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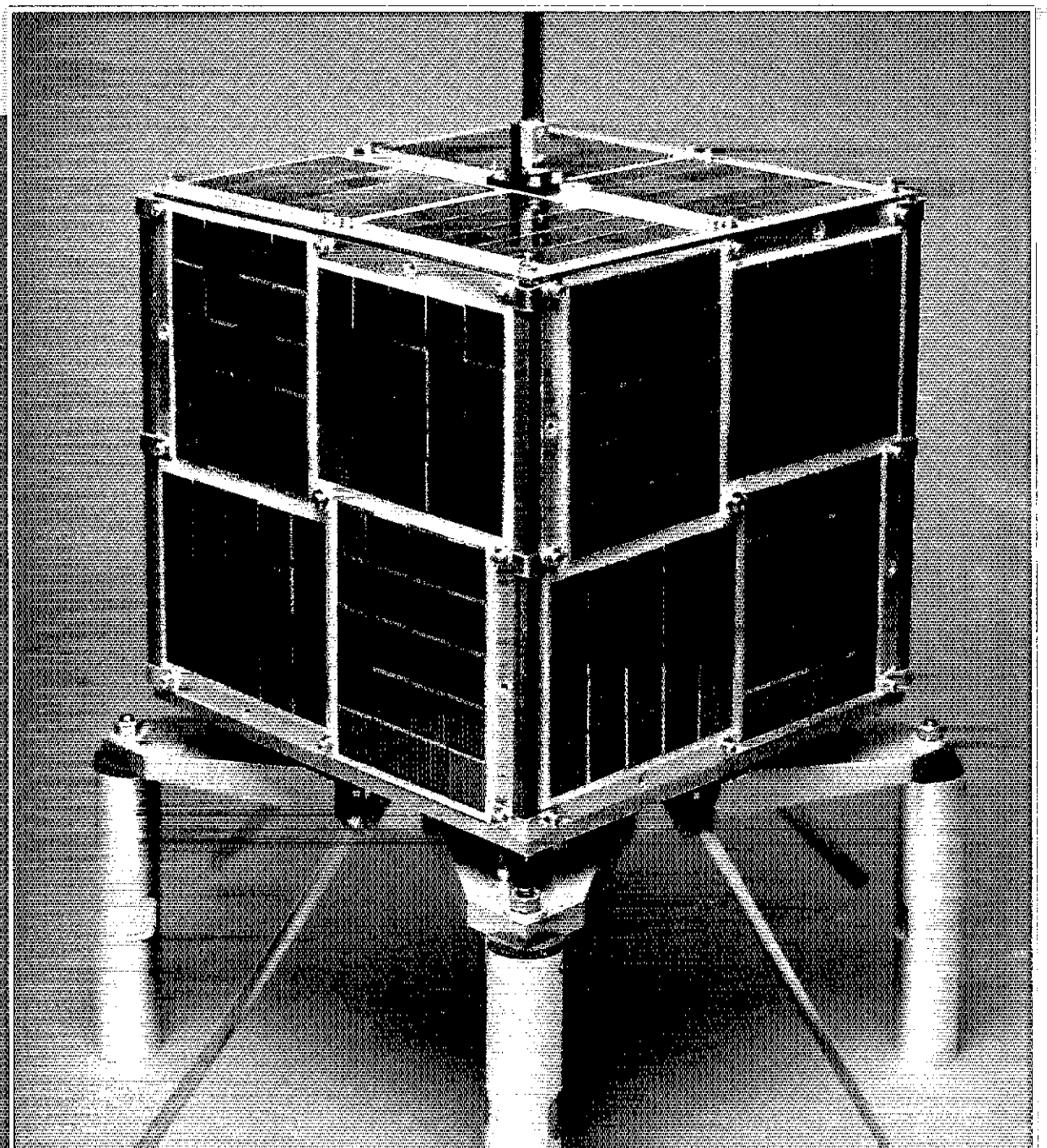

