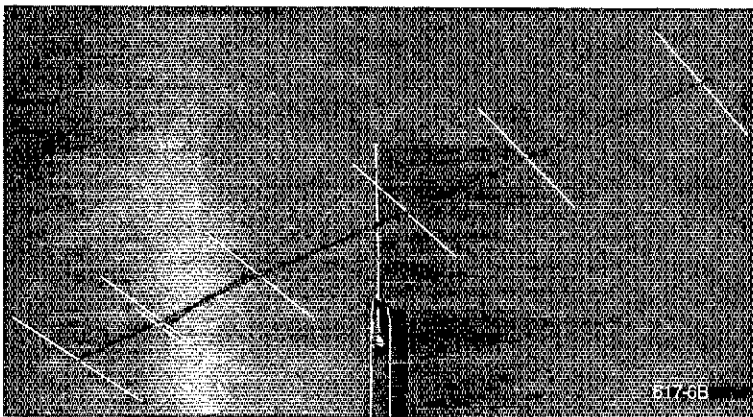
Model No.	32-19	214B	214FB	228FB	617-6B
Frequency range (MHz)	144-146	144-146	144.5-148	144.5-148	50.0-51
Forward gain (dBd)					
Front to back ratio (dB)					
E-plane B/width (deg)	2x14	2x17	2x17	2x17	2x19
H-plane B/width (deg)	2x17	2x18	2x18	2x9	NA
Side lobe attenuation (dB)	>60	>60	>60	>60	>60
SWR less than (typ)	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
Impedance (ohm)	50	50	50	50	50
Recommended stacking distance					
E-plane (ft)	14	10	10	10	NA
E-plane (m)	4.27	3.05	3.05	3.05	NA
H-plane (ft)	12	10	10	10	22.5
H-plane (m)	3.66	3.05	3.05	3.05	6.86
Weight (lbs)	12	8	8	22	26
(kg)	5.44	3.63	3.63	9.98	11.79
Length (ft)	32	15	15	15	34
(m)	6.71	4.57	4.57	4.57	10.36
Longest element (in)	40%	40%	39%	39%	113%
(cm)	102.5	102	100.3	100.3	289
Turning radius (ft)	11	7.5	7.5	9.5	17.7
(m)	3.35	2.29	2.29	2.90	5.39
Windload (sq ft)	3.5	1.7	1.7	4.0	4.8
(sq m)	3.3	1.6	1.6	3.7	4.5



214FB



214B



617-6B

Stacking Kits

For stacking two Boomers, use the following coax harness and power divider kits.

32-19 = 32-SK 214B = 22-SK 617-6B = 617-SK

When stacking four Boomers, use the following complete stacking kits. They include H frame, harness, hardware and complete instructions.

32-19 = 324-QK 214B = 224-QK

Specifications, Stacked Boomers

Antenna	2x214B	2x32-19	2x617-6B	4x214B	4x32-19
Forward gain (dBd)					
Front to back ratio (dB)					
E/H plane beamwidth (deg)					
E-plane	34°	28°	35°	17°	12°
H-plane	19°	17°	20°	19°	15°
Stacking dist Vert. (ft)	10	12	34	10	12
(m)	3.05	3.66	10.36	3.05	3.66
Horiz. (ft)	---	---	---	10	14
(m)	---	---	---	3.05	4.27
Wt approx (lb)	18*	26*	62*	69	97
(kg)	8.16	11.79	28.12	31.30	44.00
Turn radius (ft)	9	11	18	9	13.4
(m)	2.74	3.35	5.49	2.74	4.06
Wind Area (F2)	3.4*	7.0*	9.6*	8.3	15.2
(sq m)	3.2	6.5	8.9	7.7	14.1

*Support mast not included

The nominal dimensions and weights listed are for complete arrays. The antennas and stacking kits must be ordered separately.



CORPORATION

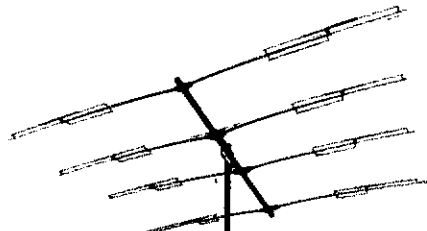
The Antenna Company

48 Perimeter Road, P.O. Box 4680

Manchester, NH 03108

SPRING MEANS ANTENNAS

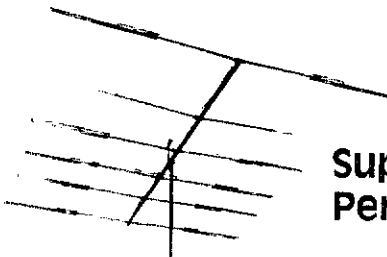
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- 14.0-14.350, 21.0-21.45, 28.0-29.750 MHz
- 4KW PEP • 50Ω feed with walun
- 24 ft. longest element



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SAME BASIC SPECS AS THE KT-34 BUT:

- 32 foot boom
- Overhead boom support with "Phillystran" non-conductive, non-reactive guy wire

DESIGNED TO OUTPERFORM ALL
COMMERCIALLY AVAILABLE TRIBANDER AND
MANY MONOBAND SYSTEMS, TOO

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QTC 667, MTN (K5OAF) sess 28, QNI 161, QTC 68, MSBN (WD5EYM) sess 28, QNI 2400, CQ 80, MN (WB5RMW) sess 27, QNI 187, QTC 9, M57 (KA5GGG) sess 23, QNI 120, QTC 22, RADES (K5GEI) sess 4, QNI 152, QTC 2, GSEN (KB5W) sess 19, QNI 297, QTC 27, CAEN (KA5AGD) sess 4, QNI 87, QTC 1, Traffic: N5AMK 489, KB5W 390, K5OAF 163, W5HKW 105, KT5Z 99, KD5P 98, W5WZ 28, W5LSG 24.

TENNESSEE: SCM, John C. Brown, NO4Q — SEC: K4TKC. STM: K4YOL. By the time most of you are reading this, the Oak Ridge hamfest will be history, I am sure that as usual it will be the big success that it has always been. I bring this up as it has been moved forward to get out of the way of the World's Fair at Knoxville, not the 3rd rainy weekend in July as in the past. The TN City (Kingsport-Bristol-Johnson City) will follow soon after. Hate to keep harping about upgrades but when one makes to the top it should be noted like NW4C (N4BYV) and NX4C (KA5RJC) to name some that have come to the attention of all. TN net certificates go to N4EFB KE4JK and W9NXC (Harrison, TN). CW Honor Roll stations for TN are W4DDK NO4Q W4WXH and W4ZJY. TSN Honor Roll stations are KA4BSG WA4CMS N4EAM N4EFB N4FTC KA4HPW WB2HSG KE4IK NG4J WA4LXP KA4OVE KA4PWU KA4RJC WD4SFB AJ4T WA4UCE and WB4YSN. I know that many are not taking the time to send a station activity report to the SCM. That is evident by the great amount of net traffic passed. Would like to hear from some of you big message handlers. Net summaries: Phone-LF, sess 106, QNI 5552, QTC 241; VHF, sess 118, QNI 3083, QTC 644; CW nets: sess 61, QNI 892, QTC 924; RTTY: sess 18, QNI 51, QTC 5. Come on RTTY people. Traffic: NG4J 572, N4EFB 502, W4WXH 446, W4OGG 178, W4ZJY 170, N4DZW 146, W4DDK 121, N4EAM 117, NV4Z 82, W4MRD 75, KY4L 51, NM4W 39, W4TYV 35, KA4BSG 33, W9NXC 31, K4WOP 31, WA4UCE 29, K4YOL 23, NX4C 21, WB4EOE 16, W4RUW 15, WD4EKA 12, WD4YT 11, WA4GLS 9, K4AMC 8, W4PSN 8, W4EWR 3, WB4DPO 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: WA4JQA. Net reporting: K4N MKPN K4N KYN K5N KNTN KEN BARE CARR. TSN SALES KYPON PAWN PAEWITN BARES SEKEN 3ARES TSTMN WARES 13ARES. Sessions 339, QNI 5103, QTC 832. New appointments: SEC: WA4UQA; EC: WD4PBF WB4ILF KD4IF KA4MKG NU4O. Upgrade: N4DBQ. His son is new Novice KA4WGM. Thanks to W4TPB for all his work on call sign plate bill. Northern Ky. Fest will be May 22. First Ky. Traffic award goes to KC4WN. Congrats to KNTN for one year of success with newsletter. We have 35 affiliated clubs in the section and 1332 League members. Traffic: KA4MZ 329, WD4YI 142, NW4P 134, K4AWN 104, KA4GFU 82, W4WQV 77, KA4SAA 64, N4EZE 60, KZ4G 52, WA4TE 50, KA4BGM 46, WB5BSC 45, WB4ILF 42, K8ACZ 40, K4MHL 36, WD4CQF 35, WA4UQA 33, WA4AGH 23, K4JLX 22, W4PKX 22, WA4YPO 19, K4HOE 18, K4AVX 17, WD4CJQ 17, WA4GAL 17, KD4TY 17, WA4SWF 16, KA4MBF 14, WA4JUI 14, WB4NHO 13, WB4APC 12, NN4H 12, KD4IF 12, WA4JAV 12, KA4GBZ 8, WD4YH 8, N4GD 7, W4OYI 7, KA4ADF 3, WA4IGD 3.

MICHIGAN: SCM, James R. Seelsy, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DEC: KC8DN WD8MBB K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNO WB8YDZ WB8YI K8ZJU.

Net	QNI*	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr.
QMN*	3653	1800 dy**	1800 dy**	1184	432	84	WA8PIM
MITN*	3953	1900 dy	68	425	28		WD8LRT
GLETN	3932	2100 dy	1057	189	28		WD8LRT
MACS*	3953	1100 dy**	813	170	28		K8LNE
UPN*	3922	1700 dy	500	110	32		WA8DHB
MNN*	3722	1730 dy**	362	83	56		KA8DEZ
WSSBN	3955	1900 dy	504	31	28		WB8SUR
BP	3930	1730 M/S	388	29	20		WB8ZGP
MEN	3930	0900 Sn	117	7	4		WB8ZGP
TASYL	3922	1900 M	23	3	4		KM8E

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. Vhf nets 9 rpts, 472 QNI, 23 tlc, 35 sess, WD8NKT mgr. 3932 is M1 emer. freq. Traffic Workshop Sn 3953 kHz, 1600. APES net Sn 3932 kHz, 1730. 00 reports: W8QG AC8Y. QBS reports: WA8RNB AF8V. New Novices in the Midland area: KA8a ORL QRO QXC. Upgrades: Tech-K8LJE; Advanced-N8CCG, WD8DWJ now KT8G, N8CQT now KT8V. MI has a new OCWA chapter, the Mid-Michigan Chapter, charter no. 135. WB8VWY is pres.; W8QOY is secy. Thanks to W8QG for the info. WD8OEP reports the 40-meter HHRCN (7250 kHz, 0030Z, M/T/Th) is alive and well and would welcome your participation. U.P. hamfest will be in Kingsford this year, July 31/Aug. 1. Do we need a hamfest coordinator? Not a new idea, but, looking at the way the dates are stacking up already on my calendar, I begin to wonder again. We do have some serious conflicts among major events, most of which could be avoided with the proper cooperation and coordination. Let me know what you think. Many will long remember the winter of 81/82, but none more gratefully than the hundred of folks who were helped when they needed it most, by Amateur Radio operators. Often at considerable risk to their own safety and well being, and with no thought of reward, amateurs throughout the U.S. and Canada upheld and enhanced our long-standing tradition of service in time of need in a most commendable way. I say in all truth and humility that I am proud to be a part of it. BPL: AF8V KA8CPS. Traffic: AF8V 693, KA8CPS 599, WB8MTD 417, K8BMMX 366, WD8LRT 308, K8KQ 208, KA8JUD 206, WB8YDZ 183, WD8RNO 142, K8GXV 128, K8KMQ 128, WB8YI 125, KA8DEZ 118, WB8SYA 118, WA8PIM 112, WD8AJE 107, WD8BIB 100, WA8DHB 95, WD8OSE 95, WB8HX 94, N8BNC 79, WD8RHU 75, K8SP 61, KA8IWW 58, K8CCP 53, WD8NKT 52, W8SCW 51, WB8TTA 48, KT8V 48, WD8EIB 41, K8LNE 37, WB8YHY 36, K8BI 35, WB8YI 35, KA8UPE 31, W8ECK 28, WD8OEP 27, K8Q 20, WB8YI 20, N8DGN 19, WB8OF 19, WB8XJ 17, W8CUP 16, WB8HPZ 16, WB8JUP 16, WB8YWA 15, K8KCF 14, WB8LDS 13, WD8LIP 13, KC8EO 11, K8ZJU 11, WD8RCK 9, KT8G 8, WB8EZ 7, KC8BH 7, WA8YBP 6, WD8BYA 4, KA8JFM 4, WB8LQ 4, W8TSP 3, WB8VL 3, WD8XZ 2, WB8M 2, K8BX 2, WB8NY 2 (Jan.), W8ECK 21, WB8XJ 30, WB8OIT 5.

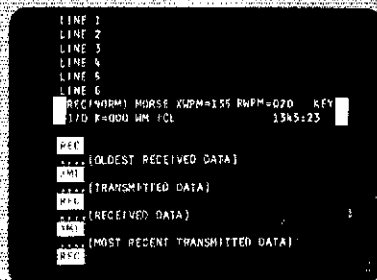
OHIO: SCM, Allen L. Severson, AB8P — ASCM: WB8MOK. SEC: KB8N. STM: K8OZ. NMs: WA8BUU W8EK KF8J WB8JGW WD8KFN WB8YGV WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	281	345	56	6:45/10 P.M.	3.577
BNR	255	172	28	6 P.M.	3.605
ONN				6:30 P.M.	3.708
OSN	253	166	28	8:10 P.M.	3.577
OSSBN	2675	2189	84	10:30 A.M., 4:15 & 6:45 P.M.	3.9725

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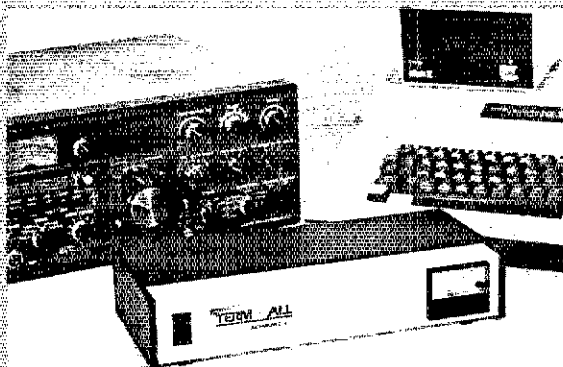
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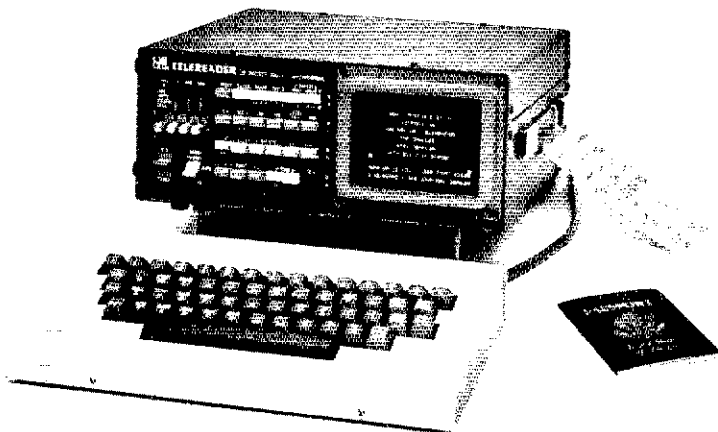
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OSSN 142 63 28 6:45 A.M. 3,577
 O6MN 441 41 28 9:00 P.M. 50,160
 They said it couldn't be done - and they were right. Our December traffic record stands but we did come close this month with a total of 12,941 from an amazing 122 stations reporting. A special "Well done!" with accolades to KBNCV, for his total of 1646 for the month! The second annual Ohio ARRL Convention in Cincinnati is now history. Those of us who attended had twice the enjoyment this year (two days instead of one). Special thanks to the hard working crew and major donors K&JE and WA8SS for their non-stop efforts, and to K&10, who so effectively represented Ho. I'm already being plans for next year's visit. Now is the season for the parades, runs, festivals, etc., so I hope everyone plans to participate as fully as possible. Event participation is our chance to hone the communication skills so necessary to render effective assistance during any of the disasters we may be facing in the months to come. Apointments: EC-NBBKR, Trumbull Co. Club elections; Madison Co. ARC: K&MYN, pres.; WDBQXT, v.p.; K&ELN, secy.; K&KHS, treas.; WBJGW, act. chm. Upgrades: W&KUZ and K&CBF, to Extra.

Local Nets	QNI	QTC	Seas.
BART	179	27	27
BRTN	452	290	28
CCOMF	99	12	8
COARES	85	5	3
Firelands Red Cr.	53	18	4
LCNWOARES	762	275	55
MASER (JAN)	135	4	4
HARA	77	4	4
TATN	277	486	62
TSRAC	933	89	31
VWCEN	49	5	4

Traffic: KBNCV 1646, WB8MZ 960, W8DMIO 552, W&BKFN 441, W&PHJ 429, K&BYR 416, K&BDJ 387, WA8HGH 349, W&BCDV 316, W&B&GW 312, W&B&DMF 290, K&OZ 276, W&B&SS 263, W&B&J 250, W&B&R 245, W&B&QHV 235, N&B&CK 228, K&FB 208, W&B&GMT 195, W&B&GX 192, K&B&YS 189, W&B&UP 187, W&B&OZ 182, K&B&E 176, W&B&OHU 156, W&B&KBW 152, W&B&K 134, W&B&SIO 113, W&B&YTD 105, N&A&UH 104, W&B&AJ 104, K&B&PT 101, W&B&MOK 100, W&B&J 94, K3RC 94, W&B&D&Y 90, K&B&EF 80, N&B&R 76, W&B&TV 76, K&C&J 75, N&B&C 75, W&B&TRK 73, W&B&EM 70, W&B> 68, W&B&EG 68, K&C&J 66, W&B&IKC 65, K&B&DL 62, W&B&S&JE 60, K&B&AN 59, N&B&CGM 55, K&A&K&FW 55, W&B&HL 49, W&B&HHZ 48, W&B&JIP 48, K&B&JQ 46, N&B&AD 45, W&B&TP 44, W&B&NEC 43, N&B&CW 42, W&B&AM 41, W&B&DRG 40, K&A&B&HG 38, W&B&UP 37, W&B&AW 36, W&B&OCL 35, W&B&N&C 35, W&B&MRL 32, K&B&VE 31, W&B&CHL 28, K&B&DJ 28, W&B&HED 25, W&B&D&YX 26, K&B&KY 25, W&B&H&D 25, N&B&EH 24, W&B&SIO 24, K&B&GV 22, N&B&CS 21, N&B&GZ 21, W&B&YTO 21, W&B&INK 20, W&B&OAC 20, W&B&VA 20, K&B&YU 20, K&B&MR 18, K&B&IU 17, W&B&OXN 17, W&B&TKU 17, W&B&NHV 16, K&B&GMF 15, N&B&NS 14, W&B&P 14, W&B&VOA 14, K&B&GGZ 13, W&B&MGA 13, W&B&OY 13, W&B&RG 13, W&B&DOS 12, W&B&HVA 11, W&B&A&H 10, W&B&B&CX 10, K&B&N&XV 10, W&B&RHP 10, W&B&RSM 10, N&B&ZC 9, K&B&N&XD 7, K&B&VOY 7, W&B&YUS 7, K&B&C&DE 6, K&B&D&G 6, W&B&M&FX 6, W&B&OJL 6, W&B&SEK 5, W&B&L&E 5, K&A&KS 5, N&B&AJ 4, W&B&NTR 4, W&B&ZM 4, W&A&TAA 2, W&B&YF 1, (Jan.) K&B&E 80, W&B&AJ 22, W&B&NTR 5, W&B&L&E 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK - SEC: KB2KW, STM: WA2SPL, ASCM: W2IT KB2TM. W&B&HOU from Southern Catskill RN reports new xmt for the rpt. AR&S developing a county-wide emergency plan with Civil Defense. WA2SPL helped out in the Valentines message fair from RPI. He's also sporting a new call sign: Army MARS that is, AA2QC1 W&B&SVA, active on N&YSM, recently upgraded to Extra. W&B&LX advises that Ulster RACOS nets have been active and that W&B&ZLY is now WA2JM/RJ. Albany ARA reports that W&B&FOO just observed 51 years as a licensed Amateur Radio Operator. N&C&ZN just upgraded to Advanced. KB2KW upgraded to Extra a while back but somehow it was omitted from the column! Several traffic stations are in line for BPL Medallions and should have them by now! A very special thanks to all those who assisted on the Indian Point Drill on March 3rd. Thanks to the many hams who helped. Comms was excellent. Many officials saw the tremendous contribution of Amateur Radio. Spelling is here and so many opportunities to provide public service with comms for walkathons, bikeathons, etc. Let's all get out and help our local groups: BPL: W&B&EAG KA2KVZ WB2MCO WA2SPL, PSHR: WB2MCO WA2SPL KA2KVZ WB2EAG WB2IWB WB2TWO KB2KW K2HNW WB2HOU N2BDW AK2E K2ZVI N&C&PX. Traffic: WA2SPL 1764, WB2EAG 615, WB2MCO 602, KA2KVZ 515, WA2YBM 129, WB2BN 128, AK2E 124, K2ZVI 14, WA2JBO 89, K2HNW 87, KB2KW 85, WB2TWO 82, N2BDW 70, WA2CJY 54, WB2SON 46, WB2HOU 43, AA2Y 43, N2C&X 33, N2BFG 23, K2MI 15, N2CPX 14, W&B&SVA 13, WB2DHR 10.

NEW YORK CITY - LONG ISLAND: SCM: John H. Smale, K2IZ - SEC: WA2KJ, STM: WB2BN9.

NY City	3630 kHz	1900/2200	K&GCE
NLI CW	3628 kHz	1930	W&B&EUF
NLIPN	3628 kHz	1930	W&B&EUF
NLS	3720 kHz	1930	W&B&EUF
NCVHF	6 04/64	2100 MWTH	WA2SOE
BAVHF	7 915/315	2030 M-F	N&B&M
SCVHF	4 775/37	2030	WA2ARC
LIMARC	6 25/85	2100 F	WA2SOE
ESS	3690 kHz	1800	W&B&WSS
NYS	3577 kHz	1900/2200	KA2CTU
NYS	7077 kHz	1000 M-S	WB2EAG

Note: All times are local. Please try and help out by checking in whenever you can. Plan now to attend the Hudson Division convention being held Oct 29-31 at the Playboy Club at Great Gorge, NJ. WA2HN is the 751st member of Metroplex. KS2G now has 3 out of 5 bands completed for 6B&V. NLIPLN welcomes WB2IWB. N2AKZ has been accepted as a full member of N&V. M&R&CORP MARS. WA2TYX has upgraded to Advanced. Suffolk Co. ARC now has their repeater located on the Telco building in Dix Hills, thanks to W&B&AT WA2S&W WA2PLT WA2ATL WB2OY WB2HEB and WA2LUY. The Staten Island Award will be sent to any ham who contacts 10 Staten Island hams, any band, any mode. Send log info plus one dollar or 3 IRCs to Walt Persans, WA2ZBE, 135 Roe St., Staten Island, NY 10310. Look for the Grumman ARC Sunday morning WA2G net on 7290 kHz at 1230Z. LIMARC participated in a combination flea market and craft fair held at the Lindner Place School in Malverne by setting up a demonstration amateur station. Members present were WB2WAK WB2WJW KB2JU

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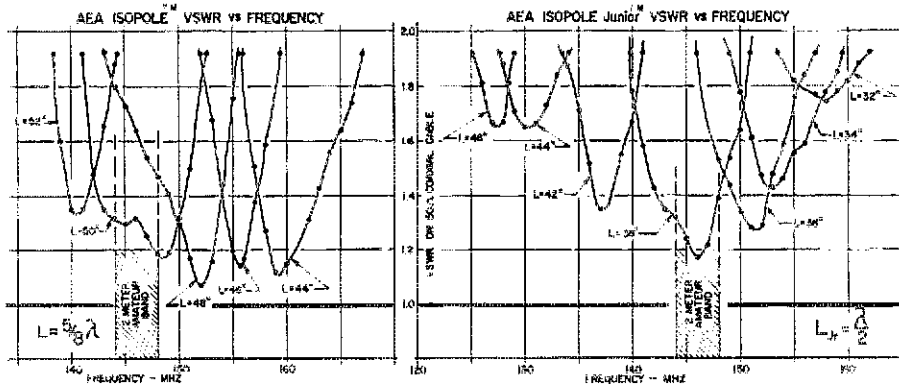


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New Castle - Delaware Amateur Supply (302) 328-7728

FLORIDA
Clearwater - Amateur Electronic Supply (813) 461-HAMS

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Salina - Electronics, Inc. (913) 827-7377

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Hopkinsville - Cohoon Amateur Supply (502) 886-4535

MICHIGAN
Durand - Omar Electronics (517) 288-2789

MISSOURI
Butler - Henry Radio (816) 679-3127

Riverside - Missouri Communications (816) 741-8118

NEBRASKA
Lincoln - Communications Center (800) 228-4097

NEVADA
Las Vegas - Amateur Electronic Supply (702) 647-3114

NEW HAMPSHIRE
Hudson - Tuft's Radio & Electronics (603) 883-5005

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Somerset - Radios Unlimited (201) 469-4599

NEW YORK
Amsterdam - Acirondack Radio (518) 842-8350

Huntington Station - B.C. Communications (516) 549-8833

New York - Barry Electronics (212) 925-7000

Oriskany - Radio World (800) 448-9338

Rensselaer - Softron Systems (918) 477-8132

Syracuse - Ham-Bone Radio (315) 446-2266

NORTH CAROLINA
Brasstown - Grove Enterprises (704) 837-2216

OHIO
Wickliffe - Amateur Electronic Supply (216) 585-7388

Cincinnati - Queen City Electronics (513) 931-1577

Reynoldsburg - Universal Amateur Radio (614) 866-HAMS

SOUTH DAKOTA
Watertown - Burghardt Amateur Radio (605) 886-7314

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Houston - Madison Electronics (713) 658-0268

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Vienna - Electronic Equipment Bank (703) 938-3350

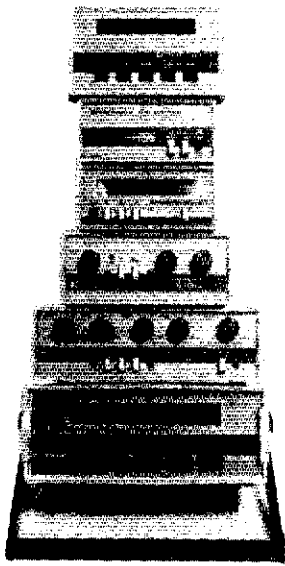
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WEST GERMANY
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and WA2NIC. K2YYM passed his Extra, along with WB2AII. KA2DRR passed his General. Radio Central has a winter net on 21.365 every Mon, Wed and Fri. WB2WLP has a complete new Kenwood-line for the low bands. KA2BSI is working at St. Charles as a "candystriper." Members of Radio Central ARC who helped with "Operation Santa" were N2AWM WB2VJO KF2F WA2MHZ and K2RPZ. WA2KEC is back on 2 with a new Kenwood TR-7850, and WA2MHZ has a new TR-2500. Congrats to W2AHV on making BPL Traffic. W2AHV 280, K2AKZ 234, WB2BNY 201, WA2ARC 200, W2GKZ 92, N2KZ 91, KA2MA 62, N2BSS 58, KA2GFU 50, N2CCN 42, KS2G 31, W2DBC 26, K2I2 24, KR2B 11.

NORTHERN NEW JERSEY: SCM: Robert Naukomm, KB2WU - ASCM: W5DTR, SEC: WB2VUF, STM: W2XD, NMs: W2CC AG2R N2BNB N2BOP KA2GQQ KA2HNP WB2IQ W2PSU.

Net	Freq	Time	Sess.	QNI	QSP
NJPN	3950	6 P.M. Dy	32	555	397
		9 A.M. Sn			
NJNE	3695	7 P.M. Dy	28	379	181
NJNL	3695	10 P.M. Dy	28	245	169
NJSN	3735	6:30 P.M. Dy	31	199	106
OBTTN	7212	8 P.M. Dy	28	519	194
TCETN	855/255	7:30 P.M. Dy	28	271	84
NJVN	49/49	10:30 P.M. Dy	30	345	231
NJWVN	90/30	8:30 P.M. Dy	4	36	8
NJRTTY	47.61	Autostart			

W2CC reports the Mayor of the City of Englewood has issued a proclamation declaring June 20-28 Amateur Radio Week. Congrats to W2NPT on upgrading to Advanced and to W2IU on being appointed Official Relay Station. The annual TCRA hamfest- flea market will be held on Sunday, May 2 at the Passaic Township Center in Sterling reports KC2FS. New officers for the Sussex Co. ARC WA2GZB, pres.; WA2LHX, v.p.; N2BIM, secy; K2CBG, treas. The Bergen Co. ARX hamfest will be held Sunday, May 23, reports KK2U. Want to have some fun and help earn credits for Amateur Radio? Then join a group and help with the many public service events during the spring and summer. Are you a member of the Amateur Radio Emergency Service (ARES)? If not, sign up and also support your local and state nets. Be trained when your help is needed. KB2WV should be back in April and station activity reports should then be sent him. Congrats to KF2T and KB2HM on making BPLI. KB2HM K2VX AG2R W2XD KF2T W5DTR N2BNB WB3HWX KA5DLV KA2JMH KA2GSX N2XJ WA7DPK. Traffic: KF2T 810, KB2HM 543, AG2R 403, K2VX 248, W2XD 237, N2BOP 126, N2XJ 108, WB3HWX 101, N2BNB 88, N2SU 67, KA2JMH 68, KA5DLV 65, W5DTR 54, W2ZEP 42, KC2AK 32, WB2KLF 31, WA7DPK 24, W2CC 23, KA2GSX 22, WA2GKG 13.

