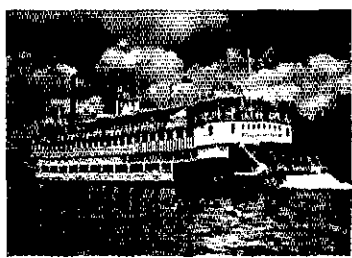
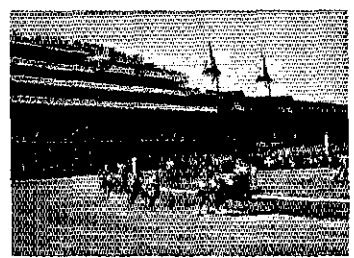


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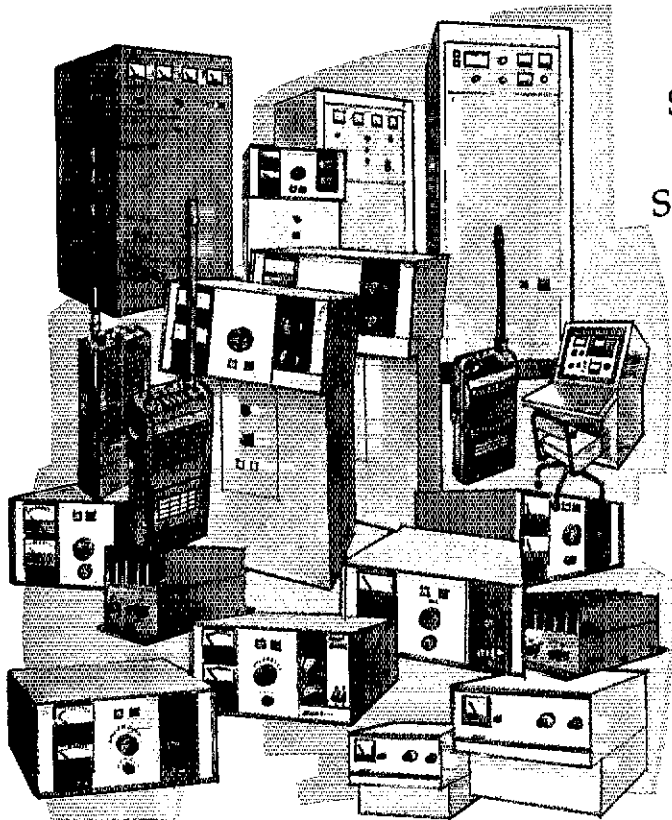
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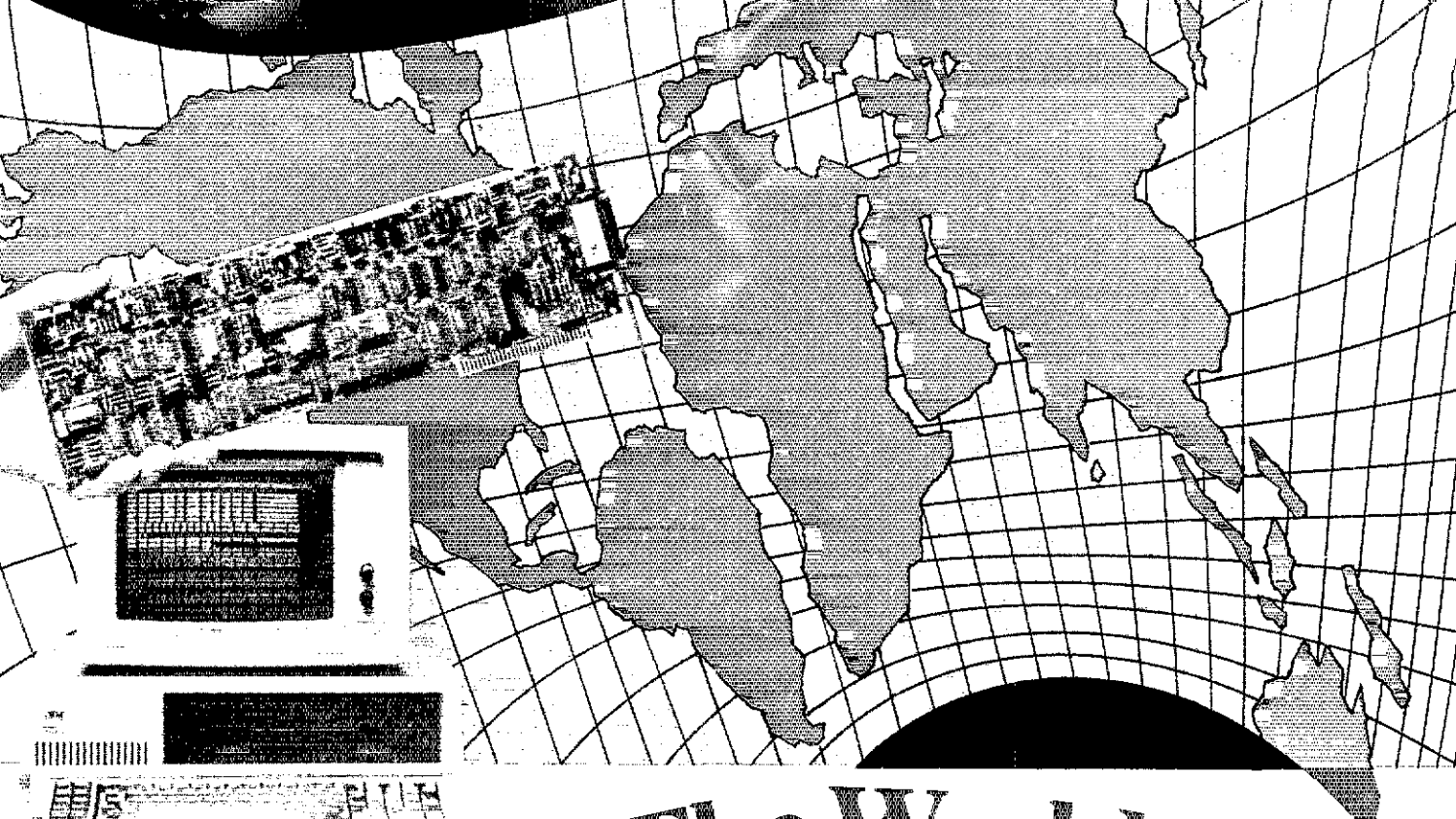
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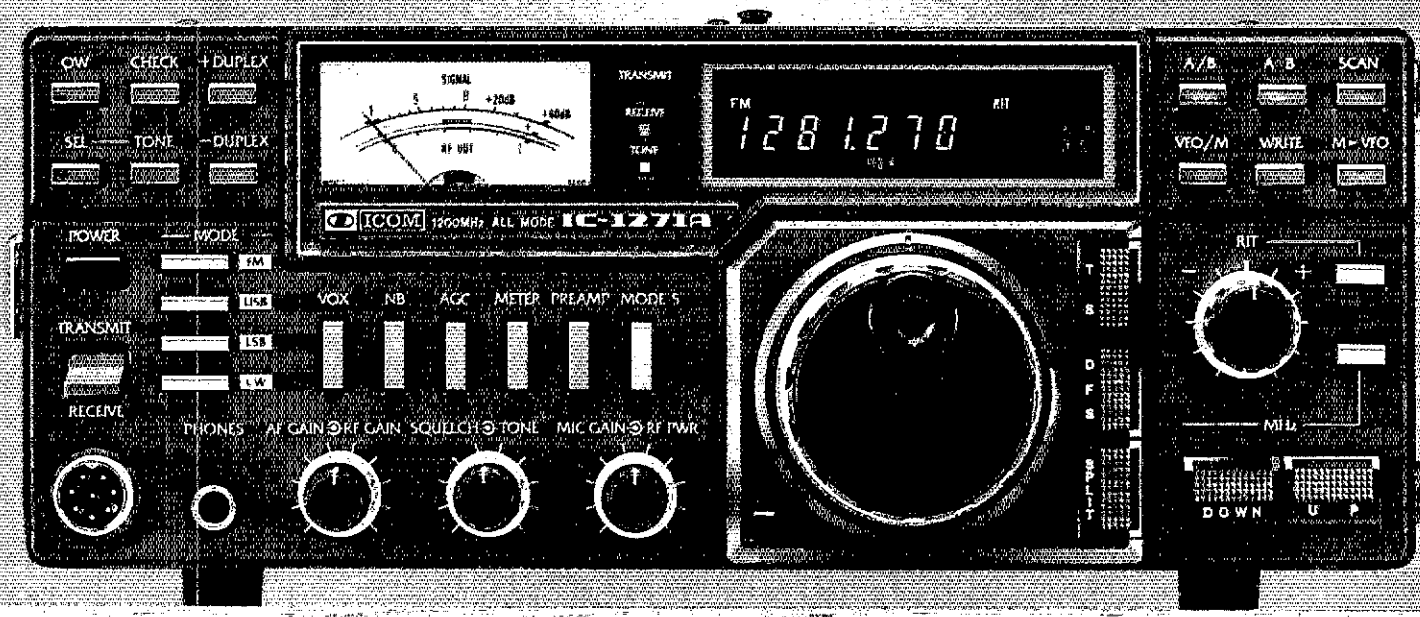


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COM 1.2GHz transceiver

# IC-1271A



## Explore the World of 1.2GHz!

Explore the world of 1.2GHz with ICOM's new IC-1271A base station transceiver. ICOM has a complete line of 1.2GHz gear to meet your operating requirements...the IC-1271A base station, IC-120 mobile and RP-1210 repeater.

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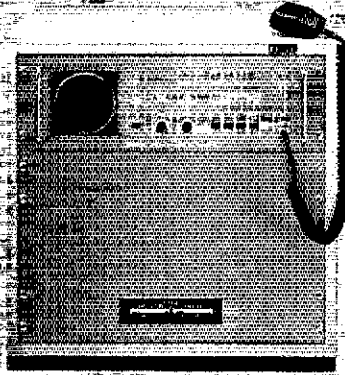
Whether your interest is in mobile, DX, repeater, satellite or moonbounce operation, the IC-1271A has exceptional receiver sensitivity because of front end GaAs FETs.

A variety of options are available for the IC-1271A including the IC-EX310 voice synthesizer, UT-15S CTCSS encoder/decoder, IC-PS25 internal AC power supply and the TV-1200 interface unit.

**TV-1200.** The interface unit allows amateur television (ATV) operation when used in conjunction with a video recorder or a video camera for transmission, and a television monitor for reception. Explore the new facet of amateur radio.

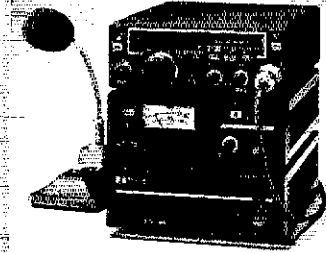


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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 1271A785

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## OUR COVER

If you've never been to the Louisville area, you've never been to (inset photos, left to right) Fort Knox, Churchill Downs, the *Belle of Louisville* steamboat or Lincoln's boyhood home. All this, and the 1985 ARRL National Convention, too! See page 16. (photos courtesy Department of Travel Development, Commonwealth of Kentucky)



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 <p><b>No Antenna No Radio No TV!</b></p> <p><b>THE FANTASTIC DOCTOR DX™ CW Band Simulation That is So Real You Won't Believe It!</b></p> <ul style="list-style-type: none"> <li>• Will improve the operating skills of ANY CW operator!</li> <li>• More fun than ANY Morse Code trainer yet devised.</li> <li>• Use with a C-64, TV set, and key (or keyer).</li> <li>• Experience the thrill of a "DXpedition" to anywhere in the world.</li> <li>• Operate anytime you want, ideal for travelers.</li> <li>• Impressive award certificates available for verified performance.</li> <li>• On-going contests: 8-hour sprint and 24-hour marathon.</li> </ul> <p><b>\$99.95</b></p>	<p><b>HOT ROD™</b> ½ Wave Telescope Antenna <b>\$24.95*</b></p> <ul style="list-style-type: none"> <li>• Fewer telescopic sections than any ¼ wave whips.</li> <li>• Shorter and lighter than all ¼ wave whips</li> <li>• Better performance than a ¼ wave whip when mounted on a handie talkie.</li> <li>• Special matching network designed by Professor D.K. Reynolds (co-inventor of Isopole™ antenna).</li> </ul>
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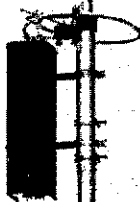
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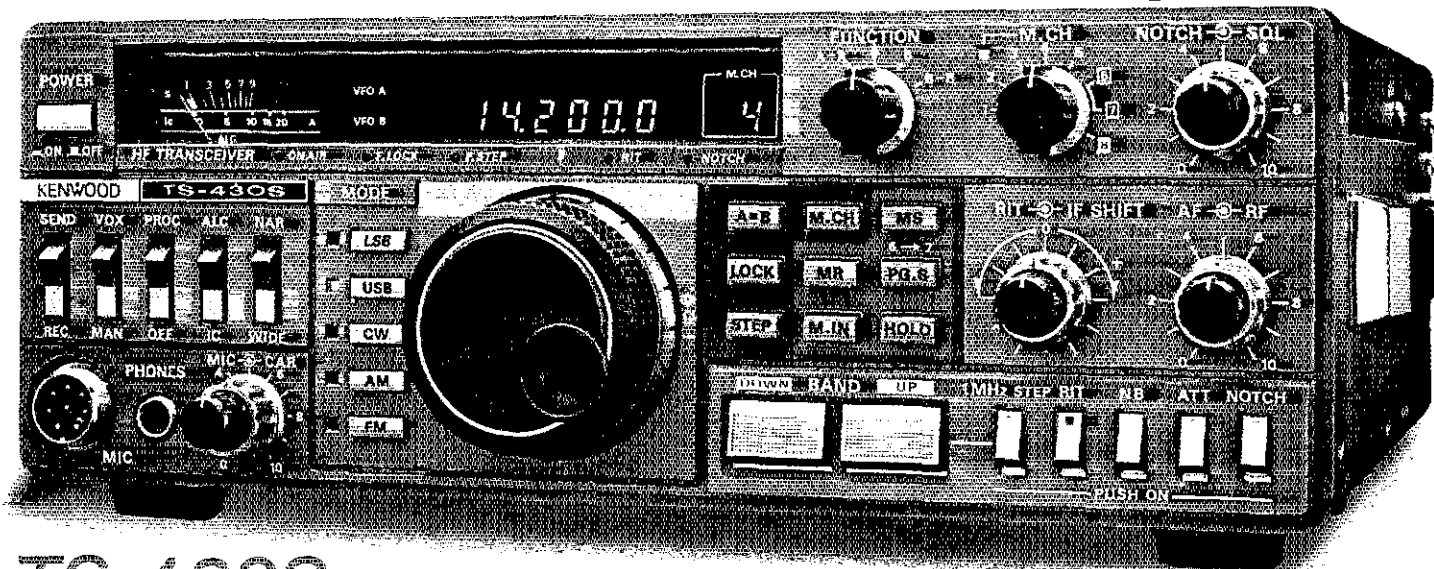
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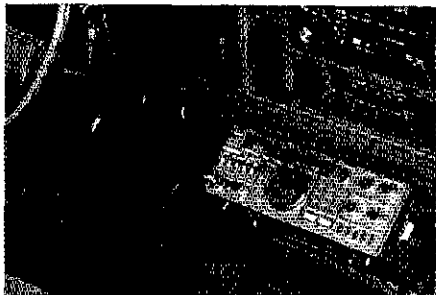
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## “Digital DX-terity!”



## TS-430S

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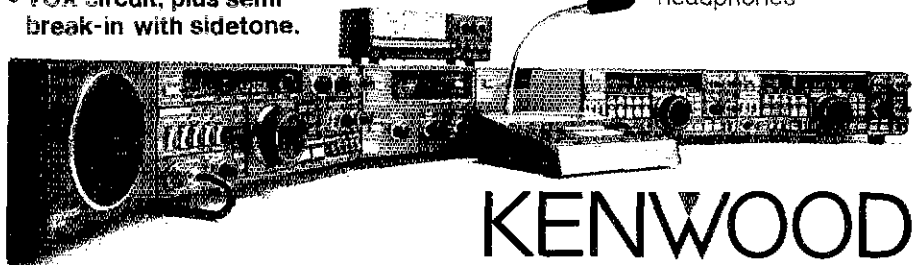
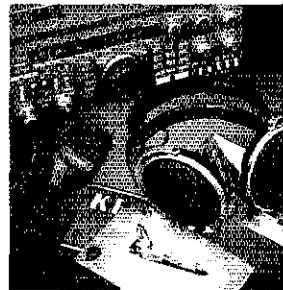


- **Covers all Amateur bands** 160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction** Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker suppresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.

- **Reliable, all solid state design.** Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.** Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.
- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

### Optional accessories:

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



# KENWOOD

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

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



# KENWOOD

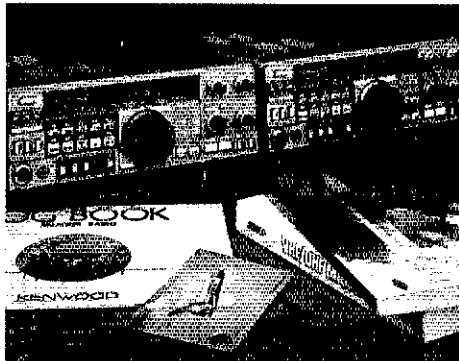
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## Matching Pair

### TS-711A/TS-811A VHF/UHF all-mode base stations.

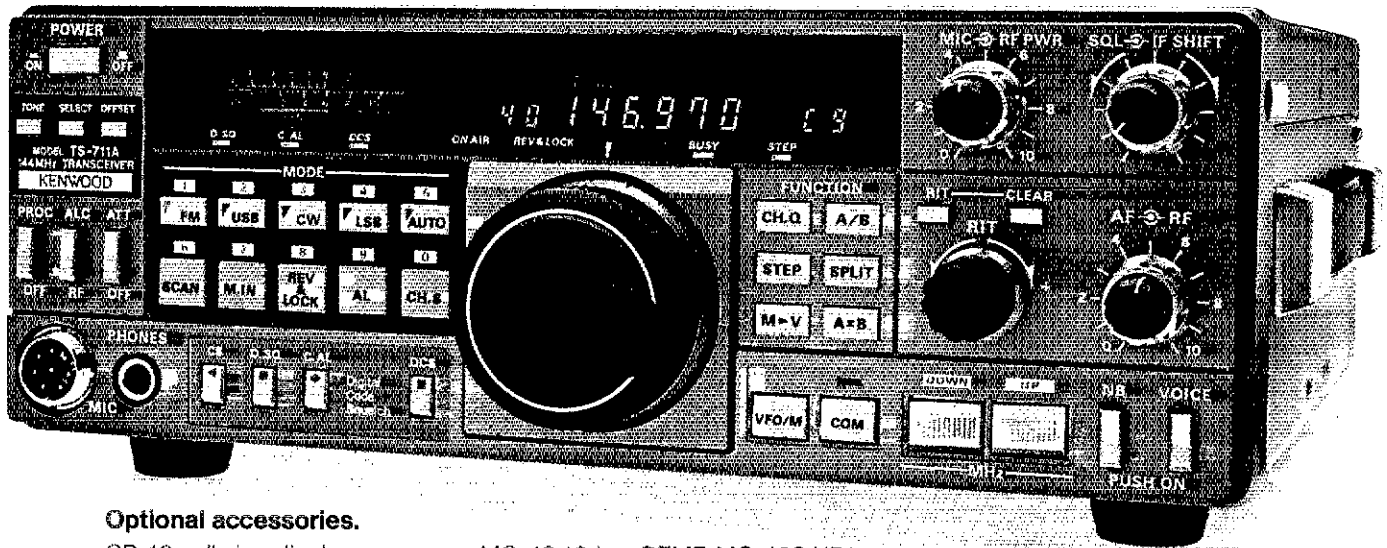
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.**  
The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.**  
Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.**  
Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.**  
Programmable band and memory scan (with channel lock-out). An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.**  
Continuously adjustable from 2 to 25 watts.

- **Automatic mode selection.**  
You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.**  
For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.**  
Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.**  
Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **Optional voice synthesizer.**  
More TS-711A/TS-811A information is available from authorized Kenwood dealers.



#### Optional accessories.

- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- PG-2J DC power cable
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:  
SW-200A 1.8-150 MHz  
SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner

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# KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
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September 1985

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

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

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

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

All membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA

Telephone: 203-666-1541

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## “It Seems to Us ...”

### Repeater Coordination

For the past six months, the ARRL Board of Directors has been grappling with one of the knottiest regulatory issues facing radio amateurs: formulation of a response to the FCC Notice of Proposed Rulemaking concerning repeater frequency coordination, PR Docket 85-22. The Commission proposes to define “frequency coordinator,” “coordinated repeater” and “harmful interference,” and then to write into the rules its existing policy that noncoordinated repeaters must give way if their operation causes harmful interference to a coordinated repeater. While on the surface the new rules proposed by the Commission are rather straightforward, they raise issues that are at the very heart of the philosophy of Amateur Radio operation.

The general principle that guides radio amateurs in the selection of operating frequencies is that everyone has an equal right to use any frequency to which their license entitles them access. Prior occupancy doesn't guarantee an interference-free contact on a crowded band, although it is understood that anyone wanting to operate will select a frequency and power level that minimizes interference to others, consistent with the desired communication. The result may strike some as being a bit disorganized, but scholarly papers have been written that demonstrate the efficiency of the approach. As long as a bit of interference is tolerable (and except for emergency situations for which there are special provisions in the rules, it generally is) we can accommodate a lot more stations in our crowded bands, and can accomplish a lot more communication, than could be provided by any system of planning or coordination.

Respective of this principle, virtually everyone agrees that frequency coordination of repeaters is a good idea. Coordination is a process by which a pair of frequencies is selected for the operation of a repeater, from a particular location and with a particular power level and antenna configuration, that will minimize interference to and from other repeaters on the same or adjacent channels. The selection is made by an organization representing those amateurs in a given area (frequently, but not necessarily, a state) who are interested in repeater operation, based upon data maintained by the coordinator and by coordinators in adjacent areas. Repeater coordination is seen as essential because, for technical reasons, most repeaters are fixed-frequency devices; because most are available for use around the clock, precluding time-sharing of a frequency as is done informally on HF; and because, to get any value from the repeater's existence, the users must know where to find it!

FCC has based its proposed definition of “harmful interference” on the ITU definition, and provides the following explanation in the text of the Notice: “Harmful interference in this context is not merely annoying interference, such as being able to hear distant signals due to temporary propagation phenomena, but is interference which seriously degrades or obstructs repeater operation, such as repeated interruption of operations caused by two different mobiles trying to access two different repeaters on the same frequency.”

The degree of sophistication required in coordinating repeaters varies widely. In remote, sparse-

ly populated parts of North America, coordination demands are minimal; in other areas, the only way new repeaters can be accommodated in some bands is by placing severe new constraints on existing repeaters—something that coordinators understandably are reluctant to do. If the Commission were to attempt to define coordination criteria in its rules, or to empower a single national organization to adopt such criteria, what made sense in one place would be wholly inappropriate—either unnecessarily restrictive, or insufficiently specific—in others. Clearly, the best place for such decisions to be made is as close to the local level as possible, where local circumstances can be taken into account and those affected can have the greatest voice in the process.

Extended discussion, both before and during the Board Meeting in late July, led the ARRL Board to unanimous adoption of the following policy guidelines for the League's comments in Docket 85-22:

1) Preferred status in instances of harmful repeater-to-repeater interference should be granted to amateur repeater operators who have implemented the recommendation of their local, or regional, frequency coordinator and are thereby coordinated.

2) Frequency coordination should be strongly urged for all amateur stations in repeater, or auxiliary, operation in any geographical area which is served by a frequency coordinator.

3) The FCC should not consider alternatives to frequency coordination nor mandate methods of coordination.

4) The use of modern technological innovation, such as those cited in the NPRM, should be encouraged, but not substituted for frequency coordination.

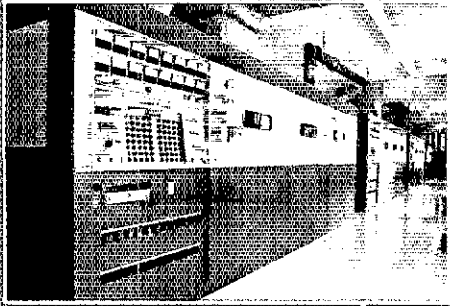
5) The FCC should not recognize a single entity, such as a National Frequency Coordinator, for amateur repeater operation. Such coordination activities should be performed by local, or regional, frequency coordinators with appropriate support to these coordinators to be provided by the ARRL.

6) The ARRL also recommends that the scope of frequency coordination include all Amateur Radio stations in repeater or auxiliary operation.

7) The ARRL further recommends that consideration of the procedural framework within which frequency coordinators are recognized and conduct their operations be the subject of a future FCC proceeding.

That last guideline represents the longest “loose thread” in the finely woven fabric of repeater coordination policy. A coordinator's authority is derived from consent of the governed, but how is that authority conferred? Generally it has been by default: repeater coordination is a thankless task, and if someone has been willing to take it on they've been more than welcome to do so—and most have done an excellent job. But increasingly, we're hearing of groups wanting to coordinate an impossibly small geographical area, or set up in competition with an existing coordinator—and there has to be a mechanism for mediating such situations before chaos erupts. Once the commission has established the basic principles underlying repeater coordination, addressing this issue is the logical next step.—David Sumner, K1ZZ

High Falls, VP Engineering,  
Radio Free Europe, Munich, stands  
beside GE 100 kW HF transmitter  
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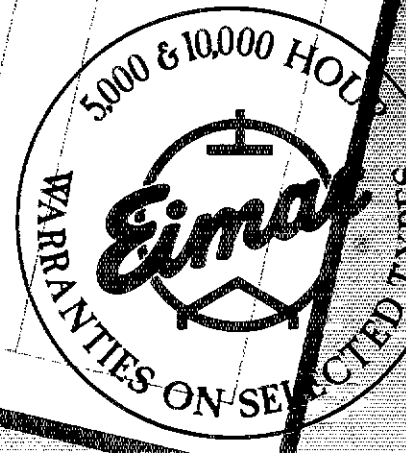
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Serial Hours

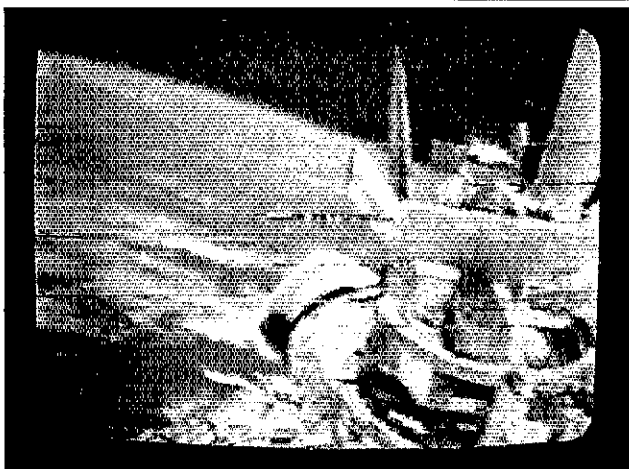
Serial Hours

MONTH: (up to December, 1984)

TYPE	IN SERVICE		SPARES		REMARKS
	Serial	Hours	Serial	Hours	
4CV	46N-413	62660			
100,000C	46N-415	64879			
	86G-265	61929			
	86G-270	59636			
	86N-527	62456			
	46N-896	59246			
	46E-283	53892			
	46E-283	64300			
	86J-368	59474			
	86T-890	64066			
	86Q-624	64354			
	86D-158	57907			
	86J-367	59991			
	86J-373	57805			
	86A-2	42273			
	86V-817	59386			
	870-730	41416			
	86V-815	47749			
	86G-273	59067			
	86A-7	57026			
	86G-266	57865			
	86W-1297	26623			
	86C-161	11752			
	86A-6	49355			



# UP FRONT in QST



This high-resolution SSTV image showing part of the cargo bay and a view of Earth is one of many messages W00RE/Challenger sent to amateurs worldwide during Space Shuttle mission STS 51-F, from July 29 to August 6. Details of this and other amateur operations aboard the Challenger will appear in next month's QST. QSO information should go to ARRL Hq., ATTN: STS 51-F W00RE, 225 Main St., Newington, CT 06111. (Txn to ROBOT for lending the 1200C color scan converter used to receive this and other SSTV images at ARRL Hq.)

## K2BSA: A Scouting Adventure

With the help of K2BSA, thousands of Scouts from across the country recently got a first-hand look at Amateur Radio. While in operation at the National Scout Jamboree at Fort A. P. Hill, Virginia, July 24-30, K2BSA operators invited visiting Scouts to share in QSOs with amateurs in over 100 countries and all 50 U.S. states, with many Scouts taking the mike to send messages to family back home. If you had a two-way with K2BSA and would like a QSL card, send an s.a.s.e. to ARRL Hq. to the attention of Leo Kluger, WB2TRN. And don't forget the Jamboree on the Air (JOTA), to be held October 19 and 20. See next month's Contest Corral column for details on how you can join in the Jamboree.

## ACB Radio Amateurs: In the Special Interest of Blind Hams

ACB Radio Amateurs is a new group that is actively seeking to **expand the information, referral and support services available to amateurs** who are blind or visually impaired. Among the many areas the group plans to address are methods of administering license exams and the modification of radio equipment for use by hams who are visually impaired. ACB Radio Amateurs was formed as a result of discussions held last year at the American Council of the Blind Convention in Philadelphia. To find out how you can get involved, write to John McCann, KW4U, 2025 Eye St., NW, Suite 405, Washington, DC 20006.



It's been quite some time since the 24-MHz band was formally proposed for amateur use at the World Administrative Radio Conference in 1979, so when amateurs finally got access to the band this past June they were ready! Among the many amateurs taking part in the "band warming" were Don Miller, W9NTP, and Bert Beyt, W5ZR. They established what could be the first SSTV contact on the new band at 1815 UTC June 22, evidenced by this transmission captured by W9NTP's camera.



Exciting news from western China: A China-Japan mountaineering group has established what may be the **highest Amateur Radio station in the world**. The station, BT0NMN, operated during the climb and at the summit of Mt. Naimona'nyi in Tibet (the tallest peak shown on the QSL card), previously the highest unclimbed mountain in the world. While in operation, from late April to mid-June, the group established contact with more than 1000 amateurs worldwide. See this month's How's DX? column for details.

## 24 MHz, VECs and Youth Among Board Meeting Topics

The ARRL Board of Directors met in Hartford, Connecticut, July 25-26. Among the topics acted on were

- adoption of a plan for the 24-MHz band
- support of the FCC retaining responsibility for all amateur exam question pools, with VECs generating the tests
- approval of special ARRL membership rates for youth.

For details on these and other actions, see Moved and Seconded, page 54.

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# League Lines

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Yes, indeed, the *ARRL Board of Directors met in Hartford on July 25 and 26, 1985*—don't miss the details in *Moved and Seconded*, this issue. Several new wheels are already in motion:

Know of any *hams who are age 17 or younger* and are the oldest licensed amateurs in their families? There is now *an added incentive for these persons to join the League*. Please pass the word along that ARRL membership dues rates for Full Members have been reduced for ages 13 through 17 to \$12.50 (\$17.50 U.S. funds in Canada), and for those 12 and younger the rate is only \$6.25 (\$11.25 U.S. funds in Canada). Prospective members meeting these qualifications must supply proof of their age (statement from a parent or guardian will do) and also provide a list of all licensed amateurs who are members of their family (defined as a mother, father, husband, wife and siblings). Such memberships or renewals must be made directly to Headquarters and not through affiliated clubs. Help encourage young amateurs to become League members. Spread the word!

The Board has authorized an *Ad Hoc committee on Amateur Radio spread-spectrum* standards. If you have an interest in writing interoperability standards, please prepare a letter volunteering for appointment and a resume detailing your experience as it relates to Amateur Radio spread-spectrum communication. Address your letter to: Dr. Larry E. Price, W4RA, ARRL, 225 Main St., Newington, CT 06111. Mark your envelope "Attn: Spread-Spectrum Committee."

*You can help battle VCR RFI*. Poor shielding and plastic cases have made the playback heads of many video-cassette recorders highly susceptible to RFI in the 500-700 kHz and 3.5-7 MHz ranges—and rumor has it that VCR prices may drop to well below \$200 U.S. by Christmas, making it likely that neighbors on all sides of a radio amateur might own VCRs. You, too! You, your neighbors and your VCRs can help get a handle on this problem. Get involved by sending Hq. your reports of any interference to your own and your neighbors' VCRs—it's as easy as completing an RFI Immunity Complaint Form, available from Hq. for a 22-cent s.a.s.e.

*Volunteers are needed to fill Assistant Technical Coordinator (ATC) positions* in virtually all sections, and *Technical Coordinator (TC) posts* in some sections. (See "ATC: New Kid on the ARRL Block," *QST*, April 1985.) Appointees named in the balance of 1985 will receive a complimentary set of these resource books while supplies last: the *1985 ARRL Handbook for the Radio Amateur*, *1984-85 Call Directory*, *Radio Frequency Interference*, *CATVI Working Materials* and (when printed) the *Field Resources Directory*. A set will also be sent to TCs and ATCs already on record at Hq.

*Interested in writing articles about Amateur Radio for major nonham magazines*, to promote Amateur Radio? The ARRL Hq. staff would like to help. Send your manuscript to the Editor, *QST*; if it's generally well-written to begin with, Hq. will assign an experienced editor to work with you to produce a polished manuscript.

*ARRL-accredited Volunteer Examiners will receive accreditation endorsements* shortly. The endorsement stickers were delayed at the printer. All VE accreditations through the ARRL/VEC are provisionally extended until December 31, 1985.

Repeater owners and operators: *Register your repeaters with ARRL Hq. by November 1* for inclusion in the *1986-87 Repeater Directory*. Listings no older than July 1982, will be carried over verbatim from the 1985-86 edition unless amended, and listings older than July 1982, will be dropped unless renewed. It's easy to get involved: just register your machine on a repeater registration card, form CD-240, available from Hq. for an s.a.s.e.

*The special prefix CH has been authorized for the use of radio amateurs in Manitoba* over the period October 16 to November 16, 1985, in commemoration of the 100th anniversary of Louis Riel. Riel (1844-1885), born in St. Boniface, fought to preserve the French language and the French national identity in Canada.

*Calling ARRL Headquarters on the telephone?* You can help the receptionist connect you with the right staff person in record time by specifying as closely as possible what questions you need answered or by stating exactly who you need to talk to. The longer you linger at the switchboard figuring out what you need from Hq., the greater the likelihood that all incoming lines will be unnecessarily "busy" when other callers call. Help us help you by having your goals in mind before dialing. If you're calling long distance, and wish to speak with a specific Hq. staffer, there are certain "core hours" when it would be better to call: Between 9 and 11:30 A.M., and 1:30 and 4 P.M. Eastern time, staff absences will be minimal. Full Hq. hours are 8 A.M. to 5 P.M. Eastern time.

# When the Heat Is On

As thousands of acres of California mountain lands vanished in smoke, radio amateurs went into the thick of it to keep communication lines open for disaster-relief agencies.

By Ed Mitchell, WA6AOD

P.O. Box 390145, Mountain View, CA 94039



Photos by WA6AOD

*The damage would have been far worse without the help of the Amateur Radio operators. [Their work was] Excellent! Superb! They provided critical communications when our radio system was overloaded and in places that our radios wouldn't work.—Jim Bliss, Fire Commander, California Department of Forestry*

The terror that struck Silicon Valley began on the first Monday in July. Beneath 100-degree, sizzling-blue skies, a grass-and-brush fire in the hills above Palo Alto consumed nearly 1000 acres, completely destroyed 14 homes and damaged 28 more, and left \$9 million in wreckage and many families homeless. More than 30 amateurs participated during the fire-fighting effort and subsequent mop-up. But this fire was only a preview.

Within a week, dozens of grass and brush fires would break out. Thanks in part to prompt reporting by ham radio operators participating in the California Department of Forestry (CDF) "Volunteers in Prevention" program, most of these were contained quickly. But two fires—one on Finley Ridge, east of Morgan Hill, and a second near Lexington Reservoir in the Santa Cruz Mountains—quickly gained the upper hand, severely taxing the resources of exhausted fire crews. And the Lexington fire, located in steep, densely overgrown, inaccessible terrain, burned for six days, becoming the worst local fire in 15 years.

Before the Lexington fire could be contained, it would consume 13,800 acres, destroy 42 homes, burn right past 2500 more houses, force evacuation of 4500 people and require over 2000 fire fighters. An around-the-clock support network of hundreds of ham radio operators manned VHF/UHF voice and packet-radio stations at base camps, evacuation centers, on CDF and National Guard helicopters, on the fire lines, at remote mountaintop observation posts,

at ranger stations throughout the mountains, and at CDF regional headquarters in Morgan Hill, Felton and Monterey.

## The Palo Alto-Los Altos Hills

Sunday, June 30, 1985: Hiking along the San Andreas earthquake fault in the hills above Palo Alto, California, we stopped to watch a jack rabbit munching on dry grass. In most years, this area would still be lush and green through mid-July. But on that day, the earth lay dry, the grass brown and dead. Little rain had fallen since January.

We watched the sun set to the west, orange and bright, like a ball of fire falling to earth. Deer crossed through the meadow in the gathering dust. Standing in the warm evening air, we joked about the dryness and the high fire danger that had come so early this summer. We wondered how long this tranquil scene might last.

Monday, July 1, 1985: By midday, the mercury had risen faster than the sun. Old records had gone by the wayside as the temperature climbed to over 100 degrees.

Around 4 P.M., the sunlight filtering through the curtains took on a sickly yellow coloring. It reminded me of when I was 11 years old and the whole world seemed to turn shades of yellow-brown and orange as fires burned out of control in the nearby Santa Cruz Mountains. Fires? My heart skipped a beat. Pulling the curtain aside, I could see a thick layer of smoke blowing our way.

I grabbed the hand-held radio and

flipped the "on" switch. The local Amateur Radio Emergency Service (ARES) Southern Pennsylvania Emergency Communications System repeater W6ASH/R was "double beeping" the courtesy tone—a sure sign that we had an emergency in progress.

Just a mile and a half away, Rick Joslin, WB5VUL, Ted Harris, N6IIU, and Ray Antasek, WA6TKV—all volunteers with the American Red Cross—were on the scene. The fire was burning through dry brush and eucalyptus trees along the shallow canyon of Arastradero Road. Several structures were engulfed in flames. The fire was burning out of control in both Palo Alto and Los Altos Hills.

Moderate winds had blown embers and ashes across the road. Sparked by flying ash, two more fires erupted near the top of a hill, 1500 feet away.

Near the main fire, flames crossed Arastradero Road and began burning through the subdivision on Liddicoat Drive. WB5VUL yelled "Look out!" as an adjacent wall of eucalyptus trees burst into flame. The amateurs in the Red Cross van made a hasty retreat to a nearby intersection, but even this location was only temporary, as the fire soon forced another quick escape.

## More Amateurs Respond

With the inferno flying about them, N6IIU asked for a net-control station. Jim Lomasney, WA6NIL, ARRL Emergency Coordinator for Palo Alto, volunteered.



N6IUU, WA6TKV and WB5VUL (l-r) find themselves in the thick of the action soon after arriving on the scene at the Palo Alto-Los Altos Hills fire. The three are American Red Cross Disaster Services volunteers and members of the Amateur Radio Southern Peninsula Emergency Communications System. They used the W6ASH repeater to coordinate the setting up of a Red Cross shelter, and later to pass critical message traffic for Fire Command.

Meanwhile, N6IUU, wearing his Red Cross Director of Disaster Services hat, called the Palo Alto Unified School District through the W6ASH autopatch. "Can someone open up Lucille Nixon Elementary School to establish a Red Cross shelter for the victims?" The answer was yes, but no one was available to deliver the keys. Once again, WA6NIL volunteered, relinquishing net control while enroute to the school district offices.

Inside the offices, WA6NIL was out of radio contact. But the officials on the scene changed their mind and asked that the shelter be set up at Gunn High School. Once outside the office, Jim got the message and returned to exchange the keys.

Dave Ricci, WA6TJX, came on frequency, just outside the disaster area. He relocated to Gunn High School to assist with setting up a shelter.

Clay Satterlee, NG6A, called in from the south valley to offer his help as liaison to the Silicon Valley Emergency Communications System (SVECS), in case additional amateur support was required. He cautioned that the SVECS people were exhausted, having just returned from the San Antone fire, to the east. There, some of the amateurs had put in 24-hour shifts.

Bernie Beck, N6BOV, volunteered to cover the permanent Amateur Radio station installed at the Palo Alto Emergency Operations Center, in the basement of City Hall. She was joined a few minutes later by Fred Dietrich, NM6J.

Calls went out for more fire fighters. The fire had moved into a subdivision of expensive, ranch-style homes. Sparks were everywhere, igniting dry, wood-shake roofs like matchsticks. California Department of Forestry (CDF) units, including two helicopters and two fixed-wings, arrived from Morgan Hill, 40 miles to the south. City

fire department crews came from as far north as Belmont, near San Francisco, and others from the heart of Silicon Valley. More than 200 fire fighters were called to assist. Crossing county lines, the fire storm moved from Santa Clara into San Mateo County. Confusion persisted as agencies that do not normally work together were forced to coordinate their efforts. Four strike teams, each consisting of five engine companies, were formed—two from Santa Clara and two from San Mateo.

### Fire Command Radios Fail

Fire Operations and the Red Cross moved their command post from the fire scene to the Palo Alto Country Club, located on a hill overlooking the canyon. From this position, Fire Operations could see much of the fire. But because of mountainous terrain and the failure of two fire department repeaters, their frequencies did not work and they did not have reliable communications with the EOC. Moving to the Fire Operations van, N6IUU provided a link to the EOC over the amateur network.

At the EOC, Dan Heiser, assistant city manager for the City of Palo Alto, needed to speak with the fire department's public information officer. Locating the PIO, N6IUU handed him his hand-held radio, while NM6J at the EOC put Heiser on the mike—a scene that was repeated many times during the evening.

As the fire burned, the Country Club parking lot became the center of all fire-related activity. CDF helicopters swooped low overhead, landing near their fuel truck at the lot's south end.

### A Second Fire Begins

The thick smoke and crowds of gawkers slowed traffic to a crawl on the adjacent Interstate 280. A passing amateur, Dave Harris, KB6FVA, came on frequency and requested an autopatch to the California Highway Patrol. A vehicle had overturned, spilling fuel and igniting a second grass fire near the Stanford Linear Accelerator, just north of the existing blaze.

Unfortunately, the CHP telephone number beeped a busy signal. A second attempt was made. WB5VUL, monitoring the CDF helicopter frequency, announced that one of the pilots had spotted the accident scene and help was on its way. This blaze consumed nearly 200 acres.

### Children and Horses in Danger

The hills west of Los Altos and Palo Alto are rural in nature. Home to Silicon Valley's success stories, several stables dot the area. Many people had driven in with horse trailers in an attempt to rescue their animals, further adding to the congestion on the surrounding roads.

A report was passed on the amateur net that an estimated 60 horses had escaped from the Flying Tails Farm in the center of the fire. Someone had opened up the

stables and allowed the horses to stampede to freedom. All horses, while bewildered and frightened, were reported safe in the parking lot of the Donald C. Powers Laboratory, housing Stanford University's Center for Computer Research in Music and Acoustics. This traffic was passed back to Gunn High School, where anxious horse owners received the good news.

NM6J, at the EOC, reported that a few horses had escaped early on and had been retrieved. A message was passed back to Gunn that Westwind Barn, located further up the mountain, would provide stables for as many horses as possible.

Back at the shelter, 36 cots had been set up. Food was made available, and several restaurants provided donations. But one of the victims at Gunn was suffering from smoke inhalation, so WA6NIL requested a paramedic. N6IUU, at Fire Command, gave the request directly to the fire department for dispatch.

The City Recreation Department had a day camp for children located at Foothill Park, upwind and out of danger. But there was no way for parents to pick up their kids because all the roads were blocked by fire or fire equipment. The Recreation Department decided to ferry the kids down the mountain by bus, dropping them off at the Lucille Stern Community Center. City Rec notified as many parents as possible by telephone.

But the police had told everyone that the Red Cross had set up a shelter at Gunn High School. Parents who tried to drive up and retrieve their kids were stopped at the police road block and inadvertently diverted to Gunn. Meanwhile, those who had received the telephone call were on their way to Lucille Stern Community Center. Again, ham radio provided a vital link between the city and Gunn High to sort out the correct set of parents and send them on to the Lucille Stern Center. WA6NIL relinquished net control to Ed Radlo,



The fire department's public information officer (center) uses N6IUU's (right) hand-held radio to communicate from the Fire Command post with Assistant City Manager Dan Heiser, positioned at the Palo Alto Emergency Operations Center. Mountainous terrain and the failure of two fire department repeaters made use of the amateur network essential.





W6FRA (left) shadows California Department of Forestry fire commander Bob Taylor as they prepare to depart the Vasona base camp in a helicopter. Aerial surveillance was a primary means of monitoring the fire's intensity and direction.

AJ6V, who carried on until midnight. Bill Zaner, the Palo Alto city manager and a ham himself (WB6IYS), told NM6J that he was impressed with the amateur operations and passed along his compliments to the entire crew.

By sundown, the fire was contained, but not before completely destroying 14 homes and an estimated 1000 acres. Another 28 homes suffered varying degrees of damage. Hot cinders from smoldering eucalyptus continued to flare. Robert Smithwick, W6JZU, volunteered to man the Fire Operations command post from midnight to 6 A.M. Control and mop-up would take several days.

The 11 o'clock television newscasts featured the amateur operation. In a bit of exaggeration, KRON-TV, San Francisco, reported that "ham radio was providing the only link to behind the fire lines."

### Mop-Up

For two more days, amateurs provided coordination and support services as the mop-up and damage assessment proceeded. Arvid Hamer, WA6UUT, managed the EOC position during the clean-up operation. Much traffic was exchanged on behalf of the American Red Cross. More messages were passed between the officials on the scene and those at the EOC. The city manager of Los Altos Hills requested a copy of the damage assessment report via the amateur net. Later, when he needed to contact someone at the Palo Alto Tree Department concerning the smoldering eucalyptus trees, amateurs provided the needed link.

When Zaner needed a message delivered to the County Office of Emergency Services, he contacted the assistant city manager via radio and had her relay the message. Many inquiries such as, "Where is the McDowall family?" and "Which homes were damaged?" were all passed and dealt with on the amateur frequencies.

At the July 3 Los Altos Hills Town Council meeting, a resolution praising the efforts of the Amateur Radio operators was passed. After the meeting, Ed Radlo, AJ6V, spoke with two of the council members and Mayor Louise Dronkert. Mayor Dronkert gave her personal thanks for the assistance that had been provided.

Nearly three-dozen Amateur Radio operators assisted in the containment and clean up of the Palo Alto fire. Many others had volunteered to help, but as the situation improved their assistance was not required.

### The Alert Continues

The Palo Alto fire was controlled, but the fire danger remained extreme. In fact, conditions became much worse. Amateurs maintained a constant vigil, staffing the VHF, UHF and packet links at the CDF Regional headquarters in Morgan Hill. By Tuesday afternoon, the CDF had issued a special request, aired by KK6N on WB6ADZ/R, the Silicon Valley Emergency Communications System repeater:

QST QST QST

The Amateur Radio Emergency Service has been placed on standby alert by the regional headquarters of the California Department of Forestry. All Amateur Radio operators are requested to monitor their local ARES repeater or the 145.45-MHz repeater. During sleep hours, monitor the simplex alert frequency of 145.695 simplex. End of QST.

The heat and dry weather continued unabated. Throughout the 4th of July, amateurs participated in the California Department of Forestry's "Volunteers in Prevention" program, patrolling the mountain roads late into the evening. Grass fires and just plain suspicious activity were reported via WB6ADZ/R direct to the amateurs at the Morgan Hill CDF dispatch center.

Despite the heat, conditions in the South Bay Area remained relatively calm and under control. Several fires flared up, but were quickly extinguished. The big danger lay far to the south, with hundreds of thousands of acres charred near the cities of San Luis Obispo and San Diego and Wheeler Ridge, which eventually burned all the way to Ojai.

When several fires burn at once, fire fighting resources are stretched to the limit. Local fire fighters had traveled south to help at San Luis Obispo, leaving just three CDF fire engines in the entire county. Other crews from the Sierra foothills had driven 300 miles to the Wheeler Ridge fire. With an estimated 1 million acres burning simultaneously in 14 western states, the men and women who battled the blazes were spread much too thin. A disaster was waiting to happen.

The weekend of July 6-7 saw a large contingent of amateurs on duty at the Moffet Field Naval Air Show, providing parking and traffic-control coordination. With over 400,000 visitors to the air show, the amateurs provided essential services, coordinating the traffic situation and working with numerous government agencies, including the U.S. Navy, the California Highway Patrol, the FAA and the City of Sunnyvale.

Shortly after 2 P.M. Sunday, as the crowds waited for the Navy's precision flight team, the Blue Angels, to take to the air, a distant smoke cloud caught their attention. All eyes turned southward. The cloud was growing quickly. The hills above Los Gatos were clearly on fire and burning rapidly.

### The Lexington Fire

Over the next six days, this fire would become the worst local fire in 15 years, endanger 2500 homes and require over 2000 fire fighters to achieve containment.

Hundreds of Amateur Radio operators would volunteer an estimated 3000 hours of time and over a quarter million dollars worth of communications equipment to provide around-the-clock communications support in the most demanding of circumstances. Already cognizant of Amateur Radio capabilities, the CDF would assign operators to base camps, evacuation centers, helicopters, mountaintops and even to the fire lines.

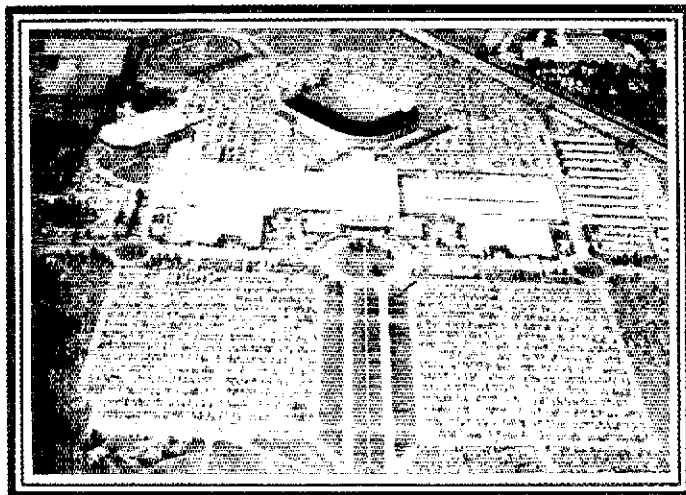
These amateurs would handle logistics traffic—coordinating people, equipment, food, repairs, public-information activities and phone patches—"shadow" fire officials, pass hundreds upon hundreds of messages each day, haul fire fighters and equipment in their own vehicles and perform repairs to CDF radio equipment as they were surrounded by flames.

Perhaps the most significant public service event in memory, the California fires demonstrated a simple truth: When the heat is on, Amateur Radio delivers. ☐

# 1985 ARRL National Convention, Louisville, Kentucky

Enjoy a weekend of Amateur Radio in the true spirit of Southern Hospitality October 4-6.

By Bob Hall, K4KWN  
3125 Lynnwood Way  
Jeffersontown, KY 40299



The largest single-floor structure of its kind in the world, the Kentucky Fair and Exposition Center, will be the site of this year's ARRL National Convention. Over a quarter of a million square feet will be devoted to Convention programs.

Within a day's drive of more than half of the nation's population, Louisville provides convenience for travelers that is hard to beat. Paved, on-site parking for more than 17,000 cars provides unparalleled accommodations for automobile travelers. A parking fee of \$2 per vehicle is charged. *If you have a receipt for your parking fee, it may be used as a \$2 credit toward anything sold in the ARRL booth, including ARRL memberships.*

Standiford Field is served by 11 different airlines, including Delta, Piedmont, TWA, Eastern and USAir. Hotel and motel courtesy limousine service is available and, since the convention hotel is less than a mile from the airport, you have only minutes to wait before being whisked away to your weekend of fun. And with the Convention hotel being just across the street from the hamfest site, you can participate in festivities all three days within a short, leisurely stroll.

The Executive West is the Convention hotel, and special rates are being offered to Convention participants. Reservations can be made by contacting the Executive West, Freedom Way and Fairgrounds, Louisville, KY 40209.

If you are coming by recreational vehicle, make arrangements to park right on the fair-

grounds; full RV hookups will be available. For RV reservations, contact KFEC, P.O. Box 37130, Louisville, KY 40232.

## Forums, Vendors, and More!

Over a dozen forums have been scheduled for your enjoyment during the three-day affair. At press time, here is the way the schedule looked.

**Friday:** Three forums have been scheduled. First on the agenda, at 1 P.M. Eastern Time, is the AMSAT forum with Executive Vice President Dr. John Champa, K8OCL. The second forum, ATV and SSTV, with Don Miller, W9NTP, moderating, will start at 2:30 P.M. The DX forum is the last of the day, starting at 3 P.M.

**Saturday:** The first forum of the day will be on packet radio, led by Jeff Ward, K8KA, of ARRL Hq., and Harold Price, NK6K. Dave Smith, W8YZ, will be presenting a program entitled "Standing up to Standing Waves," starting at 10 A.M. The ARRL forum will start at 11:15 A.M., with Larry Price, W4RA, Len Nathanson, W8RC, George Wilson, III, W4OYI, and Dave Sumner, K1ZZ, leading the discussion. Ray Kowalski, Chief of the Special Service Division of the Private Radio Bureau, will be chairing the FCC forum, starting at 1:30 P.M. Other forums of the day include a computer forum led by Herb Nichols, W3EOA, starting at 2:30 P.M.; a repeat of the AMSAT forum held on Friday (2:45 P.M.); and a Contesters forum at 3 P.M., led by Shelby Summerville, KI4DC.

**Sunday:** A Navy MARS forum starts off

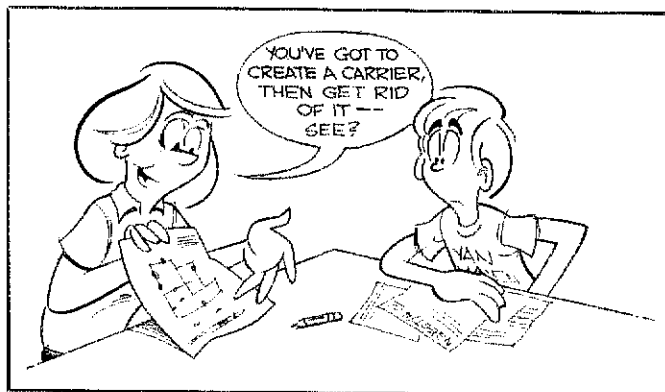
the last day of the Convention, with Charles Wirth, K4OQN (NNØLUK/NNØGAT), moderating. The ARES forum, which will start at 10 A.M., is under the direction of George Wilson, W4OYI. The topic will be the aftermath of the anticipated earthquake in the New Madrid fault. Dr. Friday, Deputy Assistant Administrator of the National Weather Service in Washington, DC, Dr. John Kiefer of the University of Kentucky, and ARES and DES officials throughout the area will participate. The last forum of the day is still pending, but we hope to be able to present the latest ham in space, Tony England, WØORE.

Of course, we will have a large contingent of major vendors (168 booths available), as well as a huge flea market (500+ booth spaces) for you to visit—all under one roof and air conditioned! A women's program will be conducted both Saturday and Sunday, from early morning until mid-afternoon.

Amateur Radio license examinations will be given all day Saturday. Advance registration is required. Participants need to submit an FCC Form 610 along with a copy of their Amateur Radio license, a copy of their Code Credit certificate, if applicable, and a \$4 check or money order payable to ARRL/VEC to: Volunteer Examiner Program, Walter H. Bowman, WD4RAK, P.O. Box 603, Radcliff, KY 40160. For further information, contact the Greater Louisville Hamfest Assn., P.O. Box 34444, Louisville, KY 40232, tel. 502-368-6657.

# The Principles and Building of SSB Gear

This intermediate-level series is aimed at those who want to build a small SSB transmitter and learn how SSB equipment operates. A practical project will be described later in the series.



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

Would anyone *build* an SSB transmitter today? After all, doesn't everyone buy a commercial rig these days? These questions are worth asking ourselves if, indeed, we have no interest in what goes on within the cabinets of the store-bought transceivers most of us own. But, wouldn't it be fun to construct a low-power SSB transmitter for the experience and understanding it would provide? For some, the answer is yes. A secondary benefit is that you will be better equipped to pass the next higher license-grade test if you know what takes place in an SSB circuit. Beyond that, you will be able to do a better job of troubleshooting your commercial SSB ham gear if you know what the various circuits are supposed to do in the process of generating an SSB signal.

As we move along with this new series I will describe a QRP SSB transmitter for

the 75-meter band. It will be easy to build and adjust. The total cost should be within most experimenters' budgets. But first, let's review the subject of SSB generation within the scope of modern filter-generator techniques.

### Circuit Lineup

Rather than burden or confuse you with an elaborate SSB transmitter circuit, I'd like to illustrate the basic principles by using a block diagram that shows the bare essentials of an SSB generator. Please refer to Fig. 1 for this discussion.

If we start at the left of the diagram in Fig. 1, we see that the first stage or stages of an SSB transmitter are designed to amplify the energy from a microphone. This is necessary in order to provide ample speech power for the balanced modulator. The speech amplifier should be designed to pass

only those voice frequencies needed for communications—typically 300 to 3000 Hz. Proper selection of resistor and capacitor values will shape the amplifier response for the specified passband. We must also ensure that there is no hum introduced in the speech-amplifier section. This means the dc operating voltage needs to be well filtered. Some form of RF suppression is desirable between the mic input jack and the speech amplifier. This will prevent distortion and howling from RF energy that could enter the input circuit of the speech amplifier through unwanted RF pickup on the microphone cable. These are subtle but important design steps. Later in this series, we will examine actual circuits for speech amplification, along with detailed circuit data for the other stages shown in Fig. 1.

Next comes the balanced modulator. This is perhaps the most important part of

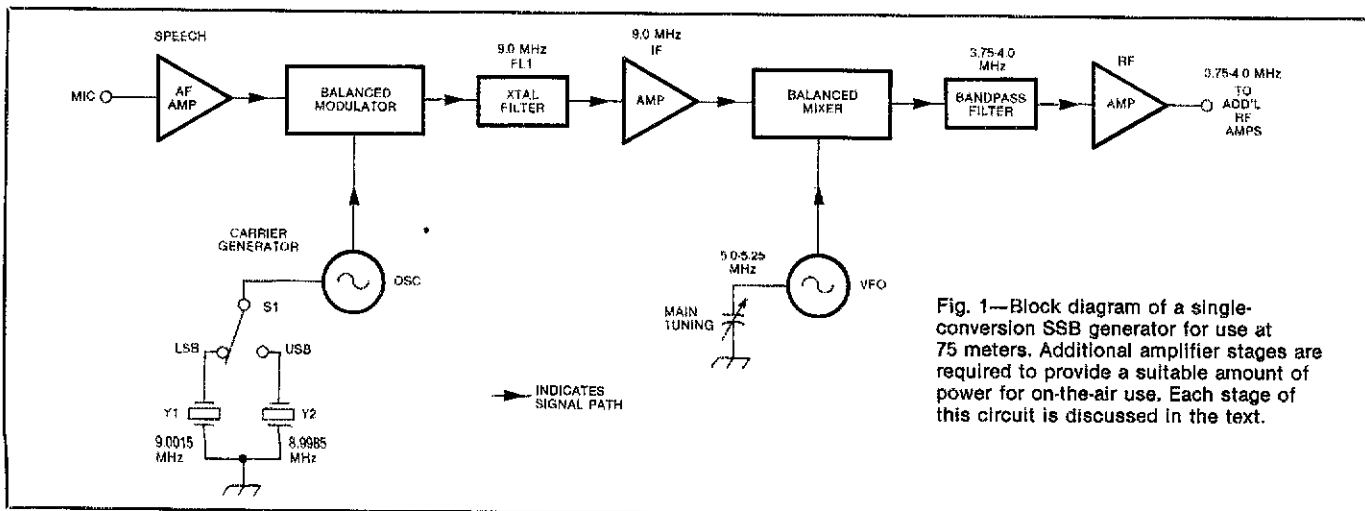


Fig. 1—Block diagram of a single-conversion SSB generator for use at 75 meters. Additional amplifier stages are required to provide a suitable amount of power for on-the-air use. Each stage of this circuit is discussed in the text.

the generator, other than the SSB filter (FL1). The balanced modulator combines the speech energy from the audio amplifier and the RF current from the carrier generator to provide modulated RF output at 9 MHz. It must also balance out (remove) the 9-MHz carrier. The output from the balanced modulator is double-sideband, suppressed-carrier energy at 9 MHz. Balanced modulators are similar to balanced mixers in the way they are constructed. There are many types of circuits for use in this part of an SSB generator; we may use individual transistors to form a balanced circuit, we may use ICs designed especially for this service, or we might choose a diode variety of balanced modulator. Some circuits are referred to as "singly balanced," while others are "doubly balanced." The doubly balanced modulators offer the greatest carrier suppression. Some simple illustrations of balanced modulators are given in Fig. 2.

Ideally, the unwanted carrier should be suppressed by at least 50 dB. If we were to allow the carrier to remain at the output of the balanced modulator, we would have a small AM transmitter (carrier and AM sidebands). Therefore, the greater the carrier reduction, the better the quality of the SSB signal. Poor carrier suppression can be observed by tuning off to the side of an SSB signal. It appears as a weak beat note.

#### Carrier Generator

We need to have a carrier generator in order to produce an SSB signal. The operating frequency of the carrier oscillator (Fig. 1) is chosen in accordance with the center frequency of the crystal lattice SSB filter (FL1). Two crystals (Y1 and Y2) are used to allow upper- or lower-sideband operation. The exact crystal frequencies used depend in part on the shape of the filter-response curve. The crystal frequencies must fall at points on the response curve that are approximately 20 dB below the peak response of the curve, as shown in Fig. 3. This procedure ensures the most realistic voice quality (natural sound) at the receive end of the SSB communications circuit. Wrong placement will lead to a high-pitched or low-pitched voice quality. Correct positioning of the carrier frequencies is important also for ensuring ample suppression of the unwanted sideband (reduction in level of the USB energy when working LSB, and vice versa).

If we want to use the SSB transmitter for CW operation, we must unbalance the balanced modulator. Generally, this is done by routing a dc voltage to a part of the balanced modulator, which, in turn, causes imbalance. This permits the carrier to ride through the circuitry that follows the balanced modulator and ultimately to the antenna. A drive or carrier-level control is often used to vary the degree of imbalance, and hence the level of the driving power to the RF amplifier stages after the mixer of

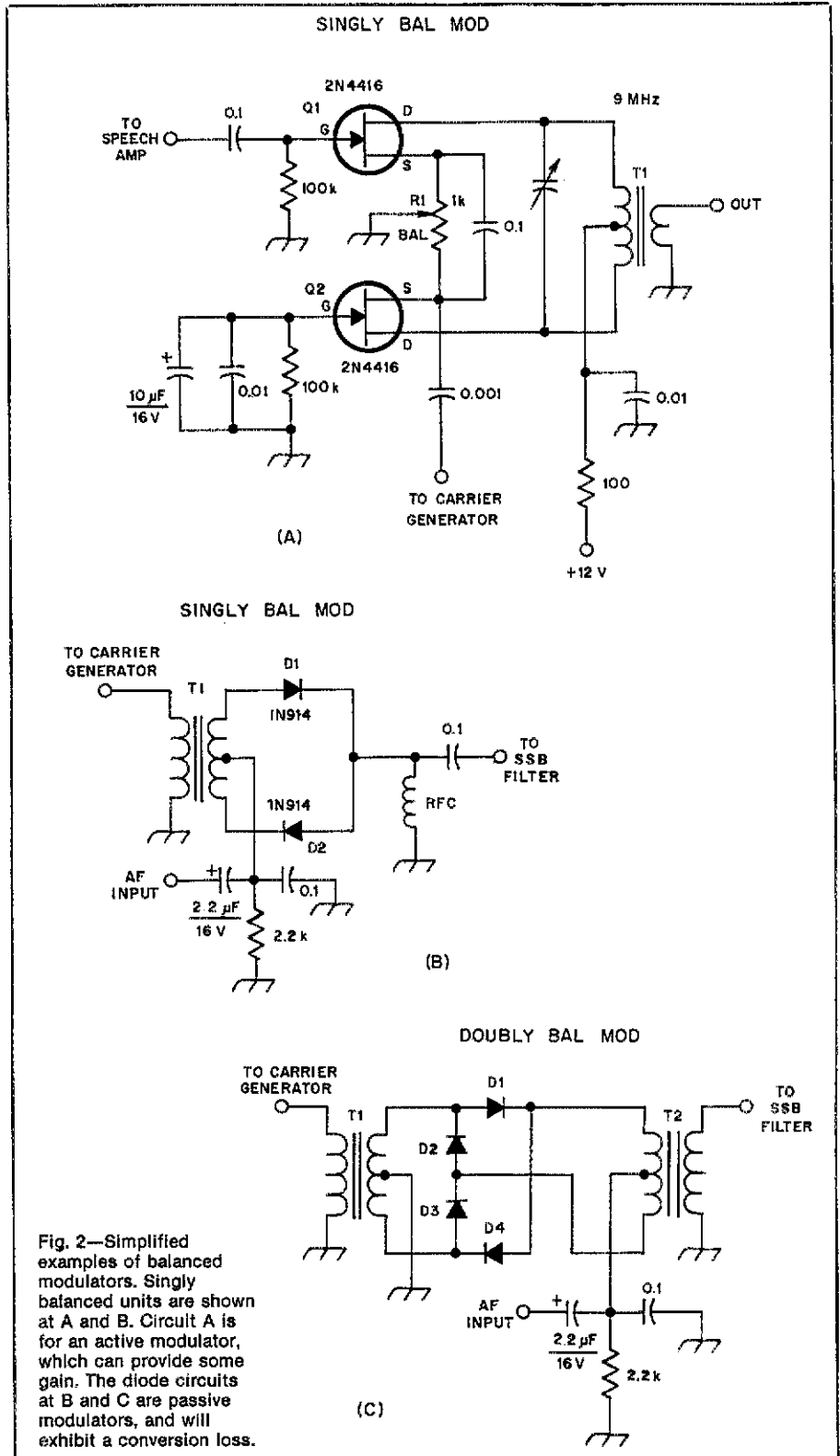


Fig. 2—Simplified examples of balanced modulators. Singly balanced units are shown at A and B. Circuit A is for an active modulator, which can provide some gain. The diode circuits at B and C are passive modulators, and will exhibit a conversion loss.

Fig. 1. We will learn more about the mechanics of this feature later in the series.

#### SSB Filter

Most SSB rigs today contain crystal filters, although mechanical filters remain available for intermediate frequencies up to 500 kHz. The most commonly available

nonsurplus filter is designed for a center frequency of 9 MHz, and it is available by mail. Matching USB and LSB crystals are also available for the carrier generator.<sup>1</sup>

The function of the crystal filter is to

<sup>1</sup>Notes appear on page 19.

suppress the unwanted sideband while passing the desired one. The greater the number of poles or crystal sections used in a filter (up to a practical limit), the steeper the filter side response (skirts) and the better the rejection of the unwanted sideband. Most SSB filters are listed as 4-pole or 8-pole types. Homemade lattice filters were commonplace when SSB first became popular, but we can now purchase a ready-made filter for less money than we would pay for new crystals that are etched for the exact frequencies required. Homemade ladder filters are practical and inexpensive if we build them with surplus crystals.<sup>2</sup>

Each crystal filter has a characteristic input and output impedance. We must be certain to provide a resistive termination of the proper value if we are to expect the specified performance of a given filter. Incorrect termination can vastly alter the response curve of a filter, and may lead to what is known as "ripple." This shows up as one or more dips in the flat part of the response curve (filter nose), and some of the unwanted dips in response can be several decibels in magnitude. Ideally, the nose of the filter-response curve is flat.

### Post-Filter Amplifier

All filters (LC or crystal) cause some signal loss. This is called *insertion loss*. The amount of power loss varies with the design and brand of filter, but it is normally between 5 and 8 dB. Therefore, it is a good idea to recover that loss by adding an IF amplifier directly after the filter, as shown in Fig. 1. In fact, this stage can be arranged to provide a slight gain, say 15 dB. If we deduct the 8 dB of insertion loss from FL1, we still have a bonus 7 dB of gain for the 9-MHz SSB signal from FL1. It is not imperative that we make up the lost gain in this part of the circuit; it could be added after the balanced mixer. However, that would place an additional amplifier in the 3.75- to 4.0-MHz RF section, and having so many stages on the same frequency could encourage self-oscillation at 75 meters. We must be careful when using the post-filter 9-MHz amplifier. If we allow it to have too much gain, it can drive the balanced mixer too hard, and this will cause unwanted distortion products to be generated within the mixer. Mixer distortion would then be passed along at 75 meters and greatly amplified. The result would be a wide signal in the 75-meter band.

### Balanced Mixer

Now comes the conversion section of our SSB generator. We must move (heterodyne) the 9-MHz SSB signal to the band of our choice. In this example, we are shifting from 9 MHz to 3.75-4.0 MHz. Our balanced mixer works just as it would in a receiver. That is, we inject the mixer with two frequencies (9 MHz and 5 MHz) to produce a sum or difference output frequency ( $9 - 5 = 4$  MHz, or  $9 + 5 =$

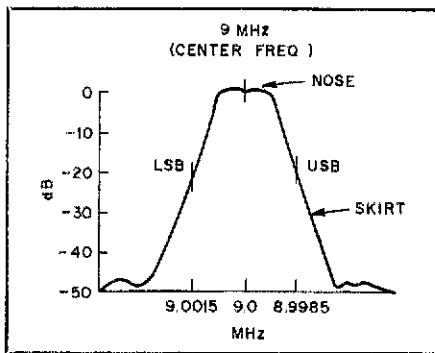


Fig. 3—A typical response curve for a crystal-lattice SSB filter. Note that the carrier-generator frequencies for USB and LSB are placed 20 dB down from peak response on the curve (see text).

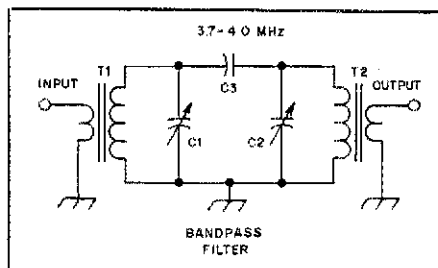


Fig. 4—Circuit example of a two-pole band-pass LC filter. The inductance values for T1 and T2, plus the capacitance used at C1 and C2, depend on the operating frequency and the general design of the filter. C3 is also a calculated value. Filters of this type are suitable at the output of a balanced mixer to minimize the passage of unwanted frequencies.

14 MHz). If we are to generate 75-meter SSB energy, we must choose the difference frequency. We could build a 20-meter SSB transmitter by selecting the sum of the mixer frequencies. The RF amplifiers and filter (FL2) that follow the mixer would then have to be designed for 14-MHz operation. In fact, many early two-band homemade SSB transmitters were built for 75 and 20 meters in order to use this convenient frequency scheme. The use of upper sideband on 20 meters and lower sideband on 75 meters may be a result of this frequency arrangement (the sidebands become inverted when switching from the difference to the sum frequency).

Mixers follow the same rule in SSB generators as they do for receiver design. This suggests that we should avoid single-ended mixers (a 40673 MOSFET, for example) and use singly or doubly balanced mixers. Once more, we can use bipolar transistors, FETS, ICs or diodes, just as is the case with the balanced modulator. In fact, the circuits of Fig. 2 can be adapted for use as balanced mixers by substituting the 9-MHz energy for the audio-frequency voltage specified.

The advantage of using balanced mixers

is that cancellation of the 9- and 5-MHz energy is enhanced. A doubly balanced mixer will greatly suppress these two frequencies, whereas a singly balanced mixer will reduce only one of the unwanted frequencies. Our objective is to extract only 3.75-4.0 MHz energy from the mixer output.

It is advantageous to filter the mixer output with a band-pass LC filter (FL2 of Fig. 1). This further reduces the level of the 5- and 9-MHz components before the mixer output signal is fed to the 75-meter RF amplifier. A typical band-pass filter is shown in Fig. 4. It must have a broad enough response to pass the frequencies from 3.75 to 4 MHz without attenuation other than the usual insertion loss. The filter should attenuate all frequencies below 3.7 and above 4 MHz.

A reasonably pure signal should be available for the stages that follow the mixer. This will help to ensure that the various "straight-through" amplifiers do not act as mixers and cause spurious transmitter output frequencies. Getting rid of amplifier harmonics is a job by itself: We don't want to battle additional spurious frequencies along the way.

### Installation Wrap-up

The discussion we have had this month relates primarily to the fundamental nature of an SSB generator. This treatment has been based on the single-conversion concept. Most commercial transmitters, receivers and transceivers use the double-conversion approach, which is more complex in terms of gain distribution and the reduction of spurious response. For the purpose of this series, we will stay with the single-conversion process. It will reduce the parts count and lessen our burden of providing a spectrally clean output from the transmitter.

The carrier generator of Fig. 1 and the VFO section in the same block diagram are not necessarily representative of a quality design. Normally, each stage would be followed by a buffer amplifier. This would isolate the oscillators from the circuits they connect to, thereby minimizing frequency changes caused by load variations. Single-stage oscillators are depicted for the purpose of simplicity.

We recognize that many of you are familiar with how an SSB transmitter functions. But we want to give newcomers a better understanding of this established mode of communications. The seasoned readers may want to stand by until we present the practical circuits that will be used in the workshop portion of this series.

### Notes

<sup>1</sup>Spectrum International, Inc., P.O. Box 1084, Concord, MA 01742. Catalog available on request.

<sup>2</sup>W. Hayward, "A Unified Approach to the Design of Crystal Ladder Filters," *QST*, May 1982, p. 21.

# Remote Control of Digital Communications

Want to ham away from the shack? Phone home and operate RTTY, AMTOR or CW from a remote ASCII terminal.

By Robert K. Ewing, WA4GWG  
P.O. Box 263, Lincroft, NJ 07738

Did you ever miss copying the evening W1AW bulletin or not check into the local 2-meter RTTY net because you were working late? By teaming up the Kantronics Universal Terminal Unit (UTU) with an auto-answer modem (modulator/demodulator) at your home station, you or other authorized licensed control operators can telephone from a desktop computer and read the mail or get on the air. A phone and an ASCII terminal become your remote-control point; if you have one of the lap-size portable computers, that means operation from almost anyplace. From the remote ASCII terminal, you will be able to send and receive Baudot, ASCII, AMTOR or CW with remote speed selection. Manual remote-control capability on all digital modes except packet radio can be yours. This interface can actually be adapted to most Terminal-Node Controllers (TNC) in place of the UTU if you need remote packet. You won't be able to change frequency remotely, but with this simple interface you can have a lot of fun!

## The Kantronics UTU

The heart of this multimode system is the UTU manufactured by Kantronics. Unlike many modems that are made to interface with a particular computer and require tailored software, the UTU has its own internal microprocessor. Thus, it can interface with any asynchronous, 110- or 300-baud, full-duplex, serial RS-232-C (or TTL) ASCII terminal or computer port. Even a dumb Model 33 Teletype® can be used; hence the word "universal" in its name. If the shack computer is upgraded, the UTU is one peripheral that won't be obsolete as long as the new machine has a serial-interface port and software is available to make it emulate a dumb terminal.

The UTU measures about 2 × 6 × 7 inches and weighs less than 2 pounds. Connected between a local ASCII terminal and a transceiver, it performs code and speed conversion, modem functions, and TR

switching for all character-oriented digital modes. Since transmit and receive modes are toggled by a simple two-key ESCAPE T or ESCAPE R sequence, terminal interface using an auto-answer modem is easy. After the UTU is turned on, an initial carriage return from the terminal signals the UTU to determine and match your terminal data rate (110 or 300 bauds) and send a mode-selection menu to the terminal. A single-character response places the UTU in the selected mode, and the default speed for that mode is displayed. Characters are then sent to the terminal as they are received. One selection is "O" for options. This returns a special menu for options selection. If AMTOR MASTER or SLAVE operation is selected, the UTU will ask for an input of the four-character SELCAL code. Speed can be changed by ESCAPE sequences. ESCAPE T and ESCAPE R control transmit and receive, respectively. ESCAPE X returns you to the main menu.

The UTU cabinet has connectors on the rear and LED indicators on the front panel. Using switched-capacitor filtering and crystal-controlled standard 170-Hz-shift AFSK tones in the modem section, it is state of the art. Open-collector outputs provide for direct dc keying of FSK and the

push-to-talk line, while a reed relay is used for CW keying. One of the niftiest features is the LED bar display tuning aid. It works so well I haven't bothered to try the external scope outputs available on the rear panel. The UTU requires an external dc power supply of 12 V at 200 mA. This makes mobile or portable operation with a lap-size computer feasible. Imagine, mobile or backpack RTTY!

The computer-interface connector on the UTU is a 5-pin DIN jack. It consists of the following RS-232-C signal lines, which can be internally strapped for TTL levels: transmit data, receive data, ground request to send and clear to send. The last two don't have to be connected, and the UTU buffer also supports CONTROL S/CONTROL Q (XON/XOFF) flow-control protocol. If your terminal doesn't have flow control, watch your typing speed. A mating DIN plug and color-coded cable are supplied, but an RS-232-C connector is necessary to interface it with the computer terminal or modem. It is convenient to wire the RS-232-C connector to a Data Terminal Equipment (DTE), as shown in Fig. 1, so it can be plugged into a terminal for local control in the shack. The UTU can be regarded as Data Circuit-Terminating

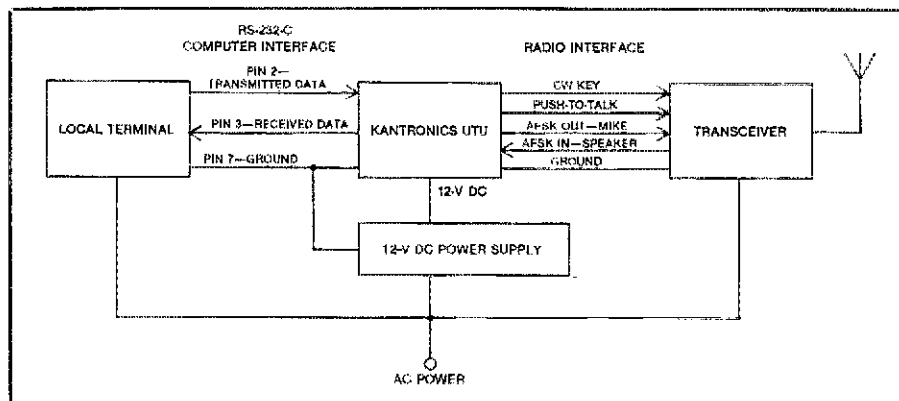


Fig. 1—Local-control interface.

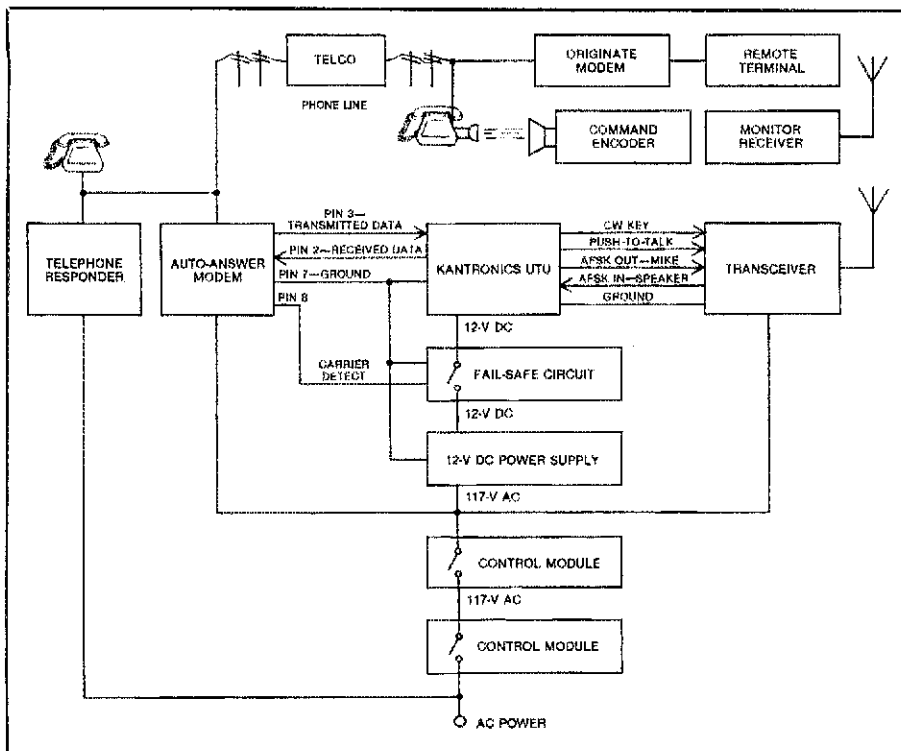


Fig. 2—Remote-control system block diagram.

Equipment (DCE). In connecting the auto answer modem, we are making a DCE-to-DCE interface, so what is transmitted data to the modem is received data from the UTU, and vice versa. In Figs. 1 and 2, the words "transmitted data" and "receive data" are from the on-the-air perspective. Use a null-modem adapter cable or a switch to reverse RS-232-C pins 2 and 3 when interfacing to a modem for remote operation (Fig. 2).

### The Fail-Safe Circuit

To comply with FCC regulations regarding control-link malfunction, a fail-safe circuit must be added to the modem interface when using it for remote control. Pin 8 of the modem RS-232-C interface provides a carrier-detect signal that is positive with respect to ground (pin 7) while the distant modem carrier tones are present (the control link has not failed). This signal goes negative when the tones from the distant modem are lost and can be used to sense control-link malfunction and stop radio transmission. A switching transistor and reed relay connected to pins 7 and 8 (as shown in Fig. 3) form the fail-safe circuit. The relay contacts can be placed in series with the PTT or key line, or simply be connected in series with the 12-V supply to the UTU. Don't forget the spike-protection diode across the relay coil.

Check the configuration section of your modem manual. The Hayes Microcomputer Products Smartmodem, for example, has several configuration switches. Configuration switch 6 must be in the UP posi-

tion to read the carrier-detect status. The DOWN position straps pin 8 TRUE even if a carrier is not present. This is used to fool a computer to enable it to send data when the modem is in a local command state with the phone line on hook. Don't fool your fail-safe circuit! Switch 3 should be up so result codes like RING are not sent to the UTU. Switch 4 of the Smartmodem should be down so that the modem does not echo characters when in a command state. The UTU echoes characters as they are transmitted from the output buffer. If the modem somehow escaped into the command state, it would echo the echo. This would result in a character being sent repeatedly in an endless loop. On the Smartmodem, switch 1 should be down to ignore the Data Terminal Ready (DTR)

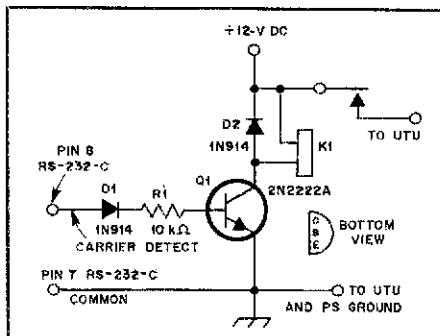


Fig. 3—Control link fail-safe circuit.

K1—12-V reed relay, RS 275-233 or equiv.  
R1— $\frac{1}{2}$ -W unit.

lead when not in use, and switch 5 should be up to enable auto-answer.

### The Rules

It is a good idea to review the FCC Rules pertaining to remote-control operation before attempting it. Actually, it's a good idea to review all the Rules occasionally, as there have been quite a few regulatory changes. Why not purchase a copy of the *ARRL FCC Rule Book*?<sup>1</sup> Operation of a station by remote control is the title of Section 97.88.

Section 97.88 (a) requires that you post a photocopy of your station license in a conspicuous place at the station location.

Section 97.88 (b) requires that the name, address and telephone number of the licensee and of at least one control operator be posted at the remotely controlled transmitter.

Section 97.88 (c) requires that the control operator monitor the frequency of emission before and during operation. Courtesy isn't just good operating practice, it's the law! I use a Sony ICF-2001 portable HF receiver (Fig. 4). It is small and synthesized. The new Sony ICF-2002 is even smaller. If there is any noise at all, a local receiver for manual reception of CW on HF will be needed.

Section 97.88 (d) requires that provisions be incorporated to limit transmission to a period of no more than three minutes in the event of a malfunction in the control link. With the fail-safe carrier-detect circuit, transmissions will cease instantaneously with the loss of a remote-terminal carrier.

Section 97.88 (e) states that repeater stations cannot use their input frequency for control links; this does not apply to our nonrepeater wireline control.

Section 97.88 (f) requires that the station records contain name, address and call sign of all persons authorized by the station licensee to be control operators. Station records must also contain a functional block diagram of the control link with a technical explanation sufficient to describe its operation.

Section 97.88 (g) requires that each remotely controlled station be protected against unauthorized station operation, whether caused by activation of the control link or otherwise.

### Security

To comply with §97.88 (g), the station location should be locked and secured from unauthorized access while it is unoccupied. The control link can be protected from actuation by using a separate, unlisted phone number or by remotely enabling and disabling the system. I did both. If you use a separate, unlisted phone number for the

<sup>1</sup>The FCC Rule Book, 4th ed. (Newington: ARRL, 1985).



Fig. 4—Remote-control-point equipment. A Radio Shack Model 100 portable computer with a built-in modem is used as a terminal. The BSR hand-held command encoder enables the system. A Sony ICF-2001 is used to monitor the operating frequency.



Fig. 5—Station remote-control equipment. The Kantronics UTU sits atop a Hayes auto-answer Smartmodem. The control-link security is provided by a BSR X-10 telephone responder and two appliance-control modules.

control link, it can also be used for computer communication while you are home calling bulletin boards. This prevents tying up your main phone lines, and you won't have to explain why your computer modem deafened friends with an answer tone. People who don't like telephone-answering machines will hate auto-answer modems. The unlisted number offers security. Anyone who wrongly dials this number will surely be surprised.

Anyone who accidentally dials your control link from a computer terminal will receive the opening menu. No harm is done unless they stumble across the ESCAPE T sequence or manage to load a SELCAL into the AMTOR MASTER or SLAVE options, which would key your transmitter. If you don't connect the PTT or CW key line and plan to use the remote interface strictly for receiving, you need not bother with any security measures. You will never have to worry about tap dancing in front of the FCC, but you won't have as much fun, either.

#### War Games, Anyone?

Having an unlisted control-link number is not protection against the scary scenario of the recent popular movie *War Games*. In this movie, a mischievous hacker with an auto-dial modem conducts a brute-force automated search for local phone numbers with auto-answer modems in quest of computer systems to intrude and explore. It could almost make you paranoid. I thought about modifying my equipment to use nonstandard tones, but this would prevent me from using outside terminals. Placing a computer between the modem and UTU to implement password sign-on protection was also considered. This would tie up the computer and, besides, passwords are challenges to curious hackers. Exposure to accidental wrong-number dialing and

brute-force searches can be minimized by leaving your modem auto-answer disabled when not in use.

Simply plug in your terminal on days you plan to use it. Better yet, remotely enable and disable the auto-answering feature of the modem just prior to and after actual use. The idea is not to prevent accidental access, but to hide the very existence of an automated system from potential intruders. You can remotely switch the modem ac power or use the DTR RS-232-C input line on pin 20; remember, on the Hayes Smartmodem, you must set the configuration switch to sense the status of this line. The modem will not answer if this line is not TRUE (positive input voltage with respect to ground pin 7). You could use the tone pad on a UHF hand-held radio to toggle a flip-flop and RS-232-C driver. By convention, RS-232-C requires a negative voltage to signal the NOT TRUE state; however, you may not need to use a real RS-232-C driver. Most modems will respond to DTR control using ground and +12 V to represent NOT READY and READY, respectively.

#### The Telephone Responder

I discovered that I already had remote enable/disable capability with the BSR X-10 telephone responder system shown in Fig. 5. BSR system components are available from Sears, Radio Shack and Heath. The telephone responder also answers the phone automatically, but does not do so with modem tones. Instead, it acknowledges commands with three short beeps. The hand-held, acoustically coupled command-tone encoder looks like a DTMF pad, but actually sends out serial AFSK code words that sound like RTTY. These tones will also work through an autopatch, which is a convenient way to turn on the air conditioner to precool the house while

you are driving home. This is legal remote control of an object; FCC rules no longer restrict amateurs to remote control of model craft. Autopatch use isn't recommended though. It invites a tape-recorder-playback attack a la the *War Games* movie.

The responder has a three-octal-digit security access code that offers 512 combinations for password protection. Up to eight different wireless module addresses can then be commanded on or off, controlling ac appliances throughout the house. Plugging the modem ac power cord into one of the modules or using the module to switch a +12-V source connected to the modem DTR lead solves our remote enable/disable auto-answer problem. In fact, the rig can be plugged into the same appliance module, turning off ac to the transceiver when it is not in use. An appliance module that has a relay output and not a lamp-dimmer module should be used. Radio Shack carries universal appliance modules for 3-wire grounded receptacles and loads. Push-button, programmable-timer, burglar-alarm and RS-232-C interface command modules are available to increase the flexibility and utility of the system for controlling lights and appliances throughout the house, in addition to controlling various functions in your ham shack.

The telephone responder system will be more convenient to use if you connect it to your regular phone line and keep the modem on a separate line. If the phone is not answered within 42 seconds in the normal mode, the responder will answer. It will issue three beeps and await your security code and commands, which it also acknowledges with three beeps. It then times out and disconnects after 42 seconds to await the next call.

If you have only one phone line, the responder has an answering machine mode



that allows it to share the line with the modem. In this mode, when the phone rings, the responder will engage the line after 42 seconds, regardless of who answered the phone. You should carefully check your modem operating characteristics for timing conflicts, however. For example, the power-up default settings for the Hayes Smartmodem cause it to answer on the first ring and disconnect if a carrier is not detected in 30 seconds. Luckily, the BSR telephone responder goes off-hook before this, preventing the phone connection from being broken, although the responder will not accept commands until 42 seconds after the first ring.

If your modem times out too early, the phone connection may be lost. There are two solutions to this problem. The first is to change the modem default settings if they are programmable. In this case, you may have to use the DTR lead for auto-answer enabling if cycling the ac power restores modem default settings. The other solution is simply to hold the modem on-line with carrier from your remote terminal long enough for the telephone responder to engage the line 42 seconds after the first ring. This will allow you a 42-second window to send telephone responder commands.

### BSR Idiosyncrasies

You should be aware of a couple of idiosyncrasies. The BSR system sends high-frequency coded pulses through the house wiring, and some EMI/RFI line filters will attenuate the pulses with unpredictable results. Sometimes, modules plugged directly into an RFI filter are unaffected, while certain command- and appliance-module combinations in other parts of the house stop working. If you install or relocate an RFI filter, test the operation of all appliance modules from different command-module locations.

In BSR remote operation, an appliance is normally left turned on, but plugged into a module that is in the off state. The modules have a convenience feature in which they turn themselves on if the appliance power switch is turned off then on. Thus, a user may have local, as well as remote, control. When I tried to remotely turn off my ICOM 751 (it has an internal ac-power-supply option), a curious thing happened. The BSR module snapped off, but then, as relays in the '751 deenergized, the load impedance changes were interpreted by the BSR module convenience feature as a local control switch cycling. The module then promptly turned itself back on after every repeated attempt to turn it off by remote control! More problems, more solutions.

The answer was to plug two appliance modules in tandem, set to the same address. When they are sent the OFF command, both turn off simultaneously, and the combination seems to add enough hysteresis to prevent the '751 relays from resetting either module. To turn the rig on, two sequential ON commands must be given. The first turns on the appliance module plugged into the line, allowing commands to reach the second module. Repeating the address and ON command turns on the second module and powers the rig.

### Safety First!

Put yourself in Murphy's shoes before operating your station unattended. What would you do to your station if you were Murphy? Is your rig rated for RTTY duty-

cycle operation and properly fused? Is the ventilation unobstructed? Is the right antenna connected, and is it out of the reach of neighborhood kids? Is the rig preset to the intended frequency and mode? Make sure the control-operator friends you designate are aware of station status before operating.

### Remote Frequency Control

The ultimate in remote control can be yours if you use this system in conjunction with the Shackmaster. Manufactured by Advanced Computer Controls, the Shackmaster is a versatile multifunction station accessory designed primarily for remote control by voice.<sup>2</sup> When used with the ICOM IC-751, it allows remote frequency, mode and band selection. It also features provisions to perform the BSR security function when used with the Heath GD-1530 RS-232-C to BSR X-10 interface. The Shackmaster can be seen in Fig. 6 alongside the other station equipment that allows me the opportunity to perform remote control.

### Conclusion

You should check out your UTU with your rig in local operation before attempting remote control. Use some common sense and operating courtesy. Observe the rules and have fun. Working the world from your office work station is more interesting than any spreadsheet program—

<sup>2</sup>Advanced Computer Controls, Inc., 10816 Northridge Square, Cupertino, CA 95014, tel. 408-749-8330.

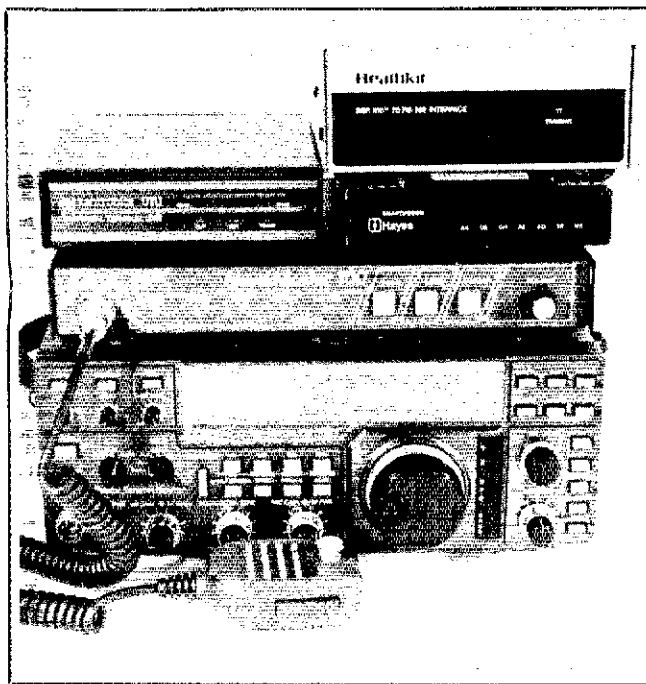


Fig. 6—The luxury of remote frequency control and voice modes can be added by using the Advanced Computer Control's Shackmaster with the ICOM IC-751 transceiver. The Heath GD-1530 RS-232-C to BSR X-10 interface allows the Shackmaster to perform the BSR security function using DTMF for the command encoder.

but do it on your own time!

The first time I copied the WIAW bulletin from the office, one of my co-workers suspected that I had tapped a super-secret military command and control network when he saw: THIS IS ARRL HEADQUARTERS STATION, BULLETINS FOLLOW ... scrolling up the screen. When he later looked over and saw orbital data for Russian satellites, he was convinced!

I hope the ideas presented in this article will stimulate experimentation. There are many potential applications for remote-control station operation, including landline keying of Civil Defense RTTY or co-locating a shared high-performance HF station at your club's dream hilltop repeater site. Club members don't have to travel to the club station location to operate; they can operate from their home computer. The applications are limited only by our imagination, and we hams can imagine a lot. Did you know that Radio Shack has acoustic coupler cups for the Model 100 portable that allow it to be used from a phone booth? Clark Kent, eat your heart out!

*Bob Ewing was first licensed in 1965, as WN4ASU. In 1973, he upgraded to Advanced class and was assigned his present call sign, WA4GWG. Bob holds a BSEE (1969) from the University of South Carolina and is presently employed by BDM Management Services Company as a senior engineer. A member of the ARRL and the IEEE, he holds a First Class Radiotelephone license with radar endorsement. Licensed as a professional engineer in New Jersey, Bob enjoys the experimental and technical aspects of ham radio and microprocessors.*

# Loops and Dipoles: A Comparative Analysis

Many factors affect the gain, resistance and general performance of full-wavelength loop antennas. Author Dietrich reports his analysis of loops of various shapes, and compares the characteristics to that of a half-wavelength dipole.

By James L. Dietrich, WAØRDX  
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A long-standing question regarding antennas concerns the precise gain of a one-wavelength loop. An early and oft-quoted figure of approximately 4 dBi was estimated by Lindsay for a one-wavelength circular loop.<sup>1</sup> More recently, Belcher and Casper modeled the full-wavelength loop, using two quarter-wavelength dipoles spaced  $0.318 \lambda$ —the diameter of a one-wavelength circle.<sup>2</sup> They reported a gain of 4.09 dBi, but later uncovered a computer-programming error. A subsequent calculation, using a dipole spacing of  $0.25\lambda$  to better approximate a square loop, gave 2.78 dBi of gain.<sup>3</sup> Along these same lines, Lawson calculated a 2.99-dBi gain, using a truncated-cosine current distribution on two quarter-wavelength dipoles to represent the two in-phase sides of the square loop, while omitting the out-of-phase sides.<sup>4</sup> He reasoned that the fields caused by these currents will cancel. Using this result, he further estimated the gain of the circular loop at 3.28 dBi by considering an equivalent length and spacing of the two high-current sides.

Most of the literature on this subject deals with the circular loop, and presents equations for field strength only.<sup>5-7</sup> However, one paper gives a computed curve that shows 3.5 dBi of gain for a one-wavelength circular loop.<sup>8</sup> Another reports a measured value of 3.4 dBi for a 1.1- $\lambda$  circumference.<sup>9</sup>

So it seems that, depending on the particular model and approximations used, one can arrive at a gain value anywhere from 3 to 4 dBi. Now,  $\pm 0.5$  dB has little practical significance in most cases, so why all the interest? Well, I think that because this radiator is a basic form and enjoys such widespread use, by itself and in parasitic arrays, we would like to state the

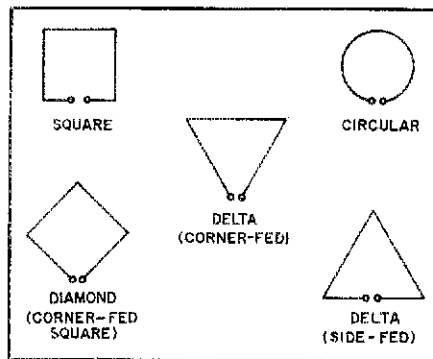


Fig. 1—Five full-wavelength loop shapes are shown here. The Delta loop is an equilateral triangle, with each side being one-third of a wavelength.

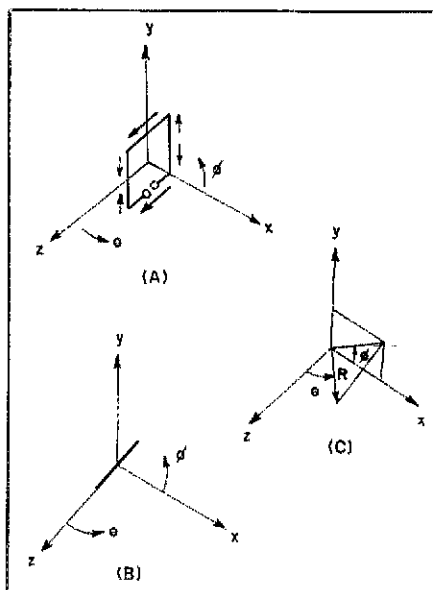


Fig. 2—Geometry used to define antenna position and direction for a square loop (A) and for a half-wavelength dipole (B). At C, the angles  $\theta$  and  $\phi$  are defined for any direction.

characteristics in a precise fashion, just as we can for the half-wavelength dipole antenna. To this end, the following analysis is presented for the gain, radiation resistance and radiation pattern of 1-wavelength loops in all of the popular configurations shown in Fig. 1.

## Formulation of the Problem

The geometry of the problem is shown in Fig. 2A. A square loop is located in the Y-Z plane, with its center at the origin and the feed point at the center of the lower side. A half-wavelength dipole will be referred to, and is oriented as shown in Fig. 2B. In Fig. 2C we can note how to determine the angles  $\theta$  and  $\phi$  for any direction of R. The angle of R from the Z-axis is expressed as  $\theta$ . Symbol  $\phi$  is the angle between the X axis and the projection of R onto the X-Y plane.

The currents for the loop are indicated by the arrows on the sides of the square. The heavier arrows indicate the higher current regions. As with the half-wavelength dipole, the amplitude is accurately described by a cosine distribution. This has been verified by measurement on various shapes of loops of total length up to  $3 \lambda$ .<sup>10</sup> Having established this, the total radiation field was obtained by first finding the field resulting from each side of the loop individually, positioned as in Fig. 2B, then repositioning and reorienting the sides to their appropriate positions of Fig. 2A. Finally, the four resulting fields were added.

## Results of the Analysis—The Fields

The fields for the 1-wavelength square loop are given by

$$E_{\phi} = \cos \phi \sin A \left[ \frac{C \cos B - \sin B}{1 - C^2} \right] \quad (\text{Eq. 1})$$

<sup>1</sup>Notes appear on page 26.

$$E_{\theta} = -\cos \theta \sin \phi \sin A$$

$$\left[ \frac{C \cos B - \sin B}{1 - C^2} \right]$$

$$+ \cos B \left[ \frac{\cos A - \cos \theta \sin A}{\sin \theta} \right] \quad (\text{Eq. 2})$$

where

$$A = \frac{\pi}{4} \cos \theta$$

$$B = \frac{\pi}{4} \sin \theta \sin \phi$$

$$C = \sin \theta \sin \phi$$

The total field from these two components is

$$E_t = (E_{\phi}^2 + E_{\theta}^2)^{1/2} \quad (\text{Eq. 3})$$

For comparison, the field for a half-wavelength dipole, as shown in Fig. 2B, is

$$E_{\theta} = \frac{\cos \left( \frac{\pi}{2} \cos \theta \right)}{\sin \theta} \quad (\text{Eq. 4})$$

Equations for each antenna have been normalized so the field strength is unity in the maximum direction:

$$\theta = 90^\circ \text{ and } \phi = 0^\circ$$

The two similar-looking terms in Eqs. 1 and 2 result from the vertical sides of the loop. The last term in Eq. 2 is caused by the horizontal sides. As has been estimated in the past, the field contribution of the vertical sides is small, having a maximum value of  $E_{\theta} = 0.06$  at  $\theta = 36^\circ$  and  $\phi = 90^\circ$ , that is off the sides at an elevation of  $\pm 36^\circ$ . These four low-amplitude lobes slightly cancel the field from the horizontal sides in directions other than the forward direction. This increases the gain a small amount over that when considering the horizontal sides alone.