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- **Separate frequency display for "main" and "sub-band."**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!
- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
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- **Balance control and separate squelch controls for each band.**
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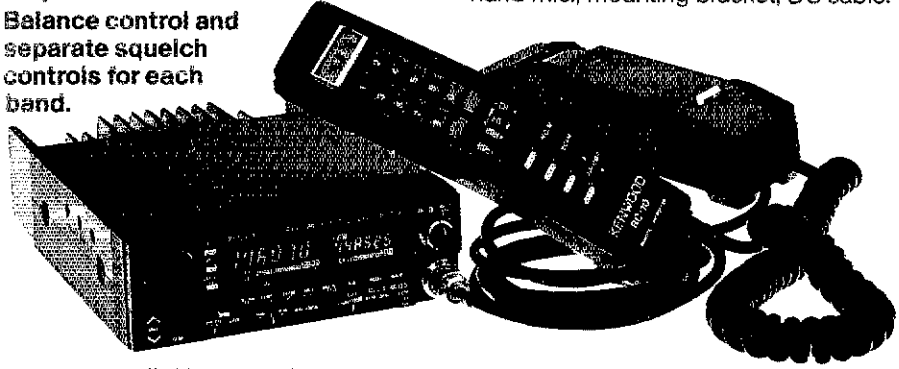
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.



TM-721A shown with optional RC-10

Optional Accessories:
• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-700** Dual band (2 m/70 cm) mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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

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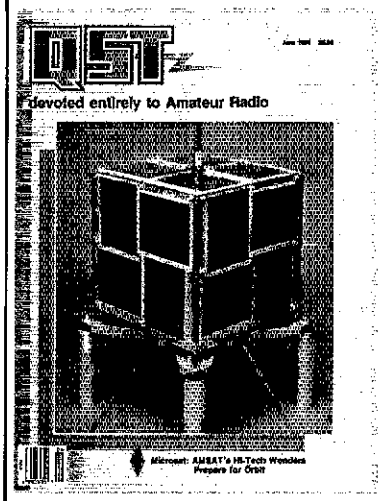

OUR COVER

This year's launch of six miniature OSCARs will mark a new level of technical achievement in the Amateur Satellite Service. "Microsat: The Next Generation of OSCAR Satellites —*Part 2*," beginning on page 53, caps off an in-depth look at these tiny birds' conception, development, participants and mission profiles. *(photo courtesy Richard Chandler)*

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SPECIFICATIONS

Model	**ARX-2B**	**ARX-220B**	**ARX-450B**
Frequency, MHz	135-160	220-225	435-450
SWR 1.2:1 Typical 2:1 Bandwidth, MHz	>3	>5	>10
Gain, dB	excellent	excellent	excellent
Power Rating, Watts FM	1000	500	500
Radiation Angle, Deg.	7	7	7
Horizontal Radiation Pattern, Deg.	360	360	360
Height, ft. (m)	14 (4.3)	9.3 (2.8)	4.9 (1.5)
Weight, lbs. (kg)	6 (2.7)	5 (2.3)	1 (.45)