MIDWEST DIVISION

IOWA: SCM: Bob McCaffrey, K4CY — SEC: W0RPK, STM: KA0X, NMs: WB0AVW WA0AUX WD0HND W0YLS. I know I speak for many hams throughout the nation when I say that we shall mourn the untimely passing of W0LU, who was known for his many contributions to this hobby. Get your reservations in now for the National Convention at Cedar Rapids. New officers at Ft. Dodge are N0CJ, WB0NMW WB0OJT and K0ARA and in Humboldt N0APC N0CUB WA0WHZ K0GP. New upgrades: KA0IT N0BHA K00P KA0LIU WB0RVS. New OFS: I1, KA0BGIN, PSHR to KA0JQG WB0QAM. KA0BGIN. Notice classes in Mason City, SooCy, DSM. Send me a notice class in Mason City, SooCy, DSM. 100% rep to DTRN and TEN. My thanks to the ECs who represented the ARES at IVOAD meeting. Storm watch activities should be ready to go. Contact your EC. Good gathering at Atlantic. K10N is "Waterloo Ham of the Year". WD0CMB is new pres of U of I ARC. Thanks to K0IIR OO, AA0J OO, W0BQ OBS, W0JAQ OBS for 100% reporting. How about the rest of you!

Net	Freq	Days	UTC	QNI	QTC	Sess.
TLCN	3560	Dy	0030-0400	424	192	56
IGN	3713	TThS	0100	73	53	12
75M Phone	3970	M-S	1830-2330	1960	111	48
PM net	3978	M-F	2130	232	11	19

See you at the National keep reports coming!! Traffic: WA0AX 556, WB0QAM 205, AE0BR 156, K0GP 136, W0SS 117, W0YLS 112, WD0HND 97, KA0JQG 105, WB0UPF 58, K0CY 54, KA0BGG 34, W0BWB 32, WB0AVW 22, KA0ADF 16, KA0JPN 15, K0EVC 8, K0ZQ 8.

KANSAS: SCM: Robert M. Summers, K0BFX — SEC: W0KL, STM: W0OYH. Looks like the ice and wind done went and did W0AM a turn again; his West Coast vacation was what did it — just got to stay home and keep the heat to the beam cw. Storm season is about upon us again and a group from Pilot Knob ARC attended the KC SKYWARN organizational meeting to prep for the worst. Know of someone interested in getting cw speed up a bit? Tell them about code practice from W0TQ Mondays 3751 kHz at 715 P.M. local. The Kansas DX Club is now an ARRL affiliated club. They have a club frequency of 146.49 MHz. A weekly DX net meets every Wednesday except the night of the reg club meeting at 7 P.M. on 3.810 MHz. Anyone interested may contact Dean Lewis, 609 Otto, Salina, KS 67401. They do have a newsletter and the SCM is on the mailing list. Recent coordination requests approved by the repeater council are: Iola 146.04/146.64 N0CHE; Marion 147.69/147.09 K0PFU. Traffic: W0FRG 166, K0EZ 138, W0QMT 103, WB0ZEN 102, W0HI 84, W0OYH 81, AC0E 72, KA0CJF 69, W0AM 65, K0BFX 65, WB0YLP 36, W0BYP 34, KA0E 31, K0FPC 13, W0RBO 12, W0PB 11, W0KL 7, W0NYG 4, N0LL 3. (Jan.) K0EZ 115, W0AM 28.

MISSOURI: SCM: L.G. Wilson, K0RWL — ASCM: W0OTF, STM: KM0L, SEC: N0AJI. The Heart of America RC recently completed Novice classes and are hopeful of a new crop of Novices for Field Day. The Kansas City DX Club is gearing up for Dayton and will be sponsoring pile-up contests again this year in the Hospitality Suite. Congrats to the following upgrades: Tech: KA0EUG@ KA0KAA; Gen — WA0ADJ KA0KBX KA0KBY; Adv — WD0FYI.

Net	QNI	QTC	Net	QNI	QTC
MOSSBN	642	62	CMEN	99	0
NEMOE	98	3	ACE	48	1
HBN	455	46			

Get well soon goes out to KC0CL and WA0HML. The Ozark ARS reports that their rpt 146.37/97 is back on after being struck by lightning. Traffic: KC0AS 472, KC0CL 108, W0BMA 100, K0SI 93, W0OTF 91, K10K 71, KC0HV 70, W0CUD 60, K0BL 52, N0DDZ 38, N0BKH 30, K0PCK 25, WB0SS 20, KM0L 13, K0RWL 10, W0BNIE 9, W0NUB 3.

NEBRASKA: SCM: Shirley M. Rice, KA0BYP — SEC: N0AIH, STM: WD0BQG. Our deepest sympathy to the

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- Optional SC-1 Station Console includes quartz LCD Clock, AC Power Supply, DTMF 16 Button Pad, Scanning Controls, and XCVR A - XCVR B Microphone Switching.
- Optional Accessories: FP-80A AC Power Supply, FTS-64E 32 Tone CTCSS/Burst Encoder, YM-34 Desk Microphone, YM-38 Desk Microphone with Scan Switches.

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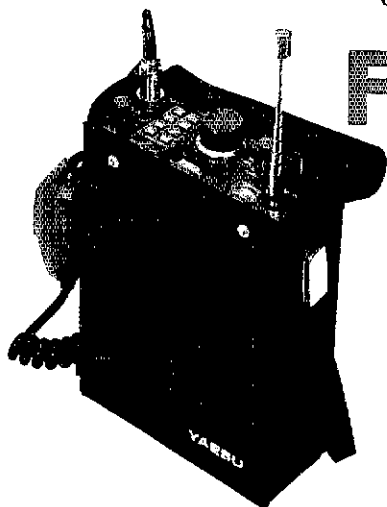
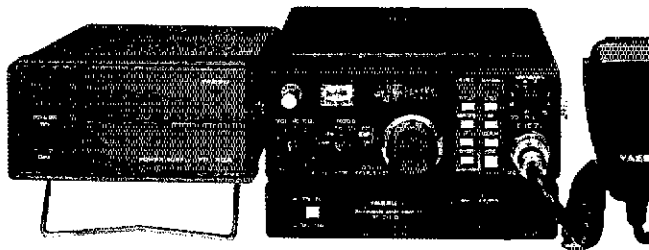
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- Dual VFO System with two synthesizer steps per mode. Use one VFO for the FM band and the second VFO for SSB, if you like!
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- Synthesizer steps optimized for mode in use.

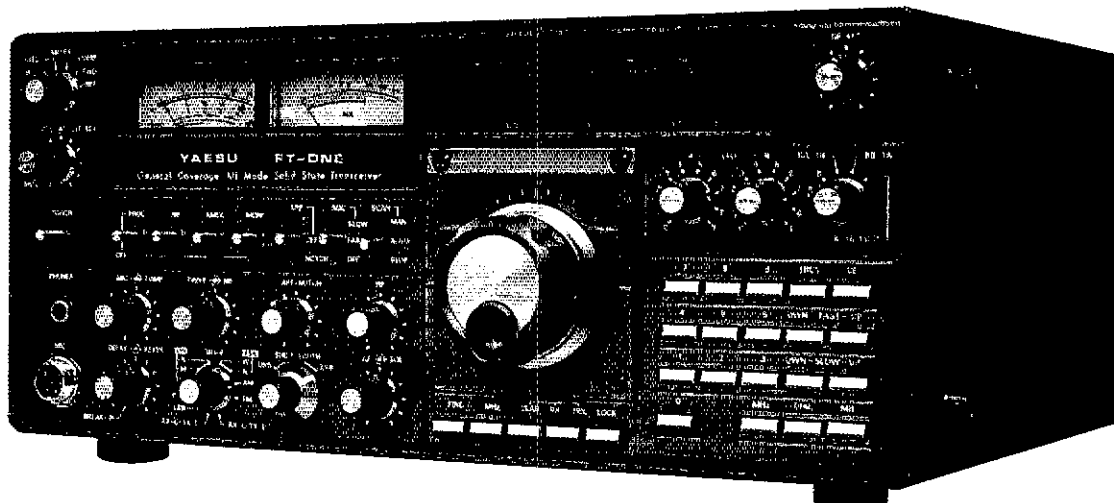
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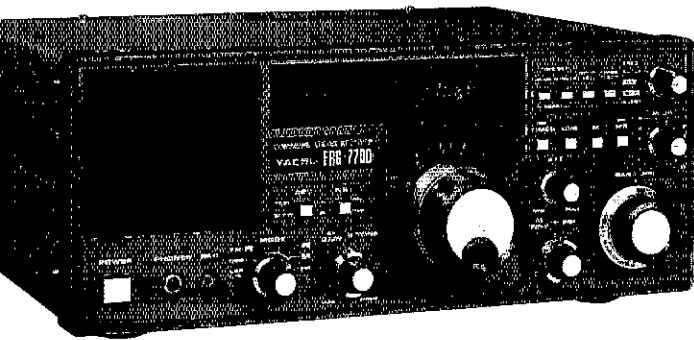
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The radio.



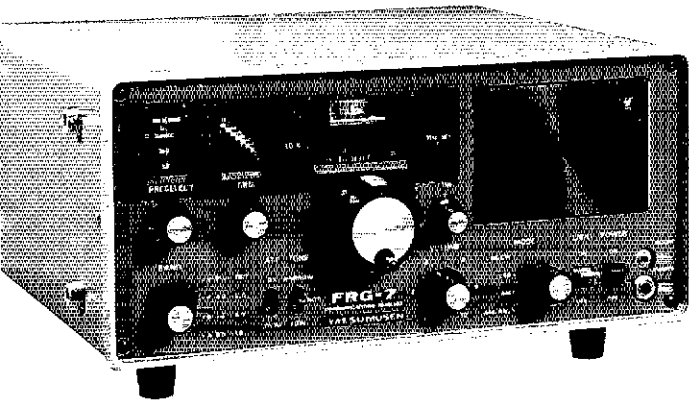
382-1

FRG-7700

DELUXE HF COMMUNICATIONS RECEIVER



- 150 KHz through 29.99 MHz coverage on AM, SSB, CW and FM
- Three AM bandwidths for changing interference conditions on crowded shortwave broadcast bands.
- Built-in Quartz Digital Clock with timer for control of station accessories.
- Tape Recorder Output Jack on front panel.
- Noise Blanker and AGC Selection controlled from front panel.
- Optional memory unit allows storage and recall of up to 12 frequencies — no more frantic dial twisting at I.D. time!
- Optional Accessories: FRV-7700 VHF Converter, FRT-7700 Antenna Tuner, FF-5 500 KHz Low-Pass Filter, DC-7700 DC Kit, YH-77 Headphones and QTR-24D Deluxe World Clock.

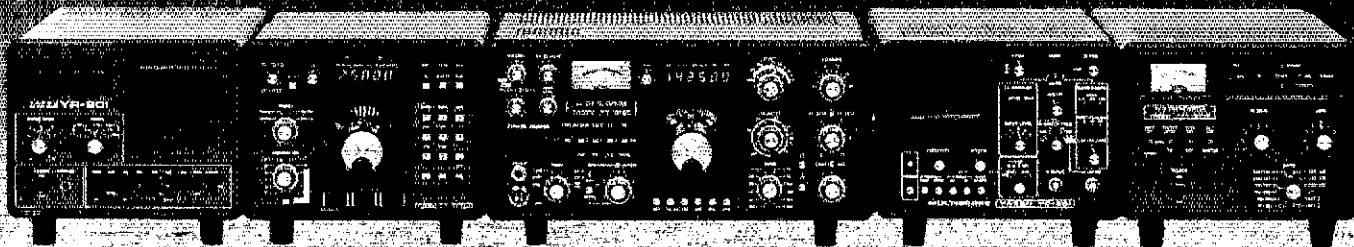


FRG-7 HF COMMUNICATIONS RECEIVER

- Top-selling Shortwave Receiver provides high performance at a reasonable price.
- 500 KHz - 29.99 MHz using Wadley Loop Synthesizer for excellent stability.
- Audio Filter for enhanced reception under difficult conditions.
- Built-in Tunable Preselector for excellent out-of-band interference rejection.
- Front panel Tape Recorder Jack plus Headphone Jack.
- Dial Lamps may be switched off for reduced power consumption.

FT-101ZD MK III

COST-EFFECTIVE DX PERFORMANCE!



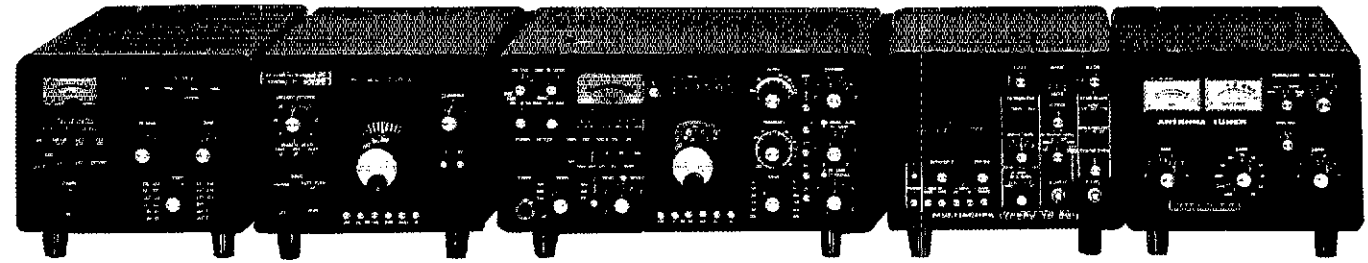
- 160-10 Meter coverage on SSB and CW. AM or FM Unit may be added as optional accessory.
- Variable IF bandwidth, using cascaded crystal filters for excellent interference rejection.
- Audio Peak/Notch Filter for razor-sharp selectivity.
- CW Wide-Narrow Selection using optional 350, 450, or 600 Hz CW Filter.
- RF Speech Processor and Adjustable-Threshold Noise Blanker are built in.
- Worldwide Power Capability provided by Multi-Tap Power Transformer, covering 100/110/117/200/220/234 VAC.
- Rugged 6146B Finals with RF negative feedback.
- Optional Accessories: FV-101DM Scanning VFO with 10 Hz Synthesizer and Memory, FTV-901R VHF/UHF Transverter, FC-902 Antenna Coupler, SP-901P Speaker/Patch, DC-101Z DC-DC Converter, FA-9 Cooling Fan, complete line of Microphones.

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The radio.



FT-902DM

THE CHOICE OF CHAMPIONS
FOR DX AND CONTEST
OPERATION AROUND THE WORLD



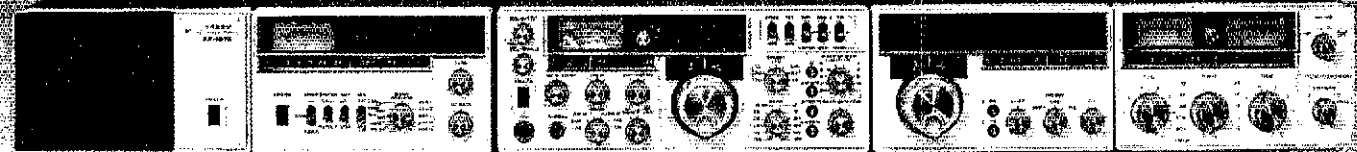
FT-902DM Accessories

- SSB, CW, AM, FM and FSK operation built in for All-Mode Versatility.
- 160-10 Meters, including the new bands recently assigned at WARC.
- Variable IF Bandwidth and IF Rejection Tuning for outstanding Selectivity. Cascaded Filters standard, not optional accessories.
- Audio Peak CW Filter provides single signal reception.
- Built-in Curtis 8044 IC Keyer.
- Built-in Memory System for control of Transmit, Receive, or Transceive Frequency.
- Rugged 6146B final tubes with RF negative feedback for excellent spectral purity.
- Built in RF Speech Processor and IF Noise Blanker.
- FTV-901R extends coverage to 50, 144, and 430 MHz on full duplex (External Receiver required for duplex operation) for satellite work. 6M/70CM Units optional.
- FV-901DM Synthesized VFO scans in 100 Hz steps and sports 40 Frequency Memory Bank for DX or contest work.
- YO-901P Multiscope includes IF Monitor, Panadapter, and Two-tone Generator for quick station testing.
- FC-902 Antenna Coupler provides for matching 3 Coax-fed Antennas plus one random wire.
- YR-901 CW/RTTY Reader provides versatile Teletype or CW Monitoring using external video monitor.
- SP-901P Speaker/Patch and SP-901 External Speaker round out your FT-902DM Total Communications System.

FT-107M

SOLID-STATE HF TRANSCEIVER

BROADBAND PERFORMANCE
FOR EASE OF OPERATION



- All Solid State; 160-10 Meter Transceiver equipped for SSB, CW, FSK, and AM operations.
- 12 Frequency Memory System with Digital Memory Shift providing scanning capability (Scanning Microphone optional).
- Excellent VSWR Turndown Characteristics: 75% Power Output at 3:1 SWR.
- Variable IF bandwidth using Cascaded Crystal Filters, Audio Peak/Notch Filter built in.
- Diode Ring Mixer for strong IMD performance. Low-Noise Premix Crystal Local Oscillator.
- Digital plus Analog Frequency Counter Readout. Digital Display utilizes true frequency.
- Built-in RF Speech Processor and IF Noise Blanker.
- Choice of optional internal or external AC Power Supply.
- Optional 350, 450, and 600 Hz CW Filters.
- Optional Accessories: FV-107 External VFO, FTV-107R VHF/UHF Transverter, FC-107 Antenna Coupler, SP-107P Speaker/Patch, SP-107 Speaker.

Price And Specifications Subject to
Change Without Notice or Obligation

YAESU
The radio.



382-3

YAESU ELECTRONICS CORP. 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

ICOM Presents the Minicom IC-25A

Imagine..25 watts/5 memories/2 scanner systems in a 2"H x 5½"W x 7"D 2 meter transceiver!

A very small package with a 25 watt punch, the IC-25A is a full featured FM transceiver for the space conscientious operator. Nearly the same size as an automotive AM radio, the IC-25A will fit in places usually considered impossible for a one piece 2 meter transceiver. The IC-25A is no lightweight when it comes to features:

- 5 memories. Store your favorite frequencies.
- Priority channel. Monitor your most important frequency.

- 25 watts high/1 watt battery saving low power.

• Touchtone™ mic standard..no extra cost...to work your favorite autopatch repeater.

• Full band scan/programmable scan (set your own limits)/memory scan...all with automatic resume after preset delay or carrier drop.

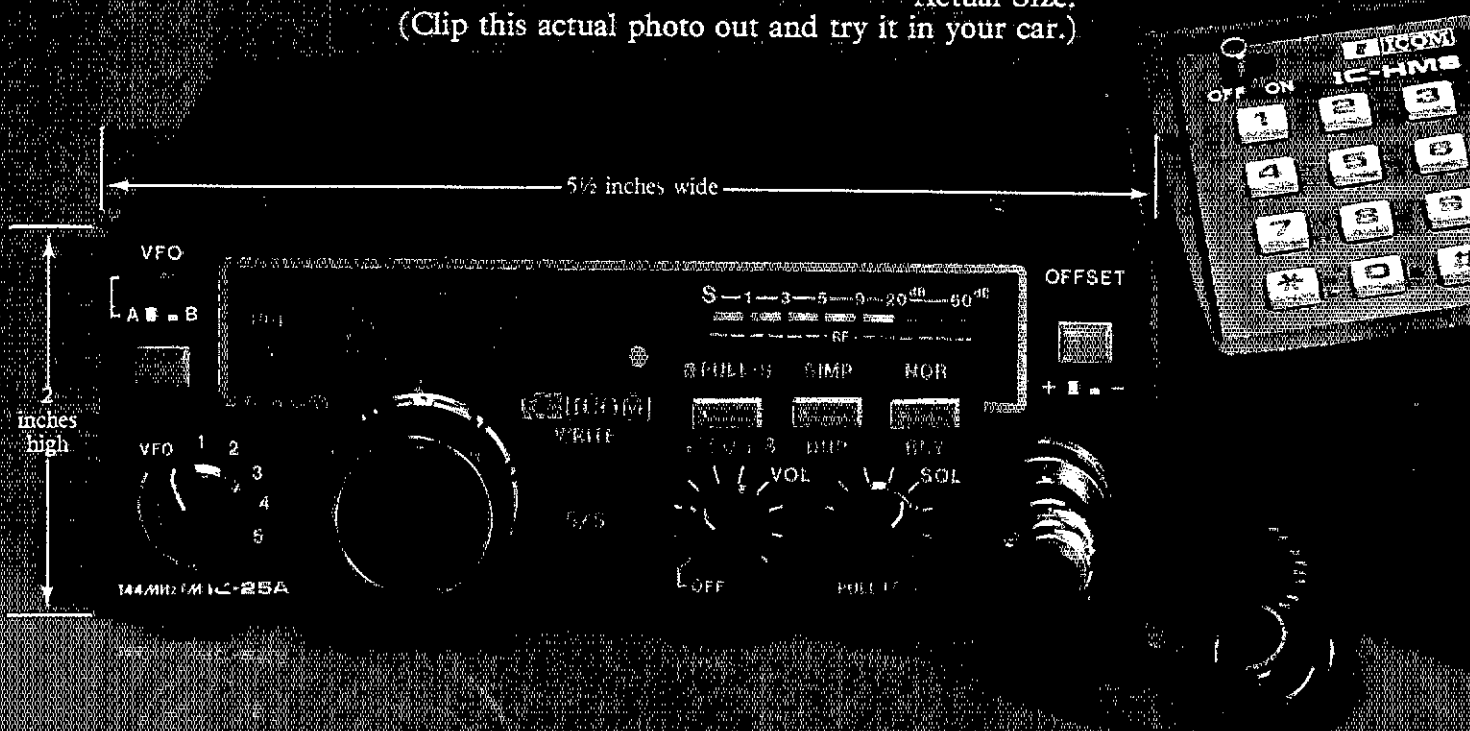
• 2 VFO's with data transfer standard.

• 2 tuning rates 5KHz (A VFO) or 15 KHz (B VFO).

• Nor/Rev switch for instant monitoring of repeater inputs.

• Memory back up power supply option holds memory when attached.

Actual Size.
(Clip this actual photo out and try it in your car.)



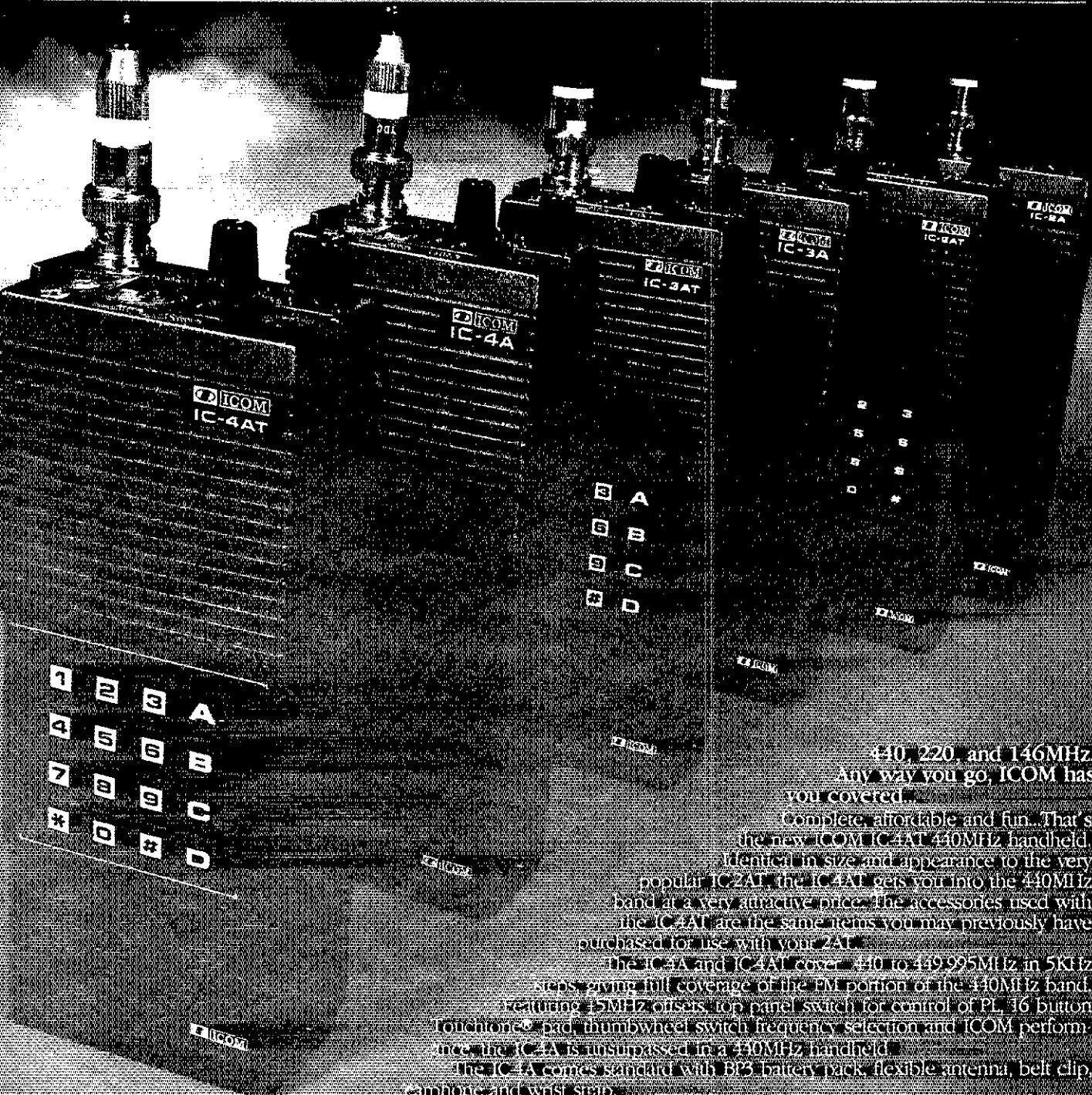
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3331 Towerwood Drive, Suite 307, Dallas, TX 75234



ICOM

All stated specifications are approximate and subject to change without notice or obligation. ALL ICOM radio equipment is designed and manufactured in Japan.

Hut, 2,3,4...



440, 220, and 146MHz. Any way you go, ICOM has you covered.

Complete, affordable and fun. That's the way ICOM IC-4AT 440MHz handheld. Identical in size and appearance to the very popular IC-2AT, the IC-4AT gets you into the 440MHz band at a very attractive price. The accessories used with the IC-4AT are the same items you may previously have purchased for use with your 2AT.

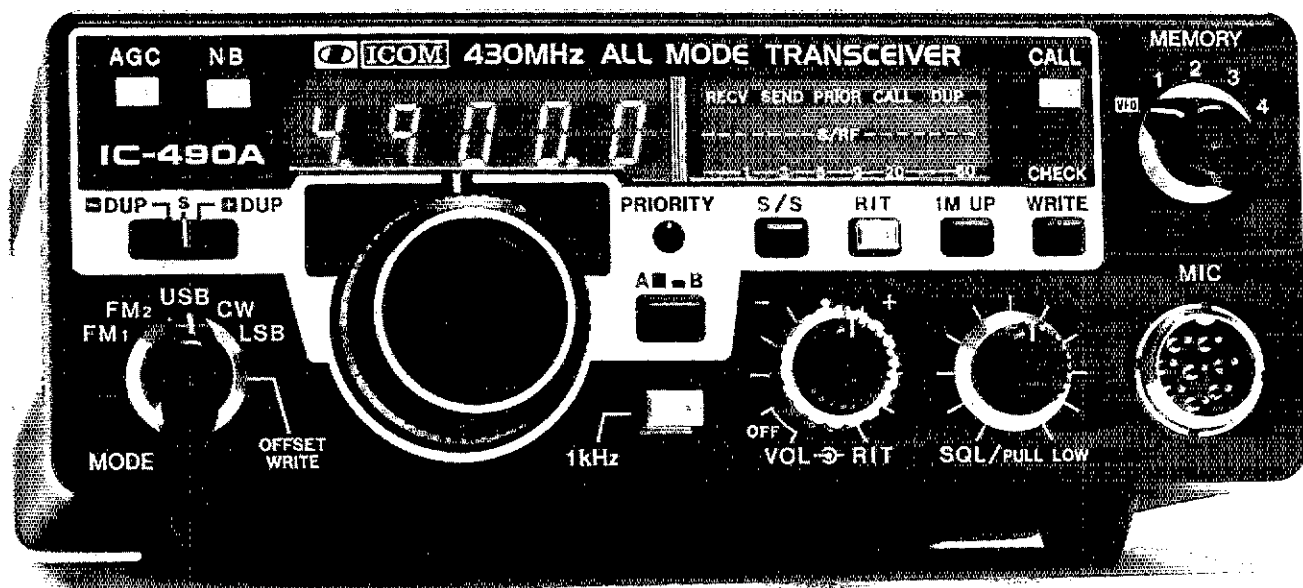
The IC-4A and IC-4AT cover 440 to 449.995MHz in 5KHz steps giving full coverage of the FM portion of the 440MHz band. Featuring 5MHz offset, top panel switch for control of PL, 16 button TotemPole™ pad, thumbwheel switch frequency selection and ICOM performance, the IC-4A is unsurpassed in a 440MHz handheld.

The IC-4A comes standard with BP3 battery pack, flexible antenna, belt clip, earphone and wrist strap.