### Radiation Patterns

To calculate the radiation (power) patterns in the principal planes we have the following:

Horizontal ( $\phi = 0^\circ$ )

$$E_{\theta}^2 = \left[ \frac{\cos \left( \frac{\pi}{4} \cos \theta \right) - \cos \theta \sin \left( \frac{\pi}{4} \cos \theta \right)}{\sin \theta} \right]^2$$

Vertical ( $\theta = 90^\circ$ ) (Eq. 5)

$$E_{\theta}^2 = \cos^2 \left( \frac{\pi}{4} \sin \phi \right) \quad (\text{Eq. 6})$$

These are considerably simpler than

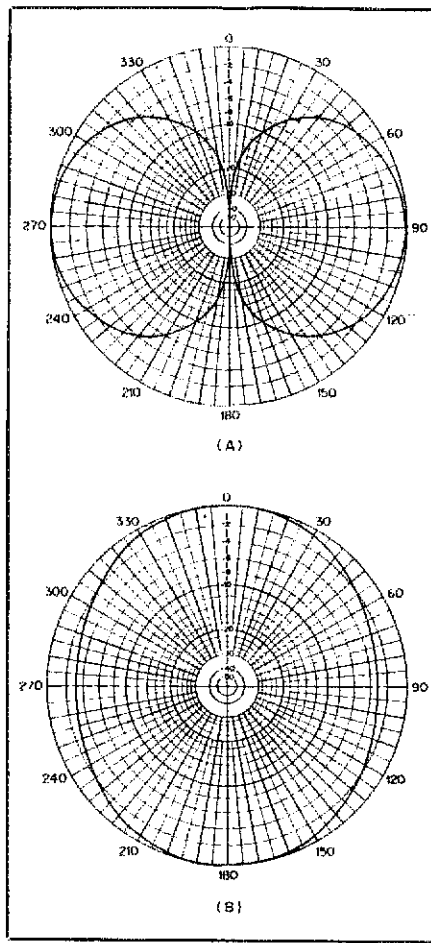


Fig. 3—At A, horizontal radiation pattern for the 1-wavelength square loop. With reference to Fig. 2A,  $\phi = 0^\circ$  and the variable angle is  $\theta$ . The vertical radiation pattern for the 1-wavelength square loop is shown at B. With reference to Fig. 2A,  $\theta = 90^\circ$  and  $\phi$  is the variable angle.

Eqs. 1 and 2, because the vertical sides make no contribution in these planes. The polar patterns are shown in Fig. 3. Fields and patterns of other shapes of loops are not given, since they are similar to the square loop. For example, comparing the square and circular loops, we find that the difference in the horizontal patterns is less than 0.2 dB. In the vertical patterns, the

maximum difference is in the vertical direction, where the square loop is 3.01 dB down, while the circular loop is 3.74 dB down—a difference of 0.73 dB.

For other shapes of loops, the level relative to on-axis in the vertical direction is given in Table 1. Note that this is not relative to the  $\lambda/2$  dipole, but rather just the amount the pattern is down from the forward (maximum) direction.

### Gain Calculation

Gain (over isotropic) may be defined as the ratio of maximum power density to average power density.<sup>11</sup> For the loops under consideration, this is expressed by

$$\frac{1}{G} = \frac{2}{\pi} \int_0^{\pi/2} \int_0^{\pi/2} (E_{\theta}^2 + E_{\phi}^2) \sin \theta \, d\theta \, d\phi \quad (\text{Eq. 7})$$

$E_{\phi}$  and  $E_{\theta}$  are the normalized fields, which are given for the square loop in Eqs. 1 and 2. Numerical evaluation of Eq. 7 was performed to an accuracy that ensured gain figures to two decimal places. A summary of these results is given in Table 1 for the various 1-wavelength loops and half-wavelength dipole. It shows that the popular square loop has a gain of about 1 dB over a half-wavelength dipole, and that the other shapes are within about one-third of the square configuration. There's nothing too surprising here, except that the gains are a little lower than those often quoted. This results from early estimates of loop gain being based on the circular case, and being a bit high besides.

As a practical matter, it should be noted that dipoles and loops are usually operated at resonant lengths that are very close to one-half and one wavelength, respectively, so the actual gains will be those given in Table 1. For antennas of other lengths, the gain is different. Short dipoles have 1.76 dB of gain, while a 1-wavelength dipole has 3.82 dB of gain. (For patterns of  $1-\lambda$  and  $1.28-\lambda$  dipoles, see *The ARRL Antenna Book*, 1984 Ed., pp. 6-7, 6-8.) Loops exhibit similar gain behavior, as shown in Fig. 4, which contains a plot of

Table 1  
Summary of Loop and Dipole Characteristics

			Gain Over Isotropic (dB)	Gain Over Dipole (dB)	Radiation Resistance (ohms)	Rel. Level at Vertical (dB)
—	$\lambda/2$	Dipole	2.15	0	73	0
□	$1 \lambda$	Square loop	3.14	0.99	117	-3.01
○	$1 \lambda$	Circular loop	3.49	1.34	133	-3.74
◇	$1 \lambda$	Diamond loop	3.14	0.99	117	-2.70
▽	$1 \lambda$	Delta loop	2.82	0.67	106	-2.09

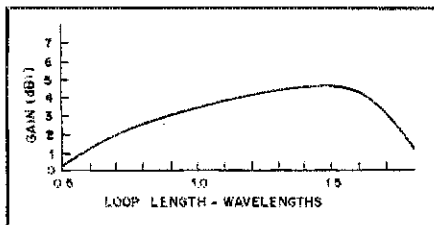


Fig. 4—Computed gain vs. length of a circular loop in the direction broadside to the loop.

computed gain versus length for a circular loop. The drop in gain for short lengths illustrates that loop radiation patterns develop a null in the forward direction as the size is reduced.

### Radiation Resistance

Radiation resistance for any antenna may be calculated by:<sup>12</sup>

$$R = \frac{E_0^2 r^2}{30 G} \quad (\text{Eq. 8})$$

where

$E_0$  is the field strength in the maximum direction, at distance  $r$ , with a current of one (1) at the feed point

$G$  is gain over isotropic (not in decibels).

For the square loop,

$$E_0 = 120/\sqrt{2} \text{ at } r = 1.$$

Eq. 8 was used to find the radiation resistance for this and other shapes of loops shown in Table 1.

These figures bear the same relation as does the 73 ohms to a dipole; that is, they apply to infinitely thin wire loops, exactly one wavelength long. The input resistance of a practical loop will depend, as with the dipole, on the conductor thickness and length. Thicker conductors and shorter lengths lower the resistance.

### Discussion

The results given for all the loops are self-explanatory. However, several qualitative observations can be made. First, all the loops are slightly less directive (broader pattern) in the horizontal plane than is the half-wave dipole, since their horizontal portions are shorter. This is, however, more than compensated for by the "arraying effect" of the two high-current segments (Fig. 2A) that give the vertical pattern directivity. The increased gain is a result of this. It is reflected in the relative vertical level values for each loop (Table 1).

In the case of the square and diamond (corner-fed square), the gain was found to be identical within the accuracy of the calculations. The slightly higher vertical directivity of the square is just compensated by a higher horizontal directivity of the

diamond, as a result of its greater horizontal dimensions. Although the gain and radiation resistances are identical for these two, the patterns are not exactly the same, nor do they differ simply as a result of a 45° rotation.

The data shown for the Delta loop applies if the feed point is at the corner or the center of the side. The characteristics are identical, since the current distribution is the same. The Delta loop has the smallest gain because the effective separation of the high-current points is the smallest, as evidenced by the vertical level indicated in Table 1. In contrast, the circular loop has more high-current portion at a greater separation than the others; hence the highest gain.

Additionally, the Delta loop vertical pattern is symmetrical about the horizontal plane, and the direction of maximum radiation is broadside and not offset above or below the horizontal. These two things are not obvious since the triangle shape lacks the vertical symmetry of the other three forms.

### Conclusion and Acknowledgment

Values of gain and radiation resistance have been presented for several shapes of 1-wavelength loop antennas. This, and the discussion of their pattern characteristics, gives a clear picture of the behavior. The results should be helpful in determining radiation characteristics of the loop antenna when ground effects must be accounted for, and may also shed some light on the performance of Yagi arrays that use loop elements.

My thanks to reviewer Walter Maxwell, W2DU, for enthusiastically tackling the technical details of the analysis to verify the results and for his interest and suggestions in presenting the material.

### Notes

- <sup>1</sup>J. E. Lindsay, Jr., "A Parasitic End-Fire Array of Circular Loop Elements," *IEEE Trans. Antennas and Propagation (Communications)*, Vol. AP-15, Sept. 1967, pp. 697-698.
- <sup>2</sup>D. K. Belcher and P. W. Casper, "Loops vs. Dipoles—Analysis and Discussion," *QST*, Aug. 1976, pp. 34-37.
- <sup>3</sup>J. L. Lawson and P. W. Casper, "Loops vs. Dipoles—Where Will It All End?" *QST*, April 1977, pp. 51-52.
- <sup>4</sup>J. L. Lawson, "Yagi Antenna Design: Quads and Quagis," *Ham Radio*, Sept. 1980, pp. 37-45.
- <sup>5</sup>E. J. Martin, Jr., "Radiation Fields of Circular Loop Antennas by a Direct Integration Process," *IRE Trans. Antennas and Propagation*, Vol. AP-8, Jan. 1960, pp. 105-107.
- <sup>6</sup>J. E. Lindsay, Jr., "A Circular Loop Antenna with Nonuniform Current Distribution," *IRE Trans. Antennas and Propagation*, Vol. AP-8, July 1960, pp. 439-441.
- <sup>7</sup>A. Richtscheid, "Calculation of the Radiation Resistance of Loop Antennas with Sinusoidal Current Distribution," *IEEE Trans. Antennas and Propagation (Communications)*, Vol. AP-24, Nov. 1976, pp. 889-891.
- <sup>8</sup>S. Ito, N. Inagaki and T. Sekiguchi, "An Investigation of the Array of Circular-Loop Antennas," *IEEE Trans. Antennas and Propagation*, Vol. AP-19, July 1971, pp. 469-476.
- <sup>9</sup>J. Appel-Hansen, "The Loop Antenna with Director Arrays of Loops and Rods," *IEEE Trans. Antennas and Propagation (Communications)*, Vol. AP-20, July 1972, pp. 516-517.

<sup>10</sup>P. A. Kennedy, "Loop Antenna Measurements," *IRE Trans. Antennas and Propagation*, Vol. AP-4, Oct. 1956, pp. 810-818.

<sup>11</sup>*The ARRL Antenna Book* (Newington: ARRL, 1984), pp. 2-14, 2-15.

<sup>12</sup>*The ARRL Antenna Book*, pp. 2-5, 2-6.

*Jim Dietrich was licensed as WA0RDX in 1967. He is a Life member of the ARRL and holds an Extra Class License. Three of his articles have been published in Ham Radio. He has also been granted a U.S. patent for a Sub-harmonic Pumped Mixer Circuit. Jim earned his MSEE at Kansas State University in 1974. He worked for the Boeing Company as part of the Microwave Staff and Electro-Optics Systems organizations until 1981. He has since worked in these areas as a private consultant, and is now program manager at Sigtek Corp., a supplier of commercial and military earth-station equipment.*

## Strays



I would like to get in touch with...

anyone involved in an IBM PC user's net. Austin, WB8SXM, and Martha Quinn, KA8LMF, 1806 Vinton, Royal Oak, MI 48067.

anyone who has used a Tano Corp. Dragon computer. M. McDaniel, W6FGE, 940 Temple St., San Diego, CA 92106.

anyone with alignment data for a BC-101 and a Sam SD-10 manual. Lisle T. Hines, K2QLA, 11 Meadow Dr., Homer, NY 13077.

anyone with service information or a circuit diagram for a Central Electronics Model MM-1 multiphase RF analyzer. Jack V. Washburn, W9IVB, 2 Weaver Pl., Urbana, IL 61801.

anyone with an RIT modification for the Heath HW-101 transceiver. Shawn Sabo, KB4KGB, 1555 Mill Run Ct., Lawrenceville, GA 30245.

## Next Month in QST

Next month, there are plenty of projects to keep your workbench hopping. The amateur looking to add a low-power 40-meter rig to the station will find an article on building a QRP VFO-controlled CW transceiver. Also, there's Part 2 of the principles and building of SSB gear. The beginner and the advanced AMTOR enthusiast will find plenty of helpful hints in "The User's Guide to AMTOR Operation." Or how about learning how to control a CAT with your computer? For the contesteer, there will be the November Sweepstakes rules and the results of the 1985 International DX Contest. Don't miss 'em!

Feedback: Last month in this space we said that a new column, Under Construction, would debut in the September issue. Because of a scheduling change, it's been delayed a couple of months.

# The Super Duper

## Part 1: Learn programming techniques while designing a contest duping and logging program.

By George Allison, K5IJ

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Few electronic developments have made such an impact on the art of Amateur Radio as the introduction of personal computers (PCs) to the world's ham shacks. Whether they're solving, in just a few minutes, antenna-radiation calculations that would have been impossible to solve just a few years ago or communicating with other computers over the air, PCs are becoming just as much a part of Amateur Radio as speed keys and microphones. The potential of the PC is limited only by the imaginations of the hams who use them.

To use a PC effectively, you don't need an in-depth knowledge of its central processor. It is basically an iterative machine—one that repeats simple operations, such as addition or subtraction, but at a rate of millions of calculations per second. An input/output (I/O) device then connects the processor to you. You type on the keyboard and something appears on the screen.

When you begin to use a computer, you will probably use a program purchased for it, such as a game or word processor. Eventually, though, you should try writing your own programs to customize the computer for your own needs. Programming is not difficult; any licensed amateur has more than enough intelligence to write and debug complex programs. Once you start, you'll be surprised at how quickly your programming ability improves. In fact, the only problem you will have is figuring out how to put all this capability to work in your shack.

One of the ham-related tasks at which the PC excels is logging and dupe-checking during contests. With absolute accuracy, it can rapidly check a file of hundreds or thousands of calls for a duplicate entry and, if no duplicate is found, the program can automatically add the call to the file, along with the date, time and whatever else you want. It was with this in mind that I wrote a "do it all" contest-logging program. It can do whatever you used to do by hand and then print it up neatly when the contest is over. You'll actually be able to read those 3 A.M. entries!

Since many of you may just be getting started in programming, the explanation of

how the program operates is more important than what it does. This article, then, will show how a program is developed and how each section works. I'll also explain some programming techniques you can adapt to your own programs. Once you understand how the program presented here works, you can have some fun by customizing it to meet your own needs.

### The Program Goals

Before starting to write the program, we must determine what we want the program to do. This appears to be a trivial step, but it is often overlooked by beginners. The result is usually an unnecessarily long program, with a hodgepodge of patches, caused by numerous changes of mind as the program is written. If you spend just a few minutes, prior to sitting at the keyboard, thinking about the problems to be solved, a much more coherent and integrated program can be written.

Any constraints caused by the programming language or the computer itself must be considered before writing a program, for these will definitely influence the programming style and the ability of the program to solve the given problem. Finding out after several days of head-scratching that your computer just doesn't have enough memory to accommodate your grand solution is a frustrating way to learn good programming practices.

The goals of this program are to:

- perform dupe checks of call signs. The dupe-checking system must be suitable for contests in which the stations can be worked only once on all bands and for those in which the stations can be worked once per band.

- log contacts. The computer is to add the date and time of the contact automatically, then accept operator inputs for RSTs and comments.

- count contacts. The program should be able to log at least 500 contacts.

- maintain a file of Sections for the ARRL Sweepstakes. The program should display the names of Sections that have not been worked.

- provide some means of removing entries from the log.

- save the log to a floppy disk at any time

and, if desired, save the log automatically after every 10 contacts.

- display lists of contacts according to operator desires. For example, the program should be able to display all contacts with WA9XYZ.

- sort contacts alphabetically within a band. The alphabetizing must conform to standard amateur usage, so that, for example, the W4s, WA4s and WB4s are together, and W4AA comes just before WA4AA.

- print the complete log or selected portions of it at any time.

- keep track of available memory and to notify the operator when memory runs out.

The computer and the programming language impose the following constraints:

- The program is to be written in BASIC, since it is widely available. BASIC limits the capability of the program, however, since most interpreters cannot access more than 64 kbytes of memory. This may, in turn, limit the features of the program and the amount of data that can be logged.

- The program should be written in "generic" BASIC. There are almost as many different versions of BASIC as there are computers, and each has its own idiosyncrasies. By using the generic version, the program can be adapted more easily to different computers. This program was written on an IBM® -PC-compatible computer with an 80-column screen. Most functions in the program are available on other PCs, and I have added suggestions about adapting it if the functions are not available on your computer.

### The Dupe Checker

Now that the goals and limitations are listed, we can begin to write the program. The program is most easily written in blocks, a step at a time, with each block tested and debugged before another is added. We'll start with the block that is the center of the program—the dupe checker.

Incoming calls are entered into the dupe checker. The dupe checker maintains a file of all the stations worked, and it compares the incoming call to those in the file to see if the new station has been worked before. If it has been worked before, the program

prints a message; if not, the new station is added to the list.

To understand how the dupe checker is programmed, we'll first make a model of what it does, then transform the model, step by step, into plain-language instructions. When the instructions are clear and complete, they can be translated into the BASIC commands necessary to implement the program. This set of instructions, or *algorithm*, is necessary when you write any program, and the success of the program depends entirely on the correctness of the algorithm.

A simple model for a dupe checker is a mail bin with slots for QSL cards. Let's build 100 slots into the bin and number them from one to 100. We'll put one QSL card into the first slot, to represent the first contact we have made.

When the next QSL card comes in, we go to the bin and compare it with the card already there. If it is the same, we throw it out; if it is different, we put it into slot number two. After four unique cards have been received, the bin looks like that in Table 1.

When the next QSL card arrives, we take it to each slot, starting with slot one, and compare it with the card in that slot. If the new card matches a card in one of the slots, it is a dupe and is thrown out. If it doesn't match, it is put into slot number five. So, if a card from KD5KO comes in, we would find no match in slot one, but a match in slot two; the card would be tossed. A card from K6LY, however, would not find a match in any of the occupied slots and would be deposited in slot five.

Putting this into step-by-step instructions, we

- 1) Build a bin with 100 slots.
- 2) Put the first QSL card into slot number one.
- 3) Take the next QSL card and compare it, slot by slot, with the cards in the bin.
  - 3A) If it matches, throw it out.
  - 3B) If there is no match, put it into the next empty slot.
- 4) Repeat step 3.

Now we'll use this model to write the program. The card bin is represented in the computer by a matrix with 101 elements, numbered from 0 to 100. The program needs a counter to keep track of how many matrix elements are filled, and some input and output statements to tell us when to type in the next call sign and whether it is a dupe. The BASIC program is shown in Fig. 1.

This program takes the first call sign typed at the keyboard and puts it into the first matrix element. The next call sign is placed into the first empty element, which is pointed to by the counter number (CT). The program then starts at the beginning of the matrix, checking for duplication. If none is found, it goes to the next element, and so on, until it stops at the element just before the one with the new call sign. If no dupe has been found by then, the counter

**Table 1**  
**Model of Dupe-Search Program**

WA6PDN	KD5KO	WB1NHP	WB4YZC		
1	2	3	4	5	...

```

10 REM **** DUPE CHECKER ****
20 DIM QS(100) 'CREATE 101-ELEMENT MATRIX
30 INPUT "ENTER FIRST CALL: ";QS(0) 'GET THE FIRST ELEMENT
40 CT = 1 'START THE COUNTER
50 INPUT "ENTER NEXT CALL: ";QS(CT) 'NEXT CALL INTO MATRIX
60 FOR I = 0 TO CT-1 'CHECK FOR DUPES
70 IF QS(CT) <> QS(I) THEN GOTO 100 'NO DUPE-SKIP TO NEXT
80 PRINT "DUPE" 'IT IS A DUPE - TELL US
90 GOTO 50 'DON'T ADVANCE COUNTER - GET NEXT CALL
100 NEXT I
110 CT = CT + 1 'NO DUPE IN MATRIX-ADVANCE COUNTER
120 GOTO 50 'GET THE NEXT CALL
130 END
  
```

Fig. 1—BASIC program for a simple dupe checker.

(CT) advances by one. If a dupe is found, the program jumps back to line 50, without advancing the counter, and the next call sign is written over the duplicate.

Some changes should be made to this program to make it easier to use. You may have noticed that there is no way to stop the program; it just keeps on running, until the counter exceeds 100, which will cause an out-of-memory error, or the computer is turned off. Either method is unacceptable.

By adding the line  
55 IF QS(CT) = "QUIT" THEN GOTO 130

the program will stop when the word QUIT is entered instead of a call sign. Similarly, the line,

115 IF CT = 100 THEN PRINT  
"MATRIX FILLED": GOTO 130

will tell us that the matrix cannot accept any more inputs, then will automatically stop the program.

To see what call signs are stored, delete line 130 and add

```

130 FOR I = 0 TO CT-1
140 PRINT QS(I)
150 NEXT I
160 END
  
```

Now, when you type QUIT, the program will display all the calls on file and then stop.

If 100 call signs are not enough, the DIM statement can be changed to construct a matrix up to the limits of the computer memory. Memory should not be a problem for this simple program; if the average call sign needs 12 bytes of storage, 1000 call signs would require only 12 kbytes of memory.

### The Logger

Now that the dupe checker has been

tested and works as we want, let's add an automatic logger to the program. Again, we'll start by describing what we want the logger to do, then write an algorithm and a program.

The function of the logger will be to:

- append the call to a log file along with the date, time, band, the other station's RST, my RST and any comments.

To conserve memory, emission type and power output will not be stored. These parameters probably would not change during a contest, and could be handwritten on the log sheets when the contest is over.

To make the logger work, we'll need to construct a two-dimensional matrix to hold all the information. The matrix is shown in Table 2. Each matrix element can be uniquely identified by a grid reference. For example, the time of the contact with WB1NHP is at element (3, 4). The call signs the dupe checker looks at are in elements (1, 1), (2, 1), (3, 1) and (4, 1).

The algorithm for the logger is

- 1) Enter the band.
- 2) Enter the first call, his RST, my RST and any comment. The computer will add the band, date and time, then put this data into column one.
- 3) Enter the next call.
- 4) Run the dupe checker as before, checking the calls in row one.
  - 4A) If there is a dupe, throw the new call out.
  - 4B) If there is not a dupe, add the call to the list, along with relevant information.
- 5) Go to step 3.

You can see that this algorithm merely builds a little more complexity onto the dupe checker. This is the essence of the "building block" approach to programming: Rather than writing a lengthy

**Table 2**  
Call Sign and Data Array

	1	2	3	4	5
1. CALL	WA6PDN	KD5KO	WB1NHP	WB4YZC	
2. BAND	40	40	40	40	
3. DATE	11-7	11-7	11-7	11-7	
4. TIME	1031	1040	1052	1106	
5. HIS RST	589	579	579	599	
6. MY RST	579	589	579	589	
7. COMMENT	JOHN	HERB	BUZZ	ANDY	

```

10 REM *** Logger ****
20 DIM Q$(100,7) 'CREATE A TWO-DIMENSIONAL MATRIX
30 INPUT "ENTER BAND ";BA$ 'ENTER THE BAND
40 INPUT "ENTER FIRST CALL ",Q$(0,1) 'GET FIRST CALL
50 Q$(0,2) = BA$ 'ADD BAND
60 Q$(0,3) = DATE$ 'ADD DATE
70 Q$(0,4) = TIME$ 'ADD TIME
80 INPUT "ENTER HIS RST ",Q$(0,5) 'GET RST
90 INPUT "ENTER MY RST ",Q$(0,6) 'GET RST
100 INPUT "ENTER COMMENT ",Q$(0,7) 'GET COMMENT
110 CT = 1 'SET COUNTER
120 INPUT "ENTER NEXT CALL ",Q$(CT,1) 'GET NEXT CALL
130 FOR I = 0 TO CT-1 '
140 IF Q$(I,1) <> Q$(CT,1) THEN GOTO 170 '
150 PRINT "DUPE" ' DUPE CHECKER
160 GOTO 120 '
170 NEXT I '
180 Q$(CT,2) = BA$ '
190 Q$(CT,3) = DATE$ '
200 Q$(CT,4) = TIME$ ' GET DATA
210 INPUT "ENTER HIS RST ",Q$(CT,5) '
220 INPUT "ENTER MY RST ",Q$(CT,6) '
230 INPUT "ENTER COMMENT ",Q$(CT,7) '
240 CT = CT + 1 'ADVANCE COUNTER
250 GOTO 120 'GET NEXT CALL
260 END

```

Fig. 2—BASIC program for a dupe checker and logger.

```

260 REM **** SORTING ROUTINE ****
270 SF = 0 'SORTING FLAG = 0
280 FOR I = 0 TO CT-2 'START SORTING
290 IF Q$(I,1) < Q$(I+1,1) THEN GOTO 340 'ORDER CORRECT
300 FOR J = 1 TO 7 'ORDER NOT CORRECT
310 SWAP Q$(I,J) ,Q$(I+1,J) 'SWAP ELEMENTS
320 SF = 1 'THERE WAS CHANGE - SORTING FLAG = 1
330 NEXT J
340 NEXT I
350 IF SF = 1 THEN GOTO 270 'IF THERE IS CHANGE, JUMP TO TOP
360 CLS 'CLEAR THE SCREEN FOR PRINTING
370 FOR I = 0 TO CT-1 '
380 FOR J = 1 TO 7 '
390 PRINT Q$(I,J); " "; ' PRINTING ROUTINE
400 NEXT J '
410 PRINT '
420 NEXT I '
430 END

```

Fig. 3—Lines to add to the program in Fig. 2 to implement a bubble sort and screen printer.

program from scratch, we'll start with a simple base program, make that work, then gradually add more parts to it. If bugs do develop, they can most likely be found in the last part added, and correcting the program is much easier. The BASIC program for the logging and duping algorithm is shown in Fig. 2.

As before, you can add lines to quit the program to check on the matrix size and to display the calls. If your version of BASIC does not have the DATE\$ and TIME\$ functions, add the following lines:

```

35 INPUT "ENTER DATE",DATE$
65 INPUT "ENTER TIME",TIME$
195 INPUT "ENTER TIME",TIME$

```

### The Sorter

After a contest, have you ever wished that you had a list of all the contacts you made, sorted alphabetically, just like in a call directory? To do this by hand, with several hundred calls, is more trouble than it's worth, but your PC can do it in just a few minutes. To see how to do it, we'll look at a programming technique called the *bubble sort*.

Imagine you have a list of six names in random order that you want to arrange alphabetically. It is easy to do this in your head—just look for the As, then the Bs, and so on, juggling groups like Brenda and Bob, until the list is correct; then, write down the sorted list. Your PC, however, iterative brute that it is, can't think like this. It needs a step-by-step algorithm to accomplish the alphabetizing.

The simplest method is to look at the names in groups of two, starting at the top. If the group of two is in alphabetical order, leave it alone. If not, swap the names. When this step is finished, the group will be in the correct order, and we move on to the next group. After the last group is finished, we jump back to the top of the list and start over. If we make it through the list without having to make any changes, the list is in alphabetical order and we can stop.

Let's look at a list of names and apply this technique to see how it works. The list is

Mike  
Vickie  
Carlos  
Tim  
Charlene

The first two names, Mike and Vickie, are in the correct order, so we'll leave them alone. The next two, however, Vickie and Carlos, are incorrect, so they are swapped. Vickie is now in position three and is compared to Tim. Their order is not correct, so Vickie moves to position five, where she is compared to Charlene and swapped. We then jump back up to Mike and go through the list again.

Each pass through the list improves the alphabetical order. The results of the first

three passes are

	First	Second	Third
Start	Pass	Pass	Pass
Mike	Mike	Carlos	Carlos
Vickie	Carlos	Mike	Charlene
Carlos	Tim	Charlene	Mike
Tim	Charlene	Tim	Tim
Charlene	Vickie	Vickie	Vickie

On the fourth pass you will find there are no changes to make, and the sorting will be finished. The names slowly migrate to the correct positions, much like bubbles rising in a tank of water; hence the name bubble sort.

A step-by-step algorithm for the bubble sort is:

- 1) Set the sorting flag equal to zero.
- 2) Compare the first two elements for correct order.

2A) If the order is correct, leave them alone.

2B) If the order is incorrect, swap them and set the sorting flag equal to one.

3) Perform step 2 for each pair of elements on the list.

4) When the end of the list has been reached, look at the sorting flag.

4A) If it equals one, the list was changed so jump back to step 1.

4B) If it equals zero, no change was made and the sort is complete. End the program.

We can add the bubble sort to the logging routine by inserting a new line, 125, and adding the lines shown in Fig. 3.

```
125 IF Q$(CT,1) = "SORT" THEN
    GOTO 260
```

If your computer doesn't have the SWAP function, delete line 310 and substitute

```
310 TP$ = Q$(I,J)      'TEMPORARY
                        STORAGE FOR
                        (I,J)
311 Q$(I,J) = Q$(I+1,J) '(I+1,J) GOES
                        TO (I,J)
312 Q$(I+1,J) = TP$    'TEMPORARY
                        STORAGE TO
                        (I+1,J)
```

And if you don't have the CLS function, replace line 360 with

```
360 PRINT CHR$(XX)
```

where XX is a number that, when printed, causes your computer screen to go blank. This number can be found in your computer manual.

The sorting flag, found in lines 270, 320 and 350, tells the program that a correction was or was not made during a pass through the list. Initially, the sorting flag is set to zero. If two elements are found to be out of order, they are rearranged and the sorting flag is set to one. At the end of the pass, the program checks the flag; if it equals one, a swap was made somewhere in the list and the program jumps back to the start, where the flag is reset. If the flag equals zero, then no change was made and


the sort is complete.

While bubble sorts are easy to explain and to program, they are extremely S-L-O-W. If you're sorting 500 calls, there will be enough time to have dinner while your PC is grinding away. This is a task you will want to save for after the contest!

Although this routine does arrange calls alphabetically, it is not quite correct for amateur call signs. We want the call areas to be grouped so the W1s, WA1s and WB1s are together when the sort is done. In a strictly alphabetical sort, the W1s will be followed by the W2s, then the W3s, and so on. We can correct this by rearranging the call sign prior to sorting.

To rearrange the call, first determine what the most important element of the call is, then the next and the next. The determination I made is that the calls should be sorted by (1) the first letter of the call, (2) the number of the call area, (3) the call-sign suffix and, finally, (4) the second letter of the prefix, if there is one. The call sign WB2CEF, for example, would be rearranged to W-2-CEF-B prior to sorting.

#### Next Time

We have taken a look at some good programming practices and at a couple of the algorithms that make up a logging-and-duping program. Take some time to enter the listings and get familiar with them. Change them to meet your requirements. Next month, we will look at the whole Sup'r Dup'r program—how it works and how to use it. 

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## Strays



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### QEX: THE ARRL EXPERIMENTERS' EXCHANGE

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- Converting British screws to American sizes, by Ladimer Nagurney, WA3EEC.

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I would like to get in touch with...

anyone with a manual or schematic diagram for a Midland International Corp.

hand-held CB radio, Model 13-124 C. Joseph Karr, 3800 Cheyenne Ct., Unit C, Racine, WI 53404.

anyone with a schematic diagram or manual for an RCA oscilloscope, Model W0-56-A. Harry H. Heinrich, W9KPG, 2961 Emmalane Dr., Green Bay, WI 54301.

anyone with a circuit diagram or service manual for a Pace Communicator MX with a Hi-Lo power switch on the front panel. Sam Beverage, W1MGP, Box 858, North Haven, ME 04853.

anyone with a manual or schematic diagrams for a Delco Electronics CVT-21 Radio-Phone. Jim Folk, N8GDD, 210 E. Vine St., Kalamazoo, MI 49001.

anyone with information on interfacing a Macrotronics M80 with a TRS-80 Model III computer. Russell B. Smith, W6ONK, P.O. Box 141, Brownsville, OR 97327.



# A Close Look at Frequency Modulation

Many who use FM have a general idea of what it's all about, but if you'd like to delve a bit deeper into its mysteries, try this article on for size.

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Frequency modulation (FM) has been around since at least 1930. It is a useful and popular method of modulating radio frequency carriers. FM is popular on the 144, 220 and 420-MHz amateur bands, and is used also on 29 and 50 MHz. Despite the widespread use of FM, some of its characteristics (such as the definition of narrowband FM) are not universally known.

## Modulation Techniques

A review of the common analog-modulation techniques will help put FM into perspective. Fig. 1 shows a comparison of an unmodulated carrier (CW or continuous wave), an amplitude-modulated (AM) carrier and an FM carrier. Note that phase modulation (PM) is closely related to FM and is, in fact, the industry standard.<sup>1</sup> However, since either one can be derived from the other by filtering the modulating signal (see note 1), and since the terminology associated with FM (e.g., frequency deviation) is more common, FM will be discussed here. The mathematical expression for each of the signals is given in Fig. 1.

A is the peak amplitude of the signal  
 $\theta$  is the relative phase of the signal  
 $m(t)$  is the modulating signal  
 $f$  is the carrier frequency  
 $k$  is the deviation constant  
 $t$  is time

The time-domain waveform for each of the signals is also shown. In addition, a vector diagram is shown for each of the cases. This representation will prove useful in explaining some of the unique characteristics of FM.

First, look at the vector diagram for the CW signal. The vector length represents the signal amplitude relative to some arbitrary reference. Next, visualize the vector rotation around the intersection of the axes at

a rate equal to the carrier frequency ( $f$ ). At the end of every cycle, the vector has rotated 360 degrees and ends up back where it started,  $\theta$  degrees away from the reference. This vector representation, therefore, contains the same amplitude, phase and frequency information that the time-domain waveform had. Note that the vertical component of the rotating vector will trace out the corresponding time waveform.

The AM vector is the same as the CW vector except that as the vector rotates, the amplitude is changing. It still rotates at the carrier frequency and ends up at  $\theta$  degrees at the end of each cycle, but the amplitude

changes depend on the modulation that is applied. The situation is more difficult to visualize with the FM case. The vector is still rotating at approximately the carrier frequency, and the vector amplitude is constant. Since the frequency is being modulated, however, the vector does not always end up at the same phase angle at the end of each cycle. The "end of each cycle" refers here to the end of each cycle of an unmodulated carrier. So the vector can be visualized as rotating at a rate that varies with the instantaneous voltage of the modulating signal. Sometimes the vector rotates a little faster (increased frequency), and sometimes it rotates a little slower

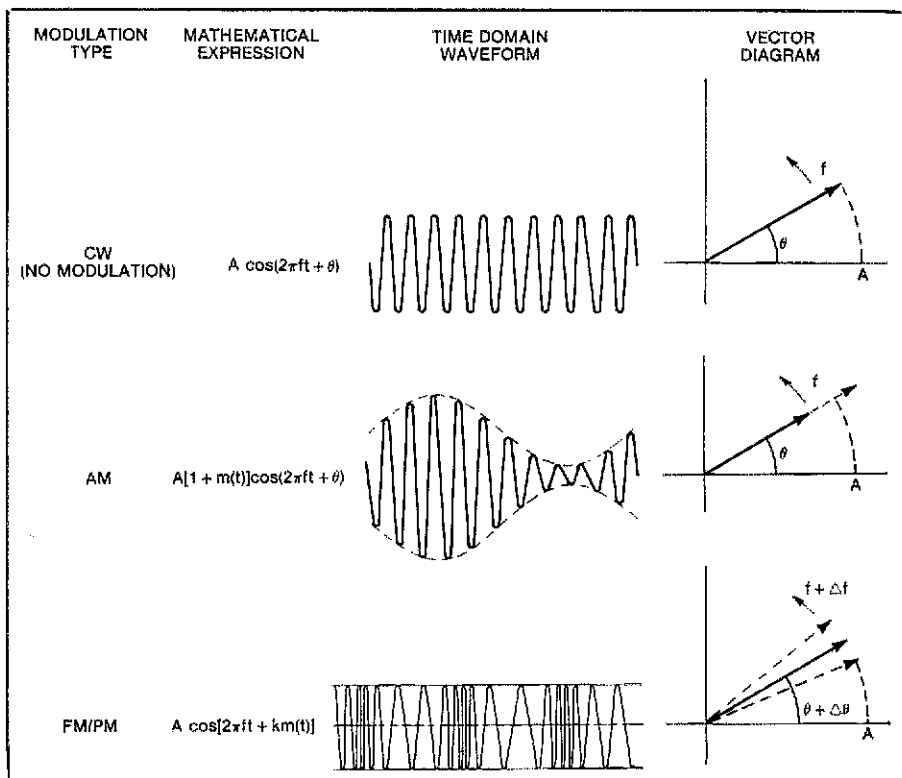


Fig. 1—Comparison of modulation techniques.

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

(decreased frequency). This effect can be thought of as a change in frequency or a change in phase; hence there exists a relationship between FM and PM. Both FM and PM are types of *angle modulation*, since they both affect the phase angle of the carrier.

### Single-Sideband Modulation

Single-sideband modulation is the most common form used on the HF bands. It is a version of AM that increases the efficiency of the system by eliminating the power in the carrier and one of the sidebands.<sup>2,3</sup> Since the RF spectrum of an SSB signal is just a frequency-shifted version of the modulating signal, the bandwidths of the two signals are the same. Fig. 2 shows the spectrum of the modulating signal and that of the resulting SSB signal (in this case, upper sideband).

### Frequency Modulation

An FM signal is described by its *frequency deviation*, which is the maximum instantaneous change away from the carrier frequency, and by the modulation index, which is defined as

$$\text{Modulation index } (\beta) = \frac{\text{frequency deviation}}{\text{modulation frequency}} \quad (\text{Eq. 1})$$

Analysis of FM signals is difficult in the general case, but is manageable for sinusoidal modulation. Unlike AM/SSB signals, FM signals theoretically have an unlimited number of sidebands. For sinusoidal modulation these sidebands behave according to a class of mathematical functions called "Bessel functions." Table 1 lists the relative amplitude of values associated with each sideband, depending on the modulation index. For sinusoidal modulation, sidebands are spaced at integral multiples of the modulating frequency away from the carrier. FM has upper and lower sidebands that are equal in amplitude but may be 180 degrees out of phase (see Table 1). Note that the amplitude of the carrier changes with the modulation index (and, in fact, the carrier disappears for a modulation index of about 2.4!). Sideband values less than 0.01 are not shown. Fig. 3A shows the spectrum of a typical FM signal with a modulation index of 1.0.

### FM Bandwidth

FM is generally divided into two categories: narrowband and wideband. Narrowband FM is defined as an FM signal that occupies the same bandwidth as an AM signal with the same modulation applied (note 3). Recall that the bandwidth of an AM signal is twice the modulating signal bandwidth. Since the signal shown in Fig. 3A has several significant sidebands, it is clearly not a narrowband type. The

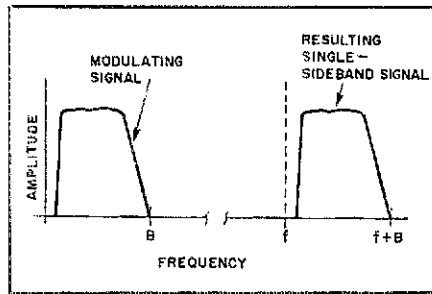


Fig. 2—The bandwidth of the modulating signal and the resulting RF signal are the same for SSB modulation.

dividing line between wideband and narrowband is somewhat arbitrary. It depends on what level of sidebands is ignored. But narrowband is usually taken as  $\beta$  less than 0.2 to 0.5 (note 3). The spectrum and performance of narrowband FM is identical to AM except that the lower sideband of narrowband FM is 180 degrees out of phase with respect to its AM counterpart, as shown in Fig. 3B (see note 3).

The terms wideband and narrowband are also used in the amateur world to indicate 15-kHz deviation or 5-kHz deviation, respectively. There was a time when both

Table 1  
FM Sidebands with Sinusoidal Modulation

Modulation Index $\beta$	Carrier	1st SB	2nd SB	3rd SB	4th SB	5th SB	6th SB	7th SB	8th SB
0.1	0.997	0.050							
0.2	0.990	0.100							
0.5	0.938	0.242	0.031						
1.0	0.765	0.440	0.115	0.020					
2.0	0.224	0.577	0.353	0.129	0.034				
5.0	-0.178	-0.328	0.047	0.365	0.391	0.261	0.131	0.053	0.018

Values are the amplitude relative to an unmodulated carrier, and are for both upper and lower sidebands. Odd-numbered lower sidebands are 180 degrees out of phase with the upper sideband. Negative values indicate 180-degree phase shift.

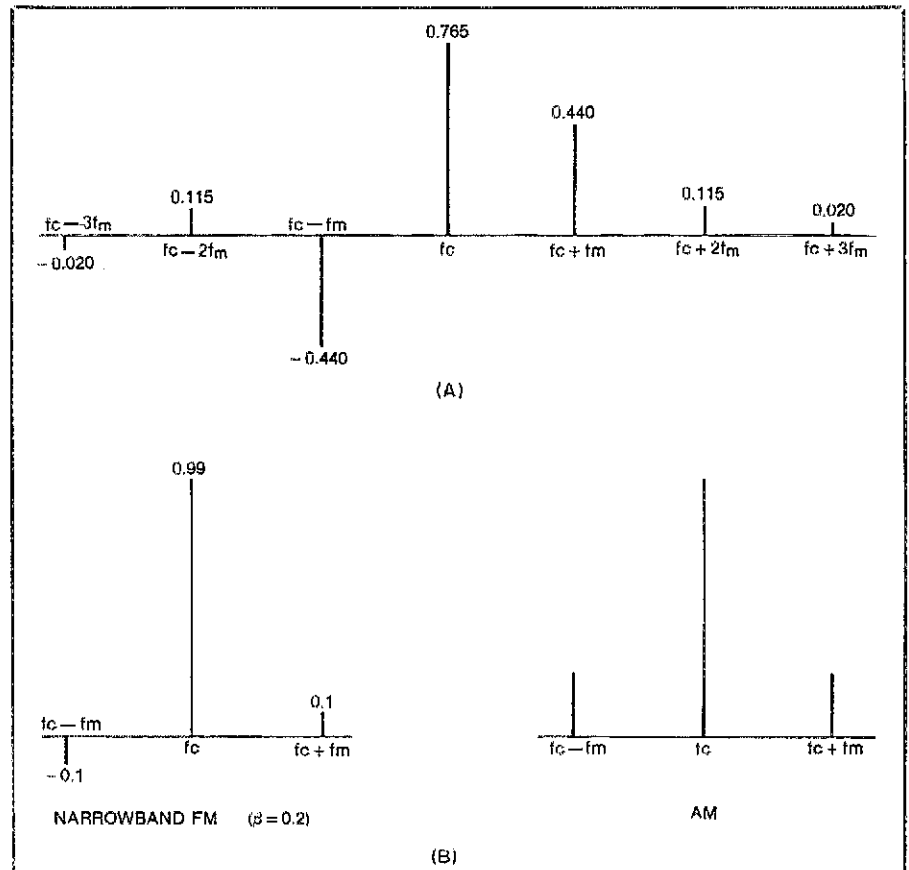


Fig. 3—Illustration A shows a wideband FM signal with sinusoidal modulation of frequency (FM) and a modulation index of 1.0; carrier frequency ( $f_c$ ) is included. Amplitude values are relative to an unmodulated-carrier amplitude. The data at B show that narrowband FM and AM spectrums are alike, but the lower sideband of FM is 180 degrees out of phase (indicated by the minus sign).

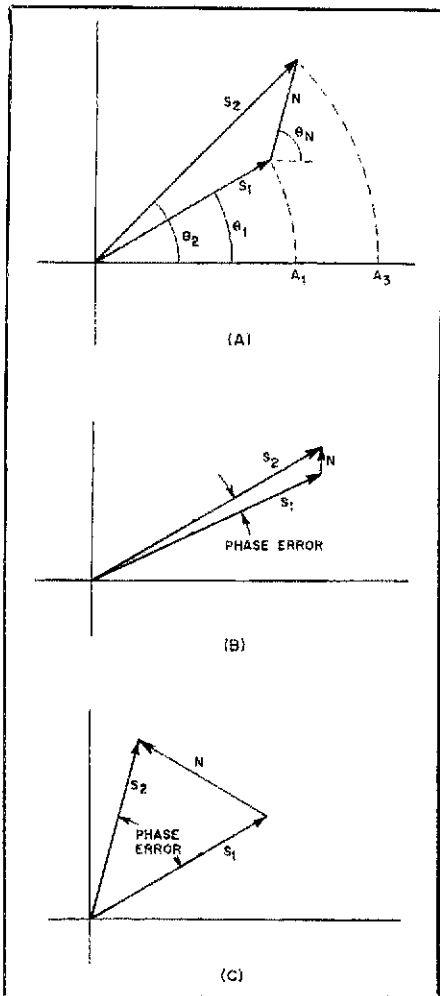


Fig. 4—Drawing A is a vector diagram that shows signal S1 added to the noise (N) to produce a new signal, S2. At B, we have a vector diagram for the larger SNR case. It shows a small phase error. Illustration C is a vector diagram for a small SNR case. It shows large phase error.

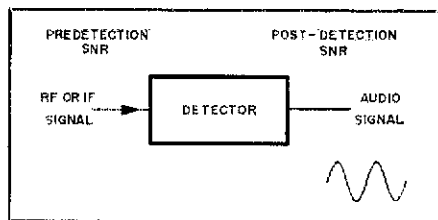


Fig. 5—The SNR into the detector determines the SNR out of the detector. It may or may not be the same, depending on the type of detector used.

types of commercial equipment (wide- and narrow-band FM) were used on the ham bands, but now FM calls for 5 kHz of deviation. For the maximum modulation frequency of 3 kHz,  $\beta = 5 \text{ kHz}/3 \text{ kHz} = 1.67$ , clearly *not* narrowband. If a lower modulation frequency is assumed,  $\beta$  is proportionally larger (e.g. for a modulation frequency of 1 kHz,  $\beta = 5 \text{ kHz}/1 \text{ kHz} = 5$ ). This is important because

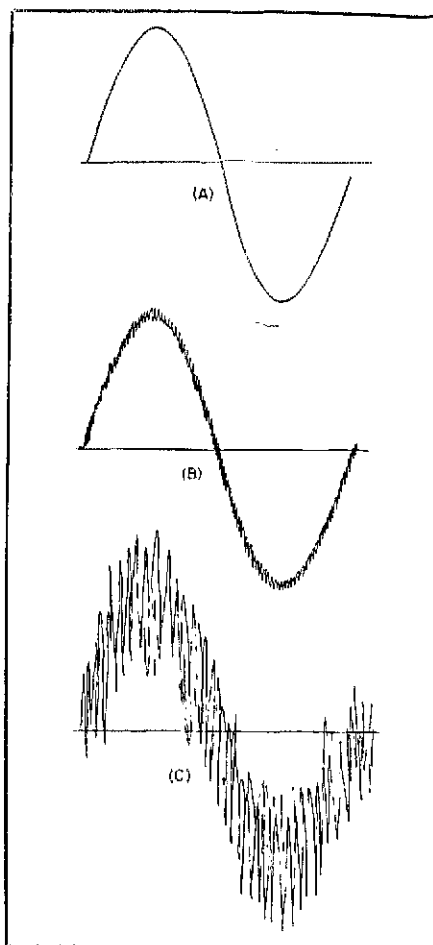


Fig. 6—A sine wave is shown at A. Example B is a sine wave with noise. Zero crossings are easy to determine. At C is a sine wave with a large noise level. Zero crossings are no longer easy to observe.

there are certain types of performance associated with wideband or narrowband FM, and improper use of the terms confuses the situation. FCC regulations allow only narrowband FM below 29 MHz. Since narrowband FM has no advantage over conventional AM, it is seldom, if ever, used.

A common way of estimating FM bandwidth is Carson's rule:<sup>2</sup>

$$\text{FM bandwidth} = 2 (\text{deviation} + \text{modulating-signal bandwidth}) \quad (\text{Eq. 2})$$

Note that for very large deviations, the FM bandwidth is approximately twice the deviation; for small deviations, the FM bandwidth is approximately twice the modulating signal bandwidth.

#### Performance with Noise

In a real communications system, noise is present and must be taken into account to determine system performance. The effect of noise can be shown graphically by using the vector representation of a modulated signal, then adding in the vector

representation of noise. Fig. 4 shows a signal vector (S1) combined with a noise vector (N). To combine two vectors, the tail of one vector is placed graphically on the head of the other vector. Usually, the noise vector is placed on the signal vector, since the noise is thought of as riding on top of the signal. The resultant vector is the new signal vector, S2 (which is really the signal plus the noise). Note that S1 (the original signal) and S2 (the new signal including noise) have different magnitudes (A1 and A2) and phases ( $\theta_1$  and  $\theta_2$ ). It may seem odd to think of noise as having a magnitude and phase. It may help to understand that the magnitude and phase of noise vary in a random but statistical manner. So while the signal vectors that have been described earlier rotate around at some frequency, the noise vector flops around in a haphazard manner.

An important figure of merit for a modulation technique is a comparison of the signal-to-noise ratio (SNR) into the detector (predetection SNR), and the signal-to-noise ratio out of the detector (post-detection SNR) (see Fig. 5). Because of the frequency-translation nature of SSB, the predetection SNR is equal to the post-detection SNR.

In a wideband FM system, the relationship is not so simple. For a high-predetection SNR, an FM detector produces an even higher post-detection SNR. But for a low-predetection SNR, the FM detector performs poorly and produces an even lower post-detection SNR. As the predetection SNR is varied from a high value to a low value, at some point the post-detection SNR rapidly decreases. This point is commonly known as the *noise threshold*, and this effect is called the *threshold effect*.

This effect is shown graphically using a vector diagram in Fig. 4B and 4C. Fig. 4B shows the large predetection SNR case. As in Fig. 4A, the noise causes a change in the signal amplitude and phase. The ideal FM detector will "ignore" changes in amplitude: Only phase changes are of interest, and in the case of wideband FM, this phase error is small compared to the phase deviation caused by the desired signal. For a given predetection SNR, the larger the deviation, the larger the post-detection SNR. The small-predetection SNR case is shown in Fig. 4C. Here, the noise vector is large enough to instantaneously shift the phase of the carrier by a large amount, causing a large error in the detected audio signal. As the noise vector flops around randomly, it will produce a high level of noise in the detected audio. Thus, the post-detection SNR is very low.

FM noise performance and threshold effect can also be examined in the time domain. The frequency of a sine-wave carrier (Fig. 6A) is determined by the number of zero crossings per second. With a noise-free signal, this is easy to do, both visually by the reader as well as electronically by an

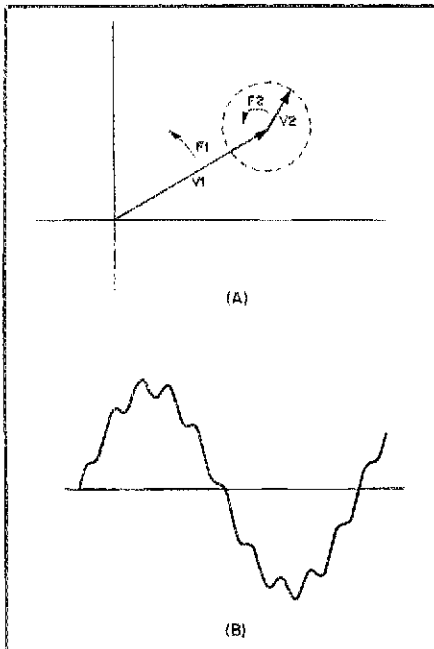


Fig. 7—At A, we can note that the larger FM signal (V1) will dominate the smaller signal (V2) as they both rotate. V1 will determine the composite rate of rotation, which is the frequency. Example B shows that the larger of these two superimposed sine waves will determine the zero crossings, and hence the frequency.

FM detector. Usually, the signal is passed through a limiter that removes any amplitude information, and then into a circuit that converts the frequency into a voltage. Fig. 6B shows a sine wave plus noise, but with a relatively high SNR. The zero crossings of this signal are still easy to determine because the signal dominates the noise. A signal with a low SNR (Fig. 6C), however, has zero crossings that are less obvious for the reader, and are harder for an FM receiver to detect. So with a high SNR, the frequency of a signal is easily determined, and any FM can be detected. But with a low SNR, the frequency is difficult to determine and attempts to extract any FM from it will result in a noisy signal.

Like many wideband-modulation techniques, FM offers the potential of trading increased signal bandwidth for increased post-detection SNR, as long as the detector is operating above the noise threshold. As the FM deviation is increased, the SNR increases. FM broadcast stations use wideband FM to transmit high-quality audio signals (audio bandwidth = 15 kHz; frequency deviation = 75 kHz,  $\beta = 5.0$ ). The deviation cannot be made arbitrarily high because the increased bandwidth in the receiver lets in increased noise, which eventually causes the detector to operate below the noise threshold. Also, the higher the deviation, the more pronounced the threshold effect.

#### Capture Effect

In SSB modulation, two interfering

## Frequency Modulation on 10 Meters

To most Amateur Radio operators, FM is associated with the VHF bands (primarily 2 meters). The FCC allows FM above 29.0 MHz (bandwidth greater than an equivalent AM signal). FM on 10 meters extends from 29.5 to 29.7 MHz. The simplex calling frequency is 29.6 MHz. Note that use of 29.5 MHz as a simplex calling frequency has the potential of satellite communications interference. Repeater offset is 100 kHz, with 29.52, 29.54, 29.56 and 29.58 MHz as repeater inputs, and 29.62, 29.64, 29.66 and 29.68 MHz as repeater outputs. Most repeaters have tone access to minimize interference when the band opens.

FM is inferior to SSB in the low signal-to-noise ratio case, and HF propagation can introduce phase-related distortion on an FM signal. Also, many transceivers used on 10-meter FM provide about 10 W of power, and few have more than 50 W of output power without an amplifier. Many stations have omnidirectional vertical antennas.

What accounts for the popularity of FM on this HF band? Ten-meter FM is similar to 2-meter FM, but permits DX contacts around the country and around the world. FM remote base stations are essentially repeaters linked into a 10-meter FM transceiver. They allow this type of operation to be done with a hand-held transceiver. Surplus CB transceiver boards have encouraged experimenters to fire them up on 10 meters. This source of low-cost radios can be adapted to the already established world of 10-meter FM. HF transceiver manufacturers have introduced multimode HF rigs, such as the Kenwood TS-430S, the Yaesu FT-980 and the ICOM IC-751. The Azden PCS-4800 is a 10-meter mobile transceiver.

An advantage that FM has over SSB is that squelch circuits are easily designed into FM transceivers, whereas attempts to squelch SSB have been complicated and results somewhat marginal. Another advantage is that FM does not require the precise control over the carrier frequency that SSB does. These two things combine for convenient monitoring of the 10-meter FM calling frequency.

A final reason that FM is being used on the HF bands is that with a signal above the threshold level, it should be good! It is not obvious how many additional S units, or decibels, of signal, high-quality audio is worth, but it is certainly pleasant to listen to. FM will probably never replace SSB for weak-signal or DX operation, but it is an interesting and enjoyable mode to operate.

Table 2  
Comparison of Amateur FM  
and SSB Parameters

	SSB	FM
Bandwidth	3 kHz	16 kHz
Transceiver complexity	More complex	Less complex
Weak-signal performance	Good	Poor
Threshold effect	No	Yes
Capture effect	No	Yes
Audio quality	Fair	Good

signals tend to add linearly, according to their relative amplitudes. Thus, two stations transmitting at the same time may both be heard. This is usually not the case for wideband FM. The stronger of the two signals will be heard clearly, but the weaker of the two will be overridden and not heard. This is known as the *capture effect*, as the larger signal is said to "capture" the receiver. The vector diagram for two interfering signals (Fig. 7A) has one vector rotating at a frequency of F1. The other vector is added on top of the first, and rotates at a frequency, f2. The second vector center of rotation is the head of the first vector, so the head of the second vector traces out a circle that is at the same time rotating around the intersection of the two axes. As long as V1 is significantly

larger than V2, V1 will dominate and determine the instantaneous frequency of the composite signal. This is similar to the *threshold effect*: A large signal has the ability to overcome smaller perturbations, such as other signals or noise.

The capture effect can also be examined in the time domain (Fig. 7B). For clarity, the smaller waveform is shown as being a much larger frequency than the larger waveform. Note that when the two waveforms are added, the larger will dominate the smaller with respect to the zero crossings of the composite waveform. So a detector that responds to the zero crossings (frequency) of a waveform will detect only the larger of the two signals.

#### FM Versus SSB

It is interesting to compare the characteristics of FM and SSB, since SSB is the standard mode on the HF bands. This has been done in a variety of papers and textbooks for the general case,<sup>24</sup> but here we will compare Amateur Radio FM and SSB signals. Amateur FM is assumed to have a 5-kHz deviation and be modulated with audio that is band-limited to 3 kHz. SSB has no equivalent modulation parameter, but again the audio signal is assumed to be band-limited to 3 kHz.

Since an SSB signal has the same bandwidth as the modulating signal, the SSB bandwidth is 3 kHz. Again, since an FM signal has infinite bandwidth, the practical bandwidth depends on how small the sidebands have to be before they can be ig-

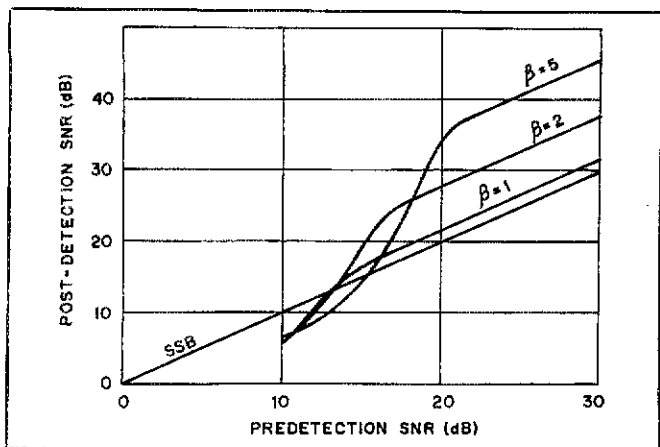


Fig. 8—SNR curves for FM with several deviation ratios based on theoretical analysis (note 2). The straight-line SSB curve is shown for comparison.

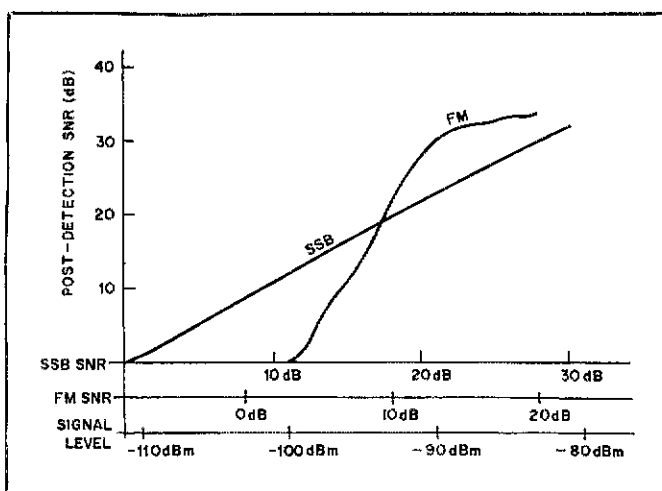


Fig. 10—Measured data for the Kenwood TS-430S transceiver.

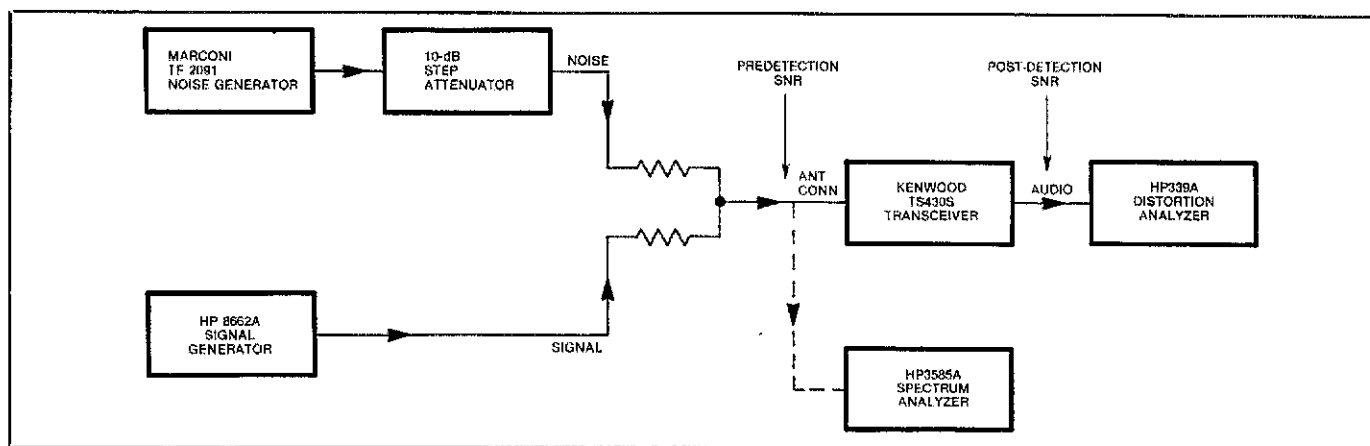


Fig. 9—Test setup for measuring post-detection SNR versus predetection SNR for the TS-430S HF transceiver.

nored. One source gives the bandwidth of an amateur FM signal with a 5-kHz deviation as 22 kHz (ignoring sidebands that are less than 1 percent of the original carrier).<sup>5</sup> Carson's Rule gives the bandwidth to be  $2(5 \text{ kHz} + 3 \text{ kHz}) = 16 \text{ kHz}$ . Both of these estimates show why the 15-kHz channel spacing used in many parts of the U.S. on 2 meters may be a little too tight unless geographic separation is used between stations on adjacent channels. This also explains why FM is used only on the wider amateur bands, as it uses more of the spectrum than SSB does.

The differences between FM and SSB are summarized in Table 2. The complexity of the transmitting and receiving equipment is generally greater with SSB. The weak-signal performance is better with SSB, which exhibits no threshold or capture effect.

These qualitative discussions describe basically the performance of the two modulation systems, but fail to give quantitative comparisons. Of particular interest is the post-detection SNR versus predetection

SNR characteristics of the two types of modulation. These have been derived using a variety of mathematical approaches, with each approach giving a slightly different answer. Fig. 8 shows one such theoretical result.

One might ask, "What performance difference would be noticed if the modulation was changed from SSB to FM on a state-of-the-art transceiver?" The performance of a new Kenwood TS-430S multimode HF transceiver was measured using the test setup of Fig. 9. The signal generator output and the noise generator output mix to produce a known SNR at the input of the transceiver. All measurements were made at 29 MHz. The noise level at the input of the transceiver was set to

$$16 \text{ nV}/\sqrt{\text{Hz}}$$

which is on the order of typical atmospheric noise. The level of the signal generated was varied to produce different SNRs at the input of the transceiver. For SSB testing, a pure sine wave was used. It produced a

1-kHz audio tone in the transceiver. For FM, the carrier was frequency-modulated with a 1-kHz signal at a deviation of 5 kHz. The audio output of the transceiver was connected to the distortion analyzer. It compares the power in the signal after the audio test frequency has been notched out. This results in a SINAD measurement:

$$\text{SINAD} = \frac{\text{signal} + \text{noise} + \text{distortion}}{\text{noise} + \text{distortion}} \quad (\text{Eq. 3})$$

If the distortion is lumped with the noise (for the purposes of this article), then a signal-to-noise ratio can be computed from the SINAD measurement.

$$\text{SNR} = \text{SINAD} - 1 \quad (\text{Eq. 4})$$

The results (Fig. 10) show the expected straight-line behavior of SSB, and the roll off of post-detection SNR for FM at a low predetection SNR. The horizontal axis

shows SSB SNR and FM SNR, which differ by 8 dB. This offset is found by taking the ratio of the two nominal receiver bandwidths in decibels [offset =  $10 \log(15 \text{ kHz}/2.4 \text{ kHz}) = 8 \text{ dB}$ ]. This is an approximation, since nominal bandwidth instead of noise equivalent bandwidth is used. Thus, for any given signal level, the SSB SNR is different from the FM SNR (by 8 dB). The plot is representative of actual operation because the noise level is essentially constant at any point in time.

Changing modes between FM and SSB will result in different IF bandwidths, and hence different SNRs. The two modulation schemes are equal at an SSB SNR of 17 dB. The FM threshold (the level at which the FM performance starts degrading rapidly) is around 10-12 dB. This agrees with some of the theoretical values (see note 3). The horizontal scale signal level is included to emphasize the comparison of FM and SSB

at the same signal level (as opposed to at the same SNR). The absolute value of the signal level is not significant, as it depends only on the original choice of noise level. At a high SNR, the measurement of the FM values was limited to about 35 dB because of the harmonic distortion in the signal-generator modulator.

The TS-430S generates about 100 W of RF power output in the SSB mode and 50 W in the FM mode. This is because of the 100% duty cycle of FM, which increases the amount of heat that must be dissipated. This would add 3 dB in favor of SSB if two TS-430s were in QSO, but this is left to you to decide. It has nothing to do, inherently, with the two modulation schemes.

### Summary

Amateur FM is wideband FM, and does exhibit the threshold and capture effects.

While SSB is superior for general HF communication, and especially for weak-signal work, FM is usable on HF as well as VHF as long as the signal levels are high enough.

### Notes

- <sup>1</sup>Cobb, "Modulation Standards for VHF FM," *Ham Radio*, June 1970.
- <sup>2</sup>Ziemer and Tranter, *Principles of Communications* (Boston: Houghton Mifflin Co., 1976).
- <sup>3</sup>Schwartz, *Information Transmission, Modulation and Noise* (New York: McGraw-Hill Book Co., 1980).
- <sup>4</sup>Crosby, "Frequency Modulation Noise Characteristics," *Proceedings of the Institute of Radio Engineers*, April 1937.
- <sup>5</sup>Maylott, "Close Look at Amateur FM," *Ham Radio*, Aug. 1979.

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- Crosby, "Frequency Modulation Propagation Characteristics," *Proceedings of the Institute of Radio Engineers*, June 1938.
- Heil, *The 10 Meter FM Handbook*, Marissa, IL: Melco Publishing, 1980.
- Heil, "Experience 10-Meter FM Operation," *QST*, Aug. 1981.
- Ingram, *10 Meter FM for the Radio Amateur*, Blue Ridge Summit, PA: Tab Books, 1980.

## New Products

### AEA TI-1

□ The TI-1 is an RTTY tuning indicator designed for use with the standard high (2125-2975) tones. Three shift ranges are covered: 170, 425 and 850 Hz. Other shift widths must be interpolated from the display.

A flat-back, heavy-aluminum enclosure measuring  $2 \times 5\text{-}1/4 \times 2\text{-}13/16$  in HWD houses the TI-1. Two side-by-side 10-segment red LED tuning-bar displays on top of the case are used for the tuning indicator. One 10-segment tuning bar is relegated to the mark tone, the other to the space tone. A 2-in speaker is mounted on the case bottom. Two paralleled 1/8-in jacks (both labeled IN) and a power (PWR) jack are mounted on the right-hand side of the case. The IN jacks provide a means of routing audio into and out of the indicator. Power requirements are 13.5-V dc at 60 mA. A dc power cord and a single 1/8-in audio plug are supplied with the TI-1.

Incoming audio is routed to an EXAR XR-2211 FSK demodulator IC and to the built-in speaker (if switched on). Output from the '2211 feeds two LM3914 LED drivers that cause the appropriate LED segments to be illuminated. A three-position slide switch selects one of the three available ranges: 2125-2295, 2125-2550 and 2125-2975, corresponding to 170-, 425- and 850-Hz shifts, respectively. Panel markings and labels help identify the selected range and mark the segments that should be illuminated once a signal is properly tuned in. Signal tuning involves positioning illuminating tuning-bar segments over white panel marks beneath the display. The accompanying manual explains how to interpret what you see on the tuning indicator. A schematic diagram, parts-layout drawing and a parts list are included. Three trimmer potentiometers are used to set the different space frequencies (the mark frequen-

cy is fixed), but no alignment instructions are included. It's easy to identify the trimmers from the schematic diagram and parts-layout drawing, however. With the chosen space frequency being applied to the TI-1 input, simply tweaking the proper trimmer to illuminate the third segment from the right should do the trick.

All components, except the speaker, are mounted on one single-sided, glass-epoxy PC board. Threaded metal standoffs secure the PC board and permit attachment of the back half of the cabinet and feet to the rest of the assembly.

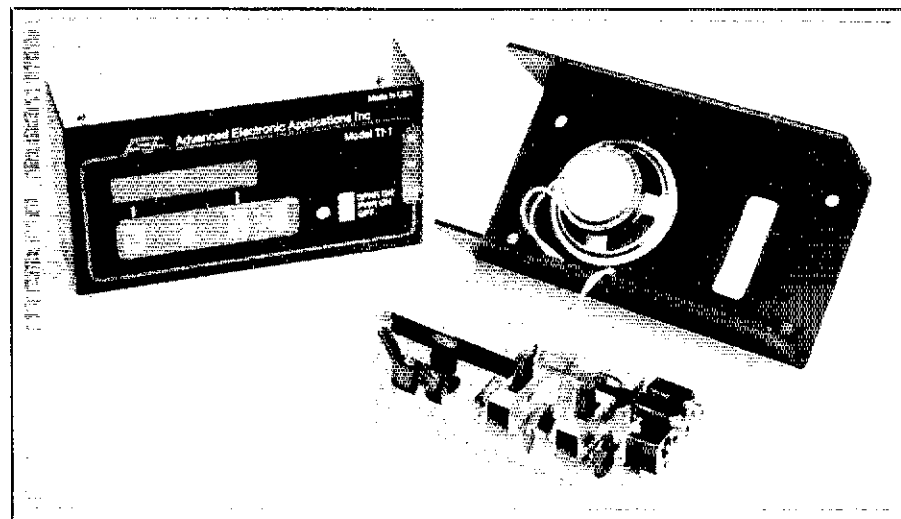
Next to the range switch is a green power-on LED and a three-position power/speaker control switch. In the OFF position, power and speaker are disconnected. Moving the switch to the PWR ON position turns on the TI-1, but leaves the internal speaker disconnected. Placed in the SPKR ON position, the switch applies power to the TI-1 and connects the speaker.

Although the package is evidently designed to lie on its back (that's where the rubber feet are located), this position makes the

readout more difficult to observe. If the TI-1 is placed vertically so that the display is easier to see, it's less stable because of the weight distribution (four stick-on feet are supplied). Also, the sounding-board effect of the speaker facing the desk is lost in this position.

Comparing the TI-1 display to the tuning indicator on the AEA CP-1 modem, I find it easier to tune in signals properly using the TI-1; signal tuning is more precise. The objective is to tune the receiver until the third display segment from the extreme right- and left-hand edges of the tuning bar is lit. Under ideal conditions, a single segment of each 10-segment section will be illuminated, but in most cases there will be some flicker of adjacent segments. It takes only a few minutes to become accustomed to using the TI-1, and it's easily adapted for use with almost any modem.

The TI-1 is available from Advanced Electronic Applications, Inc., P.O. Box C2160, Bldg O & P, 2006 196th SW, Lynnwood, WA 98036-0918, tel. 206-775-7373. Price class: \$120. — Paul K. Pagel, N1FB



## ICOM IC-745 HF All-Band Transceiver/ General-Coverage Receiver

How many different things can a transceiver do? If there is an upper limit, I'm not sure what it is, but Amateur Radio equipment manufacturers appear to be in a race to find it or prove it doesn't exist. ICOM's latest contender in this "contest" is the IC-745. This radio has a number of features. In fact, there are 38 knobs and buttons on the front panel alone, and some of those control more than one function!

I used the review unit at my station over a period of two months. My uses ranged from ragchews on quiet bands to phone Sweepstakes (and quite a bit of listening during the CQWW CW). Since the review unit came with the FM option, I was able to use it on the local 10-meter FM repeater, and I checked into MARS nets on several occasions. Let's take a look at some specifics and see how the IC-745 measures up.

### The Transmitter

Simply put, the transmitter works well. I used the '745 to drive my SB-220 amplifier. Even on 10 meters, the '745 provided more than enough drive power to bring the '220 up to full output. This has not always been true of other solid-state-final-amplifier transceivers I've used. What kind of signal reports did I receive? Other stations had nothing but praise for the quality of transmitted signal from the '745.

An internal electronic iambic keyer (optional) was included with the review unit. You simply connect a paddle to the radio via a stereo-phone plug and adjust the speed with a front-panel control. I estimate that the speed ranged from approximately 10 WPM to approximately 50 WPM. At around 20 WPM, there is a sharp knee in the speed adjustment. It is possible that this glitch could be eliminated by using a reverse log-taper potentiometer. Although there is no means to adjust weighting and spacing, the keyer should prove adequate for the casual user. When the front-panel keyer speed control is moved to the OFF position, the internal keyer is disabled and the rear-panel jack provides for on/off keying with a straight key or external keyer.

An accessory jack on the rear panel permits you to connect an RTTY modem or other terminal to the transceiver easily. Although my station is not equipped for these other modes, some tests were conducted in the ARRL lab. On the surface, the '745 seems ideal for the AMTOR forward-error-correcting mode, but the audio recovery time when switching from transmit to receive may be greater than the standard response delay from the other station, which means that the '745 might not "hear" the receipt acknowledgment during AMTOR ARQ operation.

### The Receiver

In addition to covering all the HF amateur



### ICOM IC-745 HF Transceiver, Serial No. 3101

#### Manufacturer's Claimed Specifications

Frequency coverage: Receive—0.1-30 MHz; transmit—1.8-2.0 MHz, 3.45-4.1 MHz, 6.95-7.5 MHz, 9.95-10.5 MHz, 13.95-14.5 MHz, 17.95-18.5 MHz, 20.95-21.5 MHz, 24.45-25.1 MHz, 27.95-30.0 MHz.

Modes of operation: CW, SSB, FM, AM (receive only), RTTY.

kHz/turn of knob: Not specified.

Frequency display: 6 digit.

Frequency resolution: 100 Hz.

S-meter sensitivity ( $\mu\text{V}$  for S9 reading): Not specified.

Transmitter power (input): All modes, 200 W. (Transmitter does not function in AM mode.)

Harmonic suppression: More than 40 dB.

Spurious suppression: More than 60 dB.

Third-order IMD: Not specified.

CW keying waveform: Not specified.

Receiver sensitivity: SSB, CW, RTTY (1.6-30 MHz)—less than  $0.15 \mu\text{V}$  for 10-dB S/N; FM—less than  $0.3 \mu\text{V}$  for 12-dB signal + noise + distortion/noise + distortion.

Squelch sensitivity: Less than  $0.5 \mu\text{V}$ .

Receiver audio output @ 10% total harmonic distortion: More than 2.8 W.

Color: Two-tone green.

Size (height, width, depth): 4.5 x 12 x 14 in.

Weight: 18 lb.

#### Measured in ARRL Lab

As specified.

As specified.

As specified.

2/200.

5/16-in-high, blue fluorescent digits.

As specified.

Preamp in (preamp out): 160 m, 55 (94); 80 m, 44 (100); 40 m, 24 (67); 30 m, 21 (60); 20 m, 28 (88); 17 m, 28 (90); 15 m, 30 (81); 12 m, 30 (77); 10 m, 28 (76).

Power output: 160 m, 118; 80 m, 119; 40 m, 125; 30 m, 126; 20 m, 127; 17 m, 126; 15 m, 127; 12 m, 132; 10 m, 135.

65 dB (see Fig. 1).

65 dB (see Fig. 1).

35 dB (see Fig. 2).

See Fig. 3.

Receiver dynamics measured with optional filters installed.

	80 m Preamp In/Out	20 m Preamp In/Out
Noise Floor (minimum discernible signal) (dBm):	-140/-133	-144/-135
Blocking dynamic range (dB):	115/113	116/118

Noise Floor (minimum discernible signal) (dBm):

Blocking dynamic range (dB):

Two-tone 3rd-order intermodulation distortion dynamic range (dB):

Third-order input intercept (dBm):

Receiver quieting ( $\mu\text{V}$  for 12-dB

signal + noise + distortion/noise + distortion):

Receiver turnaround, ms:

0.29/0.64.

See Fig. 4.

Preamp in:  $0.082 \mu\text{V}$  min., 0.3 max;  
preamp out:  $0.17 \mu\text{V}$  min., 0.72 max.

3.0 W.

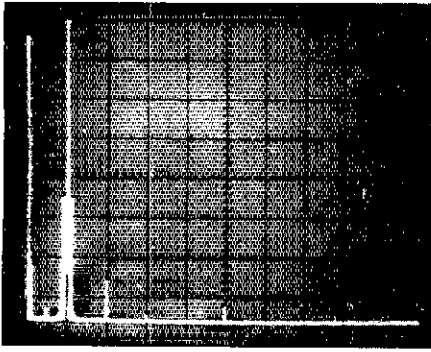


Fig. 1—Spectral display of the IC-745 output. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 100 W at a frequency of 10.1 MHz. All spurious emissions are at least 65 dB below peak fundamental output. The IC-745 complies with current FCC specifications for spectral purity.

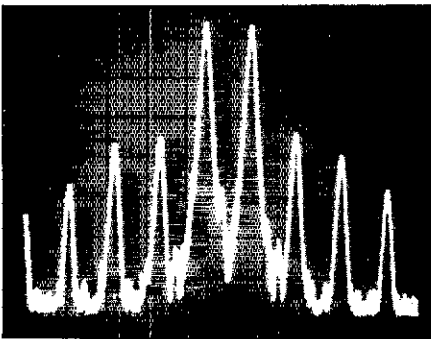


Fig. 2—Spectral display of the IC-745 output during transmitter two-tone IMD test. Third-order products are 34 dB below PEP, and fifth-order products are 40 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The IC-745 was being operated at rated input power on the 10-meter band.

bands, the '745 functions as a general-coverage receiver from 100 kHz to 30 MHz. Triple conversion is used, with the first IF being at 70.4515 MHz; the second and third IFs are 9.0115 MHz and 455 kHz, respectively.

The operating modes are LSB, USB, CW, RTTY, AM or FM (if the optional FM unit is installed). As you push the MODE-SEL switch, the '745 switches from one mode to the next in the above order, and then from FM back to LSB. Although my initial reaction to this system was not totally favorable, I became quite fond of it before the end of the review period.

Band selection is achieved by locking the BAND switch in the "in" position and rotating the tuning control. In the HAM mode, rotating the tuning control clockwise moves the operating frequency to the next higher ham band; counterclockwise, to the next lower ham band. In the general-coverage mode, the frequency changes are in increments of 1 MHz. You must, of course, remember to move the BAND switch to the "out" position to tune within the band.

Within a given band, tuning is in 10-Hz steps. When tuning in a slow CW signal or a continuous carrier, I found the "step" effect

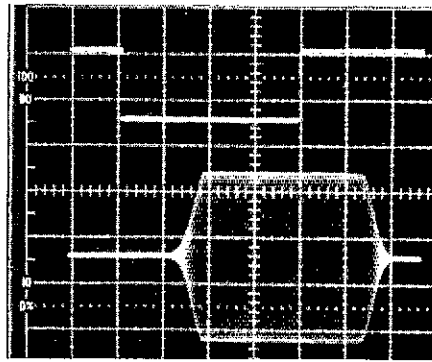


Fig. 3—CW keying waveform of the IC-745. The upper trace is the actual key closure; the lower trace is the RF envelope. Each horizontal division is 5 ms.

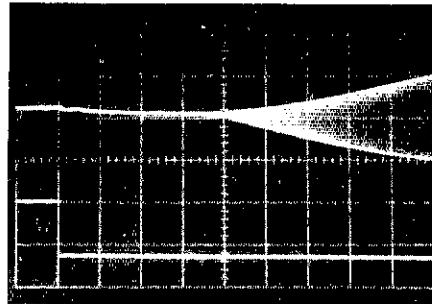


Fig. 4—Receiver recovery (turnaround) time. The upper trace shows the key opening; the lower trace shows receiver audio output. Horizontal divisions are each 20 ms. There is an approximate 80-ms delay before receiver recovery.

of this tuning system mildly objectionable. Pressing the TUNING RATE switch causes the '745 to tune in 1-kHz increments—which is most beneficial when moving from one end of the band to the other.

In SSB operation, the '745 performs admirably. It is a pleasure to use under normal conditions. Optional filters were installed in the review unit for SSB and CW use. The built-in notch filter does a good job of taking out annoying carriers. Two separate controls on the front panel allow selection of OFF, NORMAL and WIDE and LEVEL of the built-in noise blander. The noise blander is quite effective in dealing with ignition noise, and to some extent it is effective against the "woodpecker." Control of the AGC timing is achieved with a front-panel control that permits ON/OFF control and FAST-SLOW variation.

The receiver is not without faults, however. Although IF shift and passband tuning are both available, they are not available simultaneously; Because they are controlled by the same switch and potentiometer, you must select one or the other. I did not find either of them to be particularly effective in tailoring the passband to eliminate QRM. If I could have used them simultaneously, it might have improved receiver performance.

The '745 has a built-in receiver preamplifier that does its job very well, but I'm not sure its job is needed on the HF bands these days. Without the preamp turned on, the receiver exhibits more than enough sensitivity on all

the bands and modes I tried. With the preamp on, the '745 front end tends to be overloaded by strong signals. Under crowded band conditions (contests), it exhibits this tendency even with the preamp off. ICOM might make better use of this control to switch an attenuator in and out of the receive circuit.

### VFOs and Memories

The transceiver has two variable-frequency oscillators and 16 memories—which eliminates any need for an external VFO. Like most other synthesized transceivers on the market these days, the VFOs are simply memory locations. The memory contents are incremented or decremented with an optical interrupt device on the tuning control. The use and feel, though, is about the same as the now-archaic PTO.

Although ICOM has included both receiver and transmitter incremental tuning (RIT and XIT) in the '745, their effectiveness is limited by the range they can move from the displayed frequency: plus or minus 1 kHz. Additionally, the display frequency does not change with changes in either RIT or XIT.

ICOM has provided scan operation for the '745. The 16 memories may be scanned, or all frequencies between two limits can be scanned. This feature could be quite useful in some applications.

### The Manual

Remember all the knobs and buttons on the radio? You may have guessed by now that it is not always obvious from casual observation just how to use each control effectively. What does the manual say? It is apparent that the manual was written by someone who lacked a real understanding of contemporary English as used in the Amateur Radio fraternity. Some portions might be confusing to anyone operating a transceiver for the first time.

If we were talking about an inexpensive, six-channel, crystal-controlled, 1-W-output FM rig, then almost anyone smart enough to pass a Novice exam could figure out how to use the rig in a few minutes. But this radio has 38 knobs on the front panel! Obviously, ICOM has spent a lot of money to engineer and produce such a complex and apparently well-made piece of equipment. Spending a little bit more to tell the purchaser how to make the best use of his or her investment would increase customer satisfaction.

### Odds and Ends

The optional built-in IC-PS35 switching-type power supply was not reviewed; an external IC-PS15 supply was used instead.

The IC-HM12 scanning microphone was supplied with the review unit. It permits you to change frequency by pressing either of two switches located on top of the microphone housing. Mobile operators will appreciate this feature.

As this review was being completed, ARRL received word from the field indicating that the microcode for the microprocessor that controls the radio is stored in random-access memory (RAM). A built-in lithium battery is used to maintain the RAM when the unit is disconnected from a power supply. Once the battery fails or is disconnected, however, the '745 (and perhaps other contemporary transceivers) must be returned to the factory for reprogramming. We checked one of the

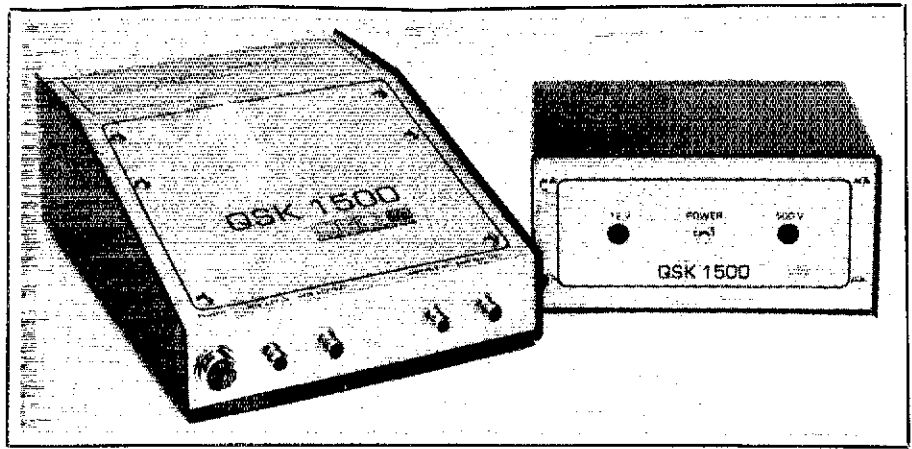


ICOM transceivers in the ARRL lab and found this to be the case.

Would I recommend this model to someone looking for a new transceiver? It really depends on the intended use. If the prospective user were a ragchewer or casual operator who also enjoys shortwave listening, the '745 probably should be considered. On the other hand, shortcomings in the receiver section would tend to limit its effectiveness in a contest setting.

The FM unit had two problems associated with it as it came out of the box. It was returned to the factory for service, which was done quickly and thoroughly at no cost.

Manufacturer: ICOM America, Inc., 2380-116th Ave., Bellevue, WA 98004. Price class: IC-745, \$1000; IC-SM6 Microphone, \$40; IC-PS35 Internal Power Supply, \$160; IC-FL44A Filter, \$160; IC-FL32 Filter, \$60; IC-FL53A Filter, \$100; IC-EX243 Keyer, \$50; IC-EX242 FM Module, \$40; IC-EX241 Marker, \$20.—Peter R. O'Dell, KB1N



### QSK 1500 HIGH POWER RF SWITCH

□ Have you ever wished you could get rid of that big, slow relay in your amplifier? Wouldn't it be nice if you didn't have to wait for the relay to open and close each time you made a transmission? You could replace your old amplifier with one of the newer QSK types, or try separate antennas, but the QSK 1500 might be a better approach.

The QSK 1500 is an RF switching unit that bypasses the relay in your amplifier by using PIN diodes to route the signals. The unit is installed between your QSK transceiver and the amplifier. Instead of keying your rig, you key the QSK 1500, which then keys your rig, controls the relay in the amplifier and directs the RF signals through the system.

#### How Does It Work?

The functional diagram in Fig. 5 shows the signal paths in the unit. When you first start to transmit, the QSK 1500 closes the relay in the amplifier. Then, the PIN diodes switch on in the transmit direction. This allows drive to the amplifier and power from the amplifier to the antenna. Other PIN diodes switch off the receive direction when transmitting. When you unkey the transmitter, the bias to the various PIN diodes changes, removing the amplifier from the circuit and opening the receive path. These actions take place even though the TR relay in the amplifier is energized during the switching process. The relay in the amplifier remains closed for a little more than a second after unkeying, and only opens when you stop transmitting for more than this relatively long time. With the relay energized or not, the received signals pass through the QSK 1500 to the input of the receiver.

#### Laboratory Testing

During laboratory testing, the QSK 1500 was used with a Yaesu FT-980 QSK transceiver and a Collins 30S-1 linear amplifier. Fig. 6 shows the keying waveform during testing. The upper trace shows the CW waveform; the lower trace shows the recovered audio. The sweep time is 10 ms/div. So far, so good! The RF is driving the amplifier, and we can hear received signals between our transmissions.

Now let's look into the QSK 1500 a little

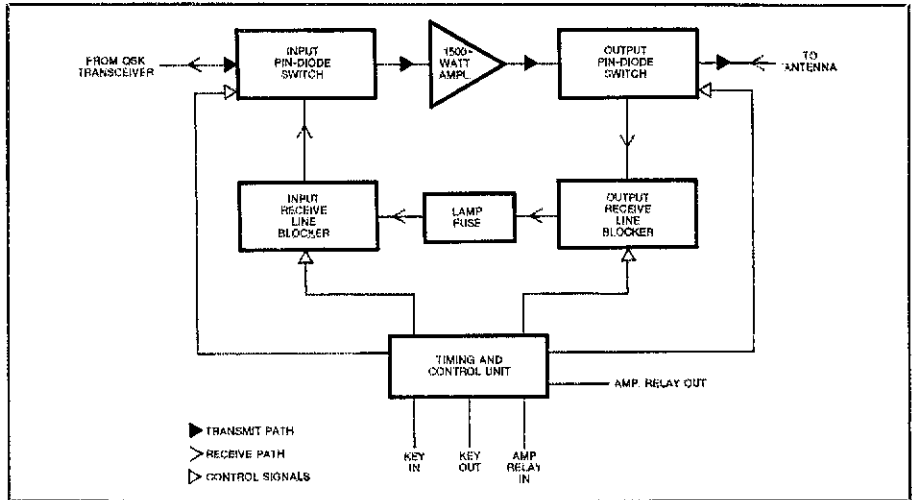


Fig. 5—Simplified functional block diagram of the QSK 1500 High Power RF Switch.

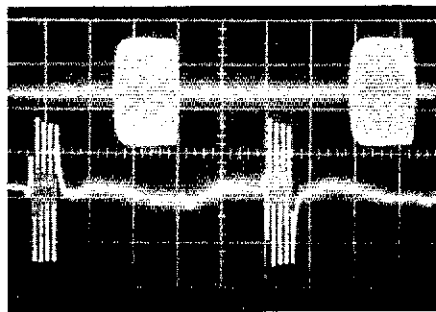


Fig. 6—Keying waveform of the QSK 1500. The upper trace shows the RF output of the amplifier; the lower trace shows the recovered audio. Horizontal divisions are each 10 ms.

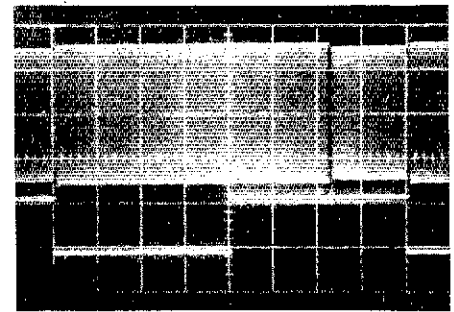


Fig. 7—The switching characteristics of the QSK 1500. The upper trace shows the RF from the signal generator; the lower trace shows the output of the electronic keyer. Each horizontal division is 5 ms. Measured insertion loss was less than 1 dB.

closer and find out what it does. By connecting a signal generator to the QSK 1500 antenna port, and inserting a jumper between the AMP RLY IN and AMP RLY OUT connectors, we can view the signal generator output at the transceiver input. Fig. 7 shows what is really happening. The lower trace is the output waveform from an electronic keyer connected to the unit. When the key is closed, RF (upper trace) is received through the shorted amplifier loop. After the key opens, we still

see RF through the amplifier loop for approximately 12 ms. Then we can note an abrupt change in the signal from the generator. We are now seeing the signal as it passes through the receive loop. The slight gap in the upper trace indicates the switching time between transmit and receive. The difference in amplitude between the two sections indicates losses in the receive circuit. This loss was measured at less than 1 dB. Receiver

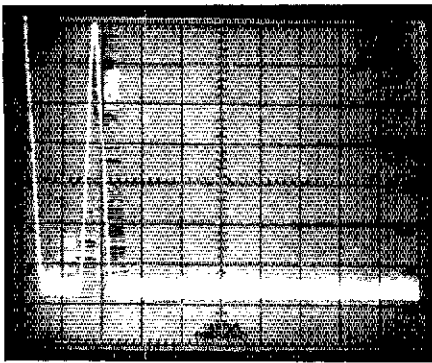


Fig. 8—Spectral display of the output of the test transceiver operating on 1.875 MHz without the QSK 1500. Vertical divisions are each 10 dB; horizontal divisions are each 1.0 MHz. All spurious emissions are at least 65 dB below peak fundamental output. The transceiver complied with current FCC specifications for spectral purity. This display is typical for all bands, 80 through 10 meters, when the QSK 1500 is used.

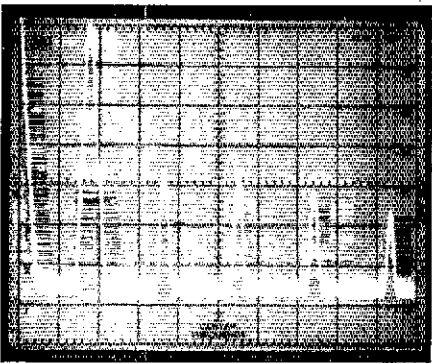


Fig. 9—Spectral display of the QSK 1500 output during initial testing. Vertical divisions are each 10 dB; horizontal divisions are each 1.0 MHz. The output waveform exhibits harmonics of the fundamental frequency that exceed the FCC requirements, (approximately -35 dB).

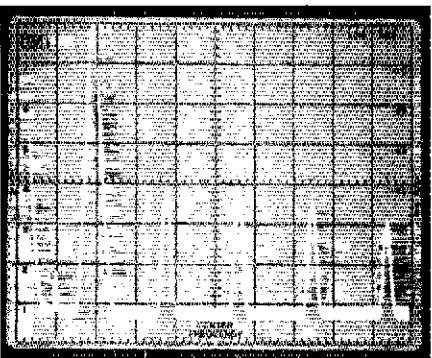


Fig. 10—Spectral display of the QSK 1500 output after replacement of D1. Test conditions are as shown in Fig. 9. Harmonics of the fundamental frequency are now at least 42 dB below the peak fundamental output power. The unit complies with current FCC specifications for spectral purity.

testing indicated about 1-dB degradation in the minimum discernible signal of a typical receiver when the QSK 1500 is used. This, of course, caused a small (approximately 1-dB) decrease in the two-tone intermodulation distortion dynamic range.

The output of the QSK 1500 was examined with the spectrum analyzer. On all bands, 80 through 10 meters, the unit worked well, meeting all FCC requirements for spectral purity. We did find some problems on 160 and 6 meters, however. On 160 meters, one of the PIN diodes was generating harmonics at a level greater than prescribed by the FCC. A call to the manufacturer solved the problem. A supplier had furnished a diode other than that specified, but supposedly better. Replacing the offending diode brought the unit output back into specification, and we were assured by the manufacturer that the diode problem was solved. Fig. 8 shows the bare transceiver output on 1.875 MHz. Fig. 9 shows the QSK 1500 output with the defective diode installed. Fig. 10 shows the QSK 1500 output with the defective diode replaced. Note that the installation of the correct diode lowered the harmonic level from 35 dB to 42 dB below rated output power, well within the -40 dB requirement.

The problem on 6 meters was caused because the RF chokes used in the unit are resonant at 6 meters. (The unit is rated only to 10 meters.) When the unit is operating on 6 meters, the fuse lamp glows during transmissions, indicating some stray currents in the system.

### What Are Its Limitations?

The QSK 1500 is designed to work with a QSK transceiver. It will not work with a separate receiver/transmitter combination or make a non-QSK rig into a QSK rig.

### Will It Work in Other Modes?

Yes. In particular, it allows the use of an amplifier with AMTOR, RTTY and SSTV, but at reduced power levels. The QSK 1500 is rated to operate with 1500-W PEP output at 40-WPM CW. Continuous-duty operation requires a reduction in output power (800-W PEP). It can also be used to operate SSB.

### Conclusions

The QSK 1500 would be a fine addition to any shack. It can turn the average amplifier into state-of-the-art equipment without any modification. The unit is well built, with quality components. If you plan to build an amplifier, it could be designed into the project, eliminating any need for relay switching. It can even be used to switch between two separate antennas automatically (exciter only): for example, receiving on a Beverage and transmitting on a vertical. Also, the fuse lamp in the circuit provides protection from anything that could damage your sensitive receiver.

Manufacturer: Design Electronics Ohio, 4925 South Hamilton Rd., Groveport, OH 43125, tel. 614-836-3929. Price class, \$300.  
—Jon F. Towle, WB1DNL

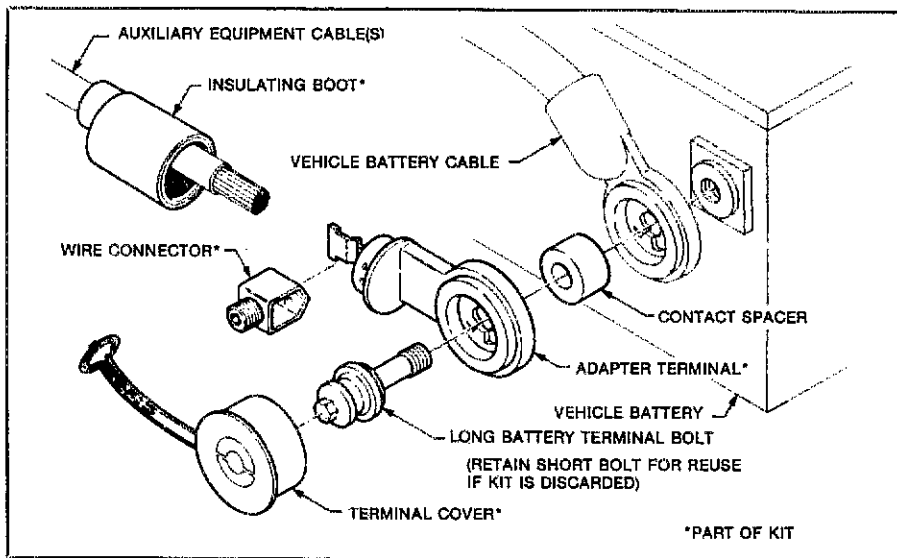
## New Products

### GENERAL MOTORS RADIO-INSTALLATION GUIDELINES

□ General Motors Electrical Systems Center has published a brochure covering installation of RadioTelephone/Mobile Radio equipment in automobiles. Recommended installation schemes are shown, together with details on

the use of the AC-Delco Side Terminal Adapter Package 1846855 with battery bolt (PN7803 Delco; 12004188 GM) and spacer (PN7804 Delco; 12004189 GM).

For more information, write to EMC Dept. MR, Bldg. 40, General Motors Proving Ground, Milford, MI 48042-2001.—Bruce O. Williams, WA6IVC



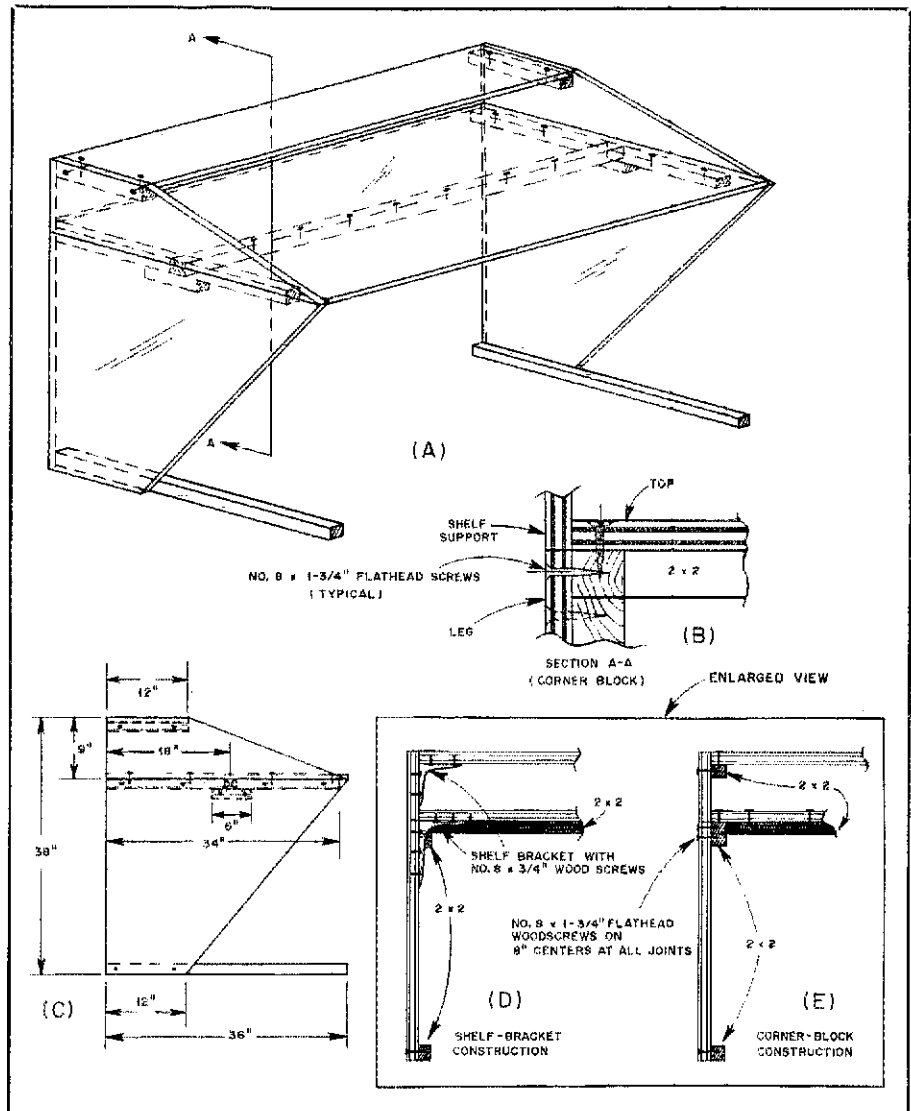
## A ONE-SHEET PLYWOOD OPERATING TABLE

□ After looking for a suitable bench at a reasonable price, I decided to build one for myself. My design is shown in Figs. 1 and 2.

The bench is made from a single sheet of 3/4-inch plywood (finished one side), four 6-foot-long 2 × 2 boards and some miscellaneous hardware. The 2 × 2s are used as feet, a brace under the tabletop and corner blocks at the plywood joints. (Screw blocks of scrap 2 × 2 to the table legs as supports for the 2 × 2 table brace.) Materials for the table cost me about \$35. One could add drawers or more shelves, if desired.—Max Alexander, KABITE, Bloomingburg, Ohio

[Max supplies an eye-pleasing design for a radio table, but there are few construction details. Those of you who are experienced carpenters can devise joints that make the plywood table a sturdy structure. Some suggestions are included in Fig. 1. Hams unacquainted with the tricks of joinery may wish to replace the corner blocks with shelf brackets (8- to 10-inch brackets at the tabletop, 4- to 8-inch brackets at the shelf; see Fig. 1D) to strengthen the table-to-leg and shelf-to-support joints. Two or three brackets at each end of the table should be sufficient. Eliminate two 6-foot 2 × 2s from the materials list if shelf brackets are used.—Ed.]

Fig. 1—A drawing of the finished station table (A). Detail 1B shows the details of the leg/shelf-support/tabletop joint. The arrangement shown prevents the shelf assembly from sliding off the tabletop. Fig. 1C is an end view of the table: It shows the corner-block (shown shaded) dimensions and screw placement. A front view of the shelf-bracket installation is shown at D. E shows the same view for corner-block construction.



## A NONDIGITAL LOGGER DUPER

□ How many times have you heard a CQ call and wished that you knew whether you had worked that station at some earlier date? Have you spent time flipping through your logbook(s), QSL cards or the *Callbook*, only to discover that the station has established contact with someone else—when you needed the contact for WAS or DXCC? I'll bet you have—many times; it has happened to me. One could answer every call, but that would produce duplicate contacts with states and DXCC countries.

What about that 8P6 station you worked last week? The operator called you by name and reminded you of a QSO last year on 15 meters. How can the operator do that? Certainly one couldn't remember all that information. After all, he may have added 4000 to 5000 QSOs to the log since last talking to you. The answer is probably his filing system, which makes it easy for him to pull your card before you finish sending your station information. Here is a system that is easy and inexpensive to set up and maintain. It requires 702 3- × 5-inch index cards, a box to hold them and the patience to record the contacts.

I prefer to file contact records by the first two letters of the call suffix. Each card is

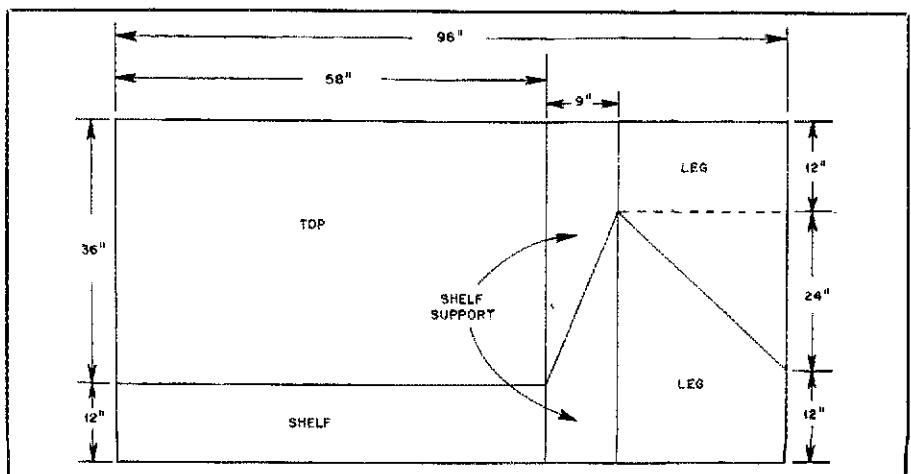


Fig. 2—A cutting pattern for the station-table parts.

labeled, beginning with "AA" and ending with "ZZ." (Include single-letter cards, "A" through "Z," to cover two-by-one call signs.) Raised index tabs make the first card in each section easy to find.