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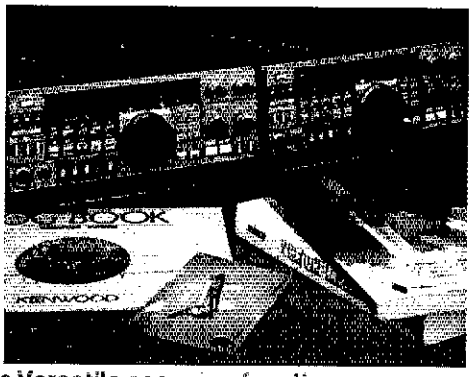
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out), "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
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- **High performance noise blanker.**
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- **IF shift.**
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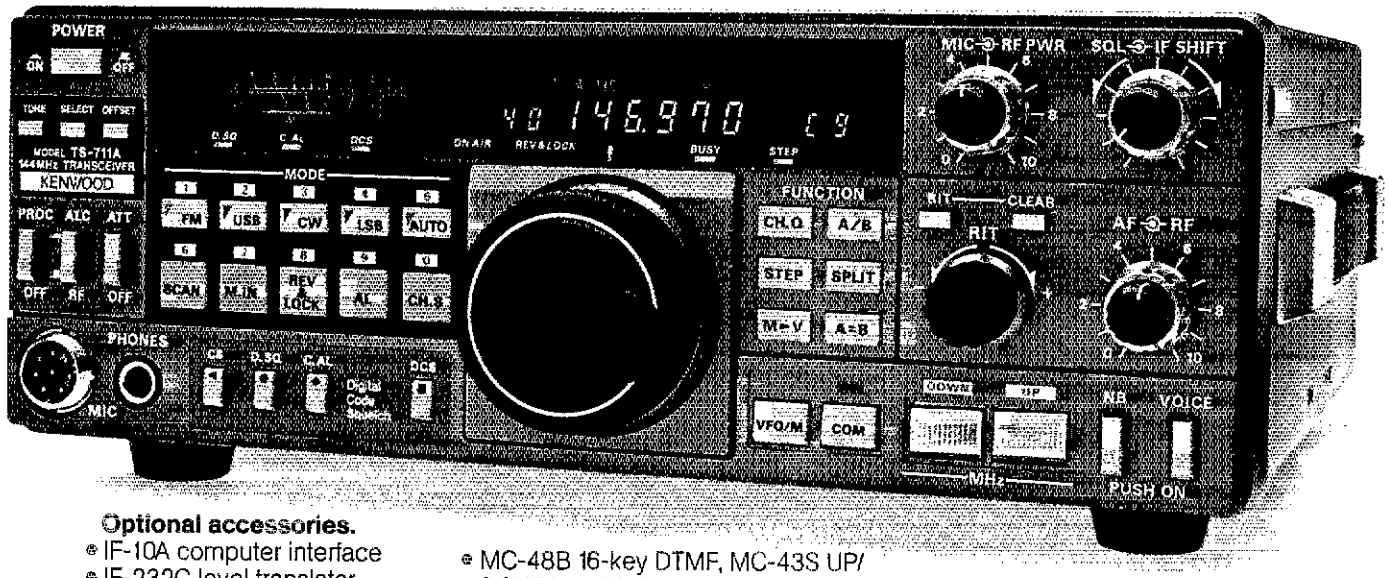
- **Semi break-in CW, with side tone.**
- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.



Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S 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
- PG-2U DC power cable

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North Texas — W. W. "Dan" Dansby, W5URI, 5805 Walla Ave, Fort Worth 76133
Oklahoma — Joseph Lynch, N6CL, PO Box 73, Oklahoma City 73101 (405-528-6625)
South Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

"It Seems to Us . . ."

Sunspots . . .

This is a great time to be a radio amateur.

For the past year we've been privileged to experience some of the finest high-frequency propagation conditions since the invention of radio. That something unusual was afoot became apparent last June, even to those of us who distrust long-term predictions of solar activity, when 10 and 6 meters suddenly blossomed with nocturnal DX. Then came the autumn, and the realization that 10 meters was now the band of choice during the daylight hours and well into the evening. With a barefoot transceiver and a simple antenna, chasing DX on the other HF bands can be a frustrating experience. Not so on 10 meters! By the time winter eased its grip, it was possible to be somewhat jaded by it all: "Conditions aren't very good today—there are *only* Europeans coming through, and they're *only* S9."

Thanks to Novice Enhancement, thousands of Novices and Technicians have enjoyed the horizon-broadening experience of a first overseas contact. And of course, it's no more possible to stop after one DX QSO than it is to stop after eating one peanut; usually, once you're bitten by the bug you stay bitten. Judging by the workload on Volunteer Examiners, upgrading as a path to greater privileges is second in popularity only to operating among these hams!

Not that all the action is on 10. Even the old-timers who claim they've "worked them all" have new worlds to conquer at 18 and 24 MHz, and the country totals among the 50-MHz faithful have reached heights that seemed unattainable just a few years ago. The lower-frequency bands stay open through the night, giving the midnight-oil-burners the chance to use 40, 30 and 20 meters—and sometimes even 15—instead of just 160 and 80.