 **ICOM**
The World System

ICOM IC-490A

Space Age Communications



The IC-490A transceiver provides many desirable base station features in a mobile package. This compact, high performance multimode radio features FM, SSB and CW (CW monitor included) to satisfy your needs in the 430-440 MHz region.

The IC-490A provides rapid QSY and accurate frequency selection in the 430 MHz band with tuning rates of 25, 5 and 1 KHz in FM; 5, 1 and 0.1 KHz in the other modes. Duplex offsets are adjustable in 100 KHz increments.

Two VFO's, priority call frequency, 1 MHz up button and 4 memories mean convenience in quickly selecting important frequencies.

Scanning features include full band scan, programmable band scan (scans between memory 1 and 2) or memory scan.

Using internal switches, the IC-490A will resume scan after an adjustable time delay, resume scan after carrier drop, sense busy or empty channels, and control scan speed.

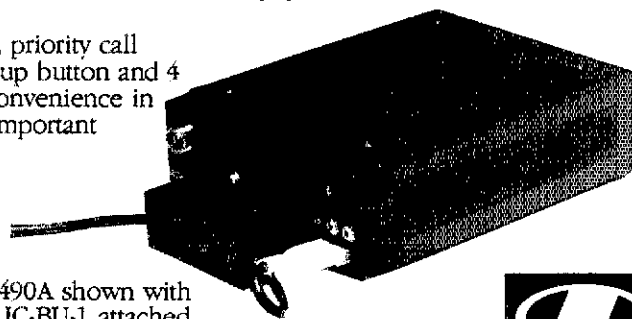
Use the call button to automatically select a frequency designated as the primary channel overriding other transceiver functions.

The IC-490A has a highly visible green LED readout for use over a wide range of ambient light conditions. Also, there are LED annunciators for receive, send, priority, call and duplex, as well as an LED meter. For receive on SSB, AGC speed and noise blanker are controlled from the front panel. Memory backup is available with the optional IC-BU-1 memory backup unit.

With 10 watts output in a 6 11/16" wide x 2 1/2" high x 8 5/8" deep package, the very compact IC-490A gives you multi-featured operation for your entry into the 70 cm band.

Included with the IC-490A is the new IC-HM11 microphone for remote up/down frequency control. See the new IC-490A at your dealer today.

IC-490A shown with IC-BU-1 attached



ICOM

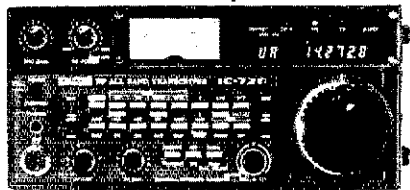
The World System



ICOM

- Check the Big Savings at AES!

SAVE \$200



IC-720A Digital HF Transceiver. 160-10m, including 10, 18 & 24 MHz, 100w. 13.8vdc/15A. 4 1/2" h x 9 3/4" w x 12 1/2" d. Wt. 17 lbs. (Regular \$1349) ... **NOW \$1149.00**
FL-32 500Hz CW filter..... 59.50
FL-34 5.2 KHz AM filter..... 49.50

SAVE \$129



IC-730 Digital HF Xcvr 80-10m, incl. 10, 18 & 24 MHz. 200w PEP. UP/DN tune w/optional HM-10 mic. 9 1/2" w x 3 3/4" h x 10 1/2" d, 10 lbs. (Reg. \$829) ... **NOW \$699.95**
FL-30 SSB filter (passband tuning)..... 59.50
FL-44 455 KHz SSB filter (Reg. \$159) ... **NOW 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
HM-10 Scanning mobile microphone..... 39.50

Accessories for 720A & 730

PS-15 Power supply (Reg. \$149)..... **NOW \$134.95**
PS-20 20A power supply (Reg. \$229) ... **NOW 199.95**
 Adaptor cable for PS-20 to 720A or 730..... 10.00
CF-1 Cooling fan for PS-15* or PS-20..... 45.00
EX-144* Adaptor for CF-1 to PS-15..... 6.50
MB-5 Mobile mount..... 19.50
 Phone patch - specify radio (Reg. \$139) **NOW 129.95**
SP-3 Base station speaker..... 49.50
SM-5 Electret desk microphone..... 39.00
AH1 Mobile ant. & tuner (Reg. \$289) ... **NOW 259.95**
AT-100 100w auto. tuner (Reg. \$349) ... **NOW 314.95**
AT-500 500w auto. tuner (Reg. \$449) ... **NOW 399.95**

SAVE \$400



IC-2KL HF linear. 160-15m, including 10 & 18 MHz. Solid-state broadband tuning, 500w out. Automatic with 720A & 730 w/EX-202 (Reg. \$1795) ... **NOW \$1395.00**



SAVE \$\$ - VHF/UHF



IC-251A 2m All-mode Xcvr. 144.8-148.1999 MHz. 10w, digital, memories, scan, 2 VFOs 13.8vdc/117vac. 4 1/2" h x 9 3/4" w x 10 1/2" d, 11 lbs (Reg. \$749) **NOW \$599.95**

IC-451A UHF All Mode Transceiver for OSCAR mode B or J & simplex. Models for 430-440 or 440-450 MHz. Similar to IC-251A (Regular \$899)..... **NOW \$769.95**
IC-AG1 UHF Preamplifier (Reg. \$89) **NOW \$79.95**

IC-551 6m SSB/CW/(FM*) transceiver. 50-53.999 MHz. 10w, digital readout, memories, scan, two VFO's & noise blander. 13.8vdc/117vac (Reg. \$479) ... **NOW \$399.95**

EX-106* FM adaptor (Reg. \$125) **NOW 112.95**
EX-107 VOX unit (Reg. \$55) **NOW 49.95**
EX-108 PB tune/RF proc. (Reg. \$105) ... **NOW 94.95**

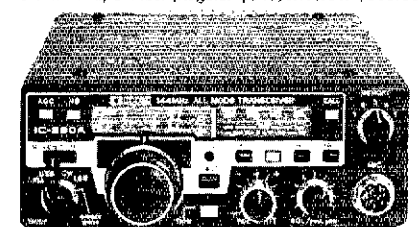
IC-551D same as 551 but 80w. **EX-107** & **EX-108** built-in. 13.8vdc/18A - **PS-20*** (Reg. \$699) ... **NOW 599.95**

PS-20* AC power supply (Reg. \$229) ... **NOW 199.95**

CF-1 Cooling fan for PS-20..... 45.00
IC-560 6m SSB/CW/FM Mobile Xcvr. 10w, digital, three memories, mem. & band scan, two VFOs. 13.8vdc/3.5A. 2 1/2" h x 7 1/4" w x 9" d, 6 lbs. (Reg. \$489) ... **NOW \$439.95**



IC-25A Compact 2m FM Mobile Xcvr. 25w, 5 memories, scan, priority ch., 2 VFOs, I/T microphone. 2" h x 5 1/2" w x 7" d, 3 1/4 lbs. (Regular \$349) ... **NOW \$309.95**



IC-290A 2m All mode mobile transceiver. 143.8-148.199 MHz. 1/10w, 5 memories, 2 VFOs, scan, I/T mic. Remote tuning w/opt. HM-10 mic. 6 1/2" w x 2 1/2" h x 8" d (Regular \$549)..... **Limited Special! \$439.95**

IC-490A 432 MHz All Mode mobile transceiver. 430-439.995 MHz, 10 watts, scanning microphone **TBA**

IC-22U 800 ch mobile. 144-147.995 MHz, 1 or 10 watts, thumbwheel frequency selection. 6 1/2" w x 2 1/2" h x 8 1/2" d, 3 1/4 lbs. (Reg. \$299) .. **Limited Special! \$239.95**

EX-199 Remote frequency selector 35.00



SAVE \$30

IC-2AT Synthesized 2m FM Hand-held with I/T pad. 800 ch. in 5 KHz steps, 144-147.995, selected by thumb wheels & +5 KHz upshift switch; ± 600 KHz offsets. .15 or 1.5w output with supplied nicad pack. Optional packs for larger capacity or higher power. Supplied with 250 ma. nicad pack (BP-3), wall charger, flex antenna, belt clip, strap, earphone and plugs. 6 6" h x 2.6" w x 1.4" d, 1 lb.

Regular SPECIAL!

IC-2AT HT w/TTP, nicad & chgr	\$269.50	\$239.50
IC-2A 2m HT w/nicad & wall chgr ...	\$239.50	214.50
ML-1 2.3/10w 2m mobile linear.....	89.00	79.95
IC-3AT 220 HT/TTP, nicad & chgr ...	299.95	269.95
IC-3A 220 HT/nicad & charger.....	269.95	244.95
IC-4AT 440 HT/TTP, nicad & chgr ...	299.95	269.95
IC-4A 440 HT/nicad & charger.....	269.95	244.95

HT Accessories: Regular

BC-25U Extra wall charger.....	\$12.50
BC-30 Drop-in charger for BP-2, 3 & 5.....	69.00
BP-2* 450 ma, 7.2v nicad pk, 1w output.....	39.50
BP-3 Extra 250 ma nicad pk, 1.5w output.....	29.50
BP-4 Alkaline battery case.....	12.50
BP-5* 450 ma, 10.8v nicad pk, 2.3w output.....	49.50

*BC-30 required to charge BP-2 & BP-5

CP-1 Cig lighter plug & cord (BP-3).....	9.50
DC-1 DC operation module.....	17.50
HM-9 Speaker/microphone.....	34.50
Leather case (specify radio).....	34.95
FA-2 Flexible antenna for 2A, 2AT (BNC).....	10.00
3A-TTN TT pad for 2A, 3A, 4A.....	39.50
Commspec SS-32M 32-tone encoder.....	29.95

VHF/UHF Portables:

IC-202S 2m SSB Transceiver. 3w PEP output. Uses "C" cells, optional Nicad pack/charger or AC supply/spkr. With mic., ant. & strap (Regular \$279) ... **NOW \$249.95**

IC-20L 2m, 10w ampl. (Reg. \$98) ... **NOW 89.95**

IC-402 432 Mhz portable SSB Transceiver. Features same as IC-202S above (Reg. \$389) ... **NOW \$349.95**

IC-30L 10w, 432 amp. (Reg. \$105) ... **NOW 94.95**

IC-502A 6m SSB port. (Reg. \$239) ... **NOW 214.95**

IC-3PS ps/spkr; portables; (Reg. \$95) ... **NOW 89.95**

BC-15 Nicads & AC chgr for portables..... 57.50

BC-20 Nicads & DC-DC chgr for portables..... 57.50

SP4 Remote speaker for portables..... 24.95

Accessories:

BU-1 Memory back-up; 25A/290A/490A..... \$38.75

BC-10A Memory back-up; 551D/720A/730..... 9.50

EX-2 Relay box w/marker; 720A/730/701..... 34.00

IC-3PE 3A ps/speaker (Regular \$95) ... **NOW 89.95**

HM-10 Scanning mic.; 25A/255A/290A/730..... 39.00

SM-2 4-pin electret desk microphone; 551/D..... 39.00

SM-5 8-pin electret desk mic.; 251A/451A..... 39.00

HOURS: Mon, Tue, Wed & Fri 9-5:30; Thurs* 9-8; Sat 9-3
 *Las Vegas & Florida stores NOT open Thursday evenings

E-X-P-A-N-D-E-D WATS PHONE HOURS
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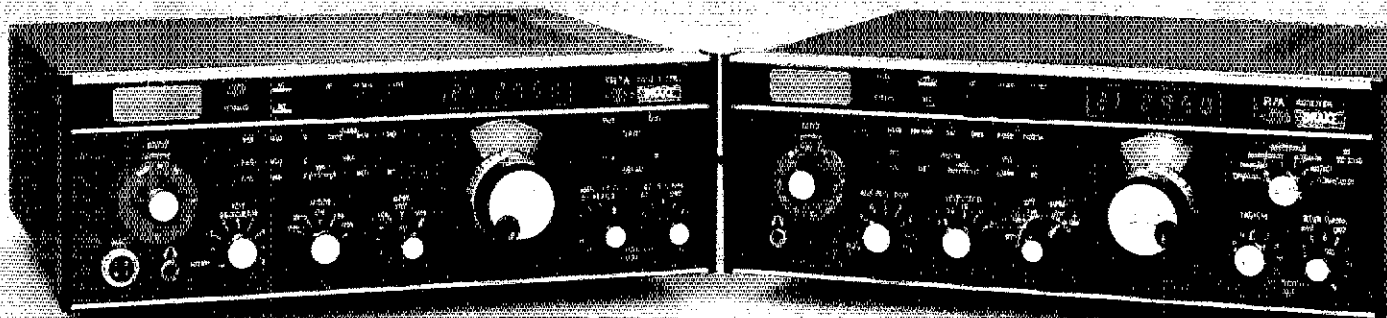
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The ultimate team... the new **Drake "Twins"**



The **TR7A** and **R7A** offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

- **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

- **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

- **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

- **CONTINUOUS NO COMPROMISE** 0 to 30 MHz frequency coverage.

- **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

- **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

- **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

- **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by

appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

- **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.



See your Drake dealer or write
for additional information.



COMING SOON: New RV75 Synthesized VFO
Compatible with TR5 and 7-Line Xcvrs/Rcvrs

- Frequency Synthesized for crystal-controlled stability
- VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed.
- Resolution to 10 Hz
- Three programmable fixed frequencies for MARS, etc.
- Split or Transceive operation with main transceiver PTO or RV75

New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO
featuring the Drake "VRTO"

- Frequency Synthesized for crystal-controlled stability
- VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed.
- Resolution to 10 Hz
- Three programmable fixed frequencies for MARS, etc.
- Split or Transceive operation with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E...

DYNAMIC RANGE

The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

RELIABLE SERVICE

When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

Yet with a product as sophisticated as one of today's transceivers, after-sales service is a must. Ask any Drake owner. Our Customer Service Department has a reputation second to none.

ACCESSORIES

Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

KILOWATT AMPLIFIER

Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier/power supply will put the TR5 on an even footing with the best of them.

ENGINEERING

The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superseded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

Features, availability and prices subject to change without notice or obligation.

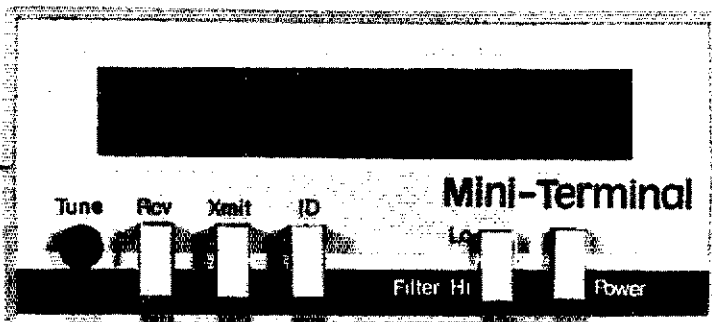
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or write for
additional information.

R. L. DRAKE COMPANY



540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

The First, The Best, and Quality that Lasts



Mini-Terminal™ suggested price \$299.95

All in one package—CW, RTTY, ASCII send/receive and hard copy capability for under \$300. Unbelievable, but true! Again, Kantronics puts all the features you want in a single unit: The Kantronics Mini-Terminal™.

You send CW with your key or keyboard, and the Mini-Terminal™ converts to RTTY or ASCII. Mini-Terminal™ also reads all incoming CW, RTTY, and ASCII messages and reads out on a bright green 10-digit display. For hard copy simply attach any Centronix compatible printer, such as the Epson MX-80 or the Paper Tiger, and watch the Mini-Terminal™ do the rest.

A complete code reader and RTTY terminal, with printer compatibility all in one package only 2½"x5"x5¼". Get all you can for your dollar; get the Kantronics Mini-Terminal™.

See your local Kantronics dealer, or contact

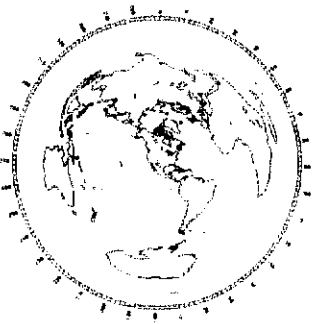
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family & friends of WD9BQD & WD9BQF who both became Silent Keys in the same week. Congrats to new appointees: KA8GKT, EC of Cummings Co.; KA8IOJ NM of Scotts Bluff ARES; W8HJA, NM of No. 40 Mir Net, replacing WD9AHV, who resigned for health reasons. AHV held it together in beginning months & HTA has certainly made it a fun net! TNX Guys & all who help. Hats off to KA8NCR new Novice & KA8IOJ who upgraded to Adv. WD9DFZ spoke to Oxford Rotary Club on ham radio. Ten hams in Aurora area starting new club with N8DTH as pres. GL! Two new rpters in NE — McCook 147.87/27 linked to 146.07/67, & Scotts Bluff ARES on 144.87/145.47. Both are open rpters. Fremont club planning an operational ham display at the local mall. Happy Easter! Traffic: WA8BOK 41, WB9GOB 40, K0DKM 34, W0ZNR 24, KA8BCE 18, WA8DXV 12, WB8GMC 12, WB8OPP 11, W8HTA 8, KA8FA 6, WB8GVR 4, W8NIK 4, WA8PCC 3, K0TUH 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — STM: K1EIC. SEC: K1WGO. ASEC: KA1AMK K1AH.

Net	Freq.	Time-local	UTC	QNI	NM
CN	3840	1900/2200	387	366	K1EIR
CPN	915/315	1800/1000 Sn			WB1AIU
NVTN	28/88	2130	98	269	WA1ELA
WCN	78/18	2130	168	432	W1DPR
PTN	13/73	2100	85	229	WB1CPF

High QNI: K1UCF, W1QJM, WB9HH/I, WB2FJU

Appointments: ORS: WB1HHV; OVS: NBAXA/I; ASEC: KA1AMK. PVRA file market May 2 East Hartford Penna H.S. Candlewood ARA sponsors the Worked All Conn. Counties Award, KA1ECL for details. Welcome WB3DZD to NTS. KA1EYK is now KA1ZD. The Meriden ARC is now meeting at the PBA Hall, MARC sponsors the Castle Craig Certificate. Contact N1API for details. W1HUE now operating as OETZES. The Eastern CT ARA machine, K1MUJ, is back, now on 147.285. ECARA file market May 18th. Contact K1SYI. CARA members WB2TIN, WA1GSO & N1BIC are back from their Anguilla mini-Expedition. Please remember to renew your ARRL membership through your local affiliated club. USS Crocker special events station May 22/23. Fairfield ARA has begun a cw net to encourage license upgrading. QNI Sunday 2000 local 21.155. Congrats to FARA v.p. W1NU the 1st CT ham to work DXCC and WAS via satellite. WB1CQO is now sporting a RTTY capability. KA1JT was the 1st YL to work RS-6 in North or South America. The CT section will be reorganized as of Jan 83, in accordance with the LRPC guidelines. Good people with a willingness to serve their section will be needed. If you are interested in serving in any leadership capacity, please contact your SCM as soon as possible. The CT SEC Net has been reactivated. DECA/ECAs are asked to check in the Sunday of the month on 3.8 at 1030 local time. All ARES ops are invited. Traffic: W1EFW 474, WB1CPF 301, N1BPD 248, K1UOE 180, WB2FJU 155, WB1GZX 163, KA1BHT 161, WB9HH/I 152, WB1CRH 100, W1XX 100, WB3ANC/I 90, WB1EKV 79, W1BDN 61, K1EUW 51, WB1ESJ 28, WA1WQG 25, WB1HHW 24, KA1KD 23, KA1AMK 20, W1ICF 12, W1CUH 4, W1FAI 4.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD

— STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr	Freq.	Time(local)/Dy	QNI	UTC
EMRI	IGQ	3.358	1900/2200/Dy	371	347
EMRIPN	KA1BJY	3.949	1700/Dy	28	28
M2MN	KA1CGP	23/83	2000/Dy	315	128
NEEPN	K1BZD	3.945	0830/Sn	75	59
HHTN	K1BSO	04/84	2230/Dy	435	250
EMRIS	N1BHH	3.715	2030/Dy	94	50
MPARAD	WA1DWS	3.924	1300/M-Sa	155	68

I have had some questions about when the Mass QSO Party is going to be. One of the organizers W1FJI moved away, but K1KJT and N1AS will probably pick up the slack. If not at least one club in the Boston area had volunteered to organize it. Keep an eye peeled in the magazine best of luck to W1FJI in Ariz. ARRL treasurer K1LLU (Boxford) reports an increase in interest and dividends on League investments from \$80 to \$228K in '81. He had revamped the investment policy and it looks like it is working. This income will be put to good use. Congrats K1LLU! Rain w/ net activated in Jan at request of WBZ-TV. Got good PR as usual. In conjunction with RI officials, WA1TBY has started a traffic newsletter called Networks. Its survival depends on your contributions. Colonial Wireless Club starting a Novice class. Acton-Boxboro club met in the Acton Jr HI for the first time and had KB1Q give an interesting talk on ham radio in Sweden. Greater Lawrence club running General/Advanced class in N. Andover. Massachusetts club preparing for some repeater work as soon as the wx warms up. Southeastern Mass ARA preparing for 30 KM road race clubhouse. Norwalk club running Novice class and has changed its meeting place to the Morrill Memorial Library. Framingham club donated \$50 to March of Dimes. Billerica club had interesting talk on RC modelling. Wellesley Club participating in BAA Marathon, but providing communications, not running. Capeway club preparing for Field Day. Quannapowitt club member WA1PLK helping K1CCW with newsletter. KA1MX is new secretary of Algonquin ARC. Middlesex club had W1D9EIR talk on non-ionizing radiation. Pilgrim AWA officers: K1BI, pres.; W1DZH, v.p.; KA1DTA, secy; KA1ALN, treas. Boxboro club preparing for 30 KM road race comm effort. Two bills to reduce license rates are in the House: 4175 would reduce rate to that of a normal registration (\$10/yr) and 1981 would add a \$2 fee to make it \$12/yr. What say we flood the Statehouse with our QSL cards supporting these bills. We need your help! Traffic: WA1TBY 705, N1BHH 382, KA1ON 258, KA1BJY 176, WB1DXR 162, KA1EMQ 121, KA1BBU 118, WB8TDA 114, N1AJJ 90, WA1DXT 81, KD1B 75, K1BZD 63, W1ATX 59, W1IDK 55, WB1GQO 50, W1DMH 47, KA1MI 36, WB7TPY 32, N8TM 29, KC1P 20, WA1FNM 15, K1LCQ 5, KA1R 5, KE1U 3.

MAINE: SCM: Cliff Lavery, W1RWG — SEC: KL7JG. STM: KA1WV. Aroostook hams KA1B NIANG WA1YTH, W1EAL, N1BK, KA1UC, KA1CNC, W1CGB, W1FYB, K1HEL, WA1YNZ, N1BGO, K1TFX and WA1URS provided comms for snow sled race Caribou/Woodland. Caribou for traffic control and race. W1KX, KA1TJ, N1AZH, KA1EGY, N1BCE, KA1CNG and KA1EIV provided comms at State Class "B" Schools cross country ski championships.

Net	Freq.	UTC	Sess.	UTC	QNI	NM
SGN	3940	2100 M-S	24	172	957	K1GUP
PTN	3596	0000 Dy	35	163	414	W1KX
AEN	13/73	8 P.M. Sn	4	1	57	WA1YNZ
SPSN			12	17	409	KA1AVU
MSN	3596	2330 MWF	12	16	106	N1BJW
RACES	3990	1230 Sn	4	2	62	W1RWG

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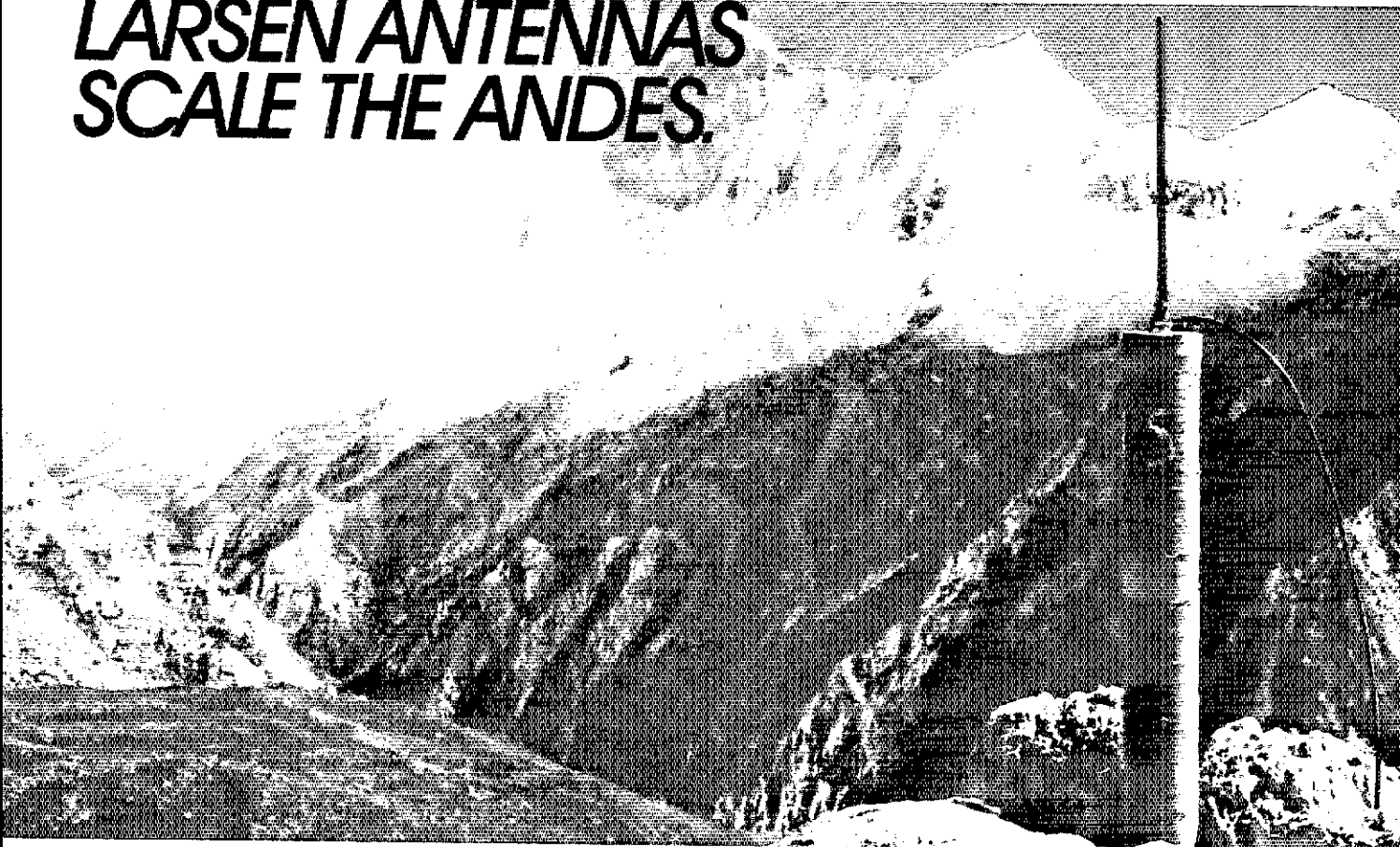
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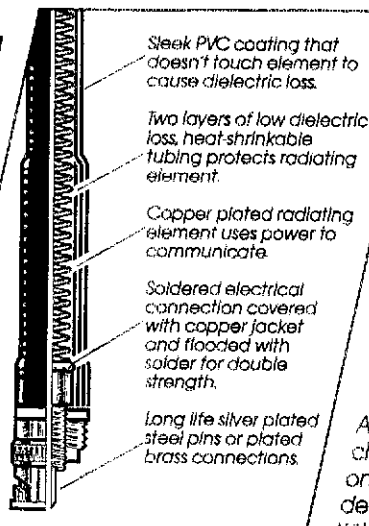
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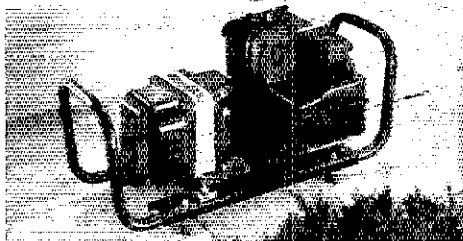
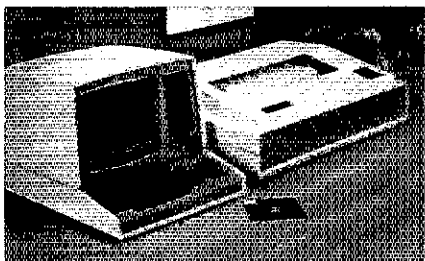
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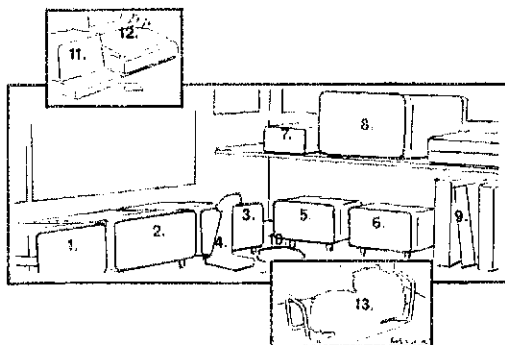
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 W1BXM 50, KA1AVU 47, N5YX 136, W1JTH 32, WB1BYH
 33, W1WCI 26, KA1AI 26, W1GCB 24, W1NV 24, W1CTR
 23, K1NAN 21, W1GKJ 16, KA1TJ 16, KL7JG 13,
 WA1JHT 13, WB1EIL 12, N1BME 10, KA1AIF 9, WA1YNZ
 8, KA1EIV 5, WA1ZJL 5, KA1ENM 4.