Store the cards in a box just wide enough for the 5-inch cards and long enough to hold more than 702 cards. (Sooner or later you will need more cards in the file.) I made my card-file box by cutting a cardboard box to size. The sides of the box are about 2 inches high. This allows the cards to stick up above the sides of the box so I can easily flip through them. Cardboard fillers at the back of the box keep the cards snug. If you want to spend more money, purchase a suitable box from a stationery store, build one from wood, or have one made for you.

The greatest task is to research all previous contacts and enter them in the file system. It takes some time, but it is necessary in order to have a complete file. Those who are less enthusiastic can begin the file with contacts made at the time the file is constructed. New Novices have a real advantage. They can begin the file with their first contact.

When do I record contacts in my QSO file? I usually perform the chore at the end of a day's hamming. Set up any schedule that suits you. The longer you wait between work sessions, however, the more tedious each session becomes. After all, you want an up-to-date and accurate record.

The logbook is more than just a record of contacts to me, and so is my card file. I file each call with the frequency, date, name and QTH. Contest QSOs, 10-10 numbers and other significant information are noted as well. Record as little or as much information as you like.

I mentioned earlier that the QSO file system is inexpensive. My total cost was less than \$7. I've used the system for five years now and have not spent another cent on it.

There it is: A QSO file system that works. It's easy to set up and is inexpensive. It can add years of convenience and enjoyment to your operation. Give it a try. The next time you hear a call sign that sounds familiar, flip to the appropriate card in your file. When you go back to the ham on the other end, carry on as if you had talked to him/her just yesterday. Those working on WAS and DXCC can eliminate lost time by working only states and countries that are not already confirmed. —*Donald E. Quick, K7TDX, Klamath Falls, Oregon*

## A STAND FOR YOUR COMPUTER MONITOR

□ Now that the age of computers is upon us, how many times have you looked at your operating desk and said, "I can't fit another thing on it!" A common item of scrap furniture can provide a space-saving stand for your computer and monitor.

While discarding some old drawers the other day, I happened to remember that my computer monitor is supported by an inverted desk drawer. Why not make a permanent stand for it? The stand I made is shown in Fig. 3. It can be placed on your operating desk or (as I have done) on a portable typing stand. My setup allows me to roll the computer up to the rig, connect the interface and operate all modes from my swivel chair. The stand also protects the computer from

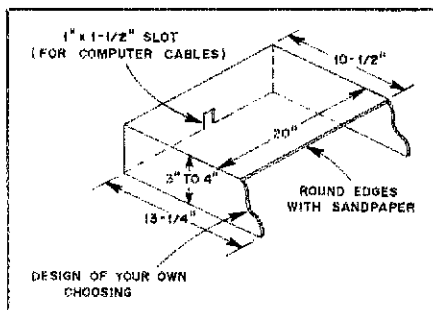


Fig. 3—A computer-monitor stand made from an old drawer, as constructed by KB1LE for his system: A VIC 20™ and a Hitachi monitor.

dust, dirt and accidental spills.

Begin construction by measuring the width of your monitor (between foot pads) and the dimensions of the computer. Choose a drawer that is a few inches wider than the monitor and computer. It should be a few inches deeper than the monitor, and high enough for the computer to slide under the stand when not in use. Invert the chosen drawer on your work surface, place the monitor on top of the drawer (with the backs of the monitor and drawer together), and mark the drawer bottom a few inches in front of the monitor screen. Remove the monitor and extend the mark across the drawer bottom with a carpenter's square. Mark the sides of the drawer with any contour that pleases you, then cut the sides and bottom on the lines. Once you have made all the cuts, sand any rough edges smooth and apply a finish. (I stained mine to match the typewriter stand.) The project took about an hour from start to finish, and the cost was less than \$3. —*Richard J. Moris, KB1LE, Bristol, Connecticut*

## ANOTHER CURE FOR CATVI

□ I had never experienced such a dramatic TVI nightmare as the one that appeared when I changed from off-the-air TV pickup to cable TV. I had no TVI problems whatsoever prior to subscribing to cable. Not only was there cross-hatch, but my station (at the 1-kW, dc-input level) totally obliterated the video and sound on all channels (TV input from the CATV converter was on Channel 3).

I tried all of the known TVI cures (and even considered standing on my head and wiggling my ears in a ritual), but none of them helped. The interference was especially bad on 80 and 40 meters, but did not occur until the transmitter power output exceeded 200 W.

After several months of resignation and self-imposed "quiet hours," I elected to tackle the problem once more. This time I chose to look *outside* the CATV system for the cause and cure. I concluded that stray rectification could cause the TVI.

I use a shunt-fed grounded tower for 80-meter operation. The same tower supports a 40-meter sloper. Buried radial wires connect to a plate at the tower base, and the plate is affixed to the tower leg by means of U bolts. The U bolts, tower leg and individual screw/nut connections for the radials had not been cleaned in three years. I removed all of the hardware, applied steel wool with vigor, coated each contact surface with silicone

grease, then reassembled the junction block and affixed it to the tower. The connection points for the ground rod that was wired to the tower leg were also cleaned. All traces of TVI were gone when I fired up the transmitter—even at the 1-kW level. Apparently, the ground connections at the system high-current point had been corroded, and had formed some very effective harmonic-generating diodes.

I experienced a similar situation a few years ago when a coaxial fitting near the base of my tower loosened and caused rectification. The connector joined the Hardline from my triband Yagi to some flexible coax near the tower base.

These experiences implicate all manner of loose joints in conductors around the home. Don't overlook joints in metal gutters and downspouts if you're tracking down TVI. Consider the potential rectification that could occur between sections of aluminum siding on a house!—*Doug DeMaw, W1FB/8, Luther Michigan*

## A PERSONAL MAGAZINE INDEX

□ While indexing the May *QST*, I had an idea that may be old hat to some amateurs but new to others.

When I am finished reading my monthly Amateur Radio magazines, I note the articles in my personal index before placing the magazines on the storage shelf. Articles on antennas, building projects, equipment, Hints and Kinks, and so on are all recorded (under appropriate headings) on file cards, which are then placed in my index file. Whenever I have a question or problem, I simply look in my index for a pertinent article. It has been helpful many times. I also look up equipment reviews, to see what the reviewers thought, before I buy.

It took a few days of on-and-off work to get all my back issues indexed, but it sure has saved me time and money. Now I don't have to go through all of my past issues to find an article.—*William Maves, NB9H, Menomonie, Wisconsin*

## A HELPING HAND

□ Fig. 4 shows a "helping hand" I developed for bench work with circuit boards. To construct the fixture, find a piece of heavy angle stock and cut it to a convenient length. Mount two alligator clips to the stock—one oriented vertically, the other horizontally. Hold the angle stock in a vise, or clamp it to a tabletop for use. Affix some felt or rubber feet to the bottom of the fixture if you desire to protect the table top.—*Greg Yadzinski, WZ4B, Buffalo, New York*

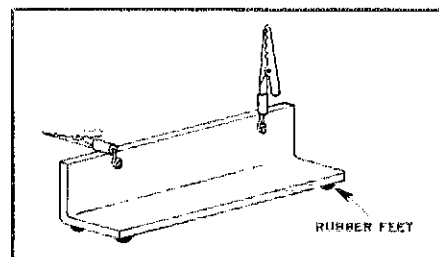


Fig. 4—WZ4B's helping-hand fixture.

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

## DOPPLE (DOPPEL) QUAD UPDATE

□ Several amateurs have contacted me about their experiences with the antenna described in "Try a 'Dopplequad' Beam Antenna for 2 Meters," QST, Feb. 1985, pp. 28-31. The information they've related to me should be of interest to others contemplating construction of the antenna.

John, WB3LTT, used no. 4 AWG copper wire for the driven element and 7/16-inch aluminum tubing for the five reflectors. Using the dimensions given in the article, he achieved near-unity SWR at 146 MHz, with band-edge readings of 1.2:1 at 144.5 MHz and 1.5:1 at 148 MHz.

Cliff, W6BEP, told me his antenna had an SWR of at least 3:1 across the band, although all antenna dimensions were as shown in the article. Cliff was using direct coaxial-cable feed. Bob, KB6DYM, built a twin quad. He, too, discovered that the SWR was higher than it should be. After a number of experiments, Bob found the SWR could be brought low by simply keeping the coaxial-cable feed-point lead lengths as short as possible.

In the article, Fig. 4 is a photograph of the antenna feed point that shows rather long coaxial-cable leads. That photo was taken during feeding experiments, and the SWR was poor with that method. My final feed method uses direct coaxial-cable feed with lead lengths of about 1 inch. After Bob shortened the cable leads, he measured an SWR of 1.2:1 or better across the entire band. Bob's antenna has 11 reflectors spaced about 6 inches apart and employs loops of 3/8-inch copper tubing 20-1/8 inch square. Plexiglas® sheet insulates the driven elements, and a hardwood boom is used.

Mike, AC5P, suggests contacting your local electric company for scrap no. 4 or no. 2 aluminum grounding wire to use as the loop elements. Mike recommends hammering the aluminum slightly to flatten it for drilling mounting holes. He also thinks that the addition of an adjustable 1/4-wave shorted stub at the feed point might improve the feed characteristics. Jeff, W9QBJ, says that hand-drawn 1/4-inch copper tubing and 1/4-inch solder elbows can be obtained from refrigeration supply houses. These materials can simplify loop construction while improving their rigidity.

A key reference mentioned in my article, "The UHF Compendium" by Karl Weiner, DJ9HO, is no longer available from the Ham Radio Bookstore. I suggest you write the publisher directly for information about availability.<sup>1</sup> Also, I accidentally "American-

ized" the spelling of "Doppelquad" in my article.

John, VE3BVX, has expressed an interest in producing a commercial version of the antenna. Those of you who are interested in such an item should contact him.<sup>2</sup>

I would like to thank everyone who took the time to contact me about the antenna and their experiences with it. I hope many others can make good use of the information you shared with me.—Keith A. Kunde, K8KK, 8355 Dalepoint Rd., Independence, OH 44131

## AM BROADCAST-STATION HARMONICS

□ In reading Doug DeMaw's "Understanding TV and Radio Interference" article in Feb. 1985 QST, I found an error in his interpretation of FCC rules concerning spurious emissions from AM broadcast stations. AM stations are bound to a much more stringent regulation than -40 dB or 50 mW. FCC Part 73.44(a)(3) states: "Any emission appearing on a frequency removed from the carrier by more than 75 kHz must be attenuated at least  $43 + 10 \log_{10}$  (power in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation." For the 50-kW station mentioned, this would indicate a radiated power of 500  $\mu$ W at the harmonic frequency.

In practice, the harmonic signal at any listening point may be due more to rectification in local metallic connections (such as power lines) than to radiation from the AM station's antenna. This makes calculation of effective radiated powers more or less meaningless. In making annual measurements of harmonics, I frequently note heavy ac cross-modulation, and DFing usually shows the source to be in some other direction than the broadcast antenna.—John K. Andrews, K1VHO, Chief Engineer, WTAG, 402 Shrewsbury St., Holden, MA 01520

## DETERMINING LINE LENGTHS

□ There is a popular myth in Amateur Radio that one may, for example, prepare an open quarter-wave line by connecting a loop of wire to one end and finding a dip on a dip meter by trimming the line to resonance. What is actually obtained is a line having a capacitive reactance equal to the inductive reactance of the loop. As an example, a 4-inch wire loop will yield a line 82.8° long at 18 MHz. Reducing the loop to 2 inches will yield a line 86° long. No matter how small the loop is

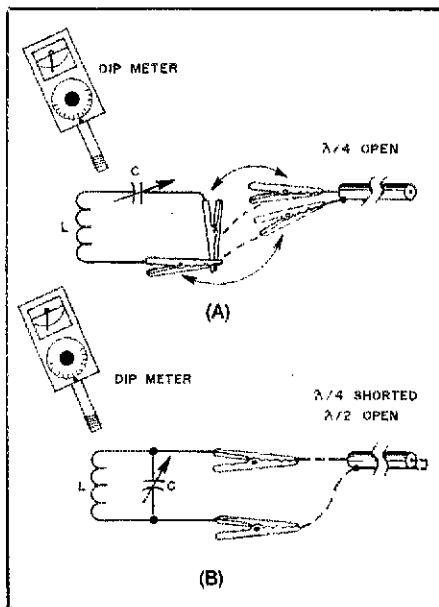


Fig. 1—Methods of determining 1/4 and 1/2 line lengths. At A, 1/4 open-circuited line; at B, 1/4 shorted and 1/2 open-circuited line.

made, the resulting line will approach—but never equal—90° or a quarter wave.

The proper way to accomplish this task is to parallel a coil and capacitor that will resonate at the required frequency (see Fig. 1A). After resonating the network, open the connection between the coil and capacitor, and connect the line to the pair in a series circuit. The line should be initially somewhat longer than required and trimmed until the circuit again resonates at the desired frequency. For a shorted quarter-wave line or an open half-wave line, the line is connected in parallel with the coil and capacitor (see Fig. 1B).

The reason that the loop cannot be used alone is that the input impedance,  $Z_c$  of an open line up to 90° (a quarter wavelength) is capacitive and equal to

$$X_c = Z_0 / \tan \theta \quad (\text{Eq. 1})$$

where

- $X_c$  is capacitive reactance ( $Z_c$ )
- $Z_0$  is line impedance
- $\theta$  is angular length of line

Hence, when the length is such that the capacitive reactance resonates with the inductive reactance of the loop, a dip is obtained. If the line is actually cut to 90°, the reactance goes to zero since the tangent of 90° equals infinity and (neglecting losses) becomes a short circuit. When the line is placed across

<sup>1</sup>Verlag Rudolf Schmidt, Rudolf-Diesel Str. 1, D-8670 Hof/Saale, Fed. Rep. of Germany (ask for the English edition).

<sup>2</sup>John E. Thomas, Lindsay Specialty Products Ltd., 50 Mary St. West, Lindsay, ON K9V 4S7, Canada

the inductance of the loop, this produces no dip on a dip meter.—*Charlie Michaels, W7XC, 13431 N. 24th Ave., Phoenix, AZ 85029*

## POWER SUPPLY RETURNS

□ I just finished reading "Construct the 'Ultimate' DC Power Supply," in July *QST*. I was pleased to see so much attention paid to the protective circuitry in the supply, and appreciated the discussion concerning the selection of pass transistors. But I feel that *QST* readers may be in trouble if they decide to make substitutions for these devices based on this information.

The article implies that the maximum power dissipated by the pass transistors is found by multiplying the maximum current drawn from the supply by its maximum output voltage. This is not true. The power dissipation is calculated using the collector-to-emitter voltage drops of the pass transistors. There may be a little more than 60 V at the collectors of the pass transistors. With 50 A being sent to a short circuit as a worst-case load, more than 3000 W would go up in heat, not the 2500 W stated in the article.

Power dissipation in the driver stage of the supply also deserves consideration. The current gain of each of the 2N3772 pass transistors means that the driver transistor must supply 1.2 A to the pass transistors. Since the driver transistor will have almost the same collector-to-emitter voltage drop as the pass transistors (about 60 V, worst case), it will need to unload roughly 72 W in heat. Bolting the driver transistor to the same heat sink as the rest of the pass transistors should provide relief for it.

Given "typical" devices and the intermittent power requirements of most amateur equipment, few people who build this supply may ever experience worst-case conditions, but *QST* readers should be aware that no one is immune to them.—*Gregory A. Tracza, WA2OOD, 720 Bridger Dr., Colorado Springs, CO 80909*

□ I feel I must comment on the Ultimate DC Power Supply article. The author uses the MC3423 chip to provide "overvoltage protection." The chip is used to drive a miniature relay which, in turn, removes gate current to an SCR. My first concern is with the time lag the relay introduces. Inexpensive small relays may require up to 15 or 20 ms to respond. The reason Motorola recommends direct connection to an SCR is to minimize the lag between sensing the overvoltage condition and output shutdown. Motorola has several excellent application notes on the use of this IC and selection of appropriate SCRs for use with it.

The next problem the author introduces is the 0.05- $\mu$ F capacitor at U3's input, pin 2. It may prevent RF from tripping the MC3423, but it also introduces another time lag in the shutdown sequence.

Finally, there is a capacitor shown connected between pins 3 and 4 of U3—the voltage sense and current-source pins, respectively. This capacitor adds additional, optional, programmable delay to the MC3423's turn-on. This capacitor's value is not marked on the schematic, so hopefully it is a very small capacitor. [See Feedback; it is a 0.1- $\mu$ F polystyrene capacitor—Ed.]

The MC3423 IC is designed for providing firing current to the gate of a large SCR connected directly across the output of the supply. As soon as the SCR has current spreading across its gate, supply shutdown begins. The SCR keeps the output voltage low until the protective fuse or other shutdown devices can activate. Hopefully, the voltage drop across the SCR during turn-on will not be enough to damage circuits connected to the supply.

Frankly, I wouldn't tie any voltage-critical devices, typically RF finals, to the Ultimate supply. By the time the overvoltage protection kicks in, most devices would be destroyed.—*Al Nowakowski, W4VP, 4741-F Courtney La., Raleigh, NC 27604*

□ Regarding the otherwise excellent article, "Construct the 'Ultimate' DC Power Supply," I was concerned to read the suggestion of replacing a 15-A circuit breaker with a 20-A breaker because "most modern wiring can handle 20 A." The current-handling capacity of a wire is based on its diameter (American Wire Gauge), conducting material (usually copper or aluminum) and insulating material. Number 14 copper wire should be protected with no greater than a 15-A circuit breaker. If by odd chance a no. 12 copper line is protected by a 15-A circuit breaker, only then would a 20-A circuit breaker substitution be safe.

The National Electrical Code further requires a circuit be loaded to only 80% of its rating, or rated at 125% of the load. At 117 V, however, a 2500-W load should be run on no. 10 AWG copper and protected by a 30-A breaker [(2500 W/117 V)  $\times$  125% = 26.7 A]. The suggestion to use a 234-V line is good, thus requiring only no. 14 AWG copper wire and a 15-A breaker (2500 W/234 V  $\times$  125% = 13.4 A). Both options would most likely require a dedicated circuit.—*John Hatten, N7BWX, 604 12th St., Bellingham, WA 98225*

## Feedback

□ Please refer to "Designing a 2-Meter Portable Yagi," June 1985 *QST*. On page 31, in the last line of text,  $R_f$  should be  $R_s$ . This alters Eqs. 1 and 2. Eq. 1 should read

$$X_s = \pm \sqrt{R_s (Z_0 - R_s)}$$

and Eq. 2 should be:

$$X_p = \frac{R_s \times Z_0}{X_s}$$

$R_s$  and  $R_f$  are used properly in all other places in the article.

□ In Fig. 1 of "The Radio System Integrator," June 1985 *QST*, p. 20, a connection should be shown between the junction of RFC1/C2/T1 and R6/R7.

□ Thanks to Stas Andrzejewski, W6UCM, for the following information regarding "A Simple 10-M FM Receiver," *QST*, Jan. 1985, pp. 19-21. On page 20, Fig. 2, the lead from the 120-pF SM capacitor that connects to the junction of Y1, the 50-pF SM capacitor and pin 1 of U2 should be shown connected to pin 2 of U2 and the other lead of the 50-pF SM capacitor. The PC foil pattern and parts layout have the capacitor properly connected. Also in Fig. 2, the 2.7-k $\Omega$  resistor connected to pin 8 of U3 should be 2.7 ohms. The 1.0- $\mu$ F capacitor at the bottom of the parts-placement guide (Fig. 4) should be labeled 0.1  $\mu$ F.

Some builders have experienced problems with LO stability or failure to oscillate. For unstable LOs, remove D1, D2, the 100-ohm resistor and 10- $\mu$ F capacitor, and install a 78L05 voltage regulator as shown here in Fig. 2. If the LO fails to oscillate, increase the value of the coupling capacitor between U1 pin 7 and L1 from 33 pF to 0.001  $\mu$ F. A fine-tuning control for the LO can be had by making the circuit changes shown at pins 8 and 9 of U1. The potentiometer provides for tuning the range of 29.5-29.7 MHz by using the AFC varactor in U1. Lastly, if the quadrature coil (L3) you use has a built-in capacitor, the 270-pF capacitor across L3 is not needed.

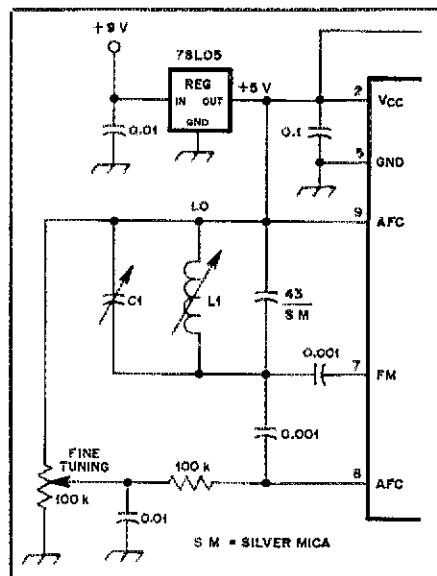


Fig. 2—Circuit changes for the Simple 10-M FM Receiver.

□ *QST* readers who are building or contemplating building "A Simple 435-MHz Transmitter," *QST*, May 1985, should write for a copy of the information we recently received from author Reed. Send a business-size s.a.s.e. to the Technical Department Secretary, ARRL, 225 Main St., Newington, CT 06111, and request the 435-MHz Update.

□ Refer to Fig. 1 of "Construct the 'Ultimate' DC Power Supply," July 1985 *QST*, page 26. The capacitor connected between U3 pins 3 and 4 and ground should be marked 0.1- $\mu$ F polystyrene.

# Clarence D. Tuska—1896-1985

The last surviving pioneer of early organized Amateur Radio, Clarence D. Tuska (ex-1WD and 1ZT)—cofounder and first secretary of the American Radio Relay League, as well as cofounder and first editor of *QST*—passed away June 20, 1985 after a long illness. He was 88.

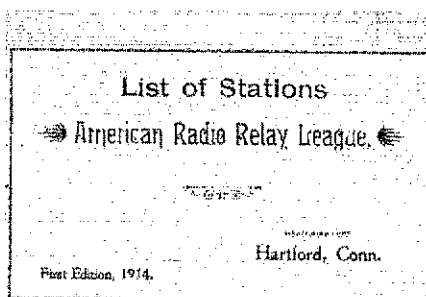
Clarence Denton Tuska was born in New York City on August 15, 1896. At age 11, he was experimenting with wireless reception, using a coherer and then graduating to an electrolytic detector. After the Tuska family moved to Hartford, in 1908, Clarence, then a high school student, established a full-fledged amateur station, using the call sign SNT. Needing pocket money, he built several simple receiving sets—slide tuner, crystal detector, single headphone—for consignment sale in a local hobby shop. The noted inventor Hiram Percy Maxim, prompted by his son Hamilton's interest in wireless, tried one of the receiving sets. When it failed to perform to their satisfaction and they returned it, Tuska paid a somewhat timorous visit to the Maxim household to find out why. It developed that what was desired was a "more powerful" set, and Tuska left with an order for a loose coupler, variable condenser, crystal detector and Brandes Navy phones. It served the Maxims well for several years.

But more important, the meeting initiated a solid friendship destined to have considerable impact on the future of Amateur Radio. In those days, primitive equipment limited the distance any one station could reach. How to expand coverage was a regular topic at club meetings, such as the new Radio Club of Hartford, which Maxim and Tuska had joined (the latter as secretary). Both had ideas for some kind of relay system for expanded communication capability. The youngster had in mind a "one-shot" demonstration, say from Hartford to Buffalo. But in the famed inventor's vision, a relay system could constitute a basis for holding together a body of amateurs on a national basis, where other attempts to organize had failed. In March 1914, he proposed the club undertake such a project.

The club approved the concept and agreed to sponsor the effort and to help with finances. Application forms for membership in "The American Radio Relay League," along with announcement of the relay project, were sent to every known amateur operator. There were no



Clarence D. Tuska, ex-1WD and 1ZT, cofounder of the ARRL and *QST*.



## ANNOUNCEMENT

¶ *QST* is published by and at the expense of Hiram Percy Maxim and Clarence D. Tuska.

¶ Its object is to help maintain the organization of the American Radio Relay League and to keep the Amateur Wireless Operators of the country in constant touch with each other.

¶ Every Amateur will help himself and help his fellows by sending in 25 cents for a three months' trial subscription.

THE PUBLISHERS OF *QST*

dues. Response was overwhelming. Tuska handled all of the heavy paperwork load from his parents' home in Hartford. By August, more than 200 relay stations had been appointed. But differences between the two visionaries and the club on policy matters led to each organization going its own way.

Later in the year, the League published a call book, *List of Amateur Stations*, which sold for 50 cents—with a national map of station locations and a pad of message blanks thrown in. In mid-1915, the two recognized the need for a monthly bulletin of some kind, and *QST* was born—at 10 cents a copy or 25 cents for a three-month trial subscription. Editor Tuska produced the first issue, dated December 1915. Copies of it and later issues were wrapped for mailing on the Tuska dining-room table. Maxim himself regularly delivered two mail sacks full of *QST*'s to the post office in his Franklin automobile. (Also see *QST Profiles*, November 1981, p. 81.)

The association—and the magazine—grew by leaps and bounds, until the coming of World War I shut down amateur stations. Indeed, Tuska himself went into service, commissioned in the radio section of the Signal Corps, where he set up and supervised radio-operator training schools.

After the war, the League resumed operation and, through the sale of bonds to amateurs, bought *QST* for its official organ. But Tuska turned once more to the commercial field, forming the C. D. Tuska Company in Hartford, which made the famous "Superdyne" and other sets, and the "Tuska Tickler." He also had a small broadcast station. In view of all this activity, he severed his connections with *QST* and the League. Later, he joined the Atwater Kent Company as a patent specialist. In 1935, Clarence was named director of patents for the Radio Corporation of America in New Jersey, where he served until retirement and lived until his death.

If there is a Hall of Fame of Amateur Radio Silent Keys in the great beyond, a special section for early pioneers would include such distinguished names as Hiram Percy Maxim, Charles A. Stewart, Arthur A. Hebert, Kenneth B. Warner and Francis E. Handy, to mention a few. Clarence D. Tuska is now most certainly an illustrious member of that eminent group.—*WIRW*

# VEC Report Card

The FCC has confirmed it: Volunteer Examiner Coordinators are generating some happy news for the Amateur Radio Service!

By Curt Holsopple, K9CH  
 Manager, ARRL Volunteer Examiner Department

**A**round the middle of every month there is an election-night air of anticipation in the ARRL/VEC office. That's when the FCC reports the test-activity statistics for the previous month. Month after month, the news gets better.

The accompanying tables tell the story in detail. In Table 1, the Volunteer Examiner Coordinators (VECs) are ranked according to the number of tests administered by their respective VE Teams. Out of 28 VECs sanctioned by the FCC to coordinate test sessions, the top five handle about 85% of the examinations by hundreds of VE Teams all over the nation and even overseas.

## What the VECs Are Doing

Table 1 shows the top five VECs and their activity for the first half of this year. As you can see, the ARRL/VEC is coordinating the majority of the VE Teams (almost two-thirds, so far in 1985). We are proud of the job *all* Volunteer Examiners are doing to bring license exam opportunities to the Amateur Radio community.

By the way, most of the VECs who do *not* work directly with the ARRL use the same question pools. We applaud those VECs for recognizing that the candidates deserve a fair shake and, therefore, use test questions for which license manuals are available. Just as radio waves have no regard for city limits or state boundaries, testing should be consistent for all licensees.

## VEC Performance Ratings

Each month, the FCC publishes performance data on the VECs, rating the percentage of Form 610 applications submitted late or with errors, plus other criteria. The numbers for June 1985 appear in Table 2. We think this monthly rating is a good idea. The FCC's VEC "report cards" give useful feedback to our VEC office staff. This kind of guidance will do much to promote quality control among all VECs, and will ultimately benefit the people taking the tests.

The ARRL/VEC generates new test designs monthly. We're still accrediting hundreds of new Volunteer Examiners every month. We answer dozens of phone

calls and letters every week. Despite that workload, we process thousands of applications for new and upgraded licenses each month. With a full-time staff of only six persons to handle all of that, we're pleased with our low error rate and are looking for ways to push it still lower.

We know we're not perfect, but we're

doing all we can to be the best we can be. When an error crops up, we do everything possible to resolve it quickly.

## ARRL/VEC Activity

Table 3 shows the test activity handled through the ARRL/VEC office in the first six months of 1985. We served almost 15,000 candidates through almost 900 test sessions in that time.

The ARRL/VEC test records show that after 10 months of test activity, 45% of our 6500 accredited VEs have already served in one or more test sessions. We know that many additional VEs are accredited by the ARRL but serve under other VECs; so more than half of the VEs are active—a fine record of achievement!

## Licensing Totals

New and upgraded licenses are on an upswing (see Table 4), according to data released from the FCC at Gettysburg. These are the first months of data showing VE-administered tests without any help from the FCC Field Office examiners. We see an upward slope to the numbers through June 1985, although we expect some up-and-down pattern in the long run—some months are bound to be more popular than others for holding test sessions.

The many hundreds of hours of dedicated work given by the Volunteer Examiners have contributed to the first real growth the Amateur Radio Service has seen in a long time. That's important as we face continued battles over reallocation of our frequencies.

## A Letter from the FCC to VECs

Recently, Raymond A. Kowalski, Chief of the Special Services Division of the FCC Private Radio Bureau, wrote to all Volunteer Examiner Coordinators. If you're involved in the Volunteer Examiner Program, you should find his comments interesting.

... I am ... asking each of you to evaluate your future activities as a VEC in light of your accomplishments to date.

**Table 1**  
**Test Activity, Jan.-June 1985†**

VEC Organization	Sessions Handled	Elements Given	National Share
ARRL	881	21,558	63.2%
W5YI	154	2978	8.7%
Central Alabama	113	2275	6.7%
DeVry	94	1259	3.7%
Metroplex	40	1162	3.4%
23 other VECs	262	4881	14.3%
Total	1544	34,158	100.0%

†Based on FCC data

**Table 2**  
**FCC's VEC Ratings for June 1985**

VEC Organization	Defective Session Summary Reports
Mid South	1 of 1 (100%)
BEARS	1 of 6 (16.67%)
W. Carolina	1 of 6 (16.67%)
ARRL	10 of 187 (5.3%)
W5YI	1 of 37 (2.7%)
All others	None

VEC Organization	Defective Form 610 Applications
Milwaukee	7 of 11 (64%)
W5YI	3 of 15 (20%)
Laurel ARC	1 of 43 (2%)
ARRL	24 of 2479 (1%)
Central Alabama	1 of 220 (.5%)
All others	None

VEC Organization	Results Submitted Late to FCC
Dunedin	1 of 1 (100%)
ARRL	9 of 187 (5%)
All others	None



**Table 3**  
**ARRL/VEC Test Sessions Summary, Jan. 1-June 30, 1985**

*Results of All ARRL/VEC Sessions by Element*

	1A 5 WPM	1B 13 WPM	1C 20 WPM	2 Novice	3 T/Gen	4A Adv	4B Extra	Total
Passed	711	2548	1408	835	4487	1885	1043	12,917
Given	1027	6560	2248	946	7248	3313	1598	22,940
Pass rate	69%	39%	63%	88%	62%	57%	65%	56%

*Tally of Sessions Completed by ARRL/VEC Teams*

Call Areas	1	2	3	4	5	6	7	8	9	0	Alaska	Caribbean	Pacific	Over-seas
	74	69	57	107	119	64	84	128	58	134	0	13	8	7

*Tally of License Upgrades in ARRL/VEC Sessions*

Technician	3185
General	2139
Advanced	1624
Extra	993
Total	7941

*Statistical Summary*

Candidates served	14,882
Sessions completed	922
Avg. candidates/session	16

The VEC System is now in high gear. Many more examinations are being administered than could have otherwise been administered under the former system. Yet some VECs are coordinating

only a small fraction of the total number of examination sessions being held in their region. Others are only serving a small segment of their regions. Some have yet to coordinate a single session.

**Table 4**  
**FCC Licensing Data, Jan.-June 1985**

Month	New Licenses	Upgrades
Jan.	1343	1097
Feb.	1242	1454
March	2001	1923
April	2043	1434
May	2174	2794
June	1186	2120
Total	9989	10,822

If you are one of these, I recommend that you join forces with another VEC. For example, the Dayton Amateur Radio Association, which played a major role in the initial phase of the program, recently determined they could meet their current needs by utilizing the VEC services of the ARRL. DARA informed us of their determination and today they are no longer a VEC. That was a responsible decision by DARA . . .

By the way, a few weeks after Ray Kowalski wrote his letter, the Mid-South VEC of Memphis, Tennessee, decided to cease VEC operations and use the services of the ARRL. Several other VECs have indicated that they will examine their situations monthly, and that further mergers with the ARRL/VEC are likely.

We are happy to handle the hassles involved in generating high-quality test materials and data processing the test results. This kind of work is best handled by a centralized, professional, experienced staff. The ARRL's approach to the Volunteer Examiner Program frees the local VE Teams to concentrate on scheduling and conducting the test sessions needed to serve their local needs.

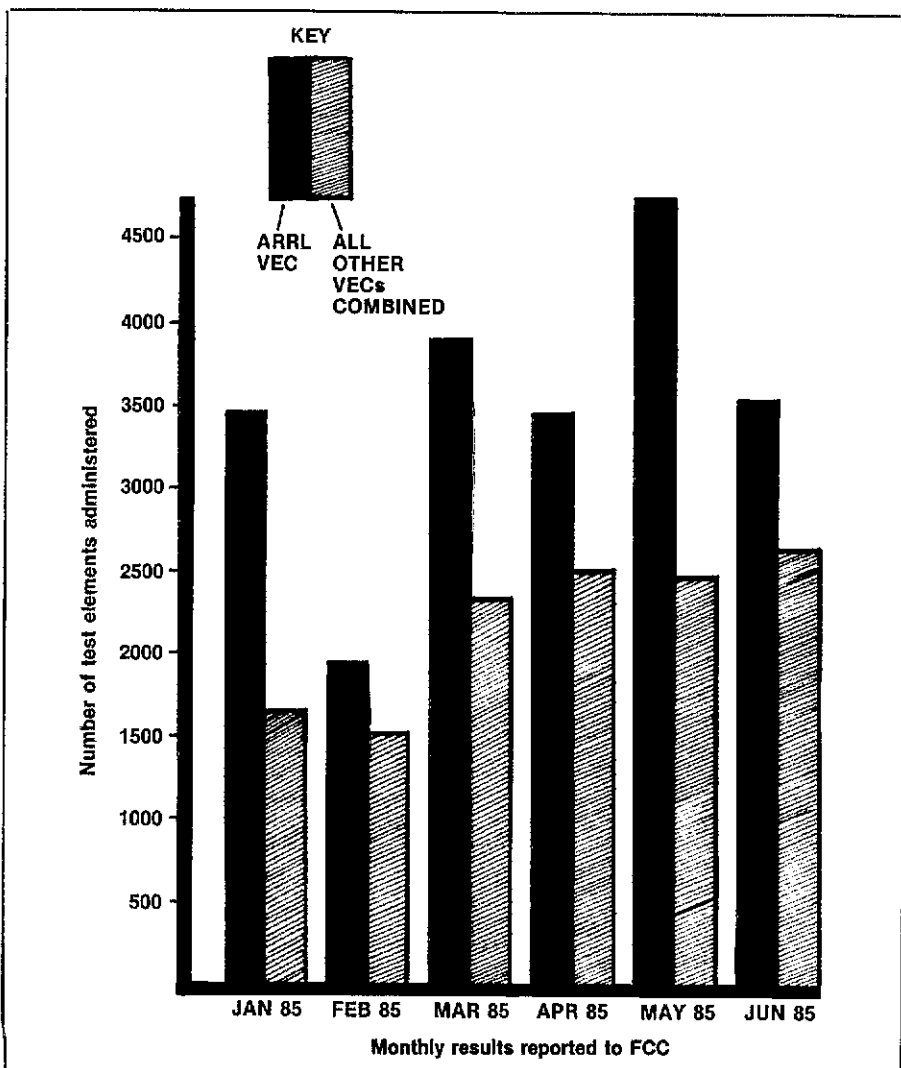
**Where to Take A Test**

If you want to take an exam and have not used the Volunteer Examiner Program, check with your local Amateur Radio club, listen for announcements on local repeaters or send an s.a.s.e. to ARRL Hq., Test Sessions, 225 Main St., Newington, CT 06111. Ask for test sessions scheduled in your state. Our listings are updated daily.

**More to Come**

In coming months we'll take you on a photo tour of a test session, the ARRL/VEC office and the FCC's licensing facility at Gettysburg. We're excited about the way Volunteer Examiners have taken hold of the VE Program. If you know someone who is an accredited Volunteer Examiner, why not pass along your thanks to them for a job well done.

If you are an Advanced or Extra Class licensee and want to become a Volunteer Examiner, we'd be happy to welcome you aboard! Just send a note to the ARRL/VEC Office in Newington. We'll get accreditation information right out to you.



This graph shows the strong growth in test activity in the first half of 1985.

# Contesting for Noncontesters

If you're not into competing, that's okay. Contests can be just for fun, too.

By Robert J. Halprin, K1XA  
Deputy Manager,  
Membership Communications Services



THE HUNT-AND-POLNCE TECHNIQUE IS THE BEST WAY TO START OUT.

It's the cool of a picture-perfect summer evening. You're sitting on the porch, enjoying the ambience of your serene residential neighborhood, and everything is grand and glorious. Then it happens—the roar of a dozen throbbing Harley-Davidsons invading your quiet environment. Trouble in paradise.

Isn't this analogous to what most hams think about the onslaught of contesters during an otherwise carefree ragchew weekend on the amateur bands? And why not? After all, ragchewing, the purest and mellowest form of communication, is the bread-and-butter of Amateur Radio operating, while contesting is life in the fast lane. Contesting is basically seeing how many stations you can work in a limited amount of time, as specified in the particular contest rules. Usually, a premium is placed on working as many different geographical areas (which could be states, ARRL Sections, grid squares, DXCC countries, and so forth) as possible. These geographical areas are called "multipliers." The contest score is generally the number of QSOs (or QSO points) times the number of multipliers. Contesting is like putting your normal hamming into fast forward!

Sure, it's all been said before. That is, there is always some substantial portion of the low-band frequency spectrum free and clear for noncontest activities. But how about a different approach? Instead of heading for the hills, why not participate, even if only briefly, in contests? In other words, if you can't lick 'em, join 'em. Contests are fun, and there's always room for the noncontester to jump in for a few contacts.

These competitions come in all shapes

and sizes, and you don't have to spend all weekend neglecting your family or other responsibilities to join in. Relatively few contesters even come close to operating the maximum allowable number of hours in the contest period. So there is *no* fundamental difference between a contester who puts in an hour or two and a noncontester who does the same. Most amateurs don't play contests to win. Only a small group of enthusiasts (see "The Contester's Persona" sidebar) go all out, so virtually everyone else taking part is in the same boat. Indeed it's the multitude of casual participants that keep the contest program alive and well.

## The True Story

Obviously, the principal question is what contests and contesters can do for *you*, the noncontester. Initially, let's lay to rest the myth about being "in the contest." You can spontaneously work as many, or as few, stations as you want (as previously indicated, only a small percentage of the competitors play to win). And you go at your own pace. You're free to choose; working stations in the contest is simply one of many fun things to do while you're just tuning around the bands.

You *do not* need to register in advance, fill out forms or get an entry number and official jersey. Nor do you need "official logs." You can operate as much as you want, and you are under no obligation whatsoever to send in a log to the organization sponsoring the contest.

Indeed, no one is "in the contest" until he or she submits an official log. Keep in mind, however, that should you decide to submit a log, the use of the official log and summary forms (typically available for an

s.a.s.e.) is tremendously appreciated by the log checkers. Further, you can submit your log for noncompetitive purposes (called a "check log"), to aid the contest checkers in cross-checking others' logs for accuracy. Either way, don't hesitate to submit even a modest score; but you are absolutely under no obligation to do so—no salesman will call! Also, you need not be a League member, a subscriber to *CQ* magazine or the lead singer of *Kool and The Gang* to participate. But if you do send in an entry, be sure to retain a complete photocopy of all submitted materials for your records and for QSLing.

So much for myths. Here are some real advantages to operating contests: It gives you something more purposeful to do when you're otherwise scanning the bands (often looking for something to do). It helps you to continually gauge the effectiveness of your antennas and your operating prowess, and the combination of the two—in other words, what you can do with what you've got!

If you're interested in obtaining the numerous awards that are out there in radioland, you might remember that making the requisite contacts for these awards under routine operating conditions is often labor-intensive. In the fast-paced environment of a major contest, it's incredible how quickly you can rack up those states, DXCC countries, prefixes, grid squares or whatever your heart desires (in the framework of the particular contest, of course) to qualify for those neat awards.

Table 1 summarizes the basics of the major contests. A "major" contest is one that sports a high activity level, presumably a more desirable training exercise than one with fewer participants. But you might find

**Table 1**  
**Major Contests**

Month	Contest	Scope	Exchange	For More Information	Month	Contest	Scope	Exchange	For More Information
Jan.	ARRL VHF Sweepstakes	Primarily W/VE	Grid-square locator	Dec. QST	May	CQ WPX Contest (CW)	International	See above	See above
Jan.	CQ Worldwide 160-Meter Contest (CW)	International	W/VE: signal report and state/province; DX: Signal report and QTH	Dec. CQ; Contest Corral, Jan. QST	June	ARRL VHF QSO Party	Primarily W/VE	Grid-square locator	May QST
Jan.	73's 160-Meter World SSB Championship	International	W/VE: signal report and province; DX: signal report and country	Dec. 73; Contest Corral, Jan. QST	June	All Asian DX Contest (phone)	Asian stns. work others	Signal report and age	Contest Corral, June QST
Jan.	73's 75-Meter World SSB Championship	International	See above	See above	June	ARRL Field Day	Primarily W/VE	Transmitter "class" and ARRL Section	May QST
Jan.	73's 40-Meter World SSB Championship	International	See above	See above	July	IARU Radiosport Championship (phone and CW)	International	Signal report and ITU zone	May QST
Jan.	73's 20-Meter World SSB Championship	International	See above	See above	July	CQ VHF WPX Contest	International	Consecutive QSO serial number and call sign	Feb. CQ; Contest Corral, July QST
Jan.	73's 15-Meter World SSB Championship	International	See above	See above	Aug.	Worked All Europe (CW)	EU stns work others	Signal report and consecutive QSO serial number	Contest Corral, May QST
Feb.	ARRL Novice Roundup	Novices/Techs work others	Signal report and ARRL Section	Jan. QST	Aug.	All Asian DX Contest (CW)	See above	See above	Contest Corral, July QST
Feb.	ARRL DX Contest (CW)	W/VE stns work DX stns	W/VE: signal report and state; DX: signal report and power	Jan. QST	Sept.	Worked All Europe (phone)	See above	See above	See above
Feb.	CQ Worldwide 160-Meter Contest (phone)	International	See above	See above	Sept.	ARRL VHF QSO Party	Primarily W/VE	Grid-square locator	Aug. QST
March	ARRL DX Contest (phone)	See above	See above	Jan. QST	Oct.	CQ Worldwide DX Contest (phone)	International	Signal report and CQ zone	Sept. CQ; Contest Corral, Oct. QST
March	Spring RTTY Contest		UTC, signal report and consecutive QSO serial number	Contest Corral, March QST	Nov.	ARRL Sweepstakes (CW)	W/VE	See October QST	
March	CQ WPX Contest (phone)	International	Signal report and consecutive QSO serial number	Jan. CQ; Contest Corral, Feb. QST	Nov.	ARRL Sweepstakes (phone)	W/VE	See October QST	
May	USSR CQ-M Contest (phone and CW)	International	Signal report and consecutive QSO serial number.	Contest Corral, April QST	Nov.	CQ Worldwide DX Contest (phone)	International	See above	See above
					Dec.	ARRL 160-Meter Contest (CW only)	International	W/VE: signal report and ARRL Section; DX: signal report.	Nov. QST
					Dec.	ARRL 10-Meter Contest (phone and CW)	International	W/VE: signal report and state/province; DX: signal report and consecutive QSO serial number	Nov. QST

that such ample activity levels are *too* much of a good thing, so lower-profile contests may be more to your liking, particularly when you're new to this form of operating. These run the gamut from state QSO parties and other special-interest contests to European, South American and other international encounters. Each contest, regardless of size, yields some valuable experience and enjoyment toward becoming contest-ready.

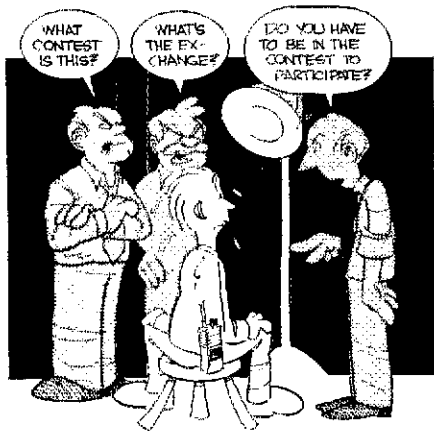
If you happen to live in a "rare" state, ARRL Section (see page 8 of *QST*), grid square or even a rare country, you can have a lot of fun and at the same time make

many contesters happy by giving them that avidly sought after multiplier. The amateur world will beat a path to your door—you'll have instant celebrity status! Find a good frequency (logically on the band that is most open at the time), call CQ, and let the good times roll! You'll be surprised how fast you can fill up those log pages, and you'll understand quickly why contesters derive so much pleasure from running contacts. (Note that, as discussed below, it's more desirable to be hunting-and-pouncing rather than CQing at the outset of your contesting endeavors.)

On some bands, contests are about the

only times you can expect to work anybody. This is particularly true with 10 meters under the present sunspot conditions, as well as 15 meters to a certain extent, and the VHF (non-FM) and some UHF bands. So operating during contests can be an efficient, if not the only, way to gain some significant experience on these frequencies.

The predictability of contest operation is another advantage, primarily on code. Since you can pretty well anticipate the component parts of the exchange, you'll probably feel more relaxed in CW contesting, even if the code is not necessarily your mode of preference. And predictability notwithstanding



standing, if increased code speed is what you're after, consider that one local Novice nearly doubled his code speed over the course of one contest weekend!

The bottom line is that contests—even during less-desirable band conditions—set the stage for all sorts of people and places to show up, and they all can be worked with reasonable effort. If you put yourself on a band under contest-activity periods, good things are bound to happen.

### Hunting-and-Pouncing

When you first start out, it is preferable to concentrate on hunting-and-pouncing—tuning for stations calling CQ CONTEST and responding to them. This is a great way to acclimate yourself to the contest environment; you probably shouldn't try to run stations until you have sufficient contest experience under your belt. Tune around and listen until you feel comfortable with the goings on, pick out a contester who sounds like he knows what he's doing, listen to the give-and-take and, when you're ready, go for it!

Indeed, you may find that hunting-and-pouncing—the thrill of the hunt—is so attractive that it's all you'll ever want to do in contests. It is certainly understandable that you may not see the point of running strings of "stereotyped" QSOs when you can be selective as to what you work. Further, you may prefer to collect multipliers in a given contest on a one-of-a-kind basis, such as making one contact in each ARRL Section for the "clean sweep" in the ARRL Sweepstakes, or aiming to make one contact per DXCC country heard in the CQ Worldwide or ARRL DX Contest. So you may find quality rather than quantity more suited to your personal operating tastes, and that's fine.

### Contest Protocol

Are you convinced there's something for you in contesting? If contesting is now in your future, it's important to keep in mind some matters of protocol.

When you are working your way up or down the band hunting-and-pouncing, please don't stop a contester's 100-contact

hour to ask what the contest is. Listen around first for a few minutes to get the particulars on your own, including the required contest exchange, or check *QST's* Contest Corral or *CQ's* Contest Calendar (see Table 1). Don't upset a contester's rhythm, particularly when he's running strings of stations during a peak hour, with Dragnet-style questions. Think of it this way: Would you run out into the middle of a marathon and clothesline one of the runners to ask him who is sponsoring the marathon, how many miles it is, or where he bought his groovy running shoes? A contester is running a radio marathon, so similar courtesy should prevail.

Once you've determined the appropriate exchange (each contest requires different information to be transmitted), send the information once and only once—that is, after you've signed your call once when responding to a CQ TEST. Remember: FCC rules don't mandate signing the other station's call. However, if you're the one running stations, you'll obviously have to sign the other station's call so people know who you've come back to! But when you start out, you'll be tuning and replying to CQs; in this instance, signing your own call *once* is sufficient.

Unnecessary "fills" (repeats) needlessly slow everyone down. Generally, the aim is to maximize the number of contacts made during each operator's own personally limited operating time. So repeat only when asked to do so.

On the other hand, a valid contest exchange requires you to copy accurately the information sent to you by the other station. So if you need a fill, ask for it! Every attempt should be made to get each bit of information correctly; the objective is a valid two-way QSO between the parties. A shortcut you can use to avoid asking the station for fills (which is often considered annoying and intrusive) is to listen to subsequent QSOs the station is making on that frequency. In this way, you can listen to him send his call and his exchange several times to make sure your log entry is accurate. This obviously pertains to stations who are calling CQ and who will be "holding court"



Bob, KW8N, and wife Joy share the fun of contest operating together.

### Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign, and complete exchange sent and received for each QSO claimed for contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or be disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

there for a while. In short, if you miss part of the exchange at first, or even the other station's call, no harm done. Just listen to subsequent QSOs until you get it.

If you've replied to a contester who's having great success running stations on a particular frequency, your excessive repeats may threaten him with the loss of that productive frequency. A contester jealously tries to maintain his CQ frequency like a family heirloom. It's a very delicate balance, working stations efficiently while keeping the frequency clear on receive. If you painstakingly repeat your information (and it is painful to the contester who's sitting there, helplessly waiting for you to finish), some aggressive individual—who may not hear you all that well—may assume that this choice frequency is unoccupied. He then will swoop in and start banging out CQ TEST at 40 dB over 9. This causes extreme heartburn for the innocent contester who has been on that frequency for a substantial amount of time working stations one after another.

Be prepared, also, for the brevity of the contester's transmission to you. Don't be put off by a contester's seemingly impersonal nature. In the heat of battle, the most you'll get in addition to the exchange is an R (roger) or TU (thank you). That's about it, the bare essentials. Often (on CW), the entire "script" is programmed into a

## The Contester's Persona

While this article is primarily for you, the *noncontester*, it's useful to get "into the head" of the serious contester, the kind of amateur sufficiently warped to devote a good deal of the weekend to the event. Strange as it may seem, spending the weekend exchanging signal reports and other so-called information machine-gun style is considered fun, even though no real communication—in the conversational sense—occurs. Some suggest contests are even dehumanizing, and they may be right, particularly if you've seen a contester slumped over his radio, haggard and needing sleep (if not a shower) during one of the major contests—a certified zombie.

For some reason, weird or otherwise, contesters get their kicks from pushing themselves and their gear to the limit, sharpening operating skills and station efficiency. It's the same kind of personal satisfaction people derive when they compete in marathons, work out with weights, play tennis or racquetball, and so on. Contesting makes a person feel fulfilled and stimulated, even though exhaustion overpowers everything else, at least in the short term. It doesn't seem that sitting in a chair in front of a radio would be that strenuous, but try doing it for 24 hours or so. In fact, it only takes an hour or so before the hallucinations begin to set in.

For most contesters, life is perfect when conditions are good, when there are plenty of contacts and multipliers to be had, and particularly when a contester is able to stake out one prime frequency, and "CQ-in" one contact after another (i.e., "running"). At this point, the adrenalin is really flowing—whatever delirium may have set in as a result of disruption of the normal sleep pattern—and the relentless pounding of signals inside headphones is no longer a factor.

But contesting—like life—is not perfect. Depending on the contest, there are slow hours, and the "rate" (number of contacts made per hour) plummets. Eyelids become as heavy as anvils.

Contesters, in their self-indulgent way, want each contest to be like an all-you-can-eat shrimp-and-salad bar. They want to keep going back for more, and their reservoir can never be filled. So why not help them out? Keep those contesters busy, awake and satiated.

memory keyer, with no wasted words. On phone, a tape loop is often used to preserve those vocal cords.

At all times, the avid contester has his eye on the clock, trying to maintain the highest rate possible. So don't be offended if he doesn't stop to chat; your contact is, nevertheless, greatly appreciated, because they do add up. And there's plenty of time to engage in dialogue after the fray.

Most contest rules allow for working a station once per band (typically, the major contests have separate and distinct weekends for phone and CW, which are considered separate contests). The ARRL Sweepstakes is an exception—you can work a station only once, regardless of band. The point here is that once you've had your chance, don't keep calling a station you've already logged. Working a station on a band on which you've already had a complete two-way QSO is called a "dupe," which counts 0 points. A good method to avoid this is to use a "dupe sheet," such as ARRL's CD-77, which is a convenient way to write in the calls by prefix. At a glance, you can tell whom you've already contacted.

Another thing to consider is that participation in contests does not require a "big" station. You can join in the fun with any kind of gear, including low power. And it should be mentioned that many of the remarkable scores listed in various contest write-ups are made with standard tribanders and routine wire antennas. Indeed, your

present station may be *better* equipped than those in use by many contest regulars.

### Making Contact

Suppose one Saturday you're casually tuning across the low end of 20 meters and you hear Mike, KH6ND, calling CQ TEST. Having read this article (and committed its contents to memory!), you decide that it would be real slick to work Hawaii to wrap up your Worked All States award. So you listen around the band for a minute or two, and rapidly determine that this particular contest merely requires the exchange of signal report and state. And you're off:

KH6ND K1XA

CQ TEST TEST

DE KH6ND KH6ND K

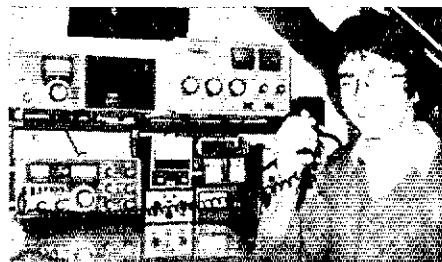
K1XA 599 HI K

R TU KH6ND QRZ

R 599 CT K1XA K

K1XA

And the contact, and your WAS, is history. Hawaii is now in your logbook, and you don't need to be Laurence Olivier to remember all your lines in this little drama. It couldn't be easier; KH6ND also gets another contact for his contest effort. So everyone wins.



In Ahlhorn, West Germany, the ARRL DX Contest has become a family pastime. Tom, DL5BAN, is active on 10-meter SSB, sharing the operating position with his father, Peter, DK4BW.

Here's how it would go on phone:

KH6ND K1XA

CQ CONTEST FROM

KILO-HOTEL-SIX-NOVEMBER-

DELTA CONTEST

K-ONE-XRAY-ALFA

K1XA 59 HAWAII

ROGER 59-

CONNECTICUT

K1XA

THANK YOU QRZed

KH6-NOVEMBER-DELTA

Other contests require a somewhat more elaborate exchange. Regardless, you have an open invitation to jump right in, whether it's a domestic or DX contest, phone or CW, single band or all band, RTTY or VHF, and so on. The most popular contests—where you might encounter the most activity—are listed in Table 1.

The rules for ARRL contests are given feature treatment in *QST*, as are the results, while the rules for numerous other important contests are summarized in *QST*'s monthly Contest Corral column and in other Amateur Radio periodicals. January *QST* features a calendar of the major ARRL contests for the upcoming year. You might also consider obtaining a copy of *The ARRL Operating Manual*, which devotes a full chapter to this subject and contains many valuable hints.

So, next time the commotion on your favorite frequency seems as tumultuous as the soundtrack of a rock video, remind yourself that contesting is part of what makes our Amateur Radio hobby rich and unique. But don't stop there, because there is no real substitute for actually sitting down in front of a radio and making real contacts during an actual contest. Why not broaden your Amateur Radio experience, and have some fun, by personally savoring the friendly competition of contesting. And when you do, going at it at your own pace and within your available spare time, don't be surprised when you get so charged up and feeling good that you'll get carried away by all the action!

# ARRL Board Meets in Hartford

Repeater coordination, attracting youth, and call-sign and band-plan proposals highlight the July 25-26 Second Meeting.

By W. Dale Clift, NA1L  
Executive Associate, ARRL

The 1985 Second Meeting of the Board of Directors of the American Radio Relay League was held at the Parkview-Hilton Hotel in Hartford, Connecticut, on July 25-26. Representatives of each of the 16 regional ARRL Divisions were present. The names and addresses of all Directors appear on page 8 of this *QST* under the headings of their respective Divisions. In following the actions of your elected representatives in the pages that follow, containing the official Minutes of the meeting, bear in mind that a lot of behind-the-scenes work is done in committees and in drafting motions both before and during the meeting. Board members who make few motions themselves generally contribute in a myriad of other ways to the smooth functioning of the League's decision-making team.

## Repeater Coordination

Among the highlights of this meeting,

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***The ARRL recommends that the FCC in a future proceeding consider "the procedural framework within which frequency coordinators are recognized." Minute 74***

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the Board established the policy of the League with regard to FCC's repeater-coordination proposal in Docket 85-22.

**Table 1**

### ARRL Band Plan for 24-MHz Band

24.890-24.920 MHz	CW only
24.920-24.930 MHz	CW and digital
24.930-24.990 MHz	CW, phone and SSTV

(See Minute 39)

ARRL Counsel is directed to file in support of preferred status for coordinated repeaters; frequency coordination is strongly urged but not mandated; coordination should be on a local or regional level; and the scope of coordination should include auxiliary operation. A related Board action directs that there be a study of the costs of ARRL maintaining a national repeater data base for use by coordinators.

## Recruitment, Lower Youth Dues

Recruitment of youths into the Amateur Radio Service and onto the membership rolls of the League remains a high priority. The Board adopted a reduced ARRL Full membership rate for youths. See League Lines, this issue, for details. Staff was encouraged to cooperate with and supply information about Amateur Radio to youth groups. There is also to be a program designed to integrate Amateur Radio into the curricula of the electronics and communications schools of the nation's armed forces.

## Amateur Examinations

There were several actions related to Amateur Radio examinations. The Board went on record in favor of having FCC retain the responsibility for all amateur exam question pools, with Volunteer

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***"... the League adheres to the principle that the FCC retain responsibility for all Amateur Radio examination question pools ... " Minute 35***

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Examiner Coordinators (VECs) responsible for creating the actual tests therefrom. The League will also petition the FCC to require that two General or higher class operators, rather than one, administer

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***ARRL Counsel was instructed to amend the League's position "so as to maintain the present power limits in the Novice bands below 28 MHz." Minute 81***

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a Novice test, should the Commission enhance the Novice license by increasing privileges. The ARRL Executive Committee will also study the need for a revision to FCC rules to standardize Morse code

## ARRL Organizational (Regarding Articles of Association and Bylaws)

Minute	Purpose	Disposition
16	Amend Bylaw 4, dues on installment basis	Lost
73	Amend Bylaw 6, lower youth dues	Adopted

## Other ARRL Organizational Matters

21	Policy concerning contacts with federal government	Adopted
31	Develop plan to promote local Memoranda of Understanding to assist ARES	Adopted
37	ARRL badges for additional field appointees	Tabled
41	Membership promotion by QSL Bureaus	Adopted
42	Advisory Committees' meetings funded	Tabled
43	ARRL Computer Networking Conference scheduled	Adopted
49	ID badges for ARES	Referred to Committee
52	Advisory Committee members to submit reports	Adopted
53	Study new membership category for clubs	Adopted
54	Commend staff and volunteers in exam program	Adopted
71	Recommendations strengthening CRRL	Adopted
72	\$3000 for employee incentive awards	Adopted
75	Commendation re 24-MHz band access	Adopted
78	Study ways to strengthen Technical Information Service	Adopted
83	Commend QSL Bureau volunteers	Adopted

## Amateur Radio Operations

30	Add Pribilof Islands to DXCC list	Tabled
36	Special Service Clubs certify WAS, 5BWAS, VUCC	Adopted
39	Band plan for 24.890-24.990 MHz	Adopted
50	Ad Hoc Committee on spread spectrum	Adopted
58	Amend 220-225 MHz band plan	Adopted
59	Study costs of national repeater data base	Adopted
60	Amend 440-450 MHz band plan	Adopted
67	Reevaluate 23-cm repeater offsets	Adopted
68	Eliminate ARRL QSO Party contest	Adopted
69	Study 420-450 MHz repeater band plan	Adopted
74	Repeater coordination comments, Docket 85-22	Adopted

## Legal and Regulatory (Nonoperating)

35	FCC retain responsibility for exam question pools	Adopted
45	Review of one-hour RACES test limit	Adopted
56	Propose to assist FCC assign call signs	Adopted
57	Study insurance needs during emergency operations	Tabled
65	Require two or more examiners for Novice	Adopted
66	Study testing procedures for code proficiency	Adopted
81	Maintain present power limits in Novice bands below 28 MHz	Adopted

## Publications/Media

38	Study desirability of publications feedback card	Adopted
40	Study feasibility of videotape explaining packet radio	Adopted
44	Field Organization recruitment/education brochure	Adopted
46	Thank DARA for help with ARRL PSAs	Adopted
47	Pamphlets promoting Amateur Radio	Adopted
51	Staff encouraged to work with youth groups	Adopted
62	Thank volunteers for help with ARRL PSAs	Adopted
76	Amateur Radio in Armed Forces curricula	Adopted

## Miscellaneous

61	Tenth Pan-American games	Adopted
63	Certificates for Amateur Extra Class	Adopted
64	Technical Excellence Award to AJ3K	Adopted
70	Determine 1984 Instructor of the Year	Referred to Committee
79	Study Amateur Radio archive	Adopted
82	Commend Senator Barry Goldwater	Adopted

Special Service Clubs will be able to certify operating awards for Worked All States, 5-Band Worked All States and the VHF/UHF Century Club (VUCC). The ARRL QSO Party contest will be dis-

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***"It was moved . . . that individuals so designated by Special Service Clubs be permitted to certify and issue the following awards: Worked All States, Five Band Worked All States, VHF/UHF Century Club." Minute 36***

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continued, and the Emergency Communications Advisory Committee will review problems caused by the current limit of one hour for Radio Amateur Civil Emergency Services (RACES) test and drill periods. Also, in view of recent FCC action looking to authorize spread-spectrum emissions in the Amateur Service, the Board created an Ad Hoc Committee to develop spread-spectrum standards.

## ARRL To Assign Calls?

The ARRL Executive Vice President is to submit to FCC a preliminary proposal to provide it with assistance in assigning amateur call signs. Ways of strengthening the ARRL Field Technical Information Service are to be studied. Recommendations pertaining to the strengthening of the Canadian Radio Relay League were approved.

## VHF/UHF Band Plans

There were several actions pertaining to VHF/UHF band plans. The 220-225 MHz band plan was changed to show repeater channel spacing of 20 kHz rather than 40 kHz. There is to be a study of the band plan for 420-450 MHz regarding repeater in/out relationships. FM repeater offsets in the 23-cm band plan are to be reevaluated by the VHF Repeater Advisory Committee.

## Following This Article . . .

A table summarizing the actions taken by the ARRL Board of Directors appears with this article. This chart and article provide only a thumbnail description of what happened, and we urge you to read the whole text of what interests you in the official Minutes, which immediately follow this article.

testing for all classes of license.

## Novice License, Awards, Spread Spectrum

The Board directed some fine-tuning of the League's proposal to enhance Novice

privileges. Counsel is to amend the ARRL position taken in RM-5038 so as to maintain the present power limits in the Novice bands below 28 MHz. In other action the Board decided that persons designated by

# Moved and Seconded . . .

## MINUTES OF THE 1985 SECOND MEETING OF THE BOARD OF DIRECTORS

### THE AMERICAN RADIO RELAY LEAGUE, INC.

July 25-26, 1985

#### AGENDA

- 1) Roll Call
- 2) Moment of silence
- 3) Consideration of the agenda for the meeting
- 4) Approval of Minutes of 1985 Annual Meeting
- 5) Oral reports of the officers
- 6) Receive reports and consider recommendations of the committees
- 7) Consideration of ARRL Position Relative to PR Docket 85-22, Repeater Coordination
- 8) Directors' motions

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in second session at the Parkview-Hilton Hotel in Hartford, Connecticut, on July 25, 1985. The meeting was called to order at 8:34 A.M., EDT, with President Larry E. Price, W4RA, in the Chair and the following Directors present: Thomas B. J. Atkins, VE3CDM, Canadian Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, K0PGM, Rocky Mountain Division; Linda S. Ferdinand, N2YL, Hudson Division; Thomas W. Frenaye, K1K1, New England Division; Paul Grauer, W0FIR, Midwest Division; Clyde O. Hurlbert, W5CH, Delta Division; Mary E. Lewis, W7QGP, Northwestern Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Millus, Jr., W4UG, Roanoke Division; Tod Olson, K0TO, Dakota Division; Fried Heyn, WA6WZO, Southwestern Division; William J. Stevens, W6ZM, Pacific Division; Hugh A. Turnbull, W3ABC, Atlantic Division; Raymond B. Wangler, W5EDZ, West Gulf Division; George S. Wilson, III, W4OYI, Great Lakes Division.

Also in attendance as members of the Board without vote were Leonard M. Nathanson, W8RC, First Vice President; Garfield A. Anderson, K0GA, Vice President; Jay A. Holladay, W6EJ, Vice President; Richard L. Baldwin, W1RU, International Affairs Vice President; and David Sumner, K1ZZ, Executive Vice President. Also in attendance at the invitation of the Board as observers were the following Vice Directors: Richard P. Beebe, K1PAD, New England Division; Evelyn D. Gauzens, W4WYR, Southeastern Division; Howard S. Huntington, K9KM, Central Division; John C. Kanode, N4MM, Roanoke Division; Harry MacLean, VE3GRO, Canadian Division; Stephen A. Mendelsohn, WA2DHF, Hudson Division; Marshall Quait, AG0X, Rocky Mountain Division; Richard Ridenour, K0BZL, Midwest Division; Robert P. Schmidt, W5GHP, Delta Division; and Allan L. Severson, AB8P, Great Lakes Division. There were also present Harry J. Dannels, W2HD, President Emeritus; Honorary Vice Presidents Robert York Chapman, W1QV, Jean A. Gmelin, W6ZRJ, and J. Lincoln McCargar, W6EY; Past President Carl L. Smith, W0BWJ; Secretary Perry Williams, W1UED; Treasurer James E. McCobb, K1LLU; Counsel Christopher D. Imlay, N3AKD; Canadian Counsel Robert Benson, O.C., VE2VW; Executive Associate W. Dale Cliff, NA1L; Stephen

C. Place, WB1EYI, Volunteer Resources Manager; Paul Rinaldo, W4RI, Publications Manager; William L. Lazzaro, N2CF, Development Manager; and Michael R. Zeigler, Controller.

2) The assembly observed a moment of silence in recollection of amateurs who have passed away since the previous Meeting of the Board, especially ARRL cofounder Clarence Tuska, ex-1WD, ex-1ZT.

3) The Chair recognized Mr. Wilson, who introduced the new Vice Director from the Great Lakes Division, Mr. Severson (applause). The Chair recognized Mr. Grauer, who introduced the new Vice Director from the Midwest Division, Mr. Ridenour (applause). The Chair recognized Mr. Atkins, who introduced the Vice Director from the Canadian Division, Mr. MacLean, attending the Board Meeting for the first time (applause). The Chair recognized Mr. Gmelin, who introduced Honorary Vice President McCargar, attending a Board Meeting for the first time since 1950 (applause).

4) On motion of Mr. Olson, seconded by Mr. Stevens, it was VOTED that, with the addition of agenda item 6e) "Report of the Executive Committee" and 6k) "Report on Division Surveys," the agenda is adopted as presented.

5) On motion of Mr. Olson, seconded by Mr. Turnbull, it was VOTED to approve the Minutes of the 1985 Annual Meeting in the form in which they appeared in the March 1985 issue of QST.

6) Moving now to agenda item 5, supplementary oral reports of the officers were presented. At 8:47 A.M., staff members Clift, Lazzaro, Place, Rinaldo and Zeigler were temporarily excused from the meeting. Mr. Price presented his oral report covering certain aspects of ARRL's Washington representation; the ARRL Development Program to increase the numbers of amateurs and of League members; and the forthcoming meeting in Hartford of the International Amateur Radio Union's Region 2 Executive Committee. At 9:47 A.M., the staff returned to the meeting.

7) First Vice President Nathanson presented his report covering the convention of the National Cable Television Association which he attended; preparation of a revised employee manual; federal preemption; a program to reactivate members who have not renewed ARRL membership; the Young Astronaut Program; ARRL forums at conventions; his work on the Administration and Finance Committee; and the ARRL request to FCC for enhancement of Novice class privileges.

8) Vice President Anderson reported on his activities for the past six months, and noted a willingness of clubs to accept the challenge and develop ways to increase the numbers of radio amateurs. He also reported on his meeting with the Publications Committee and praised the work of the Publications Group staff.

9) Vice President Holladay's report included his attendance at the western conference of the Armed Forces Communications and Electronics Association; his work on the Membership Services Committee; and the memorial service for the late Don Wallace, W6AM.

10) Next came the report of Mr. Baldwin, covering his activities as Vice President for International Affairs and President of the International Amateur Radio Union (IARU). Organizational activities included participation in the IARU Region 1 HF Working Group meeting in Germany in March and the Region 1 Executive Committee meeting in Yugoslavia in April. Preparation for a future World

Administrative Radio Conference (WARC) was among subjects discussed during a trip to Singapore for the Asia Telecom 85 exhibit and forum. In June, Mr. Baldwin taught a course, "Amateur Radio Administration," under the auspices of the United States Telecommunications Training Institute, for five telecommunications officials from Ghana, Dominica, Tonga, Tanzania and Taiwan. Meetings planned for the second half of the year include the IARU International Study Group on the Intruder Watch, Geneva; attendance at the World Administrative Radio Conference on the use of Geostationary Satellite Orbit (WARC-ORB 85); participation in the 75th Anniversary of the Wireless Institute of Australia; a meeting of the IARU Administrative Council; and the sixth Triennial Conference, IARU Region 3, in Auckland, New Zealand. Mr. Baldwin also noted the forthcoming meeting of the IARU Region 2 Executive Committee immediately following the Board Meeting, in the same location. The Board was in recess from 10:15 to 10:55 A.M.

11) Executive Vice President Sumner presented an extensive written and oral report on the activities of the Headquarters during the first half of the year. The ARRL budget for 1985 predicts a small deficit; at the half-year point, the loss was somewhat less than anticipated. A membership-promotion campaign has produced an increase of some 6000 members in the first half year. A mailing to former members will be made in August and the Club Challenge program will get renewed emphasis in September when clubs return to normal activity. With respect to the parallel effort to increase the number of amateurs, the total licensee numbers have not yet turned upward. Development Group involvement in Shuttle Mission 51-F has delayed the start of a formal recruitment program, but of course, the excitement surrounding the space mission could itself bring in some new amateurs in due time. The report dealt at great length with activities within the Publications Group, especially focusing on the new License Manuals, which have been very well received by the amateur population. The report also covered several items related to QST, including wider distribution in retail sales and scheduled appearance of the magazine among the complimentary reading material on flights of Ransome and Piedmont aircraft. A progress report was rendered on actions stemming from the January Board Meeting and on studies which the Executive Vice President performed at the request of the Board, including the feasibility of ARRL providing assistance to FCC in call sign issuance. The assembly was in recess for lunch from 12:29 to 1:33 P.M., reconvening with all persons hereinbefore mentioned present.

12) Continuing Agenda item 5, Treasurer McCobb presented a brief oral report focusing on the condition of ARRL's surplus at the end of the first half year, with comparisons to year-end 1984 and last June.

13) Counsel Imlay presented an extensive report, covering implementation of the 24-MHz band; frequency coordination of repeaters in Docket 85-22; proposed expansion of frequencies available for auxiliary operation, Docket 85-215; amendment of Part 15 for low-power communication devices; increased cable-signal leakage, Docket 85-38; amendment of the Rules to prohibit disqualified persons from participating in third-party communications, Docket 85-51; regulations concerning amateur operator examinations by volunteers, Docket 85-21; radiolocation in 1900-2000 kHz, Docket 84-874;



amateur microwave allocations, Docket 85-23; the FCC proposal to permit land mobile in 421-430 MHz in Detroit, Cleveland and Buffalo, Docket 85-113; 7-MHz broadcasting in Region 3, Docket 84-706; automatic control of Amateur Radio stations, Docket 85-105; 7-MHz telephony in the Caribbean, Docket 85-104; maintenance of amateur operator question pools, Docket 85-196; F1 emissions in the 160-meter band, Docket 84-959; PRB-1, the ARRL request for limited Federal preemption of regulation of amateur antenna structures; and status reports on local litigation involving amateurs.

14) Canadian Counsel Benson presented his report covering trademark matters; corporate activities of the Canadian Radio Relay League; tower restrictions and radio frequency interference; contact with the Department of Communications; customs duty matters; and his work with the Ad Hoc Committee on Strengthening CRRL.

15) Mr. Grauer, as President, presented a brief report of the ARRL Foundation, including recent scholarship activity.

16) Moving on to agenda item 6, the report of the Administration and Finance Committee was presented by Chairman Metzger, covering capital equipment, WIAW renovation, personnel matters, the staff pay structure, and employee policies. It was moved by Mr. Metzger, seconded by Mr. Milius, that the following sentence be added to the end of Bylaw 4: "Members may be permitted to pay dues on an installment basis, in accordance with a schedule and rates as determined by the Executive Vice President and published periodically by QST." After discussion, it was moved by Mr. Butler, seconded by Mr. Grauer, that the matter be laid on the Table, but the motion to Table was LOST, 7 votes in favor to 8 opposed. A roll call vote being required, the results were announced as follows: number of votes cast 16, necessary for adoption 12, ayes 9, nays 7. So the motion to amend the Bylaws was LOST. Those voting in favor were Mrs. Ferdinand, Mr. Frenaye, Mr. Hurlbert, Mrs. Lewis, Messrs. Metzger, Milius, Olson, Stevens and Wilson. Those voting opposed were Messrs. Atkins, Butler, Carey, Grauer, Heyn, Turnbull and Wangler.

17) It was moved by Mr. Metzger, seconded by Mr. Hurlbert, that Bylaw 6 is revised by striking the text and substituting therefor the following: "6. A member who has not reached the age of 14 may request an annual dues rate equivalent to 20% of the rate set forth in Bylaw 4. A member who has not reached the age of 18 may request an annual dues rate equivalent to 60% of the rate set forth in Bylaw 4. This rate shall not be available for life membership." After discussion, however, Mr. Metzger, with the consent of his second, withdrew the motion.

18) Mrs. Lewis, as Chairman, presented the report of the Membership Services Committee, covering the 160-meter band plan, QST wrapper inserts, Field Organization and administration of awards, awards and contests on 10 and 24 MHz, and advisory committee structure.

19) Mr. Butler, as Chairman, presented the report of the Publications Committee, which recommended that present policies in reference to QST contributions by authors other than staff continue in force. The report also discussed extensively the schedule of publications by ARRL, correspondence letterhead, satellite orbital predictions, propagation charts, question and answer pools on disk, and the YL column in QST. The Board was in recess from 3:15 to 3:42 P.M.

20) Mr. Wilson, as Chairman, presented the report of the Volunteer Resources Committee, covering Section news in QST; the Public Service Honor Roll; the new publication, *Field Forum*; qualifications of Assistant Technical Coordinators; the Volunteer Examining Program; scholarships and awards; administration of field awards; and advisory-committee structure.

21) Mr. Price, as Chairman, presented the report of the Executive Committee, concerning contacts with Federal government officials. On motion of Mr. Carey, seconded by Mr. Milius, the following policy was adopted and ordered placed in the Director's Workbook:

"shall, subject to instruction from the Board of Directors, and with the assistance of the Executive Vice President, represent the League in its relationships with the public and the various governments, governmental agencies and officials with which the League may be concerned and shall be the official spokesman of the Board of Directors in regard to all matters of League policy."

Policies adopted by the Board govern the functioning of the Washington Area Coordinator and League Counsel, and provide for their oversight by the President in their contacts with Federal entities. The Executive Vice President is responsible to the President for contacts made by staff in the performance of their duties. From time to time, assignments involving Federal government contact may be made by the Board to individuals or to Ad Hoc Committees, task groups or task forces; in such cases, the extent of contact authorized will be determined by the terms of reference.

It is important for the policies of the Board to be communicated to Federal government personnel in a consistent manner, and for the League to present a position of unity at all times. Accordingly, the only contact with FCC, congressional and other Federal government personnel which involves, or could be construed to involve, ARRL or amateur radio policy matters, shall be as outlined above.

Board policy prohibits the filing of comments in FCC proceedings by members of the Board, either on their own behalf or on behalf of other organizations. This policy is not to be construed as prohibiting Board members from encouraging the filing of comments by others in support of League positions, or from contacting their own elected government representatives to gain support of League positions.

Expenses incurred while arranging for or engaging in Federal government contacts in contravention of this policy will not be reimbursed by the League.

Further guidelines for the ethical conduct for officers and directors are contained in the Director's Workbook.

22) Mr. Atkins, as Chairman, presented the report of the Ad Hoc Committee on the Strengthening of CRRL. The report focused on technical details of further transfer of membership functions and responsibilities to CRRL as of January 1, 1986 and beyond.

23) Mr. Wilson, as Chairman, presented the final report of the Ad Hoc Committee on Volunteer Monitoring. On his motion, seconded by Mr. Grauer, it was VOTED that the Ad Hoc Committee on Volunteer Monitoring be dissolved with further review of the program assigned to the Volunteer Resources Committee and that the unexpended budget of the Ad Hoc Committee be released to the General Fund.

24) Mr. Turnbull, as Chairman, presented the report of the RFI Task Group, covering review of Headquarters correspondence on cable and general interference problems; the filing of comments opposing relaxation of cable leakage limits; field tests of upstream ingress in residential areas; the American National Standards Institute Ad Hoc Committee C63 dealing with RF immunity; and a planned study of cordless telephones and home security devices by C63.

25) Mr. Wangler, as Chairman, presented the report of the ARRL Committee on the Biological Effects of RF Energy, including preparation of draft ARRL comments in Docket 79-144; review of and reply to an item in the British medical journal, *The Lancet*; attendance at the Bioelectromagnetics Society meeting in San Francisco; reply comments in Docket 79-144; and guidance by ARRL to its members on the prudent handling of RF energy.

26) Mr. Quiat, as Liaison, presented the report of the Ad Hoc Committee on Amateur Radio Digital Communication, covering the Fourth Amateur Radio Computer Networking Conference in San Francisco; standardizing command and response protocols; progress in development of network protocols; application to register "AX.25" as a Service Mark; cooperation with manufacturers on incorporating packet radio capability in digital

communications equipment; and proposals for the Fifth ARRL Amateur Radio Computer Networking Conference, 1986.

27) Mr. Nathanson, as Chairman, presented a brief oral report of the Task Force on Federal Preemption of Tower and Antenna Regulations. Action by FCC in response to PRB-1, ARRL's request for partial preemption, is expected by mid-autumn. It should be regarded as providing a useful legal tool, rather than as a panacea to solve all problems.

28) Mr. Butler, as Liaison, presented a report of the VHF Repeater Advisory Committee, recommending that ARRL not endeavor to become a national repeater coordinator; that ARRL should continue to offer its assistance to coordinating councils; and that ARRL should file comments in PR Docket No. 85-22 providing for a more clear definition of a repeater coordinator.

29) In the absence of Vice Director Rush Drake, as Liaison, the report of the Contest Advisory Committee was placed on file. It covers the Committee's negative recommendation on a contest code of ethics; the Committee's recommendation that the solicitation of contacts during a contest period by non-Amateur Radio means be prohibited; and other items under review by the Committee.

30) Mr. Kanode, as Liaison, presented the report of the DX Advisory Committee, covering its recommendation that the Pribilof Islands be granted separate-country DXCC status; a recommended change in the wording of DXCC rule 5(b); and other matters under consideration by the Committee. It was moved by Mr. Stevens, seconded by Mrs. Lewis, that the following resolution be adopted:

WHEREAS, the petition of the Alaska DX Association for separate-country status for the Pribilof Islands was submitted to the League in August 1983, and

WHEREAS, the question of separate-country status for the Pribilof Islands has remained unresolved for two years creating uncertainty for participants in the DXCC program, and

WHEREAS, it is in the best interest of the League and the DXCC program to resolve this uncertainty in a way that will inject vitality into the DXCC program, and

WHEREAS, the DX Advisory Committee, after lengthy deliberation, has rendered its recommendation that the Pribilof Islands be considered a separate country for DXCC purposes,

BE IT RESOLVED, that the Pribilof Islands be added to the DXCC countries list for contacts after November 15, 1945, with cards to be accepted for credit as soon as is administratively feasible.

After discussion, on motion of Mrs. Ferdinand, seconded by Mr. Heyn, it was VOTED that the matter be laid on the Table. Mrs. Lewis and Mr. Stevens requested to be recorded as opposing the motion to Table.

31) Mr. Beebe, as Liaison, presented the report of the Emergency Communications Advisory Committee focusing on the need for local-level Memoranda of Understanding between ARRL field organization officials and their respective municipal governments, departments and private agencies. On motion by Mr. Wilson, seconded by Mr. Butler, it was VOTED that (1) the Field Services Department develop a plan to actively promote local Memoranda of Understanding for potential use by the ARES field organization officials following the general guidelines and intent of the 1985 interim ECAC report and (2) the Volunteer Resources Committee will review and recommend such a program to the Board no later than the 1986 Annual Meeting.

32) Mr. Mendelsohn, as Liaison, presented the report of the Public Relations Advisory Committee, covering a pictorial-style pamphlet about Amateur Radio; development of a slide show as requested by the Board in 1984; promoting amateur licenses among graduates of armed forces communications schools; and preparation of ARRL public-service announcements for radio and television.

33) Mr. Olson presented a comparison of statistics derived from surveys conducted in three ARRL divisions. The Board was in recess for dinner from 4:58 to 8:21 P.M., reconvening with all persons hereinbefore mentioned present except

**POLICY GOVERNING CONTACTS WITH  
FEDERAL GOVERNMENT OFFICIALS  
BY MEMBERS OF THE ARRL BOARD**  
ARRL Bylaw 31 provides that the President

Messrs. Baldwin, McCobb, Rinaldo and Zeigler.

34) Turning to agenda item 7 there was extensive discussion of an ARRL position relative to FCC Docket 85-22. The Chair appointed the following as a drafting committee for ARRL's comments in the matter: Vice President Holladay, Chairman, and Messrs. Mendelsohn, Quillat, Severson and MacLean, with the last as secretary. The Board was in recess for the night at 9:43 P.M., reconvening on the morning at 8:37 A.M., with all persons hereinbefore mentioned present except Messrs. McCobb and Zeigler. In addition, the members of the Ad Hoc Committee appointed the previous evening were absent from portions of the meeting in order to complete the assigned task with regard to PR Docket 85-22.

35) Turning to agenda item 8, Directors' Motions, on motion of Mr. Wilson, seconded by Mr. Wangler, it was VOTED that the League adheres to the principle that the FCC retain responsibility for all Amateur Radio examination question pools, and that Volunteer Examiner Coordinators be responsible for creating the actual tests therefrom. Counsel will file such comments as may be required with respect to Commission action in conformity with the principle.

36) It was moved by Mrs. Ferdinand, seconded by Mr. Olson, that individuals so designated by Special Service Clubs be permitted to certify and issue the following awards: Worked All States, Five Band Worked All States, VHF/UHF Century Club. On motion of Mr. Hurlbert, seconded by Mr. Olson, it was VOTED to decide the matter by roll call vote. The question was then decided in the affirmative, 9 votes in favor to 7 votes opposed, so the motion was ADOPTED. The following Directors were recorded as voting in favor: Mr. Butler, Mrs. Ferdinand, and Messrs. Frenaye, Grauer, Heyn, Hurlbert, Metzger, Olson and Wilson. The following Directors were recorded as voting opposed: Mr. Atkins, Mr. Carey, Mrs. Lewis, and Messrs. Milius, Stevens, Turnbull and Wangler.

37) It was moved by Mr. Grauer, seconded by Mr. Frenaye, that the Board authorize the Executive Vice President to make available to the following field appointees and field volunteers ARRL badges of distinctive design, at reasonable cost, as follows: (a) to the field leadership positions, ARRL-logo call sign badges with a deep green background and same general design as those authorized for the official family, and (b) to the Volunteer Examiners and "members of Amateur Auxiliary," ARRL-logo call sign badges with a white background and same general design as those authorized for the official family. After discussion, on motion of Mrs. Lewis, seconded by Mr. Metzger, it was VOTED that this matter be laid on the Table.

38) On motion of Mr. Frenaye, seconded by Mr. Atkins, it was VOTED that the Publications Committee study the desirability of a program where ARRL publications carry a postage-paid form that solicits feedback from the purchaser on desired changes, additions or corrections.

39) On motion of Mrs. Lewis, seconded by Mr. Frenaye, it was VOTED that the ARRL adopt a band plan for the 24-MHz band as follows: 24.890-24.920 CW only, 24.920-24.930 CW and digital, 24.930-24.990 CW, Phone and SSTV.

40) On motion of Mr. Stevens, seconded by Mrs. Lewis, it was VOTED that the Executive Vice President study the feasibility of producing a videotape explaining packet-radio equipment design for presentation to computer users and amateurs not familiar with this mode of communication.

41) It was moved by Mr. Milius, seconded by Mr. Stevens, that the ARRL QSL Bureaus, if they desire, be permitted to insert on an occasional basis, an ARRL membership application in return envelopes. After discussion, on motion of Mr. Hurlbert, seconded by Mr. Stevens, it was VOTED that the motion be amended to read as follows: "that the ARRL QSL Bureaus be urged to insert on an occasional basis as determined by guidelines to be established by the Executive Vice President, an ARRL membership application in return envelopes, and that it is the policy of the Board that the use of QSL Bureau services implies the grant of authority from the user to do so." After discussion, the motion as amended was ADOPTED.

42) It was moved by Mr. Carey, seconded by Mr. Butler, that the advisory committees be authorized funding for in-person meetings of all or part of the Committee upon specific approval from the Executive Committee or Board, which permission

would be granted only in rare or unusual circumstances. After discussion, on motion of Mr. Metzger, seconded by Mr. Turnbull, it was VOTED that this matter be laid on the table. The following Directors requested to be recorded as opposed to laying the matter on the Table: Mrs. Ferdinand, Messrs. Wilson, Frenaye, Heyn, Wangler and Carey.

43) On motion of Mr. Butler, seconded by Mr. Hurlbert, it was VOTED that the Fifth ARRL Computer Networking Conference be scheduled for the weekend of March 7-9, 1986 at Orlando, Florida, in conjunction with the Florida State Convention.

44) On motion of Mr. Heyn, seconded by Mr. Frenaye, it was VOTED that the Executive Vice President be directed to produce a Field Organization recruitment/education brochure to be available free of charge to League members by the end of January 1986.

45) On motion of Mr. Wangler, seconded by Mr. Heyn, it was VOTED that the ECAC review the current limit of one hour for RACES test and drill periods to extend the time per week to allow for support communications to other emergency operations requiring more than one hour.

46) On motion of Mr. Wilson, seconded by Mr. Atkins, it was VOTED that the Board of Directors of the ARRL assembled at Hartford on 25 July 1985, does thank the Dayton Amateur Radio Association for their help and support in providing the facilities to videotape the ARRL public service announcements at the 1985 Dayton Hamvention.

47) On motion of Mrs. Ferdinand, seconded by Mr. Butler, it was VOTED that for the design and production of an initial quantity of pamphlets as proposed at Minute 54 of the 1985 Annual Meeting, and to implement that portion of the PRAC report, the sum of \$10,000 is authorized, contingent upon the raising of an equivalent amount from the Amateur Radio industry.

48) It was moved by Mrs. Lewis, seconded by Mr. Frenaye, that in light of the unique role that Field Day plays in emergency communications preparedness activities, the Emergency Communications Advisory Committee and Contest Advisory Committee study the desirability of extending Field Day operation to the 24-MHz band beginning in 1986, and that a report be submitted to the Board for the January 1986 Annual Meeting. After discussion, on motion of Mr. Hurlbert, seconded by Mr. Carey, it was VOTED that this matter be laid on the Table. Mrs. Lewis and Mr. Frenaye requested to be recorded as having voted opposed to laying the matter on the Table.

49) It was moved by Mr. Milius, seconded by Mr. Frenaye, that a standard identification badge be designed and made available for purchase with space thereon providing for inclusion of the name and call sign of user, for use by all amateurs except field leadership appointees who are members of the Amateur Radio Emergency Service but not necessarily members of the ARRL. After discussion, on motion of Mr. Frenaye, seconded by Mr. Butler, it was VOTED that this matter be referred to the ECAC for study.

50) On motion of Mr. Butler, seconded by Mr. Heyn, it was VOTED that an Ad Hoc committee on Amateur Radio spread-spectrum standards is established for a period of two years, with a budget of \$1500 for the remainder of 1985, and the President is authorized to appoint up to seven members, including Board and Headquarters liaisons. The assembly will be in recess from 10:10 to 10:43 A.M.

51) On motion of Mr. Hurlbert, seconded by Mr. Wilson, it was VOTED that staff is encouraged to cooperate with and supply information to youth groups (such as Boy Scouts of America and Young Astronaut Council) as seems likely to develop interest in Amateur Radio among their members. Such support will recognize principles of fairness to both League members and other youth groups.

52) On motion of Mr. Wilson, seconded by Mrs. Ferdinand, it was VOTED that each member of an advisory committee is expected to submit a written report to the Director of his or her Division at least two weeks before each regular Board meeting. This report will include a summary of all matters pending before the committee and will also indicate the individual's recommendations as to matters expected to be before the Board in the Committee's area of concern.

53) On motion of Mrs. Ferdinand, seconded by Mr. Frenaye, it was VOTED that the Volunteer Resources Committee be directed to consider a new

type of membership classification. This classification would be available to affiliated clubs and be similar to the existing associate membership in that no voting privileges would be included.

54) On motion of Mr. Frenaye, seconded by Mr. Carey, it was VOTED that the Board of Directors heartily commends the enthusiasm and effectiveness of the ARRL staff and the hundreds of volunteers who are administering the large and complex task of volunteer examining.

55) On motion of Mr. Olson, seconded by Mr. Hurlbert, it was VOTED that the motion dealing with the role Field Day plays on the 24-MHz band be lifted from the Table. At this point, Mrs. Lewis, with the consent of her second, withdrew the motion.

56) On motion of Mr. Stevens, seconded by Mr. Olson, it was VOTED that the Executive Vice President is authorized to submit to FCC a preliminary proposal for ARRL to provide assistance to the Commission in the area of call sign issuance along the lines of his report to this meeting of the Board; and further, that the Executive Committee is requested to monitor the progress of this proposal and to supply periodic reports to the Board.

57) It was moved by Mr. Milius, seconded by Mrs. Lewis, that the Volunteer Resources Committee study ways and means to protect amateurs, insurance-wise, who are injured or killed while on the performance of emergency service or drilling in emergency service for ARES and ARRL. After discussion, on motion of Mr. Grauer, seconded by Mr. Metzger, it was VOTED that the matter be laid on the Table. Mr. Milius requested to be recorded as opposing the motion to lay the matter on the Table.

58) On motion of Mr. Carey, seconded by Mr. Butler, it was VOTED that the ARRL Band Plan for the 220-225 MHz band be amended to show that repeater frequency pairs and simplex FM frequencies are allocated on 20-kHz channel spacing, rather than 40-kHz spacing, and that the plan be so shown in subsequent editions of the Repeater Directory.

59) On motion of Mr. Butler, seconded by Mr. Atkins, it was VOTED that the Executive Vice President is directed to study the costs associated with providing a system for maintaining a national repeater data base. This system should consist of: (1) an existing computer (on a time-shared basis) and (2) the toll-free telephone line, now used by the publication sales department, for use by frequency coordinators between the hours of 6 P.M. and 6 A.M. Eastern time. The results of this study should be presented to the Board not later than the 1986 Annual meeting.

60) On motion of Mr. Wangler, seconded by Mr. Butler, it was VOTED that the Band Plan for the 440-450 MHz band, with specific frequency pairs recommended for repeater use in this band, be based on 25-kHz channel spacing, and that the plan be shown in subsequent issues of the Repeater Directory.

61) On motion of Mr. Metzger, seconded by Mr. Turnbull, the following resolution was ADOPTED:

WHEREAS the Tenth Pan-American games are scheduled to be held in Indianapolis in 1987, and

WHEREAS these games are intended to enhance international goodwill, an objective shared by Amateur Radio and the League and

WHEREAS the ARRL Indiana Section is ready, willing and able to provide appropriate support to the Pan-American games,

The Board of Directors of the ARRL does hereby commend the officials of the ARRL Indiana Section for initiating planning for this event in so timely a manner; and the Board further requests the Executive Vice President to provide appropriate and timely support for these volunteer efforts.

62) On motion of Mr. Wilson, seconded by Mr. Atkins, it was VOTED that the Board of Directors of the ARRL, assembled at Hartford on 25 July 1985, does thank: Mr. Henry Greenberg, K2SSQ, Director; Mr. William Pasternak, WA6ITF, Producer; Mr. Dave Bell, W6AQ, Producer; Mr. Richard Mosenon, N2BFG, Writer; Mr. George Barker, N1AF, Cameraman; Mr. Stephen Mendelsohn, WA2DHF, Soundman; Mr. Forest Oden, N6ENV, Editor; and Mr. Jean Shepherd, K2ORS, Actor, for their professional efforts and help in producing the latest series of ARRL Public

#### Service Announcements.

63) It was moved by Mrs. Ferdinand, seconded by Mr. Carey, that a quality certificate, suitable for framing, will be provided to persons passing Extra Class examinations before ARRL Volunteer Examiner Teams. The price will be fixed by the Executive Vice President at an amount that will cover all applicable costs. After discussion, it was moved by Mr. Holladay, seconded by Mr. Heyn, that this matter be laid on the Table, but the motion to Table was LOST. After further discussion, on motion of Mr. Wangler, seconded by Mr. Butler, it was VOTED that this matter be postponed until after the recess for lunch. The Board was in recess for lunch from 11:52 A.M. until 1:23 P.M., reconvening with all persons hereinbefore mentioned present except Messrs. Lazzaro, McCobb and Zeigler. The Board took up the matter that had been postponed. On motion of Mr. Frenaye, seconded by Mr. Stevens, it was VOTED that the motion pertaining to certificates for Extra Class operators is amended to read as follows: "A quality certificate, suitable for framing, will be offered to persons holding the Extra Class license. The price will be fixed by the Executive Vice President at an amount which will cover all applicable costs." The question being on the motion as amended, the same was ADOPTED.

64) On motion of Mrs. Ferdinand, seconded by Mr. Wilson, it was VOTED that James Rautio, A3JK, be awarded the 1984 Technical Excellence Award and awarded the Pewter Cup for his outstanding series of articles, "The Effect of Real Ground on Antennas." These articles appeared in February, April, June, August and November 1984 QST.

65) On motion of Mr. Frenaye, seconded by Mrs. Ferdinand, it was VOTED that Counsel is directed to file a request with the FCC to amend section 97.28(b) of the FCC Rules to change the phrase "one volunteer examiner" to "two volunteer examiners."

66) On motion of Mrs. Lewis, seconded by Mr. Butler, it was VOTED that the Executive Committee study the need for a revision to the FCC rules and regulations governing procedures for testing candidates in proficiency in Morse code reception, with the intent of standardizing these procedures under the Volunteer Examiner program.

67) Moved, by Mr. Stevens, seconded by Mr. Milius, that the VHF-Repeater Advisory Committee be requested to reevaluate that portion of the 23-cm band plan pertaining to FM repeater frequency offsets, presently set at 12 MHz, in light of recent developments in the availability of commercial equipment for this band. MOVED, by Mr. Heyn that the matter be laid on the Table. But there was no second, so the motion to table was lost. The question then being on the motion, the same was ADOPTED.

68) It was moved by Mr. Milius, seconded by Mrs. Lewis, that the Membership Services Committee study the possibility of eliminating the ARRL QSO Party. After discussion, on motion of Mr. Olson, seconded by Mr. Frenaye, it was VOTED that the motion is amended to read: "Resolved, that the ARRL QSO Party be discontinued." The question thereupon being on the main motion as amended, the same was ADOPTED.

69) On motion of Mr. Butler, seconded by Mrs. Lewis, it was VOTED that the VHF Repeater Advisory Committee be requested to study the band plan for 420-450 MHz, with the intent of recommending a standard for the repeater portion. Repeater in/out frequency relationships, either high-in/low-out or low-in/high-out (to provide maximum flexibility for repeater coordinators) should be specified for each 25-kHz channel. A report from the committee should be made to the Board at the 1986 Annual Meeting.

70) It was moved by Mr. Heyn, seconded by Mr. Wangler, that the Executive Vice President is immediately to proceed with the process of determining the 1984 Instructor of the Year Award in line with the procedures described in the September 1984 issue of QST. After discussion, on motion of Mr. Olson, seconded by Mr. Hurlbert, it was VOTED that this matter be referred to the Volunteer Resources Committee.

71) On motion of Mr. Atkins, seconded by Mr. Olson, it was VOTED that the recommendations contained in the report of the Committee for the Strengthening of CRRL be approved as presented.

72) On motion of Mr. Metzger, seconded by Mr. Frenaye, it was VOTED that to implement the employee incentive program endorsed by the Administration and Finance Committee, the 1985 budget be amended by adding a line item of \$3,000 for employee incentive awards, to be made at the discretion of the Executive Vice President.

73) It was moved by Mr. Olson, seconded by Mrs. Lewis, that By-law 6 be amended to read as follows: "6. Any member who is the eldest person eligible for full membership in the family (where family is defined as a mother, father, husband, wife and siblings) and who has not reached the age of 18 years may request a dues rate equivalent to 50% of the rate set forth in By-law 4; or, if he has not reached the age of 13 he may request a dues rate of 25% of the rate set forth in By-law 4. To be eligible to request such special rates in addition to qualifying by age the member must: a) provide a list of all the licensed amateurs that are members of the family (family as previously defined) and b) submit the membership application or renewal directly to ARRL Headquarters and not through an affiliated club. This rate shall not be available for Life Membership." After discussion, a roll-call vote being required, the question was decided in the affirmative; all Directors voted in favor, except Mr. Grauer, who voted opposed, so the By-law was AMENDED. The Board was in recess at 3:01 P.M., reconvening at 3:26 P.M.

74) The Chair recognized Mr. Holladay, who reported on the progress made by the Ad-Hoc Committee appointed the previous day to draft a motion that would state the policy of the Board with regard to the FCC proposal dealing with repeater coordination, PR Docket 85-22. It was moved by Mr. Butler, seconded by Mr. Carey, that Counsel is directed to file comments with the Federal Communications Commission in PR Docket 85-22 based on the following policy guidelines:

1) Preferred status in instances of harmful repeater-to-repeater interference should be granted to amateur repeater operators who have implemented the recommendation of their local or regional frequency coordinator and are thereby coordinated.

2) Frequency coordination should be mandatory for all amateur stations in repeater or auxiliary operation in any geographical area that is served by a frequency coordinator.

3) The FCC should not consider alternatives to frequency coordination nor mandate methods of coordination.

4) The use of modern technological innovation, such as those cited in the NPRM, should be encouraged, but not substituted for frequency coordination.

5) The FCC should not recognize a single entity, such as a National Frequency Coordinator, for amateur repeater operation. Such coordination activities should be performed by local or regional frequency coordinators with appropriate support to these coordinators to be provided by the ARRL.

6) The ARRL also recommends that the scope of frequency coordination include all Amateur Radio stations in repeater or auxiliary operation.

7) The ARRL further recommends that consideration of the procedural framework within which frequency coordinators are recognized and conduct their operations be the subject of a future FCC proceeding.

The text of the ARRL's comments in this proceeding shall be reviewed by the Executive Committee prior to filing with the Commission. On motion of Mr. Wilson, seconded by Mr. Carey, it was VOTED that the motion be amended by striking the word "mandatory" in paragraph two and substituting therefor the words "strongly urged." After further discussion it was unanimously VOTED that the motion as amended is ADOPTED. Mr. Atkins abstained.

75) On motion of Mr. Hurlbert, seconded by Mrs. Lewis, it was VOTED that

WHEREAS, this Board in January 1985 charged the President, the Executive Vice President, Communications Counsel and the Washington Area Coordinator to use their best efforts to obtain the release of the 12-meter WARC band to the Amateur Service, and

WHEREAS, those League officials exercised diligence, skill, determination and effort far beyond the normal call of duty in the successful pursuit of the objective, and

WHEREAS, on June 22, 1985, at 0001Z, that objective became the reality of "CQ 12," now therefore,

BE IT RESOLVED that this accomplishment be recognized and rewarded by this Board, on its own behalf, and on behalf of all U.S. Amateurs as follows: "Atta Boy!"

76) On motion of Mrs. Ferdinand, seconded by Mr. Stevens, it was VOTED that the Executive Vice President be directed to formulate a program designed to integrate Amateur Radio into the curricula of the electronics and communications schools of the nation's armed services; to propose and promote implementation of such a program to appropriate representatives of the Army, Navy, Marine Corps, Air Force and Coast Guard; and to provide any assistance required in establishing such a program.

77) It was moved by Mr. Grauer, seconded by Mrs. Lewis, that the motion dealing with ARRL call sign badges for additional field appointees be lifted from the Table, but the motion was LOST.

78) It was moved by Mrs. Lewis, seconded by Mr. Milius, that the Membership Services Committee study ways and means to move the "Technical Information Service" back to Headquarters. On motion of Mr. Frenaye, seconded by Mr. Heyn, it was VOTED that the motion be amended by striking the complete text and substituting therefor the following: "that the Volunteer Resources Committee study ways and means to strengthen the Technical Information Service." Mrs. Lewis and Mr. Milius requested to be recorded as voting opposed to the motion to amend. The question then being on the motion as amended, the same was ADOPTED.

79) On motion of Mr. Stevens, seconded by Mr. Milius, it was VOTED that the Executive Vice President investigate the feasibility of establishing and maintaining a national archive facility for Amateur Radio and report to the 1986 ARRL Annual Board Meeting.

80) It was moved by Mr. Milius that the FCC be petitioned to change the name of the Novice Class License to Amateur Entry Level License. There being no second, the motion was LOST.

81) On motion of Mr. Butler, seconded by Mr. Frenaye, it was VOTED that Counsel be instructed to file a petition for leave to amend the ARRL petition designated RM 5038 so as to maintain present power limits in the Novice bands below 28 MHz.

82) On motion of Mr. Heyn, seconded by Mr. Butler, the following resolution was ADOPTED:

WHEREAS, Senator Barry Goldwater, K7UGA, has been of invaluable assistance to the Amateur Radio Service in sponsoring legislation over many years, to provide for the enhancement of international goodwill through the reciprocal licensing of aliens; to authorize the establishment of minimum performance standards for home electronic equipment; to establish and provide for the reimbursement of expenses of the Volunteer Examiner Program; to improve rule compliance via the Volunteer Monitoring Program; and to defend the right of amateurs to erect reliable, effective antennas; and

WHEREAS, this assistance has been provided through the selfless dedication of Senator Goldwater to the Amateur Radio Service;

NOW, THEREFORE BE IT RESOLVED that the League present Senator Goldwater with a plaque to be presented at the Southwestern Division Convention on August 10, 1985, to express the gratitude of the League, its members, and all amateurs for the unique contributions of this gentleman.

83) On motion of Mr. Milius, seconded by Mr. Butler, it was VOTED that the ARRL Board of Directors in meeting assembled extends its appreciation to sincerely thank all those individuals who have devoted and continue to devote their time and energy working in the QSL Bureaus.

84) There followed an opportunity for all present to make final comments. There being no further business the Board adjourned *sine die* at 5:36 P.M. Total time in session as a Board: 14 hours 14 minutes; direct authorizations: \$14,500.