How long will these marvelous conditions continue? No one can say for sure; that's part of Amateur Radio's mystique. Based on past solar cycles it seems a pretty safe bet that we have another two years, maybe more, to enjoy "easy" DX.

Most amateurs will find these two years to be an ideal time to work into parts of the world they can't reliably reach under "normal" conditions. The desire to make the rare contact and make way for the next DXer is understandable, even laudable if that's how the operator at the other end wants to do it. But let's also use this time to really *talk* to our counterparts, at least in the not-so-rare countries, instead of always just exchanging signal reports with a list of people who remain strangers. As radio amateurs we have an extraordinary tool for international goodwill at our disposal: the opportunity for direct, uncensored, one-on-one exchanges with ordinary people in the farthest reaches of the globe. For a time, nature has blessed us with an unusual ability to do so. Let's make the most of it.

. . . and Red Ink

Not surprisingly, the increased sunspots have led to dramatic increases in some activities at ARRL Headquarters. The QSL bureau is practically working two shifts, trying to cope with the millions of cards being exchanged by amateurs in the US and other countries. DXCC and other awards applications are pouring in at a record clip. We're getting more contest entries, and the logs are bigger. The increased enthusiasm spurred by the good conditions has led to greater demand for all sorts of information services.

At the same time we were beginning to grapple with this happy problem of an upsurge in activity last year, ARRL was also absorbing the extraordinary expenses of a vigorous defense of the 220-MHz band. At Headquarters, we assumed the burden of running two computer systems in parallel until the phaseover to the new IBM System 38 could be completed. So we can retain and attract qualified staff, the Headquarters salary schedules were adjusted upward at the beginning of 1988 as a partial offset to dramatic increases in housing costs in the Hartford area. To provide better service to our Volunteer Examiners and examinees, we initiated fieldstocking of hundreds of VE Teams. To top it off, the postage rates went up—and we do a *lot* of mailing.

Increased Amateur Radio activity was reflected in increased revenue for the League from membership dues, publications sales, and advertising. But as you will see in the audited financial statements beginning on page 65, for every dollar of new revenue we had two dollars of new expenses. In 1988 the League operated in the red—the first time this has happened since 1978.

ARRL doesn't exist to make a profit; our performance as an organization is judged by how well we protect, promote, and advance Amateur Radio, not by the financial "bottom line." We'd much rather see an ocean of red ink than see a threat to Amateur Radio go unchallenged because "we can't afford it." The League remains on a firm financial footing. Still, after nine years in which we were able to maintain and add to the League's financial reserves—reserves needed to ensure that we will be able to address future threats, needs, and opportunities effectively—the 1988 loss is sobering.

Rather than just bury the bad news in mouse print in the back of the journal, we thought you as members ought to be told up front. We thought you should also know that the League's management is committed to closing the gap between revenues and expenses, so we can enter the 1990s confident of our ability to continue doing the job for Amateur Radio.—*David Sumner, K1ZZ*

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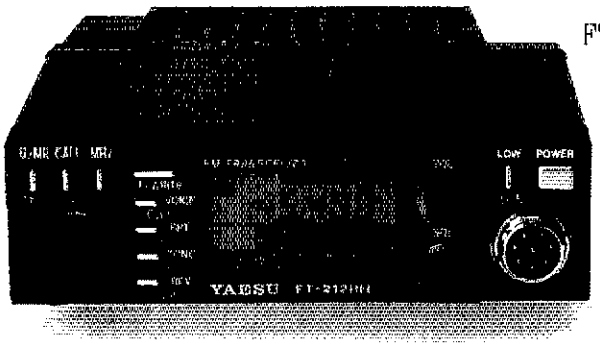