NEW HAMPSHIRE: SCM, Robert G. Mitchell, W1NH —
 STM: W1TN, SEC: AK1E, NMA: N1NH K10SM W1VTP.
 The CVFMA's King Ridge hamfest and flea market will
 be on Sept. 26. W1VTP has high QN on NHN. Nashua
 EC WRRC sending up a TV mobile for Public Service and
 EC work. K1V back from St. Maarten where he was
 P47A. The YL corner of the Nashua club bulletin is
 edited by N1BWH. KA1FWQ now K1IR. Your SEC still
 needs ECs for Cheshire, Strafford and Sullivan Cos. Call
 him for details. NH tlc handlers meet Sundays at 10:15
 local on 3970 with link to Concord 3494 machine.
 WA1WEY and N1CB's harmonics now KA1IM and
 KA1IN. New Extra K10SM keeping old call. On highways
 and byways KA1FZ, W1BXM WRCC and WB1BRE.
 W1UN received YI QSL for #309, W1GUX vacationing in
 6-Land, N1NH motorcycle mobile on 2M. W1RTV and
 K10SM instructors for Nashua club classes. Traffic:
 W1HT 40, K1H 29, N1W 28, W1K 15, K1R 105,
 K10SM 133, KA1BJ 130, W1VTP 126, N1AL 107, AK2E
 94, KB1A 80, W1ALE 71, W1GUX 69, W1MHX 58, W1CUE
 38, KA1CJ 25, K1NH 25, KA1FKM 24, WA1PEL 23,
 N1AKS 18, KA1HUW 9, WA1YAZ 5, W1NH 5. (Jan.)
 WA1YAZ 9.

RHODE ISLAND: SCM, Gordon F. Fox, W1YNE — SEC:
 KA1EHR. STM: KA1FE, RIEM2MTN. WR WA1OSL
 reports 20 sess, 166 QNI, 42 QTC, K1GJ, NM RI
 Teleprinter Net, reports 49 QNI, 20 sess, QTC 23. SEC
 KA1EHR reports 107 ARES members with 7 nets in
 operation. W1EOP has gone into full-time traffic
 handling with 1731, which is an all-time record for RI.
 AB1D is active on hf mobile with new loom setup.
 N1BAQ has new harmonic, traffic: W1EOP 1731, KC1G
 70, W1NCO 58, WA1GEO 47, KA1SO 36,
 AE1S 14, AF1P 10, KA1EPP 8, N1RI 8.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABO.
 STM: N1ARI. I thank the amateurs who gave the time
 and use of their equipment furnishing communications
 in the drill exercise at the Vernon Nuclear Plant. Our
 SEC is sending in to QST a report on this, including
 known hams who took part. The report pointed up the
 need for better 2-meter vhf tie-ins, which is being worked
 on. Any suggestions would be appreciated. Carrier
 24/533/22: GMN 24/435/37; VSB 28/243/21; VTN
 26/102/68; VFN 47/6/4; RFD 4/64/48. Green Mtn. Wireless
 Society of Rutland is now an affiliated club. Congrats
 would like news from all our clubs. Traffic: K1BOG 263,
 N1ARI 132, KA1GID 99, W1RNA 88, WB1ABO 49, AE1T 36.

WESTERN MASSACHUSETTS: SCM, William J. Hall,
 W1JJP — SEC: WB1HH. STM: W1UD. ACC: W1YI. Congrats
 summa cum laude to WA1JPN her extraordinary
 achievement in upgrade to Extra Class, notwithstanding
 multiple physical handicaps, working further writing,
 poetry, college courses and regular QNI in ESS and
 WMN. Other notable event in Worcester Co.: the promotion
 of W1DOY to pres. of CMAFA; well-deserved for his
 long and dedicated leadership in traffic, emergency and
 community work. K1SF continues DXing on 6M, with
 LU8YYO. Tlc sked assists by WA1OUZ KA1CDC
 WB1CGK K1PUG very helpful. Recent 6:30 A.M. round-
 table with W1RED/8P8EZ on 14.290: K1MAL W1GQP
 K1NWE W1NLE W1KK W1MPG K1ANX W1CJL. Hams
 that made PR points with federal, state and local
 officials in recent Yankee Vermont Atomic exercise: W1YI
 WB1HH, WB1JH, W1JHK, W1Z, WB1JEN, PSHR:
 WB1HH W1UD WB1CGK KA1T K1JHC W1KK. Traffic:
 W1UD 382, WB1HH 328, KA1T 282, WB1CGK 138,
 WA1ITL 110, WB1CDC 102, W1YI 102, K1JHC 82, W1KK
 81, W1JP 33VP2V2F 4, WA1OPN 27, K1PUG 25, W1BVR
 18, W1ZPB 9, WB1EN 5, WA1OUZ 4.

NORTHWEST DIVISION

ALASKA: SCM, Richard Henry, AL7O — SEC: AL7AC.
 STM: WL7H. OVGs: KL7WE KL7JAI KL7NO. OO: W6SJJ.
 KL7HPU issued a Certificate of Merit for her efforts and
 dedication to the ARRL NM for the past two years. Visited
 with the ARCTIC ARC in Fairbanks. KL7JDP assumes
 ASN NM March 1. The repeater in Glenallen should be
 active soon and a special thanks to the AARC for supplying
 the duplexer. Glenallen freqs 146.07/67.
 Petersburg will have a rpt on the air soon from Duncan
 Canal 146.38/98. Alaska Code Net needs your support
 7060 kHz 0500Z nightly. KL7FD is in charge again this
 year of communications support of IDITAROD. Traffic:
 KL7T 73, KL7LO 14, AL7N 2. (Jan.) W6SJJ 66, KL7KD 42,
 WL7H 33, KL7T 30, KL7LO 18, AL7N 4, KL7KE 2.

IDAHO: SCM, Lem Allen, W7JMH — CLUB NEWS: Mt.
 Home planning to use 2-meters group for comms during
 March of Dimes Walk-a-thon April 24, and use QRP on
 Field Day. The Idaho Society of Radio Amateurs, Inc. is
 reorganizing to include a central administrative body to
 perform essential duties on behalf of all its affiliated
 clubs. The desired end result is to promote good will and
 increase enjoyment of Amateur Radio operation, with a
 deeper involvement in public service. PEOPLE AND
 THINGS: K7RT attended ARRL NW Directors meeting,
 as ASCM to represent us in restructuring confab.
 WB7PFG has new Omni! All Idaho hams were saddened by
 the passing of W7GQA.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935	7 P.M. Dy	28	1428	47
CD	3590	8:10 A.M. M-F	20	876	14
IMN	3635	8 P.M. M-F	20	171	75
TV Emerg	3494	8:30 P.M. Sn	4	256	—

Send a message. Join the ARES. Become involved in
 public service.
MONTANA: SCM, Les Belyea, N7AIK — Congrats to
 W7IDK who received his official ARRL instructor certificate.
 There are 5 new Novices in the Havre area via the "IDK"
 school. Interesting to note that there are 13 OM/XYL
 amateurs in the Sidney-Glendive area. WA7GVT, EC for
 Dawson Co., is doing an excellent job, and also puts the
 Lower Yellowstone ARC newsletter together. Surprise parties
 were held for W7BQE and W7OIG in Sidney, both 75 years
 young and very active. Libby ARC is now an ARRL club.
 Their charter night was held last April 17th with a good
 turnout. K7AOZ, division vice director, and SCM were
 in attendance. KC7IK from Lewistown is very busy with
 his OC activities. KB7BJ and KB7Q each worked 6 states
 in one evening on 2 meters (cw aural). Wow! The
 Yellowstone ARC (Billings) put up a special events station
 using the call of

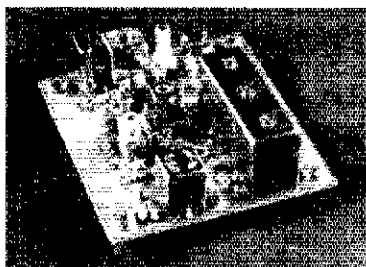
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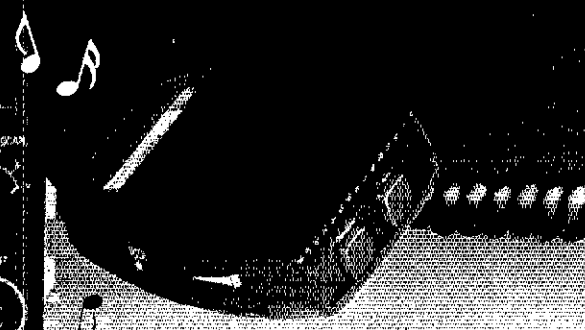
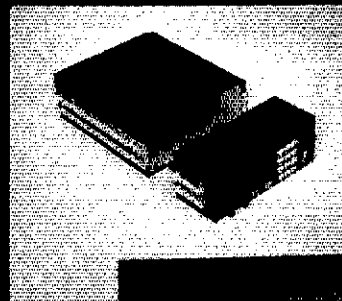
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**SUPERIOR
COMMERCIAL GRADE
2-METER FM TRANSCEIVER**

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TOUCH-TONE®
PAD KIT INCLUDED**

COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- **8 MHZ FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN:** Receive and transmit 142.000 to 149.995 MHz in selectable steps of 5 or 10 kHz. **COMPARE!**
- **SIZE:** Unbelievable! Only 6 1/4" by 2 3/4" by 9 3/4". **COMPARE!**
- **MICROCOMPUTER CONTROL:** All frequency control is carried out by a microcomputer.
- **MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES:** When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. **COMPARE!**
- **PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL:** Frequency is selected by buttons on the front panel or microphone.
- **8 CHANNEL MEMORY:** Each memory channel is reprogrammable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- **INSTANT MEMORY 1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- **MEMORY SCAN:** Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- **PROGRAMMABLE BAND SCAN:** Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- **DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT):** The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. **COMPARE** this with other units that claim to scan in 5-kHz steps!
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- **REMOVABLE HEAD:** The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. **COMPARE!**

- **PL TONE OSCILLATOR BUILT IN:** Frequency is adjustable to access PL repeaters.
- **MICROPHONE VOLUME/FREQ. CONTROL:** Both functions may be adjusted from either the microphone or front panel.
- **NON-STANDARD OFFSETS:** Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are **BUILT IN!** **COMPARE!**
- **25 WATTS OUTPUT:** Also 5 watts low power to conserve batteries in portable use.
- **GREEN FREQUENCY DISPLAY:** Frequency numerals are green LEDs for superior visibility.
- **RECEIVER OFFSET:** A channel lock switch allows monitoring of the repeater input frequency. **COMPARE!**
- **SUPERIOR RECEIVER:** Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. **COMPARE!**
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- **OTHER FEATURES:** Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
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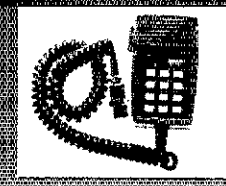
- Features such as ten channel memory in two banks of five each, a solid 25 watts of power, full MARS and CAP coverage from 143,000 Mhz to 148,995 Mhz, plus built in memory retention for up to one year . . . and much, much more makes this the radio of the year. If you have been waiting to move up to a new model, or have wished for a radio with "everything" . . . KDK has it!
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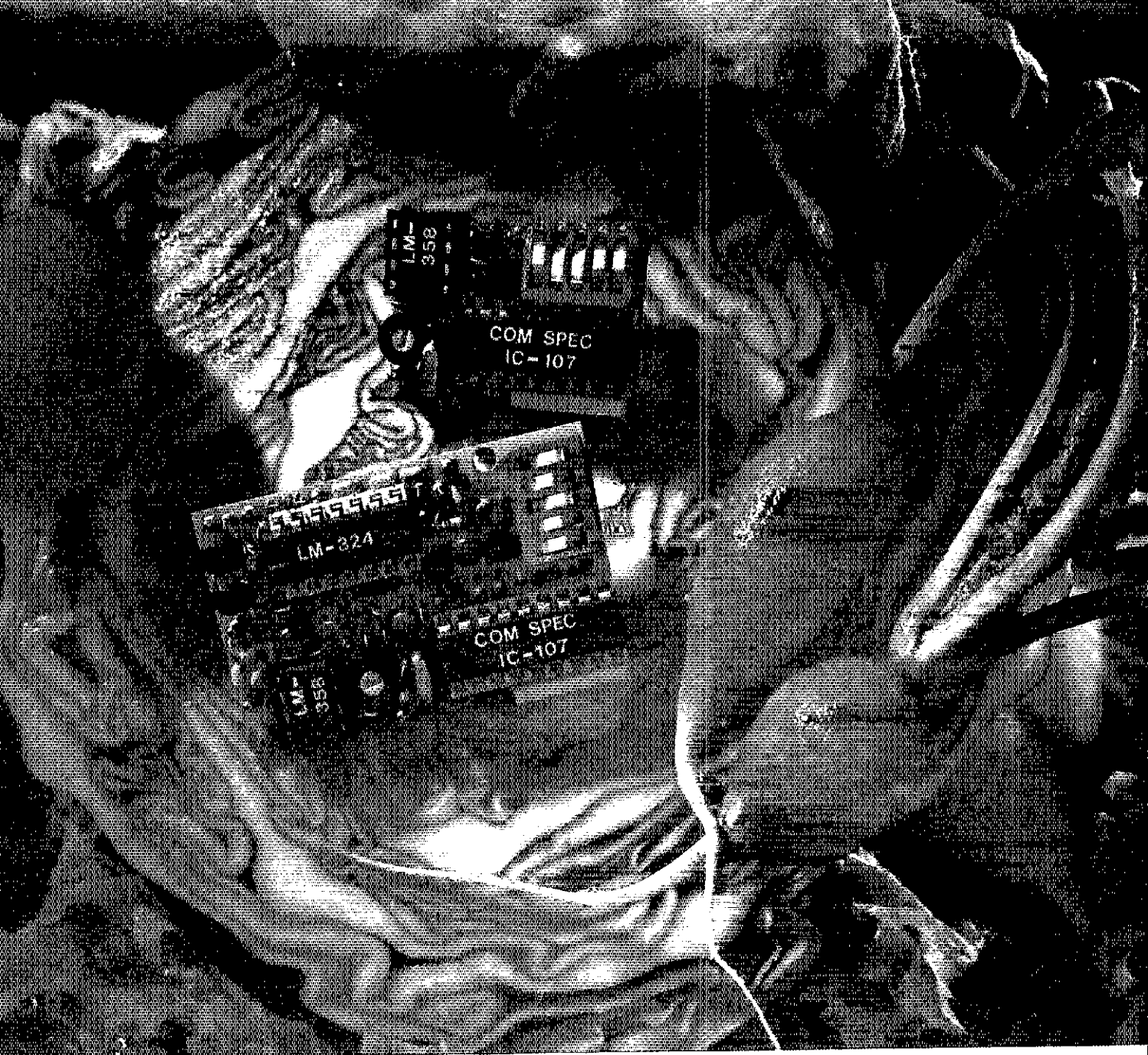
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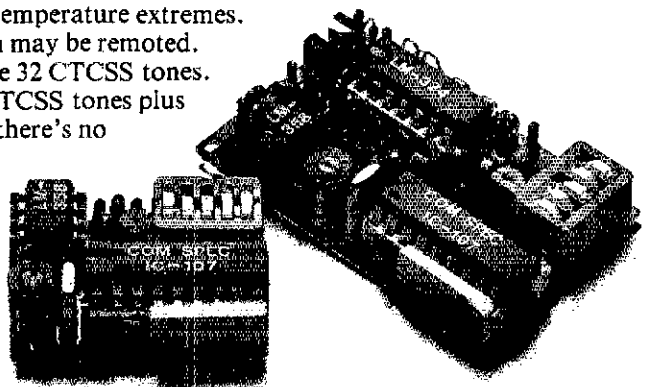


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58TV, 5 band trap vertical \$99.00

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15 meter	\$10.00	\$15.00
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40 meter	\$15.00	\$21.00
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BM-1, bumper mount	\$16.95	
MO-1, fender mount mast	\$22.36	
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 HG-54-HD, 54 foot self support \$1287.50
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15m532 5 el 15 meter beam	95lb.	10.0
15m845 5 el 15 meter beam	140lb.	14.0
20m436 4 el 20 meter beam	108lb.	12.0
This is a custom antenna		
20m536, 5 el 20 meter beam	113lb.	13.5
20m546, 5 el 20 meter beam	n/a	n/a
This is a custom antenna		
20m646, 6 el 20 meter beam	176lb.	17.0
40m329, 3 el 40 meter beam	110lb.	12.6
40m346, 3 el 40 meter beam	177lb.	13.8

Call for prices. P.O.B. Dallas

HY GAIN ANTENNA PACKAGE #1

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 HGS2SS, self supporting tower
 HAM IV, rotor
 COA, (3 furnished) coax arms
 HG-10, 10 ft mast
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 CD-45, rotor
 ROTOR lower mast support:
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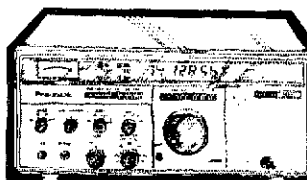
We have more phones ringing than personnel to answer them. Please be patient or call back during business hours. Sorry, no WATS Line calls taken Saturdays.

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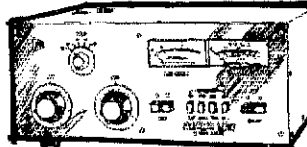


ST-144/μP

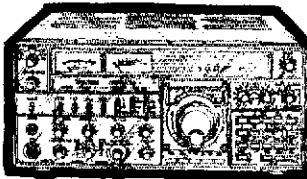
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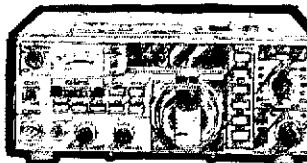
Pro-Mark KWM-380



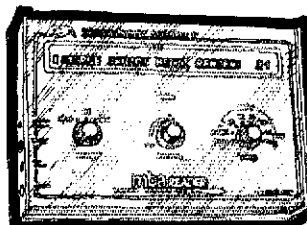
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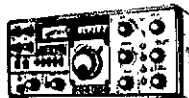


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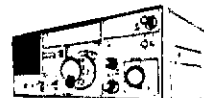
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SF-2 5/8 Wave, 2 Meter Antenna	\$9.00
HOT Hustloff Mt. with Swivel ball	\$14.00
G5-144B 2M Colinear, fixed Station, 6db	\$68.00
G7-144 2M Colinear, fixed Station, 7db	\$99.00

Full Line Available on Sale Call

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20G 10 ft. Stacking Section	\$32.00
25G 10 ft. Stacking Section	\$39.50
45G 10 ft. Stacking Section	\$87.50
25AG 2.3 or 4 Top Section	\$52.50
HDBX 48 48 ft. Free Standing Tower	\$320.00
HBX56 56 ft. Free Standing Tower	\$340.00
FK2548 48 ft. 25G Foldover Tower	\$725.00*
TB3 Thrust Bearing	\$48.00
SB25G Short Base for 25G	\$16.50
BPH25G Hinged Base Plate	\$59.75
AS25G Accessory Shelf	\$9.50
HB25AG 14" House Bracket	\$14.50
BPC25G Cement Base Plate	\$32.00
BA525G Short top section w/lacc. shelf	\$36.00
M200 16 gauge, 10 ft., 2" O.D. Mast	\$19.50
M200H 1/8" wall, 10 ft., 2" O.D. Mast	\$36.00

Freight prepaid on Fold-over towers. Prices
10% higher west of Rocky Mts.

Philly Stran Guy Cable in stock - for price and
delivery call (703) 569-1200

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- Shipping charges not included
- Prices subject to change without notice
- Some items limited to stock only
- Limited quantities
- No COD's

HY-GAIN

TH3JRS Jr. Thunderbird, 750W PEP	\$150.00
HO-2S Hy-Quad, 2 Element	\$235.00
TH5DXS Thunderbird, 5 Element	\$215.00
TH3MK3S Thunderbird, 3 Element	\$195.00
TH2MK3S Thunderbird, 2 Element	\$128.00
TH7DX Thunderbird, 7 Element	\$336.00
392S TH6DX Conversion Kit to TH7DX	\$135.00
105BAS 5 Element 10m "Long-John"	\$114.00
155BAS 5 Element 15m "Long-John"	\$161.00
205BAS 5 Element 20m "Long-John"	\$269.00
14AVQ/WBS 10-40m Vertical	\$49.95
18AVT/WBS 10-80m Vertical	\$67.50
V-2S Colinear Gain Vertical 138-174 MHz	\$33.75
BN-86 Ferrite Balun, 10-80 meters	\$13.00
HDR-300 Deluxe Rotor, Digital Readout	\$375.00

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SALE \$1,306.70

HQ5358 52 ft. Self-Supporting Crank-up Tower	\$990.00 Value
HG-COA 3 each Coax arm for Tower Legs	\$39.00 Value
TH5DXS Thunderbird, 5 Element Triband	\$319.95 Value
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HG-10 10 ft. mast 2" O.D. 120 Wall Steel	\$56.00 Value
BN-86 Ferrite Balun	\$16.95 Value

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48 States. ADDED BONUS: Include M.O. or
Certified Ck. with order and receive a
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NO SUBSTITUTIONS PLEASE. SALE ENDS 4/30/82.

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A3 3 Element Triband Beam	\$167.00
A4 4 Element Triband Beam	\$204.00
A743 7 & 10 MHz Add On for A3	\$55.00
A744 7 & 10 MHz Add On for A4	\$55.00
AV3 3 Band Vertical 10-20m	\$41.00
AV4 4 Band Vertical 10-40m	\$62.00
AV5 5 Band Vertical 10-80m	\$68.00
R3 14,21,28 MHz Ringo	\$204.00
32-19 Boomer 19 Element 2m	\$75.00
214B Jr. Boomer 14 Element 2m	\$61.00
A147-11 2m 11 Element Antenna	\$34.00
A147-4 2M 4 Element Antenna	\$23.00
ARX-2B 134-164 MHz Ringo Ranger II	\$34.00
A144-10T 145 MHz 10 Element	\$41.00
A432-20T 432 MHz 20 Element	\$41.00
A14T-MB Twist Mounting Boom & Bracket	\$21.00

Full Line Available on Sale Call

MINI-PRODUCTS

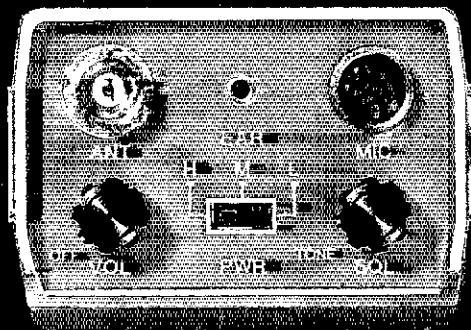
HQ-1 Mini-Quad 6/10/15/20m Antenna	\$129.95
B-24 2 Element HF Mini-Beam 6/10/15/20m	\$99.00
RK-3 3rd Element Add-on for B-24, Improves 10-20m	\$67.00
C-4 Mini-Vertical 6/10/15/20m	\$59.00

ROTORS & CABLES

CDE HAM IV Rotor	\$175.00
CDE T2X Rotor	\$244.00
CDE 45 Rotor	\$92.00
Alliance HD-73 Rotor	\$92.00
Alliance U100 Rotor	\$42.00
RG-6/U Foam Coax 95% Shield	24c/ft.
RG-213 Coax, Mil. Spec.	28c/ft.
Mini-6 Coax 95% Shield	12c/ft.
Rotor Wire 8 Conductor	15c/ft.
4 Conductor	7.5c/ft.



ST-144/μP, 2 Meter FM



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■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTEC technology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.



24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.



Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.



The Memory Mode is indicated by the small "M" above "5"; the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.



Memory Scan with "Priority Scan Auto-Resume" has stopped on Memory 9 to listen for a few seconds.



Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.

All stated specifications are subject to change without notice or obligation.

Accessories for SANTEC Handheld Radios

- clockwise from upper left:
- Leather Case (ST-LC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

The ST-144 μP is approved under FCC Part 15.



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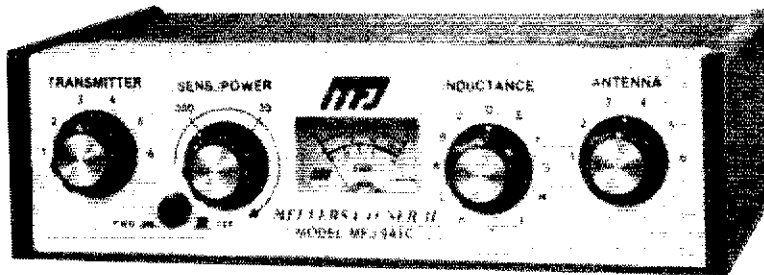
MFJ

ANTENNA TUNERS

16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

\$89⁹⁵

(+ \$4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

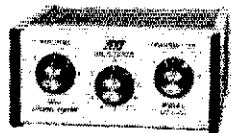
Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has

SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, \$79.95 (+ \$4), like 941C less balun. MFJ-945, \$79.95 (+ \$4), like 941C less antenna switch. MFJ-944, \$79.95 (+ \$4), like 945, less SWR/Wattmeter. MFJ-943, \$69.95 (+ \$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, \$3.00.

MFJ-900 VERSA TUNER



MFJ-900

\$49⁹⁵

(+ \$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient air-wound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

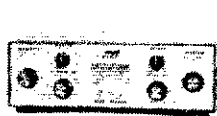
Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, \$59.95 (+ \$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-1601D, \$39.95 (+ \$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II



MFJ-949B

\$139⁹⁵

(+ \$4)

MFJ's 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 & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III



MFJ-962

\$229⁹⁵

(+ \$10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, \$189.95 (+ \$10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, \$4.95.

MFJ-984 VERSA TUNER IV



MFJ-984

\$329⁹⁵

(+ \$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for refl., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, \$239.95 (+ \$10), like 984 less ant. switch, ammeter.

MFJ-982, \$239.95 (+ \$10), like 984 less ammeter, SWR/Wattmeter. MFJ-980, \$209.95 (+ \$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

\$329⁹⁵

(+ \$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W). 6 position ant. switch. Al. cabinet. Tilt bail.

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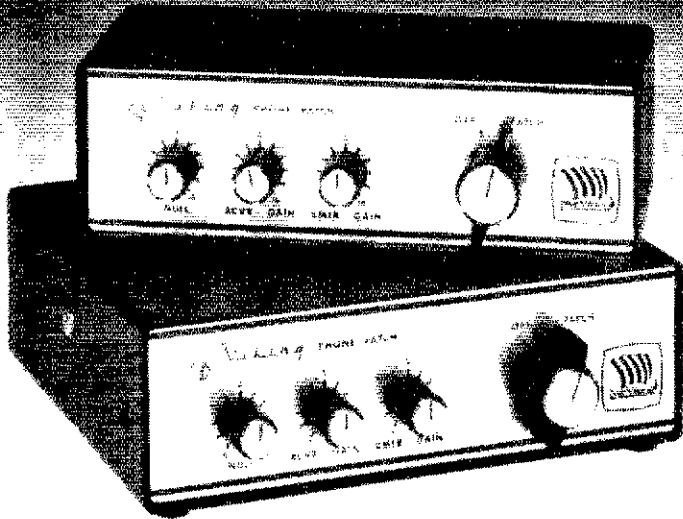
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In "PATCH" position, speaker cuts out and

audio is switched to handset for monitoring.

EFFECTIVE SHIELDING.
RF filtering and bypassing helps prevent RF feedback from telephone line.

TWO MODELS & NYE'S TWO YEAR WARRANTY.
Model 046-001, without speaker, provides connection to your own external speaker. Model 046-003 has built-in speaker and is designed for use with transceivers.



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LaRue Electronics, 1112 GRANDVIEW STREET, SCRANTON, PA. 18509 - Ph. [717]343-2124

K7EFA and had lots of contacts. They will also report on the Montana QSO Party this October. More later on this. Still looking for "Ham of the Year." Send your candidates resume to the SCM by June 15. IMN QNI 171, QTC 75, BSN QNI 218, QTC 10, MTN QNI 829, QTC 93, PSHR: WB7DZX. Traffic: WB7DZX 278, W7TGU 268, WB7WVD 84, N7AIK 44, W7NEG 25.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: K7WWG.

Net	Time/Day	Freq.	QNI	QTC
OSN	0230/0600Z Dy	3587	478	633
BSN	0145Z Dy	3908	1058	43
OARES	0115Z Dy	3993.5	596	87
OARES	0230Z Dy	3993.5	64	29
PITZ	0200Z Dy	148.76	342	2
WCN	0300Z Dy	3702	531	233
SOARES	0300Z MTHFS	148.94	540	200
SOFM	0330Z T	146.64	134	5
LBLARES	0330Z Dy	146.79	594	22
PDXARES	0300Z Dy	147.32	1327	14

Late: PDXARES, QNI 1424, QTC 18. Upgrades: Extra-KQ71 (ex-WA7UEV) & WB7VHB. Advanced-WB7TKY, WA7YSU, KA7JY, Tech-KA7LCO, KA7KDU, N7DOB (ex-KA7JOW). Novice-KA7MDM, KA7MDU. Congrats W7TC 1981 IARU (cw) Champ! WA7MOK got DXCC (225). BSN had 1000 plus checkins in Jan and Feb. QTVARC officers: WB7ADM, pres: KA7JUT, v.p.: N7CZY, secy: N7BLI, treas: Hoodview, AC: WB7WFD, pres: WB7UES, v.p.: KA7CED, secy: KA7HCO, treas: SA7ARC, KB7K, pres: KA7GNQ, v.p.: KA7BNB, secy: KA7CVZ, treas: 131 members at reg. meeting of QTVARC, (over 200 on roll). McMinnville High School club looking for equipment/antennas. Traffic: W7VSE 797, WA7LGN 686, KA7ELI 376, W7ZB 214, WB7RKU 185, N7BQY 164, K17Y 92, W7LNE 88, WB7OEX 77, WA7IHS 60, KC7OR 50, W7QMU 43, W7HLF 39, W7DAN 33, W7LT 18, W7TC 18, K7WWR 11.