Respectfully submitted,  
Perry Williams, WIUED, Secretary

RR-1

- *Only Extras May Administer 13-WPM Code Test*
- *More on Automatic Control Above 29.5 MHz*
- *Intrusion Sensors May Sweep 1.6-10 MHz*
- *Criminal Complaints Filed Against Jammers*

## Auxiliary Operation on All Amateur Frequencies?

The FCC has proposed to allow auxiliary operation on *all* amateur frequencies, with the exception of 431-433 and 435-438 MHz. Section 97.3 of Part 97 of the FCC Rules defines auxiliary operation as "Radio communication for remotely controlling other amateur radio stations, for automatically relaying the radio signals of other amateur radio stations in a system of stations, or for intercommunicating with other amateur radio stations in a system of amateur radio stations." Presently, auxiliary operation is restricted to frequencies above 220.5 MHz.

In December 1984, the Quarter Century Wireless Association (QCWA) filed a petition asking the FCC to delete Section 97.61(d) from Part 97. At that time, the frequencies

for auxiliary operation were specified in that Section. Since then, the frequencies have been moved to Section 97.86. Accordingly, in the Notice of Proposed Rule Making (NPRM) in PR Docket 85-215, the FCC proposes to amend Section 97.86.

Auxiliary operation is primarily used for remote control link purposes. Restricting auxiliary operation to frequencies above 220.5 MHz has precluded the use of remote-control devices, including simplex autopatches, on the 2-meter band. Adoption of the NPRM as proposed would permit simpathe use on any amateur frequency.

In its petition, the QCWA states that the technological state of the art has made restrictions on auxiliary operation unnecessary. The

FCC stated that "The rationale for expanding the use of auxiliary links in the Amateur Radio Service is consistent with our proposal in PR Docket 85-105 to broaden the uses of automatic control."

The Commission invites amateurs to file comments documenting any problems that may arise from permitting auxiliary operation on all amateur frequencies. Comments may be filed until September 24, 1985, and formal comment requires the filing of an original and five copies. Send your comments to the Secretary, FCC, Washington, DC 20554. Copies of the NPRM are available from ARRL Hq. for an s.a.s.e. with 39 cents postage. ARRL would like to receive copies of comments filed on this proposal.

### AUTOMATIC CONTROL? ARRL COMMENTS ON FCC PROPOSAL

In PR Docket 85-105, the FCC proposes to allow automatic control for all amateur stations above 29.5 MHz. Section 97.3 of the FCC Rules defines automatic control as "the use of devices and procedures for control so that a control operator does not have to be present at the control point at all times." The original ARRL petition that prompted this action requested automatic control for *digital* communications above 30 MHz. For details, see *Happenings*, June 1985 *QST*.

The League brings the inconsistencies regarding third-party traffic to the attention of the FCC. "The proposed third-party rules also impose unnecessary and onerous restrictions on the development and operation of digital communications networks . . . What is supposedly allowed radio amateurs by permitting automatic control is at the same time taken away by a proposed blanket prohibition from transmitting third-party traffic by automatically controlled stations."

ARRL comments include the history of automatic control and autopatch operation, and discuss the reverse autopatch and the need for some restrictions on automatic control. ARRL states that the "potential for abuse by unlicensed individuals in a digital amateur radio system exists *only* at the point where the third-party traffic is originated and introduced into the amateur radio medium." It is therefore necessary for a control operator to monitor the transmission only when a message is being introduced into the system.

ARRL comments suggest that the FCC adopt a definition of third-party participation

into Section 97.79: "Participation means the origination, introduction or reintroduction of a communication into the amateur radio medium by a third party." ARRL also suggests that automatic control be permitted only for digital communications, provided that automatic shutdown would occur if a malfunction is detected and devices are installed to assure compliance with the rules when a control operator is not present. The League requests that the blanket prohibition of third-party traffic on automatically controlled stations not be adopted.

### ONLY EXTRAS MAY ADMINISTER GENERAL CLASS CODE TEST

In Order 85-344, released July 12, 1985, FCC granted a Petition for Reconsideration in fact while dismissing it in effect. Such was the response to a Petition for Partial Reconsideration filed by Frederick O. Maia, W5YI. Maia held that an earlier Order dismissing a petition concerning six specific changes to the VE program had been correct with respect to examination Element 4(A) (intermediate theory) but had erred as a matter of law with respect to Element 1(B) (the 13 WPM code test).

The petition, filed by Gordon Girton, W6NLG, in September 1984, asked that Advanced class operators be allowed to administer Elements 1(B) and Elements 4(A) and 4(B) (Extra Class theory). FCC dismissed this, repeating that exam elements for a given license class must be administered by a higher-class license. The exception is that Extra Class examiners can and must administer the Extra Class exam, there being no higher-class license.

The Maia petition agreed, except in the case of Element 1(B). It asked the Commission to take another look at allowing Advanced class licensees to administer the General class code test, saying that this would allow greater availability of examiners for the General and Technician class exams.

The Commission took another look at its decision on the Girton petition, but concluded that " . . . the statute permits us to accept the voluntary services of Amateur Extra licensees to administer all elements for all classes; Advanced licensees to administer 1(A), 1(B), 2 and 3 for applicants for the Novice class."

The Commission said that " . . . while this may expand the pool of examiners . . . its effect is not nearly as dramatic as argued by the commenters." The FCC granted that it had reconstrued a statute as allowing Advanced Class VEs to administer the 13-WPM code test.

But FCC concurs with the ARRL's assessment that there are sufficient examiners and examination opportunities, and it feels that the amateur community has risen to the challenge to the tune of administering volunteer examinations to over 4000 applicants each month. Therefore, FCC will continue to accept the voluntary services of only amateur Extra operators in the administration of Element 1(B) to applicants for the General class license.

### NOVICE ENHANCEMENT UPDATE

The ARRL proposal for expanded Novice privileges has been assigned RM number 5038. Deadline for formal comments filed with FCC was July 26. For more on the

original proposal, see July 1985 QST. Copies of RM-5038 are available from ARRL Hq. for an s.a.s.e. with 56 cents postage.

## LEAGUE FILES ON CARIBBEAN PHONE EXPANSION

Responding to a petition from David Novoa, KP4AM, the FCC has proposed to allow U.S.-licensed amateurs in the Caribbean Insular Areas to operate phone in the band segment 7075-7100 kHz. Amateurs in Alaska and Hawaii have already been granted this privilege in light of their proximity to Region 3. The FCC has proposed in Docket 85-104 to expand this privilege to all U.S.-licensed amateurs operating outside the 48 contiguous states.

ARRL comments state that contrary to a claim made in Novoa's petition, interference from broadcast stations above 7100 kHz is just as bad in the 48 states as it is in Puerto Rico. Nevertheless, ARRL supports the proposal, since the number of potential 7075-7100 kHz users is not sufficient to be a significant problem to amateurs operating CW and RTTY here. U.S.-licensed amateurs in the Caribbean are sometimes precluded from operating in Caribbean emergency nets because some of these these nets operate between 7075-7100 kHz.

The League takes exception to the wording of the proposal. By permitting the use of these frequencies outside the 48 states, amateurs on the high seas anywhere would be permitted to use them. This goes beyond Novoa's original request and would significantly increase the use of the segment. The League suggests that the rule be modified to specify stations west of 130° west longitude or south of 20° north latitude. This restriction would better accomplish the objectives of the original petition.

## 1.6-10 MHz FREQUENCY SHARING?

FCC is considering allowing the operation of field disturbance sensors across the 1.6-10 MHz segment. The sensors are used by retail stores as anti-theft devices. Presently, these devices are restricted to discrete channels at 2, 4.5 and 8.2 MHz. In response to a petition filed by the Kuogo Corporation, FCC has proposed to allow these devices to use frequencies between 1.6 and 10 MHz, subject to the noninterference provisions of Part 15. ARRL has filed comments in this Docket (PR Docket 85-129), and requested that the devices be prohibited from operating in the 160, 80 and 40-meter amateur bands, or their use be restricted to commercial, business or industrial environments. Sensor manufacturers feel that the reduced sensitivity of their devices derived from using a wide sweep of 1.6-10 MHz will result in fewer false alarms.

## CABLE OPERATORS MUST OBEY FREQUENCY OFFSETS ON AERONAUTICAL BANDS

The FCC has denied seven petitions for reconsideration concerning cable TV operations on aeronautical frequencies (Docket 21006). The FCC believes that the required uniform frequency offsets are necessary to ensure an absence of harmful interference to the aeronautical frequencies. This is only an interim solution because eventually the FCC may

## Are You a Lawyer? Amateur Radio Wants You!

Your legal expertise is needed in the Amateur Radio community to help build and maintain the legal foundations for our hobby. The League has initiated a Volunteer Counsel Program, designed to help stem the tide of overly restrictive regulations on Amateur Radio. You can help. If you have an interest in this exciting area of communications law, are a reputable member of the bar of at least one state and are a League member, please contact us. As a Volunteer Counsel, you will be kept well informed about areas of law affecting Amateur Radio. For further information, write to the ARRL Volunteer Counsel Program, 225 Main St., Newington, CT 06111.

If you live in one of the following ARRL Sections, your legal experience is especially needed: North and South Dakota, Arkansas, Mississippi, Maine, Rhode Island, Alaska, Idaho, Montana, Nevada, North and South Carolina, West Virginia, Utah and North Florida.

split the communications channels, rendering them co-channel to the cable system. The Commission recognizes that reduced leakage is the only long-term solution, but mandatory offsets are desirable in the short term.

## LEAGUE REPLIES TO FAR EAST BROADCASTING COMPANY

In MM Docket 84-706, FCC granted international broadcasting stations in the western Pacific area (ITU Region 3) the right to use 7.1-7.3 MHz, but with safeguards for the Amateur Service in Region 2. Since it appeared that broadcast antennas already in use exceeded the standards FCC promulgated, the ARRL filed a Request for Partial Reconsideration appreciative of their careful consideration but asking for fine-tuning of the protection requirements.

FEBC, Inc. took issue with the League's request and filed an Opposition. ARRL, in turn, entered its Reply to Opposition on July 3, clarifying points and reemphasizing that the adjustments sought should not be troublesome to the broadcasters.

## COMPUTER USER FINED FOR TELEVISION INTERFERENCE

On May 9, 1985, the U.S. Attorney for the Eastern District of Pennsylvania announced that a total of \$3000 in fines was sought in a suit filed against Comp-Art, Inc. for unlawfully interfering with television reception in a South Philadelphia neighborhood over a period of 18 months. An FCC engineer

determined that a computer used by Comp-Art was causing the interference. Under FCC regulations, the computer used by Comp-Art may not be used if it causes interference with television reception. Fines were levied on Comp-Art for failing to correct the problem and shield the computer to eliminate the interference.

## UNLICENSED "OSCAR GROUP" OPERATIONS HIT BY FCC

In the first of a series of planned enforcement operations against "The Oscar Group," a net of unlicensed radio operators working near 6930 kHz, the FCC fined Clinton E. Berger, of Ridgetop, Tennessee, \$1000. Berger was located by the FCC Atlanta District Office, in cooperation with the Commission's high-frequency direction-finding network, during communication with other Oscar Group members. Frequencies used by the Group are assigned to the International Fixed and Land Mobile Radio Services in the U.S. Other cities chosen for concentrated enforcement by the Commission's Field Operations Bureau are Indianapolis and San Francisco.

## CRIMINAL COMPLAINTS FILED AGAINST JAMMERS

The FCC announced on July 3, 1985 that criminal complaints had been filed against three Michigan individuals accused of making illegal Amateur Radio transmissions. These complaints resulted in the arrest of Glenn L. Barrick, of Detroit; Richard Szabo, of Farmington Hills; and Robert J. King, of Redford Township. Pending the filing of formal charges against the individuals involved, the criminal complaints have now been dismissed by the U.S. Attorney for the Eastern Division of Michigan.

Dismissal of the criminal complaints now allows the cases to be processed in a more routine manner. Upon complete review of the case information, the results may be presented to a federal grand jury to seek indictments for violation of federal law. Conviction could result in a possible maximum sentence of one year in prison and a \$10,000 fine for each offense. The FCC Detroit District Office conducted the investigation and located the illegal operators in response to numerous complaints about deliberate interference being caused to Amateur Radio communications.

## CALIFORNIA AMATEUR GETS RELIEF FROM CABLE TVI

In the latter part of 1983, Patrick Coker,

## Be a Contributor to the Goldwater Scholarship Fund

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

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

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

Recent contributors of \$25 or more include: Glenn H. Landis, N3CGL; in memory of Harold Layher, WA8PCC; in memory of Carl Lindemann, Jr., W2MLM; Richman ManHertz, WA2IDZ; Paul Mezzapelle, WA6NLJ; Dean Parpart, W5VPF; Earl W. Sherman, W6QGD.

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**Board Liaison**—Wayne Overbeck, N6NB, 11552 Gall La., Garden Grove, CA 92640

KA6ZVP, of Canyon County, California, discovered that ATC Cablevision was the source of the 200-kHz-wide, 20- to 60-dB-over-S9 interference to his Amateur Radio communications. Because the interference involved both ingress and egress, he sought immediate assistance from the cable operator. ATC responded by replacing existing cable with all new cable. Despite this, the level of interference remained unchanged. Coker's subsequent attempts to resolve the interference over a six-month period resulted in no further cooperation from the cable company.

Coker filed a complaint of harmful in-

terference against ATC in June 1984 with the FCC Long Beach, California, Field Office. The FCC responded with a letter of inquiry to ATC Cablevision, and the cable company immediately advised the Long Beach FCC office that 50 percent of Coker's interference problem had been corrected by their reinstallation of a splice connector. ATC further advised the FCC that a replacement of subscriber drop cables—a job which it expected to have completed by mid-September—would correct the remainder of Coker's interference problem.

Because Coker's communication with the

FCC continually indicated that the level of interference remained unchanged, FCC conducted an inspection of the cable plant in March 1985. The FCC found that ATC Cablevision had two sites where cable leakage levels were greater than permitted under Part 76 of the FCC Rules. In its initial response to the Commission's notice of violation, ATC indicated that it could not duplicate the Commission's findings. However, ATC later told the Long Beach District Engineer that the leakage had been corrected. ATC said that a child's tampering with the cable had been the cause of the damage.—Katherine Hevener, WB8TDA

## News about Stations in the West of China

*How's DX? is delighted to be the recipient of current West China news by Tong Xiaoyong, Chief Operator of BY1PK, P.O. Box 6106, Beijing, People's Republic of China.*

Until May 26, 1985, Mt. Naimona'nyi, located at Puran of Ali Prefecture (Tibet Autonomous Region in China), was the highest among the unclimbed mountains of the world (7694 meters). The Chinese Mountaineering Association, Doshisha University and Kyoto University organized the China-Japan Joint Friendship Expedition, hoping to climb to the peak between April and July of this year. BT0NMN, the special amateur station for the expedition, was located at base camp, about 4700 meters above sea level, at the foot of Mt. Naimona'nyi. The "highest

Amateur Radio station in the world" started its contacts on a trial basis with amateur stations in Beijing and Xinjiang on April 25, establishing contact with other stations after May 1. The station, operated by Zou Rong-xiang, worked all HF bands with an FT-757GX and a three-element Yagi. It was an exciting moment on May 26 when BT0NMN contacted BY1PK with the news for Beijing that the first eight mountaineers (four Chinese and four Japanese) had reached the summit!

Located in Zone 23, BT0NMN provided a lot of excitement when on the air. Even though Zou was very busy with his other mountaineering chores, he still found time to work over 1000 hams on 5 continents, in 30 countries. June 20 was the wrap-up date for BT0NMN, but those lucky enough to have

worked the station can confirm via P.O. Box 6106, Beijing, People's Republic of China. The card design shows a full view of Mt. Naimona'nyi with details about the joint expedition on the reverse side (see Up Front in QST, p. 11).

Another west-area operation is the Chinese Radio Sports Association (CRSA) station BY0AA, Xinjiang Branch. The station is located in Wulumuqi and has been active since April 5 of this year. It's the first amateur station of the Chinese minority-nationality regions. BY0AA is equipped with an FT-102, TL-922 and a TA-351 tribander that is about 35 ft high on the roof. This station's operation concentrates on 20-meter CW, but is equipped for all HF bands. QSL information for BY0AA: P.O. Box 202, Wulumuqi, People's Republic of China.

### MACAU/XX9UT

From April 28 to May 7 this year, XX9UT was operated by JA1s PCY UPA UT JFIWQC JK1KHT JP1 TRJ. The group worked over 9k contacts in 66 countries from the 21st floor of the Hotel Presidente in Macau (obviously with an appreciative hotel manager!). Equipment used included a TS-430S + FL-2100Z and an IC-551. Yoshi, JA1UT, who is handling the QSL chore, heartily reports on the special cooperation of XX9WW and VS6CT.



JA1UPA (JA1UT's XYL) and JK1KHT operating XX9UT from the 21st floor of Macau's Hotel Presidente.

### IARU REGION 3 SIXTH CONFERENCE

Nov. 13-17 will see this Auckland get-together with NZART as the host society. Marking the occasion, NZ hams have permission to use the prefix ZM from Oct. 1 through year end. A special station, ZM6ARU, will operate from the conference venue Nov. 9-18.

To publicize the conference, NZART is proposing the IARU Region 3 Conference Award, available worldwide for contacts made during November with the conference station, ZM6ARU, and other ZM stations. Any band/mode may be used. Overseas stations contact ZM6ARU and two other ZM stations. (Note: Five other ZM stations may be substituted for ZM6ARU.) ZL/ZM stations contact ZM6ARU and five other ZM stations. The award is available to SWLs. Send log details (no cards) and 3 IRCs (\$1 equivalent for surface, \$2

air) to the perennial NZART Awards Manager, Jock White, ZL2GX, 152 Lytton Rd., Gisborne, New Zealand.

### WA3HUP

Mary Ann notes that she has been receiving cards for stations she doesn't (as well as some that she does) handle cards for. She wants to save you postage and asks that you take note of the following calls and whether she handles them: 3A2CZ and 3A2LC (CW only), VQ9DX, CT2FH (should go to W4JVU), 7X2BK (should go to F6EWK), S79WHW, SU1MI, J28AA, A92DT, 3A2EE, OD5GL (direct), JY5CI (via G4WFZ), TA2TA, ZA1BC (pirate), CT2CR, KF4YB/EA7, CR9AK (via VK2AHE). The following stations were hers and are QRT as of 1980: CN8s CW AK AQ CX CY. She handled the PY0FN DXpedition for March 3-25, 1978. (Note that the cards for same call operated in 1984 do not go to her.)

### KP2

If your travels take you to St. Thomas, Virgin Islands, remember that Tuesday noon is the weekly luncheon of the Virgin Islands Amateur Radio Club, at the Dolly Deck, Havensight Mall,

Charlotte Amalie. Some familiar Caribbean calls appeared at the June get-together, including KP2AJ, WP2ADB, WP2ACV, WP2AJ, WP2ADA, WP2ABG, KA2PWE, WP2AEJ, NP2AZ, W2VHP, KA6YSJ, NP2AB, VP2VI, W4EWH, KV4IE, WP2ADL, KP2J. The club asks that cards for KV4 calls with single-letter prefixes *not* be sent to the Virgin Islands Amateur Radio Club. By the way, one luncheon with the group makes you an honorary member.

### STROKE TT

"An interesting thing happened to me the other day at about 1500Z, with my beam on Asia while I was on 20 sideband. On about 14,215, I heard a weak signal signing stroke TT. Being an avid DXer and having two bogus Chad cards, my ears really sharpened up. Around came the beam to 52 degrees—short path from L.A. to Chad. It was a Yank's voice signing the stroke TT. As the beam stopped, the signal was weak, and he was in QSO with a stateside station. During the next transmission by the stateside station the other shoe dropped. It was a W—stroke Travel Trailer! My whole day was shot. But then, I began to think about the novelty in the use of the TT, and it made my day. Oh yes, I'm still looking for a good Chad card for my 330 confirmed!"  
—W6OB

### 4U1VIC TIPS

The Vienna International Amateur Radio Club's first newsletter listed tips for those working the station: (1) Unless told otherwise by the operator, please do not QSL to the operator's home call. (2) Do not send Austrian stamps for postage; they can't be cancelled at the U.N. Post Office in the Vienna International Centre, requiring a separate "trip" to the local Austrian Post Office. (3) Put the name of the operator on the QSL. VIARC is especially grateful to the Austrian Radio Club for receiving and sending cards for 4U1VIC via the OE Bureau.

### THE UN AT 40 AWARD

On Oct. 24, 1985, the United Nations will



Pat, KP2J, ex-KV4CI/ZC8PM/etc. (W1YL photo)

## Troster's Tips for Easy Listening

If the DX station is working "split frequency," does he use a particular operating pattern? Does he move up or down a little bit after each QSO (i.e., work the next station up or down a kilohertz or so)? If so, you might try moving a similar (or slightly different) amount in the same direction. Sometimes go the other direction; the DX station will not keep going in the same direction forever! If the DX station goes hit-or-miss, up, down, all over, your best bet is to try to find a clear spot in his general listening range and hope he will find you sooner or later. You will need two-receiver capability to work this way. Most DXers now can do this. Those who do not have the equivalent of two receivers have to be fast tuners!

More next month from W6ISQ.

celebrate the 40th anniversary of the coming into force of the United Nations Charter, signed in San Francisco in 1945. To celebrate this event, and in the spirit of developing friendly relations among nations, the U.N. Staff Recreations Council ARC is sponsoring this award. It is available to an amateur or SWL contacting or hearing two of the three Amateur Radio stations operating with the U.N. prefix: 4U1UN, at U.N. Headquarters in New York City, 4U1ITU, at International Telecommunication Union Headquarters in Geneva; 4U1VIC, at the Vienna International Centre in Austria. Send a list of stations worked with contact data, with usual signed statement. The award fee is \$5 U.S. or 15 IRCs, of which \$4 will be donated to UNICEF, the United Nations Childrens Fund. Applications must be sent before Feb. 1, 1986 to the United Nations Staff Recreation Council Amateur

Radio Club, United Nations DC1-0724, Box 20, New York, NY 10017.

## TYPEWRITER PILEUP

[The following is courtesy of W6BDN.]

Strolling homeward from the store, I stopped to chat with W6TC, my local *olde timer*. I didn't linger long. George had a hot DX tip: 3C1YL was on 20. It was one that I needed.

While the amplifier warmed up I swung the beam a bit south and started tuning. There she was, 5 by 5, at 14.191 MHz. The racket up band left little doubt as to where she was listening. I started studying the pileup. It seemed that there was propagation to almost everywhere. Therefore, it seemed that it should be possible to locate the station being worked. Switching back and forth between VFOs, I tried to get the timing and find a pattern.

I began to zero in on the successful contenders. No tail ending. She was moving up after each contact. Yes, about 1 kHz each time. There definitely was a pattern. Okay, it's a typewriter pileup. She tabs up the band in about 1200-Hz steps. When she gets to 210, carriage return to 14.2.

Enough analysis. Go get'er. I fell into step and started calling. I was close to the frequency with the winners, but not one of them. After a few such tries, I called silently to myself while listening on my frequency. Aha, there was too much QRM following her QRZ. She couldn't hear anything until after the dust settled a bit. I stayed in step, but waited before calling. No, still too quick; more delay. Progressively, my timing improved. She'd reply to someone at about the time my toes released the switch. Not me—not yet—but my chances looked good. I'd never psyched-out a pileup this well before. (It was almost fun!)

"The station ending in November only, please." That could be me! Not the perfect catch I hoped for, but it'll count for a new one, anyway. There was a lot of QRM on my frequen-



CE3CEW is the first Latin YL making DXCC RTTY (103 countries). Carmen holds A-1 Operator and DXCC CW, and has participated in expeditions to Juan Fernandez and Easter Island, launching them for the first time into radioteletype. (CE3CBG photo)

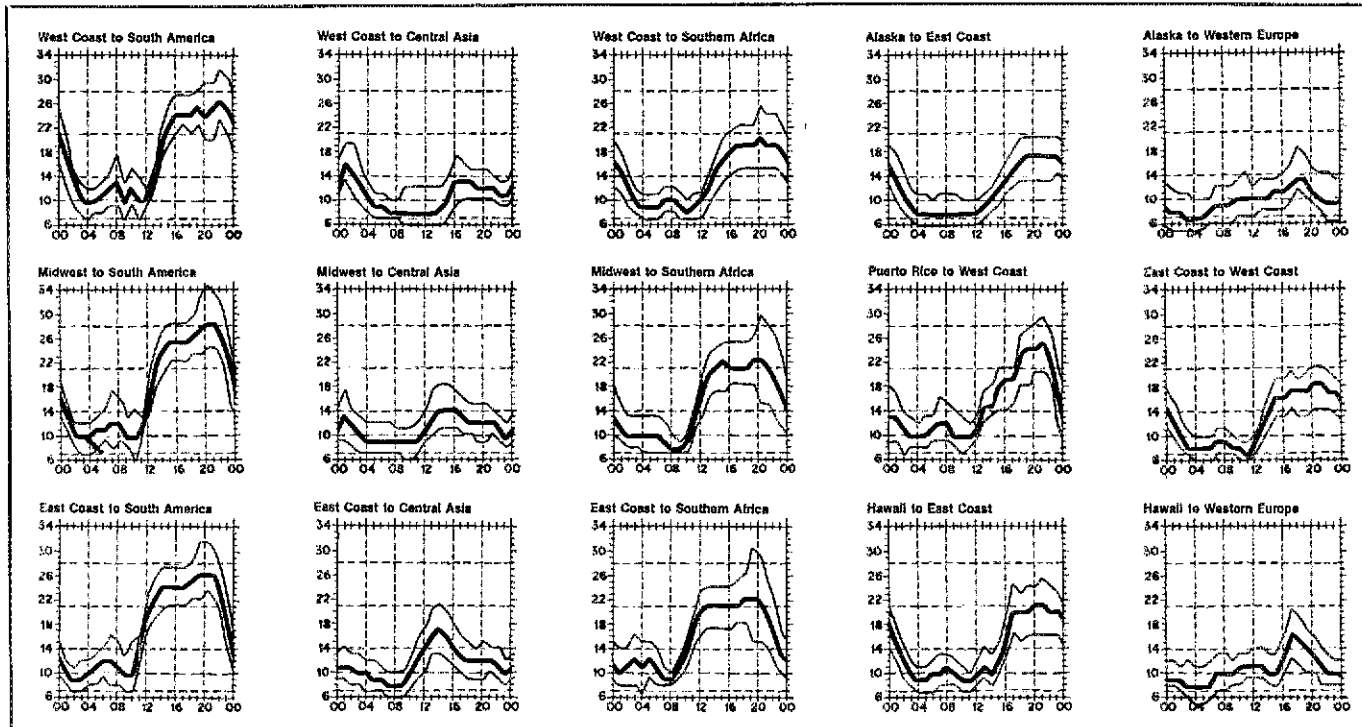
cy, and we were having trouble transferring all the characters in my call. After several exchanges, Martha used a somehow familiar but nonstandard phonetic. It was a memory trigger. Without thinking, I lapsed into an ancient dialect: "That's William Six Baker Dog Nancy, QSL?" "QSL!"

Hmmm, Martha didn't sound *that* old. Oh well, maybe I don't sound that old either.

## THE CIRCUIT

□ The annual NEDXCC dinner will be held Oct. 12 at the Elks Lodge in West Concord, MA. The day will feature afternoon and evening programs, with W8TN of FO0XX fame heading the bill. Details are available from K1VHS.


□ **KH6IJ:** W5IB reports Nose was his first DX on 24.9 MHz at "band opening," and his first station on 7 bands (80-10 meters). Naturally, KH6IJ's card was the first DX QSL received for the new band.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as



□ **Uganda:** The DXCC desk notes documentation has cleared for 5X5GK, 5X5BD and 5X5WR. Only contacts after Aug. 28, 1984 count for 5X5GK, however.

□ **Blasket Island:** ON4JL, ON4QP, ON5KL and ON6NW hoped to QRV in July from the Grand Blasket Islands, the most western point of Europe (not counting Iceland). Located in Ireland, it counts separately for Geoff Watts's Islands-on-the-Air award (reference EU07). If you worked EJ2B, confirm via ON5KL. 

vice operates *only* in an outgoing capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," June 1985 *QST*, page 55, or send an s.a.s.c. to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

U.S. amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) ARRL members may send SWL cards to foreign amateurs. QSL managers: write for details.

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

#### Requirements

1) Presort your DX QSLs alphabetically by call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y, and so on).

2) Enclose the address label from your current copy of *QST*. The label shows that you are a current ARRL member.

3) Enclose payment of \$1 per each pound (or less) or cards—approximately 155 cards weigh one pound. In other words, \$1 is the *minimum charge* whether you send 1 card or 155 cards. Please pay by check (or money order) and write your call sign on the check. Do not send cash.

4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St., Newington, CT 06111.


5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

6) Blind members who do not receive *QST* need only include the appropriate fee along with a note indicating that the cards are from a blind member.

7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is cur-

rent. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a *QST* label enclosed for each ARRL member sending cards.

#### Countries not Served

A5	Bhutan	V4	St. Christopher and Nevis
A6	United Arab Emirates	VP2E	Anguilla
A7	Qatar	VR6	Pitcairn Island
BV	Taiwan	XT	Burkina Faso
C9	Mozambique	XU	Kampuchea
D6	Comoros	XW	Laos
ET	Ethiopia	XX9	Macao
HZ	Saudi Arabia	XZ	Burma
J5	Guinea-Bissau	YA	Afghanistan
KC4	U.S. bases in Antarctica	ZA	Albania
KC6	Belau	ZD7	St. Helena
KC6	Micronesia	ZD9	Tristan da Cunha
KH1	Baker and Howland Is.	ZK2	Niue
KH3	Johnston Is.	ZK3	Tokelau
KH5	Palmyra and Jarvis Is.	3C	Equatorial Guinea
KH7	Kure Is.	3V	Tunisia
KH9	Wake Is.	3W	Vietnam
KP1	Navassa Is.	3X	Guinea
KP5	Desecheo Is.	4W	North Yemen
P5	North Korea	5A	Libya
T2	Tuvalu	5H	Tanzania
T3	Kiribati	5R	Madagascar
T5	Somalia	5U	Niger
TJ	Cameroon	5X	Uganda
TL	Central African Rep.	7O	South Yemen
TN	Congo	7Q	Malawi
TT	Chad	8Q	Maldives
TY	Benin	9G	Ghana
TZ	Mali	9N	Nepal
		9U	Burundi 

## QSL Corner

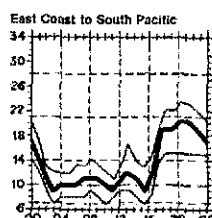
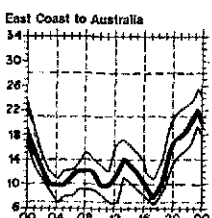
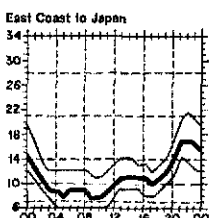
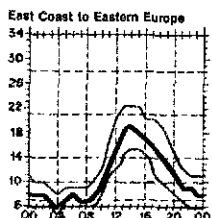
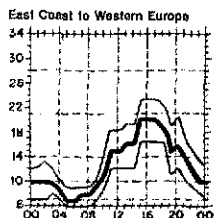
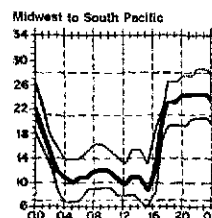
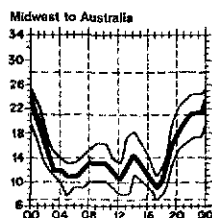
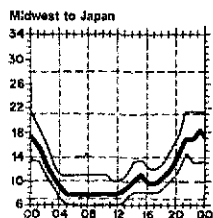
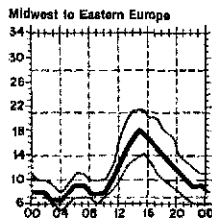
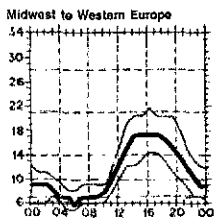
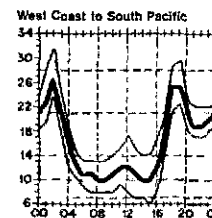
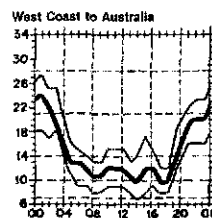
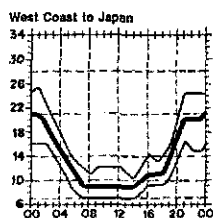
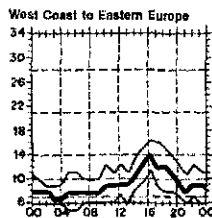
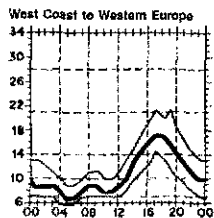
Administered By Joan Hushin, KA1IFO

### ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at minimum cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just \$1 per pound or portion thereof (155 QSL cards average a pound). Recommended size of QSL cards is 3½ × 5½ in (90 mm × 140 mm).

The ARRL-Membership Overseas QSL Ser-



the lowest curve (optimum traffic frequency, or FOT). See April 1983 *QST*, page 63, January 1977 *QST*, page 58, September 1977 *QST*, page 35, and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for September 16 to October 15, 1985, assume a sunspot number of 11, which corresponds to a 2800-MHz solar flux of 73.



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

## THE NOVICE LICENSE

□ I must write and give my support to the new proposal concerning Novice enhancement. I strongly feel that this may be the answer to the problem of declining activity and interest in the Novice ranks.

I commend you for your courage in taking this step. There should be no doubt that there will be smoke and flames on this subject! There are those who still are complaining about incentive licensing after all these years, so you can expect to have full mailbags for months to come on this issue also.

To those who are in opposition to the proposal, let me ask that they give very serious thought to just how it will harm their operation and, if it does, if it is not worth the enjoyment of seeing new blood enter the great hobby we have.

I have taught many Novice classes, spoken at many community functions on ham radio and given many demonstrations to groups such as the Boy Scouts, Girl Scouts and church groups. The question that always comes up is "How can I use my computer with that radio?" When told of the restrictions of the Novice license to CW, the interest of these kids drops to near zero. Today's youth are computer oriented, and RTTY, AMTOR and packet radio are just the things to get their interest.

Keep it up, gang. This may be one of the best things you have done in the 20 years that I have been a ham.—Blaine "Len" Lyon, KCTEG, Blackfoot, Idaho

□ In general, I support the ARRL petition to the FCC which seeks to diversify Novice privileges. However, I oppose the suggestion to allow higher-class licensees to use full power in the Novice segments. The Novice bands as they stand today are sanctuaries for the low-power operators as well as training areas for Novices. Elimination of the power restrictions will drive Novices to use 220 phone or another of the new proposed modes. While this may be good for encouraging activity among Novices, it will not be good for developing code proficiency or operating practices suitable to the HF bands. The power restriction is the best thing that ever happened to the Novice bands. Let's keep it that way.—Brian R. Page, KBACGU, Lawrenceville, Georgia

□ It seems that a growing feeling expressed by Amateur Radio operators is that the "code only" privileges of the Novice license discourage people from becoming a part of the pastime.

While many revisions of the Novice privileges are being bandied about, I believe a simpler solution is at hand: Eliminate the Novice written requirement, and replace it with the previous FCC "Novice" written requirement, which is the Technician written test. Upon successful completion of these, the new licensee would have the best of both worlds, and a more meaningful license.

I have no fear that using an expanded Technician written examination (one which includes the Novice written elements) will

discourage anyone. In fact, the opposite will be the case. The allure of being able to use all modes immediately upon passing the first exam will attract many more persons into the hobby. Too many have been "turned off" by the current "code only," "easy to get" initiation license.

Ham radio needs no "initiation" or "pay your dues" license. Ham radio needs involved people.—Merrill Jay Mirman, KT3Z, Springfield, Pennsylvania

□ I think expanded Novice privileges that include voice and data modes is an excellent idea. This new "Super Novice" license and the enhanced Technician with 10-meter phone will really appeal to the potential new hams.

This ARRL proposal will attract "high tech" young hams without lowering Amateur Radio's emphasis on achievement and upgrading of skills. Now, how about proposing a "Super Extra" for those of us who would like to upgrade beyond the Extra and commercial tickets?—Nick Leggett, N3NL, Washington, DC

[Editor's Note: QST's December 1984 In Training column (pp. 74-75) discusses the possibilities of examinations that, while not granting any additional Amateur Radio privileges, would measure knowledge beyond the Extra Class license.]

□ There's a lot of discussion on Novice enhancement. I feel we could get some of these silent operators on the air by whetting their appetite. We would then benefit by seeing more Novice participation in Amateur Radio activities.

Repeaters: Clubs use them, sponsor them and survive by them, and the Novice population wants in on the action. Well, let's let them in the door and get their interest piqued. Two meters is out of the question for possible Novice operation as it is already overcrowded, but 220 MHz is still ours, and the 1240-MHz band is a frontier and probably a good place for these "new blood" operators.

I feel that "all modes" on 10 meters for Novices is a darn good idea which is overdue. The Europeans have had their entry-level licensees operating "all modes" on 10 meters for many years.—Steven L. Smith, N2BVJ/W9, Galveston, Indiana

## NOVICES AND ELMERS

□ Amen to John Foss, W7KQW, and his Elmer system proposal in July QST In Training, Where Have All the Novices Gone? I was fortunate to have two Elmers at my side for my first QSO: a chap I met at school, WB3JIS, and his father, W3KXR. Their support and encouragement during my preparation for the Novice test and their advice and suggestions in getting me on the air were great. I might not have gotten on the air without their assistance.

A newcomer to Amateur Radio can gain background information about our hobby from the many books available, but an Elmer can show Amateur Radio to the newcomer. My Elmers answered my many questions when I got stuck in my Novice, and later my Tech, studies, allowed the use of their station

for my first QSO, loaned me a rig to get my home station started, advised me on the purchase of my own rig and showed me the "luxuries" of a higher-class license. You can't get assistance like that from a book.

Every newcomer to ham radio can benefit from the experience and wisdom of an Elmer. As in my case, an Elmer can show what you can do with a higher-class license, which provides incentive to upgrade, fast! Because of the personal attention and help an Elmer can provide, the Elmer system proposed by W7KQW could play a major role in getting 600,000 hams by 1990.—Douglas A. Alderdice, KA2WFT, Buffalo, New York

## YUPPIE HAMS?

□ With the Baby Boom generation working in full force, striving toward upward mobility, individualization and being fashion conscious, I wonder how many of those "baby boomers" are hams? They are well educated and always on the go, either to work at 7 A.M. or to the health club or singles' bar at 11 P.M. They can sometimes be heard in very short QSOs on the local 2-meter repeaters or ragchewing on 20 meters while mobiling in their 320i's.

Ever worked one of those young, hyper-energetic guys in a contest? Do they have time to contest? I'm sure they insist on a PC for logging/duping purposes. Do they ever chase DX? Sure they do... DXCC matches nicely next to the MBA from Columbia U.

Yes, hams are in every age as well as lifestyle... Gotta go now, aerobics starts in 15 minutes.—Rod Tom, KH6JAT, Aiea, Hawaii

## HERE AND THERE

□ Is anyone else tired of hearing the constant use of the words "here" and "there" in QSOs when they are inappropriate or surplus?

For example: "Your signal's report here is five by nine." If you're speaking, you'd better be *here*. Would not "My name is Dick" be better than "The handle here is Dick"? Or "You've got a few calling you, *there*." (They're certainly not calling you *here*.) "Glad to make your acquaintance, *there*." This is the famous use of there in place of a period. It adds nothing to the sentence, but length.

And what about "we" for "I"? It's a remnant of the distant past. "We'll be listening *there* tomorrow for you to call us *here*." Good grief! How about, "I'll listen tomorrow for you to call" instead?

I challenge every ham who reads this to stop using "there" and "here" and to quit hiding behind the mike. Say "I," "me" and "my" instead of "we" and "us." You are proud of your own identity, aren't you?

It's tough enough to understand and relate to each other in everyday situations. Let's not compound the problem on the air by clinging to useless and sterile ham jargon.—Richard C. Rhodes, KH6IO/5, San Antonio, Texas



## CRRL Officers and Directors

**President:** Thomas B. J. Atkins, VE3CDM  
**Vice President and Secretary:** Harry MacLean, VE3GRO

CRRL, Box 7009, Station E, London, ON N5Y 4J9, Tel. 519-451-3773  
CRRL Outgoing QSL Bureau, Box 113, Rothessay, NB E0G 2W0

**Honorary Vice President:** Noel B. Eaton, VE3CJ

**Directors:** G. Andrew McLellan, VE1ASJ  
Albert G. Daemen, VE2IJ  
Raymond W. Perrin, VE3FN  
William A. Gillespie, VE6ABC  
William Kremer, VE7CSD

**General Manager:** Raymond Staines, VE3ZJ

**Counsel:** B. Robert Benson, Q.C., VE2VW  
Suite 1600, 2020 University Ave.,  
Montreal, PQ H3A 2A5

## Moved and Seconded . . .

Minutes, CRRL Board Meeting No. 8  
July 13, 1985

1) Pursuant to due notice, the Board of Directors of the Canadian Radio Relay League, Inc. met in annual session at the Airport Holiday Inn, Toronto, Ontario, on July 13, 1985. President Tom Atkins, VE3CDM, called the meeting to order at 0905 EDT. The following were present: Vice President and Secretary Harry MacLean, VE3GRO, and Directors William Kremer, VE7CSD (Western Region), William Gillespie, VE6ABC (Prairies Region), Raymond Perrin, VE3FN (Ontario Region), and Albert Daemen, VE2IJ (Quebec Region). Also present, but as observers without vote, were Honorary Vice President Noel Eaton, VE3CJ; Counsel Robert Benson, Q.C., VE2VW; General Manager Raymond Staines, VE3ZJ; Ontario Section Manager Larry Thivierge, VE3GT; Assistant Directors Al d'Eon, VE3AND, William Hardie, VE3EFX, William Loucks, VE3AR, Zeliko Soric, VE3NLI, George Spencer, VE6AW, and Gordon Steane, VE3BMG; and ARRL President Larry Price, W4RA.

2) President Atkins announced that Director Andy McLellan, VE1ASJ (Atlantic Region), was unable to attend because of a family commitment. Everyone then observed a moment of silence in memory of amateurs who had passed away.

3) It was agreed to follow the agenda that had been provided. Moved by Mr. Kremer, seconded by Mr. Perrin, the Board VOTED to adopt the minutes of CRRL Board Meeting No. 7 as issued by the Secretary.

4) President Atkins asked that Directors' reports be received as written. Counsel Benson then reported on a number of legal matters: The CARL trademark problem would soon be resolved. CRRL Publishing was now incorporated. An antenna and tower by-law case in Hampstead, Quebec, might require opposition at the highest levels. Counsel was working with Revenue Canada to ensure that tariff exemptions on amateur equipment would be retained as tariff laws were rewritten. Also, Counsel had provided legal assistance in the Jack Ravenscroft, VE3SR, case.

5) Mr. Perrin provided additional background on the Jack Ravenscroft case. The Board then discussed the possibility of direct financial aid. There was concern that this could set a difficult precedent. CRRL needed a legal assistance policy. Moved by Mr. MacLean, seconded by Mr. Perrin, the Board VOTED that Mr. MacLean form a committee to study the matter and make recommendations within 60 days.

6) Counsel Benson then reviewed changes to the CRRL By-laws proposed by a committee headed by President Atkins. These changes would reflect the current status of



A busy moment at the CRRL Board meeting. From left to right are VE3CDM, VE3GRO, VE3ZJ. (VE3AND photo)

CRRL, clarify the rules for recalling a Director and clarify the rules governing elections. The Board considered each change in turn and when necessary suggested modifications. Rules governing elections proved to be difficult. It would be necessary for the Board annually to create an Election Committee. This would prevent Board members who were running for office from having to rule on the eligibility of persons who might be running against them. The Board agreed to return to this matter later in the day.

7) The Board recessed from 1025 to 1040.

8) The Board then discussed a Travel and Expense Policy prepared by Mr. Loucks. A number of amendments were suggested. Moved by Mr. Gillespie, seconded by Mr. Perrin, the Board VOTED to adopt the policy as amended. Moved by Mr. Perrin, seconded by Mr. Daemen, the Board VOTED that travel allowance for cars used on CRRL business be \$0.16 per kilometre.

9) The Board then discussed CRRL Life Membership. ARRL President Price indicated that ARRL's experience with Life Membership had been positive. Moved by Mr. Atkins, seconded by Mr. Gillespie, the Board VOTED that Mr. Staines form a committee to study the matter and make a recommendation within 60 days.

10) General Manager Staines reported on developments at the CRRL Headquarters office in London, Ontario. Computer hardware and software were now operational. Membership information from ARRL was now being loaded into the computer for test runs in preparation for CRRL taking complete

responsibility for Canadian League members' monies, membership records, QST mailing labels and membership-renewal notices.

11) The Board then discussed a set of recommendations on CRRL affiliation prepared by Mr. Kremer. Most Board members agreed that a 51% League membership requirement would be burdensome. They also noted that few affiliated clubs were taking advantage of the \$2.50 rebate on CRRL memberships processed through a club membership secretary. Simplest would be best. Moved by Mr. MacLean, seconded by Mr. Kremer, the Board VOTED to adopt the following resolution: That CRRL invite all Canadian radio clubs to identify with the aims and objectives of CRRL through affiliation; that there be five classes of affiliation—provincial societies, local clubs, special-interest groups, student groups and senior-citizen groups; that affiliation not be based on a minimum CRRL membership requirement; that upon affiliation, each society, club or group receive a charter of affiliation and be mailed the CRRL News bulletins and such other information, special offers and newsletters as might be made available; and that the basic requirement for continued affiliation be the annual completion of a report form.

12) The Board then discussed the operation of incoming QSL bureaus. Several were self-sustaining; others required financial assistance to meet their operating expenses.

(continued on page 78)



**President:** Richard L. Baldwin, W1RU  
**Vice President:** Carl L. Smith, W0BWJ  
**Secretary:** David Sumner, K1ZZ  
**Assistant to the Secretary:** Naoki Akiyama, JH1VRQ/N1CIX

**Regional Secretaries:**  
John Allaway, G3FKM  
Secretary, IARU Region 1  
10 Knightlow Rd.  
Birmingham B17 8QB  
England

Alberto Shaio, HK3DEU  
Secretary, IARU Region 2  
9 Sidney Lanier La.  
Greenwich, CT 06830  
USA

Masayoshi Fujioka, JM1UXU  
Secretary, IARU Region 3 Association  
P.O. Box 73, Toshima  
Tokyo 170-91  
Japan

## The Objectives of the International Amateur Radio Union

As defined in the new Constitution of the IARU, its objectives are:

a) Representation of the interests of Amateur Radio at and between conferences and meetings of international telecommunications organizations;

b) Encouragement of agreements between national Amateur Radio societies on matters of common interest;

c) Enhancement of Amateur Radio as a means of technical self-training for young people;

d) Promotion of technical and scientific investigations in the field of radiocommunications;

e) Promotion of Amateur Radio as a means of providing relief in the event of natural disasters;

f) Encouragement of international goodwill and friendship;

g) Support of Member-Societies in developing Amateur Radio as a valuable national resource, particularly in developing countries;

h) Development of Amateur Radio in those countries not represented by Member-Societies.

In these pages, we have many times em-

phasized the importance of IARU participating in World Administrative Radio Conferences (WARCs) held by the International Telecommunication Union (ITU), especially those general WARCs in which the table of frequency allocations is subject to revision. And to participate in a conference means that IARU must also take part in the preparatory work, as it is now doing in anticipation of a general WARC that might be held as soon as 1991. For example, by the time this column appears in print, along toward the end of August, an IARU team consisting of W1RU, YU7NQM, SP5FM, I1RYS and W0BWJ will have been present for all or part of ORB-85. (ORB-85 is the short title—the full title of this ITU conference is The World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It.)

If any Amateur Radio matters come before the conference, the IARU team will be prepared to handle them. Otherwise, the IARU team members will be keeping IARU visible at this ITU conference and becoming acquainted on a personal basis with delegates from the many administrations present—

delegates who can be expected to play important roles in other ITU conferences where we will want and need their support for the Amateur Radio Service.

Then, there is the matter of encouraging agreements between national Amateur Radio societies on matters of common interest. In Auckland, New Zealand, in November, there will be the Sixth Triennial Conference of the IARU Region 3 Association, during which the amateur societies in Region 3 will work out common agreements on band plans (that is, the use of the spectrum by mode), operating matters such as contests, handling reports of interference to stations of the Amateur Service, etc. Because there will be observers present from the other two IARU regions as well, it will be another opportunity for IARU to display its international character.

We are, after all, highly interdependent. In our unity there is the strength to defend the Amateur Radio Service at international telecommunications conferences. And in our unity there is the realization that any major action taken by an individual member-society has an impact on other member-societies.

More about the objectives of IARU another month.

### 50 MHz IN GREAT BRITAIN

It is expected that the band 50.0-50.5 MHz will be allocated to British amateurs sometime in the fall of 1985. This good news comes as the result of a great deal of hard work on the part of the Radio Society of Great Britain.

### 15TH ANNUAL SEANET CONVENTION

The Southeast Asia Net (SEANET) will hold its annual convention in Cebu City, Philippines, Friday through Sunday, November 22-24, 1985. Convention headquarters will be the five-star Cebu Plaza Hotel. Further information on special hotel rates, registration, Philippine Airlines discounts and the convention program can be obtained by writing to the Cebu Amateur Radio League, Inc., P.O. Box 304, Cebu City, Philippines. The net meets daily at 1200Z on 14,320 kHz. While SEANET is not an IARU activity, a great many IARU types take part in its operation and in the convention activities.

### SIXTIETH ANNIVERSARY, NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS

The New Zealand Association of Radio

Transmitters (NZART) will celebrate its 60th anniversary at the Annual Conference to be held in New Plymouth, New Zealand, May 31-June 2, 1986. The New Plymouth Amateur Radio Club, which will also celebrate its 50th anniversary in 1986, will host the event. Visiting amateurs wishing to attend please write to NPARC, P.O. Box 675, New Plymouth, New Zealand.

### AUSTRALIA AND WIA'S 75TH ANNIVERSARY

Correcting some misinformation in this column in the April 1985 issue—the ending date of the WIA 75 Award is the end of December 1985, not the first of December. Amateurs outside Australia (and including VK9 and VK0) can qualify for the WIA 75 award in the following three ways:

- Contact the commemorative station, VK75A.
- Contact a radio amateur who has already qualified for the WIA 75 Award and obtain, during the QSO, his Award Certificate Number.
- Contact 75 WIA members—no more than 30 in any one call-sign area—and log their WIA membership numbers.

### Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee	
— Members	This issue, p. 60
Affiliated Club	
— Coordinators	May 1985, p. 71
Club Contest Rules	Jan. 1985, p. 72
License Renewal	
— Information	Jan. 1985, p. 45
Major ARRL Operating	
— Events and Conventions	
— 1985	Jan. 1985, p. 46
MARS Information	July 1985, p. 46
QSL Bureaus	
— Incoming	June 1985, p. 55
— Outgoing	This issue, p. 63
QST Abbreviations List	Jan. 1984, p. 53
Rules, September VHF	
— QSO Party	Aug. 1985, p. 75
Rules, 1985 CRRL	
— Can-Am Contest	Aug. 1985, p. 80
Third-Party-Traffic	
— Countries	Oct. 1984, p. 73

## How to Communicate Efficiently

Repeaters exist to make communications more efficient. However, if the communicators (Amateur Radio operators) communicate inefficiently, the function of the repeater is wasted. The previous installment of this column described the components of a VHF/UHF repeater and transceiver, and how the components interact to bring us the FM repeater mode of Amateur Radio operation. This installment will describe how you can use the components to communicate efficiently.

### Find a Repeater

Before you can communicate through a repeater, you must find one. You can consult local hams for information about local repeater activity, or you can consult a repeater listing. Various clubs publish statewide and regional directories of repeaters, and the ARRL annually publishes the *Repeater Directory*, which lists repeaters throughout the U.S., Canada and other parts of the repeater world. (Even though you may know all about the local repeaters, it is not a bad idea to get a copy of the *Directory* for operating outside your locality during vacations and business trips.) Once you find a repeater to use, become familiar with its operating procedures before you make your first transmission.

### Making Your First Transmission

Making your existence known on a repeater is simple. If there is no activity on the repeater, simply transmit your call sign ("KA1ZZZ") or "KA1ZZZ listening" to get somebody's attention.

If there is a conversation in progress and you wish to join in, transmit your call sign during the break that occurs after one station stops transmitting and another station starts. Usually, the station that transmits after your transmission will acknowledge you.

Calling another station is a simple procedure also. If the repeater is quiet, simply

call the other station: for example, "K1XA, this is WA2FTC." If a conversation is in progress and it sounds like it is about to end, you can wait until it is over before calling the other station; or if the conversation sounds like it is going to continue for some time, transmit your call sign between transmissions. When you are acknowledged, ask if you can make a quick call. Usually, the other station will acquiesce. If the station you are calling answers, ask it to stand by until the present conversation is over or, if possible, ask it to meet you on another repeater or a simplex frequency.

In a similar vein, if another ham does transmit his call sign in the middle of your conversation, the next station to transmit should acknowledge the breaking station and let him make a call or join the conversation. It is impolite not to acknowledge him and it is just as impolite to acknowledge him but not let him speak. It may be an emergency.

When it is your turn to transmit, pause briefly before you begin transmitting, to allow another station to break into the conversation. Some repeaters have "courtesy beepers" that force the users to leave a space between transmissions. The beeper sounds a second or two after each transmission to permit breaking stations to transmit their call signs in the intervening space. The other stations may continue the conversation (and acknowledge the breaking station) only after the beeper sounds.

### Breaks and CQs

A couple of don'ts. Don't use the word "break" to break into a conversation unless it is the operating practice in your area. In many areas, "break" is used only to indicate that there is an emergency and that all stations should stand by for the breaking station.

Don't use a series of "CQs" followed by your call sign to initiate a conversation. It takes much more time to transmit than simply

"K1EFI listening." A single "CQ" is used in some areas. Remember: We are striving for efficient communications.

### Go Simplex

Once you have established a contact on a repeater, move the conversation to a simplex frequency. A repeater serves as an intermediary for stations unable to communicate directly; therefore, it is inefficient to use a repeater when the repeated stations can communicate on a simplex frequency. Besides, communications on a simplex frequency offer a degree of privacy that is impossible to achieve on a repeater.

One word of caution: When selecting a simplex frequency to converse on, be sure it is a frequency designated for FM simplex operation (check the band plans listed in the *Repeater Directory*). Certain parts of the band are specifically set aside for other modes of operation, such as satellite and weak-signal CW and SSB. By selecting a simplex frequency indiscriminately, you may interfere with stations operating in other modes and not be aware of it.

Keep each transmission as short as possible. Short transmissions permit more people to use the repeater. All repeaters promote this by having timers that shut down the repeater whenever someone transmits for too long. With this in the back of their minds, most users keep their transmissions brief. Learn the length of the repeater's timer (the length may vary with each repeater), and stay within its limits.

These are some of the basic operating procedures for repeater operation. Monitor the local repeater and listen to how these procedures work in the real repeater world; you may discover that the local repeater has its own special operating procedures. A little reading (of this column) and a little listening (to the local repeater) will prepare you to communicate efficiently in the FM repeater world.

### VERMONT FORMS INDEPENDENT REPEATER COUNCIL

In Vermont, repeater owners have broken their ties with the New England Spectrum Management Committee and formed their own repeater group, the Vermont Independent Repeater Coordinating Committee (VIRCC). The group feels that "Vermont is unique in several ways and demands the attention of its own coordination committee to address its own needs." As an illustration of how bad things are in the Burlington area, six repeaters are coordinated by three different councils!

On the 2-meter channel-spacing front, the VIRCC favors 15-kHz spacing and proposes using 15-kHz spacing below 146 MHz. VIRCC may be contacted through its chair-

man, Ed Nowak, N1QG, at P.O. Box 99, Essex, VT 05451.

### REPEATER LOG

According to reports received in the month of June, repeaters were involved in the following public-service events: 15 weather emergencies, 1 medical emergency, 14 vehicular emergencies, 6 fire emergencies, 2 search and rescue, 18 public-safety events, 12 drills/alerts and 2 power failures.

The following repeaters were involved (followed by the number of events): K1FFK 2, KA1KPH 1, WB2ZZI 8, N3AFX 1, W3AVK 1, W3BRZ 9, W3GV 1, W3UDX 2, WA5LVT 1, N6AHW 1, KH6HHG 1, K6JE 1, WB6MFX 1, W6NBH 1, WB6NLU 1, K6VDS 1, WB7CGQ 1, W7HSG 1,

K7OMR 8, WB7OPZ 1, W8BI 1, WD8IEL 7, W8BTD 1, W8DC 2, K8DDG 7, W8TD 1, WA8UE 1, W9QYQ 2, WA0FYA 2 and W0MXW 2.

## Strays

I would like to get in touch with...

anyone with an operating manual and a schematic diagram for frequency meter FR-149B/USM-159, manufactured by Etron, Inc. Gordon L. Schmehl, W7LVU, P.O. Box 26913, Tempe, AZ 85282-0310.

## WORLD RECORD ON 47 GHz: SOME DETAILS

Last month in *Up Front* in *QST* we reported a new microwave world distance record. Two Swiss operators, Erich Zimmermann, HB9MIN/P, and Arnold Sporbeck, HB9AMH/P, set the mark on January 13 of this year with a 53-km QSO on 47 GHz. This contact is the latest in a series of 47-GHz contacts between these two stations. Earlier contacts were: December 26, 1984—59/59 at 1 km; December 29, 1984—55/55 at 20 km; and January 13, 1985—59/59 at 20 km and 55/55 at 38 km. HB9AMH/P was located in IN37OD, 1025 meters above sea level, and HB9MIN/P was at a bearing of 104 degrees, in IN37WB. Both stations ran wide-band FM Gunn oscillators and homebuilt receiving mixers. Dish antennas were used at both ends. Of particular interest is HB9AMH's antenna—reportedly made using a lampshade purchased from a Swedish furniture company!

## PACK RATS 2.3-GHz GRID-SQUARE EXPEDITION

Over the June contest weekend (June 7-9), several members of the Mt. Airy VHF Radio Club (well known as the Pack Rats) organized a 2.3-GHz grid expedition to FM18, FM19, FM28 and FN10. The stations involved were WA3AXV and WA3JUF, who operated their home stations, and N3CX, N3AOG and WB3DNI, who operated portable using the club call sign, W3CCX. The portable station included equipment for 144 MHz (40-W SSB plus small boomer), for use in setting up the contacts, 1296 MHz and 2304 MHz (6-W plus 2- $\times$  45-el loop Yagis). Using N3AOG's RV as a base, the expedition first set up in Tuckahoe State Park, MD, close to the intersection of the four grids FM18, 19, 28, and 29. After initial tests on 1296 MHz, it was decided to move to the Delaware coast at Cape Henlopen, in FM28. Signals on the morning of June 8 were very strong. On 144 and 1296 MHz, 59 reports were exchanged; on 2304 MHz, WA3AXV was 559-579 and WA3JUF was 539-569. The next site chosen was Curtis Point on the Chesapeake Bay, south of Annapolis in FM18. WA3AXV was still strong on 2304 MHz with 559-579 signals, but WA3JUF had equipment problems and, despite trying for 90 minutes, no contact was established on 2304 MHz. On the evening of the 8th, the expedition drove north and, after a few hours' sleep, moved on to Gap, PA, in FM19. After making 2304-MHz contacts with both WA3JUF and WA3AXV, the expedition moved again, this time to Vintage, PA, in FN10, and again made contact on 2304 MHz with the home stations.

On the following Sunday, June 16, N3CX and N3AOG set out for Sea Bright on the New Jersey coast, in FN30. Contact was made with WA3AXV, who was strong on 2304 MHz at 559/579. WA3JUF was considerably weaker at 339, but the contact was made. The mobile station then headed north to Greenwich Point, CT, in FN31. After discussion with local authorities, they were allowed to set up in a private (residents only) park about 15 ft from the water's edge. 1296-MHz signals were extremely strong at 59

with rapid QSB. On 2304, WA3AXV was 549/569 and WA3JUF was 559/579. Signals were very good, and an SSB contact was also made.

Contact distances were: FM28—105 miles, FM18—125 miles, FN10 and FM19—45 miles, FN31—95 miles, and FN30—75 miles. This was with only 6 W on 2304 from the mobile station, illustrating that high power and elevated antennas are not necessarily required to make contacts on 2304-MHz tropo. At the end of this expedition, WA3AXV had worked 11 grid squares on 2304 MHz, and WA3JUF had worked 10 grid squares. Also to be credited with assistance are WB2NPE, W3HQT/1, AK3O and WA3IWT, who lent equipment used on the expedition.

*(Adapted from an article by Dave Hackford, N3CX, in Cheese Bits, the Pack Rats' newsletter)*

## 1296-MHz TROPO CONTACTS

There was a very good tropo enhancement between May 31 and June 3, resulting in what is believed to be a new 1296-MHz overland U.S. record contact of 1112 miles between Wes Atcheson, WA5TKU, in Sanger, TX (EM13) and Ottmar Fiebel, W4WSR, in Jupiter, FL (EL96). WA5TKU used a homebuilt solid-state transverter with 10 W out to a homebuilt 19-element loop Yagi at 70 ft. Reports of 549/539 were exchanged. WA5TKU also worked several other Florida stations, including W4ODW, W4NTD and W4EQR.

Al Ward, WB5LUA, also worked some good DX during this opening, including WA4OFS, W4ODW, W4EQR, K4NTD and W4WSR (1073 miles). During the VHF contest, WB5LUA and W5GG worked WB4NXY in Kentucky and W8VP in Ohio (as did W5HN), giving WB5LUA states no. 19 and no. 20 on 1296 MHz. Al comments that signals were so good between Texas and Florida that on May 31, after working W4ODW on 1296 MHz with 59 signals, W4ODW went out to his car and worked Al with 1 W and a small Yagi from his mobile station!


## MICROWAVE ANTENNA ALIGNMENT AID

When you use very-high-gain, narrow-band beamwidth antennas on the higher microwave bands, accurate antenna pointing can make the difference between a successful contact and no contact at all. One way to align a transmitting antenna is for the receiving station to relay back the signal to the transmitting station on tail-back channel at a lower frequency, often 144 MHz. The transmitting station can then adjust antenna beam heading for maximum signal on the talk-back link. One problem is that with QSB and AGC operating on both the transmit and talk-back circuits, you may have difficulty determining exactly where the signals peak.

An idea by Dave Fielding, G8KHU, helps solve this problem (*RSGB Microwave Newsletter*, May 1985). He suggests coupling the AGC output of the receiver to a VCO (voltage-controlled oscillator) and relaying the subsequent audio tone back to the transmitting station on the talk-back link. The transmitting station then adjusts the antenna beam heading for a maximum frequency tone on the talk-back link, the frequency not being affected by QSB or AGC

on the talk-back circuit. Such procedures are often required on 10 GHz and above, and are especially useful when one station has considerably more TX power than the other. The station with the most TX power first aligns his antenna by the method outlined above. The station with the lower TX power then aligns his antenna on the signal from the first station, and thus the best possible link is established.

## MORE RAIN-SCATTER NEWS

A recent visit by G3WDG yielded more information on rain-scatter propagation on 10 GHz. G3WDG and G4KGC have been monitoring troposcatter signals from G3JVL, at a distance of about 100 miles. Small dish antennas are used at both ends of the path, with G3JVL running about 4 W from a TWT. During normal conditions, the troposcatter signal is just discernible in the noise. During rain storms at the receive end of the path, however, signal levels increased considerably, with signals detectable on a handheld horn, pointing about 20° above the horizon. Such signal enhancements do not seem to be so strong on the lower bands, and on 24 GHz it would be expected that absorption by water vapor would severely attenuate signals. The unusual enhancement of scatter signals by rain at 10 GHz may make fixed-station operation possible even from relatively poor sites. Signals have been heard beaming straight up into rain clouds, and everyone has a clear path in that direction! I would be interested to hear from anyone here in the U.S. who has observed rain-scatter enhancement on the higher bands. 

## Strays



### QST congratulates...

- the following radio amateurs on 50 years as a member of ARRL:
- Richard C. Dunham, W1EWF, of Arlington, Virginia
  - Robert G. Ling, W1IBF, of Sudbury, Massachusetts
  - William E. Chambers, W7BYK, of Sultan, Washington
  - Pat Stewart, W7GVC, of Walla Walla, Washington
  - F. Carl Daehler, W8BKD, of Stout, Ohio
  - Joseph P. Andrasko, W2ETS, of Maspeth, New York
  - William F. Green, W2AEU, of West Hempstead, New York
  - Joseph F. Prestia, W1HSI, of Pittsburgh, Pennsylvania
  - W. Raymond Burrows, WA2FLT, of Verona, New York
  - Walter Arndt, of Poulsbo, Washington

## Are Activity Nights Doing the Job?

The concept of setting aside a specific evening to concentrate activity on each of the various VHF bands has been with us for a number of years. While a positive step, it has met with only limited success. One problem has been that agreement has never been total across the country as to which night should be devoted to each band. Some have made the point that other activities make it consistently difficult for them to get on the air on certain evenings. Another apparent shortcoming with the scheme has been the complaint that putting out the effort to get on another band, when all of the activity on it is confined to one night per week plus a few contests, does not appear to represent a good use of limited time and resources.

In an effort to overcome these objections, WIGXT has revived an idea that has been

mentioned from time to time but seems worthy of airing again: that is, to replace activity nights with activity *hours*. Lou's proposal would designate the period from 1800 to 1900 local time each evening to 6-meter operation. The next hour would be for 2 meters. From 2000 to 2100 would be devoted to 1 1/4 meters. From 2100 to 2200 would be the period set aside for 70-cm activity. Beginning at 2200, operation on the higher bands, including 23 cm, would be emphasized. WIGXT stresses that no hard-and-fast rules are intended. For example, no one should be criticized for being on 70 cm during a time suggested for 2-meter operation. The proposed schedule would merely provide guidelines for concentrating activity. This type of schedule may present some difficulties in those areas bisected by time-zone lines. Accommodating such local anomalies would be

left to those affected. This column is one medium available for publicizing any local variations.

WIGXT points out that the specific times are selected to be consistent with those presently used during VHF contests. In that context, they have proved quite successful in getting people together during those events. They should also provide a good basis for achieving the same objective at other times.

I feel that the suggestion appears to have considerable merit, but would like to hear from other VHFers in various parts of the country before deciding whether to urge its universal adoption. One idea might be to give it a trial run for a month or so and see how it works out. I would appreciate hearing from anyone on the subject, and will endeavor to provide space for comments received.

### 1985 PACK RATS VHF CONFERENCE

Once again the Mt. Airy VHF Radio Club, known to most as the Pack Rats, is sponsoring the Mid-Atlantic VHF Conference. This year's affair, the ninth since the event was begun, will be held October 5 at the Warrington Motor Lodge, Rte. 611, Warrington, PA. The conference will, once again, feature talks of interest to VHFers, and will be followed by a buffet banquet. The following day, the Club holds their 14th annual Hamarama at the Bucks County Drive-In, just south of the motel. This is a giant flea market with many items of interest to VHFers (as well as other hams) offered for sale. Combined registration for the two events is available for \$4 by addressing P.O. Box 311, Southampton, PA 18966. Checks should be made out to the Mt. Airy VHF Radio Club. For further information on either event, call Lee Cohen, K3MXM, at 215-635-4942.

### A WET GRID-SQUARE EXPEDITION

Did you ever complain that many nearby grid squares lie entirely over water? N6CA and several others have decided to do something about this situation, which quite obviously exists in the Southern California area. Chip and his friends have chartered a boat and plan to sail it to DM02, CM92 and CM93 beginning at 1800Z Sept. 14. Not coincidentally, this is the start of the September ARRL VHF QSO Party. Operation will be under the call N6CA/MM, with all bands from 6 meters through 23 cm represented. The group may also work 13 cm plus 10 GHz and 24 GHz, and possibly higher assignments if appropriate gear can be readied in time. Contact N6CA for further details. I am informed by those at Headquarters who administer the program that contacts with water-covered grids do count for VUCC.

Let's hope for more such seafaring grid-square expeditions.

### ON THE BANDS

**6 Meters**—Many have, no doubt, already heard about the big news item for this month. But, for those who may have just returned from three months in Antarctica, it is the July 2 E<sub>s</sub> opening from the U.S. East Coast to the British Isles. There have been other such openings in the past

two years, but this one was the most widespread and longest lasting of any transatlantic E<sub>s</sub> propagation yet experienced. Scattered reports have arrived of several stations as far south as Washington, DC working one or more stations from across the pond. The farthest south that has come to this conductor's attention to date is K3EST, just south of Washington. This word comes from W3ZZ, just north of the nation's capital, who completed a QSO with EI0RTS at 2358Z. W4CKD, in the Virginia suburbs, reports hearing a number of weak signals, but was bothered by line noise and local QRM. Bob did identify EI0RTS, but did not call him, as he had worked several E<sub>is</sub> on F2 and wanted to give those who needed the country a chance. W3WFM, 50 miles north of Baltimore, hooked up with G4DGU at 2345Z. Once again, during such openings, WA1OUB in New Hampshire was in the thick of things. Bob was alerted to the possibility of interesting conditions at 2115Z by very short skip to the northeast on 10 meters. He began calling on 6 meters and was rewarded at 2145 by a call on 28.885 from G4GLT. It would be 2230 before the select group of 100 Gs, who have special permits for 50-MHz operation, would be allowed to begin transmitting on the band. Another crossband contact was made at 2209 with

G4BPY, and another 10 minutes later with G4IFX. Bob contacted G4GLT again at 2225 and held the QSO until the "magic hour," when they hooked up for a two-way 6-meter QSO with 5 × 9 signals both ways. WA1OUB went on to work G4BPY at 2232, EI0RTS at 2232, G6NB at 2234, GW3LDH at 2242, G3OSS at 2244, G3COJ at 2255, G3WBN at 2302 and G4DGU at 2305. At 2356, EI0RTS was worked again, and the last contact was at 0027 July 3, with G3JYHU. Except for G4GLT and EI0RTS, most of the signals were quite weak, between 4 × 3 and 5 × 5. Bob adds that several of the Gs reported hearing 4s and 5s earlier in the day. From the Boston area, WIJR reports working G4GLT, G4BPY, GW3LDH, G3COJ and EI0RTS. Joe says the latter was the last signal heard at 0012Z. Down the coast to the City of Brotherly Love, W3IWU comments that he first noted weak signals on 28.885 at 2130Z and identified G4GLT's signal on that frequency at 2156. Herb then listened to several crossband QSOs over the half hour, as well as the U.S. side of a number of two-ways over the following hour. At 2340, he heard G4DGU, and EI0RTS initially at 2351—whom he finally worked at 0041, with 559 signals both ways. W3IWU notes that the band swung to the west, and was open for single and double hop until 0315. Must have been quite an evening. Where was W3XO? Visiting in-laws in Texas, that's where! This was apparently not the first instance of propagation between the U.S. and the U.K. this year. On June 26 at 0000Z, K7KV Seattle reports hearing the GB3NHQ beacon on 50.05. It is understood that this beacon runs 30 W to an omnidirectional antenna and is located near London. Dave also heard KITOL during the same period.

This seems to be a particularly auspicious time to mention that there is the potential of good news brewing in the U.K. with regard to expanded 6-meter operation. I hope to have more on this next month. In the meantime, watch the *ARRL Letter* and listen for bulletins on WIAW.

Not all of the 6-meter DX was to the east. K7RWT Portland, OR reports that, after being told of a KL7 contact by a station in Kentucky during a widespread double-hop opening July 8, he began making some noise to the northwest. At 0552Z July 9, his calls were answered by JH0PJH. During the 8 minutes that propaga-



One of the U.K. 6-meter permit holders, John Baker, GW3MHW.



### 70-cm Standings

For WAS holders, listings are WAS number, call, state, call areas worked and grid squares worked. For others, call, state, number of U.S. states worked, number of call areas worked and grid squares worked. Call areas are the 10 U.S. call areas plus KL7 and KH6, plus each VE and XE call area, plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Grid squares are those Maidenhead designators worked since the VUCC Award was instituted, January 1, 1983. Those not showing some indication of activity or interest within the past two years are subject to deletion. They will be reinstated upon providing an indication, in writing, that they are still interested in being listed. It is not necessary to have worked any new states or grid squares in order to be reinstated. Compiled July 14, 1985. Deadline for next update is January 10, 1986.

WAS Holders	WA2TIF	NY 13	5	—	WA4SBC	VA 20	8	—	WA5VJB	TX 12	4	—	KØTLM*†	MO 47	24	49
1 WØYZS*	MO	—	—	—	W3IY4	VA 19	7	—	K5LLL	TX 11	6	—	WØRAP*†	IA 45	32	100
2 K2UYH*†	NJ	56	—	—	WA4PCS	KY 18	7	—	W5DFU	OK 10	4	10	WØTE*	IA 42	—	—
3 K5JL*†	OK	—	—	—	WB4NMA	GA 17	6	—	N5BBO	TX 10	3	—	KAØY*	IA 40	9	—
4 WB5LUA*	TX 41	—	—	—	K4GL	SC 16	7	—	W5UWB	TX 8	3	—	WØPW*	CO 28	10	—
5 W5FF*†	NM 28	—	—	—	KC4P	AL 16	5	—	W5NZZ	TX 6	3	—	KØDAS	IA 26	7	—
6 W1JR*†	MA 45	123	—	—	K4LHB	VA 13	6	—	WA5YOU	LA 5	2	—	KØALL*	ND 20	12	—
					K4KAE	SC 12	5	—	WØABN*	43	34	—	WØOHU	MN 20	6	—
					W4F	GA 11	4	25	K6JYO*	9	6	—	WØFY	MO 20	—	—
K1FO*	CT 36	39	112	—	WD4CXU	VA 11	4	—	WØBNTM*	8	7	—	WØLER	MN 18	6	—
AD1C	MA 33	10	—	—	N4Z	FL 9	3	—	WØ6HXM	4	2	—	WØBDRL	K8 18	5	54
W2SZ/1	MA 25	11	77	—	KB4CRT	FL 9	2	31	W4WD/7*	UT 38	33	—	WØVB	MN 17	6	—
K1PXK	CT 25	11	—	—	WA4OFS	FL 8	2	18	W7JF*	MT 15	11	—	KCØQR	NE 11	4	27
K1LPS*	VT 22	12	—	—	W4SLM	GA 6	2	13	W7HAF*	MT 11	15	19	WØBDGF	NE 10	3	25
W1GXT	MA 13	6	—	—	K4KJP	FL 6	2	—	W7LUX	AZ 5	3	—	WABNOK	MO 9	3	—
WA1JOF	MA 13	4	—	—	WD4DGF	TN 5	3	7	K7ICW	NV 4	2	—	WØZKG	IA 9	3	—
N1AIS	MA 11	5	—	—	K5FF*	NM 38	29	—	WATJJO	NV 3	2	—	WØBRWC	IA 8	3	—
W1HDQ	CT 11	4	—	—	WØRRY/5*	OK 32	35	—	N7EIJ	ID 2	1	—	KCØOG	NE 7	2	17
K2RIW*	NY 28	12	—	—	W5UKQ*†	LA 31	23	—	WØSD	OH 45	34	—	WØS	SD 7	2	—
W2VC	NJ 25	11	81	—	W5SAFY*	TX 28	—	83	K8WW*	MI 30	9	73	KLWZ*†	28	25	—
K2GK	NY 24	9	43	—	W5HN	TX 25	7	—	WØBKC	MI 30	8	—	KHØHME	2	2	6
W2DWJ	NJ 22	9	—	—	W5RCI	MS 25	7	—	WØIDU	MI 27	8	—	VE1RC	3	2	—
WA2FGK	NJ 22	9	—	—	K5SW	OK 20	7	—	WØBPT	OH 23	9	—	WØ2DFO	12	7	—
W2PGC	NY 20	10	—	—	WA5HNK	TX 16	6	—	WØ2DIN/8	WV 13	6	—	VE3LNK	15	6	43
W2CNS	NY 20	9	—	—	K5BMR	OK 16	4	53	WØ9SNR	IL 33	11	48	VE3AIB	11	7	—
K2YCO	NY 17	8	—	—	K5WE	OK 15	4	35	WØZIH	IL 33	11	—	VE4MA*†	40	39	—
K2OVS	NY 16	6	—	—	K5JRH	TX 15	4	—	WØUD	IL 28	10	—	VE7BBG*†	39	32	—
W2CRS	NY 16	—	—	—	K5DHU	TX 14	5	44	K9XY*	WI 21	11	—	—	—	—	—
N2EO	NY 13	5	—	—	WA5DDBY	TX 14	4	—	K9SM	IL 16	7	16	JA9BOH*	18	31	—
					W4GJO	GA 23	—	—	W5MSV	IL 14	5	49	—	—	—	—
					K4CAW	NC 23	—	—	K89NM	WI 9	3	—	—	—	—	—
					WØANXY	KY 22	8	54	N4JS/5	MS 13	5	—	—	—	—	—
					KC4EG	KY 21	8	—	K5YY	AR 13	4	34	—	—	—	—

\*EME used for some contacts  
†WAC

tion was in, signals from the Japanese station ran 3 × 1, while his were reported as 5 × 2.

As promised last month, here are the details on W6JKV's operation from Belize and Desecheo. From V3GE, Jim was able to work only stations across the southern tier of states except for K7KV Seattle, who was in several days at both sunrise and sunset. One 2-meter contact was made from this QTH, WB5LBT Baton Rouge, LA via scatter. Things were somewhat busier from KP5. From that rare spot, W6JKV/KP5 completed 537 6-meter QSOs and again a single 2-meter exchange. This one was also via scatter with W5HUQ/4 Jacksonville, FL. On 6 meters, all U.S. call areas were worked, plus VE1 and 3. In addition, contacts were completed with VP9GE, 9Y4JW, 9Y4LL and J88AR, as well as stations in KP4, YV and ZF1. In the U.S., 4 W1s were worked, 19 W2s, 34 W3s, 205 W4s, 132 W5s, a single W6 (WA6PEV), 5 W7s, 33 W8s, 38 W9s and 54 WØs. I am sure that, once again, everyone joins with me in thanking Jim for another job well done. On this DXpedition, as in some past ones, he was assisted by KB6AFZ. Cal did quite a bit of operating on OSCAR 10, and I am sure his efforts were appreciated by the followers of that facet of our hobby.

As of mid-July, it appears to have been a better-than-average E<sub>s</sub> season. I have received numerous other interesting reports and am sorry that space does not permit featuring all of them.

**2 Meters**—Some were beginning to predict that we would experience little 2-meter E skip this summer. Despite a West Coast opening early in May and some scattered ones about the time of the June contest, there did seem to be fewer than usual. The fireworks of July 8 more than made up for the past dearth, however. From here on the central East Coast, it was rather spotty, with signals from a particular area in for only a few minutes and often not very strong. But, it was a 2-meter E<sub>s</sub> opening—and therefore exciting! Several in this area worked WØEMS Nebraska, WØTEM and WØFOY Iowa, and WØSD South Dakota between 2230 and 2350Z. K5SW's log begins at 2223Z and lists stations worked as W1JR, WA1JTA and K1GVM—all Massachusetts in FN42; KQ3C and KQ3D—both Pennsylvania in FN11; WA2VNS, W2CRS, WB2CLN and KZ5P/2 in FN32, and W9IP/2 in FN24—all in New York; WA1AYT Maine in

FN43; and WB1FVS in Connecticut in FN31. Also worked were VE3FN and VE2DFO in FN25 and VE3NQX and VE3FGU in FNØ4. That area faded at 0014Z July 9, and nothing was heard until 0229Z, when Sam worked N7EIJ Idaho DN17 and W7HAH DN26, and heard KC7BQ DN47, latter both in Montana. The last signal heard was from KA7BZJ Washington in DN17 at 0254Z. NØLL Smith Center, KS reports a similar lineup. From 2303 until 0007Z, Larry worked stations in CT, RI, NY and NJ. Then, between 0140Z and 0250Z July 9, the band opened to the west, bringing in WA, OR and MT stations. Altogether that evening, he had 32 QSOs in 10 states and 13 grid squares, 7 of them new.

It's not often that I receive direct reports from overseas concerning propagation events. So when one such account does arrive, I try to give it an airing. This one was a particular pleasure to receive because it is from an old friend, Bob Panknen, formerly K4SYP, now doing business as EA5CHT. Bob reports that, like North America, Europe has been experiencing its share of 2-meter E<sub>s</sub> openings. One that he caught on June 18, beginning at 1140Z, featured contacts with Italian stations IK7CJV and IK8GAD, both in the Taranto area and both on FM. Then came a string of five SSB contacts with IKØFPA, IØNCP, IØAKP, I6WJB and IØCUT—all near Rome. Following a break for lunch, Yugoslav stations YU2AKL, YU1MWP and YU1AFS went into the log. In all, the opening lasted for 1½ hours. EA5CHT runs 10 W to a 10-element vertical beam, and is located on the southeast coast of Spain, just 600 meters from the Mediterranean. He gives his Maidenhead locator as IM97RK. He notes that tropo at that QTH is exceptional, with daily propagation to both Morocco and Algeria. EA5CHT also reports that, several days before this 2-meter E<sub>s</sub> opening, the Madrid gang had mentioned strong reception of the British 6-meter beacon.

Another DXpedition is reported in the *2-Meter EME Bulletin*. In late May, W6DB/7 Nevada was put on 2-meter EME by a group including N6AMG, K6QXY, WA6MGZ and K6PVS. Several of the group arrived the weekend prior to the operation to put up the antenna and assemble the rest of the station. Unfortunately, their efforts were partially thwarted by a small tornado that went through the place during the

intervening week. But, following repairs and the correction of a few cockpit errors, they got underway, netting 53 stations and providing several WASSs.

**The Higher Bands**—K1FO near Hartford, CT provides a sequel to the tremendous trans-Gulf tropo opening that took place around June 1. Knowing about the opening and studying the weather maps, Steve figured that there was a chance for some propagation from his part of the country to the south as the air mass responsible moved east and north. His vigilance was rewarded at 2230 EDT June 4, when he contacted AA4NA Orlando, FL on 70 cm. This was the beginning of an over-2-hour session in which, in addition to AA4A, WA4GHK Palm Bay, K4DZP Miami, WA4OFS St. Cloud and K4NTD Oakland were also worked. Three grid squares—EL98, EL97 and EL95—were represented. Steve notes that activity was low, with N2BFJ on the south shore of Long Island the only other station on in his area. N2BFJ is known to have worked K4DZP. K4QIF and WD4GXN in Tidewater, VA were also active and very strong off the backs of their beams. Perhaps if more of us kept informed of band conditions in other parts of the country and watched the weather maps, we would catch more openings like this one. A greater number of beacons might help also.

WB5LUA McKinney, TX provides more information on conditions during the June contest. Al worked 23-cm states 19 and 20 by virtue of contacts with WB4NXY Kentucky and W8VP Ohio. He notes that W8VP also completed 23-cm contacts with Dallas-area stations W5HN and W5GG. On 70 cm, Al reports contest contacts with Virginia, Tennessee, Ohio, western Pennsylvania and West Virginia, among others.

W5DFU Tulsa, OK writes that July 4 was hot in his part of the country in more ways than one. In addition to the weather, Warren says that both 23 and 70 cm produced some great tropo DX into the upper Midwest. On the morning of Independence Day, he heard W5SAFY Vernon, TX working WØRAP Cedar Rapids, IA on 23 cm. After they finished, he hooked up with WØRAP for a good SSB QSO. He then went to 70 cm and worked WA9BTT Bowen, IL along with KB9BI and WØEMO. WA9BTT's signal was S9 and remained in for over an hour. □

## Joan Gibson, KG1F: This Column's New Conductor

Beginning next month, a new conductor will be taking on the editorial chores of YL News and Views: Joan Gibson, KG1F. Joan takes over for Jean Peacor, KHJV, who after many dedicated years as this column's conductor has retired to the tranquility of Cape Cod, Massachusetts.

A resident of Waterbury, Vermont, Joan comes to *QST* with a wealth of writing and editing experience. While with McGraw-Hill, she developed material and wrote feature articles for about 15 trade and technical journals, handling subjects from computers to space technology. As a freelance television documentary writer, Joan acquired skills in writing for large, general audiences. She has also developed and taught a television curriculum at Castleton State College, and has been a freelance writer for *Vermont Real Estate* and *Vermont Skiing* magazines. Her most recent writing achievement is a guest article that appeared in this column in February 1984, "The Care and Feeding of the Long-Distance Contester."



With her varied background in Amateur Radio, writing and editing, Joan Gibson, KG1F, is sure to touch on all of the interests of women hams. (W1AIM photo)


Joan's interests in Amateur Radio are varied. She chases DX, hunts certificates and is an avid contester. Among her operating awards are DXCC, 5BWAS, WAC/YL, WAS/YL and DXYL, and she captured high world-score honors in the 1983 Phone YL/OM contest and the top U.S. score in the 1984 CW YL/OM contest. An Extra Class ticket holder, Joan serves as net control for the Central Vermont Radio Club Traffic Net, is a member of the Civil Defense Communications Group and is a Volunteer Examiner. She is a member of ARRL, YLRL, YLISSB and the Central Vermont Radio Club.

In the coming months, Joan will be covering the many facets of YL participation in Amateur Radio. With your help, she can maintain the high standards this column has had throughout the years. If you have an interesting story to tell or know someone who would be an interesting subject of a YL News column, drop Joan a line at RR 1, Box 1465, Waterbury, VT 05676.—Andrew Tripp, KA1JGG



On June 24-28, the YL International Single Sideband group met at Sugarloaf, Maine. More than 100 members and family attended the event, enjoying a few days of DX forums, meetings and socializing. Here's a look at some of the participants through the camera lens of KG1F. Left photo (l-r)—KU7F and NV6L; center photo—WA1TIV, W5VUD, W5VUZ and WA1YKI; right photo—N7SD and KA1JC, who chaired the convention.

### YL HOWDY DAYS

YL Howdy Days, sponsored by the Young Ladies Radio League, from 1800Z September 4 until 1800Z September 5. Only YL-to-YL QSOs count. All bands and modes; work a station only once. Exchange call signs and "yes" or "no" indicating YLRL membership. Count 2 points per YLRL-member QSO, 1 point for nonmembers. No multipliers—score equals number of QSO points. Suggested frequencies: CW—3.540-3.570, 7.040-7.070, 14.040-14.070, 21.080-21.110, 28.080-28.110 MHz; phone—3.940-3.970, 7.240-7.270, 14.250-14.280, 21.350-21.380, 28.580-28.61 MHz. Band allocations in other countries are often different from those in the U.S. Look for DX YLs in other parts of the bands, especially on 40 and 80 meters. Mail signed logs by October 1985 to Marty Silver, NY4H, 3118 Eton Rd., Raleigh, NC 27608. 

### Strays



#### SAVE THOSE QSTs

Never throw anything away—put it in your junk box, where it may come in handy some day. That ham attitude should extend to *QST*, too. What may have seemed to be unimportant at one time may be just what you need to know when you decide to get on another band, go hunting for flea market bargains or just plain extend your ham horizons. Pretty nearly everything a ham could want to know appears in *QST* at one time or another. Having *QSTs* on hand could save you a whole lot of time looking for information—not to mention the enjoyment you could have "rediscovering" articles you had forgotten

about or had no interest in at the time.  
—Jay K. Klein, WA2LII

#### 12 METERS WORLDWIDE

Amateurs operating on the new 12-meter band now have their own organization: 12-12 Worldwide. Its purpose is to promote worldwide activity and good operating practices on the band. The organization publishes a members' newsletter and sponsors awards. Interested? Contact 12-12 Worldwide, Steve Walz, WA5UTO, Box 222, Cherokee, OK 73728.

## Broadcasting

The FCC recently released a Report and Order in Docket 79-47 which, in part, has revised and clarified the Amateur Radio rules pertaining to broadcast-related activities. This month, we'll take a close look at how these rules will affect your Amateur Radio activity.

*Q. First things first: What is meant by the term "broadcasting"?*

A. Section 97.113(a) defines broadcasting as "The dissemination of radio communications intended to be received by the public directly or by intermediary relay stations."

*Q. When may an amateur station engage in broadcasting?*

A. Never. According to Section 97.113(a), "An amateur station shall not be used to engage in any form of broadcasting." Broadcasting stations have been allocated frequencies for their purposes and the Amateur Radio Service has been allocated frequencies for its purposes. The two should not be mixed.

Under Section 97.91, "One-way communications," the following are not, in general, construed as broadcasting: beacons, radio control, emergency communications, information bulletins, round-tables, nets and code practice. Similarly, satellite telemetry transmissions and telecommand operations are allowed under Sections 97.419 and 97.421, respectively.

*Q. May a local broadcast station record an Amateur Radio station's transmissions and receptions for use on a local news program?*

A. Yes. As a result of the Report and Order, permission to retransmit Amateur Radio transmissions is no longer required. Because of this, hams are no longer protected from possible misuse of their transmissions. "Section 97.113(b) does not restrict broadcasters from retransmitting amateur communications. It is no longer necessary or desirable to require broadcasters to obtain retransmit consent from amateur radio stations." (Report and Order in Docket 79-47)

*Q. A radio station would like to broadcast*

*weather and commuter traffic reports provided by Amateur Radio operators. Is this legal?*

A. Broadcasters and ham radio operators must not make special arrangements to broadcast or collect for broadcast routine weather and commuter traffic reports. However, if the broadcasters happen to overhear such information from Amateur Radio stations, they may broadcast it. [97.113(b)]

*Q. Are special arrangements required to broadcast transmissions from the Amateur Radio Service regarding weather conditions that pose a threat to the immediate safety of human life or the immediate protection of property?*

A. In extremely rare instances where hams are forewarning the public of an immediate danger, special arrangements to broadcast their transmissions are not required. The Commission, in its Report and Order in Docket 79-47, stated, "We note that a rule of reason applies when interpreting this emergency exception to the broadcast prohibitions in the amateur radio service. Thus, conveying news information directly relating to an unforeseen event which involves the safety of human life or the immediate protection of property falls within this rule of reason, if it cannot be transmitted by any means other than amateur radio because of the remote location of the originating transmission or because normal communications have been disrupted by earthquake, fire, flood, tornado, hurricane, severe storm, or national emergency. We believe acceptable uses of amateur radio in emergencies are governed by traditional common sense interpretations of those provisions of current Section 97.91 which we are now including in 97.113."

*Q. A repeater in a neighboring town is equipped to retransmit local NOAA weather broadcasts picked up from a VHF weather radio. Is this practice legal?*

A. No. The retransmission of programs or signals emanating from any class of radio station other than amateur is clearly prohibited

under Section 97.113(c) of the Commission's rules. However, there are at least two ways to make this information available legally. If the weather service has a recorded telephone message, you can have one of the autopatch functions encoded to dial that telephone number. Thus, it would not be a retransmission by automatic means, since it was never transmitted in the first place. The other way is to have someone speak the weather information from memory or from a script. And, of course, it should be addressed only to amateurs so that the transmission of the information is not intended to be received by the general public.

*Q. So, isn't WA3NAN violating the Commission's rules when it retransmits space shuttle audio?*

A. No. WA3NAN operates under a blanket FCC waiver of Section 97.113 available to all licensed amateur stations for the duration of all space shuttle flights. As a condition of the waiver, the retransmitted communication must be for the exclusive use of licensed Amateur radio operators.

*Q. Is W1AW violating the Commission's rules every time it transmits information bulletins and code-practice sessions?*

A. No. Information bulletins consisting solely of subject matter related to Amateur Radio, beacon or radio-control operation, transmissions intended for persons learning or improving proficiency in the international Morse code, emergency communications, and roundtable discussions or net operations in which more than two amateur stations are in communication with one another fall into the category of permissible one-way transmissions. As such, they are not considered broadcasting.

**Note:** Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL Hq., have been reviewed by the FCC's Personal Radio Branch for agreement with current FCC interpretations and policy. Numbers in parentheses refer to specific sections of the FCC rules.

## Strays



### COPING WITH ANTENNA ORDINANCES

□ What steps can amateurs take when local officials consider adopting overly restrictive antenna ordinances? When faced with this problem in Amherst, New Hampshire, Glen Whitehouse, K1GW, and Dave Mackey, K1KA, decided to join 'em, not fight 'em. First, Glen and Dave worked out a course of action. This included contacting a member of the town's planning board to alert him of amateur concerns in this area and to deter-

mine the background of the proposed change. With the help of information received from ARRL, they proceeded to communicate amateurs' interests to the board through discussions and correspondence.

At a meeting with planning officials, Glen and Dave offered to help write the structure-height section of the proposed ordinance. The board enthusiastically accepted. Ultimately, the two amateurs decided that by adding 15 words to the draft—"except towers and antennas for exclusive use of Amateur Radio not to exceed 150 feet"—they could fulfill the town's needs while also protecting amateurs' right to erect antennas.

When the proposed changes were presented at a public hearing, 10 local hams were there to lend support. As a result of all the hams' efforts, the amateur rewrite was approved by

the planning board, and the ordinance was voted in at an annual town meeting.—*Bill Burden, WB1BRE*

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

□ any ham motorcyclists interested in joining the Amateur Radio Motorcycle Club net. Ralph L. Brightwell, WA5YQI, P.O. Box 806, Henderson, TX 75652.

□ amateurs interested in forming a 40-meter "breakfast" net. Joe Nolte, KD0WP, 2113 Huntington Ave., Overland, MO 63114.

□ any amateurs interested in collecting verified-reception stamps. Harold D. Johnson, Bell Place, Apt. 307A, 4404 Bell St., Amarillo, TX 79109.

# Silent Keys

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

NIAEK, Larry J. Cincotta, Melrose, MA  
W1BCT, Charles W. Hardy, Leominster, MA  
W1BMR, Henry J. Zadroga, Bernardston, MA  
W1GCH, Charles S. Hollenbeck, Colchester, VT  
K1KVZ, Lester E. Pye, Chester, NH  
WILEA, Raymond L. Lasonde, Otis, MA  
W1ARRL, Roger W. Sampson, Everett, MA  
W1TGH, George "Bud" Leighton, Caswell, ME  
W1TY, Lyman A. Byam, Jr., Randolph, VT  
W2BIW, Glen M. Cornell, Hudson Falls, NY  
K2DQ, Cyril J. Staud, Rochester, NY  
W2HA, Peter Testan, Morristown, NJ  
W2HES, Robert D. Hubbard, Wappingers Falls, NY  
K2JJ, Gordon R. Windham, Hammond, NY  
W2LOG, Roger W. Barton, Ithaca, NY  
W2OHF, Charles Coote, Princeton, NJ  
W2RIS, Victor Lo Tempio, Sr., Rochester, NY  
\*W2SF, Milton Schwartz, Flushing, NY  
\*W2YIK, William D. Cooley, Vestal, NY  
W2ZZR, Frank A. Rotondo, Westville, NJ  
K3DEJ, Martin L. Franks, Altoona, PA  
W3DKS, Robert S. Jose, Jr., Columbia, MD  
W3IO, Paul S. Hendricks, Quakertown, PA  
W3RHK, Irwin C. Ostberg, Erie, PA  
W3RKK, S. Lee Maulsby, Baltimore, MD  
W3WZ, Casimir C. Jackson, Erie, PA  
W4DJR, Willard H. Dawson, Atoka, TN  
W4FAJ, James P. Martin, Port Saint Lucie, FL  
K4GWM, Thaddeus J. Waytaak, Pinellas Park, FL  
K4JW, John P. Weber, Jr., Melbourne, FL  
W4JZB, Irmfried Brauner, Holly Hill, FL  
N4KMO, B. Kent Van Buren, Knoxville, TN  
K4MIF, Kenneth R. Bivens, Athens, TN  
K4MUY, William "Windy" Reeves, Suffolk, VA  
W4OMU, Thomas M. Kosti, Gainesboro, TN  
NX4P, Joseph R. Sturgeon, Dunedin, FL  
W4PRE, Lawrence O. Sutton, Dunnellon, FL  
WA4TVW, Joseph V. Spivey, Suffolk, VA  
K7SA, Quinten R. Grider, Lone Wolf, OK  
W5BFF, Terrel C. Kimes, Lubbock, TX  
KB5EC, James S. Drake, Sr., Lufkin, TX

WSENG, Estel Bost, Malvern, AR  
K5GQA, L. Howard Wood, Lubbock, TX  
W5GXE, Byford L. Cook, Corsicana, TX  
W5BICF, Frank G. Boucher, Richardson, TX  
K5ITO, Walter C. Marshall, Sr., Lubbock, TX  
W5OZD, Dalton W. Savage, Albuquerque, NM  
K5POB, Bailey L. Wallis, McKinney, TX  
W5PTY, Donald P. McCann, Wister, OK  
W5SQLQ, Albert M. Payne, Anthony, NM  
K5TC, Theodore M. Thyssen, Dallas, TX  
W5BUIP, David E. Wilson, Greenville, TX  
W5WPA, Larry E. Doyle, Roswell, NM  
W5WR, Tom M. Lytle, Houston, TX  
K5YIX, Harry J. Hanke, Houston, TX  
WA6BVE, Juanita E. Downey, Lone Pine, CA  
W6EBA, Ralph W. Smith, Klamath Falls, OR  
W6EQF, Vern J. Schledewitz, Placerville, CA  
K6FC, John W. Guthrie, Carmel, CA  
W6IHD, Paul T. Haney, Mariposa, CA  
WA6IRR, Jack V. Diven, Stockton, CA  
W6QZA, Elliot F. Haberlitz, Santa Barbara, CA  
W6RJE, Luverne E. Shatto, Bakersfield, CA  
KA7AKO, Ted E. Hammill, Montezano, WA  
N7ALZ, Carlton E. Haines, Libby, MT  
N7ELJ, Roger P. Clancy, Vashon, WA  
W7FTY, Richard B. "Bud" Hunnewell, Chester, MT  
WA7JSW, Ned E. Tucker, Provo, UT  
W7LHE, Robert E. Guest, Las Vegas, NV  
W7LJH, Donald M. Nelson, Vashon, WA  
W7MY, Lloyd J. Byars, Sandy, UT  
KA7POO, Robert S. Dorsett, Moxee City, WA  
WA7ZNV, Fred L. McAdams, Carson City, NV  
W7ZXS, John "Jack" C. Coxon, Newberg, OR  
N8DLA, Gary W. Wilson, Charleston, WV  
WA8FEK, Howard E. Jedlicka, Burton, OH  
W8KBL, Bernard Burlingame, Bradenton, FL  
W8MWW, Sanders J. Mestel, Canton, OH  
W8NDJ, William C. Grundhoefer, Sr., Cincinnati, OH  
W8SDV, Charles E. Schriener, Lakewood, OH  
W8SJI, Michael Koroly, Akron, OH  
WA8SYZ, Verla F. Bouchard, Detroit, MI

W8UC, William E. Cheshire, Cincinnati, OH  
W8WPO, Charles W. Hawkenberry, Belmont, OH  
W9DNA, Paul L. Edwards, Onalaska, TX  
K9GSF, Howard L. Erickson, Madison, WI  
WD9JDZ, Robert P. Fiduccia, Rockford, IL  
W9JFG, James W. Erp, Hillsboro, IL  
W9RIL, Herbert E. Neitzel, Wisconsin Rapids, WI  
K9RT, Ronald J. Tauber, Glencoe, IL  
W9RUK, Marvin H. Eichorst, Glenview, IL  
K9SIZ, Oscar Christopherson, Menomonie, WI  
WB9S9R, Hubert D. Brown, Bramwell, WV  
KX9X, Leroy G. Woodard, Seymour, IN  
KA0AWY, Carl E. Bailey, Greentop, MO  
W0EEP, Alfred Haagenson, Fergus Falls, MN  
K0HJN, Virgil E. Siddens, Gravois Mills, MO  
W0HNV, Earl C. Kirkeby, Drayton, ND  
WA0HZL, Carl W. Anderson, Wichita, KS  
K0TBH, Ernest C. Ashley, Bemidji, MN  
W0TE, Paul J. Schmitz, Springfield, MO  
K0TSU, John F. Spahr, Kearney, NE  
K0YUA, George D. Caldwell, Lee's Summit, MO  
WA0ZIN, Carl K. Slaven, Kansas City, MO  
VE1PA, Derek W. R. Haysom, Lunenburg, NS  
VE2DQ, George W. Goodwin, Deux Montagnes, PQ  
VE3FMB, Thomas A. Sylvah, Burlington, ON  
VO1BG, Brian H. Garbett, Kelligrews, NF  
SM5LN, Martin Hoglund, Bromma, Sweden

\*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

## 50 Years Ago

September 1935

- Editor Warner eloquently relays several concerns expressed by the Board of Directors over some unfortunate operating practices that are creeping into our activities: using DX bands for local ragchews, using too much power for the distance covered, and testing our rigs on the air rather than with dummy antennas.
- We've been using pentodes in voice work mostly because of the ease of modulating the suppressor grid. George Grammer points out that a combined plate/screen modulation circuit is equally practical and retains the advantage of needing very little grid drive.
- Major Edwin H. Armstrong, inventor of the practical regeneration circuit, which revolutionized radio communication, visited League Hq. to explain some of his developmental engineering work on frequency modulation. It seems agreed that despite its various advantages, spectrum crowding will not allow its use except in v.h.f. areas and above.
- Nearly 1500 amateurs around the world reported their participation in the A.R.R.L. DX Contest—an 8-day marathon this past March. W3SI was top scorer, breaking most records with 234 contacts in 56 countries in all continents.
- Ronald King of Lafayette College uses four pieces of brass tubing, forming a square, as tuned elements for a 176-cm. transmitter. Type 955 "acorn" tubes at each corner sustain oscillation. Weird, but interesting!
- Dr. Eugene Woodruff, W8CMP, chairman of the League's planning committee for the Cairo frequency conference, has developed some fundamental arguments for justifying amateur use of a share of the spectrum, based largely on contributions to the art and service to mankind (e.g., emergency communications).
- W1HHW's type 47-46 unit is old hat in simple

frequency multiplication, but he can also get sub-harmonics by using the 46 as a self-excited Hartley oscillator and "locking" it to the desired spot.

- The 33 radio clubs reporting Field Day weekend activity was double the number of non-club participants. (Your scribe helped make a grand total of 21 QSOs with 5 dynamotor watts.)
- The Lake Worth Radio Club received a gift of a fully equipped trailer and radio gear for use in emergency communications in that hurricane-prone area.

## 25 Years Ago

September 1960

- The QSO between W1BU and W6HB made communications history—because it was on 1296 Mc. and signals were bounced off the moon! Antenna and equipment requirements were so large that only organized groups could have done the job—Rhododendron Swamp V.H.F. Society (W1FZJ, prime mover) and the Eimac Radio Club. Key to success was the 100-cycle bandwidth; imagine that kind of stability on 1296!
- Some folks think that TV is on the far fringe of amateur experimentation, but W6KYQ went a step further and added color to his setup. The flying-spot scanner limits transmission to stills/slides, but is comparatively inexpensive.
- And RTTY is moving forward as well. G2UK gives a summary of its current status in Europe, gleaned from the I.A.R.U. conference in Folkstone, England.
- War surplus has been around for 15 years, yet some items are still being found useful for new ham applications. W1HDQ shows us his conversion of the APX-6

radar identification unit to a 1215-Mc. transmitter-receiver at minimal cost.