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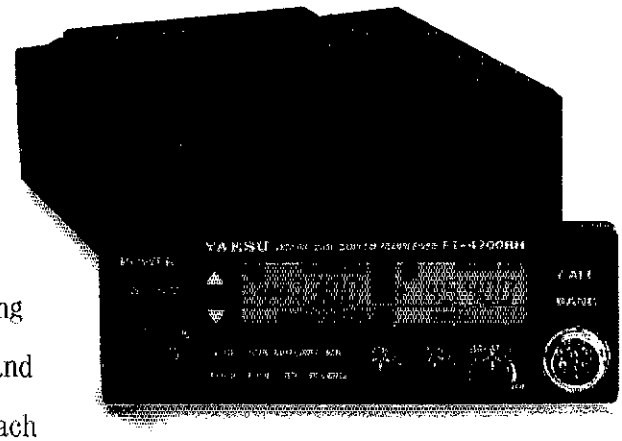

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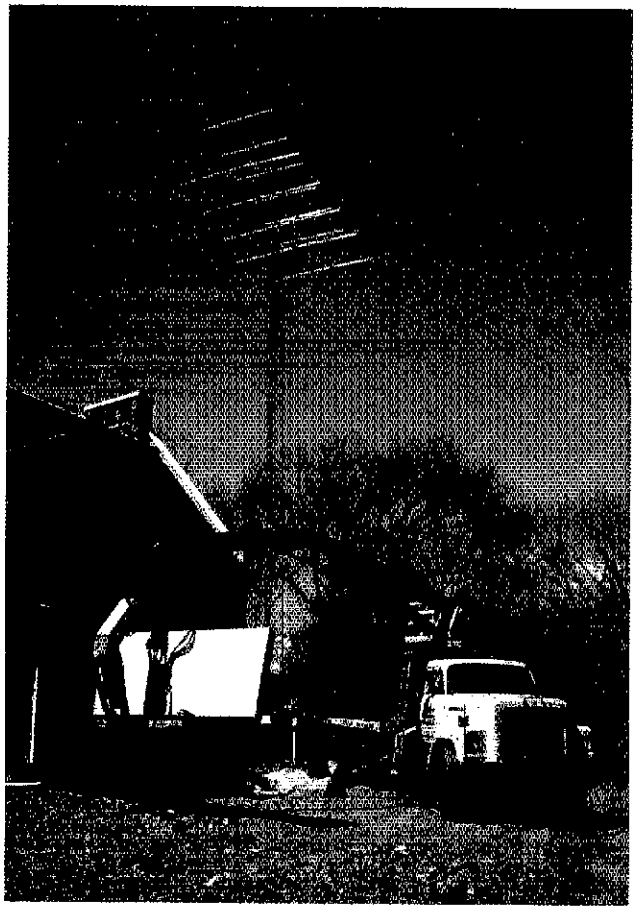
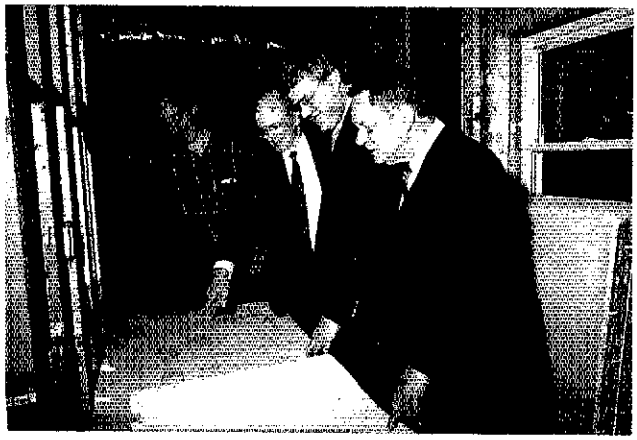
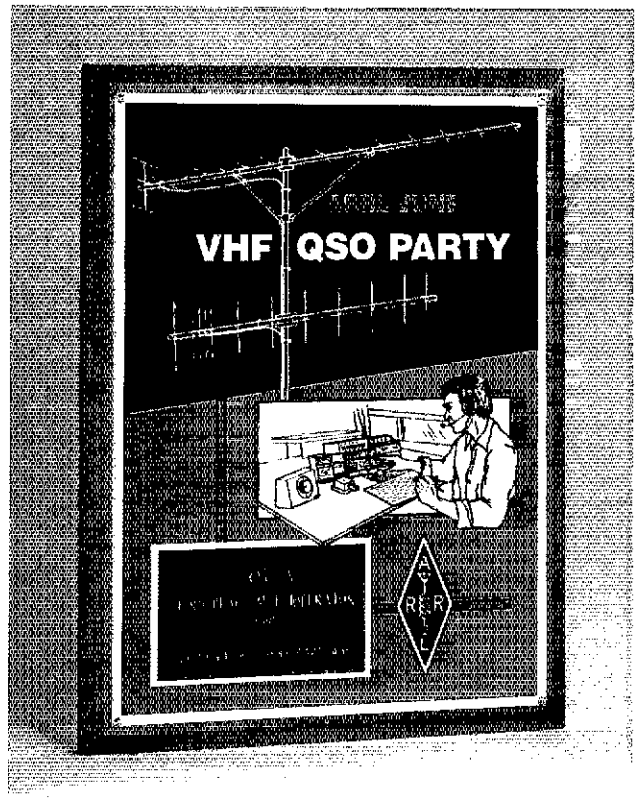
UP FRONT in QST