WASHINGTON: SCM, Jos Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Freq.	Time(Z)	QNI	QTC	6ess.
EWTN	148.84	0130/0530	72	90	4
SCARES	147.18	0330/W	90	10	4
WARTS	3970	0200	2947	263	28
WVSSB	3946	0230	684	28	28
PSTS	145.33	0130/0630	612	109	66
WSN	3590	0245/0545	816	215	57
NTN	3970	1930	873	53	28

W7JIE reports increased intruders in our bands. Lots more INTRUDER WATCH stns needed. New ARES rpt 148.30/90 WA7TWB/R on Orcas Is. serves San Juan islands. Built by N7JN, WA7TWB maintains. WA7CSK visited Maui and help AH6BK build 70 foot tower. W7IEU is having fun DXing in remodeled ham shack. He's doing fine after successful eye surgery. N7BRB EC Yakima Co. & WB7VOV Red Cross employ CAP aircraft and 2 mtrs to direct ARES ground parties for Red Cross, during floods. Radio Amateurs of Kagit Co. billed March meeting as Old Times Night. Chairman co. ARC. Co. officers are: KC7HH, pres.; WB7RIF, v.p.; treas: N7DCY, secy. CCARC celebrated their 25 years at a dinner Feb 18th. They also help each other & neighbors on 2 mtr rpt during snow storms. CCARC, W7AIA boasts 7 new mbrs & 8 upgrades. KB7WC N7ANP WB7RDE & KC7JN doing great job teaching 34 Novice & 14 General students. N7AXX won 1st place for Wash. in nat'l QSO party. Congrats. Boeing Emp. ARS sponsor BSA Explorers AR Post. W6DOW is Explorers comm chmn. W7UDG & WA7WXA are advisors. (rptd. 7th Post in nation.) This should be good for the youngsters and for ham radio. Other clubs should consider this activity. DJL Twisters AC, WB7OGA, working on state level at state fair in Sept. Needs volunteers. KA7CSP is new chmn for Northwest "83" Conv. RC of Tac. & ARES face busy spring and summer with 3 of 4 weekends working on public service events. RCT W7DK replaces offset press with later mod. used press. WA7OII acquiring carpeting for W7DK club house. Field Day is almost upon us but there's still time to get with your PD chrmn. Let's make the public aware of our activities. Please study Long Range Planning article in Dec. 81 QST on pages 6 & 58. I invite your comments. This plan in principal is to be implemented in the near future. Is. Co. ARES has 6 Electron tone alert systems to call up hams in emergencies. Traffic: W7DZX 1517, WB7WOW 525, W7EJZ 400, WB7TCF 301, N7CSP 227, N7AFY 220, WB7OGA 199, N7AFZ 189, K7GXZ 161, K7CTP 128, N7ANE 112, WA7BDD 106, W7HNA 98, W7GB 90, ADY7 77, WA7JEB 61, K7VW 56, WA7RCR 52, W7BUN 39, W7EUS 32, W7LG 21, K7ZNA 21, K7OZA 20, W7ERH 18, W7APS 12, K7OXL 5, N7GT 4, WA7OJI 2, K7RBT 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallo, W6RGG — ASCMs: W6ZF N6DHN VE2AQ/W6B. SEC: W6BKOU. N6IA, now fully 12VDC for emer and port operation. Congrats to W6DILL on upgrading to Advanced at age 71. FBI MDARC mourns the loss of K6OE. Their recently upgraded members are: to Gen KA6EBF, KA6HX; to Adv KA6PKA; to Extra KA6NAY. NCCC member WA6VEF presented a talk and slideshow on contesting at their Jan meeting. SBARA meets each 3rd Wed at Fremont School, 40230 Lalolo Rd. Try their nets on 145.80 Wed, 8:30 p.m. or on 28.7 MHz Sn at 7:30 P.M. for info. Their member KA6OIX is now N6FVL, and member W6LLE is in the hospital and is wished a speedy recovery. LARK's "Klutz of the Month" award went to W6GPDU for making a lack of time an excuse for not attending. EBARR met 2nd Fri at 7:30 P.M. at Salfurion Army center, 38th and Rheem, Richmond. HARC's officers are: W6PSV, pres.; KA6MXX, v.p.; KA6MXX, secy; WA6LLG, treas. Traffic: N6IA 335, K6APW 78, W6BUXZ 25, N6RD 2.

PACIFIC: SCM, Pat Corrigan, KH6DD — This will be my last column as your SCM. It has been my privilege to serve you, the members, as an ARRL Leadership Official for nearly 13 years, 9 years as SCM. Many significant actions were accomplished with your help, such things as changing the name to Pacific Section and including members at APO addresses. We also saw more visits by League directors than ever before and successfully negotiated emergency communications agreements with National Weather Service, National Red Cross and U.S. Postal Service. I hope these efforts will continue with a renewed enthusiasm under the leadership of SCM Army Curtis, AH6P. We must all put something back into this hobby which gives us such pleasure. It should not be a one-way street where only the benefits are enjoyed without doing anything positive to maintain and support Amateur Radio. Thanks to all who helped. Traffic: KH6HJ 87, KH6H 11, KH6B 8.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: K16T. N6AUB reports that 28 area members of the SKYWARN program participated during the torrential downpour in mid-Feb. The Sacramento

SURGE SHUNT



protects solid state communications equipment from damage caused by high-voltage transients entering the antenna system

These transients usually are caused by atmospheric static discharges or nearby lightning strikes.

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Convenient UHF type coaxial connections are supplied. Price is \$24.95

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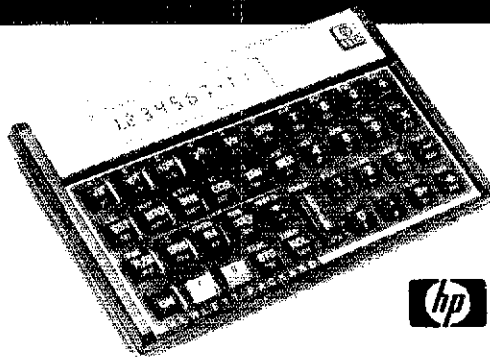
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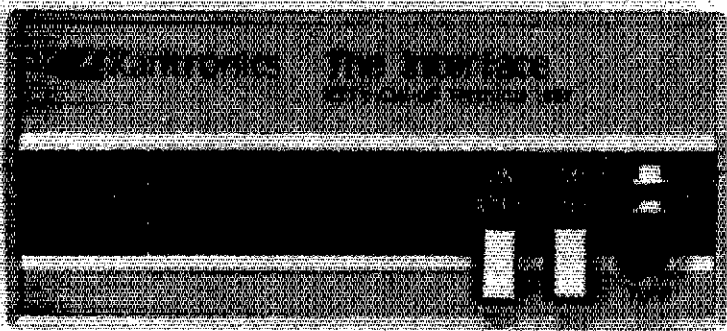
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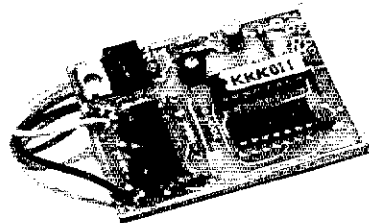
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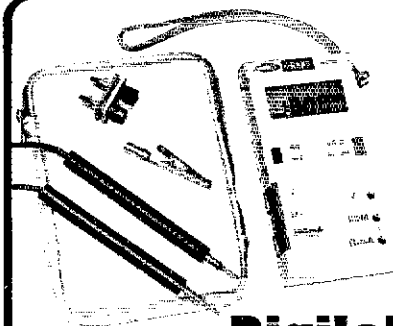
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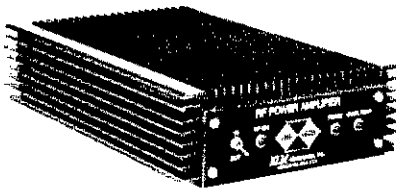
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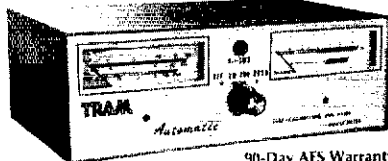


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PA10-90BL	2m FM/SSB	10w	90w	199 ⁹⁵	149 ⁹⁵
PA10-170BL	2m FM/SSB	10w	170w	299 ⁹⁵	225 ⁹⁵
PA15-40BL	2m FM/SSB	5-15w	40w	149 ⁹⁵	112 ⁹⁵
PA15-80BL	2m FM/SSB	5-15w	80w	179 ⁹⁵	135 ⁹⁵
PA15-160BL	2m FM/SSB	5-15w	160w	269 ⁹⁵	199 ⁹⁵
PA45-160BL	2m FM/SSB	15-45	160w	239 ⁹⁵	179 ⁹⁵
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PA15-120BCL	220 FM/SSB	5-15w	120w	299 ⁹⁵	225 ⁹⁵
PA45-120CB	220 FM	15-45	120w	279 ⁹⁵	209 ⁹⁵
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PA15-40CL	450 FM/SSB	5-15w	40w	199 ⁹⁵	149 ⁹⁵
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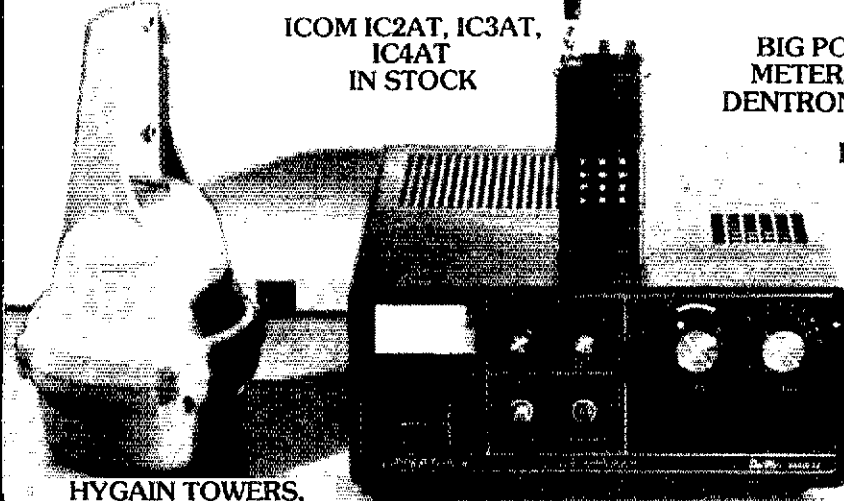


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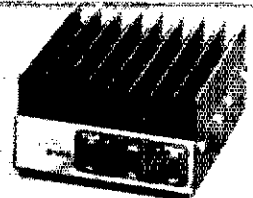
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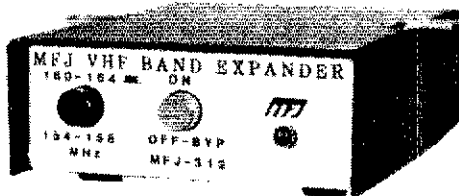
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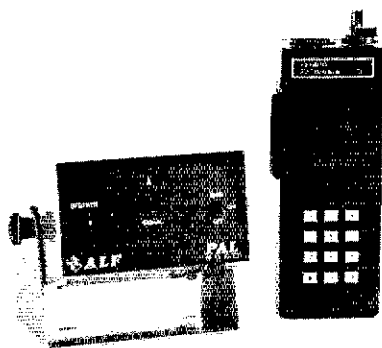
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SAN FRANCISCO: SCM, Bob Smith, NA6T — STM: K6TP. SEC: K6GCD. Marin ARC equipment chest growing for club station. K6KEW awarded PICYA Award for Meritorious Service for his life-saving effort during TRANS-PAC Yacht Race. SFRC QSO Party in April. REDXA netted 2 meg pts in GOWW. RACES training in Sonoma RA in February. FWRA — HARC EC meeting introduced KA8JED as new EC for Del Norte Co. and K68MY new asst EC for Humboldt Co. SCM attended Lake Co. meeting and saw USCG communications trailer that covers 500 kHz — 400 MHz simplex and duplex in emergency and is available to anyone. Contact USCG 12th District Hq. in San Francisco. Hope everyone supports Health Fair in SF Bay area. See your EC about April participation in the week-long operation. Traffic: W6NL 43, W6IL 23, W6RNL 212, K6TP 121, K6TUV 77, W6BTE 25, W6GGF 10.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. ASCMs: NF6K K6YK W6TRP. New officers of CCATS are: W6BITM, pres.; W6JUD, v.p.; WA6CTR, s/t. The group operates RTTY on 146.1070 in the Fresno area. The NCDXC has a chapter in Fresno. Meetings are the first Saturday of each month (except March, 2nd Sat.) at Denny's on Shaw near First. The Fresno ARC is planning for a 220 MHz rpt, WA6SIL and KA6EPK are Silent Keys. WA6SOG is KE6OD. WA6SZS is Extra. KA6CZR has 1200 counties. K6YK/m was first in Cal in the CW County Hunters Contest. K6LJ has a TR-2500. KE8GM rejoined the NCDXC and N6ADV joined. W6NTR has an IC-720. WA6BUH has a R-820. W6VH and W6DPD have FT-902 DMs. W6BYDE has a HR-220. W6DFD has FT-127 RA. WA6JDB is getting a new triband antenna. Welcome to the SJV to W6RFK. Plan for the ARRL Pacific Division Convention Oct 8-10 in Santa Cruz. Traffic: N6AWH 110, W6DPD 24, WA6YAB 24, W6RFS 10, KV6W 10, WA6JDB 4, W6SX 3.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: W6BZF. STM: W6ZRJ. GARC meets on 2nd Thurs. in Gilroy and enjoyed a talk on "Satellite TV Reception". Pres is KB6GV. PAARA enjoyed a talk by N6BIS on "Landing and Launches of the Space Shuttle Columbia". Plan your vacation time to attend the ARRL National Convention July 23-25 in Cedar Rapids, Iowa. WA6WEB presented the "History of MICRONET" to WVARA and K6GD spoke on "Contesting". WVARA received a grant from IBM to buy a 4.5 kw antenna. KE6AY is busy tuning the bands in his OO work. WA6SH and KB6GV made PSHR. 60 SPECS members participated in Pescadero/Santa Cruz emergencies. W6MMG busy on SOWP net and other skeds. N6FMF ORP on 40 and 15 mtrs. W6BGFJ holding skeds with Tahiti, busy in Ten-Ten activities and expecting visits from FO8HL and FO8HI. W6BOTS running up traffic total on NCN and RN6. W6KZJ says "nothing new" but is active on NCN, RN6 and PAN c/1 traffic nets. W6ZPJ gave talks to Mt. Diablo and FARS clubs. NPS ARC heard N6ARP speak on "Radio's Early Stepping Stones". SLAC ARC had an antenna raising party at the club shack. W6BKH presented a talk on "Emergency Procedures" to LERA ARC. The AI and Doc Show-W6VZT and W6ZRJ spoke on "Communications in the 80's" before the FARS group. Field Day planning is the topic of discussion at most of the club meetings these days. Pacific Div. Dir. W6ZM was guest speaker at SPARK meeting. New members of NCCC are: W6BJH AG6D KE6HX N6JL W6BKBZ KR6Q ND6R N6TH. KJ6V 4X4WN, all from SCV. By the time you read this the ARRL will have a new General Manager, new president and the election of new SCM will be in process. Traffic: W6KZJ 175, W6YBV 199, W6ASB 94, W6BOTS 78, KB6GV 77, W6RFF 54, W6ZRJ 24, W6BGFJ 4, W6PRI 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: NB4L.

Net	Time	Freq.	Sess.	QTC	QNI	NM
CMN	1245Z	3.927	28	269	439	W4EAT
JFKN	2330Z	3.923	28	287	887	WB4WII
THEN	0130Z	3.923	28	256	1208	WA4OBR
CMN	230Z	3.734	28	68	171	KA4AUR
CN	0100-0400Z	3.574	28	435	560	AB4S

NC section almost as busy in Feb. as Dec. Got a real kick listening to Valentines Day poetry on the tlc nets. Mail from clubs and repeater groups on the rise; good to hear from everyone. Clubs getting busy for the hamfest season. Don't forget to notify QST and the Div. Director early. WA4TCR is doing great job for FARC newsletter and ARES. He sent us two letters, one from RED CROSS and one from Crisis Control in his area. Both applauded hams in Forsyth Co. area for help during wx emergencies. Applause from here also. Mecklenburg ARS announcing net for wives at hamfest. Take my wife, please. Congrats to KA4VNH and KA4YTH who upgraded. New officers: Cabarrus Co: WA4JPO, pres.; WA4BHO, v.p.; WA4BTZ, secy. Rockingham Co getting ready for Expedition at Cape Hatteras lighthouse. They'll announce times, dates and freqs. later. FARS has done it again - new format, color, great articles, upbeat reporting and much much more. Articles by NMs and section staff make the FARS News truly of section-wide import. If the folk in Raleigh keep this up, Newington had better watch their QST. We still don't have an up-to-date list of clubs in the section. Please make sure your club, organization, or repeater group is on file with me. I need the name of the group rpt freq., if any, and a name and address of someone to contact. Write or send radiogram to me or to W4EAT. Traffic: WD4CNR 501, WD4CNR 357, KD4PJ 280, W4EAT 228, N4AL 218, WA4SRD 144, NB4L 155, KU4W 110, KF4R 98, N4AL 97, KA4KJ 79, WA4OBR 79, N4CJ 67, K4IWW 60, K4MC 54, WD4AE 52, WD4LRG 50, KD4WP 49, N4CY 48, WA4CUD 46, WB4CYN 44, WD4STE 38, WD4LOO 33, NE4J 30, KZ4A 29, WD4DCY 28, WA4OJU 25, N4GGI 24, W8PJ22, KA4ATK 14, W4RVE 12, W2JDB 9, W4EHF 8, W4TWD 6, W4WXZ 4, KC4AM 3.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC KC4LA KA4AUR. Congrats to upgrades K4EMV &

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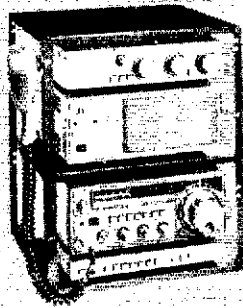
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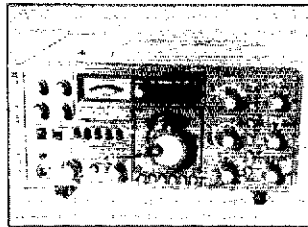
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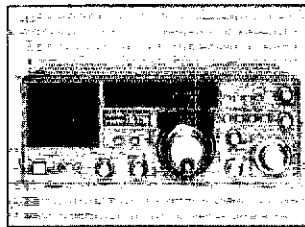
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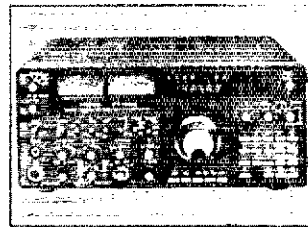
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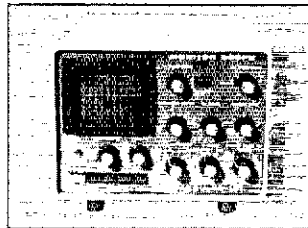
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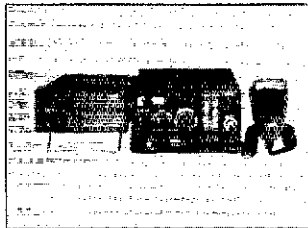
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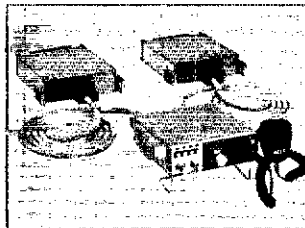
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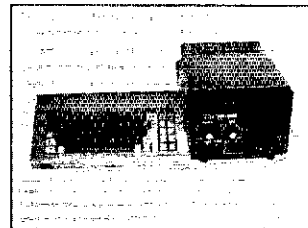
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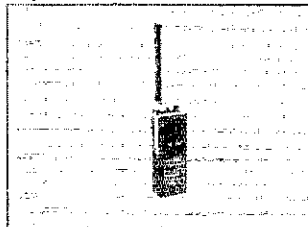
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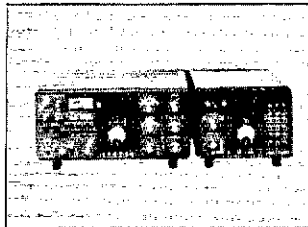
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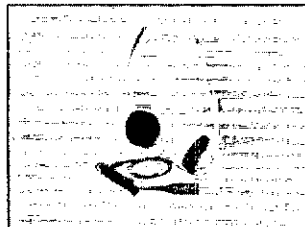
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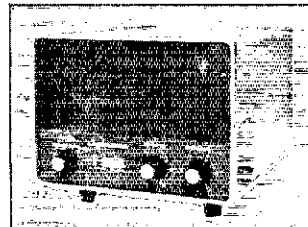
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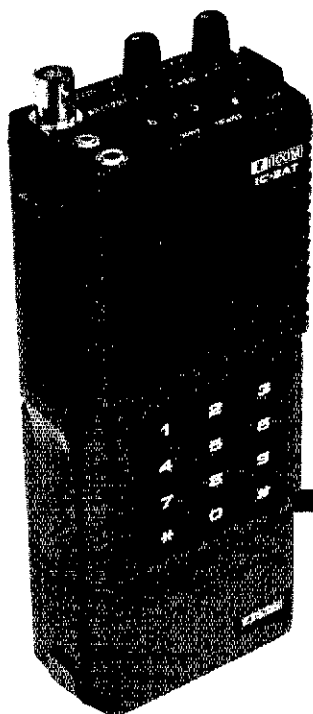
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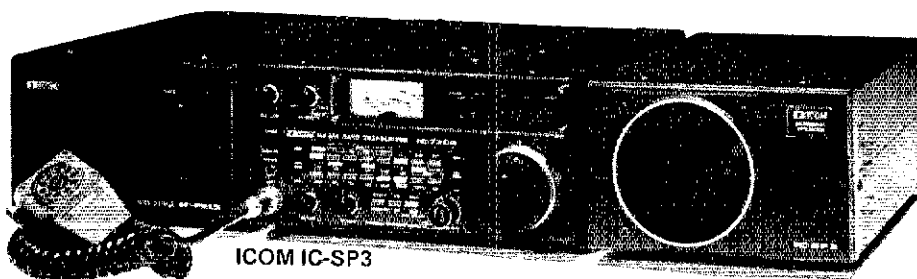
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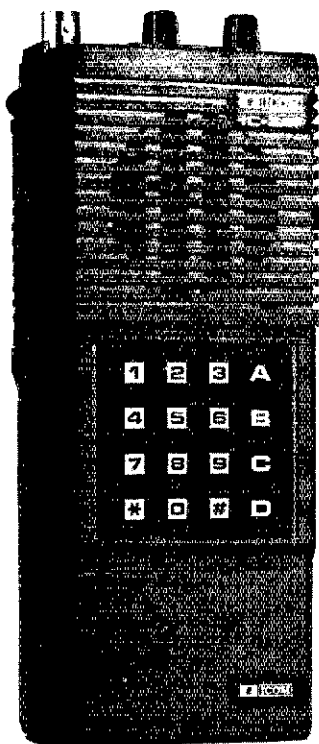
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CNA 2002 Auto 2.5W Tuner	399.95

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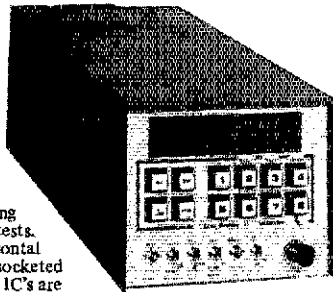
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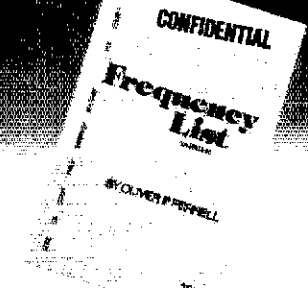
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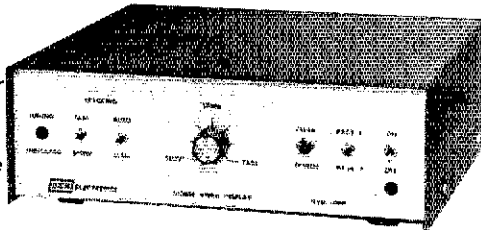
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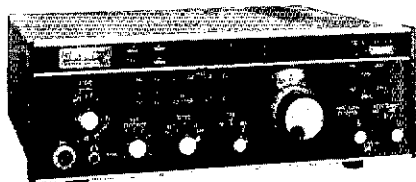
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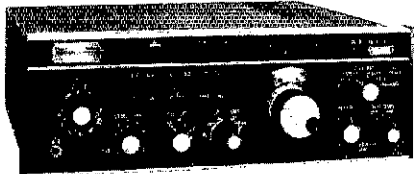
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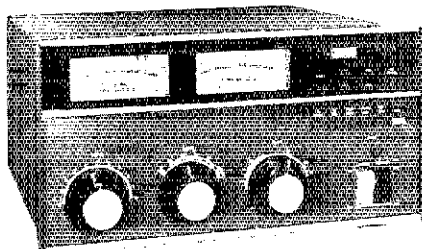
TR-7A 160m Xcvr/SW Rcvr/NB/500Hz ... \$1699.00
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 PS-75 15A power supply, 25A surge ... 199.00
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 MMK-7 Mobile mounting kit ... 79.00



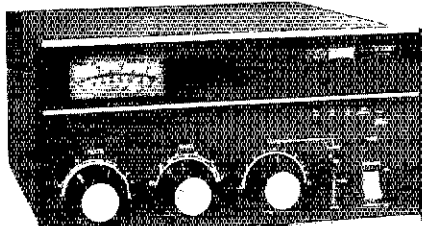
R-7A 0-30 MHz dig. Rcvr/NB/500 Hz filter \$1649.00

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 1548 R-7A/TR-7A cable interface kit ... 29.50
 7037 Extender card service kit ... 50.00
 Service manuals ... ea. 35.00
 1982 World Radio/TV Handbook ... 16.50



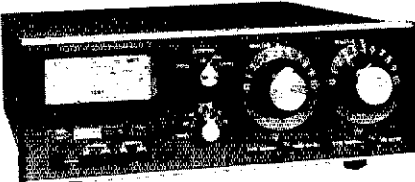
L-7 2kw PEP linear w/tubes ... \$1400.00



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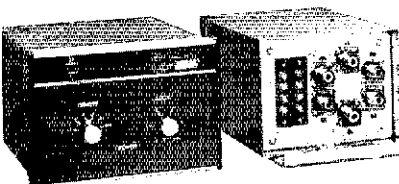


MN-75 200w, 160-10m antenna tuner ... \$259.00

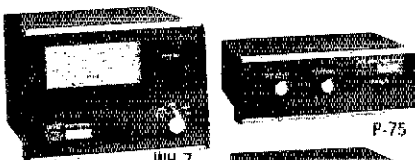


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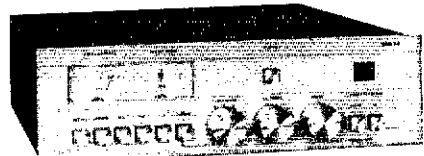
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 3001 Replacement "pill" element ... 5.00
 RP-700 Receiver front-end protector ... 90.00

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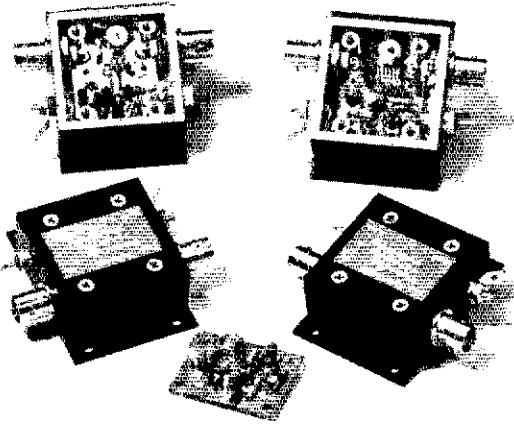
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P144VD	144-148	< 1.5	15	0	DGFET	\$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	\$37.95
P144VDG	144-148	< 0.5	24	+ 12	GaAsFET	\$79.95
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P220VDG	220-225	< 0.5	20	+ 12	GaAsFET	\$79.95
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97. WB5LI 78, WA5MIY 64, W5JOV 56.
 UTAH: SCM, Leonard M., Norman, W7PBV -- SEC: WB7BZJ, STM: W7COX, W1M1, joint Rocky Mtn and Northwestern Div. Convention at West Yellowstone. Send radiogram to K7ENE or WA7ZBO for additional info. WB7EVA and WB7BZJ running Novice class at Dixie College. W7BE reports good check in on UT VHF Wx net in spite of rptr trouble. WB7SDL on 40M. Beehive Net meets daily on 7272. Utah Code Net meets daily on 3710. N7BUO at Dixie College learning to become a DJ. Listen for him on KRDC at 90.1 FM. UARC officers: WB7DPA, pres.; W7JPG, exec. v.p.; N7BNC, v.p.; KA7AFG, secy.; KA7EUV, treas.; KB7HM N7BZC, chairpersons; KA7HFV, "Microvoit" editor; WA7UZO, asst. editor and N7SM, immediate Past President. W7KEB has new HB 20Mbeam and other antennas at 9K MSL. Traffic: K7HR 430, WA7ME 740, KA7JRC 71, WB4NVOZ 71, K7CKR 29, W7OCX, W7PBV 4.
 WYOMING: SCM, Dick Wunder, WA7WFC -- SEC: WB7EIN, STM: W8OGH. Wyoming Hamfest is July 17 & 18 at Meadow Lark Lake. Nets: Wyo. Traffic Net -- 3720 KHz, 8 P.M. dy; Wyo. Jackalope Net -- 7260 KHz, 12-15 P.M. M-S; Wyo. Cowboy Net -- 3923 KHz, 6:45 P.M. M-F; Wyo. Pony Express Net -- 3923 KHz, 8 A.M. Sn. Congrats to KA7DMW, who upgraded to Tech. WTN is looking for more checkins and more traffic to handle. W8OGH reports the Wyo. Traffic Net held 24 sessions with 99 QNI & 65 QTC. WB7NHR reports the Wyo. Cowboy Net held 20 sessions with 732 QNI & 12 QTC. WA6PFJ reports the Wyo Jackalope Net held 24 sessions with 631 QNI & 7 QTC. Traffic: WB7NHR 213, W8OGH 172, K7TFW 77, K7SLM 52.