- Band switching, 200-watts input, v.f.o. or crystal, built-in metering and Monimatch coupler—all for comparative peanuts. How? W4AMN found the answer in the ARC-5 unit he converted.
- Residual voltage to ground or leakage is often a source of trouble in a.g.c. circuits with no- or small-signal input. W9IK remedies the problem with a revamped circuit of much lower resistance.
- W6SRY's "Ultimate" is the most popular of many keyers in QST of recent years. K0MHU took the inevitable next step—converting the unit to solid-state technology.
- W2JTT made quite a hit 5 years ago with his 7-Mc. vertical radiator constructed of empty beer cans. His recent banking for 20-meter operation led to design of a matching circuit to drive the element on that band.
- RCA's new "Nuvisor" is excellent for 2-meter receiver work, says W1HDQ, with a low noise figure, exceptional ruggedness and—best of all—a moderate price.
- A number of amateurs are constructing their own receivers to achieve selectivity and stability exceeding manufactured units. W4PHJ's handsome effort described in this issue is an excellent example.
- Transistors do not produce the same heat as tubes, but are quite temperature sensitive. W2EUP discusses stabilization principles and describes practical circuit design methods.
- The 1959 Edison Award went to W8AEU, in recognition of his emergency-communications organizational efforts. He relates the procedures that have made the Cuyahoga County AREC such an outstanding preparedness group.
- A simple wavemeter for use in coax lines by W1ICP is very useful in any shack, and yet can be assembled by the newest Novice.
- The June V.H.F. Party took on many aspects of Field Day, with nearly a fourth of the participants working from remote areas. Sporadic-E skip helped boost the scores.—W1RW

# Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN  
Club Program Manager, ARRL

## MOTIVATION

Getting members to do the tasks, chores and physical work that a radio club requires has always been a problem. The lure of altruism just doesn't seem to motivate more than a few members of any club. What motivates people best? Recognition, and the promise of a reward when the job is finished.

### Points Awarded

The Triple States Radio Amateur Club (TSRAC), a Special Service Club and one of the most active and successful clubs in the country, has devised a motivation program your club may want to try. The purpose of the TSRAC points award system is to accurately measure and ultimately reward the club members who do the work of the club. Varying point values are credited to club members for activities in which they participate. Each member has a space on the club scoreboard, which is updated frequently in their newsletter, the *BNT*.

Different tasks merit different point amounts. Working on a *BNT* assembly party, for instance, will merit a member from one-half to two points. The exact figure depends on how much time was devoted to putting the issue together and how many people participated. Doing electrical work at the repeater site resulted in 2 points for each of the two club members who participated.

As described in the *BNT*, "Points will not be awarded idly but only beyond the normal call of duty or member's responsibilities. Points will not be automatic or easy to come by, since this would defeat the program and reduce their value."

### The Payoff

Members accumulate points throughout the year. Before the December annual dinner, the club officers will analyze the club's financial condition and determine the value of each point. A member's point total may be applied to the price of the annual dinner, or the points may serve as credits toward new *Callbooks*, ARRL publications or radio accessories.

The TSRAC system is elegant and effective. Its success is shown by TSRAC's overall attendance and number of activities. For more information, write to the club at Box 240, RD #1, Adena, OH 43901.

## \$1000 GRANT

Don Anderson, WD800R, sent me information on a successful grant application he made on behalf of his club, the East River Amateur Radio Club (ERARC) in Bluefield, WV, another SSC. Don works for General Telephone, also known as GTE. GTE sponsors the Volunteer Initiatives Program, which makes grants of up to \$1000 to nonprofit organizations. To qualify, a member of a nonprofit group—an Amateur Radio club, for instance—must be a GTE employee and must be an active volunteer in the group.

The amount of the grant is based on the total hours of the employee's involvement during a 12-month period. In Don's case, he had logged over 175 hours of his personal time working on the club's repeater system. In applying for the grant, Don received tax-exempt information from League Hq. and wrote a one-page request



Bill Fisher, W4BRT (left), president of the East River ARC, receives a \$1000 check from Donald Anderson, WD800R, of the General Telephone Company of the Southeast. (photo courtesy WD800R)

for the grant, which was accompanied by his club's constitution and SSC status information. The grant money is unrestricted: Once the check is made out to the club, they can use it at their discretion.

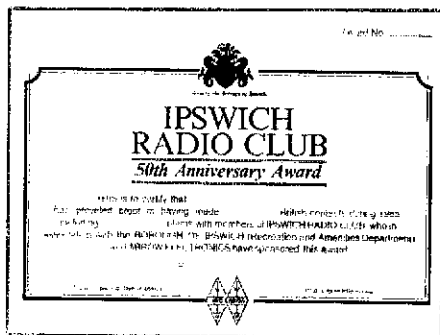
### How Can Your Club Do This?

WD800R belongs to GTE of the Southeast, but GTE has employees all across the U.S. Poll your club members; it's possible that one or more of them works for GTE. If you want more information from Don, call him at 304-325-3022 during the day. It's also probable that many large companies sponsor such programs for their employees and communities. Speak to your company's Public Affairs Office or the equivalent. Good luck!

## Newest Special Service Clubs

We welcome our newest Special Service Clubs (SSCs). Each club in this listing has pledged to serve its community and Amateur Radio with greater gusto and dedication than is the norm. Contact your Section Affiliated Club Coordinator for more information on the SSC program.

- W. J. Clarke High School ARC, Westbury, NY
- Queens College ARC, Rosedale, NY
- Associated Radio Amateurs of Long Beach, Long Beach, CA
- Nittany ARC, State College, PA
- Clements ARC, Lakewood, CO
- Ozaukee Radio Club, Mequon, WI
- Riverland ARC, LaCrosse, WI
- Tri-City Radio Amateur Club, Gering, NE
- Crete ARC, Crete, NE



This attractive certificate is available to stations accumulating 50 points worth of contacts with various stations in Great Britain. The award is sponsored by the Ipswich Radio Club in celebration of their Golden Jubilee. Write to Alan Owen, G4HMF, 102 Constable Rd., Ipswich, Suffolk IP4 2XA, England, for details.



This happy group is composed of charter members of the Wheat Straw ARC at their 25th anniversary banquet. The WSARC, with members from over 20 communities, provides support to hams in the rural areas of western Oklahoma. (photo courtesy NB5N)

# Coming Conventions

## VIRGINIA STATE CONVENTION

September 21-22, Virginia Beach

The 1985 ARRL Virginia State Convention and 10th Annual Amateur Radio and Computer Fair will be held at the Virginia Beach Pavilion on Saturday and Sunday. Featured are many dealers, special displays, forums, FCC license exams, gigantic flea market, bingo and movies for the kids.

Bring the family to vacation at beautiful Virginia Beach. Also, visit the fantastic Waterside Festival Marketplace in Norfolk.

Show time is 9 A.M. to 5 P.M. Admission for both days is \$5 in advance or \$6 at the door. Flea market tables \$5 one day, \$8 both days. For information and tickets, contact Jim Harrison, N4NV, 1234 Little Bay Ave., Norfolk, VA 23503, tel. 804-587-1695.

## RSO-CRRL '85

September 27-29, London, Ontario

You won't want to miss RSO-CRRL '85, the 17th annual Radio Society of Ontario Convention combined with the first-ever Canadian Radio Relay League National Convention—brought to you by SORT, the Southern Ontario Repeater Team, at City Centre Holiday Inn, London, Ontario.

You'll enjoy coming to London with its historic sites, outstanding educational and medical facilities, miles and miles of tree-lined streets, vibrant downtown shopping area and 250,000 friendly people. And you'll enjoy the Convention.

You'll enjoy getting together with your fellow amateurs over Ontario wine and cheese at the Friday night eyeball. You'll enjoy the extensive program that's been planned for you on Saturday and Sunday. RSO-CRRL '85 will have speakers on almost every Amateur Radio topic imaginable: OSCAR, propagation, microwaves, home brewing, antennas, coherent CW, Telidon, DX, contesting, IARU, the legal front, public service, teaching Amateur Radio, and more. Your problem will be deciding what to take in!

You'll also enjoy the CW contests, the hospitality suites, the Saturday night banquet featuring live enter-

September 6-8—Florida State, Melbourne

September 6-8—Midwest Division, Omaha, NE

September 6-8—West Gulf Division, San Angelo, TX

September 21-22—Virginia State, Virginia Beach

September 27-28—CRRL, London, Ontario, Canada

October 12-13—Kansas State, Concordia

October 12-13—South Florida Section, St. Petersburg

At press time, Amateur Radio exams are scheduled to be given at these conventions. For other exam opportunities see Hamfest Calendar.

October 26-27—Delta Division, Chattanooga, Tennessee

November 1-2—Pacific Division, Las Vegas, Nevada

## ARRL NATIONAL CONVENTIONS

October 4-6, 1985—Louisville, Kentucky

September 5-7, 1986—San Diego, California

July 10-12, 1987—Atlanta, Georgia

August 19-21, 1988—Portland, Oregon

## How to Register for Upcoming Exams

Oct. 4-6, ARRL National Convention (Louisville, Kentucky): Exams will be given on Saturday, Oct. 5, from 9 A.M. to 6 P.M., Novice through Extra Class, at the Kentucky Fair and Exposition Center. Submit a completed FCC Form 610, copy of present Amateur Radio license (copy of code credit certificate, if applicable) and check or money order for \$4 (payable to ARRL/VEC) to Volunteer Examiner Program, Walter H. Bowman, WD4RAK, P.O. Box 603, Radcliff, KY 40160. Cutoff date is Sept. 5. No walk-ins.

tainment and the midnight initiation into the Royal Order of the Wouff Hong. Not interested in Amateur Radio? You'll enjoy the extensive partners' program, which includes an excellent two-hour bus tour of London and area.

Getting to RSO-CRRL '85 is easy. London is located on Hwy. 401, midway between Windsor/Detroit and Toronto or Buffalo. London is served by Via Rail, Air Ontario and Air Canada. You can get a special Air Canada discount fare to the convention. Just call 1-800-361-7585 and mention RSO-CRRL '85. In

London, plan to stay right at the convention site. City Centre Holiday Inn is offering excellent accommodations at special, low convention rates.

For more information, or for registration and hotel reservation forms, write to RSO-CRRL, Box 73, Hyde Park, ON N0M 1Z0. For really fast service, call the RSO-CRRL '85 Hotline, 1-519-471-7691.

RSO-CRRL '85 is going to be a great convention. Whether you live in Victoria or Saint John's in Canada, or in the U.S., plan to attend. Don't miss RSO-CRRL '85!

# Hamfest Calendar

Administered By Marjorie C. Tenney, WB1FSN  
Convention/Travel Coordinator

[Attention: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.]

†Alabama (Mobile)—Sept. 14-15: The Old Time Hospitality Hamfest, sponsored by the Mobile ARC, will be held in the Texas Street Recreation Center. Hours are 9 A.M. to 4 P.M. Saturday and 9 A.M. to 3 P.M. Sunday. Admission is \$2 for both days. Talk-in on 22/82. For further information, contact Clark, WU4AM, tel. 205-666-7347, or Jim Wilder, WU4K, tel. 205-438-5661 or 343-7365.

†Alabama (Anniston)—Sept. 28: AERG (Anniston Emergency Repeater Group) will sponsor the Anniston Hamfest at the National Guard Armory, Hwy. 21, on Saturday, from 8:30 A.M. to 5 P.M. No admission charge. FCC exams, ARRL forum. Tables \$6 each for one day. Concession stand in building. Talk-in on 147.040/7.640. For further information, call 205-238-5503 between 7:30 A.M. and 4 P.M.; call 205-435-4833 between 4 P.M. and 10 P.M.

California (Sebastopol)—Sept. 21: Sonoma County Radio Amateurs, Inc. will be holding their third an-

nual ham radio flea market Saturday, from 8 A.M. to 2 P.M., at the Sebastopol Community Center, 390 Morris St., 5 miles west of Santa Rosa, just off Hwy. 12. Admission and parking are free. Tables are \$6 at the door, \$5 in advance. (Advance registration gets best indoor spaces.) Vendor setup starts at 7 A.M. Talk-in on 13/73. Radio clinic, exhibits, refreshments. Auction around noon. For tickets and information, write to SCRA, Box 116, Santa Rosa, CA 95402.

†Connecticut (Newtown)—Sept. 15: The Candlewood ARA (CARA) will hold its annual flea market at Edmond Town Hall, Main St. (Rte. 6), on Sunday, from 10 A.M. to 4 P.M. (dealers 9 A.M.). Admission \$2; tables \$7; tailgating \$5. (Barry Electronics will be there.) Talk-in on 72/12 or 52. For table reservations, send check or money order to CARA, P.O. Box 143, Bethel, CT 06801. For further information, contact Gene Marino, W1DHF, Valley View Rd., Newtown, CT 06470, tel. 203-426-8852.

†Connecticut (Willimantic)—Sept. 22: The annual hamfest and giant flea market sponsored by the Natchaug ARA will be held at the Elk's Home from 9 A.M. to 4 P.M. Admission is \$2. Volunteer FCC exam session; walk-ins accepted. Flea market, refreshments. Talk-in on 30/90 and 52. For further information, contact Ed Sadeski, KA1HR, 49 Circle Dr., Willimantic, CT 06226, tel. 203-456-7029 (after 4 P.M.).

Connecticut (Torrington)—Oct. 5: Connecticut CQ Radio Club will hold its annual flea market on Saturday, 9 A.M. to 3 P.M., at the East Albert St. Recreation Bldg. Dealers \$7 per table; tailgaters \$5. Admission \$1. Talk-in on 146.955. For further information, write to Donald D. Taylor, KA1GKJ, P.O.

Box 455, Watertown, CT 06795.

Georgia (Augusta)—Sept. 15: The Amateur Radio Club of Augusta will hold its annual hamfest at Julian Smith Casino. Tickets \$1, 6 for \$5, 13 for \$10. Food and drink available. Inside dealer table furnished—\$10; ample room for tailgaters—buy 3 tickets. Talk-in on 34/94. ARRL/VEC exams at 8 A.M. in Red Cross Bldg., 12th St. (ask talk-in for directions). For additional info, send s.a.s.e. to Bill Hardin, 4430 Forrest Dr., Martinez, GA 30907, or call 404-863-4360 after 5 P.M.

†Georgia (Gainesville)—Sept. 22: The Lanierland ARC, Inc. will sponsor its 12th Annual Lanierland Hamfest in Holiday Hall at the Holiday Inn starting at 9 A.M. No admission charge. Free tables and inside display for dealers reserving in advance. Left-foot CW contest. Country store. Large flea market. Walk-in FCC exams begin at 9 A.M. Talk-in on 07/67. For information and reservations, contact Paul Watkins, W4FDK, Rte. 11, Box 536, Gainesville, GA 30501, tel. 404-536-8280.

†Georgia (Atlanta)—Sept. 27-29: "DXpo Atlanta," sponsored by the Southeastern DX Club, will be held at the Lanier Plaza Hotel. Registration and hospitality—Friday P.M.; programs—Saturday from morning until noon Sunday. Banquet, breakfast, hospitality and programs, \$49.50. Programs include: John Devoldere, ON4UN, 80-meter DXer; Kusty Epps, W6OAT, 1985 Clipperton DXpedition (SO6XX); Carl and Martha Henson, WB4ZNH and WN4FVU, slide show (3C1BC and 3C1YL) Equatorial Guinea; and alternative activities. Room reservations directly through Lanier Plaza Hotel: \$39 single, \$45 double (mention "Ham operators/DXpo"). Tel. 1-800-282-8222 (GA); others tel. 1-800-554-8444.

†ARRL Hamfest

For further information, write to Grover Meinert, KC4BX, 729 Starlight La., Atlanta, GA 30342, tel. 404-255-4677.

**Illinois (Peoria)—Sept. 21-22:** "Peoria Superfest '85," sponsored by the Peoria ARC, will be held at Exposition Gardens, W. Northmoor Rd. Gate opens at 6 A.M.; commercial building at 9 A.M. Admission: \$3 in advance, \$4 at gate; Children under 12 free. Amateur Radio and computer displays, huge flea market, FCC exams for all classes Saturday only. Free bus to Northwoods Mall on Sunday. Full camping facilities on grounds. Saturday night informal get-together at Heritage House Smorgasboard, 8209 N. Mt. Hawley Rd., Peoria. Talk-in: call W9UVI on 146.16/76. For further information and reservations, send s.a.s.e. to Superfest '85, P.O. Box 3461, Peoria, IL 61614.

**Illinois (New Berlin)—Sept. 22:** The 10th Annual New Berlin Hamfest, sponsored by the Sangamon County Fair Assn., will be held at the Sangamon County Fairgrounds from 7 A.M. to 3 P.M. Admission and flea market setup is free and talk-in will be on 146.52 and 146.88. Food and drink available. Hamfest will be held rain or shine. For more information, contact Al Sweattman, K9QFR, Box 2, Pleasant Plains, IL 62677, tel. 217-626-1634.

**Illinois (Grayslake)—Sept. 28-29:** RADIO EXPO '85, sponsored by the Chicago FM Club, will be held at the Lake County Fairgrounds, Rtes. 120 and 45. Flea market opens 6 A.M., and exhibits open 9 A.M. Displays by major manufacturers, and gigantic outdoor flea market area. Free parking, overnight camping. Reserved indoor flea market tables available at \$5 per day and electric at \$3 per day. Seminars, technical talks and ladies programs. Tickets good both days; \$3 in advance, \$4 at gate. Talk-in on 16/76. Send s.a.s.e. to RADIO EXPO '85, Box 1532, Evanston, IL 60204, or call 312-582-6932.

**Kansas (Wichita)—Sept. 22:** The Wichita ARC annual hamfest will be held at the Salvation Army Camp Hiawatha grounds, 1701 W. 52 St. N., starting at 8 A.M. Admission is \$3.50 in advance, \$4 at the door. Flea market, ARRL forum, programs and demonstrations. Covered-dish luncheon. Commercial exhibitors welcome; contact Gary Vreeland, ND0T, 1920 S. Santa Fe, Wichita, KS 67211. Talk-in on 34/94. For further information, contact Ray Traynor, KK0S, 1838 N. Socora, Wichita, KS 67212, tel. 316-722-2630.

**Louisiana (Metairie)—Sept. 28-29:** AMACOM '85, The Greater New Orleans Hamfest and Computerfest, will be held on Saturday, from 9 A.M. to 4 P.M., and Sunday, from 9 A.M. to 2 P.M., at the Landmark Motor Hotel. Admission \$5. ARRL forum, Louisiana Council meeting, technical forums, swapfest, dealers, refreshments and banquet. Tailgate swapfest, \$2 per admission, in covered auto parking area. Banquet with Cajun storyteller for entertainment, \$17. FCC/VEC exams, Technician through Extra, at 1 P.M. Saturday. Walk-ins as accommodations permit. Talk-in on 34/94. All inquiries and correspondence to AMACOM '85, P.O. Box 73665, Metairie, LA 70033.

**Maryland (Columbia)—Oct. 6:** The Columbia ARA will hold its 9th annual hamfest at the Howard County Fairgrounds (15 miles west of Baltimore, just off I-70 on Rte. 144, 1 mile west of Rte. 32), 8 A.M. to 3 P.M. Admission is \$3; spouses and children free. Outdoor tailgating \$5; tables \$6. Indoor tailgating (payments received by Sept. 30, \$6; after that date, \$8). Food available. Talk-in on 735/135 and 52. For table reservations and information, write to Mike Vore, W3CCV, 9098 Lambskin Ln., Columbia, MD 21045, tel. 301-992-4953.

**Michigan (Mt. Clemens)—Sept. 15:** The 13th Annual Swap and Shop, sponsored by the L'Anse Creuse ARC, will be held at the L'Anse Creuse High School, 0800-1500 EDT. Admission is \$1 in advance, \$2 at the door. ARRL table, plenty of food and parking. Tables inside \$8 and trunk sales \$4 per space. Talk-in on 69/09 and 52. For information and reservations, contact Maurice L. Schietecatte, N8CEO, 15835 Touraine Ct., Mt. Clemens, MI 48044, tel. 313-286-1843.

**Michigan (Grand Rapids)—Sept. 21:** The Grand Rapids ARA, Inc., will hold its annual Swap and Shop on Saturday at the Hudsonville Fairgrounds. Dealers and a concession. Indoor sales area and an outdoor trunk swap area. Gates open at 8 A.M. for both swappers and the public. Talk-in on 16/76. For more information, write to Grand Rapids ARA, Inc., P.O. Box 1248, Grand Rapids, MI 49501.

**Mississippi (Biloxi)—Oct. 5-6:** The 9th Annual Ham/Swapfest, sponsored by the Mississippi Coast ARA, will be held at Pointe Cadet Plaza (west end of Biloxi Ocean Springs Bridge). Hours: 8 A.M. to 5 P.M. Saturday, 8 A.M. to 2 P.M. Sunday. No admission charge. Women's activities, packet radio, ARRL, computers, MARS (Navy, Army, Air Force). Seafood shrimp boil. Limited free parking and hookups for self-contained RVs. ARRL/VEC exams: preregistration by Sept. 1, limited walk-ins. Talk-in on 13/73, 144.73/5.33

and 52. For further information, contact Joyce B. Anderson, WB5LKC, 3877 Pat La., Biloxi, MS 39531, tel. 601-388-2824 or 601-432-1100.

**Missouri (Monett)—Sept. 8:** The 4th Annual Ozark Amateur Radio Club Congress and Swapfest will be held at City Park, junction of U.S. Hwy. 60 and Missouri State Hwy. 37. Swapfest at 11 A.M.; buffet dinner at 1 P.M. No tickets necessary. All amateurs and families welcome. Talk-in on 37/97, 7.250 and 52. For complete information: The Ozarks Amateur Radio Society, Box 327, Aurora, MO 65605, tel. 417-678-5330.

**New Hampshire (Sutton)—Sept. 29:** The Connecticut Valley FM Assn. will hold its 9th annual hamfest and flea market at King Ridge Ski Area from 9 A.M. to 5 P.M., rain or shine. General admission \$2; dealers and flea market setup \$3. Food available on premises. Overnight camping for self-contained units only (no hookups). Exit 11 off I-89. Talk-in on 16/76 or 52 simplex.

**New Jersey (Pennsauken)—Sept. 15:** The 37th Annual Hamfest, sponsored by the South Jersey Radio Assn., will be held at the Pennsauken High School parking lot, from 8 A.M. to 4 P.M. Advance admission is \$2.50, at the door \$3. VE exams. Table and tailgate sales (bring your own table). Refreshments in school cafeteria. Free parking. Talk-in on SJRA repeater 144.69/145.29. For further information and reservations, write to Fred Holler, W2EKB, 348 Bortons Mill Rd., Cherry Hill, NJ 08034, tel. 609-795-0577.

**New Mexico (Santa Fe)—Sept. 28-29:** Annual Northern New Mexico Hamfest, sponsored by the Northern NM ARC, will be held at the all-weather facilities of Camp Stoney, 8 miles east of Santa Fe. Saturday A.M.—ARRL/VEC exams; Saturday P.M.—aspencade color tour, free overnight camping (no hookups). Sunday, 8 A.M. to 3 P.M.—tailgate flea market, dealer display, programs, fellowship, lunch of (hot dogs, chips, pop/coffee) included with admission of \$3.75 for adults, \$1.75 for children. Talk-in on 52 and local repeaters. For further hamfest/exam info, send s.a.s.e. to NNMA ARC, Rte 3, Box 95-15, Santa Fe, NM 87501.

**New York (Corona)—Sept. 8:** The Hall of Science ARC hamfest will be held at the Hall of Science parking lot—Flushing Meadow Park, 47-01 111 St., 9 A.M. to 4 P.M. Rain date is Sept. 15. Admission (at the door): buyers \$3; sellers \$5 per space. Talk-in on 144.250 simplex link, 223.600 repeat and 445.225 repeat. For further information, contact John Powers, KAZAHJ, tel. 718-847-8007, or Arnie Schiffman, WB2YXB, tel. 718-343-0172.

**New York (Niagara Falls)—Sept. 14:** "Ham-O-Rama and Computerfest 1985," jointly sponsored by the ARA of the Tonawandas, Radio Assn. of Western NY, Buffalo ARRA and South Towns ARS, will be held on Saturday, from 7 A.M. to 5 P.M., at the Niagara Falls International Convention Center, just north of Buffalo. Admission at the gate is \$5; additional charge for selling space. Outside and inside flea markets. Outside flea market, \$5 per 6-foot space (parking not included). Inside flea market, \$15. Children under 12 admitted free. New-equipment displays, video displays, computer displays, technical programs, and more. Radio test bench. First aid. Plenty to eat and drink at the convention center. Talk-in on 13/73 and 52. For further information, contact Nelson Oldfield, WAZZSJ, 126 Greenway Blvd., Cheektowaga, NY 14225, tel. 716-634-6494 (after 5 P.M.).

**New York (Old Westbury)—Sept. 22:** Long Island Hamfair, sponsored by the Long Island Mobile ARC, Inc. Join LIMARC outdoors at New York Institute of Technology, Rte. 25A, Northern Blvd., 1/2 mile east of Glen Cove Rd. Talk-in on 146.85. Exhibitors \$5 per car space; no reservations. Call at night for info: Hank Wener, WB2ALW, tel. 516-484-4322, or Bob Reed, WB2DIN, tel. 516-221-8116.

**New York (Elmira)—Sept. 28:** The Elmira ARA will present the Tenth Annual Elmira International Hamfest at the Chemung County Fairgrounds. Among the day's activities are an outdoor flea market, indoor dealer displays of new equipment, and breakfast and lunch served on premises. The gate will open at 6 A.M., and the hamfest will continue until 5 P.M. Tickets are available at the gate or in advance from Steve Zolksky, 118 East 8 St., Elmira Heights, NY 14903.

**New York (Syracuse)—Oct. 5:** The Radio Amateurs of Greater Syracuse is pleased to announce the 30th RAGS Hamfest to be held at the New York State Fairgrounds, off Rte. 690, one mile east of Thruway Exit 39. Hours are 9 A.M. to 6 P.M., with flea-market setup beginning at 7:30 A.M. Pleasant, bright surroundings with plenty of chairs and clean restrooms. Superior breakfast and lunch that has made the Syracuse Hamfest famous. Giant indoor flea market; large table \$6. Outdoor tailgating \$3. Exhibitors and dealers. VE exams (preregistration suggested) to be held starting at noon. (Walk-ins may be accommodated

on a space-available basis.) Speakers, ARRL Forum, free parking. Admission \$3. Talk-in on 31/91 and 90/30. For further information, contact Viv Douglas, WA2PUU, or Ed Swatowski, WA2URK, at P.O. Box 88, Liverpool, NY 13088.

**New York (Yonkers)—Oct. 6:** The Yonkers ARC will sponsor the Yonkers Electronic Fair-85 at the Yonkers Municipal Parking Garage, on the corner of New Main St. and Nepperman Ave., 9 A.M. to 4 P.M. Rain or shine. Admission at the door: buyers, \$3; sellers, \$7 per parking space (admits 1 person). Live demonstrations, mini-theater, computers, satellite TV, deviation/frequency checks. Refreshments, sanitary facilities, free parking. Giant auction begins at 2 P.M. Unlimited free coffee all days. Bring your own tables. Talk-in on 265/865, 31/91, 52 and 445.15/440.15. Further information from Otto, WB2SLQ, 53 Hayward St., Yonkers, NY 10704, tel. 914-969-1053.

**Ohio (Youngstown)—Sept. 16:** The Twenty Over Nine RC will hold its first hamfest on Saturday, from 9 A.M. to 5 P.M. (open for setup at 8 A.M.), at Green Acres Campgrounds, 16 miles west of Youngstown on Rte. 76. Use Exit 54 at Rte. 534. Talk-in on 147.315 or 52 simplex. Food, drink and overnight camping available. Admission \$2 for all. For info, contact Wes, W8QHP, 141 South Schenley Ave., Youngstown, OH 44509, tel. 216-799-2094.

**Ohio (Ross)—Sept. 15:** Cincinnati Hamfest, sponsored by the Greater Cincinnati ARA, will be held at Strickers Grove, State Rte. 128, 1 mile west of Venice (Ross). Hours are 0600 to 1800. Admission is \$5. Exhibits and vendor booths, huge flea market, hidden transmitter hunt, entertainment, "Hawks" Radio Controlled Air Show. Food available. Talk-in on 28/88, 10/70 and 16/76. For full information and complete details, request your copy of the "Hamfest Issue" of *Mike & Key*.

**Ohio (Berea)—Sept. 22:** The Cleveland Hamfest and Computer Show, sponsored by the Cleveland Hamfest Assn., will be held at Cuyahoga County Fairgrounds, from 8 A.M. to 5 P.M. Flea market setup at 6 A.M. Admission in advance \$3; at the gate \$3.50. Flea market \$4. Women's activities, NASA display. Banquet on Saturday, Sept. 21, Harley House, Bagley and I-71. Cocktails at 6 P.M., buffet dinner at 7 P.M. Advance reservation required—cost is \$19. Talk-in on 146.52. For advance reservations and tickets, write to Cleveland Hamfest Assn., P.O. Box 93077, Cleveland, OH 44101.

**Ohio (Lima)—Oct. 13:** The Lima Hamfest will be held at the Allen County Fairgrounds, one mile east of Rte. I-75, Exit 125a on Rtes. 309 and 117. Advance tickets are \$3; at the door \$3.50. Tables \$6; half tables \$3.50. For reservations, send s.a.s.e. and check to NOARC, P.O. Box 211, Lima, OH 45801. Amateur exams, Novice through Extra, will be given. Send your completed FCC Form 610, a check for \$4 (payable to ARRL/VEC) and a photocopy of your current license to Amateur Exams, NC8F, P.O. Box 211, Lima, OH 45802. An s.a.s.e. is required. No walk-ins. Applications must be received by Sept. 13.

**Oregon (Milton-Freewater)—Sept. 21-22:** The Walla Walla Valley RAC, Inc., W7DP, will sponsor the 39th annual Walla Walla Hamfest at the Community Bldg., with doors opening at 8:30 A.M. both days. Admission is free. FCC exams Saturday, antique and homebrew contest, women's bazaar, swap shop, new-gear displays, repeater meetings. Camping at Ft. Walla Walla Park or at hamfest site. Talk-in on 52. For further information, contact Pat Stewart, W7GVC, 1404 Ruth, Walla Walla, WA 99362, tel. 509-525-1699.

**Pennsylvania (New Kensington)—Sept. 16:** The Skyview Radio Society will hold its annual hamfest on Sunday, from noon to 4 P.M., at the Clu Grounds, Turkey Ridge Rd. Talk-in on 04/64 and 52. Registration \$2; vendors \$4.

**Pennsylvania (York)—Sept. 21-22:** The York Hamfest, sponsored by the York ARC, Keystone VHF Club, Penn Mar RC and Hilltop Transmitting Assn., will be held at the York Fairgrounds, State Rte. 74, northeast corner of the city. Seminars, tailgating, displays, banquet and FCC exams on Saturday. Tailgating and displays on Sunday. Registration \$2 on Saturday, \$4 on Sunday, or \$5 for both days. Women and children under 12 free. Banquet is \$10 per person, by advance registration only. Tailgating, \$4 per day or \$6 for both days, per 10-foot space. Indoor display area (over 24,000 square feet). Tables \$5 and up per day. Vendors setup at 6 A.M. and registration at 8 A.M. both days. Special motel rates and overnight camping available on the grounds. Write to York Hamfest, Box W, Dover, PA 17315, for reservations and additional details.

**Pennsylvania (Warrington)—Oct. 5-6:** The Pack Rats (Mt. Airy VHF ARC) cordially invites all amateurs and their friends to the 9th Annual Mid-Atlantic VHF Conference on Saturday, to be held at the Warrington Motor Lodge, Rte. 611, and our 14th Pack Rat Hamarama on Sunday, at the Bucks County Drive-In

Theater on Rte. 611. Admission to the flea market is \$5, with selling spaces \$8 each. The gate will open at 6 A.M., rain or shine; bring your own tables. Advance registration for the Conference is \$4. Send to Hamarama '85, P.O. Box 311, Southampton, PA 18966, or contact Lee A. Cohen, K3MXM, tel. 215-635-4942.

**Rhode Island (Woonsocket)—Sept. 22:** The RI Amateur FM Repeater Service, Inc., who operate the 16/76 and 28/88 repeaters in Rhode Island, will hold their annual fall flea market and auction at the American Legion Fairmont Post 85, 870 River St., Woonsocket, on Saturday. Flea market opens at 9 A.M. Spaces are \$5 each. Some spaces under the pavilion are available, complete with tables, on a first-come, first-served basis. Auction begins at noon, continuing to about 5 P.M. Admission is free. Food and beverages available at nominal cost. Talk-in on 34/94 and 52. For further information, contact Richard Fairweather, K1KY1, 127 Sherman Farm Rd., Harrisville, RI 02830, tel. 401-568-3468.

**Tennessee (Memphis)—Oct. 12-13:** The Midsouth ARA and allied clubs will hold their annual hamfest inside the air-conditioned Pipkin Building at the Mid-South Fairgrounds. Hours: Saturday, 8 A.M. to 5 P.M.; Sunday, 9 A.M. till 4 P.M. Flea market vendors and dealers may set up Friday from 5 P.M. to 9 P.M. Door opens Saturday morning for vendors and dealers at 6 A.M. FCC exams will be given for all license classes Saturday starting at 9 A.M. at Christian Brothers College, adjacent to the hamfest site. Bring original and copy of FCC license. Flea market table spaces are \$5 each per day; tables furnished. Approximately 200 tables available, first come first served (reservations by phone or mail). Dealer booths (25) available; call for reservations. Official hamfest motel

is the Admiral Benbow Inn, 1290 Union Ave., Memphis, TN 38104, tel. 901-725-0630, with special hamfest rates. Make your own reservations. If filled, call Holiday Inn 1-800-HOLIDAY. Hospitality party, free to all hams, 7:30 P.M. to 11 P.M. with complimentary cocktails at the hamfest motel Saturday, Talk-in on 28/88; alternate 22/82. For further information, contact Clayton Elam, K4FZJ, 28 North Cooper St., Memphis, TN 38104, tel. (days) 901-274-4418 and (nights) 901-743-6714.

**Texas (Houston)—Sept. 20-22:** The Houston Ham Conventions, Inc., a nonprofit organization operating for and sponsored by Houston-area Amateur Radio clubs, is pleased to announce the 8th annual ham convention, Houston Com-Vention '85, to be held at the Stouffer Greenway Plaza Hotel, Southwest Freeway (U.S. 59) and Edloe St., 5 miles southwest of downtown Houston. Friday night: Registration opens at 5 P.M., hotel check-in, hospitality suites and HARC auction. Saturday, 8 A.M. to 5 P.M., and Sunday, 9 A.M. to 3 P.M.: Registration, forums, indoor flea market, commercial exhibits, women's luncheon and forums, free parking. Saturday night Texas barbecue. For more information, call 713-333-1466.

**Texas (Wichita Falls)—Sept. 21-22:** The annual Wichita ARS Hamfest will be held at the National Guard Armory Saturday, from 8 A.M. to 4 P.M., and Sunday, from 8 A.M. to 2 P.M. Large shopping malls, restaurants and motels nearby. Commercial dealer displays, computer goodies, homebrew contest, large indoor flea market (reserve your table now), 24-hour security; concession stand open both days. Preregistration closes Sept. 18. Register early—advance \$4, at the door \$5. Swap tables \$4 each. Talk-in on 75/15, 34/94, 449.30/4.30, 449.20/4.20. Volunteer exams given both days; send FCC Form 610 and \$4. Mail preregistration

and table reservation with check payable to WARS Hamfest, P.O. Box 4363, Wichita Falls, TX 76308.

**Wisconsin (Waukesha)—Oct. 13:** The Kettle Moraine RAC will hold its annual Ham, Computer, Video Fest at the Waukesha Expo Center, Hwys. F and FT, on Sunday. Tickets are \$2.50 in advance, \$3 at the door. Tables are \$3 for each 4-ft length; reservations will be accepted until September 27. Rain or shine, beginning at 8 A.M. Commercial exhibitors. Food available. For reservations, send a check payable to KMRA Club, P.O. Box 411, Waukesha, WI, 53187.

**Wyoming (Laramie-Cheyenne)—Sept. 6-8:** The Sixth Annual High Plains Ham Roundup will be held in the Medicine Bow National Forest, Yellow Pine Campground, 14 miles east of Laramie or 35 miles west of Cheyenne, on I-80. The event is sponsored jointly by the SHY-WY ARC, the University of Wyoming ARC and the Northern Colorado ARC. Potluck supper Saturday evening—bring a couple of your favorite dishes. Swapfest "upgrade your junk box." Packet-radio demonstration. Hat-decorating contest, musical entertainment and campfire sing-along. All hams and families welcome—any QTH. No registration fees except a modest forest service charge for campers. Plan to come one day or all three. Talk-in on 22/82 and 25/85. For further information, write to K0HRS, 2204 Vassar Ave., Fort Collins, CO 80525.

[Note: Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

(continued from page 66)

Some bureaus using postal credits rather than self-addressed, stamped envelopes had amassed considerable sums of money. Moved by Mr. Atkins, seconded by Mr. Gillespie, the Board VOTED that Mr. Daemen form a committee to consider these matters and propose a set of guidelines for the proper financial operation of CRRL incoming QSL bureaus.

13) The Board recessed for lunch from 1230 to 1300.

14) After lunch, the Board returned to the matter of the CRRL By-laws. Moved by Mr. Atkins, seconded by Mr. MacLean, the Board VOTED to adopt all changes that had been recommended, and to recommend those changes to the CRRL membership at a CRRL General Meeting to be held at 0900 EDT September 28, 1985 at City Centre Holiday Inn, London, Ontario.

15) The Board then discussed apparent DOC inaction in many areas: removal of restrictions on the 160-metre band, access to the new 24.5-MHz band, and proposals for "deregulation of mode subbands" and "restructuring of the Amateur Service." Many Board members expressed concern over the lack of growth in the Canadian Amateur Service. In a straw vote, most directors favoured the creation of some form of Novice licence, possibly with privileges similar to those now being considered for Novices in the U.S. A small number also favoured some form of no-code VHF-UHF licence similar to what is now available in the United Kingdom. Creation of a new licence class would require consensus in the amateur community. President Atkins indicated he would discuss the matter with representatives of CARF.

16) The Board then discussed changes in DOC examination procedures. Mr. MacLean

expressed concern that CRRL and CARF, which first had been asked only to amend DOC questions banks, were now being asked to develop a complete bank of questions for future multiple-choice examinations. The task was formidable. Nevertheless, amateur input would be important if examinations were to remain relevant and fair. Moved by Mr. Kremer, seconded by Mr. Gillespie, the Board VOTED that Mr. Spencer form a committee to work with representatives of CARF in developing new questions.

17) The Board also discussed the state of organized Amateur Radio in Canada. Moved by Mr. Perrin, seconded by Mr. Kremer, the Board VOTED to adopt the following resolution: Whereas the CRRL Board is in sympathy with the expressed wishes of many Canadian amateurs to have a single national Amateur Radio organization in Canada, CRRL resolves to work toward that goal.

18) The Board then discussed CRRL field organization. Many section appointments in the ARRL model were difficult to fill and possibly not essential. Moved by Mr. Kremer, seconded by Mr. Perrin, the Board VOTED that Ontario Section Manager Thivierge and Mr. Gillespie form a committee to study the matter and, that in consultation with all Canadian Section Managers, they draft a model of a CRRL field organization that would meet Canadian needs.

19) Moved by Mr. MacLean, seconded by Mr. Perrin, the Board VOTED to reaffirm the policy that CRRL membership be a prerequisite for all leadership and station appointments in CRRL field organization, including ARES and NTS.

20) Moved by Mr. MacLean, seconded by Mr. Daemen, the Board VOTED to have CRRL retain the call VE2BE, which belonged to Alex Reid, ARRL Canadian Director from 1930 to 1960.

20) The Board recessed from 1520 to 1535.

21) During the remainder of the meeting,

the Board discussed the following, with no formal action being taken at the time: The CRRL News bulletins: Acceptance continues high. The CRRL Repeater Directory: This is now the most accurate listing of Canadian repeaters available. The Foreign Licensing Information Service: Regular contact with all IARU member-societies would keep the information current. Collect calls to CRRL Headquarters: These are no longer being accepted. IARU representation: Canada continues to have a strong presence through President Atkins, Treasurer of IARU Region 2. The Committee for Special Prefixes: Mr. McLellan would serve on this. Amateur participation at Expo '86: Possible. RSO-CRRL '85: An excellent convention is being planned.

22) Finally, moved by Mr. Perrin, seconded by Mr. Kremer, the Board VOTED to approve all Executive Committee actions taken since the last meeting of the Board. There being no further business, the Board adjourned at 1740 EDT. Total time of meeting: 7 hours 35 minutes.

Respectfully submitted,  
Harry MacLean, VE3GRO  
Secretary

#### SOME QUICK NOTES

□ DOC has announced its examination schedule for 1986. DOC will hold Amateur Radio examinations across Canada on February 12, April 16, June 18 and October 15. Closing dates for submitting applications are January 15, March 19, May 21 and September 17, or about one month before the date of each examination. Remaining date for DOC examinations this year is October 16. Submit applications by September 18.

□ Don't forget RSO-CRRL '85, to be held at City Centre Holiday Inn, London, Ontario, on September 27-29. Check out the details in last month's Canadian NewsFronts and in this month's Conventions columns. It promises to be one great convention!



## Working OSCAR—The Basics

The fascinating thing about Amateur Radio satellites is . . . well, quite frankly, there's not just one thing but rather an array of features that make working OSCAR today among Amateur Radio's most fascinating, challenging and rewarding activities. Last time (June 1985 *QST*), we highlighted a few of the many activities and modes to be found on OSCAR. Now let's look a little closer at what it takes to get started using OSCAR satellites.

There are four basic topics you'll need to be familiar with to succeed on OSCAR:

- 1) When and where to point your antenna (tracking).
- 2) Basic transponder characteristics (frequencies and modes).
- 3) Basic station characteristics (transmit power, receive sensitivity).
- 4) Basic operating practice (band plan, protocol, courtesies).

First, you need to know when and where to look for the satellite (tracking). In essence, you need to know when the satellite you're interested in working is within view of your QTH. If you've got one of the new, little personal computers, AMSAT has a tracking program that makes (tracking) life very straightforward and easy. A review of the ARRL's *Satellite Experimenter's Handbook* (SEH) is recommended for a basic understanding of what's going on with the satellite—that is, its motion around the earth. But, just as you don't need to understand hydraulics to use the automatic transmission in your car, you don't need to understand Kepler's equations to use a computer to track OSCAR. But it helps conceptually to have a basic grasp of the motion of the satellites across the sky.

Several manual means of satellite tracking are also available. These aids are available from ARRL (OSCARLOCATOR), ZRO Technical Devices (Satellipise, Satellabe), and others.<sup>1</sup> The manual devices resemble circular slide rules with maps and various curves on them. When you enter a reference time and position for a certain satellite, the locators will tell you where the same satellite is at the time you select. Significantly, it will also tell you which way to point your antennas (azimuth and elevation) to zoom in on the OSCAR you want to work. Although the manual tracking aids or locators lack the accuracy, speed and general pizzazz of computer tracking methods, they are inexpensive and fairly easy to learn to use.

On the other hand, our first tracking computer was a Sinclair ZX-81, which I purchased for \$29.95 plus an extra \$10 for more memory. I got the AMS-81 tracking program from the AMSAT Software Exchange for \$10 and had an old TV monitor just perfect for the job.<sup>2</sup> So for \$50 and no sweat at all, I had a first-rate tracking computer system that gave me high accuracy and did nothing but plot orbits for me.

Second, you need to know what frequency to transmit on and what frequency to listen on. The popular current mode of operation on AMSAT-OSCAR 10 (AO-10) is called

**Table 1**  
**OSCAR Operating Modes**

Mode	Uplink Band	Downlink Band
A	2 m (145 MHz)	10 m (29 MHz)
B	70 cm (435 MHz)	2 m (145 MHz)
L	24 cm (1269 MHz)	70 cm (436 MHz)
S	70 cm (436 MHz)	13 cm (2401 MHz)
J	2 m (145 MHz)	70 cm (435 MHz)
LJ	2 m/23 cm	70 cm
K	15 m	10 m

Mode B. That means you transmit your signal to the satellite (uplink) in the vicinity of 435.1 MHz, and you listen for your signal (downlink) from the satellite on about 145.9 MHz. Moreover, since you are operating crossband, you operate full duplex—that is, you transmit and receive concurrently. Why crossband? The hardware required to provide sufficient isolation for in-band, full-duplex operation (similar to a terrestrial FM repeater) would be too massive to fit aboard a cramped-satellite. So the traditional satellite solution is to have cross-band, full-duplex operation. OSCAR satellite modes are listed in Table 1. A Mode B band-plan chart is shown in *The 1985 ARRL Handbook*, page 23-6.<sup>3</sup>

Third, you need to have a basic understanding of how to establish a station to use AO-10 in the mode you choose. You will need information to help you decide what equipment need be added to your existing shack to make it OSCAR-compatible.

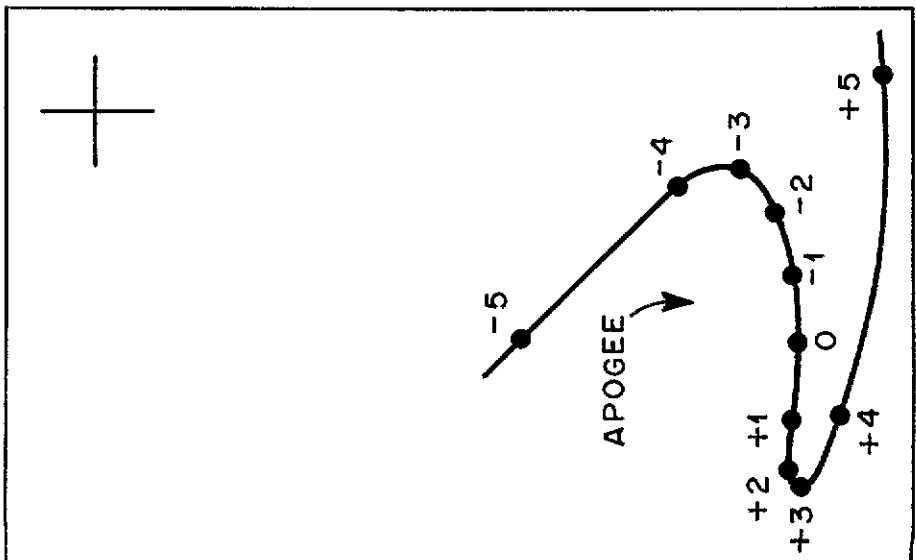
Fourth and finally, you need to be familiar with the operating practice and operating schedule for the satellites and modes you choose to operate. Operating schedules can be learned from AMSAT newsletters and nets.<sup>4</sup>

Operating practice can be learned from many reference sources, including the ARRL's *SEH* and AMSAT's beginner's manual.

Each of these topics will be covered in detail in future columns. Meanwhile, here's something you can do to get started right away. Simply take the first small step: Listen for AO-10. Make an attempt to hear AO-10 on its next available pass. All you need is a 2-meter all-mode receiver and antenna. Having a 2-meter preamp is not absolutely essential, but it makes a very, very significant improvement. Borrow or purchase one if you can. Then write or call the AMSAT Area Coordinator in your region and ask for a copy of the latest orbital predictions for your area. (You should offer to contribute to the postage costs.) Ask the Area Coordinator to help you point your beam in the right direction if AO-10 is in view then. Check to see if it's in Mode B or Mode L. You want Mode B if you want to listen to the 2-meter downlink. If you don't know who your Area Coordinator is, you can find out by calling toll-free to the Chief Area Coordinator, Jack Somers, WA6VGS, at 1-800-421-6631.

If you're lucky, the Area Coordinator will be close by, and a short drive to his QTH will result in your acquiring the key tracking data for your area. The computer-tracking print-outs will tell you the azimuth and elevation to point your antenna to track AO-10 for the next several days. Most newcomers don't have an elevation rotor. In that case, you may have some difficulty hearing AO-10 when it's above 20- or 30-degree elevation. As a start, you might select a listening period during which AO-10 is within 20 degrees or so of the horizon.

Start out by listening to the general beacon on 145.810 MHz. The frequency may be slightly different because of the Doppler shift



AMSAT-OSCAR 10 ground-track cursor for the OSCARLOCATOR. Reference data is for September 1.

effect exhibited by the fast-moving satellite. Use your receiver's USB or CW mode to listen. You may hear a buzzing sound, which is special phase-shift-keyed (PSK) telemetry, or you may catch the CW or RTTY bulletins, depending on exactly when you listen. The beacon changes mode in recurring half-hour patterns (beacons will be detailed in a subsequent column).<sup>5</sup>

Chances are, if you don't use a preamplifier, you will hear the beacon weakly or not at all. A good preamp is really very helpful, especially if your antenna is not terribly good or is in poor repair. Also, if you have a long run of transmission line between your antenna and your rig, the preamp will help most if mounted at the antenna and remotely powered from the shack. For a short test, you might consider battery powering the preamp and locating it at the antenna, just to see how well it works that way.

In any case, try tuning up to center band, 145.900 MHz. If the transponder is on, you should hear dozens of CW and SSB signals in the transponder passband. Use the USB position to receive. The convention on all the transponders is to use an uplink mode that produces USB on the downlink. Since AO-10 Mode B is an inverting linear transponder, LSB on the uplink results in USB on the downlink.

If your 2-meter station consists of a 2-meter beam with at least 10-dB gain and you have

a preamp, if the transponder is on, you'll be hearing lots of activity from local as well as DX stations. And at this point, you will have linked yourself for the first time into the worldwide network of satellite users.

But if you're disappointed in what appear to be weak signals on the 2-meter downlink, take heart. There really is a lot of 2-meter signal there, but your everyday, off-the-shelf 2-meter rig may need some help with the AO-10 signal. Most of the 2-meter radios sold have only marginal receiver front ends and really perk up with the addition of a new GaAsFET preamp out front. "Wow," you'll exclaim, "What a difference!"<sup>6</sup>

It is often helpful to have a standard frame of reference or benchmark to determine just how well you are hearing on 2 meters. To provide just such a benchmark, AMSAT began a series of on-the-satellite tests last spring. The tests are similar to the ARRL's frequency-measurement tests (FMT), except AMSAT's test works in the amplitude domain while ARRL's obviously works the frequency domain. AMSAT's receive sensitivity tests offer a convenient way to establish how well your station is performing both in an absolute sense and compared to other operators. For those who demonstrate various levels of proficiency on the test, an AMSAT Technical Achievement Award, called the ZRO Memorial Station Engineering Award, is available. The test

frequency is 145.840, and the next scheduled event will be later this month.<sup>7</sup>

First steps in a new endeavor are often long remembered. Many new OSCAR enthusiasts assert that their first OSCAR QSO was even more exciting than their first-ever QSO. Of course, you'll have to find that out for yourself. Meanwhile, your portable ionosphere whirs overhead, awaiting your signal. Once you hear OSCAR's beckoning call, you'll be hard pressed to resist for long!

Next time, we'll take a look at the antennas used in OSCAR work.

#### Notes

<sup>1</sup>ZRO Technical Devices, P.O. Box 11, Endicott, NY 13760.

<sup>2</sup>AMSAT Software Exchange, P.O. Box 27, Washington, DC 20044.

<sup>3</sup>A copy of the Mode B band plan is available free for a business-sized s.a.s.e. to the author at the address at the top of this column.

<sup>4</sup>See notes to the June 1985 column for nets and newsletter information.

<sup>5</sup>A free handout showing the general beacon program schedule is available from this column conductor for a business-sized s.a.s.e.

<sup>6</sup>Ads for 2-meter preamps are found in this QST. Refer to the ad section.

<sup>7</sup>A free information booklet about receive sensitivity and the AMSAT ZRO-Memorial Technical Achievement award is available for a business-sized s.a.s.e. with 39¢ postage affixed. Request from this column conductor at address above.

## In Training

Conducted By John Foss, W7KQW  
Training Manager, ARRL

### ON TEACHING THE CODE

CW has been with us for some years now—actually, ever since radio began. In fact, the appearance of a no-code license in the USA seems unlikely. But even if such a license were available, CW still would be a major factor on the airwaves for at least three reasons: (1) It's fun; (2) it will "get through" when nothing else will; and (3) the equipment costs less and is easier to maintain than comparable equipment for voice or digital communication.

Most amateur QSOs, by the very nature of Amateur Radio, are of relatively low priority; that is, no serious consequences result if the message does not get through. Unless it's the last hour of a contest, there's always another time. Only one's pride is at stake. But for a certain minority of ham messages, such is definitely not the case. For these, failure to get the message through can have grave consequences indeed. Under such circumstances, CW well could be the life saver—that is, if one knows how to use CW! Instances of such life-and-death situations are legion in the annals not only of ham radio but also of aviation, seamanship, exploration, military action and nearly every other field one can think of.

But if we grant that knowing code is important—apart from its use in passing license examinations—one question remains: How should we teach it? Almost every ham has an opinion on this subject, and often it seems that no two hams agree. Most think, however, that, because CW is inherently an audio phenomenon, it should be taught through audio means. Your

League has pursued that philosophy for several years and has every intention to continue. Nevertheless, within the domain of audio methods lies a huge diversity of possibilities. Obviously, no one organization can use all the approaches to teaching the code.

Although a myriad of sources exist for code practice, probably none has made its offerings so universally available to such a large percentage of amateurs and would-be amateurs as has your League. Not only is W1AW audible throughout most of North America, but League tapes and books abound in bookstores and radio stores almost everywhere. Thus, your League has an important responsibility to be certain its offerings continue to be the best possible.

For these reasons we seek to upgrade our code-learning and practice material. We want to provide practice in all kinds of CW that one is likely to hear on the radio, on or off the ham bands. This includes code groups, plain-language text (such as material from QST), typical ham QSOs, news, weather information and other offerings. It means code speeds of 5 to perhaps 40 WPM. It means cassette tapes and perhaps also software.

But we need your input, instructors! Below are some of the methods we are considering for upgrading our code program. Obviously, we cannot implement all of them—at least not now. So please write. Let us know which possibilities you consider most valuable, and what background you have in teaching code and other amateur subjects.

1) One or more tapes (standard cassette format) containing code groups, a typical ham

QSO, and news and weather information at each of the following speeds: 5, 7½, 10, 13, 15, 18, 20, 22, 25, 30, 35 and 40 WPM.

2) One code tape at each of the following speeds for each of the following kinds of text: 5, 7½, 10, 13, 15, 18, 20, 22 and 25 WPM; typical ham QSO (both sides of the conversation); code groups; combination of news and weather reports.

3) Plain-language tape in two foreign languages, chosen from French, German, Russian (Cyrillic alphabet) and Spanish at 10, 15, 20 and 25 WPM.

4) A tape at each of the following speeds containing advice for the new ham: 5, 10, 13 and 15 WPM. (Such a tape might explain some of the newer modes of communicating or discuss available software.)

5) A tape in which code speed is gradually increased from 5 to 10 WPM on one side and from 10 to 15 WPM on the other side, using code groups, plain language text or perhaps a typical QSO.

6) A tape with fading, interference and perhaps even noise on the tape (for practice in reading CW under difficult conditions).

7) An experimental tape (not subliminal) in which the code accompanies symphonic music, but with the code readily audible.

8) Some combination of the above possibilities.

9) Some possibilities we haven't thought of, but which you have thought of and can suggest to us.

Instructors, we're looking forward to hearing from you!

# June VHF QSO Party, 1985-Style

By Michael B. Kaczynski, W1OD,\* and Billy Lunt,\*\* KR1R

\*Contest Manager, ARRL

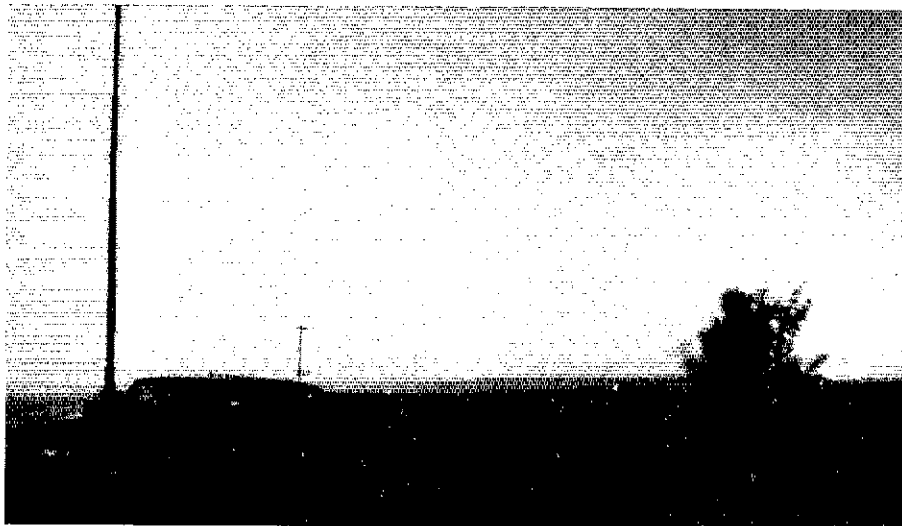
\*\*Assistant Contest Manager, ARRL

Mother Nature may not reside in Atlantic City, but it's June 8, 1985—June VHF QSO Party time—and the propagation winners are about to be announced. The E-skip envelope, please. No, Bert, we're doing the locations for best supporting tropo first. And the winners are—Seymour, Indiana; Minden, Louisiana; Oklahoma City, Oklahoma; and Muldraugh, Kentucky. Muldraugh what? There must be some mistake. No mistake, Mr. and Mrs. Mid-America. In the June VHF Contest, the gods found favor with your VHF efforts.

Just ask KC4KK/9: "The contest started out fantastic. Six was wide open. Later, 2 meters popped open and, remarkably, 10 W gave us Georgia, Arkansas and Oklahoma for our best DX yet." And WB4NXY in EM77, Kentucky: "Super conditions. I couldn't believe it when I heard WB5LUA and W5GG in South Texas on 1296." "This weekend would rival any low-band excitement that I've had over the last 28 years. I stayed up the entire contest period, since conditions were so fantastic, working grid squares on 432 that I would have thought impossible. We may never see the likes of it again."—K5YY, EM35, Arkansas. "Beautiful duct to the southwest. We copied WB0SIL with strong signals on a rubber duck. We left the operating site filled with exhilaration."—K8CQA, EN90, Ohio. "Wow, what a tropo opening! Best in five years."—W5NZS, EM15, Oklahoma.

Six-meter E-skip kept folks hopping on Saturday: "Six meters to the northeast was 40 over S9 all day."—W1WLE/4, EL97, Florida. And if that wasn't enough, the northern tier found the buzz-saw mode much to their liking, such as WA7VHW, DM07, in Washington state: "What luck! We had an aurora during the last several hours of the contest. I've never heard so much activity. Two meters sounded like 20." It was a propagation bonanza: "Simply the most exciting two days of VHF/UHF operating ever experienced. Aurora, 1000-mile tropo ducting, meteor scatter and 6-meter E-skip. Many stations worked were well over S9 on both 2 meters and 70 cm at the peak of the tropo opening." WA3TTS, EN90, Western Pennsylvania.

Conditions were not the only highlight, as this first use of grid-square multipliers in the June contest proved overwhelmingly popular. WB6KLL noted: "It makes the contest more fun. With openings, like we had on six at the beginning of the contest, DM05 became like BY1 on 20 meters. I felt like a DX station." Grid-peditions abounded in order to pass out those elusive multipliers, such as W0KEA in DM69 at 10,000 feet near Gypsum, Colorado; and WB0SIL/0, multiop station in EM46, who didn't even work their own grid square. While



Sunday evening was "electric" at AA9D.

## Top Ten

### Single Operator

AA2Z	172,830
W8ULC	138,180
WA2FGK	104,228
W9IP/2	101,985
K0TLM	93,955
KC2PX	92,340
K2CBA	90,138
KB3QM	89,355
N2BJ	83,693
K2EK	80,652

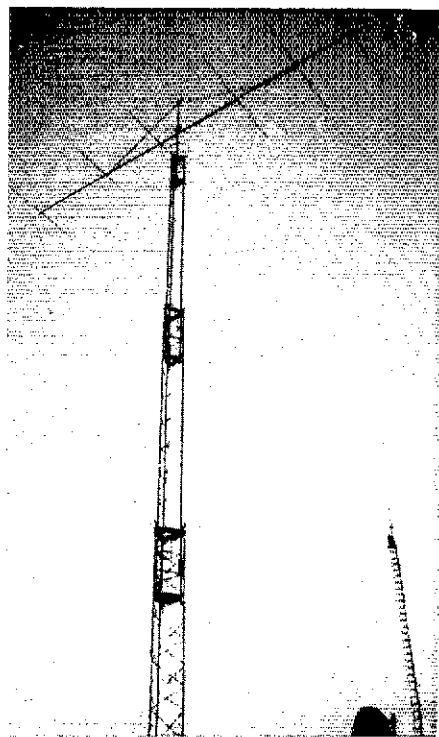
### Multioperator

W1VD	587,972
K3MTK	528,462
W2SZ/1	507,187
K3YTL	501,320
W8VP	357,445
N4DT	316,820
WDBISK	300,510
W9UD	297,920
AB4L	291,460
K1TR	290,958

W0ETT/7, DN61, who "enjoyed my grid-pedition to a rare one in southeast Wyoming," and who "would encourage others to journey to rare squares."

The scores tell the rest of the story, with the June contest traditionally featuring the exploits of the big multiops. A surprise at the top of the leader board, however, as the "W1 Victor David" crew copped top honors at 587k—with W1VD, WA1STO, K1JX and KA1GD at the controls. The "Mountaintop Kilowatt," K3MTK, took over the second spot with 528k, while perennial champ W2SZ/1 slipped to third, pursued closely by the "Yellow Traffic Light," K3YTL.

Top single-op laurels again go to AA2Z at WA2OMY's station (172k), while W8ULC rode the crest of the fantastic midwest conditions to a strong second-place position at 138k. Also



Saturday sunset in Virginia as seen from AB4L.

## End of the World DXpedition

Ah, the mighty Mississippi, gateway to a continent and home to paddlewheel steamboats and riverboat gamblers. One group of "riverboat gamblers" was heading downriver in search of adventure, ham radio style—a DXpedition!

A DXpedition usually takes place on a rock that appears at low tide, on a distant Pacific isle or some equally remote place. This was not the "usual" DXpedition, however. Instead, this was actually a "grid-pedition" to put grid square EL58 on the air.

Echo-Lima 58, the last bit of the last part of Louisiana at the Southwest Pass of the Mississippi, where you can still walk on land before you're treading Gulf of Mexico. This is why we called this excursion the "End of the World" DXpedition. We, a group of New Orleans-area hams and non-hams, loaded ourselves into three boats with enough food and gear to survive in the wilderness for a month (even though the plans were to stay only the weekend of the ARRL VHF QSO Party). The amateurs included WA5WJZ, N5BLW, K5AQY and son Russell (awaiting his call), WB5LLI, KA5WJE and WB5NHX.

The trip began early on the morning of June 8, 1985 but planning began months before, when WD5BJT of the Greater New Orleans Amateur Radio Club discovered something very interesting about the remote grid square: a perfect structure for VHF and UHF antennas—an abandoned lighthouse on an island near the mouth.

The lighthouse, although built in 1871, appeared, in recent photographs, to be in fairly good shape. A trip to the island two weeks before the VHF QSO Party confirmed this. The structure still towered almost 130 feet above the flat land of the Mississippi delta.

On Saturday morning, June 8, the crew started on the first leg of the journey by driving to Venice, Louisiana, some 50 miles south of New Orleans. Venice is the farthest place south along the Mississippi that is accessible with wheels—after that, you had better have a boat. After filing a float plan with the Coast Guard, the boats were loaded and launched, and the grid-peditioners were underway for a 25-mile joyride down the Mississippi to EL58-land.

The crew immediately became aware that one of the boats was somewhat underpowered for the load it was carrying. It was decided that the two faster boats would go ahead to the island and begin setting up camp, while the slower boat would follow.

Being aboard one of the faster vessels seemed like an advantage until they sped right into a thunderstorm. "You haven't seen the Mississippi until you've seen it from a 16-foot flatboat in a driving thunderstorm," said GNOARC president WA5WJZ.

Ultimately, the island and lighthouse were located. Because the water at the banks was so shallow, the boats had to be anchored several yards out, and the gang slogged ashore through the mud with gear and provisions.

While part of the DXpedition team set up camp at the lighthouse base, another group climbed the rusting, yet fairly solid, spiral staircase to the lighthouse top to set up the station.

By 2 P.M., W5UK was on the air, but with a severe problem: A 435-MHz radio navigation beacon had been installed at the lighthouse by an oil exploration seismic crew, and its rhythmic pulses were wiping out 70 cm, 2 meters and even causing problems on 6! All this way, all of the planning, all of the sweat and now no radio operation?

It became clear that UHF operation would be out of the question for the duration of our stay in EL58, but by rerouting our antenna cables, we were able to put 2 meters and 6 meters on. EL58 was on the air!

Two meters proved disappointing, with few signals heard and most of them from the New Orleans area, but six was sizzling! To the surprise of the W5UK bunch, people were looking for grid square EL58: "Where have you guys been? I've been looking for you," said one 50-MHz operator. Back in New Orleans, W5TVW had been putting the word out. He had been in on the early planning of the DXpedition, had lent the group some additional equipment and had helped further by telling everyone he could on 6 meters that we would be on from that magic grid square.

The little 10-W signal and the 3-element Yagi lashed to the lighthouse railing with tiewraps did not guarantee a potent signal, but the words "Echo-Lima Fifty-Eight" seemed to do the trick.

As WB5LLI and WA5WJZ handled the operating below, the rest of the crew settled down for a lunch break of rust-crunchy sandwiches (rust flakes continually fall from the iron lighthouse). As WA5WJZ tuned around, looking for new QSOs at the top of the lighthouse, the crew on the ground settled down for a well-deserved rest when cool, gusty winds came up, howling through the legs of the lighthouse, blowing the tents around. We scrambled to recover three umbrella-style pop tents and a cabin tent. The cabin tent, unlike the pop tents, was staked to the ground, but the aluminum poles could not take the pressure of the wind blowing through the front door.

It rapidly became clear that the cabin tent would have to come down before the wind did any damage, so we kicked out the poles and let the tent fall, turning our attention to the umbrella tents. After a bit of quick work, the tents were securely lashed down, and the ground crew began to think of other things.

At the top of the lighthouse, WA5WJZ was having an almost religious experience. Over his head the American flag, tied up earlier, stood straight out, as if someone had starched it. As the wind blew, the flag snapped and popped like rifle shots. As the operating table began heaving and vibrating, the logs began to fly, and he noticed that he, too, was moving toward the edge of the tower. Quickly stowing all the gear, he rapidly descended the long, narrow spiral staircase of the lighthouse. He reached the bottom, pale and shaken.

After the weather settled down, WA5WJZ returned to the top of the lighthouse, but discovered he could not stay without getting the "beebie-jeebies," so N5BLW took over as chief operator. Later, a raccoon was encountered inside the lighthouse!

After an uneventful meal, work began on a 75-meter dipole so that the HF station could be put on the air. Unfortunately, the generator, which was low on oil, decided to take a rest. Someone had left the oil cans along the river bank, a half-mile away. The tide had changed, and, well, there was no oil.

A quick substitute for the missing oil was found—outboard motor oil from the boats. The generator was back on and running, but not everyone was interested in the successful conclusion to this problem.

With VHF conditions dead and not much interest being shown in the HF rig, the decision was made to shut down power for the night. A Coleman lantern was left on to keep the "critters" away and to aid anyone needing to take a walk during the night. Unfortunately, the lantern began resonating when it ran low on fuel about 4 A.M., and began emitting a low howl. No one was quite sure what was causing the off-and-on tooting that was echoing through the lighthouse, but no one was willing to investigate, either. Near daybreak, K5AQY ventured out and turned off the offending lantern.

After a rust-crunchy breakfast, W5UK was put back on the air, but conditions were poor on Sunday morning. EL58 was on the air, but the ionosphere and troposphere were not cooperating! We then decided to begin the task of breaking camp and returning the gear to the riverbank.

The trip upriver went more smoothly than the trip down. The slower boat was loaded with less equipment, so the EL58 crew made good time back to Venice, where the boats were unloaded and holsted back onto their trailers.

For many who had made the trip, the next workweek seemed like a vacation in comparison to the weekend. Because of erratic band conditions, gusty winds and nasty QRM from the radiolocation beacon, we hadn't made nearly as many QSOs as we had wanted, but we had accomplished something: We had put EL58 on the air!

Above all, we had fun. And long after the EL58 QSLs have been sent out, we'll remember the fellows we overheard on 6 meters: "EL58? There's nothing down there but a lighthouse!" That's us—the End of the World DXpedition.—Terry Raymond, WB5NHX and Bob Dunn, WA5WJZ

topping the century mark were WA2FGK and W9IP.

The scores below list the rest of the winners, each and every entry in the June 1985 June VHF QSO Party—one many won't forget for a long time.—W7XX

Thanks to Mark Burke, KA1MIS, who helped in the preparation of this report.

### SOAPBOX

Why, oh why did I wait 'til Sunday P.M. to put the 6-meter beam up? At least, I didn't miss the buzz

(WA1HYN). If anyone thinks CW is not useful, they should try working an aurora without it (W1FXS)! Since I've sold my HF equipment, this is the only contest I can participate in. I enjoyed it. Maybe next time I can find a mountaintop for a few more points (WA1NLD). I wish more people had tried 432 MHz during the aurora. The band was almost dead except for the multispot stations (K1FO). Like grid squares!

### Division Leaders

Single Operator Call	Score	Division	Multoperator Call	Score
VE3ASO	88,058	Canada	VE3ONT	172,437
AA2Z	172,830	Atlantic	K3MTK	558,450
KA8MRI/9	51,188	Central	K9HMB	206,496
W8XG	69,906	Dakota		
K5YY	40,424	Delta	N4VC	98,468
WBULC	138,180	Great Lakes	W8VP	357,445
WA2FGK	104,228	Hudson	N2BOW	201,390
KØTLM	93,955	Midwest	WBØDRL	130,298
K1PXE	58,520	New England	W1VD	587,972
WB8UUP	7425	Northwestern	K7AUO	21,065
W6RXQ	25,875	Pacific	KE8NS	46,070
N8FCJ	81,169	Poanoke	N4DT	316,820
KAØMQA	23,268	Rocky Mountain	WØIA	16,524
KG3CL	46,898	Southeastern	N4EJW	63,325
W6CPL	7680	Southwestern	WA7JTM	33,220
W5NZS	37,180	West Gulf	WB5KTC	15,188

### Top Single Band Scores

50 MHz		144 MHz		220 MHz		432 MHz		1296 MHz	
WØXG	35,108	K2LWR	30,954	AA2Z	3588	K1FO	15,366	W3IY/4	2320
W3ZR	32,760	K2TXB	30,045	N9HH	3360	WØEH	11,092	WA2FGK	1404
W4OO	27,359	N4AR	20,017	N2BJ	1870	KC4EG	7644	N6CA	828
VE3FGU	25,200	K2CBA	18,669	WA2TEO	1836	N18Ø	7452	K1PXE	750
KC3CL	22,400	W8ULC	18,160	KC4EG	1836	K5YY	6958	K6UOH	675
AA2Z	22,152	N8FCJ	15,895	K1PXE	1720	WB4NXY	6708	W2CRS	627
W9IP/2	21,733	K5YY	13,800	W2CRS	1680	K2EK	4592	W1RIL	576
N4MM	21,105	KC4EG	13,581	W8ULC	1610	W3IP	4482	WA1JOF	552
KB3QM	21,087	WB2QOQ	12,997	KB3QM	1292	WB5AFY	4440	WA1MBA	513
NØLL	20,800	W5SUS	12,141	WA3FYJ	1232	AA2Z	4420	WB1FKF	480
*W1VD	75,838	*W1VD	75,835	W9IP/2	1080	*K3MTK	17,204	*K3MTK	3960
*K3YTL	50,307	*W8VP	57,596	*K3YTL	13,860	*W1NY	16,320	*K3YTL	3564
*VE3LNX	49,980	*W8UD/9	46,720	*K3MTK	10,530	*W1VD	14,240	*W2SZ/1	2304
				*W1VD	7280				

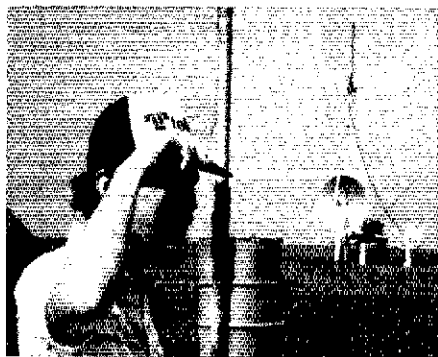
\*denotes multoperator station

### Call-Area Multiplier Leaders—Single Operator

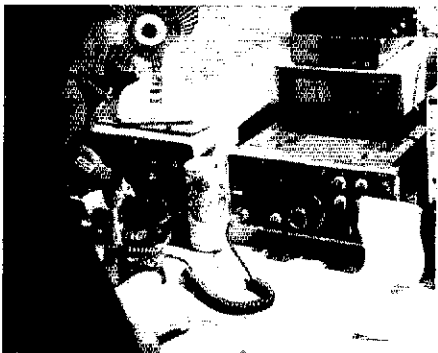
50 MHz		144 MHz		220 MHz		432 MHz		1296 MHz	
K1TOL	82	K1GX	35	K1PXE	20	K1FO	39	K1PXE	10
KC2PX	90	K2LWR	77	W2CRS	21	W2VC	30	WA2FGK	13
AA2Z	104	WA3FYJ	61	AA2Z	26	WA3TTS	39	WA3JUF	13
W3ZR	120	N4AR	99	KC4EG	27	KC4EG	49	WB4NXY	10
WB5DSH	83	K5YY	75	KB5PX	24	K5YY	49	WB5AFY	8
W6RXQ	93	WA8HHD	23	NR6G	9	NR6E6	14	N6CA	12
WØETT	91	WA8MGZ	23	K7HSJ	4	NF6X	8	WA7UUP	4
W8ULC	98	WA8DYU	26	W8ULC	23	N18Ø	46	K8TL	2
K9RO	87	W8ULC	80	N9HH	35	W9ØEH	47	W9ØEH	7
WØXG	131	KAØHPK	54	WAØNOK	13	WØFY	26	WØRAP	4
VE3FGU	112	WØFY	58	VE3BFM	19	VE3BFM	25	VE3BFM	9
		VE3FN	47						

### Call-Area Multiplier Leaders—Multiop

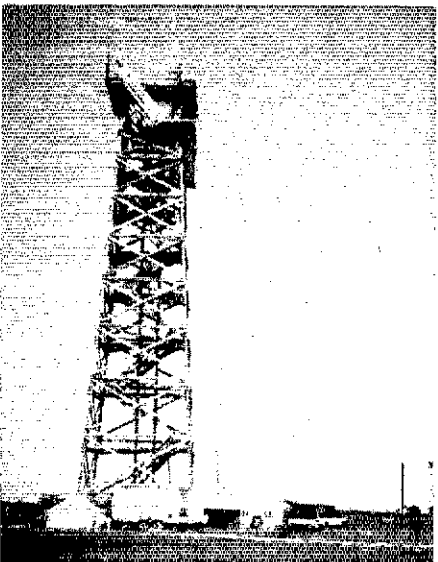
50 MHz		144 MHz		220 MHz		432 MHz		1296 MHz	
W1VD	145	W1VD	71	W1VD	35	W1VD	40	W2SZ/1	16
N2BOW	104	N2BOW	41	N2BOW	29	N2WM	30	WA2SNA	8
K3YTL	123	N2WK	41	K3YTL	45	K3MTK	46	K3MTK	24
N4HSM	134	W3GNR/3	77	N4DT	37	AB4L	51	N4DT	10
NSBHO	86	N4DT	83	N4FAC	76	N4FAC	15	AB4L	10
W6UE	67	N4FAC/5	85	KE8NS	11	W6UE	18	KE8NS	7
WA7JTM	83	W6UE	27	KB7WW	6	N7BPA	12	K7AUO	5
WB8BK	122	KB7WW	26	W8VP	49	W8VP	64	W8VP	21
K9HMB	126	W8VP	121	W8UD/9	39	W8UD/9	59	W8UD/9	5
KØTLM	102	W9UD/9	116	WBØDRL	21	WBØSILØ	45	WBØDRL	13
VE3LNX	110	WBØDRL	73	VE3ONT	28	VE3LNX	30	VE3ONT	10
		VE3FAS	57						



Dave, AA9D and crew scored 123 k, for a third-place multiop finish in Illinois.



The 2-meter position at top Arkansas multiop N4FAC/5, with N4FAC operating.



These aeriels helped W9UD cop a Top-Ten multiop finish.

(WA1TDA). You should make this a 24-hour contest only. Sunday P.M. becomes a problem for mountaintoppers (W3MR/2). This was my first all-CW contest, having lost 3 microphone cables hours before the contest (KC2GI). I had more trouble with my contesting program for the C-64 than anything else (WA2CWA). My only disappointment was the lack of activity on 220 MHz (N2WM). Things get boring when you just use 220 and 432 SSB/CW (K52T). The contest was too long. I believe it should be a 12-hour sprint or a 24-hour contest max. (WB2EYX). Wow! (KU2A). No one should complain about conditions this time... 2 meters was almost enjoyable—not as crowded since everyone was on 6 (WB3JYO). I had a lot of fun chasing our Pack Rat microwave rover to work 10 grids on 2.3 GHz for the VUCC award (WA3JUF). Did you hear me? I was the FN11 station who didn't destroy your front end (KØ3C). It can get confusing with W2IP, W3IP and W9IP/2 on the same band at the same time (W3IP). Water in coax, tornado watch, pine-tree attenuators, low generator output, all rotators

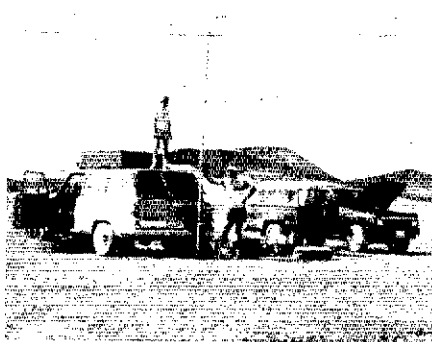
broken, half the crew left early, punctured auto gas tank (\$150), fire in the camper and a defective fire extinguisher... still a lot of fun. Just wait 'til next year (K2SPO/3). Missed working 432 VUCC by one grid during the contest (KC4EG). Super conditions on 2, 432 and 1296. While trying to work W5GG on 1296 CW, I heard WBØZJP break on SSB with a 20-over S-9 signal (WB4NXY). What a band opening on 2! The contest provided 49 new grids. I'm looking forward to the next VHF contest (AA4FQ). Super weather, location, accommodations and no equipment failures. The only thing missing was propagation. Maybe the propagation gods will smile on us in September (N4HSM). Using grid squares makes the contest more active. They should be adopted worldwide for HF as well as VHF (W4HJW). Contest rule no. 74 should read "If you plan to have breakfast, finish eating before connecting the hardline to the rig" (AB4L). In this age of modern technology, why can't someone design an alarm clock that is guaranteed to work? Mine didn't, and I missed the best part of the

2-meter opening (WB5JAR). Where's the F2 when you need it (KC5GB)? There is not enough CW on 6 (KB6CYB). There didn't seem to be as much activity on the West Coast this year, and no good 6-meter openings to Southern California. Think the grid squares work fine (K6VMN). One watt on 432 is rough (KA6ING). Who says 6 is dead? (WB6KLL). If the East Coast had listened, they could have worked more grid squares while double hop was in (K7ZOK). I'm very satisfied with the change from Sections to grid squares. Now, get the committee to change conditions from poor to good! (W7ABX). One operator went into the contest thinking it would be like November Sweepstakes and was surprised how helpful the competition was.





KØTLM put in a 94k, division-topping effort from Missouri.



WA4GPM (yes, Buzz was in DN31) operated from the north shore of the Great Salt Lake.



Northern New Jersey's number-2 single-op, KC2PX.

KB4CMF 802-43-14-B  
 WAAMMP 1-1-B  
 ABAL (+ KA4NZO, KB4s NT, XK, KF4JT, N4LMQ, W4AAH, WA4s IVF, KCO, PGI, WB4s WTC, YJC, WD4s BWL, DJT, DUU) 291,480-816-295-ABCDEI  
 W4BFB (K4TP, WA4VCC, AA4ZZ, KA4WYC, KD4IL, KS4s, KU4V, oprs.) 112,054-534-179-ABCDE  
 N4HB (+ WB4BYV) 31,351-280-107-ABD

**5**  
**Arkansas**  
 KBYY 40,424-255-124-BD  
 WBSJAR 12,168-151-78-ABD  
 NRSA 4420-82-55-AB  
 WSSUS 12,141-171-71-B  
 NAFACIS (+ WB4LHD, WD4JHD, WB5BHS, WASUMP) 95,274-405-201-ABCD

**Louisiana**  
 KB5PX 23,988-176-112-ABCD  
 WASUFH 10,296-139-72-ABD  
 WSUKQ 3240-55-36-BD  
 WDSBJT 882-31-22-A  
 W5FYZ 4600-100-46-B  
 WBSYDE 2414-71-34-B  
 NSBHD (+ W5EW, WB5NAA) 50,662-302-146-ABCD  
 WSUK (W5WJZ, WBSLLI, K5AQY, WB5NHX, NSBLW, KA5WJE, oprs.) 1326-52-30-AB  
 KA5VNX (+ KC5WA) 360-20-9-B

**Mississippi**  
 WBRCI 36,549-196-131-ABCD  
 N4JS/S 17,860-174-95-ABCD  
 WASWUX 1812-52-31-AB  
 NE5L 182-16-12-A

**New Mexico**  
 W6FF 7194-108-66-ABD  
 KASEBL 1750-50-35-AB  
 KSMAT 1064-51-14-BCD  
 W5RKS 258-25-8-ABD  
 K13L/S 3440-80-43-A  
 WBSAOX 208-16-13-B

**Northern Texas**  
 KE5EP 45,440-276-129-ABDE  
 WA5VJB 22,960-179-80-ABCDEFI  
 KD5RO 16,170-169-77-ABDE  
 K6IS 12,528-135-87-ABCD  
 N5GRK 5772-115-37-BD  
 WB5KYK 1440-44-24-ABD  
 N5J 27-9-3-B  
 WB5KTC (+ AD5I) 15,168-184-79-ABD

**Oklahoma**  
 WASWCP 71,484-210-111-ABCDEF  
 W5NZS 37,180-208-130-ABCDEF  
 ABST 11,375-155-65-BD  
 N5TM 10,050-112-67-BD  
 WB5DSH 12,284-148-83-A  
 KA5TVF 1-1-1-B

**Southern Texas**  
 WB5RUS 20,739-196-93-ABDE  
 WB5AFY 7425-75-45-DE  
 KC5GB 5900-111-50-ABD  
 WA5IYX 224-16-14-AB  
 N5BA 4680-120-39-B  
 N5FXQ 96-16-6-B

**6**  
**East Bay**  
 N6AMG 19,529-195-89-ABCDEF

N6EIO 9417-172-43-ABCD  
 WA6LHD 4795-711-35-BCD  
 KN5S 1224-51-24-A  
 W6EG 87-29-3-B  
 KB6SD (+ KD6QE) 4968-216-23-B

**Los Angeles**  
 W6CPL 7680-191-30-BD  
 WB6FCS 6641-169-29-BD  
 N6VI 1359-79-18-BD  
 W6PFE 6-2-2-BD  
 KB6CYB 680-34-20-A  
 WB6NXB 140-14-5-C  
 N6CA 828-23-12-E  
 W6LUE (A6E, N6ENU, WA6OTU, WA6PZL, oprs.) 61,759-385-124-ABCDEF  
 WB6AAQ (+ WA6ANL, WA6FWI, N6LJI) 27,887-273-79-ABCDEF  
 K6BPC (+ WA6HXD, W68s AXE, YVP, NA2D, 3905-208-35-ABCD)  
 WA6SFM (KB6CGI, N6AOK, WA6FSF, W66JUE, oprs.) 1440-46-24-ABD

**Orange**  
 K6FFW 3848-116-24-ABCD  
 KB6XG 2024-50-25-ABCDEF  
 K6IBY 1408-40-22-ABCD  
 WA6SNN 857-67-11-BD  
 K6PHE 160-16-10-A  
 WA6GFR 75-15-5-B  
 K6AMD 4-2-2-B  
 WBSAJZ6 (+ WD6HRO) 4200-99-24-BD

**Santa Barbara**  
 WB6BCN 2343-61-33-ABD  
 K6MEP (K6VMN, N6s HBI, JH, KH6N, WA6s DJS, FPX, oprs.) 31,657-317-87-ABCDEFI  
 N6LFI (+ WA6OYS, WB6YQN, KA6JOE) 21,546-273-57-BCDEFI  
 WA6JZ (+ KA6VVD) 1920-99-16-ABD

**Santa Clara Valley**  
 W6RXQ 25,875-284-69-ABCDEF  
 K6HCP 17,712-179-72-ABCDEF  
 WA6CAK 15,022-165-58-ABCDEF  
 K6SING 5248-155-32-ABD  
 K6BDK 1320-52-24-ABD  
 K9TGT6 1152-52-18-ABD  
 A6A/S 308-38-7-BC  
 K6KLY 2108-68-31-A  
 WB6MGZ 2024-88-23-B  
 K6XO 240-49-5-B  
 K6UQH 875-25-9-E  
 KF6GL (+ AA6AD, W6QAJ) 10,266-138-59-ABCD

**San Diego**  
 N6DG 6878-133-38-ABCD  
 WA6BNH 6438-161-29-BCD

**San Francisco**  
 N6GLJ 8541-144-39-ABCDEF  
 WA6LLY 1872-57-29-ABD  
 W6FSH 232-22-8-BD  
 WB6UPV 132-22-6-B

**San Joaquin Valley**  
 NR6E/S 18,005-199-65-ABCDEF  
 WB6KLL 2108-68-31-AB  
 W6SLF 188-18-11-BC  
 K6SNS (+ WB6YM, KF6GY) 48,070-401-85-ABCDEF  
 WB6WLE (+ N6FF, WA6QYS) 11,834-160-61-ABCD

**Sacramento Valley**  
 KE6ZE 6840-142-38-ABCD  
 WB6VYH 464-29-16-A  
 WA6OSX 168-21-8-A  
 WA6PTT (+ WA6 IKE, ZNM) 34,104-194-58-ABCDEF

**7**  
**Arizona**  
 K2DNR 3502-84-34-ABCDEF  
 WB7OHF 756-27-14-A  
 KC2WI7 45-9-5-B  
 WA7JTM (+ WA7s CJO, LYI, K7PRS) 33,220-287-110-ABD  
 W7DTL7 (+ W7LHA, KD7DR, WA7KUM, W7B7LF, W7RZZ) 15,730-202-65-ABCD

**Idaho**  
 W7ID 2145-61-33-ABD  
 KD7IY 1316-44-28-ABD  
 W7CVJ 140-18-7-ABC  
 WA6DYU 1222-47-26-B  
 KA7KGF 112-14-8-B  
 N7EJ (+ KA7PIE) 1925-55-35-ABD

**Montana**  
 W7HVA 1568-46-32-ABD

**Nevada**  
 K6LM7 4323-98-33-ABCDEF  
 K7COW 4240-80-53-AB  
 K7ZOK 1860-52-30-ABDE  
 W7KYT 700-30-20-ABD  
 W7ABX 532-19-14-A  
 N7BPA (+ KB7BZ, WA6YPL) 7676-127-42-ABCDEF

**Oregon**  
 WA7BU 6588-134-36-ABCDEF  
 W7TYR 4887-113-27-ABCDEFQHI  
 N7DB 4323-111-33-ABCD  
 K7HSJ 3297-105-21-ABCDEF  
 W7PUA 3120-85-24-BCDEI  
 W7JXU 912-58-12-ABD  
 WB7UNU 550-29-10-ABCDEFQHI  
 WA7IQH 300-26-10-ABD  
 WA7ECY 180-38-10-AB  
 WA3RMX 100-5-5-FGHJK  
 K6VIZ 60-10-9-D  
 K7AJO (WA3RMX, WB6BGV, K7RUN, W7s BKN, UDM, VOK, oprs.) 21,085-263-55-ABCDEFQHIJK  
 KB7WW (+ W7HR, W7DID) 19,888-231-68-ABCD  
 KE7P (+ N7CNH, WA7s TDU, TDZ) 6336-108-48-ABCD

**Utah**  
 WA4GPM 180-20-9-AB  
 K6PVS7 (+ W6OUU, W66AUP, K6HXW, N6CFQ) 5735-114-37-ABCDEFI

**Washington**  
 WB7UUP 7425-174-33-ABCDEF  
 N7FX 6396-143-39-ABD  
 W7FN 6258-128-42-ABCD  
 K7IDX7 2257-200-19-AB  
 N7BSN 1659-64-21-ABCD  
 WA7PVE 48-18-3-AB  
 N7FXQ 1233-137-9-B  
 WA7VHW 484-29-16-B  
 KB7LQ 384-52-7-B  
 WA7ATP 144-18-8-B  
 KB7LJY 30-10-3-B

**Wyoming**  
 WB7TI7 18,169-233-100-AB  
 WA7LEA 1071-36-17-ABDE  
 WA7KYM (+ W6s KJY, SII) 14,904-168-72-ABCDEF

**8**  
**Michigan**  
 KU8P 25,630-236-110-ABD  
 W6JRP 17,535-153-105-ABD  
 WD8KLU 5742-85-58-ABD  
 KB8JI 4760-75-58-ABD  
 N8BI 1890-47-27-ABCD  
 N8BMM 1127-41-23-BD  
 KM8U 9348-164-57-B  
 N8CKH 8400-150-58-B  
 WB8OOA 4320-108-40-B  
 WB8KIC (+ WB8s KAY, TGY, WA8s VPD, HTL) 274,480-743-292-ABCDEF

**Ohio**  
 WB8LC 138,180-510-235-ABCD  
 N8IO 37,800-234-120-BD  
 K8TL 21,462-184-98-8DE  
 WD8CTX 13,765-223-134-ABD  
 N8BJN 6710-112-56-BD  
 N8BTC 4808-90-4-AD  
 N8CCC 666-35-18-ABD  
 WB8LLU 782-34-23-A  
 WB8NJR 4293-81-53-B  
 W8HIG 2720-80-34-B  
 K8LMN 2201-71-31-B  
 K8MR 189-21-9-B  
 W8VP (K8s AL, IOX, KNL, KA2IQO, KA8WJE, N8s CQX, FXL, W8UA, WA8HFH, W8s DOE, ERB, W8YCYZ, WD8SDH, oprs.) 387,445-634-335-ABDE  
 W8BISK (N8s BPB, ECH, ASZ, KC8RD, W8VNE, WA8s OGS, ONQ, KA8OJX, W8ZCC, oprs.) 300,510-784-318-ABCDEFI  
 K8COA (+ WB8s JAY, TEI) 31,388-193-133-ABD  
 KC8TW (+ N8XX) 682-31-22-B

**West Virginia**  
 N8FCJ 81,169-482-157-ABD  
 W8LSC 10,508-115-74-ABD  
 W8DRR 6681-131-51-B  
 K3LNU8 (+ K3s DUA, IGH, W3ZZ, WA3s EQQ, OYV, NZL, W4PSJ) 227,088-765-249-ABDE  
 N8DKL (N8BZS, N8FVL, KC8IT, oprs.) 37,089-317-117-AB

**9**  
**Illinois**  
 N9CF 23,250-263-75-ABCD  
 WB9WMM 20,601-189-104-ABD  
 K9RO 14,006-142-94-AC  
 KA9MGR 5220-81-58-AC  
 WB9IX 3713-68-47-ABD  
 KA9QIK 656-34-16-BD  
 KA9CLP 351-32-9-BC  
 N9AQ 2940-70-42-B  
 WB9POQ 2818-77-34-B  
 K9BOL 741-39-19-B  
 KA9QYA 99-11-9-B  
 N9HH 3360-48-35-C  
 K9SH 2668-48-29-D  
 W9UDJ9 (+ K9s AKS, CHZ, W9OHU, W9DFSA, AK9P, A9EM, WB9MSJ, WB9QPI) 297,920-765-320-ABCDEF  
 K9HMB (+ K9s GL, NO, PV, W9, WB9CAS, WB9TY, W9D9IC, NA9D, KC9C, SW9I, KA9CJG, WB4YQI) 290,498-606-288-ABCDEF  
 A9D (+ N9s KC, BD, AZZ, EDT, KA9s CKI, JYI) 122,859-448-219-ABCD

**Indiana**  
 KA8MRI9 51,188-319-134-ABCD  
 KA8HPK 37,845-188-145-ABCD  
 K9DZS 19,691-160-97-ABD  
 W9DEH 14,688-130-54-DE  
 KC4KIG9 9336-138-72-AB  
 AF9L 363-22-11-BC

W3TC 1353- 41- 33-A  
 KASMQI 374- 22- 17-B  
 W8UT 3630- 55- 33-D  
 W9CFB (WD9EIX, AGSS, N8BEY, WD9CTS,  
 K9E DZE, URA, ET, KC9CP, KASPGD,  
 oprs.) 23,920- 201-104-ABCD  
 W9YB (KA9CCR, KC9G, KS9J, WA1RHS,  
 oprs.) 2952- 69- 41-ABC

**Wisconsin**

WA1ED 10,140- 125- 78-ABC  
 WA9KVS 7198- 118- 61-AB  
 N9KS 2870- 70- 41-AB  
 W9YCV 1982- 62- 29-BD  
 N9TD 172- 17- 14-BD  
 W9NAW 1344- 42- 32-A  
 W9CBE 1225- 49- 25-B  
 K9VGE 432- 36- 12-B  
 KA9HKL 360- 30- 12-B  
 K9GDF 9- 3- 3-B  
 N9DIJ 4- 2- 2-B  
 WA9HCZ9 252- 14- 9-D  
 WBUCI9 (+ K8GJX)  
 70,047- 373-181-ABD

**0**

**Colorado**

KAMQA 25,258- 227- 84-ABCD  
 KD8GT 17,920- 208- 80-ABD  
 KD8GS 4620- 98- 33-ABCDE  
 KA8NO 18,800- 200- 94-A  
 N8RI 8000- 125- 84-A  
 W8KA 1122- 85- 17-B  
 WBUR (+ KA8DN, K8XO, ND2X, W8OAL,  
 KA8CZV, NK8P, K8EU)  
 70,740- 438-135-ABCDEI

WBIA (KA8DXM, KA8QPT, W1XE, KR8J,  
 oprs.) 16,524- 188- 81-ABCD

**Iowa**

K8DAS 13,859- 129- 87-ABCD  
 WBBZKG 12,544- 143- 88-AB  
 WBBTEM 10,449- 103- 81-ABCDE  
 K8CQ 10,200- 111- 75-ABDE  
 WBBRMT 10,005- 115- 87-AB  
 W8RAP 1430- 30- 22-DE  
 KA8CSI 8316- 126- 88-A  
 WA8DCB 1728- 48- 38-A  
 WBBSDW 7980- 140- 57-B  
 WA4VWV 770- 35- 22-B  
 KA8GOA (+ NE8P)  
 338- 28- 13-B

**Kansas**

N8LL 38,503- 277-139-AB  
 W8RT 9230- 98- 71-ABD  
 WA8CFQ 2014- 53- 38-AB  
 K8VUA 3432- 78- 44-B  
 N7AQX 294- 21- 14-B  
 W8DRRL (+ WA8TKS, N8FJJ, N8UJ)  
 130,298- 475-227-ABCDE  
 KFOM (+ K88DW, WA8VJF, N8EKT)  
 69,190- 342-170-ABCD

**Minnesota**

W8XG 89,906- 381-183-ABCD  
 AD8S 6441- 119- 57-A

**Missouri**

K8TLM 93,955- 387-215-ABCDE  
 WA8NOK 37,120- 215-145-ABCD  
 W8FY 28,084- 205-118-ABD  
 K8GOB 7975- 98- 55-ABCD  
 W8BPP 1770- 46- 30-BD

AK8M 3483- 81- 43-B  
 W8SIL8 (+ N8ZZ, KC8PP, WA9NRB)  
 50,126- 285-142-ABD

**Nebraska**

N8AJU 23,760- 220-108-AB  
 K8JUS 17,278- 149-106-ABD  
 W8BYZN 7957- 108- 73-AB  
 KA8RI 1848- 86- 28-AB  
 W8BQM 1188- 43- 22-ABD  
 W8KAV 322- 23- 14-A  
 K8NG (+ KA8ABA, K88OG, N8BTN, KC8QI,  
 KA8JGH, W8BGGF, N8US, W88HY,  
 W88CKF, W88APP)  
 39,200- 247-140-ABCDE

**South Dakota**

W8BULX 308- 18- 17-A

**VE**

**Maritime-Newfoundland**

VE1AHM 135- 12- 9-BD

**Quebec**

VE2FUT 11,176- 135- 78-ABCE  
 VE2TH 4185- 93- 45-A  
 VE2YB 398- 22- 18-A  
 VE2ASL2 230- 23- 10-B

**Ontario**

VE3ASO 68,058- 327-171-ABCDE  
 VE3FGU 49,248- 312-154-AB  
 VE3BFM 44,638- 243-133-ABCDEI  
 VE3EYR 20,301- 126-101-ABCD  
 VE3FN 7830- 114- 88-BD  
 VE3BYO 5040- 99- 42-BD  
 VE3BTW3 9220- 84- 35-ABC

VE3GOE 3024- 64- 36-BD  
 VE3AL 210- 21- 10-AB  
 VE3OE 1134- 63- 18-B  
 VE3UOT 119- 17- 7-B  
 VE3CIE 442- 34- 13-B  
 VE3ONT (VE3s ABG, CDX, CRU, DSS,  
 oprs.) 172,437- 625-229-ABCDE  
 VE3LNX (+ VE3s ADJ, NSQ, OCO)  
 162,132- 587-229-ABODEF  
 VE3FAS (+ VE3KZ, VE3DDW)  
 46,240- 340-138-AB  
 VE3FHK (+ VE3s FHU, NPB, OJN)  
 16,490- 162- 97-ABD

**Manitoba**

VE4AQ 2058- 49- 42-A

**Saskatchewan**

VE5LY 378- 21- 18-A  
 VE5XV 20- 5- 4-A

**Alberta**

VE6AFO 664- 33- 12-B

**British Columbia**

VE7ASI 2511- 85- 31-ABCD  
 VE7UBC (VE7s CXG, DES, CYB, EWU, ACY,  
 AOV, FXG, oprs.)  
 2438- 79- 23-ACDE

**DX**

**Europe**

DL9RX 2- 1- 1-D

**Check Logs**

K1KL & WAQ.



# Rules, Ninth ARRL International EME Competition

Last year's EME contest showed the outstanding popularity of that communications mode. The fall weekends proved very successful, so we will continue to hold these contests, when possible, during the fall. This year's contests will be held on the weekends of November 2-3 and 23-24.

Special thanks to W1JR, WA1JXN and K2UYH for help in picking the dates for this year's contest. Forms are available for an s.a.s.e. to ARRL Hq.

**Rules**

1) **Object:** Two-way communications via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.

2) **Contest Period:** Two full weekends, Nov. 2-3 and 23-24; full 48-hour period UTC each weekend.

3) **Categories:**

(A) **Single Operator:** one person performs all operating and logging functions, equipment adjustment and antenna alignment.

(1) **Multiband.**

(2) **Single-band:** Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized 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 8, Awards.

B) **Multioperator:** Two or more persons participate; includes neighboring amateurs within one

call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups cannot use the same call signs at each location; all calls will be listed in the results.

C) **Commercial Equipment:** Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4) **Exchange:** For a valid contact to occur, each station must send and receive both call signs and a signal report in any mutually understood format, plus a complete acknowledgment of the calls and report. Partial or incomplete QSOs should be indicated in your log, but not for contest credit.

5) **Scoring:**

A) **QSO Points:** Count 100 points for each complete EME contact.

B) **Multiplier:** Each U.S. and Canadian call area, plus each DXCC country (not U.S./Canada) worked via EME on each band.

C) **Final Score:** Multiply QSO points by sum of multipliers worked on each band for your final score.

6) **Miscellaneous:**

A) Fixed or portable operation is permitted. Stations operating outside traditional call areas must indicate so, identifying the call area of the operating site.

B) Contacts may be on CW or SSB. Only one

signal per band is permitted.

C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, except for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

D) There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

E) Stations may be worked only once per band, regardless of weekend.

7) **Reporting:** Entries must be postmarked no later than 30 days after the contest and must include complete log data. Your summary sheet should show a band-by-band breakdown of QSOs and multipliers, and include details of your station setup and a photo.

8) **Awards:** Certificates will be issued to the top five stations worldwide in each of the entry categories: single operator, multiband; single operator, single band (separate awards for each band); and multioperator. Additional awards will be issued where significant achievement or competition is evidenced. In addition, each station that successfully completes at least one EME contact during the contest period will receive a certificate commemorating that achievement.

9) **Disqualification:** See January 1985 QST, page 72.



# Simulated Emergency Test

SET weekend October 19-20—prepare today for your community's tomorrow.

Have you had your house renovated lately? The photo explains, far better than words, what our Simulated Emergency Test (SET) is about.

We can't prevent destruction such as this. Amateurs can, however, give the occupants of this house enough warning to take cover, and can provide assistance in the aftermath. We might slightly alter a well-used phrase of an insurance company. We might make it known to our communities that they are "in good hams."

Those of you involved with SET, please take a careful look at the photograph. Don't take disaster preparation lightly; you may see this type of destruction in your town. SET allows you the opportunity to prepare today for your community's tomorrow.

Our annual "physical" in providing emergency communications is the SET, scheduled this year for the weekend of October 19-20. It is here that we test our capabilities, experiment with some new concepts and locate weak points—the end product being a better emergency response for the real thing. As in last year's SET, the scoring format will reflect some of the broad objectives: (1) Strengthen the VHF-to-HF link at the local level, thereby ensuring that the ARES and NTS aspects of the League's official program are working in concert, not at odds, with one another. (2) Encourage greater use of digital modes for handling high-volume traffic and point-to-point Welfare reports out of the affected simulated-disaster area. (3) Implement the Memoranda of Understanding between the League, the user and cooperative agencies. (4) Focus our energies on ARES communication at the local level, with less emphasis on running the NTS nets "into the ground." This includes increased use and recognition of "tactical" communications on behalf of served agencies and less amateur-to-amateur formal radiogram traffic (aka inbreeding) such as "I am participating in the SET."

Although this type of SET format might play havoc with some time-honored traditions, other proven procedures remain. Test messages should carry the word "Test" before the precedence; (e.g., "Test Priority" on phone and TEST P on CW). The text of such messages should also begin with the words, TEST MESSAGE. However, the word "Test" is not used in conjunction with Routine messages. Such messages are routine whether specifically for the SET or not.

Also, although October 19-20 is the official SET weekend, groups are free to conduct their SET anytime during the period of September 1 through November 30, if this is more convenient. This may be done to coincide with already planned communications activity such as a parade or festival, to provide greater mass-media exposure. The deadline for receipt of all reports is January 31, 1986.



(Clem Marion photo)

How do you participate? If you are already an enrolled ARES member or active participant in an NTS net, your ARRL Emergency Coordinator or Net Manager is already making plans for your activity. All League Officials, affiliated clubs and station appointees will automatically receive the details and reporting forms for conducting a successful SET in the October issue of *Field Forum* (which should be in your mailbox the first week of October). If you aren't on the *Field Forum* mailing list, write to ARRL Hq. for the package. If you are standing on the street corner in Winslow, Arizona, with your hand-held radio and don't know how to get in on the SET fun, contact your local ARRL Emergency Coordinator, who will quickly plug you into his SET plans. If your thumbwheels are stuck and you don't know who to call, contact your ARRL Section Manager (page 8 of any *QST*) for direction. ARRL public service officials are planning an interesting weekend for you, so volunteer your services to put Amateur Radio's emergency-communications capabilities to the test—The Simulated Emergency Test, October 19-20. Don't participate in SET for yourself, participate for your community.

Too often, we forget how Amateur Radio can do the most good. SET is our chance to show that we provide a tangible service to our communities.