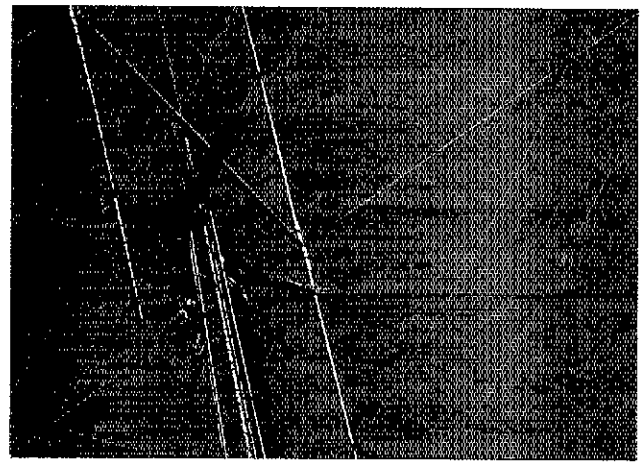


Facelift in progress: (above) A building-supply truck delivers drywall via skyhook to the W1AW renovation site. Work on the building these past few weeks included installation of wiring, plumbing and drywall. (below) AMSAT/NA President Doug Loughmiller, KO5I (2nd from r), gets a detailed on-site tour of the renovation from *QST* Editor Paul Rinaldo, W4RI; ARRL Executive Vice President Dave Sumner, K1ZZ; and League Building Manager Greg Kwasowski. Plans call for OSCAR operations including bulletins and command station functions, as well as OSCAR operation for visitors. *(photos KC1MP)*





Get psyched for June: The June VHF QSO Party (June 10-11) is just around the corner! Not to worry, though—you've still got time to get geared up and put in a winning effort. While it's fun for everyone involved, a few lucky (skillful) amateurs will receive a plaque like this one, which was awarded to N6CA in 1988. See you in June!



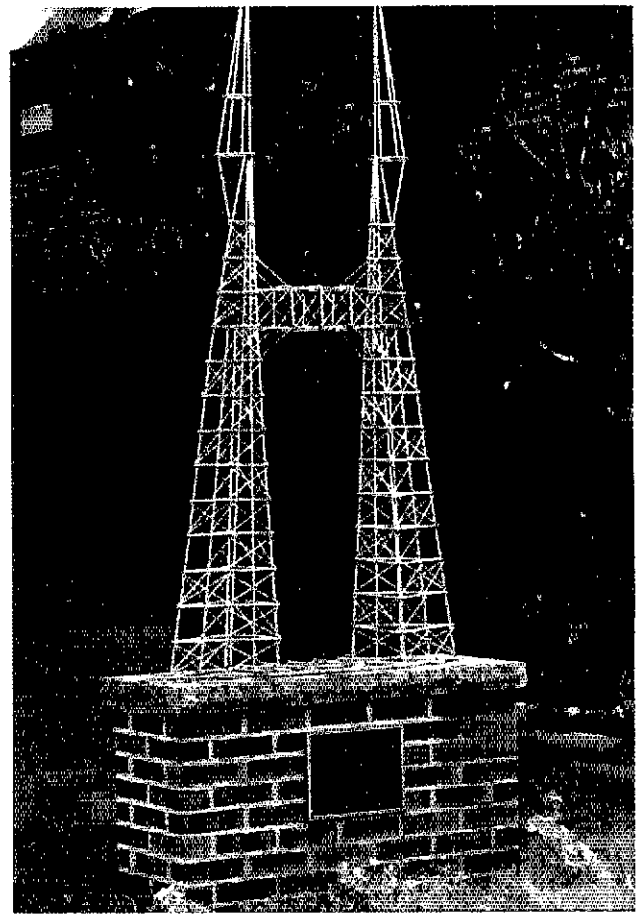
The daring young man... Mike Leazenby, ND9A, "relaxes" after making repairs to a two-element cubical quad mounted on a 70-foot self-supporting tower. *Don't* try this without the necessary skills and equipment! *(photo courtesy KF9S)*