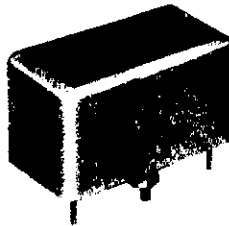
SOUTHEASTERN DIVISION

ALABAMA: SCM, H. H. Wheeler, W4IBU -- SEC: N4DMA, STM: WA4PIZ, ASCMs: KA4WVU N4DRV, KA4WVU for legal assistance and N4DRV for public information asst. Any contact for legal assistance should come through the SCM. Any public information should go directly to N4DRV. Gov. Fob James has declared the week of May 9 through May 15 as "Amateur Radio Week" so as to be in concert with the Birminghamfest to be held May 15-16. QCWA Chapter 40 organized in B'ham under old charter. Congrats on new upgrades to KA4PSX, KA4PSW, KA4PSY (three in one family), N4CZ, N4AGD, N4GKE and KE4LW. The Eufaula Club reports 288 manhours of work in CD with only 11 active members. Can our club top this? AEND now printing a newsletter thanks to WD4SEB. Five QNI a month gets you on mailing list. Muscle Shoals ARC adds tone alert to club rptr courtesy WA4LXB and WB4NQH. All 2 meter local net managers should inform the STM of their call and other pertinent info. We need volunteers as EC in many counties. How about you? Techs and above with ARRL membership are all eligible. The FCC has stated that existing technological limitations preclude the use of the UHF-TV allocations for CATV systems. Is it possible there is still work to be done at the drawing board? Ala. represented 100% by WA4KS and WA4AD on GAND. Ala. represented 98% on DRN5 by W4CK5 WA4BU WA4JDH WA4WJF WA4PIZ KD4KT K4LYY. Traffic: WA4JDH 1317, W4CK5 151, WA4LXP 111, W4IBU 85, N4BIB 67, WA4PIZ 60, K4AOZ 58, WA4ZPZ 43, WA4JP 24, WB4TVY 22, WA4HRV 19, KA4VFC 14, WD4DHI 12, W4DGH 7, K4HJX 6, WA4OEA 5, W4RNX 4.
 GEORGIA: SCM, Eddy Kosobucki, K4JNL -- ASCM: K4VHC, SEC: WB4HXE, STM: W4WXA, Chief OBS: W4BIA. First of all, tnx for the many section net & individual traffic reports this month. This info is very important to the League. Congrats again to K4EV WA4NTW & W4HON, again making PSHR. I know that there are more who don't qualify each month, so let me know if you need any info. New leadership for the Southeastern DX Club are as follows: KC4M, pres.; WB4ZNH, v.p.; KN4H, secy.; K4GFH, treas. An ARRL book collection was presented to the Nancy Quinn Library in Conyers by the Conyers ARG. Truly real club spirit. The newly affiliated Macon ARG continues with great programs and the officers are: W4TG, pres.; W4NKL, v.p.; N4ADY (ex-4IO), secy/treas.; K4LNL, WD4ANO N4CHU, dir. The ice & snow came again in Feb. & as usual the section hams turned out in droves to see it they could help. The 1676 Stone Mt. machine lost its antenna with ice 6 inches thick. This has been a rough winter. Hamfest time is now in full swing and will continue until mid-November when the convention closes it out. The Hamfestival in Atlanta on June 12 & 13 will also host the Division Convention. So make your plans now. In recent weeks I visited Albany, Newnan and the quarterly QCWA dinner. I want to thank these FB organizations for the courtesies and hospitality shown me. I will be glad to pay your club a visit but please do it in plenty of time so I can check my schedule book. I am still looking for the oldest ham in Georgia. We in this section have many real old timers, in fact some of the oldest in the country. If you should know of one please get the info together and let me know. If you don't want to write, interview the person on when I'll extract it. Traffic: WB4NTW 438, WA4WXA 210, K4EV 126, K5TF 93, K4JNL 79, W4PIM 79, WB4ZUX 61, WA4EO 35, KC4WL 35, W4YWY 26, W4HON 21, K4NM 21, N4BIM 20, W4FIZ 18, AK4T 16, KA4ATM 15, K4BAI 15, KA4RBN 15, W4REI 14, W4BIA 13, N4UZ 11, WB4APG 9, W4DGN 6, AA4E 6. (Jan.) W4FIZ 31, W4BIA 17, KA4ATM 10.

NORTH FLORIDA: SCM, Billy F. Williams, Jr., N4UF -- STM: WD4HIF, SEC: WA2GIN. The Five Flags ARC of Pensacola has WB4KGW & WB4QBB as editors of newsletter. KA4SYW active in NR. K8ND active on RTTY. TARS rptr moved to new site thru efforts of N4APG KC4N WA4KJ N4KAYD KC4DFC & KA4QG, NS4V & KD4XK planning fall upgrading. Secy W4GAA has new rptr on 146.115/715. New officers at Hernando Co. ARS are: WB4EXA, pres.; N4EBH, v.p.; K4B7H, secy. WD4JXH, treas. RFI Committee formed by HCARA with W4GJO WA3UJO and K3AW members. BVARS named WA3UBA as FD chmn. BARS homebrew contest had notable entries by NE4Z KW4T W4AND KA3KJE & WD4MSR. WD4FHD is mbrshp chmn. OARC chose N4FPA as "Ham of Month" for Jan. That group's 2-mtr activities include March of Dimes "Superwalk". WA4RQG made Advanced. DBARA had 25th birthday banquet attended by W4RH SE Dir along with ADs KB4T WA4B & W4MGO. W4K1X reports good results with new GCD antennas on 15 & 20 mtrs. KA4DCA upgraded to Tech. N4EBV wrote many emergency plans for Gilchrist Co. WD4IWD made Extra. WA4TLB & KC4ZT, KA4KWS passed Advanced. FCC will give exams in Jax the day before the 1982 Hamfest. WD4NIX & KB4LB promoting ham radio to Seminole Co. Commission. N4BQE active with CD. GCARC making plans for FD with KC4LJ N4EYO & W2LRJ bush making plans. K3AW had good talk on antennas at GCARC Jan.

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FT-101/F-101	*	*	*	*	*	*	*	*	*	*	*
FT-301/FT-7B/620	*	*	*	*	*	*	*	*	*	*	*
FT-901/101ZD/107	*	*	*	*	*	*	*	*	*	*	*
FT-401/660/570	*	*	*	*	*	*	*	*	*	*	*
FT-200/TEMPO 1	*	*	*	*	*	*	*	*	*	*	*
Drake											
R-4C GUF-1 Broad 1st IF	*	*	*	*	*	*	*	*	*	*	*
R-4C GUF-2 Narrow 1st IF	*	*	*	*	*	*	*	*	*	*	*
R-4C 2nd IF	*	*	*	*	*	*	*	*	*	*	*
Kenwood											
TS-520/R-599	*	*	*	*	*	*	*	*	*	*	*
TS-820/R-820	*	*	*	*	*	*	*	*	*	*	*
TS-130S	*	*	*	*	*	*	*	*	*	*	*
TS-530S	*	*	*	*	*	*	*	*	*	*	*
TS-830S 1st IF	*	*	*	*	*	*	*	*	*	*	*
Heath											
ALL HF	*	*	*	*	*	*	*	*	*	*	*
S70 each											
Kenwood											
TS-830S 2nd IF	*	*	*	*	*	*	*	*	*	*	*
Collins											
75S-3B/C	*	*	*	*	*	*	*	*	*	*	*



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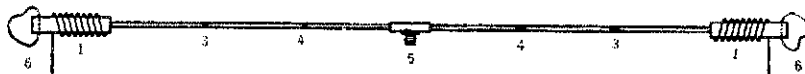
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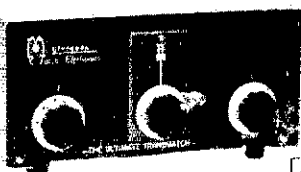
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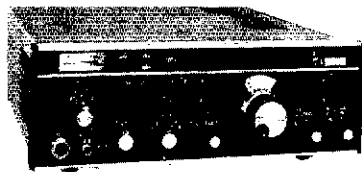
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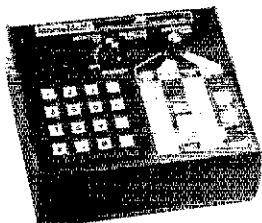
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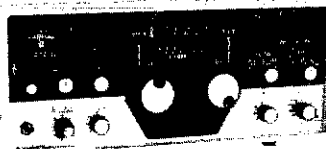


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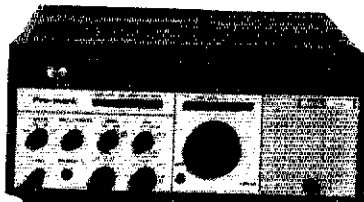
ASTRO 103 150A & 100 MXA DIPLOMAT 150



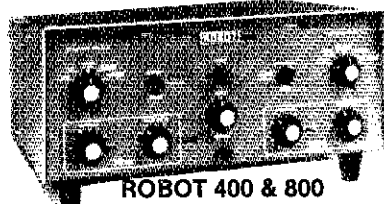
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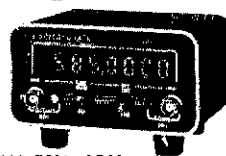


YAESU FT-208R FT-708R

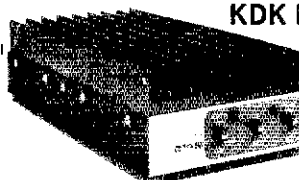
DIGITAL FREQUENCY COUNTER

Trionyx-Model TR-1000 0-600 MHz

Digimax-Model D-510 50Hz-1GHz



KDK FM-2025



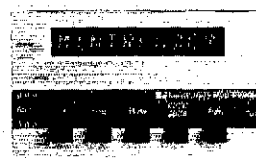
MIRAGE B-23, D-1010, B-1016



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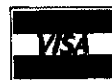
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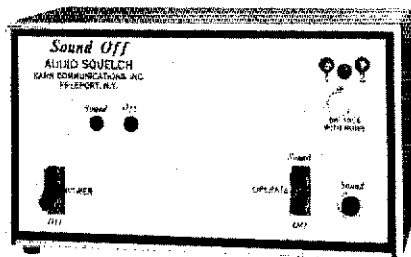
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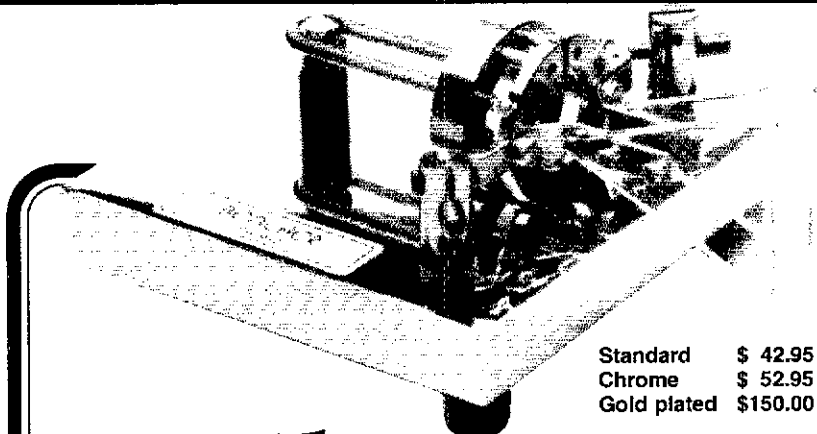
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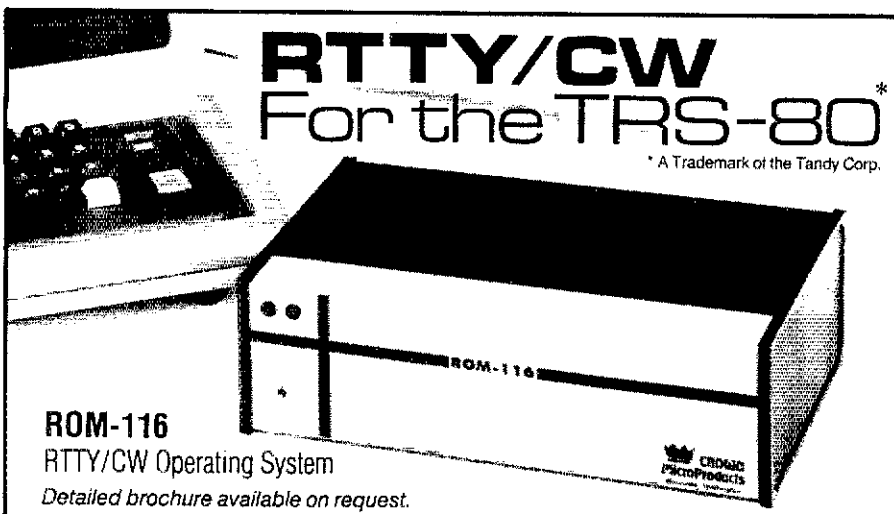
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meeting. WB4TVQ is mgr of that club's net for 1982. New treasurer for Jax RANGE is WA4RGO & the group has new hats, shirts and jackets. Fla nets busy with traffic from W4DUG fair operation. The load was carried very efficiently. NCFARS and HCARA heard W1HDQ of ARRL speak on wave propagation. N4EVY has a voice/tech net guide which is available free for a sabb. K44WOL upgraded and is now N4GIV. New ORS are WD4GUZ and WB4YQP. Traffic: WASIZ 884, WD4HIF 692, N4PL 676, WA4OXT 519, WD4IO 490, W4JL 427, N4EDH 334, WB4GHU 182, N4EEB 169, W4MGO 165, W3QO 143, K4DHX 122, WB4TZR 119, W4KIX 115, WA4EYU 122, KF4U 78, N4BZH 74, WD4MLQ 64, WB4FUY 59, WB4DTS 52, WD4GUZ 39, W3IDO 39, KB4T 26, N4EVS 24, WA4STZ 21, N4GIV 15, N4UF 15, WB4YQP 9, WA4ZTS 5.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — February was the biggest traffic month ever, with a total of 33,980 pieces reported. Still only 50 reports received — a small fraction of what we should receive. Congrats to Tampa ARFC for biggest Florida State Fair operation ever. W4DUG traffic total was 13,188! W3CUL with a total of 8937. Heard her report "Mae Bushed"! Congrats also to VE3BSY, whose total was 1197, a real significant increase over previous months. K4TH reports participation in a public service event Feb. 12-14. This was the LPGA Golf Tournament in St. Petersburg, in which a large number of radio amateurs assisted. Forthcoming events include Festival of States parades in St. Petersburg March 30 and April 3 with about 60 radio amateurs being active in each. Miami Hamfest and State Convention Feb. 6 and 7 had greatest paid attendance ever, about 12,000. It was with regret that I accepted the letter of resignation as SEC from AA4M. He has served our section long and well, finishing up 6 years in office. He left our section emergency organization in excellent condition. He has continued our section's tradition of always submitting monthly reports promptly to ARRL Headquarters. Our section has not missed in 30 years! He will be replaced by KB4OW, on March 13th. We plan to hold a little "change of watch" ceremony at the LO meeting at Orlando Hamfest. KB4OW is a real capable and energetic "go-getter", so we are confident he will do well as SEC. My term as SCM expires September 30, 1992. You should see solicitations for nominations in QST before long. I have made up my mind that I will not run for re-election. I sent a letter to this effect to Leadership. Our section now is the time for members to give serious thought to whom they want for SCM, or Section Manager. I am basically a simple-minded hard worker, doing my best to get a job done right. The SCM/SM position has become too "political" to suit me. Political squabbles turn me OFF. Traffic: W4DUG 13188, W3CUL 8937, W3VJ 2839, VE3BSY 1197, WB4FVY 979, AA4WJ 886, K4TH 587, W4DVO 550, K4SCL 533, WA4PFK 403, KY4U 349, K4ZK 285, W4SME 279, K4EUK 240, WD4COL 232, WA4HXU 224, WB4AJD 222, WD4AWN 218, WB4PIB 191, WA4EIC 168, W1NJM 165, KA4ASZ 153, W4UID 142, KE4O 117, N4ET 114, W4ACPS 112, KE4DA 103, N4KB 101, WB4WY 74, K4ACPS 57, W4ESH 57, W4NT 49, K4AFZ 47, WB4FVY 46, KA4LA 43, W4OHA 37, N4O 36, W4COK 35, W3TLV 35, W4DL 34, K5IHH 30, N4APE 24, WB4SNX 21, WB4PDP 18, KA4BBA 18, AA4BN 14, W8BZY 10, W4WYR 9, KA4ND 7, W4JM 2.

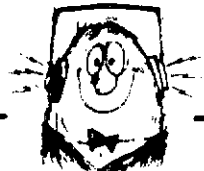
WEST INDIES: SCM, Julio Negroni, KP4CV — PRARC Convention on April 25 at Villas del Abey Hotel, Salinas PR will have an ARRL Forum. NF4D's repeater at Cerro Punta now operating on 146.315/915. He is now planning a second repeater at Cerro Santa Ana, Maricao with a possible 450 MHz link so that ARES and NTS operations will cover all of PR and VI. WP4BCV reports an outstanding opening of 8 mtrs with LUS, 9Ys, PYs, ZDs and CX pounding in. PSHR: WP4AOH. Traffic: WP4AOH 96, KP4DJ 49, WP4BCV 39.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7FDN WA7KQE. Despite the fact that February was a short month there was no corresponding lack of activity. I regret to report the following Silent Keys: N7AHS WA7ZQI. The response of Amateur Radio in times of emergency was clearly demonstrated this month by the many firms who provided comms in support of the search for N7AHS's aircraft that crashed in Oak Creek Canyon during bad weather. Thanks to K7LXL for his efforts to get to all who assisted. The Superstition ARC reports 15 of its members provided comms for the Lost Duchman Daves Parade. The Slow Speed Net now meets Thursdays at 7:30 P.M. MST on 28.135 MHz. Members of the Scottsdale and Superstition ARC's provided comms for a marathon run. ARCA new officers are as follows: K7UHW, chmn; W7WGW, v. chmn; K6JOA, treas. Members of the Coconino Co. ARC provided comms on 6 & 2 meters for the Special Olympics. W7KAX reports that WB7BVV KAT7ESZ WB7HSV and N7BTA provided comms for the Sweetheart Rally. W7LUX reports very good 6-meter single hop opening to HH2, J3, YV5 and T2. New OVS appointments: W7KMA N7GSC. New Tucson DX net Tuesdays 9 P.M. 148.07.87. PSHR: W7EP. Cactus Net (Jan): QNI 1074, GTC 175. ATEN: QNI 972, QTC 240. Traffic: W7EP 233, W7LVB 88, K7UXB 67, WA7KQE 63, W7AMM 48, K7NTG 38, W7OIF 36, K7NMQ 32, K7JKM 30, WA7NLX 20, N7EH 17, KE7W 17, W7LW 14, K7GLA 7, K7QY 4. (Jan), W7EP 198.

LOS ANGELES: SCM, Stan Broki, N2YQ — SEC: N8UK. STM: K5DY. DECS: Northwestern - K8IYK; Southbay - KE6EF; San Gabriel - WB6MKA. Again I was at the TRW Swap Meet this past month, from now on I will have a table at the swap meet for Membership services. Pins, patches, decals, ARRL publications and free literature will be available monthly at the swap meet. W6EJJ and other League officials will also be present from time to time. Congrats to N6RJ and W7L on new YL harmonic, generated Feb. 10, calling CQ DX at 7 lbs. 7 ozs. Feb. 21 the Associated Radio Amateurs of Long Beach supported the first Long Beach Marathon with comms. Over 1600 runners participated in the 26-mile event. WA6LVO reports that the 1:45 P.M. session of RN6 will be eliminated unless emergency comms are required. STM, K5DY, manager for SCN, reports that the SCN net participation awards program is being reinstated. Qualifications for this award are in Feb. issue of "Zero Beat" or can be obtained from K5DY. QO reports: K6CL 6, K6KA 63. Traffic: K6UYK 302, W6INH 186, W6FAS 114, WA6OON 102, WA6LVO 82, K7ED 70, W6NKE 47, N8BCY 40, W6BCO 32, W6BCZ 27, K6CL 22, AD6A 19. (Jan.) K8UYK 194, K5DY 40.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KN6C. WA6OHU ap-



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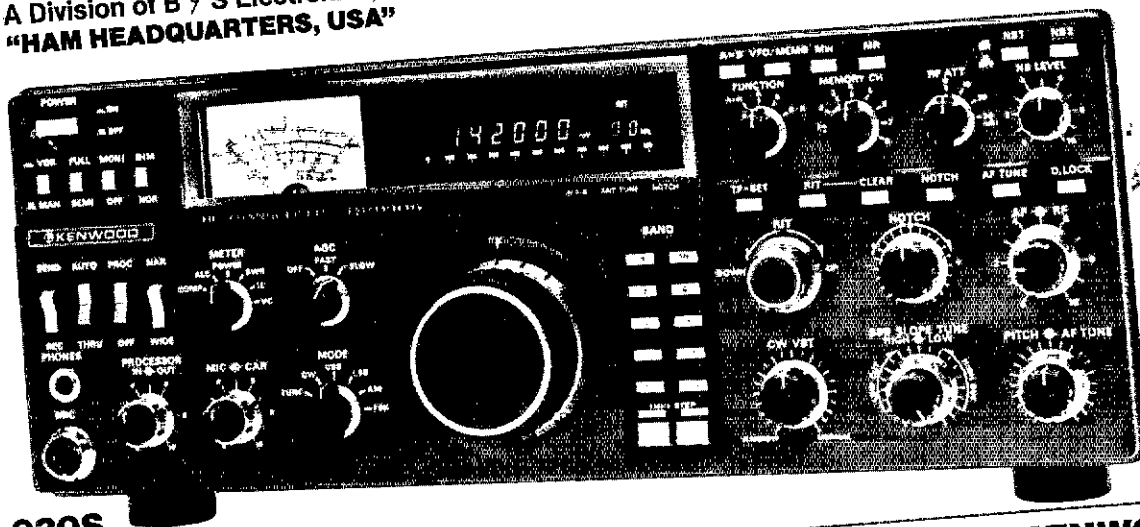
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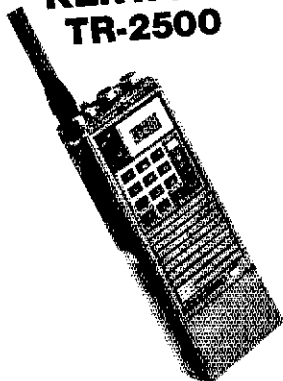
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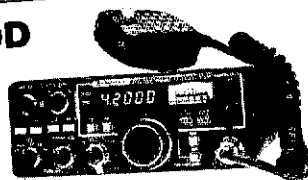
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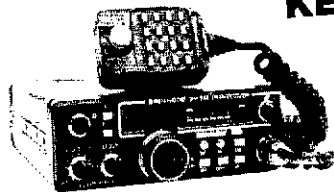
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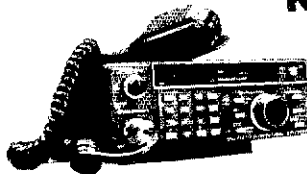
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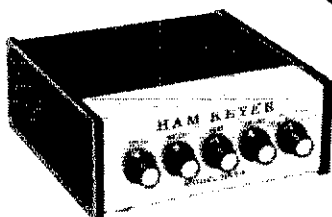
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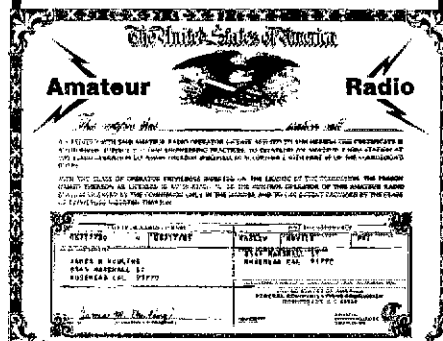
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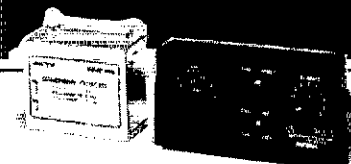
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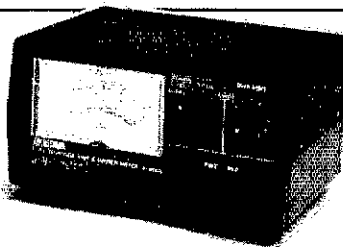
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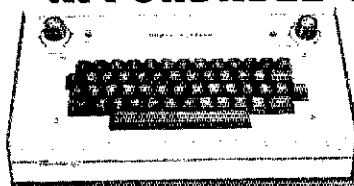
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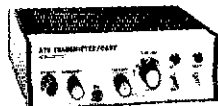


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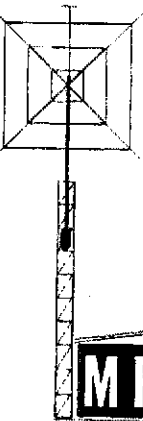
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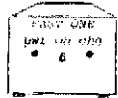
pointed EC responsible for ARES digital data communications. New OESs: WA6LLB W6GAE N8BAW and WA6QL (who was also appointed OO). OC Hamfest successful thanks to original organizer WB7EVC and Catalina RA pres WB6SJK as well as the many volunteers including those from MESAC. Almost every weekend there is a swap meet; the largest is TRW swap meet the last Saturday of the month in Manhattan Beach. For more info contact OO N6HI. Thanks to OES WD6FEM for coordination of the ham booth at the Indio Date Festival that sent over 300 messages from the public. Congrats to OES KA6HJK for 1st place in the 1981 world-wide RTTY Art Contest sponsored by SCATS. NM WA6QCA reports 484 clearings for the month on the So. Cal Net/VHF which meets daily at 9 P.M. on 147.045/646 (WD6AWP/R sponsored by SOARA) OVS N6BVU (TASMA secy) reports coordination of 144.43 for 300 baud AFSK and 144.46 for 1200 baud AFSK. SW Div Officials Net meets on 3907 kHz 9 P.M. Monday night during the summer; also SW Div ARES Net Sunday 11 A.M. has changed freq to 1945 kHz. EC A6EN has been appointed asst. director for the purpose of preparing an emergency plan for the SW Division. Congrats to N6NB for Public Info Asst (PIA) ARRL appointment. West Coast VHF/UHF Conference to be held May 7-9 in San Diego; for more info contact SCM or WB6NMT directly. Bishop ARC announces special event operation during "Mule Days", for which a certificate will be awarded for contacting station KA6AMT on 3.905, 7.240, 14.295 and 146.34/94. BPL: KS6T WB6EIG WD6FEM, PSHR: WB6CPB KS6T WB6QZB WA6QCA W6NTN N6AED KN6C. Again this year ARES will supply communications for the Gorton Bennett Balloon Race to begin May 8th at Mile Sq. Park in Fountain Valley. Please contact your EC or DEC if you can help. Traffic: KS6T 920, WB6EIG 548, W6NTN 410, WD6FEM 375, KN6C 369, N6AED 307, WB6QZB 290, WA6QCA 129, W6RE 124, W6CPB 79, KA6DZU 72, KZ6CE 36, WA6RIK 26, W6TKV 12, K6XI 8, WA6WZC 4, WA6WZN 2.

SAN DIEGO: SCM: Arthur R. Smith, W6INI — STM: NGW, SEC: W6INI. Don't forget the Southwestern Div Convention (HAMCOMP) in San Diego June 4-8. It's a combined Amateur Radio and computer convention. Register before May 15 for reduced rate. Write: HAMCOMP 2174 Foothill Dr, Vista, CA 92083 for info. The Indio Date Festival boosted NTS traffic totals. San Diego RA 1982 officers: W6UZL, pres.; WA6AIL, v.p.; W60GG, secy.; WA4OYL, treas. New ARES net operates on 446.0 MHz (simplex) with 10 members. W6THR is acting NCS. Time 1930 Saturdays. North Co. Traffic Net held 27 sessions with 95 msgs handled. Poway ARS officers for 1982 are: K7DGC, pres.; KC6S, v.p.; K6SAL, secy.; KA6EMV, treas. Communications for Special Olympics floor hockey were provided by WD6A0Z WD6AXD K6B8P N6DCX WA6RVB WA4SHP K6XK and KM6Y. A nighttime mass casualty drill in Fallbrook on Mar 3 had following participants: KB6A, KA6YJ N6AYO N6LO WA6DYV WB6EHJ W6EVL W6INI K6EYI WA6KEY W6KBD W6MNH WA4SHP W6TET W6TDF K6BXM A6S2 and W6BZJ. Traffic: KT6A 561, K6HAP 262, KM6I 205, KU6B 129, W6BGM 79, KB6A 59, N6AT 36, N6GW 5. (Jan.) W6BGM 93. (Dec.) W6BGM 98.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — SW Div-wide comms stressed, A6EN named Div. coordinator by Dir. W6EJJ as acts gear up for major June 7 disaster drill with many OES offices. Computers are to be linked. ICS mgmt system now accepted for state/fed emerg use. Trng: Vent. Co. ICS; STM N6FTO issued tbc manual, started SB Trng Net 3715 kHz 1930 Pt TThs. K68I skeds tbc trng Conejo Valley; WA6ISS gave hwy tips to ARES. SB Co. Bicentennial comms given by RA6C operating in WD6EVC coords special Olympics Camarillo RS; OES WA6MS married Saja Racing check-out Swansea; AZ ghost town trustee W6BBI now controlling 4 rpters of Silent Key W6KPS. Elaine Rollison (YL of W6BCNO) SILENT KEY — was staunch ARCIAR supporter. WB6WEV relieves WD6EZY as editor Simi Settlers paper. Tnx Bee for yeopersonal job! Citizen-of-Year award to W6QMV, by SARC. SMRA rpters new calls: 148.1373 WB6ZTX/R, 222.42/224.02 WB6ZT/R/R, 442/447.325 WB6ZTU/R. New 146.28/88 control incl. cw tail msgs et al. Work led by WA6UEO, W6B6CN, pres.; AC6I, dir. 1st/2nd place Radiosport by YLs KA6V/KD6L6. V6ARIC sent complaint to DXAC re list/net abuses. Their 10 x 6 chapter starts Mar at 700 F on 28750. Because of an error, K6VW was listed in this section's report appearing in April QST as a Silent Key. Happily K6VFE is by no means silent. Traffic: N6FTO 484, W6JGS 183, K6YD 132, W6ZRR 107, W6JTA 46, WL7ACC 10, KA6BPH 10.