## Strays



### CALL SIGN LICENSE PLATES: LOOKING GOOD FOR LESS

Are you hankering for a license plate that is "you," but don't like the high cost of so-called vanity plates? Why not get an Amateur Radio license plate? It may cost less than a vanity plate, and it makes you easily identifiable when mobile. Contact your state Motor Vehicle Department for details. (tnx KC2X)

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

former members of the Hokkaido (Japan) ARC. Mack C. Stephenson, W6WRA, 3986 Constellation Rd., Lompoc, CA 93436.

anyone with information on the history of the 20-meter Single Sideband Traffic Net. Ginny Jaikins, K8CPS, 5056 Midmoor Rd., Bloomfield Hills, MI 48013.

anyone involved with Radio Controlled Aerial Targets (RCATS) from 1965 to 1967 at Ft. Huachuca or Ft. Bliss. Bill Ames, KB1LG, 5 Turkey Roost Rd., Sandy Hook, CT 06482.

## “We Just Closed Our Eyes and Held On”

“Incomprehensible” best describes the aftermath of tornadoes that rumbled through eastern Ohio and western Pennsylvania on May 31, 1985. The National Weather Service described the storm as one of the worst in weather history. According to the Weather Service Disaster Survey Team, the tornadoes had intensity ratings of F5 and F4 on a scale of 1 to 5, meaning that their wind speeds were in the 200-300 mi/h range. While the average tornado is about an eighth of a mile wide, some of the tornadoes were 2.2 miles wide. Most tornadoes stay on the ground for a mile or two and last about 10 minutes. The strongest of the May 31 tornadoes carved a 41-mile path and stayed on the ground for nearly an hour. No pictures nor the eloquence of Brokaw, Cronkite and Chancellor combined could portray the devastation wrought upon the land.

Over 250 Emergency Communications Commendations have already been mailed from ARRL Hq., but the final total of commendations sent regarding this disaster is expected to exceed 500. We would like to extend our sincere thanks to those of you who helped your neighbors in their time of need. We're proud of you.

The following excerpts from the hundreds of reports received in the Public Service Branch serve as testimonials of the unselfish efforts of these amateurs.

### Northeastern Ohio

We were aware the tornadoes had devastated sections of northeastern Ohio. Saturday morning, June 1, W8LYD keyed up our local repeater and informed us that Amateur Radio assistance was needed in Newton Falls, Niles and Hubbard. We were told that the Red Cross needed 30 operators, but had only 20 volunteers. Several of us agreed to assist. By 11 A.M., we were on our way to the disasters.

The city of Warren was without electricity. Traffic lights were useless. Gasoline stations could not pump gas without emergency power. Cars were in lines half a mile long, waiting for gas from the two fortunate station owners with generators. Upon arrival at the American Red Cross building in Warren, we introduced ourselves to the Emergency Coordinator of Trumble County, WB8BWY, and the ARC Radio Officer, WA8EYF. Gary Chamberlain, KA8DJZ, relieved KF1V as net control since Mark had been on the air since the previous day. The net consisted of amateurs located at or with Red Cross shelters, police command posts, fire stations, Red Cross canteen trucks, damage-assessment teams, sheriff's office, the Ohio Highway Patrol, Red Cross chapters in adjacent counties and other interested/involved parties. WD8MYF, KA8HZB, KA8HZC, KA8ICB and KA8DZJ provided communications



KB3OM surveys the damage in Lycoming County, Pennsylvania. (K3QDA photo)

for seven days.—Gary J. Chamberlain, KA8DJZ, EC Medina County

### Butler County, PA

Evencity and Saxonburg areas were damaged. Amateurs jumped into action.



A closer look by KB3OM provides stark proof of the destruction. (K3QDA photo)

utilizing two repeaters since the areas were several miles apart. Butler County amateurs “held their own” for the first few days, but on day four assistance was requested from amateurs in surrounding counties. Armstrong County responded with 10 volunteers.

On day seven, over 400 volunteers from Pittsburgh arrived to begin a major cleanup of the cities. Communications during the cleanup along with the routine traffic flow

between agencies kept net members quite busy.—Gail Anthony, N3DOL, EC/RO Armstrong County

### Mercer County, PA

At 1 P.M. on May 31, the National Weather Service notified W3HV, our SKYWARN director, that severe weather was forecast for later in the day. All SKYWARN members were informed and asked to monitor the Mercer County Amateur Radio Club's repeater. At 4 P.M., the net was activated, with the first tornado touchdown occurring at 5 P.M. near Jamestown. Net control duties were transferred to W3YQ when W3HV jumped in his car to survey damage in Jamestown. Several operators provided communications in the Jamestown area, while the majority were kept on standby to continue the SKYWARN watch.

A second tornado struck at 4 P.M., demolishing parts of Wheatland, Hermitage and Greenfield. After this second tornado, we were told by NWS that no further damage was expected. All operators were released from SKYWARN, switched hats and became active as ARES members.

Amateurs were sent to the affected areas and also to various police, fire and utility agencies. For a period, Amateur Radio was the only reliable form of communications, since telephone service was disrupted. Many public-service radio systems were either off the air or totally overloaded. W2LIF/R was used for tactical communications, while AF3P/R was used for health-and-welfare, telephone calls, and nonemergency communications. Both repeaters were constantly busy through the night. Our sincere thanks goes to the operators of unaffected parts of

Ohio and Pennsylvania who provided assistance.

While relief operations were underway, amateurs assisted the State Police and local officials maintaining security in the affected area of Greenfield. Our operators were active the following three nights, patrolling the area and notifying police of suspicious activity. Throughout the day, they were busy requesting needed service in clearing debris.

Although there is always room for improvement, we believe we did an outstanding job of providing emergency communications and gained the respect of those we helped. We have evaluated our performance, and have come up with a long list of changes that should allow us to do even better in our next disaster.—*Tim Jellison, W3YQ, EC Mercer County*

### Lycoming County, PA

At 9:30 P.M. May 31, a tornado touched down in Brady and Washington Townships. At 4 A.M., the Lycoming County Red Cross requested Red Cross survey teams and established communications between the Brady Township building, Red Cross Headquarters in Williamsport and the county emergency management agency. Most telephone service in the affected area was disrupted. Only one working telephone was available in Brady Township. The net operated on the West Branch Amateur Radio Clubs Repeater with the Bald Eagle repeater as backup. Another repeater provided direct communications to survey teams in the field. The Red Cross field headquarters was closed on June 1 at 4:30 P.M., although communications between Field Red Cross teams and the county emergency management agency were continued until the morning of June 2.

Local damage to this rural area affected over 400 families, and caused 5 deaths and over 60 injuries. The disaster area was approximately 10 miles long and 1 mile wide.

The following stations were active during the emergency: K3QDA-(EC), KB3OM-(AEC), KT3G and N3CYW (County Net Control), K3PMY and KA3JFC (Red Cross Hq). Amateurs at Brady Township building and with Red Cross survey teams were KC3EC, KO3B, N3CUB, W0ZD, WA0UMB, KA3JFA, KA3JFB, WB3DKC, WA3ECT, W3ILG, W3JMY, KB3LR, KC3EH and WB3FUR.—*Richard C. Sheasley, K3QDA, EC Lycoming County*

### Portage County, OH

Friday afternoon, May 31, found many local amateurs monitoring the SKYWARN net on WB8DJP/R. A tornado watch had been issued earlier that afternoon, and everyone was watching a line of storms heading northeast across the state. Reports from spotters indicated that the storm was building in intensity. At 6:20 P.M., K8WJH reported a funnel cloud passing over eastern Ravenna. Ten minutes later, the funnel touched down and began a destructive 50-mile path through the state. Trumbull County, Newton Falls, Niles and Hubbard were severely damaged by the twister. Local fire and medical personnel were dispatched immediately to the stricken towns. KJ3O, AEC for Portage County, was contacted by the Red Cross at 7:13 P.M. and was asked to provide communications for the Red Cross volunteers preparing to leave for Trumbull County.



K3YAK and ...



KF3F keep authorities apprised of cleanup operations. (W3NRU photos)

KJ3O contacted the county EC within minutes. After the emergency call-up, 18 amateurs were on their way to Trumbull County. The ARES members manned two shelters and sent a communications team into Newton Falls. Red Cross personnel in the cities of Warren, Cleveland and Ravenna were in continuous contact via Amateur Radio.

Twelve amateurs drove to Warren on Saturday evening and provided relief for the initial volunteers. Sunday morning, the Red Cross designated KC8VX/R as their priority link between Ravenna and Cleveland. This link continued to operate until Thursday. Tuesday and Wednesday, Portage ARES members provided communications for damage-assessment crews and Red Cross canteen vehicles.

All totaled, 34 Amateur Radio volunteers worked over 645 man-hours and handled 143 pieces of formal traffic and scores of informal traffic during and after this catastrophe.—*Larry Solak, WD8MPV, EC Portage County*

### Epilogue

Ohio Section Manager, Jeff Maass, K8ND, has provided a very appropriate quote worth remembering: "Experience is the worst teacher; it gives the test before presenting the lesson." (Vernon Law)

Ladies and gentlemen, we've passed the test. Now let's crack the books.

### IN SERVICE ...

□ It was early Friday morning, May 17, when ammonia was reported leaking from a Brewer Chemical Company holding tank near pier one at Maui's Kahului Harbor. Since there was conflicting information about the type and strength of the ammonia, Maui County Civil Defense decided to evacuate nearby industrial and shopping areas in Kahului at 9 A.M.

The Civil Area Patrol (CAP) was asked to fly over the evacuation area and to broadcast the evacuation notice over the aircraft's public address system. CAP members Randal Level, WH6AZI, Jeffrey Amaral, NH6BO, and Kenneth Dorland, NH6O used KH6HHG/R to coordinate preflight preparations. WH6AZI was to be the observer on the CAP aircraft. Meanwhile, Terrence Clayton, KH6SQ, operating on 2 meters, gathered more information about the evacuation while notifying workers at other businesses in his building before leaving the area himself.

Maui County Emergency Coordinator Melvin Fukunaga, KH6H, arrived at the Civil Defense Emergency Operating Center (EOC) and provided communications liaison between police and civil-defense officials at the EOC and CAP member NH6BO, who was readying the aircraft for takeoff. Fifteen minutes after the aircraft left the tarmac, Police Chief Joseph Carvalho cancelled the mission. It had been determined that the danger was not as great as originally anticipated. The chemical was confirmed to be a 10% solution of ammonia, so there was no danger of explosion, as originally reported. Very light winds in a normally windy area helped minimize the effects of the ammonia leak and lessened the chances of a large-scale disaster.

After some 70,000 gallons of liquid ammonia had been safely transferred from the leaking tank, Mayor Hannibal Tavares issued an order pulling the evacuation boundary back to within a few blocks of the chemical-storage area. Maui ARES members, other than those aboard the aircraft, were monitoring local repeaters, ready to assist if needed. (Melvin Fukunaga, KH6H, EC Maui County)

### ARRL SECTION EMERGENCY COORDINATOR REPORTS JUNE 1985

Thirty-one SEC reports were received, denoting a total ARES membership of 16,548. Sections reporting were: ALB, AR, CO, ENY, IA, KS, MDC, ME, MI, MN, MS, NE, NFL, NV, OH, ONT, ORG, PAC, SC, SCV, SDG, SJV, SNJ, SV, UT, VA, WI, WMA, WNY, WPA, WV.

Reports were not received by the following Section Emergency Coordinators: AK, AL, AZ, BC, CT, DE, EBAY, EMA, EPA, GA, ID, IL, IN, KS, KY, LA, MAN, MAR/NFD, MO, MT, NC, ND, NH, NM, NNJ, NTX, NYC, OK, OR, QUE, RI, VT, SASK, SB, SD, SF, SFL, STX, TN, WA, WIN, and WY.

SEC monthly reports for September should be received in the Public Service Branch at ARRL Hq. no later than October 12. Reports received after the 12th will be entered as time permits.

### Transcontinental Corps June 1985

September TCC reports should be received in the

Public Service Branch no later than October 12.

Table with 5 columns: Area, Successful Functions, % Successful, TCC Function Traffic, Total Traffic. Rows include Cycle Two and Cycle Four for Eastern, Central, and Pacific regions.

TCC Certificates Issued This Month

VE6CHK KU8D WB7WOW KF7R KB7FE WA0OYI KD5RC

TCC Roster

ND5T WSJVO K76A KU6D K6UYK K6YBV W6INH VE6CHK K7RL K7R KD7EY WB7WOW KF7R KB7FE WA0YI WAJL WA4JTE WFAK NS5AMH N5AMK N5BT W6CZT N5DFO N5G5W W6KLV KD6KQ W65OXE KD5RC KA5TTH K88V W65YDD KA9FEZ KW9J W9JLJ KA8EY N5BB W65CIC W5GHP K6GM K5OAF N5TC K5TL KV5X KW9J WB9NVN KB9X W0HI K5OU...

CSTN QKS QKS-SS KSRTTY (KS), EMRI EMRIPN EMRISS EM2MN HHTN CITN NEEPN WMN WMTN WMEN (MA), AEN M/PSN PTN SGN YER (ME), MSN/1 MSN/2 MSSN MSN/RTTY MSPN/N MSPN/E MNAMWXNT PAW (MN), MON MOSSB MEOW MTTN HBN PHD PTN RRABN CMEN JCCCN MOFON (MO), MTN (MT), NCEN NCMN CN CSN CNCTN PCTN RARS THEN PETN CFWARS M2MEN (NC), MCEN NHH GSPN GSPM (NH), MSWPARC SJVN SJVN220 MCN NJN/3 NJN/L NJM NJSN (NJ), SCVHFTN NCVHFTN BAVHFTN NLI-CW (NL), BAYTH (NY), OPEN OLZ OTWN STN QCWA-63 EATIN ONON (OK), KTN OLN OPN OSN2 OSND OSN ARES/ON TIN (ONT), THN WCN OSN OHNN OARES PDXARES BSN PTTN LBLARES (OR), EPA EPAEPTN PTTN ATN D3ARES D5ARES D5TRICNTY D6ESN D8ARES PWA/ARES MARC/ARES MARCTN PPN WPAP/IT WPA2MTN NWP/PA2MTN WPA (PA), PTN (PAC), EMRI EMRISS EMRIPN QIN ION ITN QSN (QUE), RIEM2HTW (RI), SCSSBN CN CSN CNM BR2MN LC2MN GPD2MN C-PD2MN YC2MN OC2MN (SC), TNCWNT TNPN2S TNVHFTN RSVR (TN), TTN TEX TSN DFV NET (TX), BUN UCN DCESN (UT), VTN (VT), VTN VSN VSN VN/E VNL VLN STARES SVEN SSV (VA), EWTN NTN NWSSBN PSTS WARTS WSN (WA), WVN WVFN WVMON WVRN WYNN WVARN WVHN (WV).

September Section and local net reports should be received in the Public Service Branch no later than October 12.

Public Service Honor Roll June 1985

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS CW nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points, max.; (9) Participating in a public service event, 5 points, no max.

This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ. September reports submitted for this column should be received at ARRL Hq. no later than October 12. PSHR reports should be listed separately from Section News reports.

Table with 5 columns: Call, WB5SRX, KA1KPS, W7JMH, etc. Lists call signs and their corresponding points.

Table with 4 columns: NM8I, KD7G, N4PL, WA3CKA, etc. Lists call signs and their corresponding points.

National Traffic System June 1985

September NTS reports should be received in the Public Service Branch no later than October 12.

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area.

Cycle Two Area Nets

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Rows include EAN, CAN, PAN.

Region Nets

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Rows include 1RN, 2RN, 3RN, 4RN, 5RN, 6RN, 7RN, 8RN, 9RN, TEN, ECN, TWN.

TCC

Table with 5 columns: TCC Eastern, TCC Central, TCC Pacific.

Cycle Three Area Net

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Row includes EAN.

Region Nets

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Rows include 1RN, 2RN, 3RN, 4RN, 5RN, ECN, TWN.

Cycle Four Area Nets

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Rows include EAN, CAN, PAN.

Region Nets

Table with 5 columns: Net, Sess., Tfc., Avg. Rate, % Rep., % to Area. Rows include 1RN, 2RN, 3RN, 4RN, 5RN, 6RN, 7RN, 8RN, 9RN, TEN, ECN, TWN.

TCC

Table with 5 columns: TCC Eastern, TCC Central, TCC Pacific.

\*PAN operates both cycles one and two. 12C functions not counted as net sessions. Section and local nets reporting (218): ATNM AENB AEND AENZ AENX AENW AENY AENZ WAEN AENW AENW (AL), BCEN (BC), SCN1/1 SCN1/2 SCN1/V RTTY/V NCTN SCN1/3 (CA), DTTN DETN SEN (DE), QFN GN OFNS FMNTN FPTN FAST TPTN FPON SEFTN SWFTN PEN PRVAN SPARC DEN ENMC CFRN FMNTN GCVTN LSTN NFPN SVTN TPTN VEN (FL), GSN GSNB GSN (GA), ITEN TLCN (IA), ILN ISN ITN (IL), KSNB KPXI KWN KMWN

Brass Pounders League June 1985

The BPL is open to all amateurs in the United States, Canada and U. S. possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form. September reports submitted for this column should be received in the Public Service Branch at ARRL Hq. no later than the October 12. BPL reports should be listed separately from Section Traffic reports.

Table with 6 columns: Call, Orig., Rcvd., Sent, Divd., Total. Lists call signs and their corresponding message statistics.

Independent Nets June 1985

September reports submitted for this column should be received in the Public Service Branch at ARRL Hq. no later than October 12.

Table with 4 columns: Net Name, Sess., Tfc., Check-ins. Lists various net names and their activity statistics.

# Contest Corral

Conducted By Billy Lunt, KR1R  
Assistant Contest Manager, ARRL

## September

2

**IL-DX Contest, Aug. QST, page 80.**

**Novice Sprint, Aug. QST, page 80.**

4

**West Coast Qualifying Run, 10-35 WPM, 0400Z Sept. 5 (9 P.M. PDT Sept. 4).** W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7

**Summer Daze Sprint, Aug. QST, page 80.**

8

**WIAW Qualifying Run, 10-35 WPM, 0200Z Sept. 9 (10 P.M. EDT Sept. 8).** Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Sept. 4 listing for more details.

## 9-15

**QCWA Invitational Party, Aug. QST, page 80.**

## 14-15

**ARRL VHF QSO Party, Aug. QST, page 75.**

**European DX Contest, phone, July QST, page 79.**

**Ohio QSO Party, sponsored by the Cuyahoga Falls ARC, from 1400Z Sept. 14 until 0500Z Sept. 15, and from 1300Z until 1900Z Sept. 15.** 12-hour maximum. Work the same station again on each band or mode for multiplier credit. Exchange RS(T) and QTH (county for OH stations; state, VE province or country for others). Count 2 points for each contact. Work club station W8VPV for 25 bonus points. 5 points for working club members. OH stations multiply score by number of states, provinces and countries. All others multiply by number of OH counties worked (max. 88). All stations output power less than 5 W  $\times$  3; 5-200 W  $\times$  1.5. Frequencies: CW—1.805 3.530 7.030 14.030 21.030 28.010; phone—1.890 3.900 7.230 14.230 21.360 28.510; Novice—15 kHz from lower edges. Awards and certificates. Include dupe sheets if more than 200 contacts. Mail by Oct. 13 to Anthony Luscre, KA8NRC, 4380 N. Norman Dr., Stow, OH 44224.

21

**WIAW Qualifying Run, 10-35 WPM, 1300Z (9 A.M. EDT) Sept. 21.** See Sept. 8 listing for more details.

## 21-22

**Can-Am Contest, phone, Aug. QST, page 80.**

**Scandinavian Activity Contest, CW, sponsored by the Foreningen Sveriges Sandareamatorer (SSA-Sweden), from 1500Z September 21 until 1800Z September 22.** (Phone contest 1500Z Sept. 21 until 1800Z Sept. 29.) Work LA-LB-LG-LJ, JW, JX, OF-OG-OH-OI, OH0, OJ0, OX, OY, OZ, SJ-SK-SL-SM and TF stations on 3.5, 7, 14, 21, and 28 MHz only. Work stations once per band—no cross-mode QSOs. Categories: single op, all bands and QRP (max. output 10 W); multiopt single transmitter; and SWL. Multi-single stations may have only one transmitted signal at any given time and must remain on a band at least 10 minutes after a band change. Exchange signal report and serial number starting with 001. Non-EU stations count 1 point per Scandinavian QSO on 14, 21 and 28 MHz, and 3 points on 3.5 and 7 MHz. Multiply total QSO points by the number of different Scandinavian call areas worked per band. (LA1 = LB1 = LJ1 and W1XX/OZ = OZ0, etc.) for final score. Avoid contest traffic in these subbands: 3.560-3.600, 3.650-3.700, 14.060-14.125 and 14.300-14.350 except when this conflicts with national regulations. In that case, split operation must be used. Mail entries for both modes by Oct. 30 to SSA Contest Manager Goran Granberg, SM6EWB, Rosengatan 76, S-434 00 Kungsbacka, Sweden.

## 27-29

**Maine QSO Party, sponsored by the Portland Amateur Wireless Assn., from 2300Z Sept. 27 until 2259Z Sept. 29.** Work stations once per band and mode. Exchange serial number, signal report and QTH (county for ME stations; state, province or country for others). Suggested frequencies: CW—1.810, and 60 kHz up from low end; phone—1.870 3.930 7.280 14.280 21.380

28.580; Novice—20 kHz up from low end; RTTY—3.610, and 90 kHz up. Work stations on CW, phone and RTTY for each band. Count 1 point for phone, 3 points for CW and 5 points RTTY, and multiply by number of ME counties worked for final score. (ME stations multiply by ME counties, states, provinces and countries). Trophy to highest aggregate ME club score. Mail entries by Dec. 1 to PAWA, P.O. Box 1605, Portland, ME 04104.

## 28-29

**Can-Am Contest, CW, Aug. QST, page 80.**

**Scandinavian Activity Contest, phone, see Sept. 21-22 listing.**

## 29-30

**Classic Radio Exchange, sponsored by the Classic Radio Newsletter, from 2000Z Sept. 29 until 0300Z Sept. 30.** See Jan. QST, page 83, for complete details.

## October

1

**West Coast Qualifying Run, 10-35 WPM, at 0400Z Oct. 2 (9 P.M. PDT Oct. 1).** See Sept. 4 listing for more details.

5

**AGCW-DL Handsten Party (Straight Key Party), sponsored by the AGCW-DL, from 1300Z until 1600Z Oct. 5.** Frequencies: 3530-3580 7010-7040 kHz. Only straight keys (no bugs). Exchange RST, QSO no., class, name, and age (XYLs use XX); example: 579001/A/John/23. Classes: A = 3 W output, B = 10 W output, C = 150 W output, D = SWL. Scoring: class A with class A = 9 points, with B = 7 points, with C = 5 points; class B with A = 5, with B = 4 points, with C = 3 points; C with C = 2 points. Certificates. Send logs by Oct. 31 to Friedrich Fabri, DF1OY, Von dem Steintor 3, D-3017 Pattensen 1, Fed. Rep. of Germany.

## 5-6

**California QSO Party, sponsored by the Northern California Contest Club, from 1600Z Oct. 5 until 2400Z Oct. 6.** Single ops limited to 24 hours, time-off periods at least 15 minutes and noted in log. Work stations once per band and mode. Mobile stations may be worked again if they change counties. CW QSOs must be in CW subbands. No repeater or MCW QSOs. Suggested frequencies: CW—1805, and 50 kHz up from low end; phone—1815 3850 7230 14.250 21.300 28.500. Try CW on the half hour, 160 at 0500Z and 75 at 0700Z. Exchange QSO no., state (county in CA), province or country. Scoring: phone, 2 points; CW, 3 points. Multiply QSO points times number of CA counties (max. 58). CA stations multiply by number of states, provinces or counties. Awards. Submit entries by Nov. 10 to Alan A. Brubaker, K6XO, 3675 El Grande Dr., San Jose, CA 95132.

**Kansas State QSO Party, sponsored by the Boeing Employees' ARS of Wichita, from 0100Z until 0700Z Sept. 15, from 1300Z Sept. 15 until 0700Z Sept. 16, and from 1300Z Sept. 16 until 0100Z Sept. 17.** Work stations once per band and mode. Mobiles/portables may be worked again as they change county. All bands/modes except 10 MHz may be used. KS-to-KS QSOs allowed. Exchange serial number, signal report and QTH (county for KS stations; state, province or country for others). Suggested frequencies: CW—1.805 3.560 7.060 14.060 21.060 28.160; phone—1.815 3.925 7.260 14.280 21.380 28.580; Novice—3.725 7.125 21.150 28.160. KS stations count 2 points per phone QSO and 3 points per CW QSO; multiply by total number of states, VE provinces and countries worked. Others count 2 points per phone QSO and 3 points per CW QSO with KS stations; multiply by sum of different KS counties worked (max. 105). Non-KS stations may also count one additional multiplier for each group of eight QSOs with the same KS county. Certificates. Mail entry by Oct. 22 to Mike Thornton, WA0TAH, 1645 Lexington, Wichita, KS 67218.

## 6-7

**Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, from 1800Z Oct. 6 until 0100Z Oct. 7.** Phone and CW all bands. No repeater QSOs. Most activity will be 50 kHz from the lower end of CW bands and about 3890, 7290, 14,290 kHz for phone. IL stations exchange RST and county; others exchange RST and state, province or country. Count 1 point per phone QSO, 2 points per CW QSO. Work stations once per band and mode, and once per band, mode, county

for IL mobile stations. IL stations multiply QSO total by sum of states plus VE provinces plus a maximum of five DX countries. Count additional DX for points but not multipliers. IL portables and mobiles may add 200 to final score for each country from which 10 or more contacts were made. All others multiply QSO points by the number of IL counties worked. All stations may take one bonus multiplier for each eight QSOs with the same country. Awards. Send logs by Nov. 1 to RAMS, Joe LeKostaj, WB9GOJ, 9134 Ewing Ave., Evanston, IL 60203.

8

**North American Sprint, CW, sponsored by the National Contest Journal, from 0000 to 0400Z Sept. 8 (phone contest, 0000-0400Z Sept. 15).** Contests are separate; 80, 40, 20 meters only. Suggested frequencies: CW—3.530-3.550, 7.030-7.050 14.030-14.050; phone—3.770-3.910 7.210-7.240 14.260-14.290. For a valid QSO, you must send and receive all of the following information: other station's call, your call, serial number (consecutive starting with 001), your name and state (or province/country). An operator may use only one call sign during the contest. Multiply valid QSOs by sum of states, provinces and North American countries (not W/VE). KH6 is not counted as a state or as an NA country. VE multipliers are Maritimes (VE1, VO1, VO2) and VE2 through VE8 (8 max.). Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ, etc., are permitted to work only one station in response to that solicitation. They must thereafter move at least 1 kHz before working any other station, or at least 5 kHz before again soliciting calls. Team competition: Each team has a maximum of 10 members as a single-entry unit. Clubs having more than 10 members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated if a guest op) must be registered with W6OAT. The team information may be contained either in a letter received by W6OAT before the start of the Sprint or in a Western Union mailgram dated at least 24 hours before the start of the Sprint. There are no distance or meeting requirements for a team entry. CW and phone teams are separate. Entries must be received no later than 30 days after the Sprint. Mail CW entries to Rusty Epps, W6OAT, 948-H Kiely Blvd., Santa Clara, CA 95051. Phone entries go to Rick Niswander, K7GM, 1914 W. Cortez Circle, Chandler, AZ 85224.

## 12-13

**Pennsylvania QSO Party, sponsored by the Nittany ARC, from 1600Z Oct. 12 until 0500Z Oct. 13 and from 1300Z-2200Z Oct. 13.** Classes of entry: Single-op, mobile (multi-op okay), multi-single, multi-multi, QRP (max. 5-W output). Single-op and multi-single stations may use spotting nets and receivers. Phone and CW. Work stations once per band and mode. No repeater QSOs. Work mobiles again as they change counties. Exchange signal report, serial number and QTH (county for PA stations; ARRL Section for others). Suggested frequencies: CW—40 kHz up from low end and 1.810 MHz; phone—1.850 3.980 7.280 14.280 21.380 28.580, mobile window—5 kHz below listed freqs. Try 160 around 0300Z Oct. 14. Count one point per phone QSO, 1.5 points per CW QSO and 2 points per 80/160-meter CW QSO. PA stations multiply by total ARRL Sections plus PA counties, plus max. 1 DX country. Others multiply by total PA counties (max. 67). Stations on county lines count for 1 QSO credit but multiple county multipliers. Mobiles add 500 bonus points for each county from which 10 or more QSOs are made. Mail entry by Nov. 15 to Douglas R. Maddox, W3HDH, 1187 S. Garner St., State College, PA 16801.

**GARTG-RTTY Contest, sponsored by the German AR Teleprinter Group.** Shortwave portion is 1300Z-1700Z Oct. 13. VHF portion is 0800Z-1200Z Oct. 14. Score shortwave and VHF portions separately. Bands are 80 and 40 meters; 144 and 432 MHz for VHF. No repeater QSOs. Exchange RST, QSO number, name, QTH; VHF add grid locator. Work each station once per band. Count 1 point per QSO; VHF count 1 point per kilometer. Total of QSO points is the final score. Classes: A—more than 200 W input; B—less than 200 W input; C—SWL; D—VHF. Logs must include all information. Mail within 20 days to Wolfgang Puenjer, DL8VX, P.O. Box 90 11 30, D-2100, Hamburg 90, Fed. Rep. of Germany.

**Fall QRP QSO Party, sponsored by QRP ARC International, from 1200Z Oct. 13 until 2400Z Oct. 14.** Operate max. 24 hours. Choose CW or phone, not both. Work stations once per band. Exchange signal report, QTH (state/province/country) and QRP

number if member. Nonmembers send power output. Suggested frequencies: CW—1.810, and 60 kHz from low end; phone—1.810 and 85 kHz from low end, Novice—10 kHz up from low end. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (4-5 W output, ×2; 3-4 W output, ×4; 2-3 W output, ×6; 1-2 W output, ×8; 0-1 W output, ×10). If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Awards. Mail entry to be received by Nov. 12 to QRP ARCI contest chairman Eugene Smith, KA5NLY, P.O. Box 35010, Little Rock, AR 72225.

**14**  
**WIAW Qualifying Run**, 10-40 WPM, at 0200Z Oct. 15 (10 P.M. EDT Oct. 14). See Sept. 11 listing for more details.

**15**  
**North American Sprint**, phone, see Sept. 8 listing.

**19-20**  
**Simulated Emergency Test**  
**Jamboree on the Air**

**19-21**  
**RTTY DX "Twenty-Fifth" Sweepstakes**, sponsored by the Canadian AR Teletype Group, from 0200Z Oct. 19 until 0200Z Oct. 21. No more than 30 hours for single ops. Note off-times in log. Work stations once per band. Exchange RST, time GMT and zone. Amateur bands 3.5, 7, 14, 21, and 28 MHz. Classes: single op, multi-single and SWL. Scoring: 1 point per QSO with own zone; all QSO points as per CARTG zone chart. Multiply QSO points times number of counties (W, VE, VK Districts count as countries), times continents (max. 6). Two-hundred bonus points may be taken for each Canadian contact on all bands. All awards are plaques. Send logs by Jan. 1, 1986 to Canadian Amateur Radio Teletype Group, VE3RTT,

85 Fifeshire Rd., Willowdale, ON M2L 2G9, Canada.  
**Rhode Island QSO Party**, sponsored by the East Bay Amateur Wireless Assn., from 1700Z Oct. 19 until 0500Z Oct. 20, and from 1300Z Oct. 20 until 0100Z Oct. 21. Work stations once per band and mode. No repeater QSOs. Exchange signal report and QTH (city or town for RI stations; state, province or country for others). Suggested frequencies: CW—1.810 3.550 7.050 14.060 21.050 28.050; phone—3.900 7.260 14.300 21.360 28.600 50.110 144.2 146.52; Novice—10 kHz up from low end. Count 2 points per phone QSO, 3 points per CW QSO. Novices and Techs count 5 points per QSO. RI stations multiply by total RI cities and towns worked (max. 39). Awards. Mail entry by Nov. 15 (include an s.a.s.e. for results) to EBAWA, P.O. Box 392, Warren, RI 02885.

**26-27**  
**CQ WW Contest**, phone.

## Special Events

Conducted By Billy Lunt, KR1R  
Assistant Contest Manager, ARRL

**Oelwein, Iowa:** The Great Plains ARC will operate KC8CP in conjunction with Railroad Days, Aug. 31 and Sept. 1. Operation will be on 14.235 7.235 3.970. For certificate, QSL to KC8CP, Box 203, Oelwein, IA 50662.

**Tombstone, Arizona:** The Old Pueblo RC will operate W7GV in memory of the OK Corral gunfighters from 1500Z Aug. 31 to 2200Z Sept. 2. Operation will be on SSB: 28.680 21.380 14.280 7.280 3.930; CW: 21.130 7.130 3.730. Certificate via W7GV, P.O. Box 36032, Tucson, AZ 85741.

**Morgan City, Louisiana:** The St. Mary Amateur Radio Transmitting Society will operate NT5K to commemorate the 50th anniversary of the Louisiana Shrimp and Petroleum Festival on Sept. 1 from 1500Z to 2300Z. Operation will be on 7.255 14.275 and 146.52. QSL via Jackie Price, KA5LMR, 708 Front St., Morgan City, LA 70380.

**Harrisburg, Pennsylvania:** The Harrisburg ARC will operate W3UU in celebration of the 125th anniversary of the city of Harrisburg and the 200th anniversary of Dauphin County on Sept. 1 and 2 from 1200Z until 2100Z. Operation will be lower General class portion of 20 and 40 meters, and the Novice 40-meter band. Certificate via KA3BZX, 116 Revere St., Apt. 2, Harrisburg, PA 17109.

**Erie, Pennsylvania:** The Radio Association of Erie will operate W3GV to commemorate Commodore Oliver Hazard Perry's victory at the Battle of Lake Erie during the War of 1812 Sept. 7 from 1300Z to 0100Z Sept. 8 and 1300Z to 2100Z Sept. 8. Frequencies: phone—7.235 14.235; CW/RTTY—7.090 14.090. QSL via W3GV, 380 Young Rd., Erie, PA 16509.

**Oakland, Nebraska:** The Northeast RC will operate W8RWN to celebrate the 50th anniversary of their club Sept. 8 at 1900Z. Operation will be on 7.188 and 14.285. QSL via C. R. Carey, WA8DXV, 809 Wood St., Norfolk, NE 68701.

**Atlantic City, New Jersey:** The Southern Counties ARA will operate K2BR from the Miss America Pageant Sept. 10-14. Frequencies: phone—25 kHz inside General class bands; CW—65 kHz up from lower band edges and 7.125 21.250. QSL via SCARA, Box 121, Linwood, NJ 08221.

**Morton, Illinois:** The fifth annual observance of the Morton, IL Pumpkin Festival will be Sept. 11-17 from 2300Z to 0200Z each day. The Pumpkin Award will be awarded to those contacting W9EEB. Operation will be 25 kHz up from the lower end of the General phone bands. QSL via WA9JVT, Awards Manager, 109 Dietrich Ct., Morton, IL 61550.

**Lisbon, Ohio:** The Columbiana County ARC will operate N8DKX to commemorate the annual Johnny Appleseed Festival on Sept. 12-14 from 2200Z to 0100Z. Operation will be 10-20 kHz up from the bottom of the General phone bands. Certificate via N8DKX, 6008 Camp Blvd., Lisbon, OH 44432.

**Artificial Island, New Jersey:** The Public Service Electric and Gas Company ARA will operate WA2FZH at the Salem Nuclear Generating Station from 1500Z Sept. 14 until 1800Z Sept. 15. Frequencies: phone—3.930 7.230 14.260 21.260 28.560; CW—30 kHz from lower band edges, and Novice bands. QSL

via P. O. Box 543, Belmar, NJ 07719.

**Houghton, Michigan:** The Michigan Technological University ARC will operate W8YY in celebration of the university's centennial and the club's 50th anniversary Sept. 13-22. Operation will be: CW—3.745 7.145 14.070 21.070; phone—1.845 3.995 7.285 21.455 144.20. RTTY—3.625 7.090 14.095, OSCAR—in range. Certificate via Debbie Parmer, c/o W8YY, W. Wadsworth Hall, MTU, Houghton, MI 49931.

**Tuscaloosa, Alabama:** The West Alabama RS will operate WD4DAT from the campus of the University of Alabama to commemorate football coach Paul "Bear" Bryant Sept. 14, from 1300Z to 2400Z. Operation will be 25 kHz inside General phone bands, 10 through 40 meters, and bottom 25 kHz of the Novice bands. Certificate via West Alabama ARS, P.O. Box 1741, Tuscaloosa, AL 35403.

**Logan, West Virginia:** The Logan County ARC will operate KJ8E for its 5th annual "Mountain State Award" expedition from 1600Z Sept. 14. The operation will take place on a mountaintop in the heart of West Virginia's coal fields. Frequencies will be 25 kHz up from the General 40- and 80-meter bands. Certificate via Robert T. Johnson, W8VEN, P.O. Box 320, Stollings, WV 25646.

**Elizabethville, Pennsylvania:** The Berry Mountain ARC will operate N3ELR Sept. 14, from 1600Z to 2200Z, to celebrate the 150th anniversary of Salem Lutheran Church. Operation will be 10 kHz up from the lower edge of the Novice 40- and 80-meter bands and 25 kHz up from the lower edge of the General 20, 40 and 80-meter bands. Certificate via Salem Lutheran Church, Box 427, Elizabethville, PA 17023.

**Audubon, Iowa:** The area amateurs will operate KD0VU on Sept. 14, from 1300Z to 2300Z, during the 35th Annual Operation T-Bone Days Celebration. Operation will be in the middle of the General and Novice bands. Certificate via Roger Wetzel, 319 Pacific Ave., Audubon, IA 50025.

**Osier, Colorado:** The Northern New Mexico ARC will operate at the center stop of the Steam Locomotive Powered Cumbres and Toltec Narrow Gauge Railroad on Sept. 14-15. Operation will be in the lower part of the General phone bands and on 144.20 and 146.52. Certificate via Tom Mirabal, KA5FRB, 572 Todd Loop, White Rock, NM 87544.

**Idaho Falls, Idaho:** The Eagle Rock ARC will operate KX7C on 7.135 CW and NO7B on 14.250 SSB on Sept. 17, from 1800Z to 2300Z, to commemorate the 198th anniversary of the adoption of the Constitution of the United States of America. QSL via Robert Nisle, NO7B, 455 East 24th St., Idaho Falls, ID 83401.

**Delaware, Ohio:** The Delaware ARA will operate W8QLS Sept. 18-19, from 1300Z to 2400Z, at the Delaware County Fair. Frequencies are 3.860 7.235 and 14.235. QSL via Staff Stafford, W8QLS, 5987 Dublin Rd., Delaware, OH 43015.

**Hartford, Connecticut:** The Connecticut DX Association will operate KW1V from 1400Z Sept. 21 to 0100Z Sept. 22 and from 1400Z to 2100Z Sept. 22 to celebrate Connecticut's 350th anniversary with the Connecticut DX Association and the Newington Amateur Radio League. Operation will be in the General and Advanced

phone bands. QSL Dave Rose, KW1V, 13 Long Crossing Rd., East Hampton, CT 06434.

**Monmouth County, NJ:** The Ocean Monmouth ARC will operate KC2Q from 1600Z Sept. 21, to 1600Z Sept. 22 from the location of the first wireless communication in the U.S. at Sandy Hook, NJ, by Guglielmo Marconi in September 1899. Frequencies will be 3.965 7.265 14.265 21.365 28.365. Certificate via OMARC/KC2Q, P.O. Box 357 Bradley Beach, NJ 07720.

**Dubuque, Iowa:** The Great River ARC will operate Sept. 21 and 22 from 1900Z to 2400Z, in connection with the Dubuque Arboretum Days. Operation will be in the lower 20 kHz of the 20, 40 and 80-General phone bands. QSL via Gene Chappel, WB0QMA, 1795 Hale St., Dubuque, IA 52001.

**Brainerd, Minnesota:** The Paul Bunyan Wireless Assn. will operate Sept. 21 and 22, from 1500Z to 2200Z, from the site of the Paul Bunyan Festival. Operation will be in the lower end of the 10-80 General bands. QSL via Paul Bunyan Wireless Assn., P.O. Box 354, Pequot Lakes, MN 56472.

**Clondroft, New Mexico:** The Mesilla Valley RC will operate KB5T and/or KC5PP Sept. 21 and 22 from 1400Z to 2200Z, in celebration of the First Annual MVRC Mountain Rendezvous. Operation will be in the lower end of the General phone bands. Certificate via Lee Kingsley, KB5T, 1340 North Alameda, Las Cruces, NM 88005.

**Clyde, Ohio:** The Clyde ARS will operate NF8E on Sept. 22 from 1600Z to 2400Z, from the Winesburg Fall Fair. Frequencies: CW—7.125 and 21.150, SSB—3.900 7.250 14.300 and 21.400. Certificate via KA8CAS, 333 Belle Ave., Bellevue, OH 44811.

**Smith Center, Kansas:** The U.S. Center ARC will operate WA8HOZ on Sept. 28, from 1400Z to 1900Z, in commemoration of the 72nd Annual Old Settler's Day. Operation will be on 14.240. Certificate via Bob Levin, WA8HOZ, P.O. Box 103, Smith Center, KS 66967.

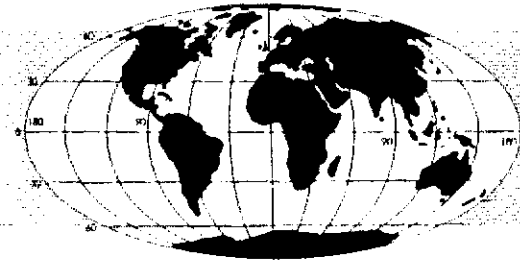
**Canon City, Colorado:** The Royal Gorge ARC will operate KD0MY on Sept. 28, from 1500Z until 2200Z, at the world's highest suspension bridge to commemorate Colorado Days. Frequencies: phone—7.235 14.235 21.360; CW—7.110 14.110. QSL via KD0MY, 3049 Ute, Canon City, CO 81212.

**Poughkeepsie, New York:** The N2ESR operation on Sept. 29 from 1400Z to 2100Z will commemorate the 48th anniversary of the commissioning of the U.S. aircraft carrier, *Yorktown* (CV-5), known as the "Fighting Lady" of WW II. Operation will be in lower end of the General class phone band. Certificate via John J. Nicalek, Yorktown Park, Red Oaks Mill Rd., Poughkeepsie, NY 12603.

**Note:** The deadline for receipt of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by Sept. 15 to make the November issue. For the convenience of those wishing to operate, please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign (if any) of the special-event station. Requests for donations will not be published.



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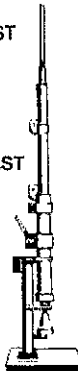
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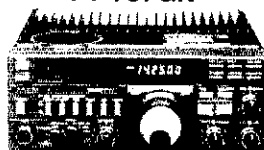
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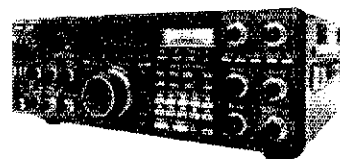
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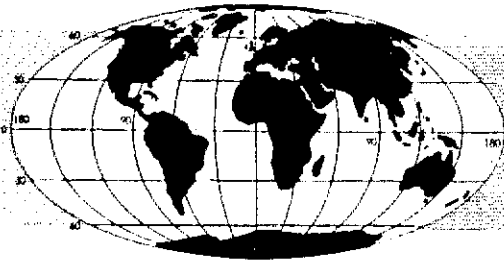
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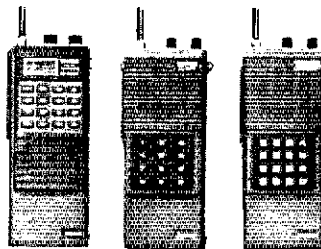
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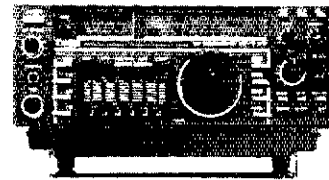
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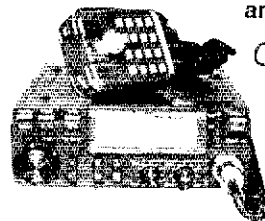
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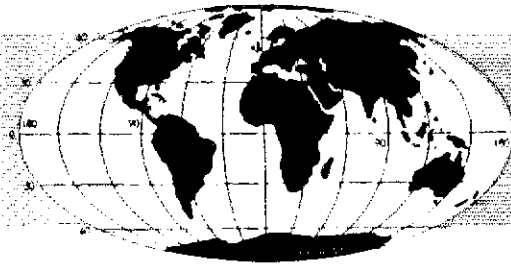
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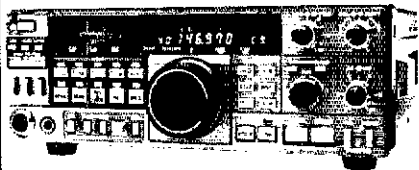


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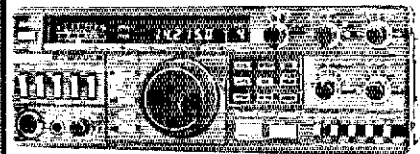
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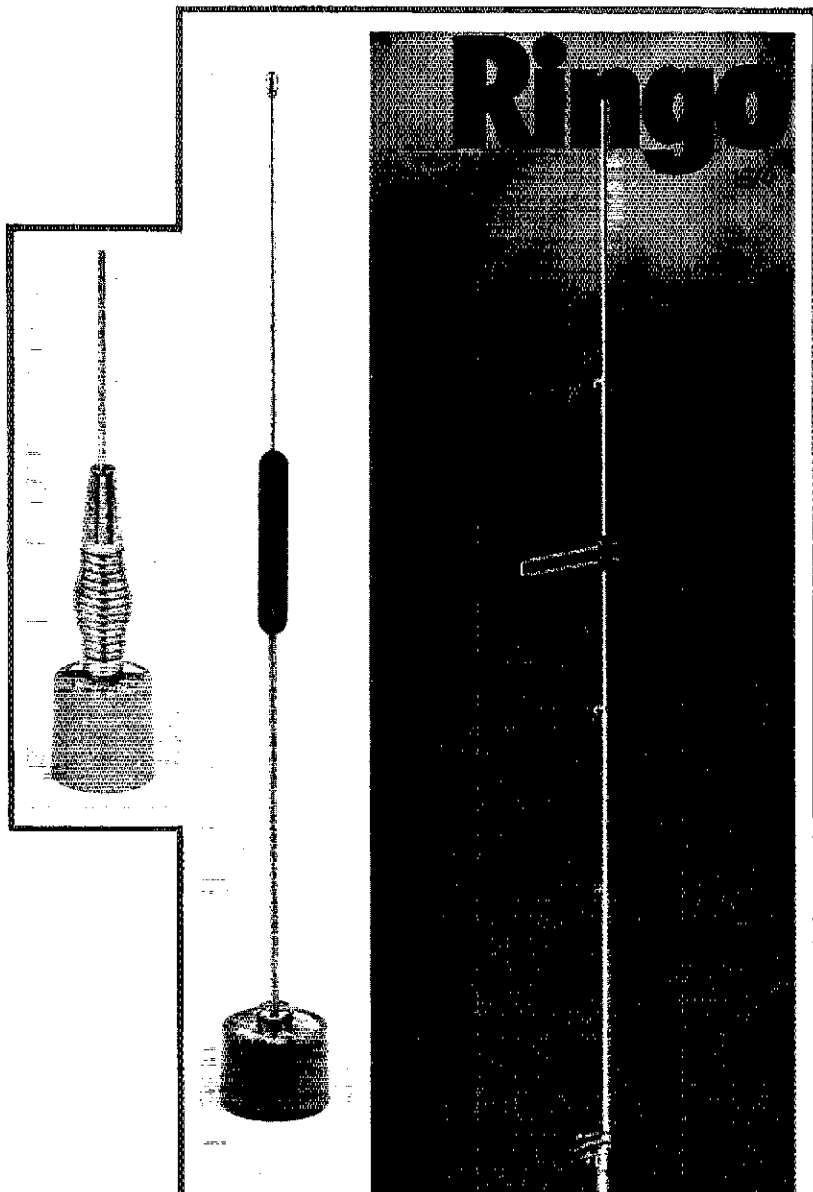
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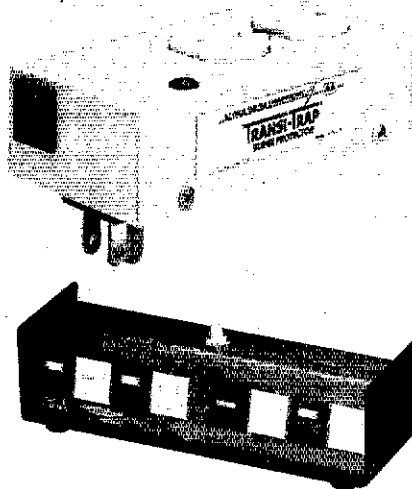
Take preventive measures now. Keep power supply and incoming coax lines "clean". Prevent infection of performance. Avoid part failure, critical equipment damage, loss of memory and premature aging. Alpha Delta

surge protection products are dependably designed to effectively block induced surges in power supplies and signal cables. Practice smart electronic hygiene... select Alpha Delta and keep your lines clean.

## NEW! ACTT—POWERLINE TRANSI-TRAP™ 3-STAGE 2000-AMP LIGHTNING SURGE PROTECTION WITH STATUS LIGHT

Two socket wall outlet unit just \$29.95. Compare to others offering only single-stage, 100-amp circuitry. Alpha Delta gives you more protection — 3-stage, 2000-amp — for your money. Unit features automatically restorable circuitry and includes resettable circuit breaker for added assurance and convenience. Configuration also provides common AC branch downline protection.

Alpha Delta ACTT



Alpha Delta  
MACC-8  
(8 outlets)  
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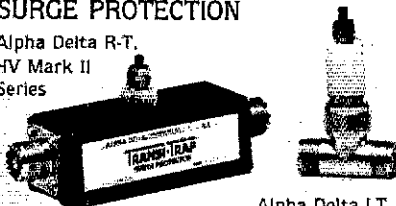
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See labels or data sheets for surge protection limitations. Powerline surge protection devices tested to IEEE pulse standards and rated at 15A, 125VAC, 60 Hz, 1875 watts continuous duty total.



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KW9J W9NXG KA9FEZ and N9EWT. CONGRATULATIONS to Terry, KA9FEZ who has recently accepted the position of Assistant Net Manager on D9RN. Field Day has again come and gone with many ARES participation messages received by SEC W9JQBH and/or SM W9SEBG. TC N9FH has been on the road again with his traveling RFI show, this month to the FRRL meeting in Aurora. He is on the trail of yet another ATC, and has been busy writing software for a number of Amateur calculation applications including VHF path loss, transistor gain, and TVI frequency relationships. APPOINTEES... HELP!! my postman is about to lynch me! It has been over a year since my RR box was changed from 46E to 234. Many appointees are still using the old number for reports and newsletters, much to the consternation of the local Post Office. Please check my address in your files and make sure that you are using the correct box number... RR #1, Box 234. TNX!! CLUBS... Illinois clubs are doing better than average for this year on getting in affiliated club info updates. Keep up the good work and remember that the club members pay their ARRL dues via the local club, a slice can be kept for your local club treasury. Traffic: KA9FEZ 331, W9HLX 213, KW9J 199, W9JUI 194, W9NXG 180, W9HOT 132, KA9EWN 99, W9BFRB 99, KC9YN 64, NC9T 63, KD9K 50, KZ9J 34, ND9V 33, KA9BB 29, K9EHP 28, W9KR 20, W9LNC 16, W9DBO 14, W9KPI 12, W9VEYM 12, K9WMP 11, W9LOU 11, K9QX 10, W9HBI 10, W9TVD 6, ND9X 3, W99IBH 2, W99HFZ 1.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: W99ZQE. STM: W9JUI. SACC: K9TUS. STC: K9PS. SGLC: WA9VCO. SOBC: KC9TA. SPIO: K9DIY. SRC: N9WB. SOOC: K9JG. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, IRN KB9SU, VHF W9MTP, IWV KABERJ.

June Net Reports

Net	Freq.	Time	Daily	UCT	QNI	QTC	QTR	Sess.
ITN	3910	1230/2300	3110	462	2332	90		
QIN	3656	1430/0000/0300	530	236	1465	90		
ICN	3708	2315	75	25	494	24		
IRN	3629	0000	111	88	764	30		
IWN	3910	1310	1687	0	398	30		
IWN	VHF	Bloomington	1077	0	300	30		
IWN	VHF	Kokomo	1191	0	215	30		
IWN	VHF	Ligonier	423	0	443	30		

Hoosier VHF Nets for June QNI 8272, QTC 144, Bulletins 90, QTR 8497 in 170 sessions for 24 nets. 9RN cycle four QNI 387, QTC 409, QTR 954, sess. 80 in 100% Stns. W9EI N9HZ KJ9J W9JUI WA9QCF W9QLW K9R W99UYU K9WVW W9XD. D9RN 322 messages in 1019 minutes. IN. 80% Stns. K9CS W9JUI N9EWT K9EAF KA9FAM W9QXF. CANO 771 messages in 30 sessions. D9RN 100% Stns. N9DWU W9JUI KA9CF. The following awards were presented at the Indiana State Convention QIN W9EI, ITN KD9DU, ARES K9KTH, Wet Net KABERJ, K9BB WA9OKK and KA9FFO. Appointments: OBS N9TV, EC's W9NICE Pike County, W9ZSK Martin County, W9FNR Miami County, W9ENU Kosciusko County, KW9D Franklin County, K9FAR Fountain County, W9TDI Clark County, W99KLV Boone County, W9KGE Marion County, ORS KW9C. ATC WA6OIZ. Silent Keys: WA9OLL N9BIN KA9KOR W9BDSR W9NKC KA9LUF W9SWK and K1TH9.

Congratulations to Allen County Amateur Technical Society and to the Washburn Amateur Radio Club for Special Service Clubs. Congratulations to K9TUS, SACC, on being chosen "Ham of the Year" by the Fort Wayne Radio Club. Congratulations to W9ADU winner of the Porter County Herb Brilar Award. Congratulations to N9DJF Lake County's first Lady Ham of the Year. Traffic: W9JUI 858, W9CNE 339, W9JZV 190, KJ9J 172, WA9QCF 83, W99UYU 59, W9UEM 48, K9DFK 45, W9UMH 45, KA9FFO 45, W9EI 43, KW9D 34, W99DWD 34, W99AWI 31, K9KTB 29, W9HZ 28, W9PMT 27, KA9EIV 26, W9DART 21, KK9D 18, D9ER 18, N9AEI 17, W9QYY 16, W9XD 15, K1RKE 15, WA9ZKK 14, K9R 14, N9DYU 12, W9BTZ 10, W9BGC 10, W9JZV 9, K9EAF 9, K9EAF 9, W9WC 8, N9DTG 8, W99QZ 8, ND9X 5, K9SBW 4, W9BAJY 3, K9OLP 2, W9KMY 1, W9BDP 1, W99VP 1, W99IHR 1, W99ZQE 1, KD9DU 1, K9SU 1, A9A 1, KM9B 1, KA9BID 1, WASJNC 1, K9JDF 1, WD9CIV 1, K99DE 1, K9DIY 1, KC9ED 1, WD9HII 1.

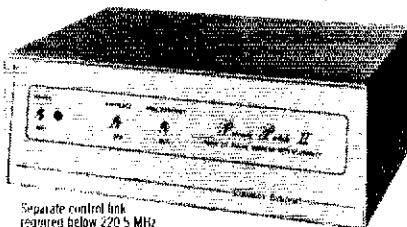
WISCONSIN: SM, Richard R. Reagent, K9GDF—SEC: W9OAK. STM: K9UTO. ACC: KA9FOZ. BM: W9J9W. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. Congratulations to new Bulletin Manager W9J9W, check with Carl if you would like to be an Official Bulletin Station. Thanks to KA9CPA, former Bulletin Manager. Would you like to be an Official Relay Station? Check with K9UTQ. Want to be an Official Observer? Contact NC9G. Does the Public Information Assistant title interest you? K9ZZ has the story. Does your county have an Emergency Coordinator? W9OAK can give you the answer. Your club need a boost? KA9FOZ might be able to help. Some Wisconsin clubs have combined meetings for fresh excitement. Ozaukee RC and Riverland ARC qualified as Special Service Clubs. Oshkosh ARC members working on novice instruction classes. There are also plenty of openings for Assistant Technical Coordinators and other fun opportunities. Write to K9GDF for any information. New Officers Sheboygan County ARC: Pres. W99V; V.P. W99CX; Sec. W99QY; and Treas. W99OWJ. Greater Milwaukee DX Association new Officers: Pres. W99N; V.P. KJ9I, and Sec./Treas. WD9JKZ. New Officers Milwaukee RAC: Pres. W99V; V.P.'s N9KY & K9HJ; Sec. K99AJ; and Treas. K9IWC. Congratulations to KA9BAC, wife of K9FH, on passing her general. K9SAO's sons are KA9TVC (age 10) and KA9TVC (age 11) County Amateurs for fresh hard working EC W99MF to sign up as an ARES member. Wisconsin has 208 net members in 119 cities. See you at the Wisconsin Nets Association Picnic, Shawang County Park, September 14th, camping available. VHF QSO Party September 14th and 15th. Silent Key W9JDT. W9NGP has excellent WIN attendance. Old Timer W9TQ reminisces about the good ol' spark days while operating packet radio. BPL to KA9CPA. The farther away the future is, the better it looks.

BWN	3984	6 A.M.	WD9IID	1150-1288-25
BEN	3865	Noon	W9SESM	
WYO	3925	12:31 P.M.	W9ZTY	220-9-19
W9BN	3985	5:30 P.M.	W9ZTY	171-206-30
WNN	3723	6 P.M.	KA9ORP	119-18-28
WCWNTN	31791	6 P.M.	N9DHT	444-43-29
WSSN	3645	6:30 P.M.	N9BDL	127-26-30
NWNTN	34194	6:30 P.M.	W9JSF	526-63-30
WIN-E	3662	7 P.M.	W99ICH	239-137-30
WIN-L	3662	10 P.M.	K9C9J	

Traffic: KA9CPA 134, K9GDF 212, W9YCV 196, W9CBE 188, W99WY 173, W99JID 127, W99ICH 116, N9DHT 93, W9LDO 87, W9UCI 82, KA9BHL 82, N9BDL 81, W9JSF 80, KA9ORP 76, W99EM 75, W9DND 67, K9AKG 63, W9ZTY 61, W9DFRI 58, N9AUG 48, K9UTQ 38, W9J9W 36, W99DY 33, KA9RI 33, W99YVC 31, KA9JY 26, W99DNG

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**TRAP DIPOLES:**

Model	Bands	Traps	Length*	Price
D-42	10/15/20/40	2	55"	\$59.95
D-52	10/15/20/40/80	2	105"	\$4.85
D-56	10/15/20/40/80	6	99"	109.95

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Model	Bands	Traps	Length*	Price
VS-31	10/15/20	1	12"	42.95
VS-41	10/15/20/40	1	27"	44.95
VS-52	10/15/20/40/80	2	52"	59.95
VS-53	10/15/20/40/80	3	49"	69.95

\*Can be used without radials. \*Permanent or Portable Use  
\*Feed line can be buried if desired

ALL ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded Copper Weld ant. wire and End Insulators, Automatic Band Switching - Tuner usually never required - For all transmitters, Receivers & Transceivers - For all class amateurs - One leadline works all bands - instructions included - 10 day trail!

**COAX CABLE:** (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	\$6.00	\$11.95
RG-58	90'	12.00	16.95

**DELUXE CENTER CONNECTOR**

- NO RUST Brass Terminals
- NO jumper wires used
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- Built in Lightning Arrestor
- With SO-239 Receptacle
- Handles Full Power
- Completely sealed, weatherproof
- Easy element adjustments
- Commercial quality

CE-1 \$8.95

**DELUXE ANTENNA TRAPS:** Completely sealed & weatherproof - Solid brass terminals - Handles Full power - NO jumpers - NO Soldering - Instructions included.

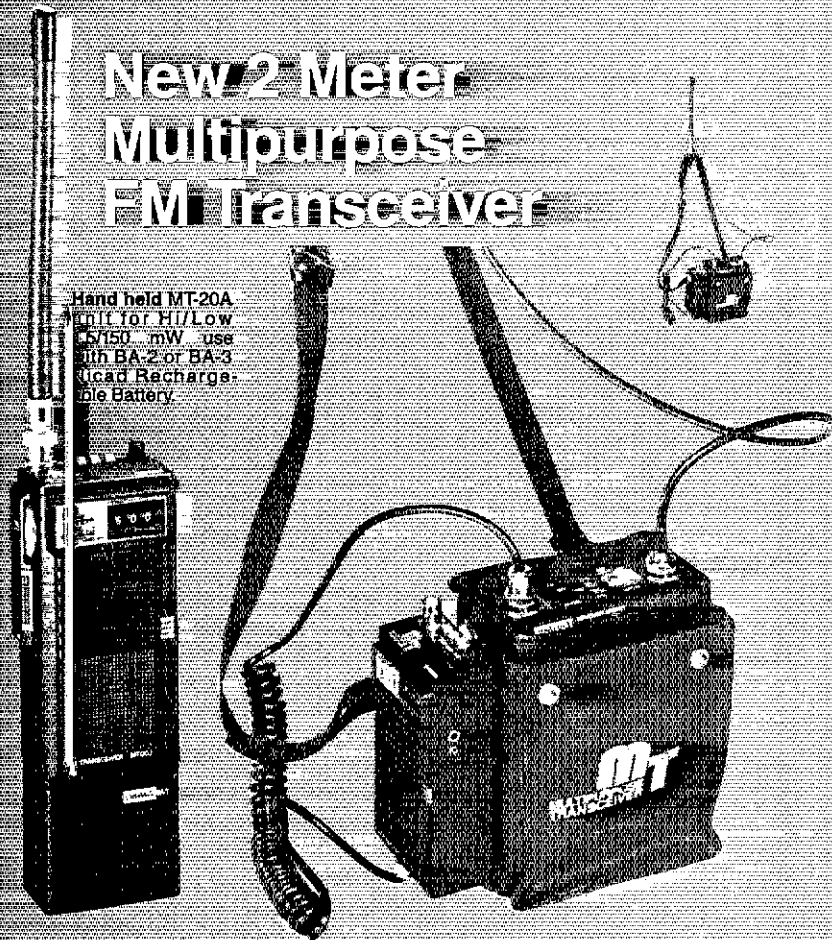
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# New 2 Meter Multipurpose FM Transceiver

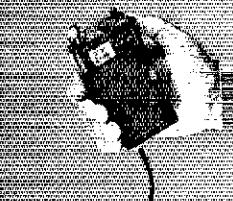


Hand held MT-20A  
suit for HI/Low  
15/150 mW use  
with BA-2 or BA-3  
Rechargeable  
Battery.

Portable transceiver puts out 10 Watts... Ideal for amateur participation events such as emergencies... athletic events... marathons.

The new MT-20A transceiver can be used as a 10 W portable unit with carrying case, LA-20 Linear Amplifier and rechargeable Nicad Battery.

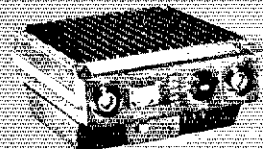
Easy to read thumbwheel digital switches provide complete coverage of the 2 meter band in 5 kHz steps.



In mobile operation, the MT-20A transceiver provides 20 W output when used with the LA-20 Linear Amplifier and plugged into the vehicle cigarette lighter through an SD-1 adapter.

Use hand held transceiver for all functions... Thumbwheel Frequency Selector... Built-in S Meter... Microphone... Speaker.

For base operation, the MT-20A transceiver provides 20 W output with the LA-20A Linear Amplifier, or can be used with any linear amplifier connected through the SD-1 Adapter.



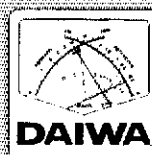
The new LA-20 2 meter linear amplifier provides 20 W at 13.8 VDC/10W with Nicad batteries of stable transmitting power using high performance transistors.

### MT-20A SPECIFICATIONS

**General**  
Frequency: 144-148 MHz in 5 kHz steps (FM)  
Excitation type: 500mV unbalanced (BNC socket)  
RF output impedance: 50Ω DC (5.5-1V DC)  
Power source: 150mA Max. on reception, 28mA on reception with no input signal, 480mA Max. on transmission  
Current drain: 150mA Max. on reception, 28mA on reception with no input signal, 480mA Max. on transmission  
Dimensions/weight: Main unit (without battery pack) 118mm(H) x 60mm(W) x 38mm(D) 250g  
Battery pack (Model BA-2/BA-3) 40mm(H) x 60mm(W) x 35mm(D) 120g  
Repeater device: Built-in  
• 600kHz transmit down shift switch  
• 600kHz transmit up shift switch  
Illuminated Dial

**Receiver**  
Circuitry: Double conversion Super heterodyne  
Sensitivity: Better than 1μV for 30dB S/N  
Selectivity: Greater than ± 7.5kHz - 6dB  
Greater than ± 15kHz - 80dB  
Image rejection: Better than - 60dB  
Audio output: 200mW (8 ohms)

**Transmitter**  
RF output power: High 1.5W Low 150mW  
Modulation: FM  
Distortion: Better than - 60dB  
Spurious emission: Electret condenser Microphone, built-in (impedance 2K ohm)  
Microphone: CTCSS unit optional  
TU-1

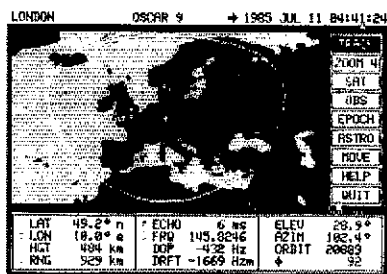
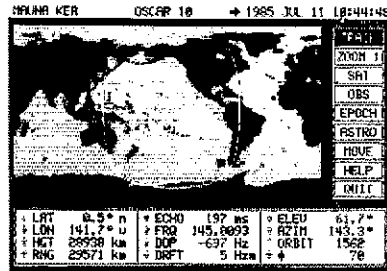
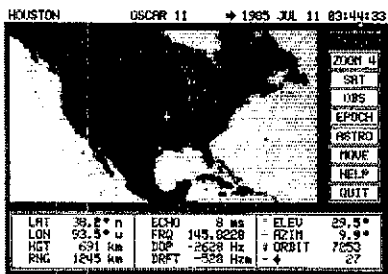


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13, KV02 12, KA09K 12, W9NGP 11, KA09KEQ 10, W9UW 9, (May) N9BCX 43.

## DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KC0T—SEC: KA0AAR, STM: KD0CI. Field Day proved to be a very interesting exercise this year, particularly on 10 meters. Operating QRP was especially challenging. The Courage "Handi-Ham" System is pleased to announce that K0HJC is the new manager of its operations. We also add our own congrats and best wishes to him and the entire "Handi-Ham" System. The Brainerd ARC and the Paul Bunyan Wireless Assn. have joined forces to administer upgrade exams in the Brainerd Lakes area. The two groups will swap test sessions on regular basis for the next months. The Brainerd ARC will be in charge of the Sept. 28 exams to be given at the Brainerd Community College. Its officers include KA0JW/Pres, WD0BAC/VP, WD0FHE/Sec and K0QIH/Treas. The club invites all to its breakfasts on the 1st and 3rd Sat. of every month at the Front Street Cafe in Brainerd. I intend to salute other clubs in future columns as space allows so watch for your club. N9BY has been appointed District EC for the North Central Dist. Net News: The deadline for submitting information for the new ARRL Net Directory has passed. If your net failed to make the deadline this year, make a note to submit the necessary info for the next issue. The Net Directory is issued in September and lists very net regardless of frequency or affiliation, and are available from ARRL or your club. It also includes valuable information about net procedures and traffic handling. It's a MUST item for your shack if you're into nets. The info deadline is July 1st. Our "Ham of the Month" selection for June is a Novice: KA0SBY. Prepare now for the upcoming SET. It's not far away! Recent upgrades include: to Tech: N9GFE KA0TOZ KA0UOV & KA0JUU, to General: WB0ZQR, to Advanced: N9EQV K0JUH & KA0JYI. Call sign changes include: N0RFB now KD0XP & KA0SUY now N9GGIN. Congrats to all of you! N9BNG reports over 40 amateur provided communications for the annual Grandmas Marathon from two locations in Duluth: K0BLG & N0BKL shared NCS duties for the event. I regret to report the following silent keys: KA0CBD WD0GEL KA0GPH & KA0SWC. Media coverage of radio amateurs in Minnesota recently included a nice article in the Mesabi Daily News about KD0HB. Has your local media promoted our great hobby? If not, perhaps it's time to look into it. 73 til next time, de KD0CI

Net	Freq.	Time	QNI/OTC/Seas.	Mgr.
MSN/1	3685	6:30P	295/85/30	WB0EHI
MSN/2	3685	10:00P	14/50/30	KA0BPP
MSN/3	3620	6:00P	180/20/20	KA0BDO
MSN/RTTY	3620	7:00P	47/12/10	WA0LUT
MSP/NIN	3929	12:00P	429/92/30	WB0WVJ
MSP/NIE	3929	5:30P	85/12/12/28	WB0BGS
MNAM/WXNT	3929	6:15P	381/232/25	KA0IZA
PICONET	3925	9:00A	234/1327/125	WB0BAC

EMERGENCY FREQ: 3929, MSO: 3620 Mon-Fri 5-7 PM Sat-Sun 8-12 AM. BULLETINS: 3620 3685 & 3929. Traffic: WA0FTC 424, KA0ARP 272, WB0WVJ 231, WB0EHI 159, KA0EPP 154, KT0I 98, KD0CI 87, K0B0WV 82, N0CLS 44, KA0ODQ 41, WD0BGS 38, KT0R 37, WD0M 28, N0EWA 23, WB0FMI 17, WB0YQ 17, K0QGI 10, K0SU 10, KD0BK 7, KA0P0W 7, N9BY 7, KD0XP 6, N0BEI 5, N0FKU 3, KD0YG 3.

NORTH DAKOTA: SM, Mike Mankey, WB0TEE—I am honored in being selected to fill the unexpired term for Joe, KNBA, and hope to do as well. The Superink is up and running with Jamestown, Bismarck, and Carrington on it. Hope that the other clubs will follow soon. The VE program look a rest over the summer but now several sessions are planned. If you have any information that is of a statewide interest that you would like to see in this column I can be found on the Data Net (3883 at 6:30 P.M. CDT), or send me a radiogram on the net. SKYWARN nets have been active with the usual good efficiency. Minot and Williston have ordered new repeaters and these should be in place real soon. Our sincere thanks to the State of N.D. for their help. 73's.

SOUTH DAKOTA: SM, Fredric J. Stephan, KC000—Station activity reports are in from a number of hams throughout the section. No club activities as yet have been received. Please send all reports before the 5th of each month so they can be reported here for the issue of two months from that date. The summer drought has already taken its toll from ranchers and farmers. Weather related emergency situations of other types are as all very possible then and now; so plan to help with emergency communications in your area. You never can tell when your assistance will be needed. Plan ahead, get organized, have a coordinated strategy, and be prepared. Public service is what our license privilege is all about. Our radio "work" is much more than just "personal enjoyment"; Amateur Radio is more than "this is just a hobby, so let's have only fun, guys." We all owe considerable public service. Let's do more in the future to show that we are deserving of our ham licenses.

## DELTA DIVISION

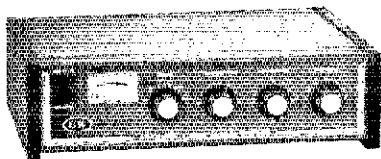
ARKANSAS: SM, Joel M. Harrison, WB5IGF—SEC: N5BPU, TC: W5FD, PIC: K5DW, SGL: W5LGI. Repeater Coordinator: WB5FDP. I have an urgent need for two volunteers to take over positions as Affiliated Club Coordinator and Section Traffic Mgr to fill the vacancies of AD5M and AE5L who have resigned due to work loads. Please contact me if interested. WB5JAR, K5UR, W0BN and others have been very active on 2 meter SSB keeping Ark. active on the grid square list. Please make a note of my new address: Star Route 3 Box 306, Judsonia, Ark. 72081. 729-3301. W5VAE and WB5IGF are active on OSCAR 10. I can supply a list of upcoming volunteer exams in the state. Traffic: W90K 30, W5UAW 17, W5RIT 17, WB5IGF 13, W5K1 10, W5MYZ 10, W5GAWU 10, N5BPU 8, KA5RRL 6, WAAZJ 6.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—SEC: KA5PFB, ACC: K5DPP, SGL: KD5SL, OO:W5PFG, TC: TJM, Delta DX Assoc. election: Freq: Ralph W5C8, VP: Tony W5BSS, SEC: John K5SE, Treas: Audrey W5YFC, ARRL Affiliated Club designation has many perks including retaining \$2 for the club treasury for each ARRL membership renewal; \$5 for each new member; ARRL furnished club bulletins, club program help and much much more. The following 24 Louisiana ARRL Affiliated Clubs represent 73% of all Louisiana Clubs: Jefferson ARC, Westside ARC, MTA ARC, Delta DX Assoc., Teche ARC, St. Mary AR Transmitting Society, Southeastern La. Univ. ARC, Ozona ARC, Lafayette ARC, Acadiana DX Assoc., Ibena ARC, SOWELA ARC, Red Stick DX Assoc., EXON ARS-Tiger Chapter, Baton Rouge ARC, Radio Amateur Service Club, United Radio Amateur Club, Shreveport ARA, Louisiana Tech ARC, Twin City Hams, Central Louisiana ARC, Old Natchez ARC, West Central

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Louisiana ARC, and the WINN ARC. Is your club interested? Contact Leo, WB2TRN, at ARRL Headquarters. DRN-5 report for June, 616 msg, 60 sessions, 90% participation by WA5LHL, KE5PP, WA5TQA, K5WOD, de WB5YDD. LAN activity 29 sessions, 64 traffic, 230 checks in de N5ANH.

**MISSISSIPPI:** SM, Paul Kemp, KW5T—SEC: AL7GQ. STM: K65W. VHF Coord: N5DWU. ACC: K65W. New appt: K5QNE PIO and OBS. New VHF Net in Hattiesburg area on 147.1272. Net meets at 0200Z. Net Manager is KASROA. Hattiesburg received their League affiliation. The Club has some very good momentum going and had a successful special event station at Paul B. Johnson State Park. The Club is also holding regular upgrade classes. Contact AG5Z or KD5SW. Repeater owners/customers voiced their desire to stay with the current 2 Meter band plan with no changes. If there are any questions, contact N5DWU. Field Day activities were good this year. Expect to see some good scores. MCARA active in providing communication support for the MAN IN MOTION during his travels along the Gulf Coast. Stations helping were: N5ATF W5DCKA K5QBU W5JXT W5SGL K55FC K5JHE W5BW K5DXY K5BV and W5HGU. Congrats to new Novice K5BKA, CANWEEK (W) sess 30 QTC 721. CANDW(B5YDD) sess 60 QTC 616. MTN(K5OAF) sess 30 QNI 120 QTC 36. MSBN(K5HKW) sess 30 QNI 190 QTC 65. GCSBN(W5JH6) sess 30 QNI 825 QTC 13. MMN(W5SRMW) sess 26 QNI 392 QTC 5. MSN(N5HGN) sess 30 QNI 80 QTC 10. MLEN(K5SWP) sess 5 QNI 107 QTC 0. CAEN(NF5Q) sess 5 QNI 110. RCARES(WD6IKD) sess 17 QNI 215 QTC. Traffic: NSAMK 475, K5OAF 170, KT5Z 73, W5WZ 62, W5LSG 21, KW5T 19.

**TENNESSEE:** SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS. OO/AA: W9FZW. PIO: WK4V. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J. TC: W4HHK. The hamfest season is about over with appearance of a drop in the attendance. At least two places or groups not having one. Both cases a family type picnic was substituted as was the original of the present day hamfest. That type of outing is generally best suited for the areas outside of the air conditioned buildings. There seems to be a bit of activity in the section related to the packet radio effort. The big question asked is "What is Packet Radio?" An ARRL publication relative to this matter can be obtained titled "AX.25 Amateur Packet-Radio Link-Layer Protocol" October 1984. There seems to be a fair supply of equipment available also. At a recent hamfest a fifty year plaque was awarded to an amateur radio operator. I am sure that there are some of that category in the Tennessee Section. If so, it would be a great time for a special ceremony for such an occasion. The Section Manager would like to hear from some of the clubs of any member in this elite group. It has been mentioned in the past about station activity reports, usually with the comment that "mine is so small that it would not be worth sending." Well, I am interested in any and all. So send five or so days of each month. We would like to include it in this column. Section traffic for the month was as follows: LF Sessions-73, QNI-3176, QTC-181; VHF Sessions-79, QNI-2062, QTC-574; TN CW Sessions-45, QNI-205, QTC-89; RTTY Sessions-23, QNI-149, QTC-23. CW net honor roll includes K9IML, W4DDK and NG4J. Thanks to all those amateurs that participated in the "Night Tango" program, NM4W, WD4Q, WB4YPO and AD4F, and the alternates. Traffic: NG4J 328, W9FZW 177, KA4RSC 156, K4WVQ 82, W4DDK 81, NN4S 36, W4PFP 27, K4JGW 21, WB4YPO 20, K4JGW 18, W3HET 16, AD4F 14, K4JMW 10, W4PSN 7, WA4HKU 7, KI4V 6, W4EWR 5, W4TYV 4, AD4F 4. (May) WB4YPO 11.

### GREAT LAKES DIVISION

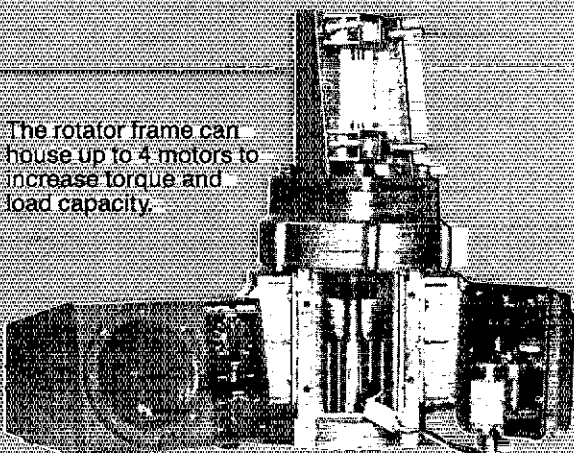
**KENTUCKY:** SM, Rose Marie Perciful, KA4SAA—ASST. SM: Dale Bennett, WA4JTE. Other KY officials: SEC: Bruce Kille, WA4JAV. STM: Raymond Smith, WB4ZDU. ACC: Mike Bruce, KA4BCM. PIO: Sam Jackson, K4TAJ. OO: Gerald Wyatt, N4GD. TC: Bill Call, K4JW. SGL: Carl Ruh, W4TZT. OBS: George Leaver, WA4AGH. These fellows are your Section leaders so feel free to contact them for advice and/or info. They need to hear from you! NEW APPOINTMENTS: Carl J. Ruh, State Government Liaison, Jim Seward KB4FDD DEC 14th District, Mike Pugh KA4MKG Etc Fayette Co. KY needs more ATO's. Refer to article in April 1985 QST. You may already be doing the job for your club or community so why not have the title. Send letters of application to the SM. VE testing programs are increasing across our state (great!) but test dates are being set too soon to get them in the column ahead of time. If you have an on-going testing sked, notify SM of info. Remember these articles have to be written two months in advance. Again request all KY clubs to PLEASE put the SM on your newsletter mailing list. This is an excellent way to be kept informed about your club as well as the state in general. Make plans for National ARRL convention, Louisville, in OCT!

**MICHIGAN:** SM, James R. Seeley, WB8MTD—ASM: WA8DHB. SEC: WB8BGY. STM: WD8RHU. ACC: K8SB. PIO: K8BK. SGL: N8CNY. TC: W8YZ.

Net Freq. Time QNI Tfc. Sess. Mgr.  
 MTN\* 3953 1800\*\* 583 191 58 W8UE  
 QMN\* 3953 1100\*\* 456 126 30 K8LNE  
 MACG\* 3922 1700 945 65 35 WA8DHB  
 UPN\* 3722 1730\*\* 187 58 53 KA8NCR  
 WSSBN 3935 1900 731 27 30 K8MSJ  
 VHF Nets 7 rpts 642 16 35 W8CUP  
 \*NTS nets. Times local. \*\*QMN late, 2200; MNN late, 2000; MACG Su, 1300. ARES Net, Su, 3932, 1730, 3932 is MI emer. freq., 1932 alt. Silent Key, with deep regret: WA8HJR, Branch Co. upgrades, reported by WD8RHU; to Tech KA8WBT KA8WBW KA8WBV KA8WBW KA8JLN; to Adv. N8GMS. FD messages received here were down from previous years. Here's the list: 18CFF, K9DAA, NJ8B, W8LF, K8BK, N8BL, WB8AI, W8MB, W8SJK, KA8T, W8THD, W8JUM, W8ZCG. Did yours make it? Here are a couple of gleanings from newsletters. From the Bay Area ARC, N8BBR opines, "Some of us have to loosen up and stop taking ourselves so seriously. Amateur Radio has a lot to offer young people. We need that talent. We 'older' folks will benefit in the long run by keeping and expanding our frequencies and methods of transmission. This can be accomplished only by active use of what we now have. We've got to come up with something exciting, novel, and (which) captures the imagination." And the LANDLINE (Copper Country RAA) reminds us even as they were themselves reminded in a recent series of emergency situations, if your attempted emergency call happens to go unanswered, especially if it's through a repeater, transmit the message "in the blind." We are listened tomorrow than many of us realize by folks with VHF/UHF scanners, and most of these folks are as public-service minded and as eager to help as are we ourselves. Traffic: K8CPS 659, A8V 289, W8OH 219, W8KQC 150, KA8VOZ 139, WD8RHU 112, WD8OUO 105, NJ8S 105.

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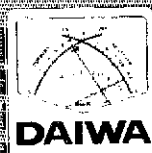
#### Rotator Unit

	MR-750E/PE	MR-300E
Rotation time	60 Hz	58 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)
Output torque Brake power	1 motor	610 lbs/inch 5,200 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch
Rotation angle	375 degrees	
Permissible mast size	1½ - 2½ inch (38 - 63 mm) < diameter >	
Control cable	6-wire cable 0.5sq - 1.25sq (AWG16/18/20 etc.)	
Continuous running	5 minutes Max. permissible	
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)	
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >	

#### Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

Wind Load	MR-750E/PE	MR-300E
1 Unit	16.1 Sq Ft	5.82 Sq Ft
2 Units	21.5 Sq Ft	11.64 Sq Ft
3 Units	26.4 Sq Ft	17.56 Sq Ft
4 Units	30.0 Sq Ft	23.67 Sq Ft



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WA2YBM 42, K2HNW 24, AA2Y 24, AK2E 23, KA2OPG 13, N2BFG 12.

**NEW YORK CITY-LONG ISLAND:** SM, John H. Smale, K2KZ - AS/IA/CC, WB2IAP, SEC, KA2RGI, OOC, NB2T, TC/RFI, W2JUP, STM, WA2ARC, PIO, W2IYX. The following are traffic nets in and around the section:  
 NLI CW\* 3630 kHz 1900/2000 N2AKZ mgr  
 NCVHF 6.745 rpt 1930 M-F K2MT mgr  
 BAVHF 6.67 rpt 2000 M-F WB2BNA mgr  
 SCVHF 5.37 rpt 2030 M-F W2GZD mgr  
 ESS 3590 kHz 1800 W2WSS mgr  
 NYS/M 3677 kHz 1000 WB2EAG mgr  
 NYS 3677 kHz 1900/2200 WB2EAG mgr

\*Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARC is sponsoring amateur radio license exams the second Sat. of each month at the N.Y. Inst. of Technology, Rt. 26, Old Westbury, for further contact: Bob Reed, WB2DIN, 2970 Valentine Pl., Wantagh, NY 11793. It is with deep regret that we list "Skip" Courtney, K2UAT, as a Silent Key, he passed away on the Friday before Field Day. Now that summer is over there are a lot of things to be done, WA2DHF needs, repeat needs people for the NYC Marathon, this is always a big event, nice chance to spend a day in the outdoors, get a guaranteed parking spot in NYC with no hassle from the police, contact Steve for further details. I am also looking to set up groups that would be interested in going around to local schools to demonstrate amateur radio to the students and hopefully get them interested in our hobby. Again, it is with deep regret that we list Ken Griffin, KB2IG, as a Silent Key. Congratulations to K2BYI on upgrading to General, W2JUP has set up an "Amateur Radio" club Bulletin Board System, it operates either as 300 or 1200 bps, the hours of operation are 6 P.M. to 8 A.M. local Mon. to Fri., and 24 hrs Sat. and Sun., the number is 736-2208. The Gt. South Bay ARC also has a sub board on the "No Trills BBS" started by the South Shore ARC and the TI-99 Users Group, the system is operational 24 hrs a day at 300 bps at 661-3643. Anybody sending in traffic totals, please send the totals to WA2ARC and your station activities, if any to me, I (and WB2IAP) would appreciate it if we were not, repeat not "purged" from your club's newsletter mailing list, we need the information. Traffic: K2YQK 122, W2GKZ 75, W2DBQ 30.

**NORTHERN NEW JERSEY:** SM, Robert R. Anderson, K2BJG - Thank you for your support in electing me as your SM. In 1977 it was my pleasure to nominate my predecessor, Robert E. Neukamm, then WA2MVC for SCM. Since then Bob, now KB2WI, has served NNJ as both SCM and SM. On behalf of the NNJ section membership, a hearty thanks to Bob for his many years of service and our best wishes to him in his future endeavors. The election of a new SM provides an opportunity to form a new section leadership staff. (New Blood). With this in mind here are my initial leadership position appointments: SEC: KB2ZM, STM: KA2HNO, OOJA: N2WMM, ACC: K2BJG, PIO: WB2NOV, SGL: W2KB, TC: K2BLA, and BM: N2CXO. I have decided to handle the ACC function myself for the time being. Appointment authority is delegated to the applicable leadership official for subordinate leadership positions of NM, DE, EC, and individual station appointments of OBS, OBS, OOJA, PIA, and NES. OS appointments are W2FMN, WA2SNA, with WA2JPK as sypop. All other current subordinate leadership and individual station appointments shall remain in effect until expiration or are acted upon by the applicable leadership official. New or renewal appointments will be listed in this column as they occur. The Ramapo Mountain ARC has added a PBBS via its club station WA2SNA-1. This NNJ PBBS is on EASTNET via digipeater WA2SNA-2. In addition to being available for general use this PBBS is dedicated to the support of the NTS and is a new OBS with APRS, bulletins automatically forwarded from the WA1W4 PBBS via EASTNET. The APRS NNJ section field emergency communications and traffic organizations are encouraged to make use of digital packet communications and the Ramapo Mountain ARC facilities. A new traffic net named New Jersey Packet Traffic Net "NJPTN" is being developed. As a start N2AAM, and KC2YG are providing interface to NJVN via the WA2SNA-1 PBBS in NNJ. Jon at the WB2MNF PBBS in SNJ is making arrangements in that area. Congratulations to the following who upgraded at the June 8 session of the NNJ VE Board. Technician: KA2V LH, KA2NCU, KA2VFL, KA2VFR, KA2YCD, KA2CK, and Adam Wasserman. To General: N2SZW and KA2MC6. To Extra: WA7QGU.

Net	Freq.	Time	Sess.	QNI	QSP
NJM	3695	1000 Dy	30	216	94
NJPN	3950	1800 Dy	35	295	78
		0900 Su			
NJSN	3735	1830 Dy	30	166	51
NJN/E	3695	1900 Dy	30	240	147
NJN/L	3695	2200 Dy	30	160	96
NJVN	49/49	2230 Dy			
OBTTB	147.12	2000 Dy	30	288	152
TCETN	147.225	1930 Dy	30	90	23
NJRTTY	147.51	Autostart		185	275
NJPTN	145.01	WA2SNA-1 PBBS			

Uplink Amateur Radio News call 201-735-8550.

**MIDWEST DIVISION**

IOWA: SM, Bob McCaffrey, K6CY - STM: KA0X, PIO: N0EBA, BM: K0IR, OOC: K0RFT, ACC: W0QAM, TC: K0DAS, SGL: K0CQ. We are losing our STM to Wyoming this month, thanks to her for a job during her tenure. Looking for someone who would like to assume STM or SEC duties. The response from the DEG/EC questionnaire was less than 50%. Those who took the time to comment, I give you a hearty thanks; still would like to hear from the rest, a tally has been sent to clubs. It is time to be planning S.E.T. Operations this year, hope more will participate - will discuss further on ITEN. Another great job on RAGBRAI, I send my ideas for next year. The ICN (bio-apex code net 3715 MW) has been stagnant, but not dead as reported. Your support and your club support is needed to get it active again, ideas to time, freq. procedures let me or N0CR know. Do not let a good training net suffer because you weren't there to help. Let me hear about your school demonstrations, as did N0FSS.

Net	Freq.	UTC	Dy	QNI	QTC	Mgr.
75 Mtr PN	3970	1730-2300	M-S	1670	155	WB0AVW
TLCN CW	3560	2330-0300	Dy	290	153	W0YLS

It is good to see so much traffic being handled via packet, some very good routing available through local CBBS, and via Midwest TTY net through KA0JRC. Traffic: WA0AUX 239, K0GP 183, W0SS 158, W0DFWB 128, K0XL 128, W0YLS 98, KA0X 66, W0HTP 55, K0BRE 54, WB0AVW 50, K0CY 48, WB0JFF 38, K0MPT 31, KA0ADF 31, W0FQ 14, K0BSC 8, A19D 4.

KANSAS: SM, Robert M. Summers, K0BXF - W0MYM reports the Sunflower chapter (#79) of QCWA now holding

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 Power: 3 Ranges (Forward, 20/200/2000 W)  
 (Reflected, 4/40/400 W)

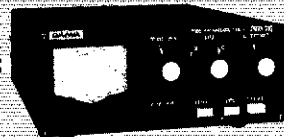


**CN-630 and CN-630N (N Type Connector)**  
 Frequency Range: 140-450 MHz  
 Power: 2 Ranges (Forward, 20/200 W)  
 (Reflected, 4/40 W)

	CN-520	CN-540	CN-550
Frequency Range:	1.8-60 MHz	50-150 MHz	144-250 MHz
Power Range:	200/2000 W	20/200 W	20/200 W
	CN-410M	CN-460M	CN-465M
Frequency Range:	3.5-150MHz	140-450 MHz	140-450 MHz
Power Range: Forward	15 W/150 W	15 W/150 W	15 W/75 W
Reflected	5 W/50 W	5 W/50 W	5 W/25 W

Back Lit, with mobile bracket.

**ANTENNA TUNERS**



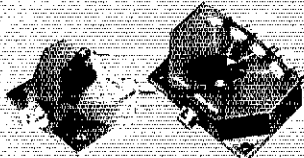
	CNW-518	CNW-419	CL-680 (no metering)
Frequency Range:	3.5-30 MHz (8 bands)	1.8-30 MHz (17 bands)	1.8-30 MHz (17 bands)
Power Rating:	1 kW CW (50% duty)	200 W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)
Output Impedance:	10-250/25-100-ohm (On 3.5 MHz)	10-250 ohm	10-250 ohm

**AUDIO FILTERS**

**AF-606K & AF-406K**  
 Four stages of filtering...variable bandwidth over broad range...razor sharp CW reception...built-in speaker. The AF-606K adds PLL Tone Decoder circuitry, PLL locks onto the desired CW signal and reproduces it with utmost clarity.



**ELECTRONIC KEYSER DK-210**  
 Sharpen your "fist" with Daiwa precision!



**COAXIAL SWITCHES**  
 PAT. No. 59-00803

	CS-201	CS-201G	CS-401	CS-401G	CS-4
Frequency:	800 MHz	1.3 GHz	800 MHz	1.3GHz	1.3 GHz
Connectors:	SO-239	N type	SO-239	N type	BNC type
VSWR:	Below 1.1:2				
Insertion Loss:	Less than 0.2 dB				

**POWER AMPLIFIERS**



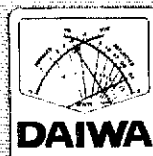
	LA-2035	LA-2035R	LA-2065R
Band:	144-148 MHz	144-148 MHz	144-148 MHz
Input Power:	0.5-3 W	0.5-3 W	0.5-5 W
Max. Output Power:	30 W plus	30 W plus	60 W plus

**POWER SUPPLIES**

PS-310M	Max 31A/Continuous 24A 3 VDC-14.6 VDC Variable
PS-310MD	Max 31A/24A Continuous 13.8 VDC Fixed Plus sub-DC outlets; Max 5.6A/5A Continuous 3 VDC-14.6 VDC

**Heavy Duty Power Supply**

PS-560MD	Max 56A/44A Contin- uous Plus sub-DC out- let 10.6/10A 1VDC-15 VDC
----------	---



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 Torrance, CA 90501  
 (213) 212-6057

MADE BY DAIWA INDUSTRY CO. LTD., TOKYO, JAPAN

# Introducing The New LK-500Z "B"

## Legal Limit Amplifier

Thinking of buying a linear amplifier? You owe it to yourself to check out the new LK-500ZB.

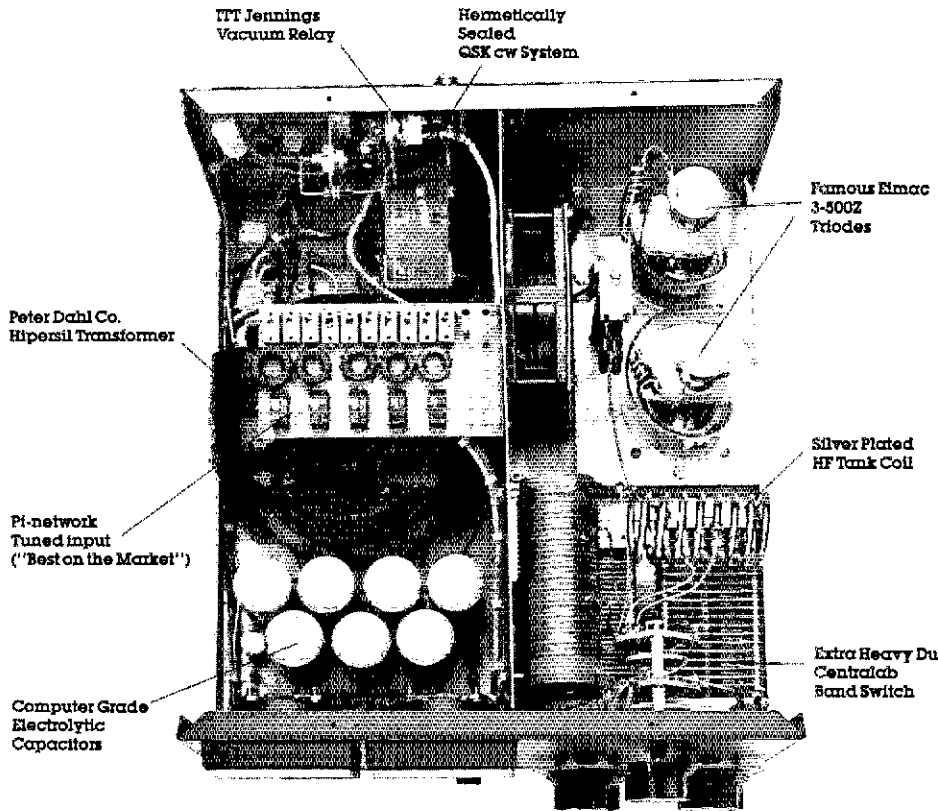
The LK-500Z series of amplifiers were created to offer the best value you can buy in HF linears covering 160-15 meters. Last year, it was demonstratively the best value. It was the lowest priced, full feature pair of 3-500Z's on the market. It had the longest warranty and the only amplifier with a money-back guarantee. It's not surprising that the LK-500ZA, both the standard and "hipersil" version, became one of the most popular amplifiers on the ham bands.

Now, for 1985, Amp Supply engineers have taken this durable, dependable "rock crusher," fantastically improved it, and called it the LK-500Z "B" version.

Improvements include an ITT Jennings vacuum antenna changeover relay with a companion sealed relay GSK system which eliminates any signal attenuation between CW characters. The silver-plated HF tank coil and the extra heavy duty silver-plated Centralab bandswitch are the finest available.

The LK-500Z "B" version has all the outstanding standard features of the LK-500ZA; such as the Peter Dahl Hipersil power transformer, and a full-wave bridge rectifier system (we will not produce amplifiers using weak voltage doublers). Computer grade electrolytic capacitors are standard and the low-pass pi-network tuned input is the absolute best on the market. Oh yes, we only use Eimac 3-500Z triode tubes in the LK-500Z amplifiers.

Amp Supply Co. has been a pioneer in manufacturing quality amateur radio products, providing service to back them up and selling at low prices. The people of Amp Supply Co. have been designing and manufacturing amplifiers since 1974, and we challenge any competition to match our total amateur HF amplifier production — 17,678 amplifiers in eleven years. You don't manufacture and



supply that many amplifiers unless you have first-rate products and service. Join the thousands of satisfied radio amateurs who have come to the people at Amp Supply Co. for their amplifier needs. We believe good service starts with answering your questions and needs before and after you buy.

All Amp Supply amplifiers carry a two year warranty. Ask our competitors what theirs is!

Our price is the whole price. LK500Z "B" version: \$1295.00 includes UPS surface charges and insurance in the continental USA. In a hurry? Two day UPS air service is just \$20.00.

The LK-500Z "B" version is clearly a progressive, new amplifier, a leader in its field; but what else would you expect from a company called Amp Supply?

Thank you for purchasing an Amp Supply Co. product.

*Denny Had*  
Denny K8KXX

### NO RISK GUARANTEE

If you are not completely satisfied with the performance of your new LK-500ZB you may return it within ten days for a refund less shipping and repackaging. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

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LK-500ZB No-Tune-Up	\$1595.00
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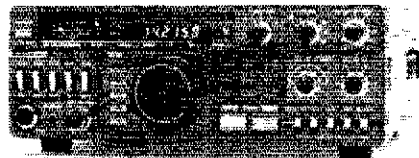
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**Amp Supply Co.**

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919-821-5518

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The FREE\* MA-4000 is a dual-band, 2m/70-cm mobile antenna only, with duplexer (no mount). Use LARSEN PO-K Roof mt. \$20.00; PO-TLM Trunk-lip mt. \$20.18 or PO-MM Magnetic mount, \$19.63

## FREE Extra Battery!

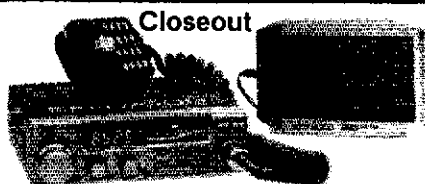
*For a Limited time!*

Purchase a TR-2600A (shown) at our normal Low Sale Price and receive an extra PB-26 battery - **FREE!**

or

Purchase a TH-21A/AT or TH-41A/AT at our normal Low Sale Price and receive an extra PB-21 battery - **FREE!**

**Call for Sale Prices**



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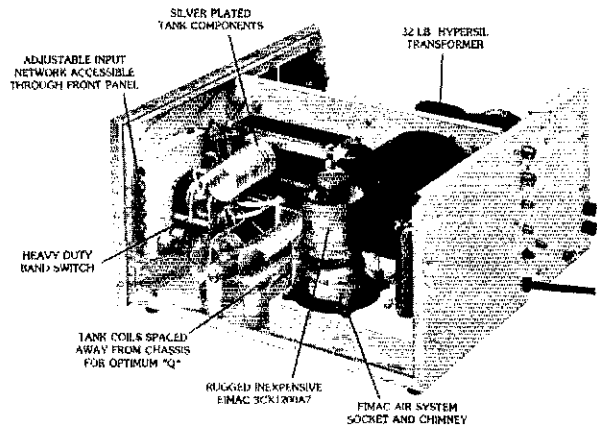
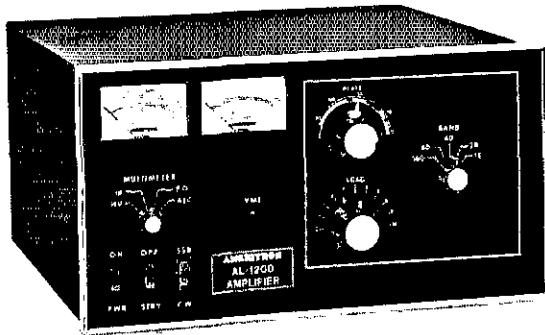
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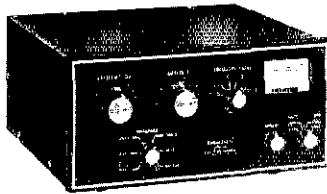
# AMERITRON AL-1200 LINEAR AMPLIFIER

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- ALC compatible with all popular transceivers.
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- Bridge rectifier supply with computer grade capacitors.
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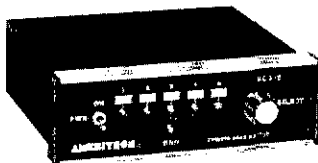
## ATR-10 TUNER

The Ameritron ATR-10 has a unique bandpass network that provides superior harmonic suppression and image rejection. It will safely handle 900 watts of envelope power from 160 through 10 meters. A heavy duty antenna switch permits selection of 5 outputs. It has a peak reading wattmeter, SWR bridge and a dual ratio balun.

## ATR-15 TUNER

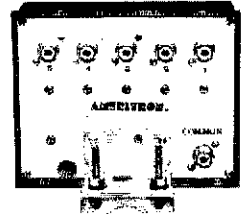
The Ameritron ATR-15 is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch. The ATR-15 has a peak reading watt meter, SWR bridge and a dual ratio balun. Size: 6"H.x13 1/4"W.x16"D.



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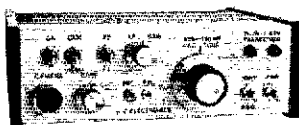
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## P.C. ELECTRONICS

Maryann Tom  
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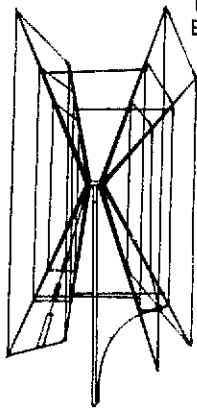


**ATV APPLICATIONS:** you can show the shack, projects, home video tapes, computer graphics & listings, repeat SSTV, or even Space Shuttle video & audio if you have a home satellite receiver. Do public service events such as marathons, races, parades, search & rescue, major fires, repeat weather radar, etc. DX depends on terrain and antennas, typ. 1 to 40 miles. For greater DX we have 20 watt amp for \$109 and 50 watts for \$185.

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TB-15	6 1/2" to 9 1/2" 1.06
TB-16	7 1/2" to 10 1/2" 1.72

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GT-30	for cable up to 3/16" dia. 51c

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GR-1	up to 2" O.D. steel 3.96

• **GUY WIRE:**

V-SW-B/20L	vinyl coated steel 4.00
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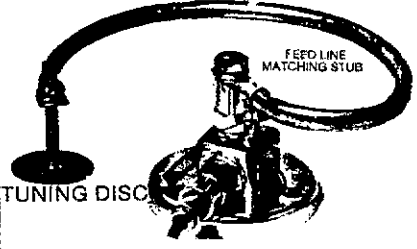
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100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

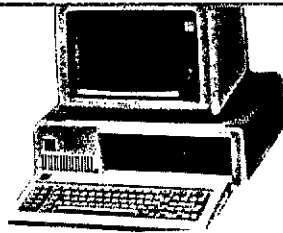
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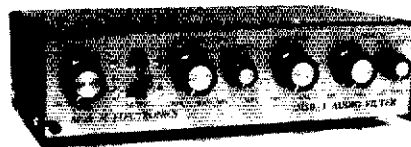
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roundtables (informal) on Sat. at 2 P.M. local time for members and other interested hams. First and third Sat of the month on CW, 3810 and second and fourth Sat. on SSB, 3920 kHz. Net reports for the month of June as follows:

Net Desg.	Name of net	QNI	QTC	Mgr
KSNB	Ks Sideband Net	966	90	WBFRQ
KPN	Ks Phone Net	463	75	WBFRQ
KWN	Ks Weather Net	832	599	WA0LBB
KMWN	Ks Morning Wx Net	713	517	WA0LBB
CSTN	Central States Tlc	1633	65	W0DE
QKS	Ks CW Net	172	54	WB0ZEN
QKS-SS	Ks Slow Speed Net	29	8	WB0MYM
Ks RTTY	Ks RTTY Net	10	0	AC0E

Field Day is now over and it is time to start thinking about those new antennas you would like to try out before winter sets in again. Field Day always brings out quite a varied supply of new one-man type (that's the kind that takes five guys and 3 boys to get it in the air. Zone 15-B will have a new EC effective 15th July. Those of you in the great northwest—KANSAS that is—should contact him, Bob Pletcher, WB0TOM. Traffic: WB0BK 383, W0K1 214, WB0FC 205, AC0E 124, WA0LBB 124, WB0FR 88, WB0FD 88, KSNB 85, K0BFX 84, W0HI 80, W0YOY 70, NB0Z 61, WB0ZEN 47, WB0PB 26, W0MYM 14, W0RBO 4.