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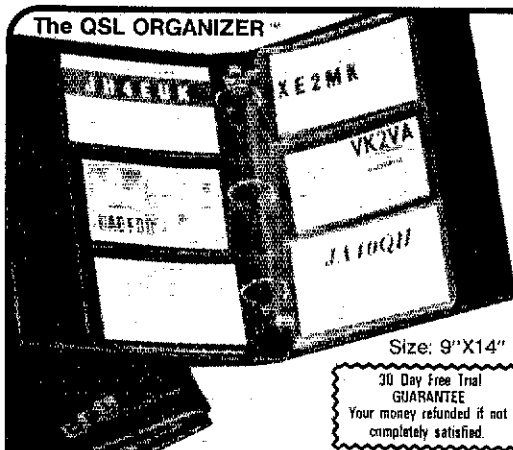
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NORTHERN TEXAS: SCM, Phil Clements, K5PC — V6SPO and I attended the Midland Swapfest on March 13th. Lots of goodies changed hands as usual, and several signed up for emergency coordinator positions. We really enjoyed this meeting each year. You need a lot of friendships and put lots of faces to all those calls you've worked! As usual, March has roared in like a lion, with millions of dollars of tornado damage here in NTX on March 13th and 14th. A novice class has started down at S. F. Austin State Univ. at Nacogdoches with 7 students, with AC5Z instructing. Don't forget to listen in on the North Texas ARES Net on 3961 kHz at 7 P.M. first and third Wed for news on all the latest ARES activity in our section. PSHR (Public Service Honor Roll): KC5FX KA5ZK K5CIN N5BT K5IWF WA5QFD K5MSP K5JL N5DKM Trn: K5N8H 108, K5JUL 206, KA5AZK 186, N5BT 150, K5CIN 118, W5BCN 110, KC5FX 96, W5OYL 87, WD5YJ 78, WA5QFD 70, N5DKW 52, KA5MAY 51, W5ERT 38, AJ5F 37, AC5Z 35, W5E5T 22, K5PC 21, KA5IWF 10, KA5MSP 9, K5HGX 8, KK5B 7, A5E1 6.

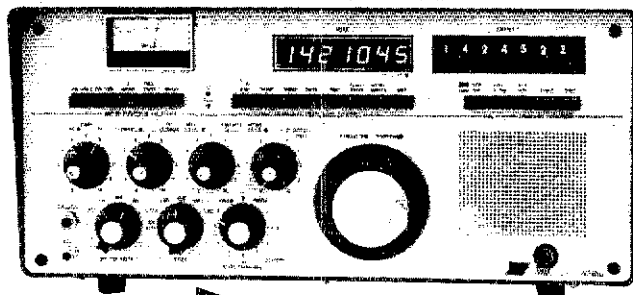
OKLAHOMA: SCM, Leonard Hollar, WA5FSN — One OVS report shows considerable vhf activity in southeast Oklahoma, with a new net meeting on K5PS machine and work being done on some other machines. Altus has excellent link with Crowell, TX and may have Wichita Falls by now. 2 OO reports with a variety of "faults" noted. WD5PWF is very proud of a "Certificate of Commendation" from ARRL for the fine newspaper story in Eireno paper. A real boost for Amateur Radio. We need more like it. I'd be getting set to teach Amateur Radio class at local vfo-tech school. Who'd see that of this. I appreciate very much the club newsletters that I receive, and can always use more. Next big date on my calendar is May 22-23, Broken Arrow Swapmeet, then Ham Holiday, July 23-25. K5WG has 182 countries confirmed on cw. KB5EK worked VK7AE on 75M asb early one morning. W5JJ experimenting with antenna couplers. More and more computers moving into ham shacks. Are we turning into a computer-type of operator? I am "old school" heaven forbid. Traffic:

K5CXP 358, W5RB 242, KV5X 171, WB5ELG 138, KB5EK 120, KA5CXV 118, WD5IFB 118, W5AS 117, W5REC 94, W5BNKC 93, N5EIH 80, W5EAY 69, WA5OUV 68, W5VXU 61, W5STFX 57, WA5FSN 55, W5JUG 37, W5VOR 30, W5VLW 28, WA5ZOO 26, K5CAY 22, N9IN 21, KC5OU 18, WA5JGU 15, WB5LSW 7, W5JJ 5.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — ASCMTM: N5TC, SEC: WA5RVT. OO reports: K5DL. OVS reports: N5AF WA5QCP. Congrats to UPGRADERS! W5BGE to Extra, N5EHO to Advanced, KA5GJR to Technician. 1982 officers for Big Bend ARC: K5FD, pres.; W5HOV, v.p.; WA5ROE, secy/treas. SEC WA5RVT and EC WD5AAH attended the Texas Emergency Management Seminar in Austin. N5EHO enjoying his new beam. K5RVF keeps busy on Delta SSB Net 1900 lcl M-S 3905 KHz. EC/OVS/OES/OBS WD5AAH has made PSHR for 14 months straight; now has RTTY going for ARRL bulletins he reads to at least 3 nets; is working with folks in north end of Brazoria Co. on emergency comms; met with Bay City club to organize APES group; Wharton Co. next. Brazos Valley ARC planning to get club jackets; the Novice class is going well with WN5TEN as Chief Elmer. Houston ARC officers for 1982: N5COJ, pres.; KB5IF, v.p.; N5BZJ, secy; N5DWI, treas. Club's code and theory classes doing well. Gulf Area YLARC (GAYLARK) officers for 1982: WD5HNG, pres.; K5MXO, v.p.; KA5FDK, secy/treas. OBS W5KLY keeps busy with 362 messages handled and 641 bulletin readings to 10 nets. WB5YDD and W5TFB made BPL. There were actually 12 ops making BPL in Dec 81, but Nr 12 arrived too late to be included with Dec report. Traffic: WB5YDD 656, W5TFB 519, W5KLY 382, W5GTF 241, N5TC 195, W5MMI 156, N5FC 127, W5FTG 93, WA5RVT 75, WD5AAH 57, W5KR 46, K5SNX 28, N5CRU 26, W5GKH 22, KA5KRI 14, N5EHO 4.

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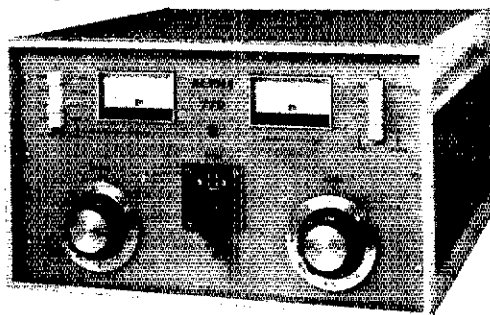


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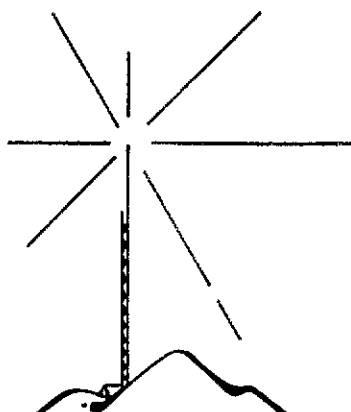
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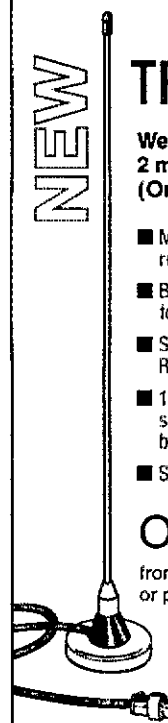
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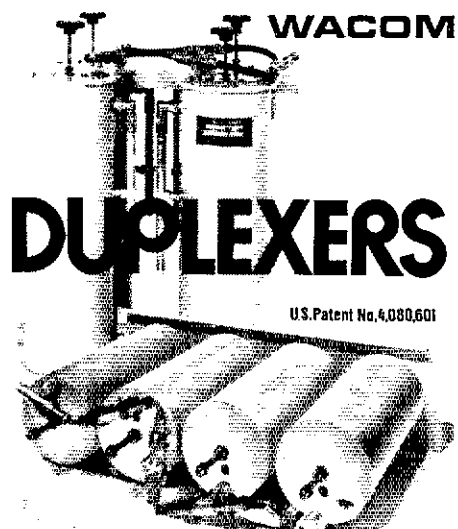
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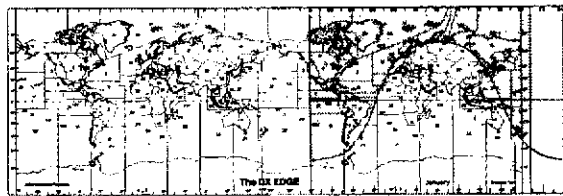
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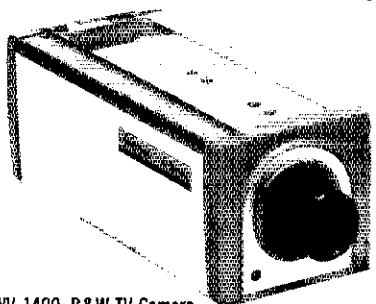
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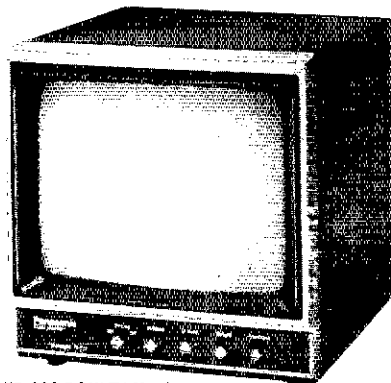
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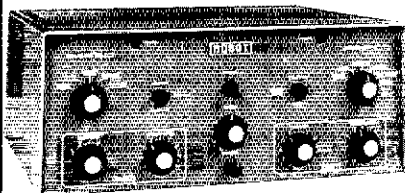


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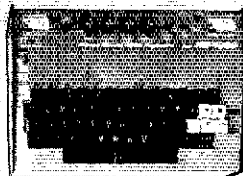
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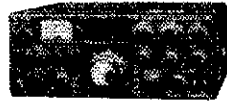
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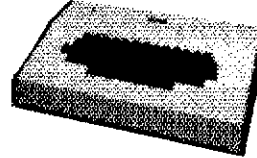
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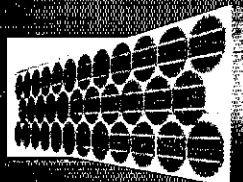
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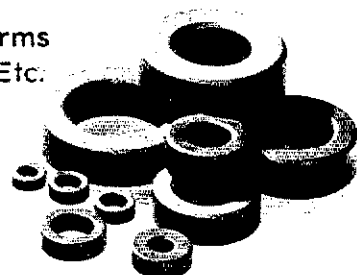
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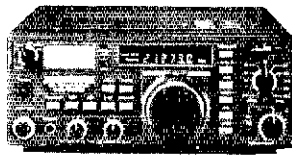
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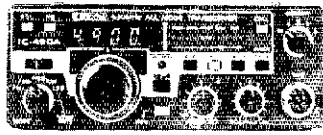
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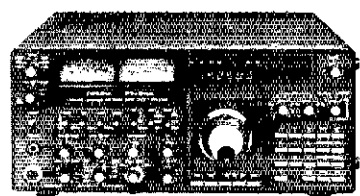


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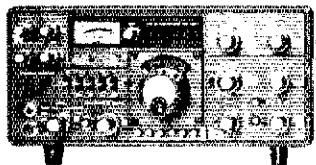
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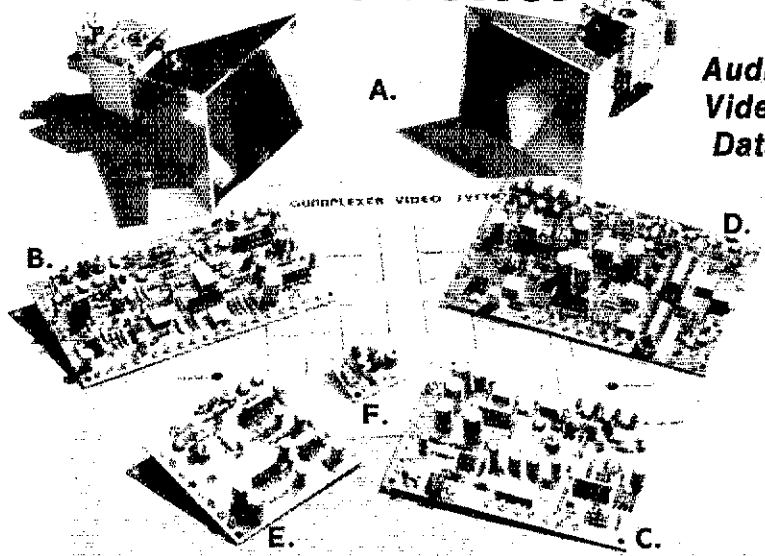
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KA4FJE

As present owner of TEN-TEC 544, I have been very happy with it. Now that I need a rig for a 2nd QTH—it, of course, must be a TEN-TEC.

WA2YHF

This is my third TEN-TEC rig. This new one is best yet! Triton IV is now back-up to new Omni C.

AD1P

This is a wonderful rig with all the serious Ham should need. All reports remark of clean keying and good quality SSB.

N4LS

It is a well thought out piece of equipment, I especially like the QSK and the convenient controls.

W8NOT

I was impressed with your reputation for providing good service and satisfying the customer.

W4JSP

In almost 27 years of Hamming, this is the best rig I've ever owned. Thank you all very much!

W7WKH

Super piece of equipment!!

N3RG

The transceiver has been on the air for 5 days, and I am more than satisfied. It is in my estimation a superb product and does exactly what I expected it to do. Signal reports are most flattering.

N2CER

Fantastic Rig, and I use on SSB ONLY.

KB9VB

I decided on TEN-TEC because of the excellent service policy of your company.

WA4RRC

I'm impressed! Will need time to take proper advantage of all of its good features. This should give the "Rice Burners" a real goal to shoot for!

W8UGT

Very fine Radio, I'm proud to be an Omni-C owner.

WD4SFY

The Omni is a beautiful transceiver. Worth every penny!

KJ5G

The Omni C is a joy to operate. My first contact was Romania.

W4REW

Numerous comments over the air pertaining to product and quality of service were very complimentary.

W5VYT

A prominent local amateur told us, "I have never met a man who bought a TEN-TEC and didn't like it." Also we wanted to buy American.

AJ0S N0CEQ

I have many friends on the air (cw) that are well pleased with TEN-TEC equipment. Especially favored among

I am extremely pleased with the OMNI-C. I have owned the best (Collins, Drake, etc.) but this product has them all beat for sheer performance and operator convenience. You are to be congratulated for producing such an outstanding piece of equipment—right here in the U.S.A.!

W9SC

I'm very pleased, after 14 years of DX'ing and contest operations and many more different rigs, this one tops them all. Super RX!

KJ2H CX1BBV

I've owned the Triton 1, then the Triton 4, now the Omni-C. Is there any other rig?

W1ZQI

Have had a Triton IV the past four years. I would not own anything but TEN-TEC. Super rigs and fantastic service.

W5TI

Had Omni-C, then tried most other rigs on market—went back to the best—The American made Omni-C.

KC5WC

I have previously owned Triton IV. Now have Omni-D Series B, your prompt and courteous attention to minor problems in the past together with fine equipment induced me to buy this one.

N5CN

Decision was on previous experience. Traded in a 544 on this rig & the only thing I would have traded that one for is another TEN-TEC—Great rig!

WD4NZP

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KA5GKO

Straight talk from owners of TEN-TEC OMNI...



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cw operators is the QSK full break in feature.

W5QNT

This XCVR has to be the ultimate "rig." I am waiting for the matching amp (the Hercules) it is on order.

K8IST

I owned a TEN-TEC Triton IV which was a sweet rig. It was natural to upgrade to another TEN-TEC.

KA4GYU

My decision was based mainly on over the air reports of TEN-TEC owners and also reported good factory service if any troubles with rig did occur.

W7GOY

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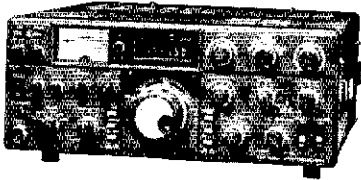
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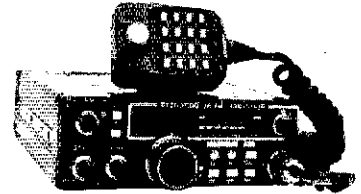
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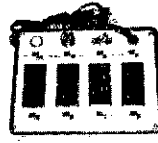
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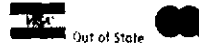
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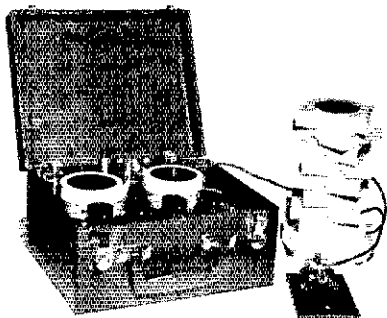
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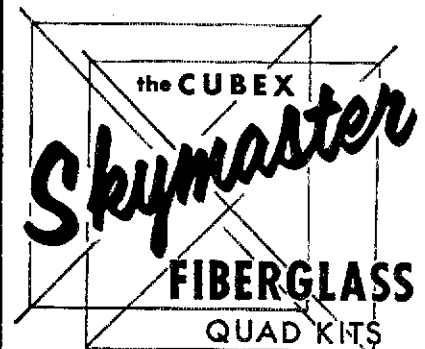
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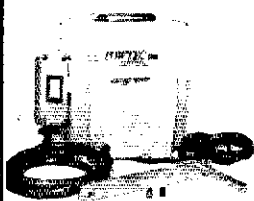
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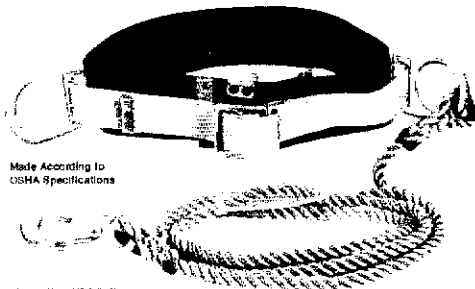
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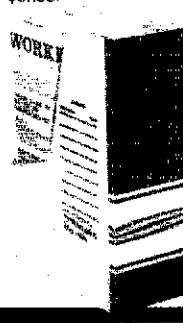
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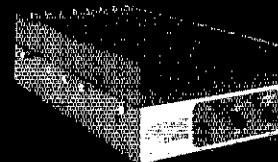
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DENTRON MLA-2500 Linear with 10 meters, \$475. Kenwood SM-220 monitorscope, new, \$275. Kenwood Filter YG88C (for TS-820S) \$40. Kenwood Filter YK88C (for TS-830S) \$45. Palomar Engineers transceiver preamplifier Model P310X, new, \$80. Art Johnson, K2POA, 656 Westminster Road, Baldwin, NY 11510. Phone 516-548-5426.

VHF SSB. Heath SB110A, SB500 speaker and AC. All near mint - \$395. Drake TC6, SC6, CC1 with AC and crystal calibrator. Excellent - \$325. EICO 717 keyer. Expertly built but never used - \$39. G. Fasse, W8UCI, 11320 Daria Ct., Warren, MI 48089.

WANTED: Hammerlund SPC-10 and HC-10 SSB converters in good and unmodified condition, preferably with original manuals. Depending on condition, top prices will be paid. Please state condition and give your telephone number and when to reach you. E. J. Cosman, 15 Ridge Street, Arlington, MA, 02174, ex-W1BOA. Tel. 617-272-4421 days.

SELL: HyGain transceiver, speaker, VFO, with Operators and Service Manuals. Excellent condition. \$900, you ship. W4PKM 615-587-0546.

FT-901DM - Absolutely mint condition with mic. \$800. Will ship. W3YZE - 301-486-6014.

SALE - HyGain 3750 transceiver - \$650 - 612-926-4011, W9HYY.

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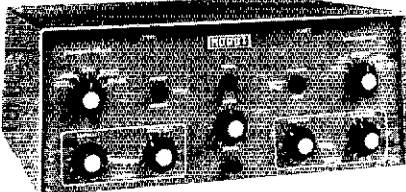
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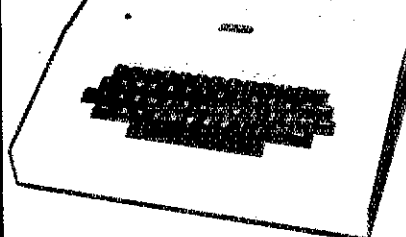


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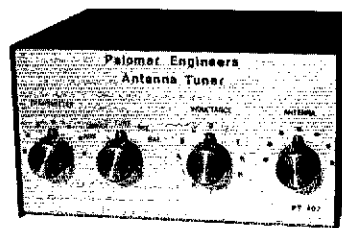
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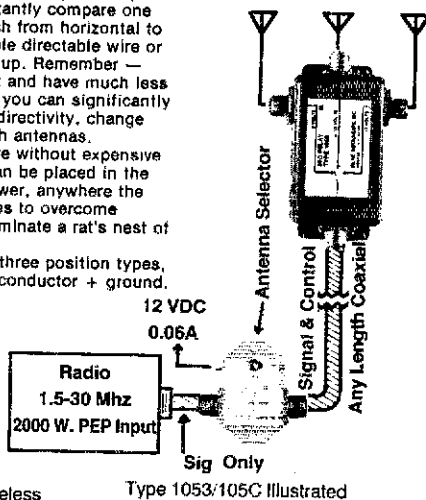
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ALPHA-78PA with 10 meters. 803-359-3418, 803-359-4618, K4RV.

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HAM-M rotor best offer. Drake TR-3, RV-3, AC-3 Turner 454X microphone \$300. Dennis Quinn, 6936 Midtown Road, Madison, WI 53711.

WANTED: Manuals and schematics for Lafayette HE-45 and HE-61. Tom, KA9IRE, Box 63 Park Falls, WI 54552.

MINT Drake TR-7, AUX-7, NB-7, fan, SL-6000, SL-1800, SL-500, PS-7, mike and speaker with boxes, manuals and warranty cards — sell for \$1650 or trade for mint TS-820S plus cash. K2RPU, 212-962-0400 or 201-526-7676 (eves).

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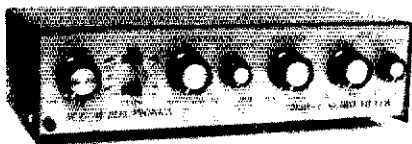
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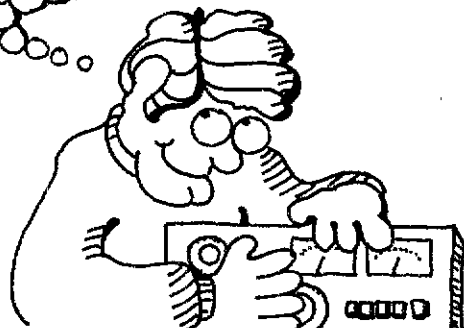
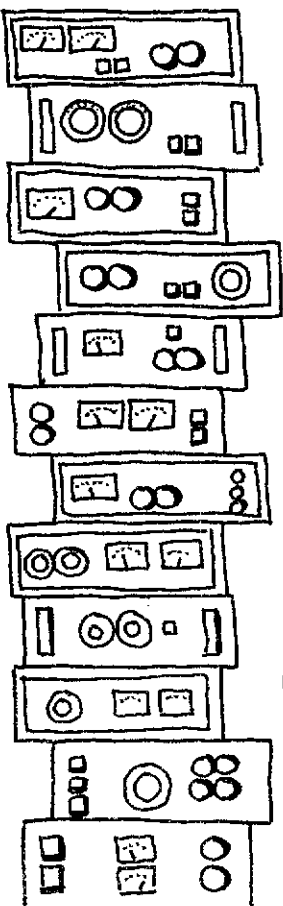
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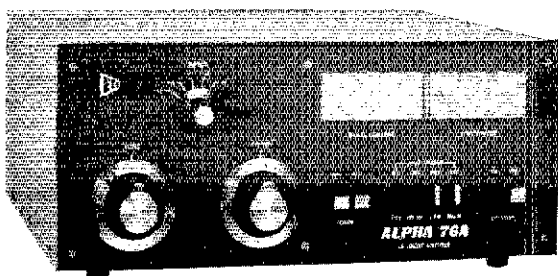
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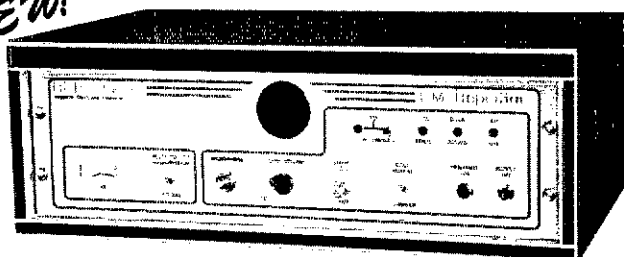
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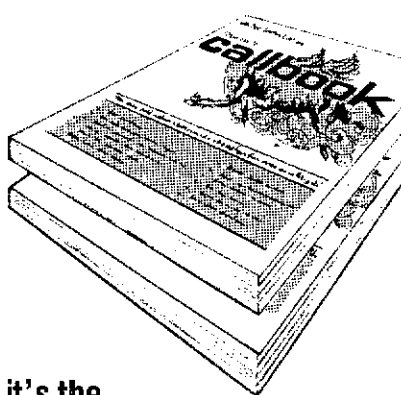
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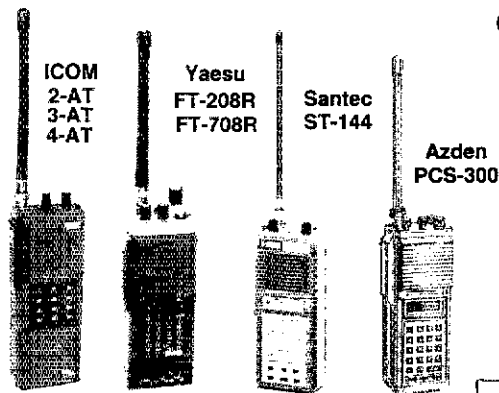
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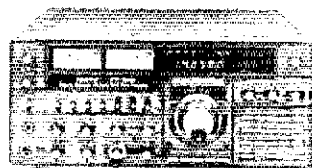
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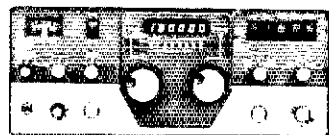


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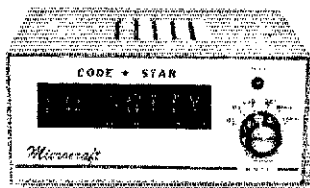
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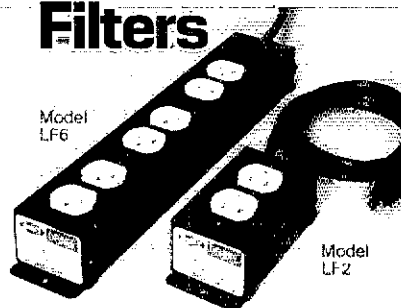


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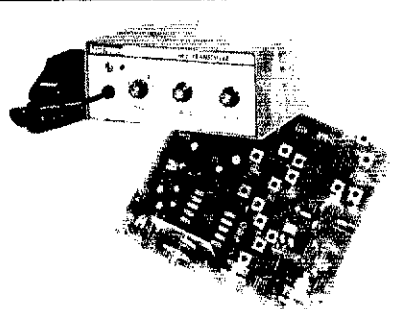
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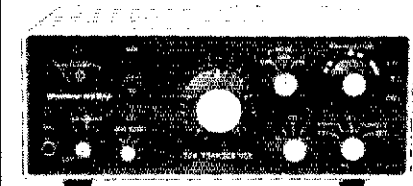
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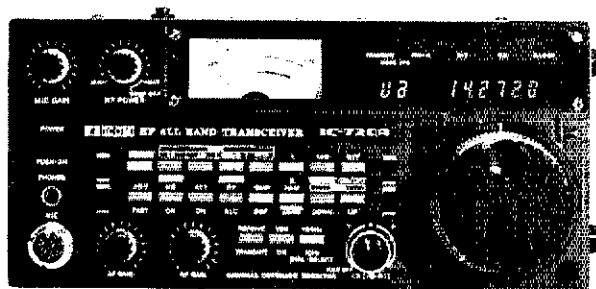
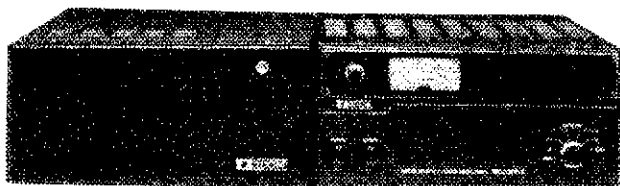
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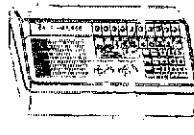
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FACTORY overrun - coaxial cable - 1 million ft. in stock; 96% shielding mill ends 150-500' rolls - RG-5A/U double shield \$140/M, RG-8/U mil spec \$175/M, RG-11/U \$145/M, RG-6X (Mini 8) \$105/M, RG-58/U \$68/M, RG-174/U mil spec \$58/M, RG-58C/U stranded noncontaminating \$88/M, PL-259 \$45/100, Nema Electronics, 5885 S.W. 80th Street, Miami, FL 33143 305-661-5534.

WANTED: 6M Icom IC-560, Yaesu FT-690R, or FT-680R. Any condition. Must be absolute giveaway priced. N7DJC, Apt. 1118, 4770 N. 7th St., Phoenix, AZ 85014.

SELLING: HT-37, 75-S1 with cw filter, Galaxy V, DX-160, Bird rf wattmeters, rx and tx tubes, meters, Rycorn SVM, miscellaneous test equipment. Send SASE for list. W5NUS, 111 South 9th St., Lovington, NM 88260.

COLLINS rack mount, 351R-2, new. \$35. W9ZR, 1-414-434-2938.

DRAKE 2C and 2CQ immaculate \$189. Icom IC-2AT with extra BP-3 \$249. Mirage B23 amplifier \$75. W5VJG/4, 89 Woodland Hills, Tuscaloosa, AL 35405. 205-566-9167.

WANTED AC-4 power supply, MS-4 speaker and cabinet for Drake T-4X. Paul Tibbs, W6WGO, 3415 Crestline Way, Soquel, CA 95073. 408-475-4280.

SELL Drake T4XC, AC4, MS4, R4C filters, noise blanker \$800; Collins KVM2, NB, 516F2 speaker \$800; RCA scope W033A-\$35 W5MUG, 145 Pasa Robles, Jackson, MS 39206.

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WANTED: SX122A, HQ180AC, or 51S-1, clean, unmodified, good operating condition, with manuals, cables & filters. Charles Godsey, WB9TKW, 3637 Plaza Drive, Bloomington, IN 47401.

WANTED HW-8, W1MK, Brookview Road, Boxford, MA 01921.

KLM Multi-2700 am-fm-ssb-cw rig. Excellent condition \$425. Dan Schreckengost, RD 3, Corry, PA 16407. 814-664-2061.

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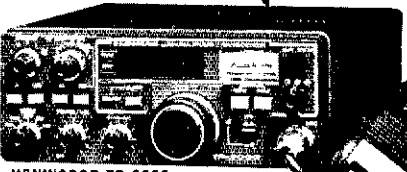
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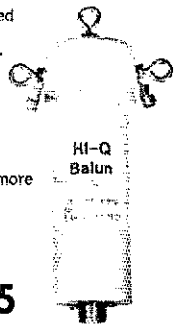
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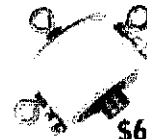
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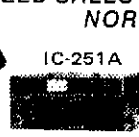
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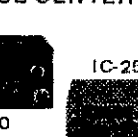
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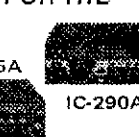
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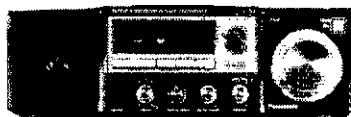
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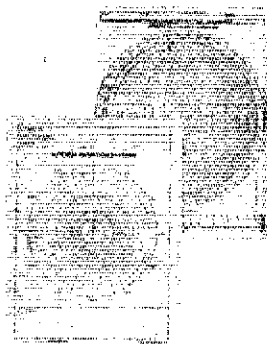
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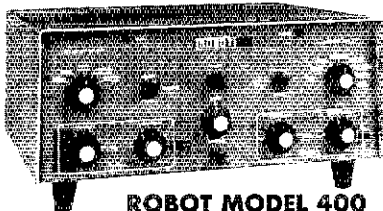
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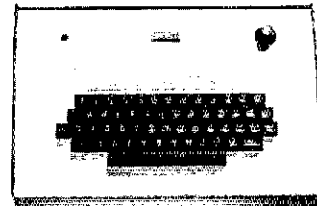
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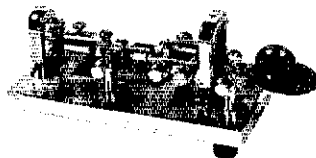
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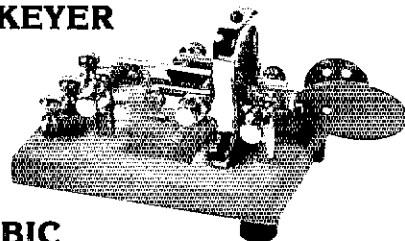
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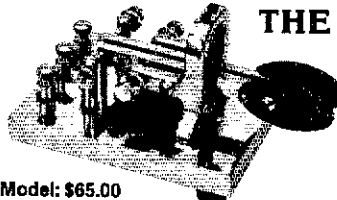
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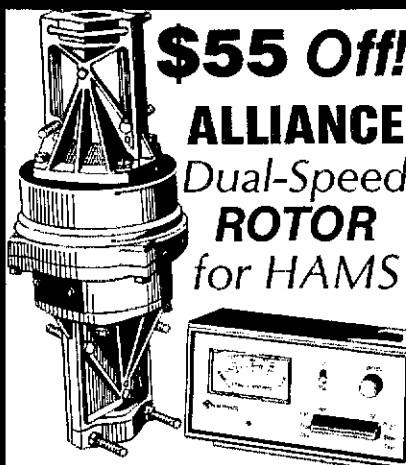
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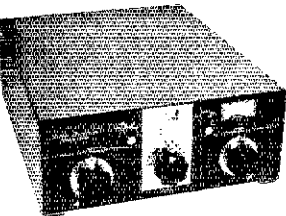
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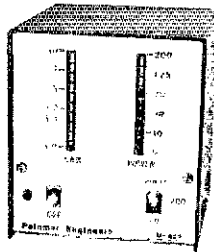
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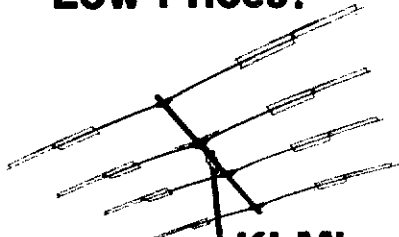
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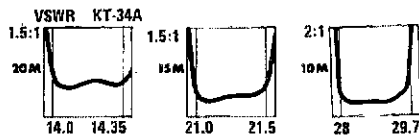
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Wind load rating based on 70 mph wind. Towers complete with rotor plate and assembly hardware. Freight prepaid to Continental 48 States.

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HDX40	40 ft	10 sq ft	164	BXB6	269	24	293
HDX48	48 ft	10 sq ft	303	BXB7	349	26	375
HDX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

HF6V	80-10 mtr. Vertical	\$109
TR160	160-mtr. Coil Kit	\$ 33
RM KIT	Roof Mount w/Stub Tuned Radials	\$ 33
STR KIT	Stub Tuned Radial Kit	\$ 20

CUSHCRAFT

A3	3-El. Triband Beam	\$169
A4	4-El. Triband Beam	\$209
A743	40 mtr. Add-on Kit for A3 Antenna	\$ 59
A744	40 mtr. Add-on Kit for A4 Antenna	\$ 50
R3	New Motor Tuned 20/15/10 mtr. Vertical	\$229
AV5	80-10 mtr. Trap Vertical	\$ 89
20-3CD	3-El. 20 mtr. Beam	\$169
20-4CD	4-El. 20 mtr. Beam	\$239
15-3CD	3-El. 15 mtr. Beam	\$ 89
15-4CD	4-El. 15 mtr. Beam	\$ 99
10-3CD	3-El. 10 mtr. Beam	\$ 69
10-4CD	4-El. 10 mtr. Beam	\$ 89
A50-5	5-El. 6 mtr. Beam	\$ 59
617-6B	6-El. 6 mtr. "Boomer"	\$169
214B	14-El. 2 mtr. "Boomer"	\$ 66
214FB	14-El. 2 mtr. FM "Boomer"	\$ 66
228FB	28-El. 2 mtr. FM "Power Pack"	\$189
32-19	19-El. 2 mtr. "Super Boomer"	\$ 79
Z20B	17-El. 220 MHz "Boomer"	\$ 69
ARX2B	2 mtr. "Ringo Ranger II"	\$ 36
ARX450B	450 Mhz "Ringo Ranger II"	\$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	\$ 59
A144-10T	10-El. 2 mtr. Satellite Antenna	\$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	\$ 66
A432-20T	20-El. 432 MHz. Satellite Antenna	\$ 45
A14T-MB	Dual Antenna Mounting Assembly	\$ 24

HYGAIN

V2	New 2 mtr. Base Vertical	\$ 36
TH5DX	6-El. Triband Beam	\$209
TH7DX	New 7-El. Triband Beam	\$339
TH3MK3	3-El. Triband Beam	\$179
TH3JR	3-El. Triband Beam	\$139
TH2MK3	2-El. Triband Beam	\$119
HY-QUAD	2-El. Triband Quad	\$209
402BA	2-El. 40 mtr. Beam	\$179
205BA	5-El. 20 mtr. "Long John"	\$239
155BA	5-El. 15 mtr. "Long John"	\$149
105BA	5-El. 10 mtr. "Long John"	\$ 99
204BA	4-El. 20 mtr. Beam	\$189
203BA	3-El. 20 mtr. Beam	\$119
163BA	3-El. 16 mtr. Beam	\$ 69
103BA	3-El. 10 mtr. Beam	\$ 59
DB1015A	3-El. 10/15 mtr. Beam	\$129
64B	4-El. 6 mtr. Beam	\$ 49
66B	6-El. 6 mtr. "Long John"	\$ 89
18HT	80-10 mtr. Hy-Tower Vertical	\$279
18AVT/WB	80-10 mtr. Trap Vertical	\$ 85
214	14-El. 2 mtr. Beam	\$ 33
2BDQ	80/40 mtr. Trap Dipole	\$ 49
5BDQ	80/10 mtr. Trap Dipole	\$ 89
BN86	80-10 mtr. KV Balun	\$ 14

HUSTLER

3TB4	New 3-El. Triband Beam	\$169
4BTV	40-10 mtr. Vertical	\$ 79
5BTV	80-10 mtr. Vertical	\$ 99
G6-144B	2 mtr. Base Vertical	\$ 69
G7-144	2 mtr. Base Vertical	\$ 99
HF Mobile Resonators (STD 400 Watt)	Super 2 KW	
10 & 15 mtrs.	\$10	\$15
20 mtrs.	\$12	\$18
40 mtrs.	\$15	\$21
75 mtrs.	\$17	\$32

BUMPER MOUNTS, SPRINGS, FOLDING MASTS IN STOCK CALL!

KLM

KT34XA	6-El. Tribander	\$479
7-2-1	2-El. 40 mtr. Beam	\$159
7-2-2	2-El. 40 mtr. Beam	\$299
7-2-3	3-El. 40 mtr. Beam	\$449
7-0-7-3-4A	4-El. 40 mtr. Beam	\$629
144-148-13LB	13-El. 2 mtr. Long Boomer	\$ 79
432-16LB	16-El. 432 MHz. Long Boomer	\$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	\$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	\$ 59

CALL FOR OUR LOW PRICES ON OTHER KLM PRODUCTS!

MINI PRODUCTS

HO-1 Mini-Quad Compact 20/15/10 mtr. Antenna	\$139
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ROTORS & CABLES

Alliance HO73 (10.7 sq. ft. Rating)	\$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	\$ 45
CDE Ham 4 (15 sq. ft. Rating)	\$169
CDE Tailtwister (30 sq. ft. rating)	\$239
HYGAIN HDR-300 (Most H.D. Rotor for BIG Arrays)	\$399
8 COND (2-#22GA./6-#18GA.) Rotor Cable	\$0.19/ft.
H.D. 8 COND (2-#16GA./6-#18GA.) Rotor Cable	\$0.36/ft.

COAXIAL CABLE & CONNECTORS

RG213/U (95% shield - non-contaminating jacket)	\$0.29/ft.
RG8X (95% shield-non contaminating jacket)	\$0.18/ft.
RG11/U (75 OHM - 95% shield)	\$0.35/ft.
1/2" Aluminum Hardline w/poly jacket	\$0.69/ft.
1/2" Copper Hardline w/poly jacket	\$1.10/ft.
1/2" Alum. H.L. Conn (UHF or N - Male or Female)	\$15.00
1/2" Copper H.L. Conn (UHF or N - Male or Female)	\$22.00
Amphenol Silver Plate PL259	\$ 1.25
Amphenol Nickel Plate PL259	\$ 0.90
Amphenol N Type Male Conn For RG213/U	\$ 2.95

HYGAIN CRANKUPS

HG37SS	37 tr. Self Supporting	\$589
HG52SS	52 ft. Self Supporting	\$829
HG54HD	Heavy Duty 54 Ft. Self Supporting	\$1379
HG70HD	Heavy Duty 70 Ft. Self Supporting	\$2379
HG50MT2	50 ft. Side Supported	\$689

ALL HYGAIN TOWERS FREIGHT PAID! CALL FOR PACKAGE QUOTE ON TOWER, ANTENNA & ROTOR — FREIGHT PAID.

ROHN TOWERS

20G — \$32.50	25G — \$38.50	45G — \$87.50
HDX32	32 ft. Free Standing (rated 10 sq. ft.)	\$169
HDX32	32 ft. Free Standing (rated 18 sq. ft.)	\$189
HDX40	40 ft. Free Standing (rated 10 sq. ft.)	\$229
HDX40	40 ft. Free Standing (rated 18 sq. ft.)	\$250
HDX48	48 ft. Free Standing (rated 10 sq. ft.)	\$289
HDX48	48 ft. Free Standing (rated 18 sq. ft.)	\$319
HDX56	56 ft. Free Standing (rated 10 sq. ft.)	\$349
FK2548	48 ft. 25G Foldover Tower	\$719
FK2558	58 ft. 25G Foldover Tower	\$799
FK2568	68 ft. 25G Foldover Tower	\$879
FK4544	44 ft. 45G Foldover Tower	\$1019
FK4554	54 ft. 45G Foldover Tower	\$1119
FK4564	64 ft. 45G Foldover Tower	\$1219

Foldover Towers Freight Paid-10% Higher West of Rockies. ALL ROHN ACCESSORIES IN STOCK — CALL!

GALVANIZED STEEL TWR. HARDWARE

3/16" EHS Guywire (3990 lbs.)	\$12/100 ft.	\$111/1000 ft.
1/4" EHS Guywire (6000 lbs.)	\$15/100 ft.	\$139/1000 ft.
5/32" 7 x 7 Aircraft Cable (2700 lbs.)	\$11/100 ft.	
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	\$0.30	
1/4" CCM Cable Clamp (1/4" Cable)	\$0.40	
1/4" TH Thimble (fits all sizes)	\$0.25	
3/8 EE (3/8" Eye & Eye Turnbuckle)	\$5.50	
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	\$6.50	
1/2 EE (1/2" Eye & Eye Turnbuckle)	\$8.50	
1/2 EJ (1/2" Eye & Jaw Turnbuckle)	\$9.50	
3/16" Preformed Guy Grip	\$1.65	
1/4" Preformed Guy Grip	\$1.85	
6" Diam - 4 ft. Long Earth Screw Anchor	\$12.50	
2" Diam - 10 ft. Long Heavy Duty Steel Mast	\$38.00	
500D Guy Insulator (5/32" or 3/16" Cable)	\$0.95	
502 Guy Insulator (1/4" Cable)	\$1.95	
5/8" Diam - 8 ft. Copper Clad Ground Rod w/clamp	\$11.00	

ANTENNA WIRE & ACCESSORIES

12 Ga. Solid Copperweld (Multiples of 50 ft.)	\$6/50 ft.
14 Ga. Solid Copperweld (Multiples of 50 ft.)	\$5/50 ft.
14 Ga. Stranded Copper (Multiples of 50 ft.)	\$5/50 ft.
14 Ga. Stranded Copper (70 ft. coil)	\$ 7.00
14 Ga. Stranded Copper (140 ft. Coil)	\$14.00
18 Ga. Copperweld (1/4 mile spool)	\$30.00
18 Ga. Copperweld (1/2 mile spool)	\$58.00
Heavy Duty B&W End Insulator	\$4/Pair
HYGAIN Model 155 Center Insulator	\$ 5.95
HYGAIN Model 157 Center Insulator w/S0239	\$11.95
450 OHM H.D. Low Loss Ladder Line	\$.14/Ft

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115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE
Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

AUTEK pioneered the ACTIVE AUDIO FILTER way back in 1972. Today, we're still maintaining that engineering leadership. Our QF-1A evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ads say. You're in for a treat!

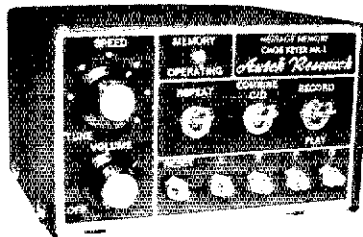
Autek filters gained their reputation by using a costly INFINITELY VARIABLE design. Yet, mass-production (we sell only ONE MODEL — the best!) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. PEAK CW (or voice) with an incredible 20 HZ

BANDWIDTH, but also variable all the way to "flat." Imagine what the NARROWEST CW FILTER MADE will do to QRM! Reject whistles with the most flexible NOTCH you've heard. Wide or narrow. Depth to 70 dB. LOWPASS helps you cope with SSB hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 QST.) The new "A" model is more selective, adds a HIGHPASS mode for SSB, and a great AUXILIARY NOTCH (35 to 60 dB) to give TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS, or NOTCH/HIGHPASS! If this doesn't convince you, please ASK ON THE AIR. Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the QF-1A features. We recommend you buy the best rig you can afford, spend \$3,000 or more, then add a QF-1A and listen to the improvement! WORKS WITH Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc.. ANY RIG!

Hooks up in minutes. Plug into your rig's phone jack, or attach to speaker wires. Plug speaker or phones into QF-1A rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries reqd. (+12 VDC hookup possible.) 6 1/4 x 5 x 2 1/2". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYSER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 \$104.50 ppd. U.S.A.

Our classic MK-1 should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for CQ's. YOU SIT BACK AND WAIT FOR A CALL! Another switch combines two messages for 50

characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. DOT AND DASH MEMORIES, TRIGGERED CLOCK, IAMBIC, SELF COMPLETING, JAM PROOF, 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT. Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. NEW: DUAL TRANSMITTER

1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. 115VAC supply built in, or connect 9-14 VDC to rear panel. Use with ANY paddle, 6x3 1/2 x 5". Burned in and tested. Sockets for IC's. Full instructions.

NOW AVAILABLE. 40% BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of ANY MK-1 ever made. Installs in 10 to 30 mins. Full instructions. Buy your MK-1 now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush QF-1A Filter at \$73.00
ppd via MK-1 Keyer at \$104.50
Speedy UPS ME-1 Expander for MK-1 at \$35 (factory installed)
 ME-1 Owner installed at \$25 (save \$10)

Add 4% tax in Fla. Add \$3 each to Canada, Hawaii and Alaska. \$3 for UPS air. Add \$18 each elsewhere (shipped air).

Enclosed is \$ _____
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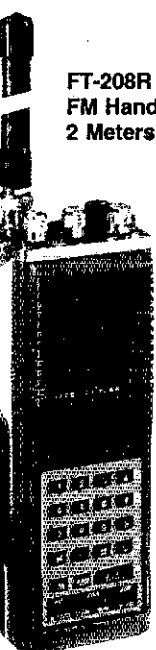
FT-230R: QUITE A SIGHT! (AND EASY TO SEE, TOO!!)

✓ Sporting an all-new Liquid Crystal Display, the FT-230R is Yaesu's high-performance answer to your call for a very affordable 2 meter mobile rig with an easy-to-read frequency display! The FT-230R combines microprocessor convenience, a sensitive receiver, a powerful yet clean transmitter strip, and the new dimension of LCD frequency readout. See your Authorized Yaesu Dealer today — and go home with your new FT-230R!

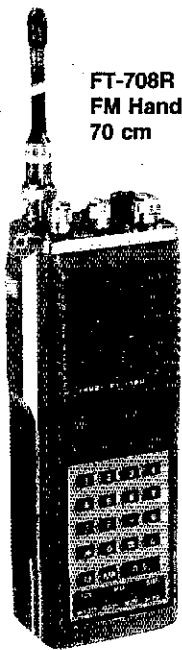


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- LCD five-digit frequency readout with night light for high visibility day or night.
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- Priority channel for checking a favorite frequency for activity while monitoring another.
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- Full 25 watts of RF power output from extremely compact package.
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- Optional synthesized CTCSS Encode and Decode/Decode boards available.
- Lithium memory backup battery with estimated lifetime of five years.
- Optional YM-49 Speaker/Microphone and YM-50 DTMF Encoding Microphone provide maximum operating versatility.

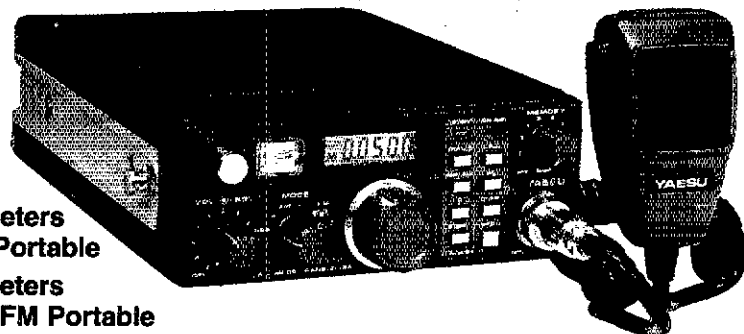


FT-208R
FM Handheld
2 Meters



FT-708R
FM Handheld
70 cm

And don't forget! Yaesu has a complete line of VHF and UHF handheld and battery portable transceivers using LCD display!!



FT-290R - 2 Meters
SSB/CW/FM Portable

FT-690R - 6 Meters
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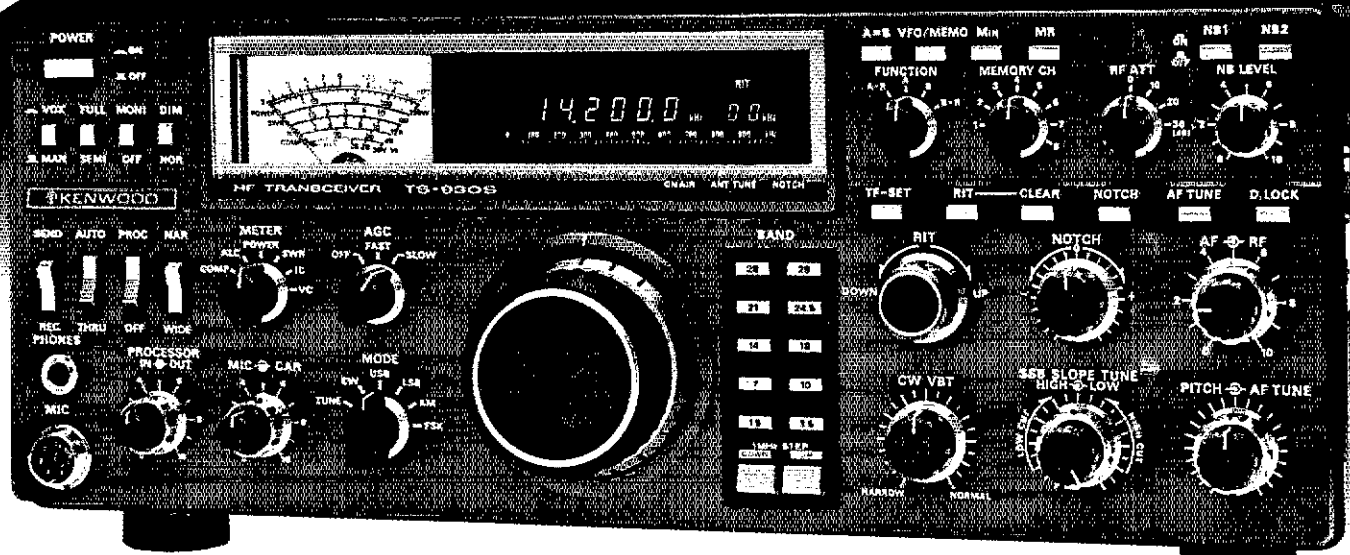


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482

NEW

"DX-traordinary."



Superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

TS-930S

The TS-930S is a superlative, high performance, all-solid state, HF transceiver keyed to the exacting requirements of the DX and contest operator. It covers all Amateur bands from 160 through 10 meters, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range. Among its other important features are, SSB slope tuning, CW VBT, IF notch filter, CW pitch control, dual digital VFO's, CW full break-in, automatic antenna tuner, and a higher voltage operated solid state final amplifier. It is available with or without the AT-930 automatic antenna tuner built-in.

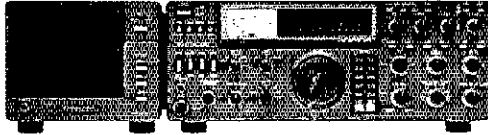
TS-930S FEATURES:

- **160-10 Meters, with 150 kHz - 30 MHz general coverage receiver.** Covers all Amateur frequencies from 160-10 meters, including new WARC, 30, 17, and 12 meter bands, on SSB, CW, FSK, and AM. Features 150 kHz - 30 MHz general coverage receiver. Separate Amateur band access keys allow speedy band selection. UP/DOWN handswitch changes in 1-MHz steps. A new, innovative, quadruple conversion, digital PLL synthesized circuit provides superior frequency accuracy and stability, plus greatly enhanced selectivity.
- **Excellent receiver dynamic range.** Receiver two-tone dynamic range, 100 dB typical (20 meters, 500 Hz CW bandwidth, at sensitivity of 0.25 μ v, S/N 10 dB), provides the ultimate in rejection of IM distortion.
- **All solid state, 28 volt operated final amplifier.** The final amplifier operates on 28 VDC for lowest IM distortion. Power input rated at 250 W on SSB, CW, and FSK, and at 80 W on AM. Final amplifier protection circuit with cooling fan, SWR/Power meter built-in.
- **Automatic antenna tuner, built-in.** Available with AT-930 antenna tuner built-in, or as an option. Covers Amateur bands, 80-10 meters, including the new WARC bands. Tuning range automatically

- pre-selected with band selection to minimize tuning time. "AUTO-THRU" switch on front panel.
- **CW full break-in.** CW full break-in circuit uses CMOS logic IC plus reed relay for maximum flexibility, coupled with smooth, quiet operation. Switchable to semi-break-in.
- **Dual digital VFO's.** 10-Hz step dual digital VFO's include band information. Each VFO tunes continuously from band to band. A large, heavy, flywheel type knob is used for improved tuning ease. T.F. Set switch allows fast transmit frequency setting for split-frequency operations. A-B switch for equalizing one VFO frequency to the other. VFO "Lock" switch provided. RIT control for ± 9.9 kHz receive frequency shift.
- **Eight memory channels.** Stores both frequency and band information. VFO-MEMO switch allows use of each memory as an independent VFO, (the original memory frequency can be recalled at will), or as a fixed frequency. Internal Battery memory back-up, estimated 1 year life. (Batteries not Kenwood supplied).
- **Dual mode noise blanker ("pulse" or "woodpecker").** NB-1, with threshold control, for pulse-type noise. NB-2 for longer duration "woodpecker" type noise.
- **SSB IF slope tuning.** Allows independent adjustment of the low and/or high frequency slopes of the IF passband, for best interference rejection.
- **CW VBT and pitch controls.** CW VBT (Variable Bandwidth Tuning) control tunes out interfering signals. CW pitch controls shifts IF passband and simultaneously changes the pitch of the beat frequency. A "Narrow/Wide" filter selector switch is provided.
- **IF notch filter.** 100-kHz IF notch circuit gives deep, sharp, notch, better than -40 dB.
- **Audio filter built-in.** Tuneable, peak-type audio filter for CW.
- **AC power supply built-in.** 120, 220, or 240 VAC, switch selected (operates on AC only).

- **Fluorescent tube digital display.** Fluorescent tube digital display has analog type sub-scale with 2.5 kHz steps. Separate 2 digit display indicates RIT frequency shift.
- **RF speech processor.** RF clipper type processor provides higher average "talk-power", plus improved intelligibility. Separate "IN" and "OUT" front panel level controls.
- **One year warranty.** The TS-930S carries a one year limited warranty on parts and labor.
- Other features:**
 - SSB monitor circuit, 3 step RF attenuator, VOX, and 100-kHz loopker.
- Optional accessories:**
 - AT-930 automatic antenna tuner.
 - SP-930 external speaker with selectable audio filters.
 - YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455-kHz IF.
 - YK-88C-1 (500 Hz) CW plug-in filter for 8.83-MHz IF.
 - YK-88A-1 (6 kHz) AM plug-in filter for 8.83-MHz IF.
 - MC-60 (S-8) deluxe desk microphone with UP/DOWN switch.
 - TL-922A linear amplifier.
 - SM-220 station monitor.
 - HC-10 digital world clock.
 - HS-6, HS-5, HS-4 headphones.

More information on the TS-930S is available from all authorized dealers of Trio-Kenwood Communications 111 West Walnut Street, Compton, California 90220



Specifications and prices are subject to change without notice or obligation