MISSOURI: SM, Ben Smith, K0PCK—Field Day in Missouri this year was a very busy one with many reports received with good totals. Newly elected club officers reported: Amateur Radio Club of Central Missouri, Pres. WB0OLE, VP, NEBA, Sec. Treas. K0BGM and P. H. W0OHC, Lake Ozark ARC; Pres. K0BPL, VP. K0BMC, Sec. Treas. K0BAW Net Manager, W0RTL, Lee, N7DF, a member of the Kansas City DX Club will be in Africa during the months of July, August and September. He hopes to operate 40 and 80 meters from Chad and Sudan. Clubs have been active providing communications for different events in their communities. The Heart of America ARC assisted on May 5 with medical communications for the Research Hospital 10 Kilometer run. Members helping were: N0AFM, WA0PFS, W0AIB, K0ORB, WA0JR, W0DEIG, K0BUH. On June 2 the HARC provided communications for the Hospital Hill Run. Taking part in that event were: K0QAE, K0FYJ, W0DEIG, W0AIB, N0EBR, K0M0E, K0BQX, WA0PFS, N0AFM, K0OHV and K0JAA. The Southeast Missouri ARC provided communications for the Cape Girardeau Riverfest. June 29 the Central Missouri Radio Assoc. and the Calaway Amateur League assisted with the Hinkson Valley Radio Club Regional Cross Country Rally at Fulton. CMRA members helping were: N0EN, K0BGC, K0ONL, N0GGJ, N0PFE, W0LDJ, A00B, K0SR, K0PCK and N0BEF. From the CAL were: W0WLU and W0NUB. I would like to hear from all clubs that help with projects in their community.

Nets reporting:

Net	Sess.	QNI	QTC	Day	Time	Freq.	Mgr.
					PM	MHz	
MON	60	230	137	Dly	7:00P-45	3.588	K0BI
MOSSB	30	546	103	Dly	6:00	3.963	K7RY
MEOW	30	456	46	Dly	5:30	3.963	K0DSQ
MTTN	21	58	27	Mon-Sat	6:30	3.370	K0BFG
HBN	20	240	18	Mon-Fri	12:05	3.800	K0DSQ
PHD	5	126	11	Mon	9:00	146.43	W0AKUH
MGFON	4	26	9	Mon	8:15	22.42/02	A1B0
PTN	8	20	8	WTF	9:00	21.114	W0BROO
RRABN	28	441	5	Dly	8:00	148.39/79	K0LLN
CMEN	6	120	3	Wed	9:00	146.10/76	K0PCK
JCCCN	4	35	1	Wed	8:00	146.407/09	W0RI
LOZFM	4	97	0	Sun	9:00	146.13/73	W0RTL
ZAEN	3	63	0	Tue	8:00	147.84/24	K0OCU
IGN	4	26	0	Thu	9:00	147.08/09	K0RLO
SARN	4	49	0	Thu	9:00	148.437/03	W0ENW
MCARES	4	39	0	Thu	8:30	146.52	W0BELJ
LAPES	4	26	0	Wed	8:00	146.102/70	W0BRHC
OCAN	3	17	0	Wed	8:30	146.44	W0RUS
LOZCW	4	12	0	Sat	9:00	3.707	W0BRT
WB0MA 247	K0SI 160	K0PCK 128	K0BAS 103	K1OY 66			
N0EN 55	A1B0 48	N0R 48	K0ORB 41	W0CUD 39	K0DSQ 33	W0YJX 31	N0BEK 23
K2ONP 23	K0NIP 23	K2ONP 23	K2ONP 23	K2ONP 23	K2ONP 23	K2ONP 23	K2ONP 23
W0AKUH 10	W0BTEG 8	W0B0CJB 1					

NEBRASKA: SM, Vern Wirka, WB0GQM—SEC: Jim Sanford, N0AII, STM: Jerry Kohn, W0BEGK. Nebraska Section Traffic Manager Jerry Kohn, W0BEGK has put together an excellent program on traffic handling. Jerry has presented his program to the Lincoln and AK-SAR-BEN Amateur Radio Clubs. Jerry invites any of the clubs in the section to contact him and he will be glad to work out some arrangement to present the program. Since the Nebraska section covers such a large geographic area it is not possible for you to attend a lot of the club meetings but we will get information and material out to any club that would be interested in a program on traffic handling. Congratulations to all of the persons who have obtained an amateur license or upgraded in the section during the many test sessions given across the section: this past summer. Myrtle Jones, K0BWM, of Bushnell, has upgraded to Extra. K0BWM is a very active amateur with an average of 90 points for Public Service Honor Roll for the first six months of 1985. Lloyd McElhane, K0DKM of Omaha reported his highest ever traffic count for the month of June 1985. K0DKM handled a total of 280 pieces of traffic for June 1985. All traffic reports are welcome, even if the total is not very high, just send your monthly station activity report to your SM. Midlands: ARES assisted Offutt Air Force Base Military police with communications during the base open house in July. Traffic: K0DKM 280, W0BTEG 133, W0K1 112, K0XY 29, WA0BOK 13, W0BGM 13, K0B0C 10, K0BWM 8, W0BGM 6, W0B0X 5, W0ZY 2, W0N1K 1.

**NEW ENGLAND DIVISION**

Net	Freq.	Local Time	QTC	QNI	NM
CN	3840	1800/2030	208	329	K0EIR
CPN	3965	1800 M-S	108	116	KA1BHT
NVTN	22/88	2130	23	252	WA1EM1
WCN	78/18	2030	128	407	WB1GXZ
RTN	13/73	2100	53	255	KA1JAN

Thanks to the many clubs and individuals who have submitted their results from Field Day, 1985. This year was very active and successful. Many tried new things, others worked to improve over 1984. The following is dedicated to Field Day, 1985. Eastern Conn. A.R.A.: First time on packet, satellite T.V., computer checks for duping; The captain and crew: First time maritime mobile; Shoreline A.R.C.: Excellent public relations with channel 8, RTTY, Novice and satellite operations; The City A.R.C.: Great turnout and good T.V.; Battery Power: T.V. to portable tower; many contacts; The Harwinton Hams: Great first annual turn out and a super layout; Waterbury A.R.C. First Field Day, many operators and a very smooth operation resulting; Fairfield A.R.A.: Great turnout, many con-

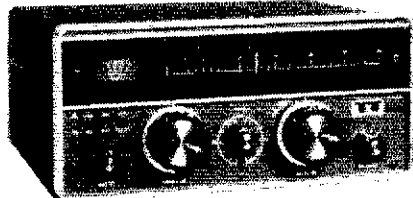




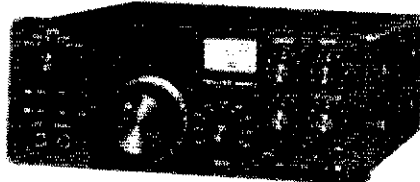
- HF Equipment**
- |                                    |         |                   |
|------------------------------------|---------|-------------------|
| 561 Corsair II 9-band digital Xcvr | 1345.00 | 1169              |
| 260 Deluxe 18A ps w/spkr.          | 199.00  | 179 <sup>95</sup> |
| 263G Remote VFO                    | 199.00  | 179 <sup>95</sup> |
| 282 250 Hz 6-pole CW filter        | 59.00   |                   |
| 285 500 Hz 6-pole CW filter        | 59.00   |                   |
| 288 1.8 KHz 8-pole SSB filter      | 59.00   |                   |
| 214 Electret desk microphone       | 45.00   |                   |
| 603 KR-1B Keyer paddle             | 59.00   |                   |
| 700C Electret hand mic w/connector | 29.95   |                   |
| 1140 18/24.3A DC circuit breaker   | 10.00   |                   |



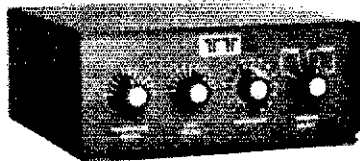
**HF Linear** Regular SALE  
425 Titan 1.5kw PEP output amplifier 2485.00 2199



**Antenna tuners** Regular SALE  
229A 1.8-30 MHz 2kw PEP tuner/SWR 279.00 249<sup>95</sup>  
4229 1.8-30 MHz 2kw tuner/SWR kit 199.00 189<sup>95</sup>



- 525D Argosy II 10/100w digital xcvr** 599.00 529<sup>95</sup>
- |                                     |        |                   |
|-------------------------------------|--------|-------------------|
| 225 9A power supply                 | 129.00 | 119 <sup>95</sup> |
| 217 500 Hz 8-pole CW filter         | 59.00  |                   |
| 218 1.8 KHz 8-pole SSB filter       | 59.00  |                   |
| 219 250 Hz 6-pole CW filter         | 59.00  |                   |
| 220 2.4 KHz 8-pole SSB filter       | 59.00  |                   |
| 222 Mobile mount                    | 25.00  |                   |
| 223A Noise blander                  | 34.00  |                   |
| 224 Audio CW filter                 | 34.00  |                   |
| 700A Electret hand microphone       | 29.95  |                   |
| 1125 DC circuit breaker w/cable     | 18.00  |                   |
| 1126 Linear amplifier switching kit | 15.00  |                   |



227 1.8-30 MHz 200w antenna tuner 89.00 84<sup>95</sup>



**Satellite** Regular SALE  
2510 SSB/CW, Mode B satellite converter 489.00 439<sup>95</sup>

- VHF Handheld** Regular SALE
- |                                      |        |                   |
|--------------------------------------|--------|-------------------|
| 2591 .3/2.5w 2m HT/batt/wall cgr/TTP | 319.00 | 269 <sup>95</sup> |
| 2201 Sub-audible tone encoder        | 55.00  |                   |
| 2202 Protective case                 | 9.75   |                   |
| 2425 30w amplifier                   | 79.00  |                   |
| 2700 Speaker/microphone              | 39.00  |                   |
| 2991 Extra 450 ma nicad battery      | 39.00  |                   |
| 2992 5 hour desk charger             | 79.00  |                   |
| 2993 12v adapter pack                | 25.00  |                   |



- 579 Century/22 50w 6-band CW Xcvr** \$389.00 359<sup>95</sup>
- |  |       |
|--|-------|
| 979 5A power supply                    | 89.00 |
| 979/E 230v 5A power supply             | 99.00 |
| 226 Crystal calibrator                 | 29.00 |
| 279 Mobile line filter/circuit breaker | TBA   |
| 679 Internal keyer kit                 | 27.00 |
| 1179 DC circuit breaker                | 10.00 |

- Misc. accessories** Regular SALE
- |  |       |                  |
|--|-------|------------------|
| 214 Electret desk mic w/4-pin plug       | 45.00 |                  |
| 700A Electret hand mic, 3-cond 1/4" plug | 29.95 |                  |
| 700C Electret hand mic, 4-pin plug       | 29.95 |                  |
| 670 Single paddle keyer                  | 39.00 |                  |
| 645 Dual paddle ultrasonic keyer         | 85.00 | 79 <sup>95</sup> |
| 209 300w dry dummy load                  | 26.00 |                  |

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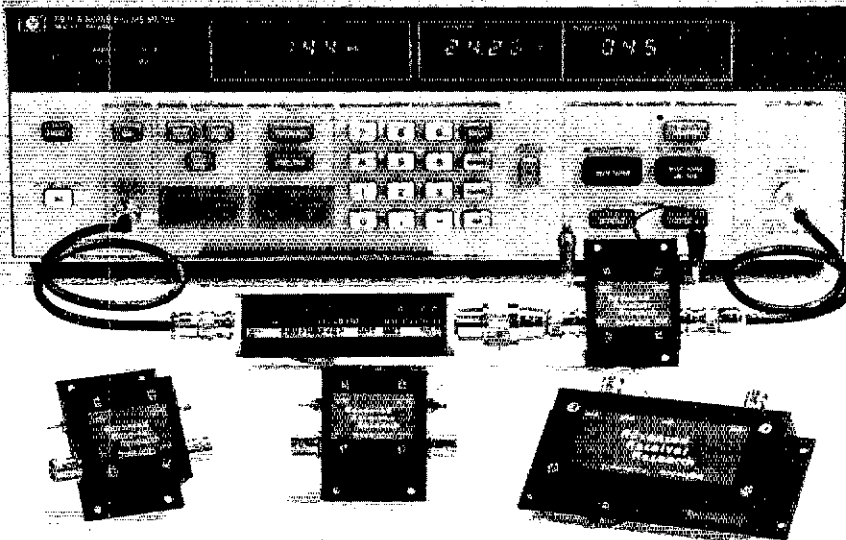
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P28VD	28-30	<1.1	15	0	DGFET	\$29.95
P50VD	50-54	<1.3	15	0	DGFET	\$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95

Inline (rf switched)	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.3	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	<1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	\$109.95

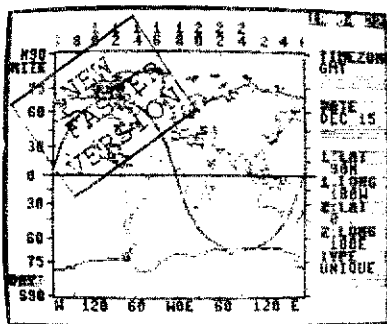
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facts; ZYGO A.R.C.: Again, large turnout, many contacts; Southington A.R.A.: A super location and a very good turnout; Stamford A.R.A.: 100% A.R.E.S. operators made a great turnout; N.A.R.A.: Fine turnout. That is all that I have received at present, but my congrats to all who participated for a job well done. Congrats to E.A.R.A. for the fine job of providing communications for the Memorial Day Road Race. Also for the Pomfret Quadrathlon, a 36 mile event! Traffic: WB1GXZ 350, W1EFW 185, KA1KPS 121, KA1KTH 86, KA1BHT 74, KA1JAN 73, KA1EGE 65, KA1GWE 63, W1WV 57, K1AQE 53, W1YOL 37, W1BDN 32, WA1NLD 11, N1BOW 11, W1CUH 7.

**EASTERN MASSACHUSETTS:** SM, Luck Hurdur, KY1T—ASM: N1BBT & K9HI, OJ1AA: KA1KF, SEC: KB1PA, STM: KW1U, ACC: K1AZE, TC: KA1IU, PIO/SGL: VACANT.

Net	Mgr.	Freq.	Time(Loc)/Dy	QTC	QNI
EMRI	N1AJJ	3658	1900/2200/Dy	344	293
EMRIPN	N1BGW	3880	1730/Dy	186	251
EM2MN	KA1AMR	63/23	2000/Dy	243	422
NEEP	K1BZD	3945	0830/Sn	13	56
HHTN	WB1CMQ	04/84	2230/Dy	220	415
EMRISS	KA1EXJ	3715	1600/2030/Dy	178	277
CITN	N1BYS	645/045	1930/Dy	75	295

Congrats and thanks to new SEC KB1PA for taking on one of the most important (and difficult!) functions in the section. Barry has already begun an extensive recruiting campaign and is polling DECs and ECs in regard to current ARES capabilities. Certificate hunters mark your calendars for all of October—Foxboro ARA has FB certificates for anyone who can work ten club members via the 147.375 Foxboro repeater. This is a nice (and certainly unique!) way for Techs to earn a certificate—Contact Frank, W1XA KA1IVJ KA1MJZ and WB1DSG. This was FARA's second VE session and is one of the many examples of EMAS clubs conducting ongoing exam opportunities. N1PSS reports that 10 stns representing the Allegheny ARES took up to Mt Escaloux for the 3rd VHF contest, putting seven bands on the air—FBI KA1KF banding (but not breaking!) under the strain from the increased Auxiliary membership. Bill isn't complaining certainly, and is still looking for a few sharp eyes and/or ears. OES/ATC AEIX successful with homebrew RTTY TU and has even modified a public domain program to use with it. STM KW1U and traffic stalwarts K1ABO and N1DDC both made BPL while Net Managers KA1EXJ, N1BGW and N1BYS made PSHR—as did KA1LIH, WA1TBY, K1ABO, KB1PA, KB1AF, WA1FCD, WA1DXT, KW1U and N1DDC. Any tfc people not receiving WA1BY's "Networks" should contact him pronto—it's super! Have you expressed your views to your Section Manager and Division Director lately? Traffic: KW1U 239, KY1K 234, KN1K 425, KA1EXJ 461, K1GRP 239, N1BGW 234, WA1TBY 232, K1ABO 225, WA1FCD 203, N1DDC 176, N1AJJ 165, KB1AF 148, WA1DXT 109, KA1EID 62, KB1PA 59, KO5 56, KA1KUC 53, W1ZHC 53, KA1AMR 50, N1BYS 50, W1CE 45, WB1CMQ 43, WA1SNH 26, K1BZD 24, KA1KU 22, WA1FNM 18, KE1L 17, W1QLL 17, KA1LIH 16, K1LCQ 14, KA1DJV 6, KY1B 2, A1EX 2.

**MAINE:** SM, Cliff Lavery, W1RWG—SEC: K1JIG/1, STM: AK1W, ACC: KY1C, BM: W1JTH, OOC: WL1K, PIO: KY1E, SGL: K1N1T, TC: K1PV. Congrats to KX11 newly elected pres of Mid-Coast RRC. Hams in west, central, and coastal Maine coordinated a comms link-up for the Maine Lung Assn's 194-mile bicycle "TREK ACROSS MAINE" from Bethel to Bar Harbor. DAY 1: Bethel to Farmington. W1HTG WA1P KY1O KA1GZ WA1XW DAY 2: Farmington to Pittsfield—KY1C KY1E KB1QK KA1JGF KA1GPO W1TGY W1JTH: DAY 3: Pittsfield to Ft. Knox—W1RU W1JTH W1TGY KA1FTO KA1HRZ—then Ft. Knox to Bar Harbor—K1JUG AK1W WA1PXD KA1LJZ WB9VKI KA9BAJ W1KMG KA1LUN. Over one hundred bikers participated. PSHR: WA1YNZ N1BUG KB1PB N1BJW. ARRL sanctioned Windsor Hamfest September 7, 1985. Windsor Fairgrounds, see N1CMZ. Traffic: W1ISO 124, AK1W 107, KA1JPP 82, KA1JQJ 72, N1BLZ 60, W1BXM 44, W1RWP 38, KB1PB 37, N1BJW 32, WA1YNZ 27, WB1GLH 23, W1GCB 17, W1KX 17, W1OTO 7, KA1FL 8, (May) KA1JPP 96, KB1PB 25, W1KX 32.

**NEW HAMPSHIRE:** SM, Bill Burden, WB1BRE—STM: W1TN, ACC: K11M. My first report as SM. Thanks to Bob, W1NH, for 20 years of dedicated service as SQM and SM. Club activities in NH increasing steadily. One of the newest clubs, the Kearsarge Amateur Radio Society began in 1985, presently has 12 members. Remember they are licensed 3 years. Notices: one of whom has upgraded. President Bob Boyd, N1CIR, reports Pub Serv activities includes 3 day Bikathon for NH Lung Assoc and a March of Dimes Walkathon. They did Field Day from atop Mt Kearsarge. A recent social was a dinner and tour of Concord Weather Station. Planned events include support of Hospital Day in local area and Fall Walkathon. Also planning to cohost a VE in the fall. Not bad—way to grow! Traffic: N1CPC 302, N1NH 189, AK1E 117, N1AKS 104, W1GLX 89, W1TN 89, W1FYR 81, WB1GXM 72, K1POV 65, KA1LW 63, K8LUX 42, W1ALE 45, N1ALM 42, KK1E 41, K1TQY 28, KA1HP0 17, K1ACL 17, W1OKU 3.

**RHODE ISLAND:** SM, John Vota, WB1FDY—#142 Routine N1AJJ 23 Mathew Mass, 7/3/85 To WB1FDY: E.M.R.I. 0 1985X Early 234 QTC 156 QNI 27 Sessions X Late QTC 137 QNI 28 Sessions 73's Bill N1AJJ #1 Routine N1BGN 12 Weymouth Mass., 7/3/85 WB1EDN, N1BGN, 300 QNI 251 QTC 186 X 73's Jack, EMRI SS Report QTC 178 QNI 277 59 Sessions X JOY KA1EXJ ACTIVITY Report Originated 0 received 98 sent 86 delivered 5 total 1979. Public Service Honor Roll 1/30 2/30 3/12 4/12 5/10 6/5 7/10 8/5 9/10 Total 94. Traffic: W1FOY 142, N1ASJ 23.

**VERMONT:** Ralph T. Stetson, KD1R—STM/BM: AE1T, SEC: W1CTM, SGL: W1KRV, ACC: OPEN, TC: OPEN, ATC: OPEN, OJ/AE: KD1R, QST ALL VERMONT AMATEURS YOUR HELP NEEDED! In following areas: Can you dedicate one hour a week, be able to keep track of who is on freq, using either voice or CW, keep good records, your services are needed as a Net Control Station, both on HF and VHF bands contact Pete AE1T VT/STM with a Radiogram indicating your interests. Do you have an interest in long range planning for communication problems dealing with local and wide area disasters contact Frank W1CTM VT/SEC by NTS Radiogram. Please include your Call, Address, Telephone Number and what your experiences are if any. Prior experience not required for all of these areas. Remember NTS Radiograms are a free service of Amateur Radio. With the approaching winter season let's get out and check our sky hooks ensuring they will fail at their appointed time. To our departing Snow Birds please let me know what your operating freqs and times are so I can let gang know where to find you. At the very least take advantage of the low sunspot activity and check into our VT nets on 75 Meters. Remember, we even have a Net for Novices, in the VSSN besides the GNM, VSSN and VTN. I am happy to report that VTN is undertaking

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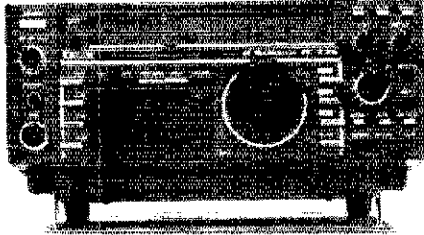
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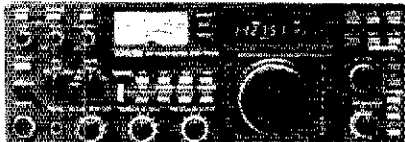
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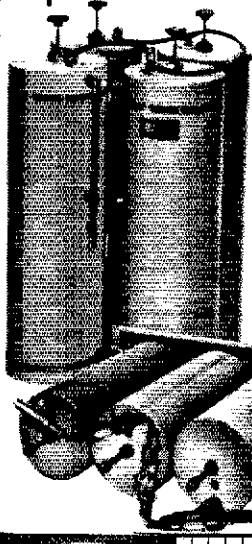
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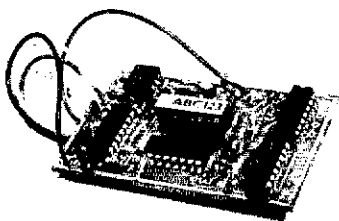


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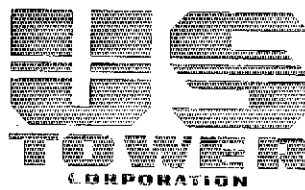
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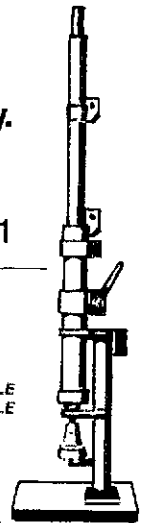
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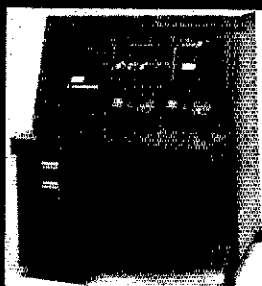
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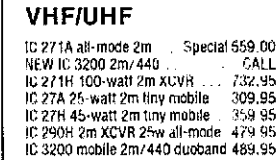
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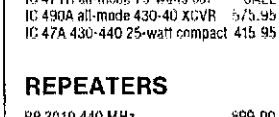
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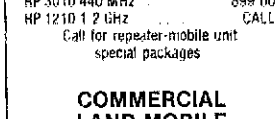
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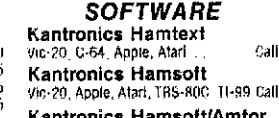
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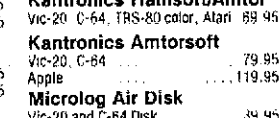
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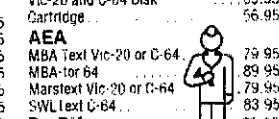
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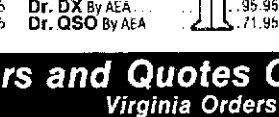
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IC 471H all-mode 75-watts out ..... CALL  
IC 490A all-mode 430-40 XCVR ..... 575.95  
IC 47A 430-440 25-watt compact ..... 415.95



IC 471A all-mode 430-450 ..... 689.95  
IC 471H all-mode 75-watts out ..... CALL  
IC 490A all-mode 430-40 XCVR ..... 575.95  
IC 47A 430-440 25-watt compact ..... 415.95



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IC 471H all-mode 75-watts out ..... CALL  
IC 490A all-mode 430-40 XCVR ..... 575.95  
IC 47A 430-440 25-watt compact ..... 415.95

IC 02AT CALL  
2m Handheld  
10 Memories  
Battery backup  
Scanning; LCD readout  
Offset in memory  
keyboard select PL tones  
Uses 2AT accessories

IC 04AT for 440 ..... CALL

IC 2AT 2m HT/Touchtone ..... 199.95  
IC 3AT 220 MHz HT/Touchtone ..... 229.95  
IC 4AT 440 MHz HT/Touchtone ..... 229.95

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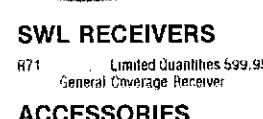
IC 735 HF Compact XCVR ..... CALL  
Includes General Coverage  
Available in May

## MARINE

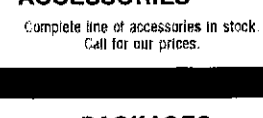
M12 12-ch Programmable HT ..... 219.95  
M2 76-channel Synthesized HT ..... 261.95  
M80 75-watt all-channel Scanner ..... 387.26  
M80C Commercial M80 ..... 429.95  
M5 all-channel HT ..... 325.95



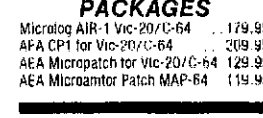
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M80 75-watt all-channel Scanner ..... 387.26  
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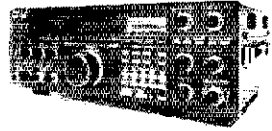
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M80C Commercial M80 ..... 429.95  
M5 all-channel HT ..... 325.95

## KENWOOD

### HF TRANSCEIVERS



TS-940S HF Transceiver ..... CALL  
With General Coverage Receiver

TS-930S HF Transceiver ..... CALL  
With General Coverage Receiver  
Optional Automatic Antenna Tuner

TS-430S HF Transceiver SUPER SPECIAL  
With General Coverage Receiver

TS-830S Transceiver ..... CALL  
160-10 Meter With Power Supply

TS-530SP Transceiver 160-10 M ..... CALL  
With Power Supply & Notch Filter

### RECEIVERS

R-2000, R-600, R-1000, R-11 ..... CALL  
General Coverage Receivers

### VHF/UHF

FR-7950/7930 ..... CALL  
2-meter Mobile Units: 45 or 25 Watts

FR-9130 2m all-mode 25W ..... CALL



FR-7950/7930 ..... CALL  
2-meter Mobile Units: 45 or 25 Watts

FR-9130 2m all-mode 25W ..... CALL

TM-211A or TM-411A ..... CALL  
2m or 70cm FM Mobile Transceivers

TM-201A 2m, 25-watt ..... CALL  
Dual Band 2m/70cm FM, 25 Watts

TW-4000A ..... CALL  
2m or 70cm All-mode Transceivers  
Usable as mobile or base station

TS-211A or TS-811A ..... CALL  
2m or 70cm All-mode Transceivers  
Usable as mobile or base station



TM-211A or TM-411A ..... CALL  
2m or 70cm FM Mobile Transceivers

TM-201A 2m, 25-watt ..... CALL  
Dual Band 2m/70cm FM, 25 Watts

TW-4000A ..... CALL  
2m or 70cm All-mode Transceivers  
Usable as mobile or base station

TS-211A or TS-811A ..... CALL  
2m or 70cm All-mode Transceivers  
Usable as mobile or base station

TS-211A, 21AT, TH-41A, 41AT ..... CALL  
2m or 70cm Ultra-compact FM XCVRS  
Pocket size, Optional touchtone pad

TS-211A, 21AT, TH-41A, 41AT ..... CALL  
2m or 70cm Ultra-compact FM XCVRS  
Pocket size, Optional touchtone pad

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2m or 70cm Ultra-compact FM XCVRS  
Pocket size, Optional touchtone pad

TS-211A, 21AT, TH-41A, 41AT ..... CALL  
2m or 70cm Ultra-compact FM XCVRS  
Pocket size, Optional touchtone pad

<b>BEARCAT</b>	
260 16-ch mobile	246.95
201 16-channel/aircraft	169.95
180 8-band/16-ch	184.00
2020 40-ch/aircraft	274.95
210XL	195.95
400 50-ch scanner/aircraft	341.00
<b>UNIDEN</b>	
Radar Detectors	Call
CB Radios	Call
<b>SONY</b>	
2002 SWL Receiver	209.95
NEW 2010 SWL Receiver	279.95
4910 SWL Receiver	89.95
<b>PANASONIC SWL</b>	CALL
<b>COBRA CBs</b>	CALL
<b>MIDLAND CBs</b>	CALL
<b>WHISTLER RADAR DETECTORS</b>	

<b>PACKET</b>	
AEA PKT1 Packet Controller	459.95
Kantronics Packet Controller	219.95
<b>HARDWARE</b>	
MFJ 1224 with MFJ C-64/V-20 Soft	79.95
MFJ New 1229	159.95
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Kantronics UTU Interface	169.95
AEA CP-1 Interface	179.95
AEA CP-100 Interface	284.95
AEA MP1 Micropatch	119.95

<b>SOFTWARE</b>	
<b>Kantronics Hamtext</b>	
Vic-20, C-64, Apple, Atari	Call
<b>Kantronics Hamsoft</b>	
Vic-20, Apple, Atari, TRS-80C, TI-99 Call	
<b>Kantronics Hamsoft/Amtor</b>	
Vic-20, C-64, TRS-80 color, Atari	89.95
<b>Kantronics Amtorsoft</b>	
Vic-20, C-64	79.95
Apple	119.95
<b>Microlog Air Disk</b>	
Vic-20 and C-64 Disk	39.95
Cartridge	56.95
<b>AEA</b>	
MBA Text Vic-20 or C-64	79.95
MBA-for 64	89.95
Marstext Vic-20 or C-64	79.95
SWLtext C-64	83.95
<b>Dr. DX By AEA</b>	95.95
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<b>PACKAGES</b>	
Microlog AIR-1 Vic-20/C-64	179.95
AEA CP1 for Vic-20/C-64	209.95
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AEA Microamtor Patch MAP-64	119.95
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From 1 Aug. to 30 Sep. 1985	
<b>10% Factory Rebate on TOWERS ROTATORS ANTENNAS</b>	
Limited to one item per category.	

<b>TE SYSTEMS RF AMPLIFIERS</b>	
With receive GaAs FET Pre-amplifier for superior weak signal reception with improved strong signal intermod rejection.	
<b>1410G 2m Amp 10W in-160 out</b>	309.00
<b>1412G 2m Amp 30W in-160 out</b>	269.00
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# Cents

## YAESU

### HF TRANSCEIVERS

NEW FT 757 HF XCVR with mic. 699.95  
with General Coverage RCVR  
includes CW Keyer, AM/FM, CW filter  
FT 77 with mic. SPECIAL 510.95  
Compact HF XCVR



FI 980 CAT System SPECIAL 1439.95  
AC Power Supply, Full Break-in CW,  
SSB/AM/FM/FSK, Speech Processor

### NEW SCANNER

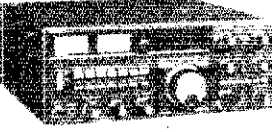
FRG 9600 Intro Price 549.95  
Continuous Coverage  
60 MHz-905 MHz, All mode

### HANDHELDS

FT 209RH 2m Handheld, Special 299.95  
All accessories in stock including:  
speaker mike, leather case, extra battery  
pack, base charger, & mobile charger

### VHF/UHF

FT 2700RH 2m/440 duo-band... 499.95  
FT 270RH 2m FM mobile... 369.95



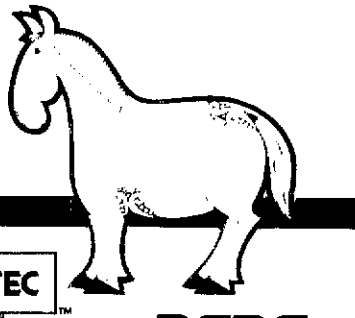
FT 226R For 2m... 759.95  
(Optional modules for 6m, 430, 440 MHz)  
Great for Satellite Work

### SWL RECEIVER

NEW FRG 8800 SWL Receiver 510.00  
VHF Converters, Active Antennas available

### COMMERCIAL LAND MOBILE AUTHORIZED DEALER

Call for information



NEW ST 200 Handheld CALL  
STLC Leather Case for ST 142 34.95  
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New ST-400ET 440 MHz HT 213.95  
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KDK  
NEW FM2033 2m 25-watt 259.95

Complete Line of Accessories in Stock  
— Call for Quotes —

WELZ  
TP5X Handheld watt meter 18.95  
SP10X 1.8-150MHz Watt Meter 32.95  
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HL30V 2m Amp 2-30 FM 59.95  
HL32V 2m all-mode Amp 2-30 74.95  
HL82V 2m Amp & Preamp 10-80 139.95  
HL160V 2m Amp/Preamp 2/10-160 288.95  
HL20U 440-450 MHz Amp 2-20 98.95  
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HC200 300-watt, Meter/Switch 86.95  
HC2000 2000-wt, Meters/Switch 295.95



2591 2m Synthesized Handheld 259.95

Century 22 CW Xcvr 350.00

2510 Model B 418.95  
Satellite Station for Oscar 10

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225 Argosy Power Supply 129.00  
260 Power Supply for Corsair 173.50  
229 1kW Tuner/Meter 249.95  
4229 1kW Tuner Kit 179.95  
2991 Battery Pack for 2591 39.00  
2700 Speaker Mic for 2591 39.00  
— All Accessories in Stock —

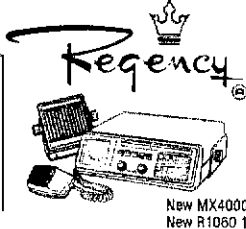


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Model 580—CALL

Full line of accessories in stock  
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### DIGITAL ARGOSY II MODEL 525D—519.95



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HX1000 20-ch  
Handheld 199.95  
NEW HX2000  
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800-900 MHz

New MX4000 mobile 30-900 MHz 389.00  
New R1060 10-ch 6-band Intro 99.95  
MX3000 30-ch, 6-band mobile 212.95  
MX5000 20-ch 25-512 MHz cont. 349.95  
MX7000 25 MHz-1.2 GHz 445.00  
Z30 30-ch, 6-band 159.95  
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B1016 2m Amplifier 10-160 242.95  
B3016 2m Amplifier 30-160 199.95  
B1010 10-100 Amp for 430-50 269.95  
B1010N UHF Amp/N connectors 279.95  
B215 2m Amp: 2 in, 150 out 245.95  
A1015 6m Amp: 10 in, 150 out 242.95

### AMERITON HF AMPS

ATR15 Ant Tuner 1500 watt 289.95  
ATR10 Ant Tuner 1 kW 242.95  
RC58 Remote Coax Switch 113.95  
NEW AL 1200 1.5 kW Amp 1389.95  
NEW AL80A 1200 watt Amp 689.95  
AL84 HF Amp 160-15 389.95

### AMP SUPPLY

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LK 5000T HF Amp no tune 1185.00  
AT 1200A 1200 PEP Tuner 169.95  
LK 5002B 2.5 kW hipersil 1132.95

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LA-2035 2m Amplifier, 2 in, 30 out 69.95  
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2 watts in, 30 watts out 2m Amp 69.95  
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2 watts in, 120 watts out 2m Amp 169.95  
200mW in, 30 watts out 2m Amp 84.95

KENWOOD T1922 7kW CALL

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RS12A 69.95 RS35M 149.95  
RS20A 89.95 VS20M 124.95  
RS35A 133.95 VS35M 169.95  
RS50A 189.95 RS50M 209.95

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173C 24-hour Digital 24.95  
963A 10" 24-hour Wall Clock 29.95  
973A 12" 24-hour Wall Clock 38.95

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375 6-position Coax Switch 23.50  
376 5-position Coax Switch 23.50  
425 1 kW Low Pass Filter 27.50  
593 3-position Coax Switch 25.25  
595 6-position Coax Switch 29.95  
AP-10 5-band Apartment Antenna 39.95  
370-15 All-band Dipole Antenna 129.95

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CN-520/CN-540 Meters 59.95/69.95  
CN-620B Meters 106.00  
CN-630 Meter 126.00  
CN-720B 2kW HF Watt Meter 120.00  
CNW-419 Antenna Tuner 500 W 174.95  
CNW-518 Antenna Tuner 2.5 kW 279.95

# ANTENNAS & TOWERS



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CUSHCRAFT  
A3 3-element 10-15-20m 205.00  
A4 4-element 10-15-20m 264.95  
E3 10-15-20m Vertical 256.95  
214B SSB/215WB FM 2m Boomers 73.00  
ARX-28 2m Ringo Ranger 34.95  
A3219 2m Boomer 88.00  
10-4CD 4-element 10m 104.95  
15-4CD 4-element 15m 118.95  
40-2CD 2-element 40m 274.95  
Other Cushcraft models available CALL

KLM  
KT34A 4-element 10-15-20m 334.95  
K134XA 6-element 10-15-20m 479.95  
2m-11X 11-element 2m 59.95  
2m-16L BX 15-element 2m 91.95

MOSLEY  
OL-33 3-element Triband Beam 265.95  
TA-33 3-element 10-15-20m 239.95  
Pro 37 7-element 10-15-20m 465.95

HUSTLER  
6-BTV 10-80m Vertical with 30m 128.95  
5-BTV 10-80m Vertical 108.95  
4-BTV 10-40m Vertical 87.95  
G6-440 440 MHz Base Vertical 96.95  
G7-144 2-meter Base Vertical 115.95  
G6-440 440 MHz Base Vertical 96.95  
MO-1/MO-2 Masts 21.50  
BM-1 Bumper Mount 14.95

MOBILE RESONATORS Standard Super  
10 and 15 meter 11.95 17.95  
20 meters 15.50 21.85  
30 and 40 meters 17.95 25.95  
75 meters 19.95 36.95

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391S TH7DX 7-ele 10-15-20m CALL  
393S TH5DX 5-ele 10-15-20m CALL  
395S Explorer 14 10-15-20m CALL  
203S 3-element 2-meter Beam CALL  
208S 8-element 2-meter Beam CALL  
214S 14-element 2-meter Beam CALL  
BN86 Beam Balun CALL  
V2S 2-meter Vertical CALL  
V4S 440 MHz Vertical CALL

### AEA ISOPOLES

144 2-meter Antenna 41.95  
220 220 MHz Vertical 41.95  
440 440 MHz Vertical 57.95

### ANTENNAS FOR OSCAR

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Cushcraft A14410T 10-ele 46.95  
Cushcraft A14420T 20-ele 64.95  
Cushcraft AOP1 Package 137.95  
KLM 2m-14C 2m 14-ele Circular 88.95  
KLM 435-18C 18-ele Circ Polar 111.19  
KLM 2m-22C 22-ele Circ 2m 109.00

### MORE ANTENNAS

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LARSEN LM-150 5/8 Mag Mount 39.95  
MINIQUAD HQ-1 141.95  
BUTTERNUT HF6V 10-80m Vert 109.95  
BUTTERNUT HF3B 2-ele Beam 169.95  
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Cablewave Hardline CALL

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HBX40 40-foot with Base 198.00  
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HBX56 56-foot with Base 335.00  
HDX40 Higher load with Base 248.00  
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*(Other BX HBX HDX in stock)*

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FK4554 54-foot 455 1295.00

*Other sizes at similar savings  
Towers shipped freight paid  
10% higher west of the Rockies*

### Straight Sections:

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25G Straight Section 48.95  
46G Straight Section 109.00

### Complete Tower Packages:

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40' 499.95 875.95  
50' 549.95 989.95  
60' 599.95 1099.95

*Each package includes top section, mid section, base, nut shell, guy brackets, guy wire, turnbuckles, equalizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages air shipped. Freight collect. FOB our warehouse.*

### HY-GAIN TOWERS

HG37SS 37-foot tall CALL  
HG52SS 52-foot tall CALL  
HG54HQ 54-foot/higher load CALL  
HG70HD 70-foot/higher load CALL  
*Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all.*



W36 36-foot tall 549.00  
WT51 51-foot tall 928.00  
LM364 54-foot/higher load 1575.00  
DX86 86-foot/motor/higher load CALL  
*Shipping not included. Shipped direct from factory to save you money.*

### CABLE BY SEXTON

RB213 Mil Spec 29'/ft  
RG8/U Foam 95% Shield 25'/ft  
8-wire Rotator 2 #18 5 #22 17'/ft  
Mini-8 95% Shield 13'/ft

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Alliance HD73 105.00  
Hy-Gain CD45 II CALL  
Hy-Gain Ham IV CALL  
Hy-Gain Tallwister TXX CALL  
Hy-Gain Heavy-duty 300 CALL  
Kenpro KR500 Elevation Rotator 159.95

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831SP 1050 Nickel PL259 0.75  
8261 Type N RG8 2.50  
2900 50239-BNC 2.99  
3112 BNC RG59 1.35  
312 BNC RG58 1.25  
831R5 Reducer RG58 0.25  
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*Special discounts on 100-piece purchases*



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Oscilloscopes  
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Telephone Test Equipment  
Function Generators  
Now in stock...CALL

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Procom 350 Procom 450  
Procom 250 and others

### BIG DISCOUNTS

Call for our prices

### BENCHER PADDLES

Black/Chrome 38.95/48.95

### MFJ PRODUCTS

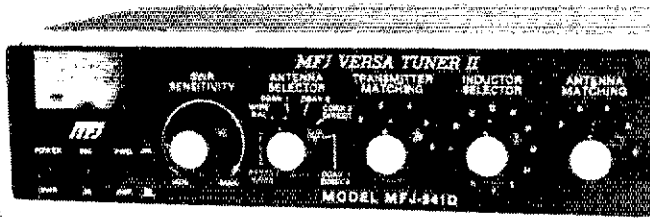
989 3 kW Antenna Tuner 285.95  
962 1.5 kW Tuner switch/meter 185.95  
949C 300-watt Deluxe Tuner 129.95  
9410 300-watt Tuner swch/meter 89.95  
1020A Active Antenna 89.95  
802 Noise Bridge 48.95  
752B Dual Tunable SSB/CW Filter 79.95  
Keyers—407, 422, 484 CALL  
Other MFJ products in stock CALL

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# MFJ ACCESSORIES

**300 WATT ANTENNA TUNER HAS SWR/WATTMETER, ANTENNA SWITCH, BALUN. MATCHES VIRTUALLY EVERYTHING FROM 1.8 TO 30 MHz.**



**\$99.95** MFJ-941D

**NEW FEATURES**

- MFJ's fastest selling tuner packs in plenty of new features!
- **New Styling!** Brushed aluminum front. All metal cabinet.
- **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.
- **New Antenna Switch!** Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.
- **New airwound inductor!** Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 watts RF power output. Matches everything from 1.8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines. Built-in 4:1 balun for balanced lines. 1000V capacitor spacing. Black. 11x3x7 inches. Works with all solid state or tube rigs. Easy to use, anywhere.

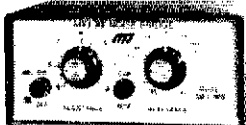
## RTTY/ASCII/CW COMPUTER INTERFACE

MFJ-1224  
**\$99.95**

Free MFJ RTTY/ASCII/CW software on tape and cable for VIC-20 or C-64. Send and receive computerized RTTY/ASCII/CW with nearly any personal computer (VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, etc.). Use Kantronics or most other RTTY/CW software. Copies both mark and space, any shift (including 170, 425, 850 Hz) and any speed (5-100 WPM RTTY/CW, 300 baud ASCII). Sharp 8 pole active filter for CW and 170 Hz shift. Sends 170, 850 Hz shift. Normal/reverse switch eliminates retuning. Automatic noise limiter. Kantronics compatible socket plus exclusive general purpose socket. 8x1 1/4x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.

## RX NOISE BRIDGE

Maximize your antenna performance!



**\$59.95** MFJ-202B

Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.

**New Features:** individually calibrated resistance scale, expanded capacitance range ( $\pm 150$  pt). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

## INDOOR TUNED ACTIVE

**NEW! IMPROVED! ANTENNA** with higher gain "World Grabber" rivals or exceeds reception of outside long wires!

Unique tuned Active Antenna minimizes intermode, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antennas. Covers 0.3-30 MHz. Tele scoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.



**MFJ-1020A \$79.95**

## POLICE/FIRE/WEATHER 2 M HANDHELD CONVERTER

Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner!

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA maritime coastal plus more on 160-164 MHz. Converter mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (up to 5 watts). Use AAA battery. 2 1/4x1 1/2x1 1/2 in. BNC connectors.

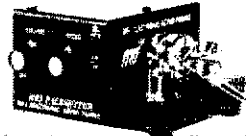
**\$39.95** MFJ-313



## MFJ/BENCHER KEYSER COMBO

MFJ-422  
**\$109.95**

The best of all CW worlds - a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher Iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044-B IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, \$9.95.



## VHF SWR/WATTMETER

Low cost VHF SWR/Wattmeter!

Read SWR (14 to 170 MHz) and forward/reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

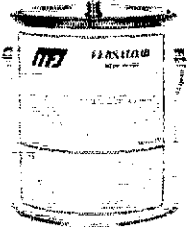
**MFJ-812 \$29.95**



## 1 KW DUMMY LOAD

Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP. VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7 1/2x6 1/4 in.

**MFJ-250 \$39.95**



## 24/12 HOUR CLOCK/ID TIMER

MFJ-106  
**\$19.95** NEW

Switch to 24 hour UTC or 12 hour format! Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Red LED .6 inch digits. Synchronizable with WWV. Alarm with snooze function. Minute set, hour set switches. Time set switch prevents mis-setting. Power out, alarm on indicators. Gray and black cabinet. 5x2x3 inches. 110 VAC, 60 Hz.



## DUAL TUNABLE SSB/CW/RTTY FILTER

**MFJ-752B \$99.95**



Dual filters give unmatched performance! The primary filter lets you peak, notch, low pass or high pass with extra steep skirts. Auxiliary filter gives 70 db notch, 40 Hz peak. Both filters tune from 300 to 3000 Hz with variable bandwidth from 40 Hz to nearly flat. Constant output as bandwidth is varied; linear frequency control. Switchable noise limiter for impulse noise. Simulated stereo sound for CW lets ears and mind reject QRM. Inputs for 2 rigs. Plugs into phone jack. Two watts for speaker. Off bypasses filter. 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, \$9.95.

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# MFJ TUNERS

**QUALITY TUNERS THAT DELIVER MORE PERFORMANCE,  
MORE FEATURES, MORE VALUE FOR YOUR MONEY.**

## MFJ-941D 300 WATT VERSA TUNER II

**\$99<sup>95</sup>** MFJ's fastest selling tuner packs in plenty of new features.  
**New styling!** Brushed aluminum front. All metal cabinet.  
 (+\$4) **New SWR/Wattmeter!** More accurate. Switch selectable 300/30  
 watt ranges. Read forward/reflected power.

**New antenna switch!** Front panel mounted. Select 2  
 coax lines, direct or through tuner, random wire/  
 balanced line or tuner bypass for dummy load.

**New airwound inductor!** Larger more efficient  
 12 position airwound inductor gives lower losses and  
 more watts out. Run up to 300 watts RF power output.

Matches everything from 1.8 to 30 MHz:  
 dipoles, inverted vee, random wires,  
 verticals, mobile whips, beams, balanced  
 and coax lines.

Built-in 4:1 balun for balanced lines.  
 1000 V capacitor spacing. Black.  
 11 x 3 x 7 inches. Works with all  
 solid state or tube rigs.  
 Easy to use anywhere.

## MFJ-949B 300 WATT DELUXE VERSA TUNER II

**\$139<sup>95</sup>** MFJ's best  
300 watt  
Versa

tuner II. Matches every-  
 thing from 1.8 - 30 MHz,  
 coax, randoms, balanced  
 lines, up to 300W out-  
 put, solid state or tubes.

Tunes out SWR on di-  
 poles, vees, long wires,  
 verticals, whips, beams,  
 quads.

Built-in 4:1 balun.  
 300W, 50-ohm dummy  
 load, SWR meter and 2  
 range wattmeter (300W  
 and 30W).

6 position antenna  
 switch on front panel, 12  
 position air-wound in-  
 ductor; coax connectors,  
 binding posts, black and  
 beige case. 10 x 3 x 7 in.

MFJ-940B, \$79.95, 300 watts, SWR/Wattmeter, antenna switch on rear.  
 No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.

MFJ-945, \$79.95, like MFJ-940B with balun, less antenna switch.

MDJ-944, \$79.95, like MFJ-940B with balun, antenna switch on  
 front panel, less SWR/Wattmeter.

Optional mobile bracket for 940B, 945, 944, \$5.00.

## MFJ-900 200 WATT VERSA TUNER

Matches coax, random wires 1.8-30 MHz.  
 Handles up to 200 watts output; efficient  
 airwound inductor gives more watts out.

**\$49<sup>95</sup>**  
 (+\$4)

5x2x6 in. Use any transceiver, solid state or tube.

Operate all bands with one antenna.

**OTHER 200 WATT MODELS:**

MFJ-901, \$59.95, like 900 but includes  
 4:1 balun for use with balanced lines.

MFJ-16010, \$39.95, for  
 random wires only. Great for  
 apartment, motel, camping,  
 operation. Tunes 1.8-30 MHz.

## MFJ-962 1.5 KW VERSA TUNER III

Run up  
to 1.5  
KW PEP  
**\$229<sup>95</sup>**  
 (+\$10)

and match any feedline  
 continuously from 1.8 to  
 30 MHz; coax, balanced  
 line or random wire.

Built-in SWR/Wattmeter  
 has 2000 and 200 watt  
 ranges, forward and re-  
 flected power. 2% meter  
 movement. 6 position an-  
 tenna switch handles 2

coax lines (direct or  
 through tuner), wire and  
 balanced lines. 4:1 balun  
 250 pf 6 KV variable  
 capacitors. 12 position in-  
 ductors. Ceramic rotary  
 switch. All metal black

cabinet and panel gives  
 RFI protection, rigid con-  
 struction and sleek styl-  
 ing. Flip stand tilts tuner  
 for easy viewing.

5 x 14 x 14 inches.

## MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

**\$329<sup>95</sup>** Meet "Versa Tuner V". It has all the features you asked  
 for, including the new smaller size to match new smaller rigs -  
 only 10 3/4"W x 4 1/2"H x 14 7/8"D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP-  
 the power rating you won't outgrow (250 pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise  
 inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges

(200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter  
 MFJ-1312 is available for \$9.95.

6-position antenna switch (2 coax lines, through tuner or direct, random/  
 balanced line or dummy load). SO-239 connectors, ceramic feed-throughs,  
 binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection,  
 black finish, black front panel with raised letters, tilt bail.

MFJ-981, \$239.95. 3 KW, 18 position switched dual inductor.  
 SWR/Wattmeter. 4:1 balun.

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- **DURA-FLEX neoprene elastomer** significantly advances antenna shock absorption technology.
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to support all local FM nets in VT Section, so let Ed KT1Q know if you're not getting support. Looking forward to meeting everybody on the VT2FM (NM Bob W1RNA) and the VSSN (NM Joe W1KRV) hope the Net Manager had a good summer off. I know they are looking for your continued support; so let's participate in the nets and renew old acquaintances. One last thought: LEAS contact your local Red Cross Chapter and enroll in a CPR and First Aid Class, these are two valuable skills that will stand by you for life. Reports June: VTN 23/89/54; V5BN 29/35/86; VTRFD 5/6/36; GMN 25/33/34; CAR 27/89/25; VTPN 5/8/4; CVFM 5/8/4. Let's keep those cards and letters coming so I can more accurately report VT Section Activities. Traffic: KT1Q 309, AE1T 126, W1KRV 64, N1BGY 16, W1OAK 13.

**WESTERN MASSACHUSETTS:** SM, Don Haney, KA1T—SEC/SGL: WB1HH, OO/RFI: N1CM, PIO/ACC: K1BE, TC: KA1JMM, STM: W1UD. Welcome to several new appointees. K1ISW is new EC for South Worcester County. New Public Info Assts. are WA1LES and KA1KPH. And W1NMQ, WA1POB, KR1R, KB1W, KA1CFE are new Asst. EC's in their counties. Last weekend in June was great success at Basketball Hall of Fame with operation of N1BHF sponsored by WORA with strong support of Mt. Tom, Provin Mtn. and NOBARC clubs. Station made BPL with 122 originations. But somehow the hams couldn't recognize those real tall guys walking around. Thought Dr. J was a new soft drink. Comms for Worcester Triathlon provided by CMARA again this year. And the first Explorer from Post 73 to pass his Novice is KA1NAH, PSHR: WB1HH, N1DMU. Traffic: N1DMU 161, W1UD 145, N1BHF 144, W1SJV 94, WB1HH 86, KA1T 78, KA1JV 38, W1JP 34, K1JHC 24, KA1CRX 20, WA1OPN 8, WB1FSV 5, W1ZPB 5. (May) W1KK 79, KA1EKQ 46, WB1HH 47, K1JV 26, WA1OPN 22, WB1FSV 12, W1ZPB 6.

## NORTHWESTERN DIVISION

**IDAHO:** SM, Lem Allen, W7JMH—SEC: KD7HZ, STM: W7GHT, PIO: WB7PFC, OO: KU7Y, RFI: K7QQP, CLUB NEWS: Eagle Rock Radio Club takes the pennant for having 14 ops out at Hille Dam for FD and all were ARES Members. Congrats to Pres. Geo. Siegel. 4 ops went to Idaho City from the DX Club on FD. Clearwater Valley ARC FD site was Wild Horse Lake with 4 ops. Many other FD operations went unreported. The Boise Club furnished Comm. for the Soccer Tourney again, under the leadership of EC K7CXG. The VOI Club is sponsoring VE Exams at Borah Hi School August 10 (Boise) starting at 1 P.M.: Contact N7FYZ. PEOPLE AND THINGS: W7JMH, N7DYU, K7IVW and kids vacationed at Yellowstone Park June 16-17-18. KD7JN has new TS-430. Congrats to the following who upgraded at the Twin Falls Swapfest Exams: KA7UGT new A, KA7UVF, WB7DQT, KA7TFE new G's, KA7VKF new T. Also N7HET, WB7DZX have new 20-WFM Certificates. All others try again.

**NET REPORTS:**

ID CD	Freq.-Time	Sess.	QNI	QTC
FARM	3990 Lsb 810A M-F	20	746	29
IMN	3557 Lsb 9 PM Da	30	1921	127
NW TFC	3835 CW 9 PM M-F	20	200	88
	146.38/98FM 630P Da	30	638	5

**GENERAL:** Send a message to your SM once in a while with news from your area to be included in this report. I'm really getting stale by myself! TNX—Lem. Traffic: KA7KAI 117, W7JMH 95.

**MONTANA:** SM, Les Belyea, N7AIK—WB7AZJ led a group of 17 on a geological tour through Yellowstone National Park, the group used 2M to keep in touch and ended up at the QTH of W7OTJ near Fishfall for a picnic and overnight camp out. Congrats to KE7EK and KA7OUS who placed first and second in the Butte High School Science Fair, and went on to take first in their divisions at the state competition. W7CRV was presented a plaque by the Yellowstone ARC to commemorate his many years of service to the club. K8PP has made many visits to clubs, showing slides of the Dayton Ham Fest. Upgrades reported. To test: WB7OZU, KA7VER, To gen - KA7UOX, KA7QVN, WB7SIE, KA7TEI. To adv - N7HFT. To extra - WB7ABS.

**Net Sess. QNI QTC Mgr.**

MSN	6	83	0	K8PP
IMN	20	200	88	WA7BDD
MTN	30	1356	115	K7FR

Traffic: KF7R 138, KA7KHL 135, N7AIK 32, WA7TUW 8, WB7WVD 6.

**OREGON:** SM, William R. Shrader, W7QMU—STM: W7VSE, SEC: N7CPA, PIO: KC7YN, SGL: KA7KSK, STC: N7ENI, ACC: KB7CC, OO: N7SC. Upgrades: WA7YUR, KC7MY (Extra); N7GMS (Advanced); KA7JJP (Tech); KA7UEB, KA7UEA, KA7UDZ, KA7VOJ, KA7VOK, KA7VBM, KA7VBN, KA7VBO, KA7VBP, KA7VLN, KA7VNL (Novice), W7ZZ won the big prize at Seaside (complete Kenwood station). W7FIU has new junior op. K8PP is the new Section Affiliated Club Coordinator. WA7AWJ has been assigned the task of Official Emergency Station for the Portland Metro 5 county area. K7RUN is the new Emergency Coordinator for the City of Portland. K7WWG is new Asst Tech. Coordinator for Portland Area. Congrats to all Portland Clubs did fine job with Rose Festival Communications. This is the season for Public Service projects, pitch in and participate. Lots of reports came in from Field Day, with many clubs active. KK7C and WB7BIV operated FD at Lake of the Woods with 1 watt QRP/Solar Power. Traffic: W7VSE 799, N7FLC 430, W7LRB 270, WB7VSN 286, KC7VOK 194, W7ZB 168, AL7W 140, N7FXJ 94, N7BGW 76, KA7AID 20, W7LFL 14, W7LNE 6. (May) W7VSE 879, N7FLC 287, W7LRB 258, W7LVB 161, K7VOJK 117, KX7W 87, AL7W 75, N7BGW 55, KA7AID 35, N7FXJ 34, W7MLM 18, W7LNE 15, KX7T 11. (Apr.) W7ZB 160. (Mar.) W7ZB 128.

**WASHINGTON:** SM, Joe Winter, WA7RWK—STM: K7GXZ, SEC: W8IIB, BM: N7IL, TC: K7UJ, PIO/SGL: W7CKZ, OO/COORD: KC7FA, ACC: KD7G.

**Net Freq. Time(Q) QNI QTC Mgr.**

EWTN	146.84/	0030/0430	72	40	WA7CBN
NTN	3970	1900	1051	90	W7UJ
NWSSB	3945	0130	701	52	W7HFN
PST6	145.93	0030/0430	201	164	W7IEU
WARTS	3970	0100	2950	250	W7SFT
WSN	3590	0145/0445	527	185	W7GB
WARNS	3940	0200	AR NEWS NET	W7CKZ	

**HAMFESTS:** Walla Walla HF Sept. 21-22. On September 30th my second two year term as Section Manager will end. I decided not to file for reelection again in order to do the many things in my life that I had put on hold. Serving the amateur community has been rewarding. I shall always cherish the many friends that I've made. I wish to thank the Staff, the many appointees and friends for their help which made my job pleasurable. Without such help

# NEW Alpha Delta Model DX-A 160-80-40 METER QUARTER WAVE TWIN SLOPER ANTENNA

The Model DX-A combines the tremendous firepower of the quarter wave sloper with the wide bandwidth of a half wave dipole. Simple to install, quick to tune. Proven longhaul DX performance.

- Installs like an inverted-V dipole. One leg for 80 meters (67') and the other leg for 160/40 meters (55'). Fed with a single 50 ohm coax. SO-239 connector provided on mounting bracket.
- Configuration provides wide bandwidth on all three bands. Typically 70 kHz on 160 meters, 200 kHz on 80 meters and full band on 40 meters. Much wider than most other loaded slopers, dipoles or verticals. Tuner usually not required.
- Model DX-A also operates on 30-17-12 meters. VSWR of less than 2.5:1. Easily matched with a tuner.
- High-power operation. Rated at 1500 watts P.E.P. output. No traps to break

down. A single "ISO-RES" isolator-resonator is used in the 160/40 meter leg.

- Current lobe up high for maximum radiation and excellent DX performance. Can be installed from 25 to 40' high.
- The Model DX-A Antenna is fully assembled, uses all stainless steel hardware, a UV-protected "ISO-RES" coil, #12 copper wire and is rated for severe environments. Specially coated wire disappears from your neighbors' view.

**\$49.95** Available from your local Alpha Delta Dealer or add \$3.00 shipping and handling (USA only).

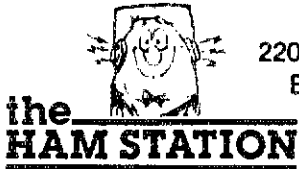
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A5 80-10M Vertical	99.00
VHF-UHF	
215WB 2M Wide Band	79.00
230WB Stacked 215's	219.00
32 19 Boomer 19ELE 2M	95.00
A147-4	32.95
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AP200 3G 220 MHZ on Glass	38.00
AP450 3G 450 MHZ	34.00
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<b>HUSTLER</b>	
G7 144 2M Vertical	\$119.95
G6 144 2M Vertical	85.95
G6 440 440 Vertical	109.95
68TV 80-10M Vertical	129.95
MD-2 Mast	23.95
RM-80 400W PEP	19.95
RM-75 400W PEP	19.95
RM-40 400W PEP	18.95
RM-30 400W PEP	17.95
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TBR-160S 160M Reasonator	49.00
RMK-II Roof Mount Kit	49.00
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HI-2V 80 40M Vertical	119.00
2MGV-5 5 2 WAVE 2M Vertical	55.00
SC-3000 30-512MHZ Scanner Ant	55.00
<b>COAX SWITCHES</b>	
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<b>DUAL BAND ANTENNAS</b>	
ICOM LARSEN WEL7	

<b>LARSEN</b>	
NLA 150 220 450 MAG Mnt.	ea \$42.95
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<b>CABLE</b>	
Standard 8 Cond	25 ft
Heavy Duty 8 Cond	36 ft
RG8U 97%	35 ft
RG8X 97%	25 ft
RG213U	35 ft
<b>AEA</b>	
isopole Jr. 144 or 220	\$39.95
isopole 144 or 220 Mhz	45.00
isopole 440 Vertical	64.95
Hot Rod H.T. Ant 144 or 220	19.95
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Alliance U-110	\$49.95
Alliance HD-73	109.95
Darwa	Call for Price
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Isopoles, Hot Rods, Software in Stock	
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RS10A 7.5-10 Amp	59.00
RS12A 9-12 Amp	69.00
RS20A 16-20 Amp	89.00
RS20M 16-20 Amp w meter	109.00
RS35A 25-35 Amp	135.00
RS35M 25-35 Amp w meter	149.00
RS50A 37-50 Amp	199.00
RS50M 37-50 Amp w meter	225.00
<b>BENCHER</b>	
BY-1 Black /By-2 Chrome	\$39.49.00
ZA-1A Balun	19.00
<b>DAIWA</b>	
CN-520 1.8-60 MHZ Mtr.	\$ 63.00
CN-620 B 1 8-150 MHZ Mtr.	110.00
CN-630 140-450 MHZ Mtr.	129.00
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1229 Interface/free Software	\$159.95
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1228 Interface/free Software	59.95
989 3KW Roller Inductor tuner	289.95

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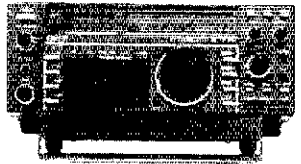
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"Call for Discount Price."

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941D 300 W full feature tuner	89.95
204 Antenna Bridge	71.95
422 Keyer Bencher Combo	99.95
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B23A 2 30W-Preamp	89.95
D1010N 10-100W 430-450 MHZ	289.95
<b>NYE</b>	
MB-V-A The Ultimate Tuner	\$499.95
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444D Hi-Lo Z Desk Mic	\$55.00
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NEW Corsair — Very Nice	CALL
Century 22 CW Xcvr	\$ 349.95
2510 Satellite Station	409.95
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HL 30V 3 30W Amp	\$ 62.95
HL35V 3 30 Amp w Gaslet	75.00
HL160V 3 10-160W Amp	295.95
HL 160V25 25-160W Amp	259.95
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HL 120U 430-449 MHZ	
10-100W Amp	319.95
HC-2000 2KW Tuner	285.95
HC 400L Tuner w Dual Needle Mtr.	175.95

**ICOM**

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HRA-2 2 Mtr. Gaslet Preamp	119.95
HRA-7 70 CM Gaslet Preamp	119.95
<b>WELZ</b>	
SP-220 1 8-220 MHZ Peak Mtr.	\$49.95
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SP-420 140-525 MHZ Peak Mtr.	63.95
<b>YAESU</b>	
FT-980 Deluxe Xcvr	\$1425.00
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FT-757AT Autotuner	235.00
FT-726R Multi Band Xcvr	CALL
FT-270H 45W 2 Mtr	375.00
FT-2700 RH 2 Mtr 440MHZ	489.95
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FRG-9600 60-960MHZ Scanning	
Recvr	CALL



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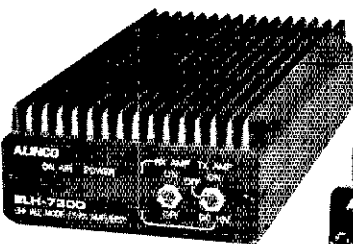
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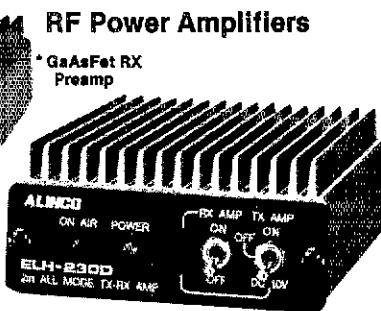


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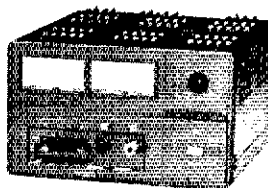
ELH-730D  
List \$158.95



ELH-230D  
List \$89.95

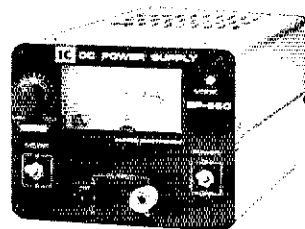
## RF Power Amplifiers

\* GaAsFet RX Preamp



EP-3030 List \$208.00

## Power Supplies



EP-680 List \$69.00

Model	ELH-230D	ELH-260D	ELH-730D
Frequency Range	144-148MHz	144-148MHz	440-450MHz
Modes	All Mode (FM SSB CW)	All Mode (FM SSB CW)	All Mode (FM SSB CW)
Input Power	1W-3W	1W-3W	3W
Output Power	30W	50W	30W
Power Source	DC13.8V/45A	DC13.8V/10A	DC13.8V/7A
RX-PRE-AMP (About)	10dB	10dB	15dB
Input & Output Impedance	50Ω	50Ω	50Ω
Dimension (W x H x D)	3.6" x 1.6" x 6.5"	3.6" x 1.6" x 8.5"	3.6" x 1.6" x 7.75"
N/W	18 oz.	24 oz.	23.5 oz.

Model	EP-3030 (With Two Meters)	EP-680 (With Dual Meter)	EP-3500 (With Two Meters)
Output Voltage	About 10V-15V D.C. (With Voltage Adjuster on rear side)	About 10V-15V D.C. (With Voltage Adjuster on rear side)	About 10V-15V D.C. (With Voltage Adjuster on rear side)
Output Current	25A D.C. (Continuous) 30A D.C. (Max.) 50% Duty Cycle	5.5A D.C. (Continuous) 6.5A D.C. (Max.)	50A D.C. (Continuous) 55A D.C. (Max.)
Ripple Voltage	Under 30mV (P-P) (Rated)	Under 30mV (P-P) (Rated)	Under 30mV (P-P) (Rated)
Power Consumption	770VA (Rated)	180VA (Rated)	1300VA (Rated)
Circuit Protection System	Automatic Current Limiting System shuts down in excess of 30 amps	Automatic Current Limiting System shuts down in excess of 6 amps	Automatic Current Limiting System shuts down in excess of 55 amps
Dimension (L x W x H) Weight	13" x 9 1/2" x 9" 19 lbs.	9" x 4 1/2" x 4" 6 1/2 lbs.	18 1/2" x 12 1/2" x 7 1/2" 44 lbs.

many others from 6-55 amps

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Takes you through the sunspot toll with solid QSO's and exciting DX.

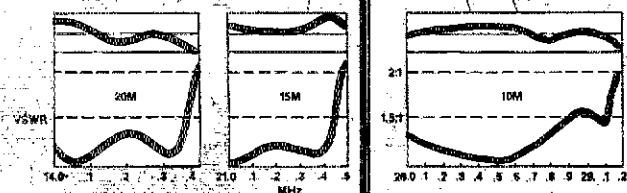
The unequalled performance of the KT-34A and KT-34XA Triband Antenna Systems are the result of KLM's uncompromising approach to antenna performance and reliability.

Our unique design utilizes lossless linear loading techniques with High Q Air Capacitors for peak efficiency. Dual driven elements deliver "Monobander" gain and low VSWR to make even barefoot solid state rigs work like kilowatts.

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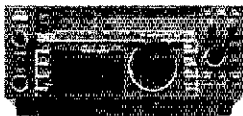
## MIRAGE AMPLIFIER SALE!



**B3016 ONLY \$199!**

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	\$249
B23	2M	No	2W	30W	\$ 79
B215	2M	Yes	2W	150W	\$259
B108	2M	Yes	10W	80W	\$159
S1016	2M	Yes	10W	180W	\$249
B3016	2M	Yes	30W	180W	\$199
C22	220	No	2W	20W	\$ 79
C106	220	Yes	10W	60W	\$179
C1012	220	Yes	10W	120W	\$259
D24	440	No	2W	40W	\$179
D1010N	440	No	10W	100W	\$289

# ICOM



**IC735 NEW General Coverage HF Transceiver Full Featured -Ultra Compact - Economical List Price \$849**  
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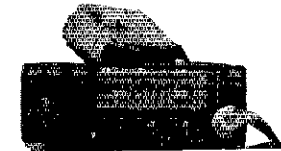
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**IC751 Full Featured HF Transceiver List \$1399**  
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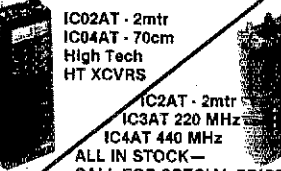
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**IC02AT - 2mtr IC04AT - 70cm**  
High Tech  
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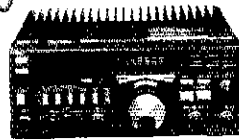
**IC2AT - 2mtr IC3AT 220 MHz IC4AT 440 MHz**  
ALL IN STOCK—  
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## ASTRON POWER SUPPLIES

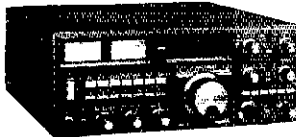
- Heavy Duty - High Quality - Rugged - Reliable
- Input Voltage: 105-125 VAC Output: 13.8VDC ± 0.5V
  - Fully Electronically Regulated—5mV Maximum Ripple
  - Current Limiting & Crowbar Protection Circuits
  - M-Series With Meter—A-Series Without Meter

Model	'Cont. Amps	ICS Amps	Price
RS4A	3	4	\$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	99
HS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS90M	37	50	229

# YAESU



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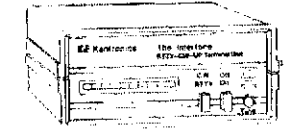
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**CP-1 COMPUTER PATCH**  
List \$239.95 SALE \$189.95

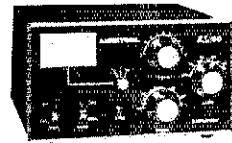
CP-1 Computer Patch ..... \$189.95  
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## Kantronics



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Amtorsoft (C64/VIC20) ..... \$89.95  
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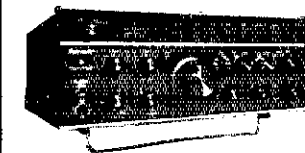
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AL-1200 1500W Output (3CX-1200 Tube) ..... \$1399  
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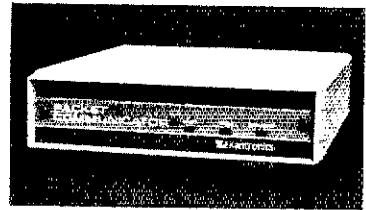
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Available: August (?)



Available: April, 1985  
Dayton

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MODEL PK1

- Ready to operate - wired and tested.
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Dimensions: 2.3 X 11 X 5 (Inches).  
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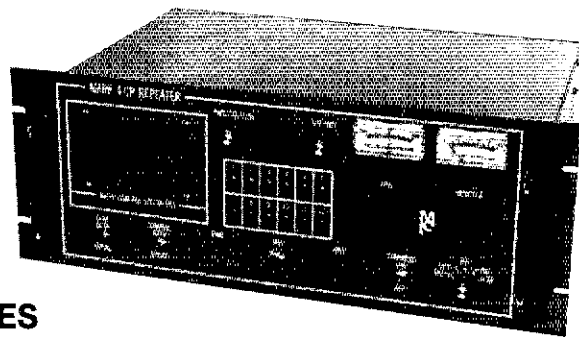
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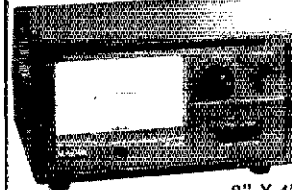


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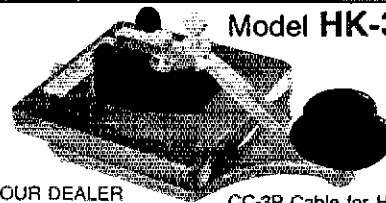
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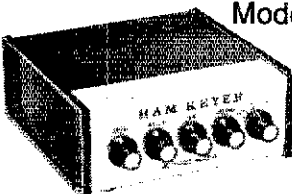


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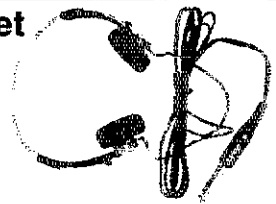
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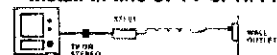
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- Hi Sens. W/Samarium Cobalt Magnets
- 4' cord W/2 CKT phone plug



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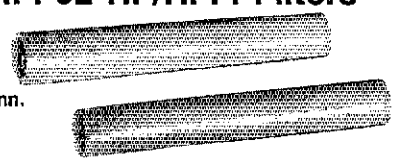
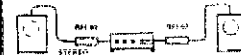
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- Rated at 5 amps.
- Install in line of TV or HI-FI



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- Set includes 2 filters & conn.



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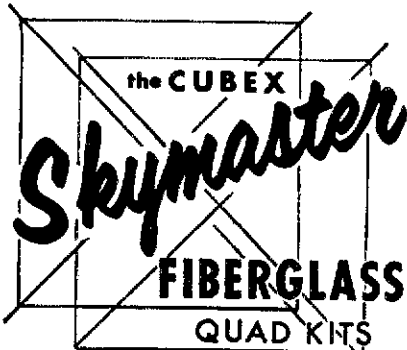
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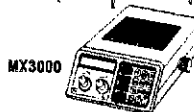
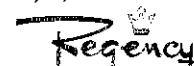
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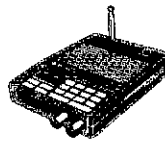
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 VN (LATE) 10 PM 3880 N4GHI  
 VLN 10:30 PM 3947 N4K8O

Another FD has come and gone with indications of plenty of activity in our section. By the number of messages that were sent to the SM via packet radio there appears to be increasing amount of stations using this mode. SM Mgr., AB4U reports that official bulletins are being sent regularly over repeaters in Richmond, Northern Va., Roanoke, Wytheville, Nansmond and Charlottesville. Bulletin stations are needed in the Hampton, Norfolk and Virginia Beach areas. If you can help in this area contact AB4U or the SM for details. As a result of a questionnaire by AB4U all OBS appointments are being reviewed if you hold an OBS appointment and have not been reporting and wish to continue contact the SM. SEC, WB4UHC, says ARES activity continues strong with many groups supplying communications for special events in their areas. WB3ANC, of Culpoper, has been made an "ATC" as interest keeps growing in this appointment. OO's WAHU, K64J, K4JOD and WB4J continue with their monitoring activities. The Richmond Amateur Radio Club has filed an application for certification as a "Special Service Club." This is the 3rd club to file an application, but I know there are many other affiliated clubs who can qualify. Contact the SM for application details. Is your club taking advantage of the cash refund offered in the ARRL "Club Challenge for the 80's" for new and renewed League memberships. Hope to see all of you at the State Convention on Sept. 21/22. There will be a combined ARES/TRAFFIC forum at 11 AM on Saturday the 21st. Normally our section traffic totals decrease during the summer months, but N4EQX makes BPL with an outstanding total of 1419 and he is closely followed by N4GHI with a 905 total. Total monthly traffic 5334 with 41 stations reporting. Traffic: N4EQX 1419, N4GHI 905, W3ATQ 340, AA4AT 286, AA4GL 282, WD4ALY 247, K4JST 232, KB4VT, 200, WB4FDT 189, WB4PNY 172, W4JIS 171, WD4OCW 121, K3PZR 86, K4AXF 77, WA4TVS 67, KA4ERP 63, NW4Q 53, K4KDJ 52, K4JIM 50, WB4DQZ 47, K4VWK 47, K4MLC 44, K4MTX 38, K4JUM 38, K4BGZ 37, K4GR 37, WB4UHC 31, N4DWO 28, N1P 28, N4KSO 25, WB4EDB 18, N4FN 17, N4TE 16, W4LXB 15, WB4KIT 10, N3RC 10, WA4CCK 7, W4TZC 7, W4PVA 4, W4KX 3, W4YE 3.

**WEST VIRGINIA:** SM, Karl S. Thompson, K8KT—W8YP was selected as NM for WVFN by net members at Jax Mill Mtg. K8BYI is new EC for Wirt Co. Beat Wishes to W8LZA for a full and speedy recovery. Into RITTY QNI WVRN at 6:30 on 3939.1. W8WHICR has been relocated and is working FB. Jax Mill next year will be July 5 and 6, 1986.

Wet	Freq	Time	QNI	OTC	Sess.	NM
WVFN	3860	6:00	584	150	30	W8YP
Hillbilly	14290	Noon Su	133	14	5	W8YP
WVN	3567	7:00	190	57	29	W8LYV
WVMD	7235	11:45	681	40	29	W8FZP
WVRN	3639	6:30	133	35	30	KD8RD
WVNN	3730	5:30	56	3	27	KD8RD

Traffic: WA3NU1 166, K8TPF 124, K28Q 117, W8YP 112, W8FZP 76, K8UQY 47, N8GJO 43, K8KT 39, KD8RD 37, K8QEW 34, N8C9 34, N8EMQ 28, K8BOGF 19, KD8G 19, WD8EBH 15, W8CAL 7, WD8MJE 3.

**ROCKY MOUNTAIN DIVISION**

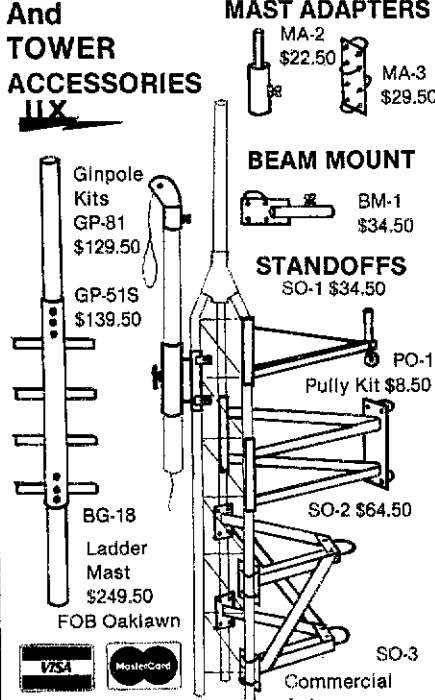
**COLORADO:** SM, Bill Sheffield, K0BJ—SEC: W80FQB. STM: W80AIT. WASM: W8RSQ. ACC: W80DUV. OO/AA: N8ETI. PIO: N8FOE. SGL: W8GOL. IC: N8CF. BM: W8MDT. K8PPYH leaves the PIO due to his work schedule, however he will remain as an advisor on the Section Team. The PIO appt. is assumed by N8FOE, who requests that he can use more PIAs from around the state. This might be a good time to mention that the section is actively trying to increase appointments in all areas. We can use OOs, ORS, OBS, PIAs, OES. Let me know if you can give the section some time in one of these areas of public service. Field Day in Colorado was as active as ever with 15 SM messages received. This summer has come and gone with many swapfests and club picnics. September will have many of the ARCs beginning their Ham Radio School classes. The last big Swapfest of the Season is Barfest on Sept. 22nd in Boulder. Don't miss this one. VE Test for Sept: Sept. 7, Pueblo Contact W80YES. Sept. 21, Lakewood Contact W8IJR. Sept. 22, Boulder Contact N8BWS. NAME Droppers: WD8FMO-WA8EBV 100 msg during Colo Races Set. Empire ARC for communications for Race of Champions. PPRRA for communications during Pikes Peak Hill Climb. 73, K0BJ. NETS: Col: QTC 47-107 Int. 831 min. QNI 724, 25 sess. CWN: QTC 61, 481 min. QNI 143, 27 sess. CWX: QTC 3177, 2700 min. QNI 2488, 30 sess. FTO: QTC 121, 121 min. QNI 1323, 33 sess. NCT: QTC 60, 191 min. QNI: 181, 21 sess. SCTN: QTC 18, 165 min. QNI 70, 10 sess. Traffic: WA8HJZ 1928, N8BQP 1902, K8CZW 632, K8PXX 452, K8JAN 428, W8ACH 392, WA8OYI 259, K8BZ 248, N8DZA 108, KD7EY 87, W8MDT 68, W8BFFV 59, W8NFW 32, A19W 32.

**NEW MEXICO:** SM, Joe T. Knight, W8PDY—ASM: W8HD. DEC: K85XD. STM: ND5T. NMS: WASUNO K8LL W8VFC. IC: W8GY. ACC: W8HD. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 190 msgs with 155 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 47 msgs with 1035 stations in. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 118 msgs with 833 stations in. Yucca 2-mtr Net 78/18 & 93/33 handled 18 msgs with 385 checkins. Caravan Club 2-mtr Net 66/08 handled 15 msgs with 177 checkins. SCAT 2-mtr Net 66/08 handled 16 msgs with 538 checkins. Everyone is looking forward to the Alamo Radio Hamfest August 31-September 1, 2. This is planned as an annual event. Traffic: ND5T 544, W5DAD 140, N5EXC 18.

**UTAH:** SM, Jim Brown, NA7G—Beehive Utah Net meets daily on 7272 kHz at 12:30 p.m. local. Utah Code Net meets daily on 3710 kHz at 7:30 p.m. local. These are your traffic nets; I encourage you to participate often. Generate some traffic; it will help the nets, and it will help you to be better prepared for emergency communications duties. During the blackout on July 8, Davis, Salt Lake, and Utah County ARES nets were active. WA7MEL on 12M the first day of FCC authorization. Field Day is over for another year. Hope your group had as good a time as ours did. 73. Traffic: K7HLR 289, WA7MEL 79, WA7JL 62, WA7KE 61, WA7WB 55, KD7NU 47, W7OCX 20, K7MG 8, KA7TYH 2.

**WYOMING:** SM, Dick Wunder, WA7WFC—Asst. Section Manager—KA7AWS, Steve Cochran, Sect. Emergency Coordinator—W7TVK, Jim Anderson. Recent upgrades include KA7VNB & KA7UWL to TECH and KA7VMA is new Novice. Field Day activity was very good in our section with the following clubs reporting their activities: Sheridan Amateur Radio League with 7 operators, Carbon County

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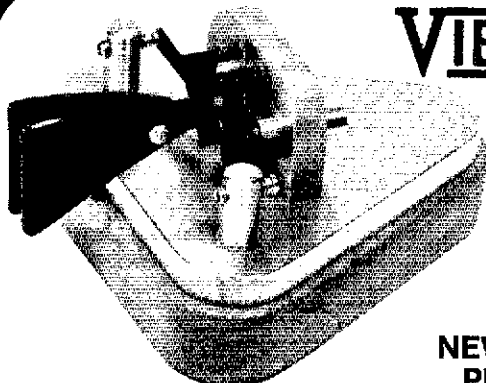
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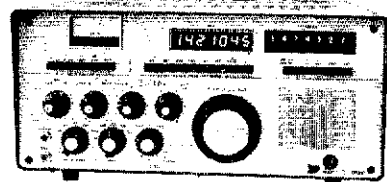
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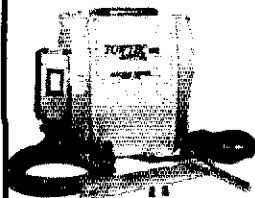


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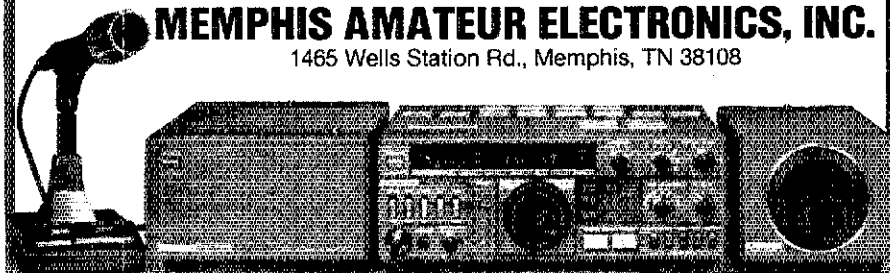
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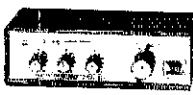


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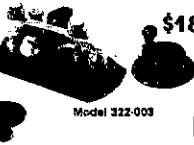


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Model 310-003

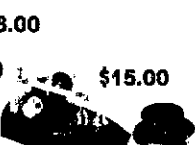
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**SOUTHEASTERN DIVISION**

**ALABAMA:** SM: Joseph Smith Jr. WA4RNP—STM: N4JAW. SGL: KA4VU. BM: KF4VY. This month the Anniston Hamfest will take place at the National Guard Armory on Highway 431 on Saturday the 28th only. I hope to see you there too. Have you tried 24 MHz yet. It is alive and waiting for you. The Calhoun Co. Amateur Radio Assoc. recently elected these new officers: Pres KJ4UX Roy, Vice Pres WA4QZF, J. B. and Sec/Treas WA4IYZ John. W4ZJY Dave is the new Net Manager of RNS Cycle 4. Here are a few upgrades I have heard about: Mike KB4MUX to Tech; Bud K4JUF to Adv; and Tom KJ4EC, Tim N4LMX, and Larry KB4GPN have made extra. I received these two Silent Key reports: K4ZXA Steven W. Boyd of Montgomery and K4TNS James D. Bell of Greenville. Traffic for June: CANDA passed 721 messages in 30 sessions with Alabama rep 100% by WB4IXA, WX4N, NW4CS, DL4RCS. DL4RCS had 68 messages in 60 sessions with Alabama represented by WA4JDH, WA4JF, NW4X, WB4IXA, WX4I, W4CKS, KC4GS and WA4BU. BPL: WA4JDH, PSHR: WA4JDH, W4CKS, WX4I, AA4KE, W4ZJY, and WA4RNP. Traffic: WA4JDH 704, W4CKS 127, W4ZJY 120, NW4X 84, WX4I 75, AA4KE 41, WA4RNP 37, WD4N9L 33, K4AOZ 26, KB4GAP 20, WA4JWF 10, W4DGH 8, WB4TVY 4, K4UMD 2.

**GEORGIA:** SM: Eddy Kosobucki, K4JNL—ASM: K4VHC. SEC: NC4E. STM: W4PIM. ACC: WA4ABY. BM: W4BIA. OO: NA4I. PIO: WA4PNY. SGL: W4BTZ. TC: K4UDR. If you didn't attend the 1985 Atlanta Ham Festival you missed one of the finest. The World Congress Center alone is something to see. The Atlanta ARC has to be congratulated for all their efforts. If expansion is needed in the future the room is right there. Can you imagine an indoor air conditioned boneyard? Remember 1987 brings the ARRL National Convention to Atlanta. The meeting on Sat. was postponed due to a gas strike. Getting the repeater situation in the section ironed out. Thank to all who took time to come & especially to Lindsay Cleveland, W4IZI for being the moderator. I have made the following changes in staff appointments beginning Aug. 1st. ASM: K4VHC, SEC: NC4E, OO Coordinator: NA4I, STM: W4PIM. In order for a section to function properly it takes a lot of cooperation. Please if you asked to volunteer to help do it in the interest of this great hobby of ours. If your club or group hasn't sent the Field Day reports in yet please do it now so the staff at ARRL Hq. can start compiling the totals etc. The following Hamfests are on tap for the section during the month of September: On the 15th it's Augusta, 2nd Gainesville, 23rd DXP in Atlanta. After 43 years at the Atlanta area John W4GEO now beams his signals from Brandon, FL. MATPARC new officers are: Pres: W4QO, VP: K3RFN, Sec: K4OAC, Treas: KB4MQ. ARC of Savannah elected K44HE Pres, N4JIV VP, N3BHK Sec, KA4CQY Treas, KB4ILV Act Mgr & W4KGP Trustee. Please if you hear of a Silent Key in the section either send the info along with the obituary to me or directly to the League. This is the least we can do for our friends. Traffic: W4PIM 199, K4AKP 110, K4VHC 71, W4JWO 57, K4MCG 52, K4JEE 38, W4MHS 37, K4EV 32, W4BIA 24, W4JON 24, W4JUZ 20, W9NXC 19, KF4FG 19, K44AT 12, N1BKC 10, KB4AI 7, K4NM 2.

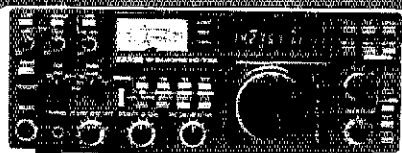
**NORTHERN FLORIDA:** SM: Phil O'Dwyer, WF4X—ACC: Roy, N4ADI. SEC: Rudy, WA4PUP. PIO: Petey, WA4PUO. BM: Wimpy, KB4LB. OO: Stoner, K4JJE. STM: Ron, WB4GH. SGL: John, KC4N. TC: Charlie, N4KFK. The July issue of the "Skip" carried a well told write-up by Ken Tolliver, NQ4P, covering the fight which the hams in the Ocala National Forest helped the fire fighters wage against the forest fires during the third week of May. Ken's fine article documented the courage, determination and ingenuity of a TEAM of Hams and firefighters and the strong bonds which were forged between the two groups. Please join me in extending a "well done" to the firemen and the following hams: NQ4P NS4C WA4MIH KJ4AN KB4HOD WD4FAL N4JHI NS4A KA4FCM N4JAO WB4HS W4LJF WT4C KA7FEL N4LO WB9NIX WA4TDO KA4WJO K4BZQ N4BHK KA4OS WB4KB N4AKA W4FI W4DNU W4F3S K4CQO N4IPE WD4PON W4XDY KB4OP WD4LOP W4TKE WD4GDB WD4HLUZ K4OLU WA4YVA W4OQF K4NTO K4BHYF WB4AWG KB4MOG KA4KDW K44ROY KB4MWJ WB4AQW K4JADG N4LHU KA9PUC N4LHU KB4MXO K4FLC and K4JBO. Since this kind of story is worthy of publication in all newspapers as well as in Ham Publications, I have asked Petey, WA4PUO our PIO to work with all of our PIA's to see if we can get this type of story to her and also to local newspapers as fast as possible so we can get some timely publicity! Traffic: N4PL 624, WX4H 527, WF4X 521, WB4ADL 472, WD4JO 230, WA4CX 284, WA4ERU 174, KB9L 158, KB4LB 134, K4AKK 102, AA4H 93, W4MGO 80, KC4VK 77, K4CQ 76, WA4SXW 72, WA4IX 64, N4DY 62, WD4BP 61, WB4TZR 52, N4JAO 50, KC4FL 49, WA4PUP 44, W4BYQP 43, KF4U 42, NF4O 42, KB4FIY 38, KB4MHH 33, NQ4P 29, W4ASZT 26, W4LDY 26, WD4EQB 25, WB4AWG 24, N4ADI 20, WB4FJY 17, NS4C 15, W4DVT 15, WD4IUI 14, W8IM 14, N4ENL 12, N4EDH 9, WA4PUO 3.

**SOUTHERN FLORIDA:** SM: Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: K4AT. BM: WA4EIC. PIO: W4WYR. SGL: KC4N. OO: W4SS. WA4EIC, Bulletin Manager, has found it necessary to resign his position as he has been called out of the state a second time due to family illness. Blaine has done a tremendous job of coordinating the OBS stations in the section. Many thanks for a job well done, Blaine! WD4KBW, Bill, has been appointed Bulletin Manager effective July 1. Bill is a well known OBS and will do an excellent job also. OBS stations reporting in May were WA4EIC, KA4GUS, W4BTL, WD4KBW, K4ZK, AA4BN, and AA4ML. There were 240 bulletins received and sent during the month by the following OBS stations—W4AF, WA4EIC, K4IEK, AA4MI, KA4GUS, W4DL, WD4KBW and AA4BN. W4LLA handled 35 phone patches in June as well as coordinating the traffic net reports in K4ZK's absence. K4ZK should be back sometime in August—he went to Seattle for his high school reunion. KB9LT has been appointed QFN manager and WX4H as Gator Net manager. Congrats to both. Thanks also to K4IA the retiring QFN manager who has done an outstanding job! Congrats also to KF4JA who has been elected manager of the Tropical Phone Traffic Net. The following Field Day stations sent me a Field Day message—Ft. Myers Area Radio Club, Center Field Day Group (BARC, HARS, and TAR), IBM Radio Club,



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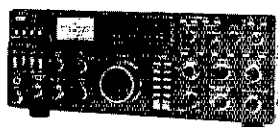


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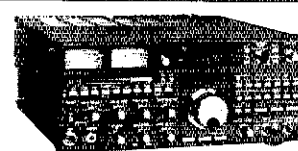


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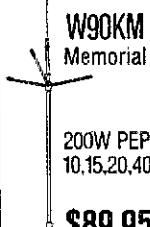
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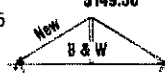
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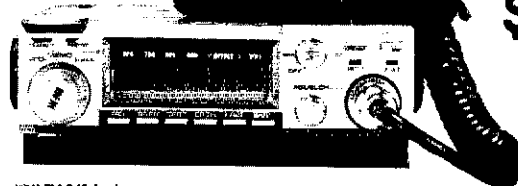
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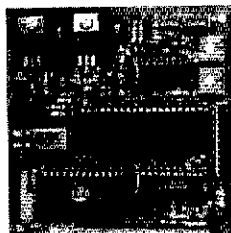
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Sarasota ARS, Hollywood ARC, N4FL, Pinellas County Amateurs, and the Charlotte ARS. The Ft. Myers club with K4AFZL at the top checked into the early session of QFN on field day Saturday with their message. K4IA checked into the same session for the Charlotte ARS. For those stations who can't "find" me—I am almost always on both the early and late sessions of QFN as well as QFNS and Fast late net. If you can't make these nets just put it into the system (NTS) and it will get to me. QFN meets daily on 3651 at 7 P.M. and 10 P.M., QFNS on 3715 at 8 P.M. and Fast late on 3940 at 10:30 P.M. The Center Field Day Group also gave five volunteer exams with two upgrades and one code certificate. 73 de WA4PFK. Traffic: W3CUL 3049 W3VR 1011, WAHAW 798, WA4PFK 317, WY8Y 225, N4KFU 178, WB4GUS 131, K4ELK 120, K4IA 109, K4AFZL 104, KF4JA 71, KA4GUS 131, W4ESH 93, WA4RUE 87, K4AZW 81, WA4EIC 77, W4DL 71, K4SCJ 71, W4ABN 69, WA4HXU 56, W4LLA 52, K4AHS 51, W4ABN 49, W3TLV 49, WD4COL 47, KF4RL 45, K4JL 41, W4SS 36, K5HH 35, N4ET 34, KB4KB 33, N4HAS 32, W4PKP 31, K9ALX 28, WB4GCK 28, K4FQU 24, W3JIR 22, W4DVO 21, WD4NXX 20, N4EOW 18, AA4MI 18, KB4ELQ 18, W4TF 16, WD9AEP 14, W4WYR 13, KB4KAW 10, K4IRT 10, N4ILN 10, KA4KDD 9, KY8T 8, KD4GR 9, W4VND 8, W4MFD 8, K4OVC 8, KB4EWO 8, N4JOA 7, K4A5IH 7, K4J1 7, W4MPV 6, WK4F 6, W4ROA 4, AA4IF 4, KA4GDU 4, WA4YNO 3, KB4BLN 2.

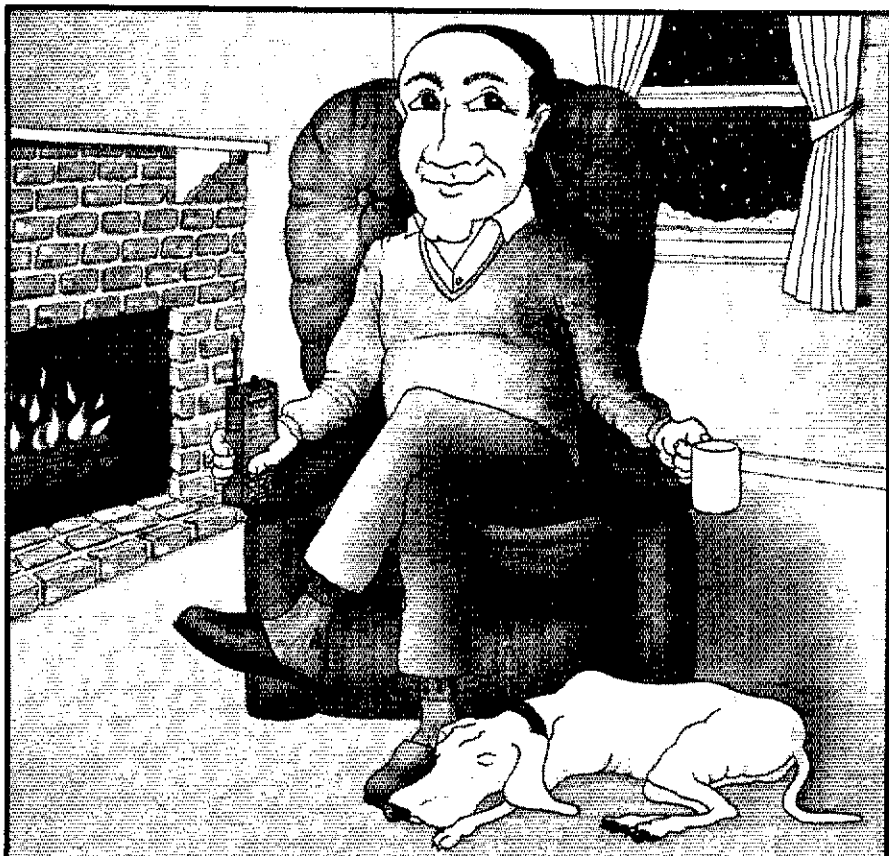
**WEST INDIES:** SM, Carlos Flores Roman, WP4J—West Indies Net Slow (WINS) Daily 7 P.M. (2300 UTC) on 3.710 MHz. West Indies Net Central (WINC) daily 6:30 P.M. (2300 UTC) on 146.94-800 MHz. On June 14-15, the SM for this section visited the St. Croix Amateurs in a celebration on their recent affiliation with ARRL. Jerry Q. Bourne, WB6RCN, President of the St. Croix Island ARC personally made arrangements for SM WP4J on his arrival. WP4J and WB6RCN talked about future activities for the better of the club in St. Croix. The celebration took place at Dick and Lavem Moffitt's home, and it was really enjoyable. Bob Denniston, VP2VI, President of the St. Thomas ARC reported a good score in Field Day with 10 operators. The P.R. Amateur Radio Clubs FD was organized by WP4J and NP4MU with many participating even though conditions were not good. Exercise NIGHT TANGO was held in P.R. with KP4DJ, KP4FW, NP4MU and WP4J. STM KP4ABK is on vacation having a good time. NM KP4DJ reports traffic: 31. Hasta Luego.

### SOUTHWESTERN DIVISION

**ARIZONA:** SM, Jim Swafford, W7FF—STM: W7EP, NM's: K6LL, KATHEV, WB7CAG. New Section appointments: K7KJ as TC, and K7KYW as Pima County DEC, with W5KMF as "Consultant." Hope to fill SEC job soon. The Arizona QCWA net meets Sundays at 1500 UTC on 3890 kHz. Field Day messages were received from the following clubs: Flagstaff, Scottsdale, AZ ARC (Phoenix), Cochise and OPRC. Numerous mountain-top operations were heard during the FD test. Your SM along with SW Division Director WA8WZO visited the July meeting of Scottsdale ARC. FB group, New Tucson station on OSCAR 10 satellite is WA5MWW, who recently copied mode B receiving sensitivity test at -18 dB below the beacon reference level. Good work. Believe we now have approx. twelve AZ stations operating on OSCAR. WB7OHF reports working over twenty states on 24 MHz during first two weeks of band opening. Our heartfelt condolences to W7MTA whose XYL, WB7ORD became a Silent Key in June. Also to the family of W7LSP, member of SARC who became a Silent Key. Show Low is now linked into the ZIA Connection via their 146.84/04 machine on Porter Mtn. Works FB. Am still interested in ideas to promote interest in ham radio for young people. KG6OK's article in "World Radio," April 1985 issue provides interesting insight into a nine-year old boy's entry into ham radio. KB7FE again made PSHR. 73. ATEN: QNI 819, QTC: 119. Cactus Net: QNI 590, QTC 57. SWN: QNI: 142, QTC: 112. Traffic: W7EP 117, KB7FE 125, K6LL 83, W7KCM 71, W7AMM 52, KATHEV 43, W7KXE 29, WB7CAG 18, K7JKM 14, NN7A 12, W7KQE 6, K7NMQ 6.

**LOS ANGELES:** SM, John Walsh, N6UK—ASM: N6ZH, SEC: N6UK, ACC: KX7Q, OOYRFI, K6BMG. We extend our congratulations to the Associated Radio Amateurs of Long Beach. They have joined the ranks of the Special Service Clubs. The recognition is well deserved by this outstanding group of amateurs. The Baldwin Hills Fire—at 2:48 on July 3 WA6LWV and WA6TWE were in QSO and both noticed a large column of black smoke. From their position on the San Diego and Harbor Freeways they pinpointed the fire location as Baldwin Hills. WA6LWV activated the Los Angeles Fire Department Fire Amateur Radio Team. After meeting the fire commander at an intersection near the fast moving fire a mobile base was established using 144 and 440 MHz. Traffic volume on the fire radio system swelled. A request was made by LAFD to use the 440 MHz autopatch to maintain contact with the department's Operation Control Division for management of fire fighting resources. As the fire developed KA6HFC and K6FG joined the command post group. Messages relayed to fire headquarters ranged from press size-ups to the unpleasant notification to city officials that the widow of a recent fire commissioner has lost her home and needed assistance. The amateur link was used to contact the LAFD Support Services Group and logistics were developed to feed some 350 hot meals at the fire site. N6CRU joined the group which continued to render assistance for the next three days. Support for the victims was rendered by the Red Cross and related organizations. Evacuation centers were set up on a Dorsey and Belmont High Schools. KX7Q opened operations at the LA Red Cross Chapter building. The vital health and welfare traffic was handled round the clock by W6NAZ, WBVGQ, KG6JC, N6GLO, N6JNH, K6BART, K6IUN, W6BIPY, N6MBJ, N6GIC, K6FZ, N6ZQ, K6AMDZ and KA6TJR. In the aftermath of the great tragedy, the efforts of the amateurs exemplify the amateur radio's highest traditions. In another area, we hear from ARRL that the Club Challenge for the 1980's is still an open race. The leaders have from 12 to 15 new applications. It would appear that the smaller clubs may have an edge. Pick up the challenge—it will be good for everyone. Traffic: K6UYK 734, W6INH 495, K6DD 99, WA6OCM 53.

**ORANGE:** SM, Joe H. Brown, W6UBC—ASM: Karl, N6BVU, SEC: Jim, AE6N, STM: Ernie, WA6QCA, EM: George, W6DXL, OOC: Alex, W6RE, SGL: Loren, N6HJC, TC: Will, AA8DD, PIC: Joe, W6DXT, ARRL Affiliated Club Coordinator slot has not been filled, applications needed for the important position. For duties and qualifications, contact the SM, (714-887-8394). The FCC license class with instructors Bruce (WB6DCC) and Karen (WB6DCB) proudly presented eight graduates of the Spring class. Six have their HAM tickets into our amateur community, have fun and congratulations to all. SOARA Educational Director announces (Bob K1BM) NOVICE license Prep course star-



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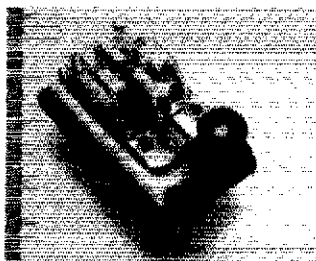
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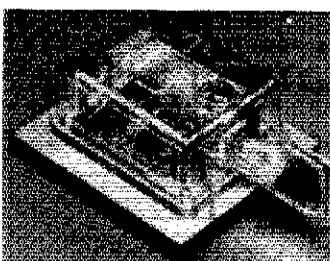
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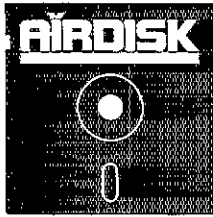
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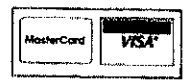
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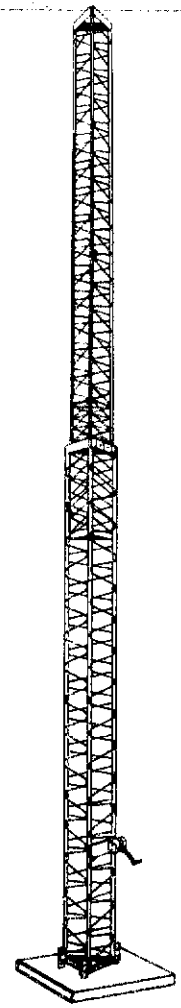
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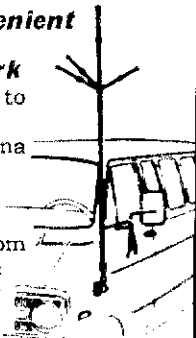
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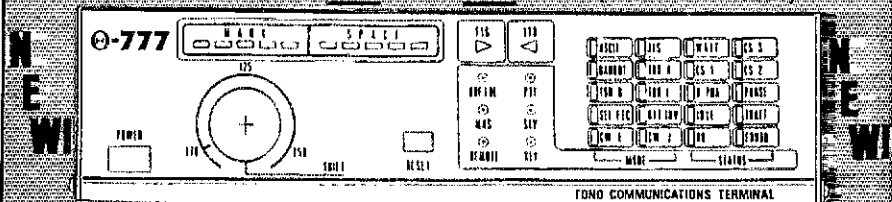
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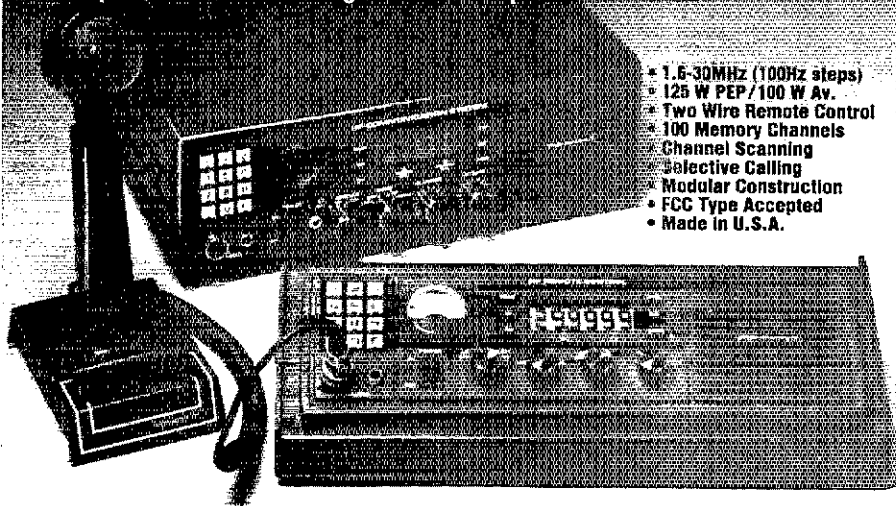
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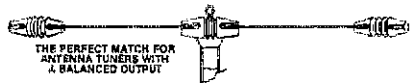
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ting Sept. 6th, MARS reports seven persons have passed the requirements for Novice ticket. The Morango Basin will be blessed with new calls. A Hardy "GOOD SHOW," to students and instructors. Blynn, WD6BNG, EC for the Barstow Area, describes the support for the HDRA Fireworks 250 of road race as a smashing success. Amateurs WRC BAPC, BARRA and WARR supported this comm. activity. Agate, ARRES RACES, VIP Groups have used their time, skills and equipment for public service. Orange Co., hazardous material incident, Alex, W6RE, and Gorden, WB6NOA, ARC COMM, activated the amateur radio comm system in Anaheim. Riverside Co., Couchilla Valley area chemical fire, Hazel NR6P EC, Joe N6LRP AEC, Mike N6KZB ARC COMM, Marvin KA6RON EC Comm support Bob W6LKN DEC OES Control Point, WA6GMV EC VIP/CDF liaison. There is no way we can list all the Radio Amateurs involved in the two incidents, only the coordinators have been listed, but over 100 amateurs handled approx. 500 tactical messages. Organization and training has paid off. PSHR WF6Q, WB6QBZ, WA6QCA, KA6HJK W6N1TN.

SCN/1	3598	7:00	29	345	242	WF60
SCN/2	3598	8:15	28	226	77	WF60
SCN/V	148,645	9:00	30	419	331	WA6QCA
RTTY/V	145,12	10:00	59	382	98	KA6HJK

Traffic: WF60 294, WA6QCA 175, KA6HJK 155, K6DD 99, N6GOT 88, WB6QBZ 76, K6ZCE 48, AD0A 36, W6RE 27, W6MTN 21, W6CPL 17, W6TKV 15, N6LNI 10, KA6HMS 2.  
**SAN DIEGO:** SM, Arthur R. Smith, W6INI, PIO: KG6LF, ACC: WA6COE, TC: N6NR, BM: WA6HJJ, STM: N6GW, SEC: W6INI. The rash of wildland fires, in early July, has seen action by San Diego amateurs. Active in the Normal Heights fire were: W6BFO, K6DBJ, N6GW, W6INI, KR6K, N6RBC, K6GLH, WA2NNT, K6PD, W6QLJ, KA6RUX, W6TGF, W6UZZ, KA6VMK, K6BFX. Later, supporting the Calif Dept of Forestry were: W6AWC, W6DSS, K6SDNR, W6INI, K6BIXG, K661, N6YX, K6PD, W6WQ, W6WZ, W6KMS, W6UZZ, K6BXM, W6YJV. Active with the Animal Rescue Reserve were: N6ELP, WA6HYQ, W6JPB, W6JLU, W6KSK, WA6NNT, KA6VMK. Apologies if I missed anyone. Repeaters used were: San Diego Repeater Ass'n's 148,285, Palomar ARC's 146.75, the 220 Club's 224.90, WD6APP's 145.32, and K66XM's 450 repeater. We couldn't have done it without them. NCTN: 29 sessions, handled 87 mgs. ARRES/CW: 5 sessions, 29 check-ins. Traffic: KU6D 118, N6GW 25, KM6I 18, K6TA 18, WA6LIK 10.

**SANTA BARBARA:** Byron Looney, KF6I—Fires are raging throughout the section. Many ops in the field and at command stations. Packet is being used to link CDF stations and for getting health and welfare traffic out of fire camps. Red Cross shelters are in operation to serve many evacuees. Kind of spooky to go through an empty state park on the 4th of July. Over 5000 people were evacuated the night before. Hardest hit has been the Ojai area. It almost makes you blush to hear CDF talk about the great amateur radio is but, fellows, you've earned it. Watch for the complete report in the fire issue of SBAR Section News. One week since Field Day but it seems like ancient history. Only five clubs sent the SM a msg for 100 pts. Lots of ops in the field. Look for some great scores from SBAR section. Traffic: N6HYM 41, K6YD 26.

**NORTHERN TEXAS:** SM, Phil Clements, K5PC—Asst. SM: NISV, STM: AE5I, SGL: W5UXP, BM: W5QXX, PIO: N5FDL, RFI: W5JBP, ACC: NISV. Many Field Day Reports from groups all over our Section. Looks like a good turn-out and a good work-out for personnel and equipment this year. Joe, K5UPN, got a nice write-up in the Longview paper for his traffic work at a senior citizen's home. KA5QYV is extremely active as Hill Co. EC and our newest Asst. Technical Coordinator. James was able to entice the press out to the Field Day site at Waco, TX resulting in a fine story and pix of W5TAM in Waco Tribune-Herald. By the way; see July 1985 QST, page 12 for a look at K5UPN doing what he does best! Starting next month I will feature one or more of our Section's Clubs and tell a little about each, and how to get in touch with them. PSHR for June: KA5AZK N5BT, KD5FR AE5I, N5EZM KA5RHC and KA5SPT. Traffic: N5BT 260, AE5I 158, KA5AZK 104, KA5SPT 100, KD5FR 80, WB4HML 76, W9OYL 57, NISV 53, KA5RCI 40, KA5OYV 32, W5QU 32, KA5RYF 28, WA5EZT 13, K5PC 8, N5EZM 6.

**OKLAHOMA:** SM, Dave Cox, N85N—ASM: K5WG, SEC: W5ZTN, STM: KV5X, ACC: N25Y, BM: WSAS, PIO: W55FB, OOC: K5WG, SGL: W5NZS, TC: W5GJM. Certificates of merit were presented to W5DJV and W5GRG for their outstanding service during a fireworks factory explosion in Hallett which claimed 21 lives. W5DJV was the first responder to the scene and administered first aid to the survivors. W5GRG established on-site communications within 5 minutes of the incident. NSFEF, W5DXT, and NSFEF were instrumental in relaying information to and from the site. Field Day is now history, with many clubs participating. The week leading up to Field Day (June 17-23) was proclaimed "Amateur Radio Week" by the governor, and by the mayors of OKC and Tulsa. Thx to W5NZS and N85N for their efforts in obtaining those proclamations. Reminder—All Section appointees should report any activity to their respective Section Leader monthly. How else can we know your accomplishments? Mail or club, PLEASE send your newsletters to NISV (the ACC), and N85N. We want to know what your group is doing, and they are a very good source of information for this column. Traffic: W5AS 274, WB5SRX 236, K5CXP 131, KB5EK 107, W5VXU 95, KA5FIU 85, W5UW 87, W5RB 66, WB5OHK 85, KV5X 82, W5REC 61, K5OU 50, N85N 49, W55FB 43, WA5ZOO 34, NR5L 28, K5GBN 25, W5VLW 25, N5PT 24, WA5OGC 23, W5VOR 19, W5UYH 12, K5ENA 10, ND6S 5.

**SOUTHERN TEXAS:** SM, Arthur R. Ross, W5KR—SEC: KA5KRI, STM: K5QEW, ACC: K55V, ASM: N5TC. The Golden Years Net is in full operation on Saturdays, 1:00 P.M. 7235 kHz and on Tuesdays, 7:30 P.M., 3873 kHz. The full story is in July QST, page 12. Get involved and help this net GO! CAS Mgr K5RG busy with tower project at new home. Brazos Valley ARC provided communications assistance for two days of the "MS150 Bike Tour." Superb Amateur Radio cooperation overcame early difficulties. Flams in Kat, L&G range not included in the early planning helped immensely to make it a successful operation. The honor roll is much too long for this report. Polly IV occupied many during the month of June. Amateurs from San Benito to Beaumont took part. O8S N5DFO reports 12 ARRL Bulletins, 8 DX bulletins, ONE QST on the Australian Emergency Test given 16 readings on 3 nets. CAND Mgr W5KLV reports DRNS represented 100%; STX stations helping were W5CTZ WB5EPA W5B5QI KD5KQ N5EFG N5DFO NSAMH W5KLV and W5YDD. O8S W5KLV reports 14 ARRL bulletins, 4 DX bulletins, 4 CRRL bulletins, 26 satellite bulletins, 4 propagation forecasts given 150 readings on 9 nets. DRNS Mgr W5YDD reports

STX represented 100% by NSAMH W5KLV WB5EPA W5B5QI W5CTZ NSGKM N5DFO KD5CB KA5THB KD5KQ W5URN W5YDD. Amateurs in the Rio Grande Valley gearing up for hurricanes: K5RAY, K5FHV, W5B5KZ, W5KVR met with representatives of K6BTV, the designated emergency station, concerning emergency passing of information, including RTTY. Traffic: W5CTZ 299, W5KLV 248, K55V 137, N5DFO 126, WB5EPA 59, NSGKM 51, W5BE 42, W5D5GKH 41, WA5VJL 27, W5AC 21, W5B5QI 19, W5KR 18, KA5PEX. (May) K5HZR 71.

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PL 259 sub/ or SO-239	65¢ ea or 10/\$5.90
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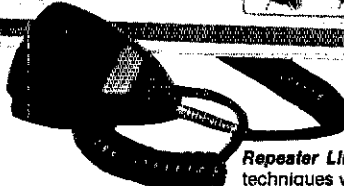
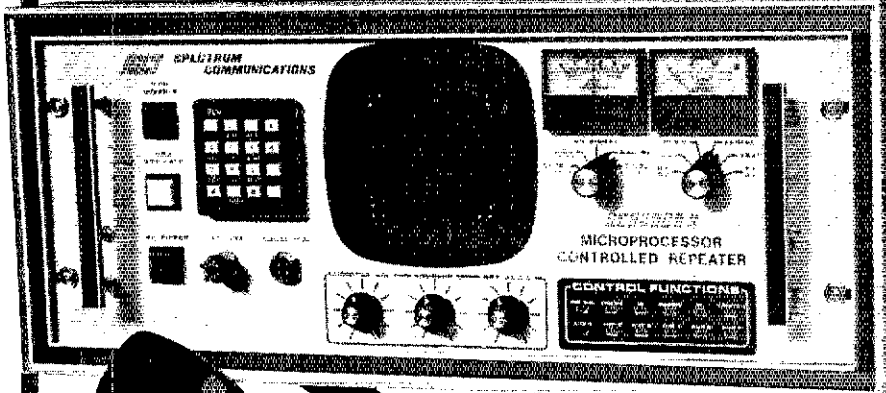
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New "Sharp" Appearance—Brushed Aluminum Panel

The SCR2000X Microprocessor controlled repeater is the newest addition to the Spectrum HiTech Repeater Line, it combines the latest state of the art digital techniques with the best of Spectrum's highly refined RF technology to yield "The Ultimate Repeater"! Operating convenience and flexibility are emphasized without sacrificing traditional Spectrum reliability and ruggedness. Go with the world leader in Amateur Repeaters! Call or write today for details. Sold Factory Direct or through Export Reps. only.

### STANDARD FEATURES

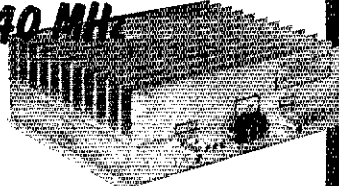
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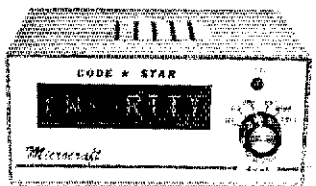
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- (1) Advertising must pertain to products and services which are related to Amateur Radio.
  - (2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.
  - (3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" x 11" sheet of paper.
  - (4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November QST. If the 20th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.
  - (5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.
  - (6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.
- The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

### Clubs/Hamfests

**QCWA** Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

**PROFESSIONAL CW** operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

**IMRA**-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14,280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

**THE Veteran Wireless Operators Association**, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Piegler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

**JOIN the Old Timers Club**, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. 1417 Stonybrook, Mamaroneck, NY 10543.

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**FIND OUT** what else you can hear on your general coverage transceiver or receiver. Complete information on major North American radio listening clubs. Send 25¢ and S.A.S.E. Association of North American Radio Clubs, 1500 Bunbury Drive, Whitlittier, CA 90601.

**MORSE TELEGRAPH CLUB**, established 1942, seeks landline and radio operators interested in telegraphy and Morse history. 45 chapters USA & Canada. For information and sample paper contact W. K. Dunbar, AD9E, 1101 Maplewood Dr., Normal, IL 61781 309-454-2029.

**THE FLORIDA Amateur Digital Communications Association (FADCA)** publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

**FREE QRP Info Kit.** Send S.A.S.E. with two first-class stamps (U.S.) or three IRCs (DX) to: QRP ARCI, P.O. Box 354, Carlisle, PA 17013.

**ILLINOIS:** Sept. 21 & 22, The Peoria Area Amateur Radio Club presents Peoria Superfest '85 at Exposition Gardens, W. Northmoor Rd., Peoria, IL. Admission \$3 advance, \$4 gate, children under 12 free. Gate opens 8:00 AM, commercial buildings 9:00 AM. Talk-in 146.167/76 call W9UVI. Latest Amateur & Computer product displays, huge flea market, free Sunday bus to Northwoods Mall. FCC exams Saturday, all classes. Full camping facilities. For tickets and info SASE to Superfest '85, Box 3461, Peoria, IL 61614.

**RADIO EXPO 85**, sponsored by the Chicago FM Club, will be held Saturday and Sunday, September 28th and 29th at the Lake County Fairgrounds, Rts. 120 & 45, Graylake, IL. Flea Market opens 6:00 AM and exhibits open 9:00 AM. Displays by major manufacturers and gigantic outdoor flea market area. Free parking & overnight camping. Reserved Indoor Flea Market tables available at \$5 per day & electric at \$3 per day. Seminars, technical talks and ladies' programs. Awards every hour—hundreds over the weekend! Tickets good both days, \$3 in advance, \$4 at gate. Talk-in on 146.167/76 MHz. Send SASE to Radio Expo 85, Box 1532, Evanston, IL 60204, or call 312-582-8923.

# KENWOOD

pacesetter in Amateur radio

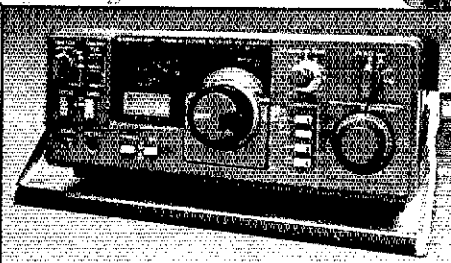
## Scan the World



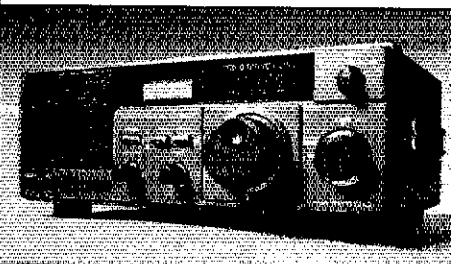
### R-2000 All-mode receiver.

- Covers 150 kHz—30 MHz in 30 bands.
- All mode: USB, LSB, CW, AM, FM.
- Digital VFO's. 50-Hz, 500-Hz or 5-kHz steps. F. LOCK switch.
- Ten memories store frequency, band, and mode data. Each memory may be tuned as a VFO.
- Lithium batt. memory back-up.
- Memory scan.
- Programmable hand scan.
- Fluorescent tube digital display of frequency (100 Hz resolution) or time.
- Dual 24-hour quartz clocks, with timer.
- Three built-in IF filters with NARROW/WIDE selector switch, (CW filter optional.)
- Squelch circuit, all mode, built-in.
- Noise blanker built-in.
- Large front mounted speaker.
- RF step attenuator. (0-10-20-30 dB.)
- AGC switch. (Slow-Fast.)
- "S" meter, with SINPO scale.
- High and low impedance antenna terminals.
- 100/120/220/240 VAC operation.
- RECORD output jack.
- Timer REMOTE output (not for AC power).
- Muting terminals

Specifications and prices subject to change without notice or obligation



**R-1000** High performance receiver • 200 kHz-30 MHz in 30 bands • AM, CW, SSB • 3 IF filters • noise blanker • RF attenuator • S-meter • 120-240 VAC • muting terminals • built-in speaker • digital display/clock/timer



**R-600** General coverage receiver • 150 kHz-30 MHz in 30 bands • AM, CW, SSB • IF filters • noise blanker • RF attenuator • S-meter with SINPO scale • front mounted speaker • 3 antenna inputs • 100-240 VAC operation • record jack • muting terminals • digital display

### Optional accessories:

- VC-10 VHF converter for R-2000 covers 118-174 MHz
- YG-455C 500 Hz CW filter for R-2000
- HS-4 Headphones
- HS-5 Deluxe headphones
- HS-6 Lightweight headphones
- HS-7 Micro headphones
- DCK-1 DC cable kit for 13.8 VDC operation
- AL-2 Lightning and static arrester
- Service manuals are available for all receivers and most accessories.

Additional information on Kenwood all-band receivers is available from authorized dealers.

## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
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**A PEEK-A-BOO VIEW**  
of the new  
**AEA MODEL PK-64™**  
**PACKET SYSTEM**  
For the  
Commodore C-64 computer



The PK-64 PACKET RADIO SYSTEM contains everything you need to make your existing station and C-64 computer into an advanced packet radio station and digipeater with the least effort (and cost) possible with today's technology.

Check out just some of the special features in the following sneak preview:

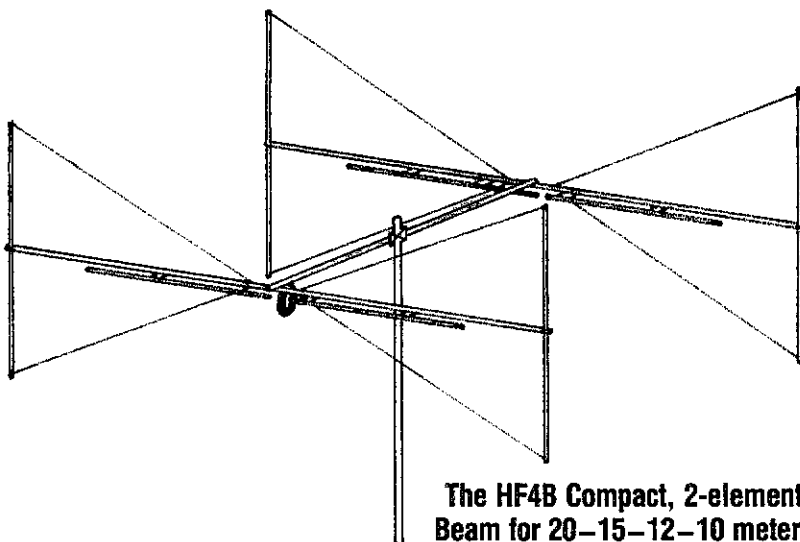
- **Hardware HDLC for full-duplex operation.**
- **Keyboard selectable HF or VHF modem built-in.**
- **Optional front panel tuning indicator for improved HF tuning.**
- **12 Volt DC operation.**
- **Special MBA-TOR™ style Communications Software including:**
  - **Split screen for more efficient communications.**
  - **Text Editing**
  - **Disk and Cassette I/O and storage capabilities.**
  - **Internal Clock automatically logs connect and disconnect times and dates.**

If you can wire a microphone connector on the end of a cable, now YOU can get on packet Radio for an introductory price under \$220. The PK-64 is scheduled for limited deliveries in September so order yours now from your favorite dealer, or send for more information.

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**Introducing the BUTTERFLY™**  
**Beam from Butternut!**



**The HF4B Compact, 2-element Beam for 20-15-12-10 meters**

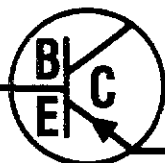
**Compact Size**

The HF4B's 12½-foot elements and 6-foot boom are ideal for home-station use and for weekend retreats, condos, apartments and other places where oversized beams are prohibited. Its light weight (17 pounds) means it can be turned with a tv rotator, yet it is robustly constructed in the best tradition of our world-famous Butternut verticals.

**Performance**

The HF4B BUTTERFLY™ has not sacrificed performance for compactness. Its unique design with fanned elements and L-C circuits avoids use of power-robbing traps yet provided high-efficiency operating on all bands. The BUTTERFLY™ outperforms anything in its class.

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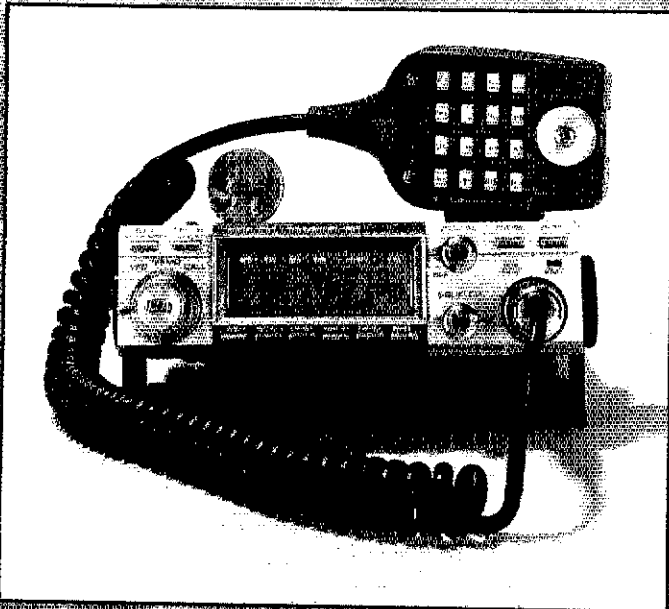
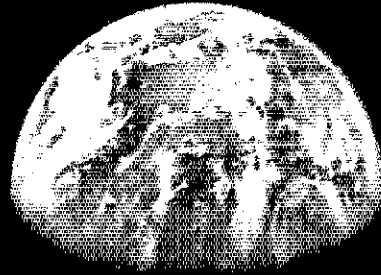


**SAVE**

**SAVE**



# SPECTACULAR SIMPLICITY



## KDK FM-240

### 2M - 25 WATT FM TRANSCEIVER

- Superior features, simpler to use for 2 meters, MARS, CAP
- Compact size for better fit in today's automobile
- 16 fully programmable memory channels, plus priority call channel, plus 2 VFOs for today's user
- Subaudible encode and decode standard for today's 2 meter bands
- Subaudible frequency programmed by freq, no chart needed
- Speech synthesis option for voice VFO
- Superior man machine interface—one knob and one button, program all of the features easily—alphanumeric LCD prompts
- 16 button speaker/mic with UP/DN lock-out switch

This radio does every single thing we asked the design staff to make it do, and it does it in an easy to use, simple manner. It is truly spectacular to operate such a radio in the 2 meter band. For example, the FM-240 has two VFO modes— one called VFO, the other QSY. So if you are on your favorite channel and want to QSY, simply push QSY and tune the main knob to the new frequency. To return, simply push QSY again. The entire radio follows this simple but spectacularly effective engineering formula. **ONE BUTTON + ONE KNOB. SIMPLY SPECTACULAR SIMPLICITY.**

ENCOMM

2800 Avenue G, Suite 800, Plano, Texas 75074  
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

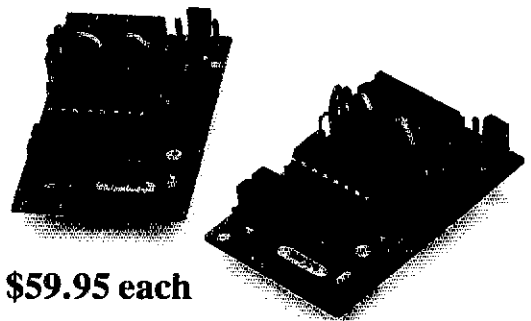
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We just struck gold with a miniature, high quality and very reliable DTMF decoder at a rock bottom price of \$59.95. Our DTD-1 will decode 5040, 4 digit codes with the security of wrong digit reset. It contains a crystal controlled, single chip DTMF decoder that works great in bad signal to noise environments and provides latched and momentary outputs. Why carry that heavy gear when its size is only 1.25 x 2.0 x .4 inches and it comes with our etched in stone, legendary, one year warranty.

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## “Dual-Band” Leader!

### TW-4000A 2-m/70-cm FM transceiver.

The first is still the best! The original “Dual Bander.” TW-4000A delivers 50 watts output on both VHF and HF in a single compact package.

2 m and 70 cm FM in a compact package.

Covers the 2 m band (142,000-148,995 Hz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440,000-449,995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (166 mm), and 4.4 lbs. (2.0 kg.).

Single-function keys allow easy operation.

Large, easy-to-read LCD display.

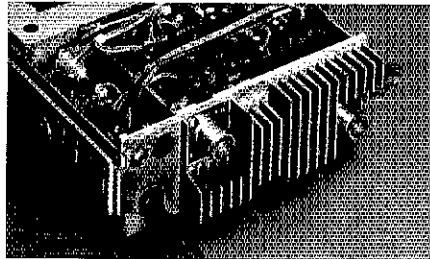
Green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, “S” or “RF” level, VFO A, B, scan, busy, and “ON AIR.” Dimmer switch.

Front panel illumination.

Memories with offset recall and lithium battery backup.

Stores frequency, band, and repeater offset. Memory 0 stores receive and

transmit frequencies independently for odd repeater offsets, or cross-band (2 m/70 cm) operation.



• **Rugged die-cast chassis.**

• **Two separate antenna ports.**

Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.

• **Programmable memory scan with channel lock-out.**

Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.

• **Band scan in selected 1-MHz segments.**

Scans within the chosen 1-MHz segment (i.e., 144,000-144,995 or 440,000-440,995, etc.); The scanning direction

may be reversed by pressing either the “UP” or “DOWN” buttons on the microphone.

• **Priority watch function.**

Unit switches to memory 1 for 1 second every 10 seconds, to monitor the activity on the priority channel.

• **Common channel scan.**

Memories 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.

• **High performance receiver/transmitter.**

GaAs FET RF amplifiers on both 2 m and 70 cm, high performance monolithic crystal filters in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.

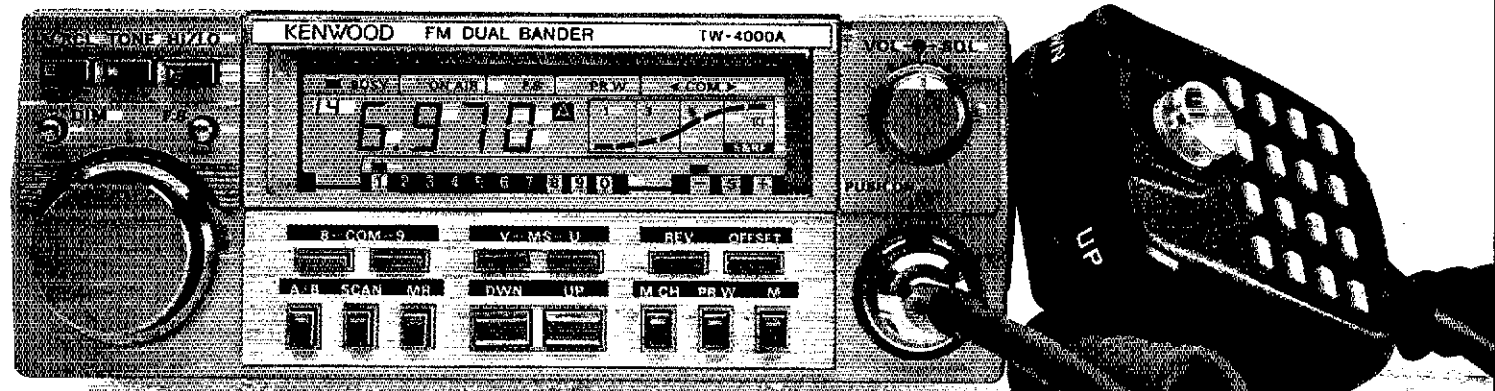
• **Optional “voice synthesizer unit”**

Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.

• **Repeater reverse switch.**



More TW-4000A information is available from authorized Kenwood dealers.



#### Optional accessories:

- V-1 voice synthesizer
- CT-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- PS-7A fixed station power supply
- MA-4000 dual band mobile antenna with duplexer
- MC-40 compact mobile speaker
- MC-50 mobile speaker

- MC-42 UP/DOWN microphone
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter
- MB-4000 extra mounting bracket

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation. Antenna mag mount is not Kenwood supplied.

## KENWOOD

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1111 West Walnut Street  
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# AMATEUR ELECTRONIC SUPPLY - USED GEAR

- ★ 10 day Trial (pay only Shipping Charges)
- ★ 30 day Warranty
- ★ Full Trade-in within 3 months on New Gear
- ★ Mastercard or VISA welcome - Call Today!

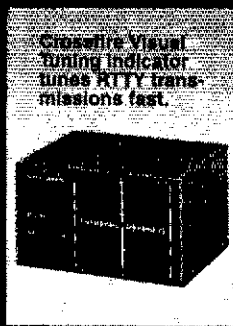
<b>AEA</b> AMT-1 w/Chirptext \$199w <b>AMERITRON</b> AL-80 Linear \$489m <b>AMP SUPPLY</b> IA-1000A Linear \$299f AT-1200 Ant tuner 119m <b>APPLE</b> 128k Macintosh computer 1249e <b>COLLINS</b> 75S-3 Ham Rcvr \$269mfc 75S-3B Ham Rcvr 299m 32S-3 Transmitter 329mc 312B-3 Speaker 29m 312B-4 Station control 189mfc KWM-2 Xcvr 439c 516F-2* AC supply 149mwfc *Not sold separately KWM-380 sn 552/blower 1995v mars/warc/1.8/update 4/84 <b>DAIWA</b> CNW-518 Ant tuner \$199m CNA-1001 Auto ant tuner 229mc CNA-2002 Auto ant tuner 289f <b>DENTRON</b> MT-3000A Ant tuner \$229f <b>DRAKE</b> 5NB Blanker \$ 29m R-4A Ham Rcvr 149m R-4B Ham Rcvr 189mf R-4C Ham Rcvr 249mw MS-3 Speaker 19m MS-4* Speaker 19mwfv *Not sold separately 4NB Blanker 49m FS-4 Synthesizer 149m FL-250 250 Hz filter 35mw FL-500 500 Hz filter35m FL-1500 1.5 KHz filter 35mw FL-6000 6 KHz filter 35m SC-2 2m rcv conv 59m SC-6 6m rcv conv 59f GPS-1 Conv ps 19m SCC-1 VHF cabib 19m CC-1 Conv console 29m TC-2 2m Xmit conv 229m TC-6 6m Xmit conv 175w R-7 SW Receiver 699wc R-7/NB/4 KHz filter 779m R-7/NB/1.8/4/AUX-7 849m R-7A SW Receiver 999mc R-7 service manual 25m T-4X Transmitter 149m T-4XB Transmitter 189mcv T-4XC Transmitter 229mwfv TR-4 Xcvr 229c TR-4C Xcvr 269w RV-4C Remote VFO 89w AC-3* AC supply 59mwfv AC-4* AC supply 79mwfv *Not sold separately TR-5 Xcvr 389m TR-7 Xcvr 549mwfv TR-7/AUX-7 569m TR-7/500 Hz 579f TR-7/1.8 KHz 579v TR-7/1.5/1.8/6/AUX-7 679v PS-7* Power supply 179mwfv *Not sold separately PS-75 Power supply 99m	MS-7 Speaker 29mv FA-7 Fan 19m 7077 Desk mic 29v MN-4 200w ant matcher 69m MN-75 200w tuner 99e MN-2000 Ant matcher 149m 7000E Terminal 249w TR-22 2m FM port 69m ETEK FR-4 Drake 4-line dig disp \$ 49m ETO Alpha 374A Linear 1499mc <b>HAL</b> ST-5000 Demod (low) \$149v ST-5000 Demod (high) 149v DS-2000 Terminal 129m DS-3000KSR Term vers 2 369m DS-3000KSR Term vers 3 469e ARQ-1000 Error terminal 649m CWR-685A Port terminal 299m CWR-6850 Port terminal 499m <b>HENRY</b> S-30 2m 1/30w aimp \$ 49m IRL 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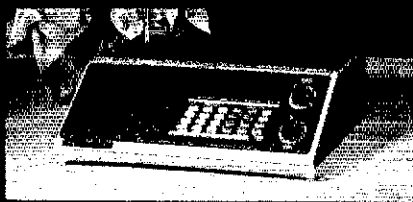
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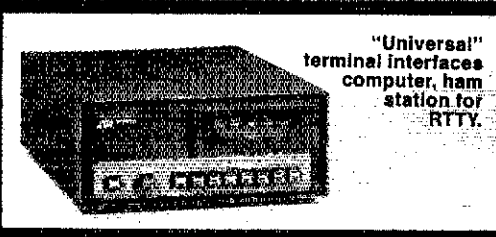
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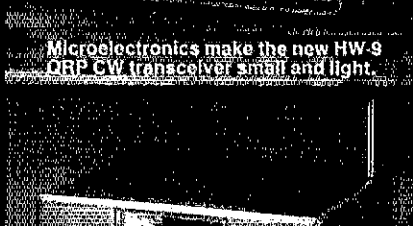
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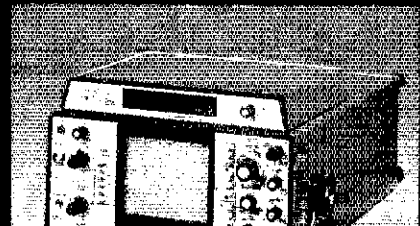
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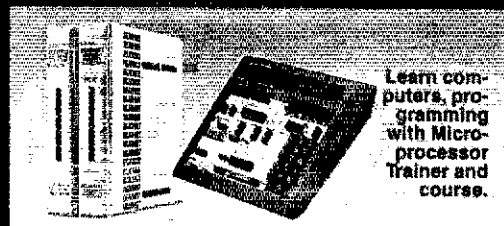
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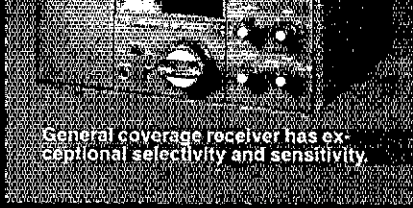
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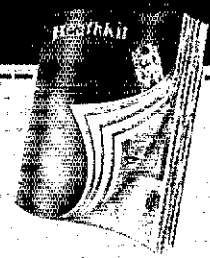
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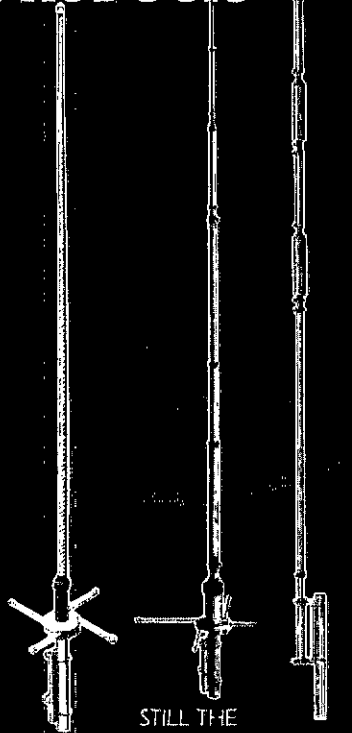
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**1985 BLOSSOM BLAST, Sunday, Oct. 6, 1985. Write "Elast" Box 175, St. Joseph, MI 49085.**

**SEPT. 8: The 43rd Annual Findlay Hamfest sponsored by the Findlay Radio Club at the Hancock County Fair grounds. On Sunday, from 8:30 AM to 5 PM. Advance tickets \$3; at the door \$4. Cut off for advance tickets is September 1st. Tables \$6 each. Flea market outdoor spaces \$3 each. Talk-in on 147.75/15 for more information write to the Findlay Radio Club, P.O. Box 587, Findlay, OH 45839.**

**FLEA MARKET & FCC Examinations: September 14. Novice thru Extra Exams given. information call 408-255-9000. Foothill College, Los Altos Hills, CA. 73 Gordon W6NLG VEC.**

**ATTEND THE BIG EVENT of the Summer Hamfest Season, the annual Cincinnati Hamfest, Sunday, September 15, 1985, at Stricker's Grove on State Route 128, one mile west of Venice (Ross), Ohio. Exhibits, Booths, Food and Refreshments available, many fabulous Awards, Flea Market (radio related products only), Music, Talks, Hidden Transmitter Hunt, Hourly Awards and Sensational Air Show. Admission and Registration \$5. For information - Lillian Abbott, K8CKI, 317 Greenwell Road, Cincinnati, OH 45238.**

**PENNSYLVANIA - Computer & Electronics Fleamarket, 175 vendor tables, indoors, Saturday, Oct. 5th - G.W. Conference Center, Willow Grove, Exit #27 Pennsylvania Turnpike. 10 AM-4 PM. Buyers \$5, Sellers from \$25. Information 201-297-2526. W2TGH.**

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**WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels, "Skyrider Commercial," early transmitters - HT-1, HT-2, HT-8, etc., other Hallicrafter gear, parts, accessories, manuals. Chuck Dachs, W0SEOG, The Hallicrafter Collector, 4500 Russell, Austin, TX 78745.**

**WANTED: old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.**

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**WANTED: AN/GRA-71 Burst Transmission Keyer. New/used or parts. R Bennett, 1913 Connie Lou Dr., Las Cruces, NM 88001.**

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**WANTED: RME 45 thru 4350A Receivers. Accessories. Original unmodified. RME literature, catalogs, manuals 1945-1959. Collector. Nick Kaef, KB4UL, P.O. Box 207, Highland Heights, KY 41061.**

**RECAPTURE EARLY DAYS of Ham radio, professional radio and broadcasting! Our book Vintage Radio (263 pages) takes you from the earliest days up through spark to early "phone days. A Flick Of The Switch (312 pages) covers Ham, commercial, wartime and broadcast radio from 1930 to 1950. Rekindle that excitement of early ham days! Discover the pleasures of collecting old radio gear! Just send \$10.95 for each book to N6VY, Box 2045, Palo Verde Pnsia., CA 90274.**

**WANTED SPEAKER Horn K4NBN "No Bad News".**

**COLLINS COLLECTORS KWMM1 with supply \$200. 50-year collection vacuum tubes. Inquire. W5QJT, 4141 Krupp Dr., E.P. TX 915-532-2509.**

**QST - Jan. 1923 to Dec. 1985, 741 copies, good to excellent, no covers missing, Make offer. W2DQC, 914-769-9331.**

**TELEGRAPH KEY collector looking for pre-1935 bugs, Spark keys, and pre-1900 landline keys. Visitors welcome. K5RW, Neal McEwan, 1128 Midway, Richardson, TX 75081.**

**SELL HALLICRAFTERS SX28A, speaker, manual, \$100, pickup preferred. Modified BC348, \$70 plus shipping; Ancient Philco scope, good working condition, \$40 plus shipping, SASE for details. Geo. Fariss, W4LVY, 205 Lannom Circle, Tallahoma, TN 37388, 615-455-1623.**

**ANTIQUÉ TELEGRAPH device: Mathews Woodpecker Telefact Mfg. by W.N. Mathews & Brothers, Inc. Est. 1899 Pat. 3-7-1916. Stored since 1945. Complete unrestored, Bakelite, chrome, brass, and wood box. Condition: interior fine exterior-good. \$175. K1MTM, 617-583-7986. E.S.D.T.-A.M.**

**DRAKE COLLECTORS: Absolutely Mint R-48 no modifications and no chassis corrosion, not many like this one left. \$250. U-ship, SASE other equipment. Tom, K4RV, Rt. 7, Box 188, Lexington, SC 29072. 803-359-3418.**

**SALE: DRAKE 2B recvr with 2BQ Q-Multiplier. First offer over \$100. Will Ship. WB9PQN, 312-244-5671.**

**FOR SALE: 75A4 receiver, serial 1081, 3.1 filter, matching speaker, mint, manual, \$195. Pick up only. W1WG, 127 Meadow St., Shelton, CT 06484. 203-734-7236.**

**FOR SALE: Hallicrafters SR-150 xcvr, AC/DC Power Supplies, Manual, Mobile Microphone. No cable or mobile mounting bracket. \$150 plus shipping. Bob Sullivan, 80 Harbor Dr., Daly City, CA 94014.**

# KENWOOD

...pacesetter in Amateur radio

## Up Front and Center!

### TR-7950/7930

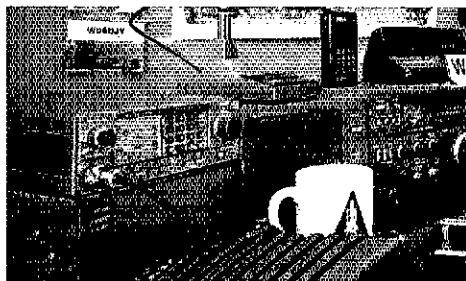
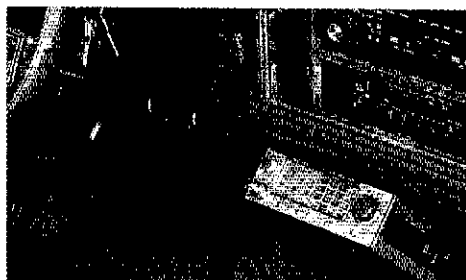
The exceptional front-end selectivity and sensitivity, coupled with Kenwood's excellent audio section, gives you lots to hear! Compact design makes this transceiver at home in the shack or on the go!

• **Large, easy-to-read backlit LCD readout.**

Indicates receive/transmit frequency, frequency offset, sub-tone selection, memory status. An LED readout indicates S & RF units, REVERSE, CENTER TUNING, PRIORITY, and ON AIR.

• **Programmable scanning, with center-stop tuning.**

Microprocessor technology allows you to scan the entire 2 meter band, or just a small portion of it. Scanning stops on the center frequency during band scan—a Kenwood exclusive!



• **21 Multi-function memory channels.**

The TR-7950/7930 "remembers" frequency offset, and optional subtone channels. Memories 1-15 are for simplex and "normal" repeater operation. Memory pairs 16/17 and 18/19 are for "odd-ball" splits. Memories "A" and "B" store upper and lower band scan limits. The radio "beeps" when memory channel 1 is selected.

• **Extended frequency coverage.**

Covers 142,000-148,995 MHz in 5-kHz steps. Repeater offsets are automatically selected in accordance with the ARRL 2 meter band plan. The front panel "OS" key may be used to allow manual changes in offset.

• **Multi-function keyboard.**

The 16-key DTMF pad can also be used for direct frequency entry, sub-tone selection, memory address and scan programming. The keyboard is illuminated for night time use.



**TR-7950 optional accessories:**

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

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

## KENWOOD

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

Model TR-7950 (45 watts) shown. TR-7930 is identical, but with 25 watts output.  
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.  
Specifications and prices are subject to change without notice or obligation.

MAKE OFFERS: Collins 310B modified TVI-proofed band-switch final external Drake LP filter 4:1 balun, Drake MN4C mint, QST 1926-1933 inc. bound volumes. W1BFT, RFD 3, Box 6A, Concord, NH 03301.

WANTED: PRE-WWII Amateur equipment by Gross, Collins, Browning, Utah, Guthman, Harvey, Howard, Meissner, Miller, others; Nagle, 12330 Lawyers, Hemdon, VA 22071.

COLLINS WANTED - Cash waiting for KW-1, 30K-1, 30K-5, 75A-1, 2, 32V-1, 2, 3, 310B-3, KWS-1, 204C-1, Gary, KE6MS, 213-431-8931.

COLLECTORS: TABLE Model Brunswick 1928 best radio. Wood cabinet with speaker, make an offer. W5JHA.

#### General

WANTED "To Win The World" DXpedition Video in VHS format. Please contact Eisho Aoki, JA2HUM, Box-7, Kitagata 501-04 JAPAN.

TELETYPEWRITER parts, supplies, gears, Toroids, S.A.S.E. list, Typetronics, Box 8873, Ft. Lauderdale FL 33310. Buy unused parts, cash or trade.

SERVICE by W9YKA. Amateur and Industrial SSB-FM repairs, calibration. Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

HAM TRADER Yellow Sheets, in our 23rd year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate — no long wait for results! SASE for sample copy, \$10 for one year (24 issues), P.O.B. 356Q, Wheaton, IL 60189.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

ARCOS VHF/UHF amplifier parts and kits. Harold "Connie" Bramstedt, 6104 Egg Lake Rd., Hugo, MN 55038, 612-429-9397.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

HOSS-TRADER, Ed Says, Shop Around for the best price then telephone the Hoss last, for the best deal.

New Display Kenwood TS-430S transceiver \$849. New Display Icom IC-2AT \$169. Display Aiden PCS-4000 \$229. New Display ICOM-735 transceiver regular \$849, cash \$849. New Display Icom-751 transceiver regular \$1379, cash \$1095. New Display Icom-745 transceiver regular \$999, cash \$695. New Display Icom D2-AT regular \$349, cash \$268. New MB-VA 3kW Nye Viking Antenna Tuner regular \$585, cash \$449. New LK-500ZA 2500 Watt Amp Supply linear with tubes/Hypersil transformer regular \$1099, cash \$895. Like new Drake B-line complete \$565. VISA/Master Card Accepted !!! Moory Electronics Company, P.O. Box 506, DeWitt, ARK 72042, 501-946-2820.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, P.O. Box 707, Linden, NJ 07036. Call toll-free 800-526-4072.

THE DX BULLETIN — America's Oldest Weekly Amateur Radio Publication. Large S.A.S.E. for samples. Box DX, Andover, CT 06232.

FAST, ACCURATE, readable, nonsensational — The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send \$19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

KEYER KITS, \$15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

EIMAC-3-500Z's. New-very limited quantity! \$85 each, cash, COD, MO. Add \$3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

AMRAD (Amateur Radio Research and Development Corporation) is a nonprofit organization of experimenters in packet radio, spread spectrum and digital communications. Monthly newsletter. Mail \$15 to AMRAD, 5829 Parakeet Drive, Burke, VA 22015. Add \$2 for Canada, Mexico; \$8 overseas air, \$2.30 surface.

SOLAR ELECTRIC panels, components, inverters. \$3 catalogs, technical information, price lists. SPECS Inc. P.O. 155, Montrose, CA 91020.

MAGICOM RF Speech Processors for selected Kenwood, Drake and Yaesu equipment. Excellent speech quality — 6dB added average output. Affordable prices! SASE for data and cost. MAGICOM, P.O. Box 6552, Bellevue, WA 98007.

T199/4A Ham Computer Programs. 39¢ Stamp to Sam Moore, AC5D, Box 368, Stigler, OK 74462.

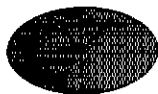
CALL Toll-free 800-327-7798. Ask for Bob Hoffman. Jaro Electronics Corp. We buy all types of tubes. Top prices paid for Varian, Eimac, Ampere, RCA, Western Electric, Raytheon, in Florida Call toll free: 800-432-8524. Address 412 27th St., Orlando, FL 32802.

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# ANTENNA PURSUIT



What is a LARAE?



How is Mr. Smith's *other* chart used?



What type of antenna might survive a nuclear attack?



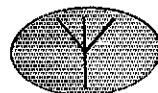
On what band will you find a crossed-loop/goniometer antenna useful?



What antenna has a "mystique" about it?



How do you wire up "Old Spruce"?



What English radio amateur has an antenna named with his call



What do baluns do and how do they do it?

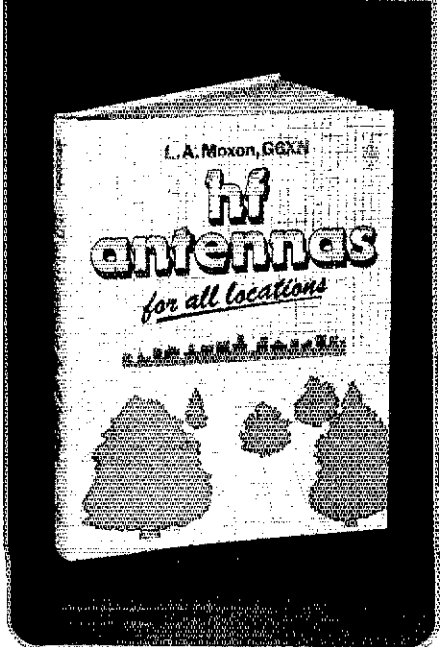
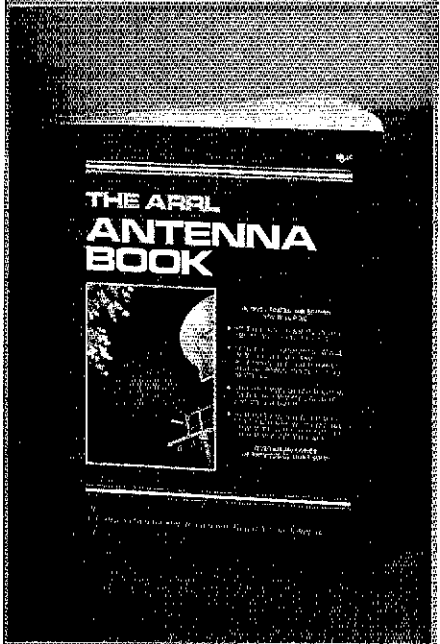
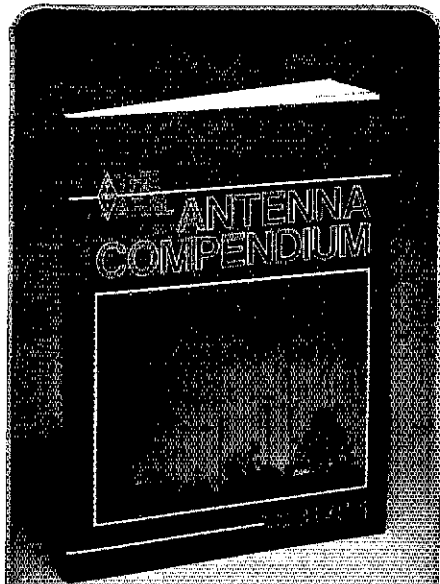


How do you build a W8JF Waveram?

**ANSWERS: You will find them in the new ARRL ANTENNA COMPENDIUM.**

**SEE PAGE 147 FOR MORE INFORMATION!**





# NEW! THE ARRL

# ANTENNA COMPENDIUM

Because of space limitations in *QST*, we don't have room to run all of the good antenna articles that are submitted. The solution to this problem? **THE ARRL ANTENNA COMPENDIUM!** You'll find 178 pages packed with new material on quads, loops, log periodic arrays, other beam antennas, multiband antennas, verticals, reduced size antennas, plus such interesting topics as: Mr. Smith's "Other" Chart and Broadband Rigs; Available Power, SWR and Loading; Baluns: What They Do and How They Do It; The Horizontal Dipole Over Lossy Ground; and Antenna Polarization. Copyright 1985. Paperbound: **\$10.00** in the U.S., **\$11.00** elsewhere.

## OTHER ANTENNA BOOKS

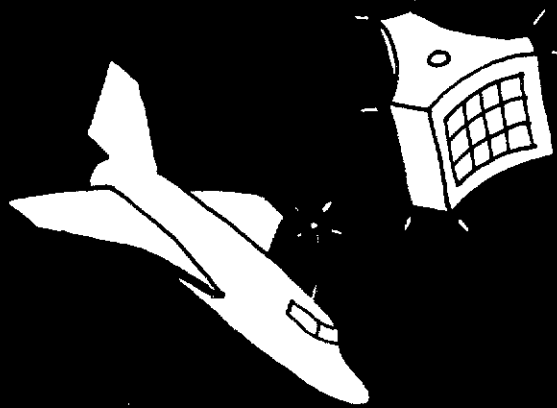
**THE ARRL ANTENNA BOOK** The best and most highly regarded antenna information available. The 14th Edition contains 328 pages of propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Copyright 1982. Paperbound: **\$8.00** in the U.S., **\$8.50** elsewhere. Clothbound: **\$12.50** in the U.S., **\$13.50** elsewhere.

**HF ANTENNAS FOR ALL LOCATIONS** by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; the Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **\$12.00**.



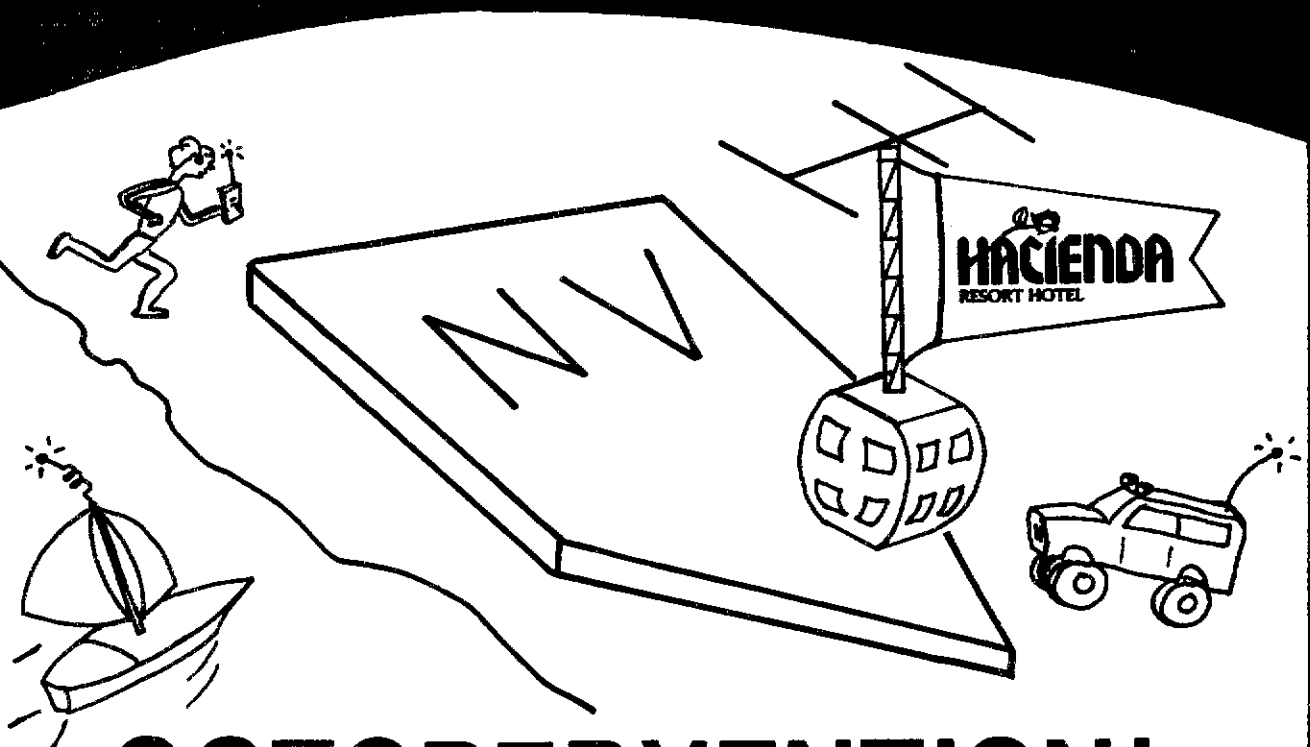
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## Incredible Flexibility!

### TM211A/411A

The TM-211A 2 m and the TM-411A 70 cm transceivers combine ultra-compact size with an impressive array of features to give you maximum flexibility in mobile operations. The TM-211A and the TM-411A may be stacked for even more operating flexibility!

#### External speaker.

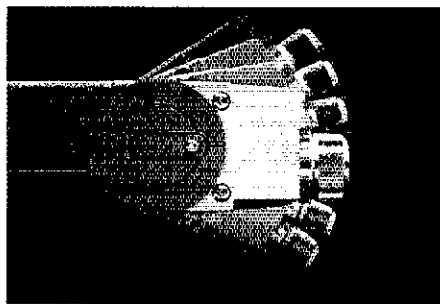
A high-quality external communications speaker is provided for the best sound quality.

#### 5-channel memory with multiple scanning functions.

The transceiver can scan the memory channels or can be programmed to scan all or a portion of the band.

#### 25 watts high power.

5 (adjustable to approx. 15 watts) low.



#### 7-position, tilting control panel.

The unique control panel is designed to increase operating and installation ease. The panel may be moved to provide the best viewing angle and handiest access to controls.

#### DCS—Digital Code Squeech.

Program your transceiver to respond only to a specific digital code—much more secure than CTCSS.

#### Priority Watch.

The "Priority Watch" mode lets you keep an eye on an important channel when monitoring other frequencies.

#### Extended frequency coverage on 2 m.

**TM-211A** covers 142-149 MHz—includes most MARS and CAP frequencies.

**TM-411A** covers 438-450 MHz

#### Optional accessories:

- CD-10 call sign display
- PS-430 DC power supply
- KPS-7A power supply
- MC-42S regular UP/DOWN hand microphone
- MC-55 (8-pin) mobile microphone with time-out timer
- MA-4000 dual band mobile antenna with duplexer
- SWT-1/2 2 m/70 cm 100 W antenna tuners
- SW-100A/B SWR/power meters
- PG-3A noise filter
- MB-201 extra mobile mount
- SP-40 compact mobile speaker



#### CD-10 DCS call sign display

CD-10 maximizes your use of Kenwood's new signalling concept, Digital Code Squeech. DCS uses a data string to open squelch on a receiver that has been programmed to accept the transmitted code. The transmitting station's call is programmed in ASCII. The CD-10 displays the station's call sign, and stores it in memory. Twenty calls may be stored. The CD-10 may be used with any receiver to display calls heard.



More product information is available from authorized Kenwood dealers.

## KENWOOD

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

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450 OHM HD LADDER LINE, POLY INS.	10¢/ft.
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4 CONDUCTOR ROTOR CABLE	8¢/ft.
5 CONDUCTOR ROTOR CABLE	14¢/ft.
8 CONDUCTOR ROTOR CABLE (2#18/#22)	16.5¢/ft.
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14 GA STRANDED COPPERWELD, 140 FT. ROLL	\$10.00
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Designed for H/T Use  
All Mode Operation with Rx Preamp

**B1016—2 Meter Dual Purpose Amplifier**  
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All Mode Operation with Rx Preamp

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All Mode Operation with Rx Preamp

**C22A—1 1/4 Meter H/T Amplifier**  
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Compact Size (3 1/2" x 2 1/2" x 7")  
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High Power H/T Amplifier  
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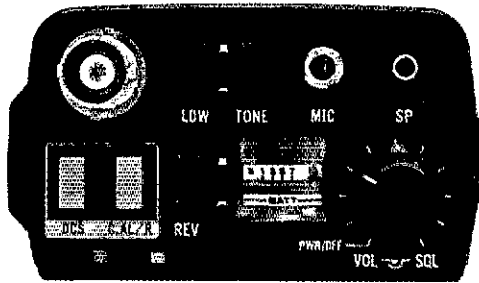
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...pacesetter in Amateur radio

## Handy Handful...

### TR-2600A/3600A

Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signalling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.



The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handful"!

#### Optional accessories:

- TU-35B built in programmable sub-tone encoder
- TB-2530 2-m 25 W RF power amp.
- ST-2 base stand/charger
- MS-1 mobile stand/charger
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/alkaline battery case
- RA-3 2-m telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- AX-2 shoulder strap w/ant. base
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.

#### Simple to operate

Functional design is "user friendly." Built-in 16-key autopatch encoder, TX STOP switch, REVERSE switch, KEYBOARD LOCK switch, high efficiency speaker.

#### Large LCD

Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.

#### Extended frequency coverage

Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz. (TR-3600A covers 440-450 MHz.)

#### Programmable scan

Channel scan or band scan, search for open or busy channels.

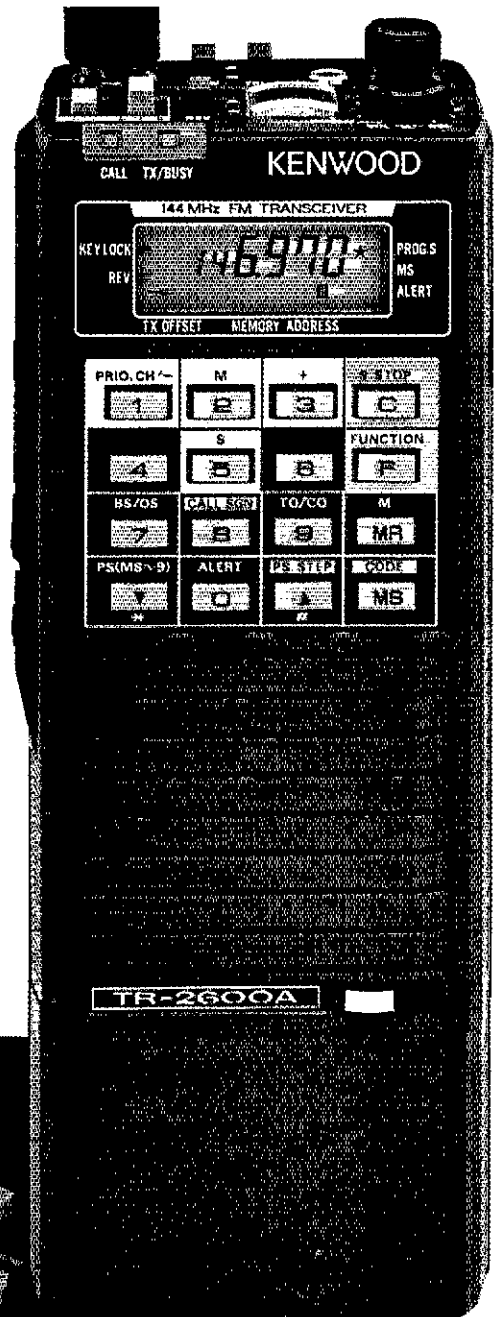
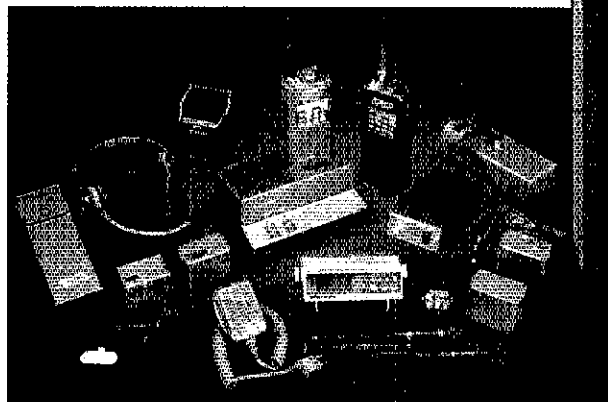
#### SLIDE-LOC battery case

#### 10 Channels

10 memories, one for non-standard repeater offsets.

#### 2.5 watts high power, 350 mW low

TR-3600A has 1.5 watts high or 300 mW low.

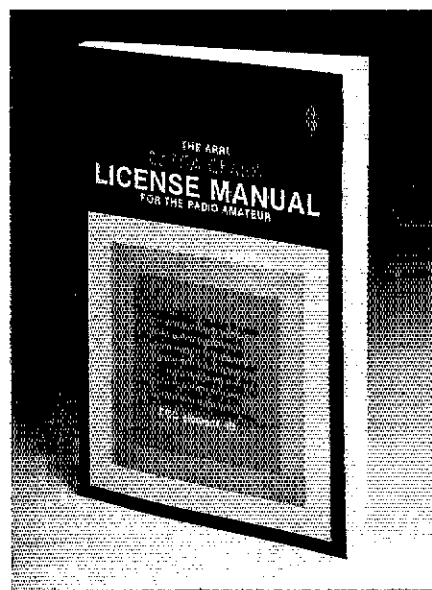
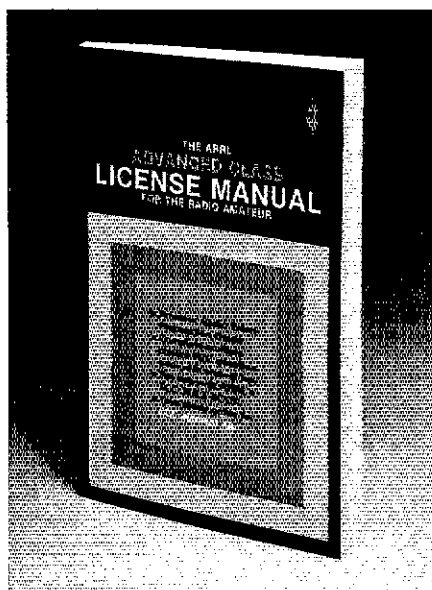
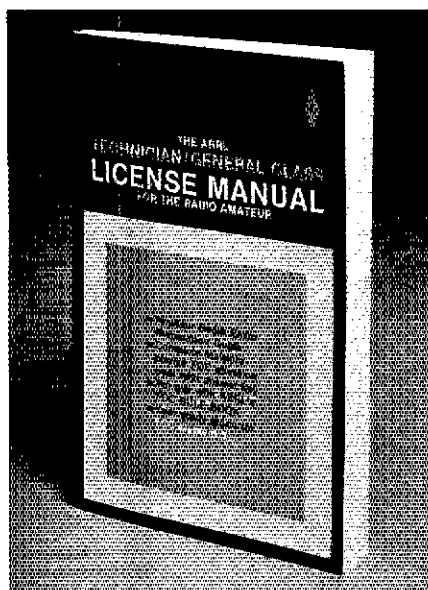


## KENWOOD

TR-2600A shown. TR-3600A is available for 70 cm operation.

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

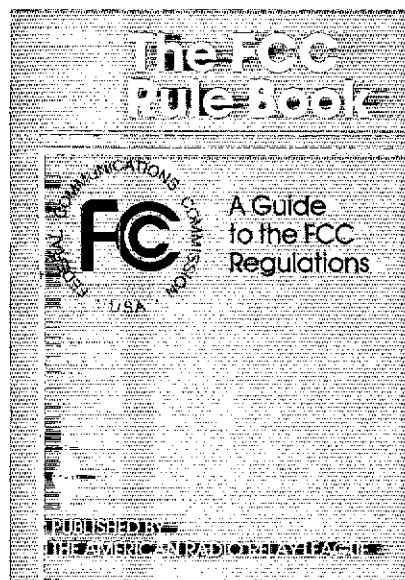
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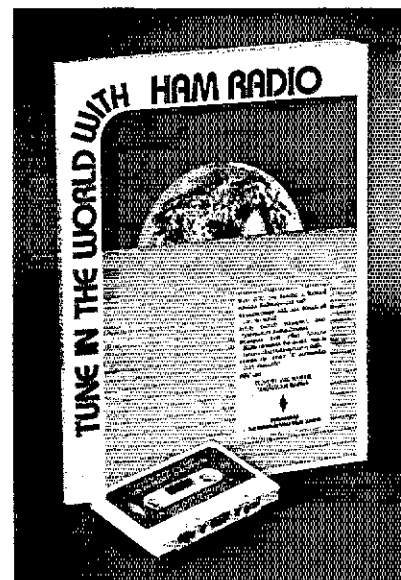


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# NEW!

# COMING TO A HAM NEAR YOU

# IC-735



## Ultra Compact

The new ICOM IC-735 is what you've been asking for...the most compact and advanced full-featured HF transceiver with general coverage receiver in the market. Measuring only 3.7 inches high by 9.5 inches wide by 9 inches deep, the IC-735 is well suited for mobile, marine or base station operation.

## More Standard Features

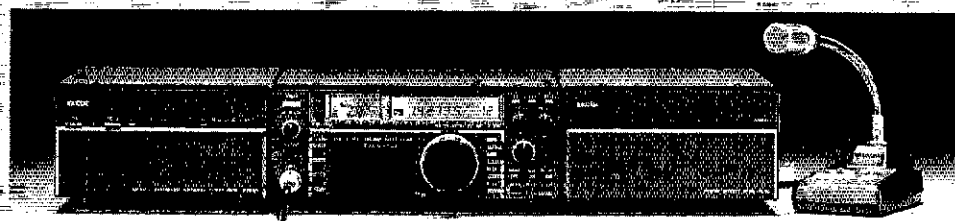
Dollar-for-dollar the IC-735 includes more standard features...FM built-in, an AT-12 scanning mic, FM, CW, LSB, USB, AM transmit and receive, 12 tunable memories and lithium memory backup, program scan, memory scan, switchable AGC, automatic SSB selection by band, speech processor, 12V operation, continuously adjustable output power to 100 watts, 100% duty cycle, and a step tunable notch!

## Superior Performance

It's a high performer on all the ham bands, and as a general coverage receiver, the IC-735 is exceptional. The IC-735 has a built-in receiver attenuator, preamp and noise blanker to enhance receiver performance. PLUS, it has a 105dB dynamic range and a new low-noise phase locked loop for extremely quiet rock-solid reception.

## Simplified Front Panel

The large LCD readout and conveniently located controls enable easy operation, even in the mobile environment. Controls which require rare adjustment are placed behind a hatch cover on the front panel of the radio. VOX controls, mic gain and other seldom used controls are kept out of sight, but are immediately accessible.



**Options.** A new line of accessories is available, including the AT-150 electronic automatic antenna tuner and the switching PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 at your authorized ICOM dealer. For superior performance and innovative features at the right price, look at the ultra compact IC-735.



# ICOM

## First In Communications



# Around the corner Yaesu's VHF/UHF

Whether it's for working your favorite repeater or working an exotic land, Yaesu's got the choice in VHF and UHF radios that you need.

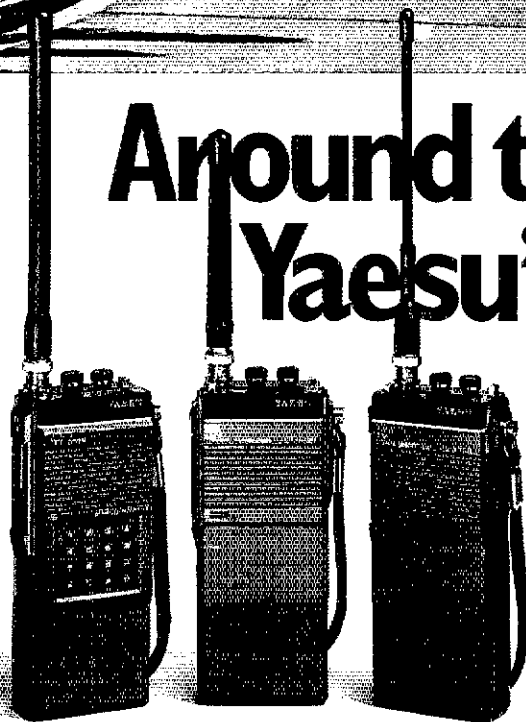
In fact, you'll discover that our VHF/UHF line is as diverse as your operating needs.

So when you want to make your VHF/UHF operation complete, just look to Yaesu for the solution.

**For your hand.** We're constantly raising the standards in handheld radio technology. And our 5-watt, 2-meter FT-209RH and

our 4-watt 440-MHz FT-709R are no exceptions.

In fact, you won't find a more flexible, easy to use HT design anywhere.



Each rig gives you a battery saver that really helps conserve your battery power.

Two microprocessors make for a wider range of scanning functions. And complete storage capability in each of the ten memory channels.

Even an optional plug-in tone encode/decode module is available.

And best yet, these two high-powered HTs fit very comfortably in your hand, thanks to an ultra-slim and lightweight design.

However, if you're looking for a more basic and inexpensive

handheld alternative, we've got your bases covered too.

We give you a choice of three bands of operation: the FT-203R for 2 meters, the FT-103R for 220 MHz, and the FT-703R for 440 MHz.

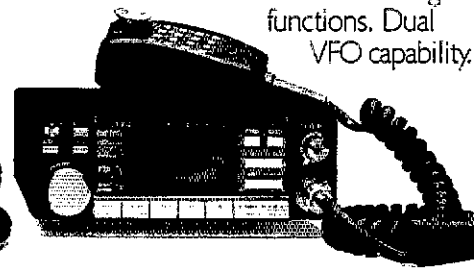
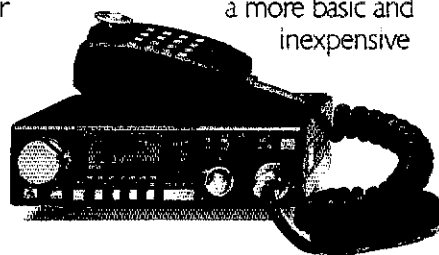
Each of these lightweight rigs features 2.5 watts of power and an optional DTMF keyboard.

**Over land.** Our two mobiles give you a lot of power in very small packages.

The FT-270RH is a 2-meter, 45-watt rig that conveniently packs its 45-watt punch into just about any small space in your car.

The FT-2700RH is a 25-watt FM dual-bander that lets you operate on 2 meters or 440 MHz. Or combine the two for cross-band, full-duplex, telephone-style operation.

Either way, both rigs are simple to operate. You get ten memory channels. Flexible band-scanning functions. Dual VFO capability.







# Around the world. He gets you there.

With a clean, uncluttered LCD display for easy readout.

You don't even have to take your eyes off the road to determine your operating frequency and memory channel. An optional voice synthesizer announces them both at the push of a button on the microphone.

Also, an optional plug-in tone encode/decode board is available.



**Across the world.** We've got the world's most popular link to OSCAR 10, the triband FT-726R.

And talk about DX. You'll be making worldwide contacts in true 20-meter style. With excellent signal quality too.

And better, you can work the world from just about anywhere, including apartments and antenna

restricted neighborhoods.

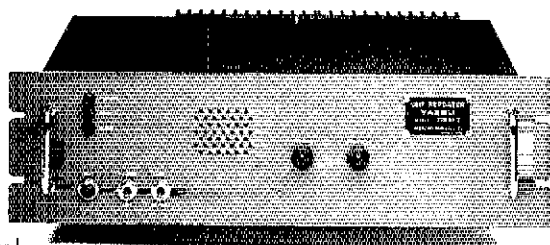
The FT-726R is a 2-meter, 10-watt rig with cross-band capability. To assemble the core of your earth station, simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You get eleven memories, dual VFO registers, highly versatile scanning functions, and a whole lot

more to make the FT-726R a highly worthwhile investment.

**Tie it all together.** Finally, if you're looking for a repeater system, we've got just the repeater and intelligent controller that you need.

We'll help fine-tune your system to fit your individual requirements. No matter what they



may be. Just write us with your system specifications, and we'll recommend the required hardware.

What's more, you can rest assured that our repeater system is proven and reliable. In fact, it's been used extensively in both amateur and commercial applications.

## **Yaesu gets you there.**

So when you're ready to get out on VHF/UHF, go with

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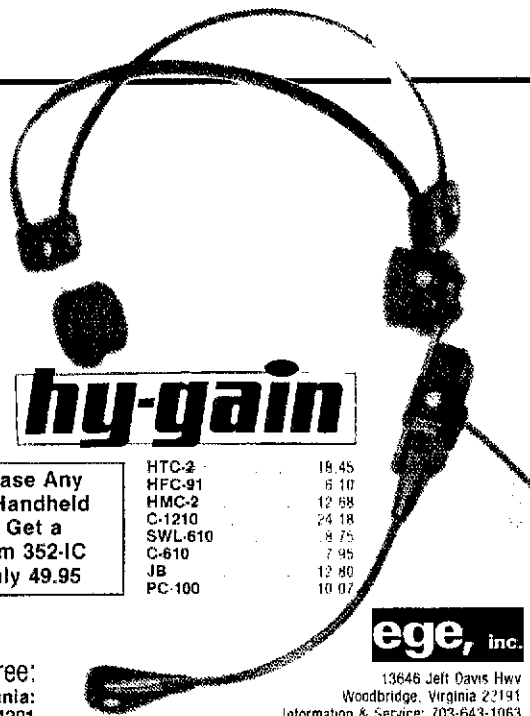
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### TH-21AT/31AT/41AT

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

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Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.

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Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (5.7 lb) **with batteries!**

#### Expanded frequency coverage (TH-21AT/A).

Covers 141,000-150,995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.

#### TH-31AT/A: 220,000-

224,995 MHz in 5 kHz steps.

#### TH-41AT/A: 440,000-

449,995 MHz in 5 kHz steps.



#### • Repeater offset switch.

TH-21AT/A:  $\pm 600$  kHz, simplex.

TH-31AT/A:  $-1.6$  MHz, reverse, simplex.

TH-41AT/A:  $\pm 5$  MHz, simplex.

#### • Standard accessories:

Rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery pack, wrist strap.

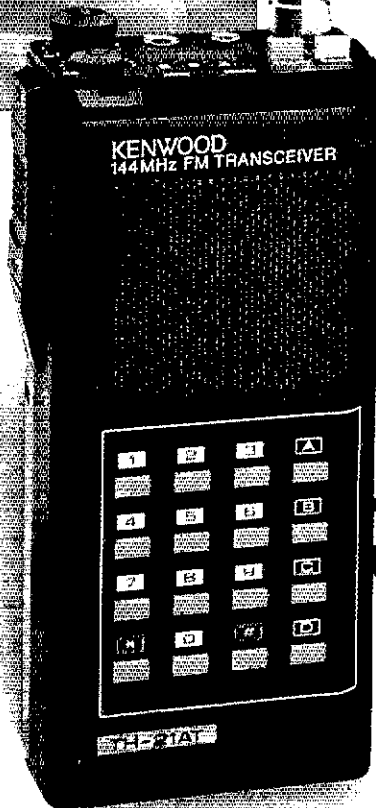
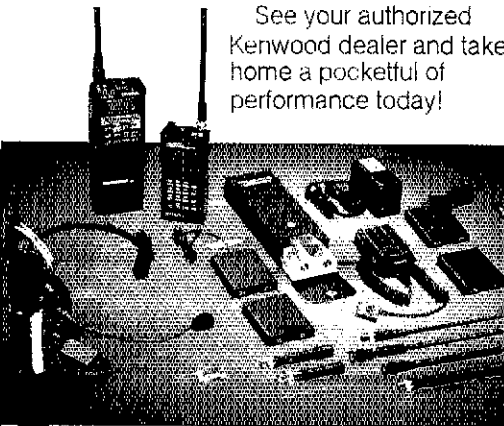
#### • Quick change, locking battery case.

The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.

#### • Rugged, high impact molded case.

The high impact case is scuff resistant, to retain its attractive styling, even with hard use.

See your authorized Kenwood dealer and take home a pocketful of performance today!



#### Optional accessories:

- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAH battery
- DC-21 DC-DC converter for mobile use
- BT-2 manganese/alkaline battery case
- EB-2 external C manganese/alkaline battery case
- SC-8 soft case for TH-21A/31A/41A
- SC-8T soft case for TH-21AT/31AT/41AT
- TU-6 programmable sub-tone unit
- AJ-3 thread-loc to BNC female adapter
- Service manual

More information on the TH-series HTs is available from authorized Kenwood dealers.

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TH-21AT shown. Standard versions TH-21A/31A/41A without DTMF pad also available. Specifications and prices are subject to change without notice or obligation.

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WANTED SWAN WM3000 watt meter K4NBN "No Bad News".

TRISTAO TX-472 crank-up tower with raising fixture and coax arms. \$1350. Pick-up only. KLM KT34XA, \$250. KLM KT34A extension kit, \$75. Cushcraft 402CD, \$125. Prefer pickup on antennas. Hy-Gain HDR-300 rot, \$400. Drake CS-7 remote antenna switch, \$75. Mike, K7C7WG, 503-684-2472 days.

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ANTENNAS-PICK-UP only. Southern New Jersey with 3-element Kirk Helically wound 40 meter beam, coast over \$600 new. Never assembled, \$400. Homebrew 5-element on 15 meters, 4 element on 10 meters, on common 30 foot boom. Works great. \$75. Also for sale, Collins 7533-B receiver with 200 Hz. CW filter. Excellent condition: \$450. Heathkit SB-300/SB-401 with Magnum Six RF Speech Processor. All three \$200. Hallcrafters S-36, 1942 vintage UHF receiver, 27-150 MHz, \$100. Call John Hill, K2YV, 212-683-2273 weekdays.

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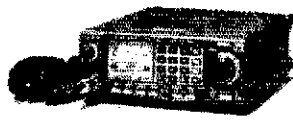
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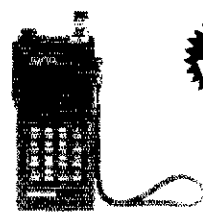


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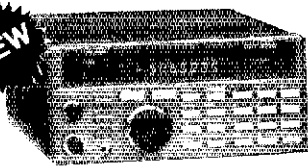
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RS-20M	RS-20A w/switchable volt and Amp meter		137.95	109.95
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**NEW MURCH UT-2000B** 160-10 meters transmatch \$285. Postpaid. K6XZ, 707-539-0316.

**WANTED: Swan 45 Mobile Antenna, MMBX** Matching Box. Both must be in excellent condition. K2UD, 372 Callodine Avenue, Amherst, NY 14228. 716-838-2406.

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**KENWOOD TS-520S** with MC-50. Like new. \$350. W2ZN, M. Kovar, 3 Puddingstone Ct., Morristown, NJ 07960, 201-287-0657.

**30S1 #11898, \$1500. 75S3B #85675, 32S3 #100498, 516F2 #22275, 312B4 #63454, \$1250. All R/E. 30L1 #12801, \$500. F455J-06, \$95. F455B-12, \$50. F455J-15, \$95. 353A-15: Adapter 75A2/HRO50, \$50. 312B5, \$300. James Craig, 32 Birchwood Drive, Rye, NH 03870, 603-964-6858.**

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**WANTED: ALPHABETICAL** names callbook. B. Cook, RD 1, Chittenango, NY 13037.



MAKE OFFER: Complete station. TH6DX antenna, Rohn 72' foldover. Rotor. Mint Collins 75S3B, 32S3, PS, keyer, processor, Digital display, Johnson KW matchbox. Buyer must remove. KA1ES, 617-369-5744.

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WANTED: DRAKE R75, SB220, NRD 515; write from New Jersey/New York to WA2VHQ, Reiner.

FOR SALE: YAESU FT-ONE, absolute mint, new March 1985, still with six months factory warranty, all 4 filters, FM unit, RAM memory board, \$1300 bank check or money order, I'll pay UPS. Allan Moser, W7GYR, 2800 Samuels Rd., Samuels, ID 83864, 208-263-3728.

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KENWOOD TS-520 w/CW/SSB filter, Tokyo antenna tuner. Autek SSB/CW/AM filter. All perfect - \$500. KB4HCD 804-298-1184.

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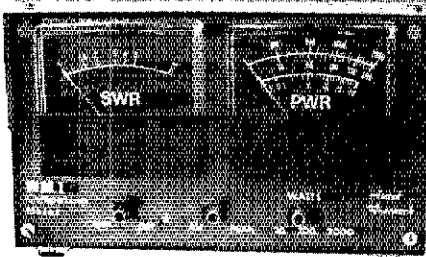
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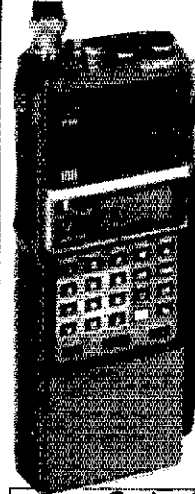
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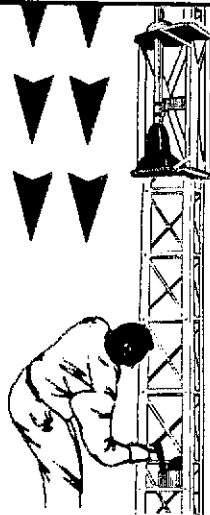
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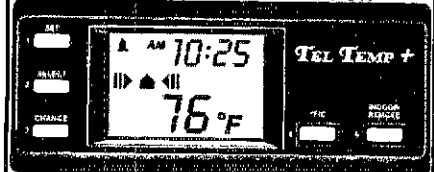
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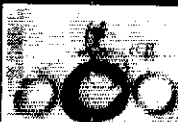
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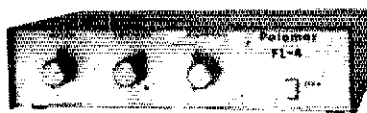
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**NOW! You can beat the QRM with this new universal audio filter.**



- For SSB/CW/RTTY/AM
- Switched capacitor filters
- Extremely sharp skirts
- No ringing

**How it works.** A 10 pole low-pass and an 8 pole highpass can be moved anywhere in the 200-3500 Hz range. This gives an amazingly sharp bandpass filter at any frequency and of any bandwidth. Interference disappears like magic. The lowpass takes out monkey chatter, the highpass gets rid of rumble and hum, and a notch filter will eliminate heterodynes.

**No complicated switching.** Simple 3 knob control. On-off switch bypasses the filter when desired.

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**Model FL-4 filter only \$139.95 + \$4 shipping in U.S. & Canada.** For 15-v DC. 115-v AC adapter \$9.95. Calif. residents add sales tax.



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Engineers**

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Phone: (619) 747-3343

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Lindy Messmer, Advertising Assistant  
203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

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# ANTENNA/TOWER SALE!

## HY-GAIN

### CRANKUP SALE!

All Models Shipped  
Factory Direct—  
Freight Paid\*

Check these features:  
• All steel construction  
• Hot dip galvanized after  
fabrication

• Complete with base and  
rotor plate  
• Totally self-supporting—  
no guy needed

Model	Load	Sale Price
HG37SS	9 sq. ft.	SCALL
HG52SS	52 sq. ft.	SCALL
HG54HD	54 sq. ft.	SCALL
HG70HD	70 sq. ft.	SCALL

Masts—Thrust Bearings—  
Other Accessories Available  
—Call! Prices Shown are  
Your Total Delivered  
In Continental U.S.A.!

## ROHN Self Supporting Towers On SALE!

### FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save \$
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	\$329
HBX48	48 ft	10 sq ft	303	\$429
HBX56	56 ft	10 sq ft	385	\$499
HDX40	40 ft	18 sq ft	281	\$399
HDX48	48 ft	18 sq ft	363	\$489

\*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

## Tri-Ex

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

- Check these features:
- All steel construction
  - Hot dip galvanized after fabrication
  - Complete with base and rotor plate
  - Totally self-supporting—no guys needed

Model	Height	Up	Down	Wind Load	List	Sale
W36	36 ft	11	20.5 ft	9.0 sq ft	\$694	\$579
W51	51 ft	11	20.5 ft	9.0 sq ft	\$1154	\$899
LM354	54 ft	0 ft	21.0 ft	16 sq ft	\$2010	\$1599
LM470D	70 ft	0 ft	22.0 ft	16 sq ft	\$4195	\$3199
(Motorized)						
DX86	86 ft	23.0 ft	25 sq ft		\$7200	Call
(Motorized)						

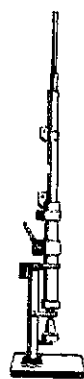
## US TOWER CORPORATION

Formerly Tristaco Tower Co.

**MA-40**  
40' tubular  
Regular \$745  
**SALE! \$549**

**MA-550**  
55' tubular

Will handle 12 sq. ft. antennas at 50 MPH winds.  
**Regular \$1245**  
**SALE! \$899**  
**IN STOCK FOR IMMEDIATE DELIVERY**  
CALL FOR INFORMATION ON ALL OTHER MODELS



**RG-213U**  
\$ .29/ft \$279/1000 ft  
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

**RG-8X**  
\$ .19/ft \$179/1000 ft

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket • Foam Dielectric

**Cable Type Loss Characteristics (dB/100 ft)**

Cable Type Imped.	10MHz	30MHz	150MHz	450MHz	
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
1/2" Alum.	50	3	5	1.2	2.2
1/2" Heliax	50	2	4	.9	1.6
3/4" Heliax	50	1	2	.5	.9

**HARDLINE/HELIAX™**  
Lowest Loss for VHF/UHF!

- 1/2" Alum. w/poly Jacket \$ .79/ft
- 1/2" LDF4-50 Andrew Heliax™ \$1.69/ft
- 3/4" LDF5-50 Andrew Heliax™ \$3.99/ft

select connectors below.

**HARDLINE & HELIAX™ CONNECTORS**

Cable Type UHF FML UHF Male N FML N MALE

1/2" Alum.	\$19	\$19	\$19	\$25
1/2" Heliax™	\$22	\$22	\$22	\$22
3/4" Heliax™	\$49	\$49	\$49	\$49

**AMPHENOL CONNECTORS**

Silver PL259	\$1.25
UG21B N Male	\$2.95 UG23D N Female \$2.95

**Antenna Wire & Accessories**

Copperweld Antenna Wire (steel core, copper coated)

Solid 12 ga.	\$ .12/ft	14 ga.	\$ .10/ft
Stranded 14 ga.	\$ .10/ft	16 ga.	\$ .09/ft
1/4 mile 18 ga copper-clad steel wire	\$30		
6 inch heavy-duty end insulator	\$2.00/ea.		
Dog-bone insulator	\$ .79	Coax Seal	\$2.50

**Van Gordon**

1-1 Balun	\$11	Center Insulator	\$6
Dipole Kits	\$80 \$31/D40 \$28		
Short Dipole Kits	\$D80 \$35/\$D40 \$33		
All-band Dipole w/ ladder line	\$29		
Eavesdropper SWL Antenna	\$64		

## CUSHCRAFT

**MULTI-BAND HF ANTENNAS**

A3 3-el Tribander...\$219 A4 4-el Tribander...\$289  
R3 20/15/10mtr Vert \$279 A73/A744 40mtr Kit \$75

**HF MOND-BAND ANTENNAS**

10-3CD	\$ .95	10-4CD	\$109
15-3CD	\$119	15-4CD	\$129
20-3CD	\$199	20-4CD	\$279
40-2CD	\$289	D40	\$149

**VHF/UHF BEAMS**

A50-5	\$ .79	617B	\$199
214B	\$ .79	3219	\$ .95
220B	\$ .95	424B	\$ .79

**OSCAR/TWIST ANTENNAS**

A144-10T	\$ .52	A144-20T	\$ .75
A147-20T	\$ .63	A161B	\$ .59
A141MB	\$ .29	P54	\$ .69

**VHF/UHF FM ANTENNAS**

A147-4	\$ .29	A147-11	\$ .49
214FB	\$ .79	228FB	\$219
A449-B	\$ .29	ARX2B	\$ .39

## HY-GAIN

Discover 2-el 40-mtr Beam  
Discover 3-el Conversion Kit  
Discover 3-el 14 SUPER SPECIAL  
QK7 2-el 40 mtr Add-On-Kit  
V2S 2-el 3-el Vertical  
1H5MK3S 2-el Band 5-el Triband Beam  
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THJRS 3-el Band Beam  
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156BAS 5-el 15-mtr Beam  
105BAS 5-el 10-mtr Beam  
204BAS 4-el 20-mtr Beam  
64BS 4-el 6-mtr Beam  
66BS 6-el 6-mtr Beam  
18HTS 80-10 mtr Hy-Tower  
LC-160 160-mtr Coil Kit for  
214BS 14-el 2-mtr Beam  
2800 80/40 mtr Trap Dipole  
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BN86 80-10 mtr KW Balun W/Coax

**HUTSLER**

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4BTV 40-10 mtr Vert.	\$89	G7-144 2-mtr Base	\$119
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10m	15m	20m	40m	75m
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Bumper Mounts - Springs - Folding Masts	In Stock!			

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**Delivered (Continental USA)**

- Optional 160 Meter Resonator Kit Model TBR 160 \$49

Free Shipping On Butternut Accessories Also When Purchased With Antenna

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40m-3 3-el 40-mtr Beam	\$459
40m-4 4-el 40-mtr Beam	\$649
2m-13LBA 13-el 2-mtr Beam	\$79
2m-14C 14-el 2-mtr Satellite Antenna	\$89
2m-16LBN NEW-16-el 2-mtr Beam	\$89
2m-22C NEW-22-el 2-mtr Satellite Antenna	\$119
432-30LBN NEW-30-el 432 MHz Antenna	\$99
435-18C 435 MHz Satellite Antenna W/CS-2	\$119
432-16LB 16-el 432 MHz Beam	\$69
435-40CX 435 MHz Satellite Antenna w. CS-2	\$159

## MINI-PRODUCTS

**HQ-1 \$159**

**ROTORS**

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Telex HAM 4 (15 sq ft rating)	\$219
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Telex HDR300 Heavy Duty (25 sq ft rating)	\$519
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Kenpro KR400 Azimuth Rotator	\$129
Kenpro KR500 Heavy Duty Elevator Rotator	\$159
Kenpro KR600 Azimuth Rotator	\$199
Kenpro KR2000 Heavy Duty Azimuth Rotator	\$379
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Kenpro KR5600 Heavy Duty Az/EL Rotor Pkg	\$329

## ROTOR CABLE

Standard 8 cond cable \$ .19/ft  
(vinyl jacket 2-#18 & 6-#22 ga)  
Heavy Duty 8 Cond cable \$.36/ft  
(vinyl jacket 2-#16 & 6-#18 ga)

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10 ft Stack Sections

20G \$39.50	45G \$112.50
25G \$49.50	55G \$134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant. Load*	Price
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	FK2558	58 ft	13.3 sq ft	\$949
	FK2568	68 ft	11.7 sq ft	\$998
	FK4544	44 ft	34.8 sq ft	\$1199
	FK4554	54 ft	29.1 sq ft	\$1299
	FK4564	64 ft	28.4 sq ft	\$1399

25G Foldover Double Guy Kit... \$219  
45G Foldover Double Guy Kit... \$249

\*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

## TOWER/GUY HARDWARE

3/16" EHS Guywire (3990 lb rating)	\$ .15/ft
1/4" EHS Guywire (6000 lb rating)	\$ .18/ft
5/32" 7 x 7 Aircraft Cable (2700 lb rating)	\$ .15/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	\$ .45
1/4" CCM Cable Clamp (1/4" Cable)	\$ .55
1/4" TH Thimble (fits all sizes)	\$ .45
3/8EE (3/8" Eye & Eye Turnbuckle)	\$6.95
3/8 TEJ (3/8" Eye & Jaw Turnbuckle)	\$7.95
1/2" EE (1/2" Eye & Eye Turnbuckle)	\$9.95
1/2" TEJ (1/2" Eye & Jaw Turnbuckle)	\$10.95
3/16" Preformed Guy Grip	\$2.49
1/4" Preformed Guy Grip	\$2.99
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500D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
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5/8" Diam - 8 ft Copper Clad Ground Rod	\$12.95

## PHILLYSTRAN GUY CABLE

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## GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$59	\$79
18 in Wall	\$39	\$69	\$89	\$129
24 in Wall	\$69	\$129	\$189	\$249



Mon-Fri: 9am - 5 pm  
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(Prices & Availability Subject To Change Without Notice)

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**TS-430S** Most Advanced, Compact HF Transceiver

- General Coverage Receiver
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- Large LCD Readout • 21 Multi-Function Memory • Lithium Back-up • Automatic Offset • Built-in Encoder • Memory or Band Scan

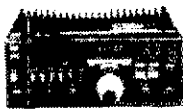
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**TR-2600**

- 2.5W/100 mW (Switchable) 2 Meter Handheld Transceiver
- LED Readout • Ten Memories w/Lithium Back-up • Band and Memory Scan

## YAESU



**FT-757 GX**

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- General Coverage Receiver
- USB/LSB/CWAM/FM • Dual VFOs
- Memory/Band Scan • Speech Processor • CW Filter and CW Keyer included

## YAESU



**FT-2700RH**

- Dual Bander
- VHF/FM
- 144.430 MHz
- 25 WATTS

## YAESU



**FT-209RH**

- 5 Watts
- 10 Memories
- LCD
- Compact

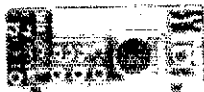
## YAESU



**FT980**

- CAT SYSTEM—Computer Aided Transceiver
- Wide Dynamic Range • General Coverage • Low Noise Front End • 10 Hz Digital Readout • All Mode Transceiver—CW/SSB/AM/FM/FSK

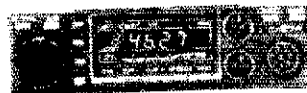
## ICOM



**IC-745 HF Base**

- All ham band HF transceiver. 16 memories. 100KHz to 30 MHz general coverage receiver and adjustable noise blanker and AGC

## ICOM



**IC-27A Compact Mobile**

- A breakthrough in 2-meter mobile communications! Most compact on the market (5 1/2" x 1 1/2" Hx7" D) contains internal speaker for easy mounting. 25 watts. 32 PL frequencies. 9 memories scanning and touchtone mic

## ICOM



**IC-02AT**

- The IC-02AT 2-meter LCD readout handheld features 10 memories, 32 PL tones, scanning, keyboard frequency entry, dial lock, 3W std. 5W opt. DMF

## ICOM



**IC-R71A General Coverage Receiver**

- The IC-R71A 100KHz - 30 MHz superior grade general coverage receiver features keyboard frequency entry, 32 memories, SSB/AM/RTTY/CW, selectable AGC and noise blanker, and wireless remote controller (optional)

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STORE IN THE  
ST. LOUIS AREA

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# Celebrate your buying decision with the money you've saved.

When it comes to getting maximum HF performance for your dollar, the choice is clear. Yaesu's FT-757GX.

Nowhere else will you find so many HF features packed into one compact, mobile-ready package. At a price that's got the competition baffled.

For starters, each 757 includes an electronic keyer, 600-Hz CW filter, AM and FM modes, AF speech processor. And a 25-kHz marker generator. All at no extra charge.

And working the DX has never been easier with dual VFOs, single-button VFO/memory swap for split-frequency operation, eight

memories, and push-button quick memory and band scan.

The 757 also lets you listen from 500 kHz to 30 MHz with its high-performance general coverage receiver. The transmitter covers 160 through 10 meters, including the new WARC bands, with 100 watts output on sideband, FM and CW.

CW buffs will enjoy the delights of full QSK operation. Plus the massive heatsink and duct-flow cooling system allow continuous RTTY operation for up to 30 minutes. Use the FP-757HD heavy-duty power supply option for continuous-duty applications.

And of course, there's the 757's highly attractive price. It's the

perfect way to get all the HF performance you desire, with money left over to apply toward other ham gear. Perhaps a power supply for base station use. An antenna or antenna tuner. Or whatever else makes your operation complete.

So ask your dealer today about Yaesu's FT-757GX. The most celebrated HF price/performer on the air.

## YAESU

Yaesu Electronics Corporation  
6851 Walthall Way, Paramount  
CA 90723 (213) 633-4007

Yaesu Cincinnati Service Center  
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# KENWOOD

...pacesetter in Amateur radio

NEW!

## “DX-cellence!”

### TS-940S

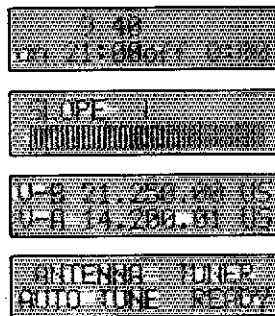
The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display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

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **Programmable scanning.**
- **Semi or full break-in (QSK) CW.**

- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**

#### Optional accessories:

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



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



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

## KENWOOD

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

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