Enjoy your trip: Bob Kass, N8KDN (r), of Huntington Woods, Michigan, got to have a nice visit with Master Yasuda, JE2HCG, of Ogaki, Japan during Bob's recent trip to Japan. Bob got Master's name from the ARRL International Travel Host Exchange (ITHE) before leaving, and as a result got to visit Master's home, eat in local restaurants where a non-Japanese-speaking person would not normally go, and visit a school and attend a kindergarten graduation concert. Bob wants to make amateurs aware of the ITHE and how it can enhance a trip to a foreign country (or enhance a visit to the US by a foreign amateur!). *(photo courtesy N8KDN)*

Call for Volunteers

Amateur Radio operators in the southeastern US are needed for the Amateur Radio Tracking Experiment, which will take place in association with the University of Alabama/ Weber State College Sub Orbital Academic Research (SOAR) program in October 1989. The experiment will place a 1-W 2-meter FM transmitter in the lower troposphere at an altitude of three miles to study tropospheric propagation. Because of a reduction in the grazing angle of the radio wave (as compared to ground level), tropospheric propagation will be enhanced by at least one order of magnitude. Interested amateurs should contact David Babulski, WBØUKK, 2677 Colony Circle, Snellville, GA 30278, telephone 404-985-1020.

First prize: Emily Wilkerson, KC4ILM, of Camden, North Carolina, captured the first-place trophy for seventh-grade-and-up at the Victory Christian School History/Science Fair in March. Emily, an eighth grader, decided on her own she was going to get her Novice license and do a display on Amateur Radio. She passed her Technician in January and got her license in time to include it in the display. Her first HF contact was West Germany, and she has worked about 25 countries so far. She isn't the only ham in her family: There's her mother, N4RIH; her father, WM4D; grandfather N4UPX; uncles WB4HWO and N4RKM; and an aunt, KC4FVM. *(photo by WM4D)*



Wireless pioneer honored: Members of the Murgas ARC (Wilkes-Barre, Pennsylvania) presented a plaque to the Sacred Heart Church when it dedicated a monument to the memory of Father Murgas in 1979. Father Murgas held 17 US patents in the field of wireless telegraphy, and was appointed chairman of the first board of the National Radio and Communications Commission in 1925 by President Coolidge. Father Murgas had to decline the appointment due to failing health and pastoral obligations. *(photo courtesy K3SAE)*

League Lines

The FCC has adopted new Part 15 low-power device rules in a First Report and Order to General Docket 87-389, ***including new "consumer" bands—four of which are also ham bands!*** Low-power devices, such as garage door openers, wireless stereo speakers and home security devices, are not required to be licensed. The ARRL Executive Committee has voted to seek reconsideration and to seek whatever relief is necessary to protect amateur interests. See page 63 of the Happenings column for the story.

The ARRL National Convention is June 2-4 in Dallas/Ft Worth, Texas. For more information, see May *QST*, page 52. As in previous years, the PRB-1 seminar entitled "Land Use Regulation of Federally Licensed Communications Facilities" will be open to all ARRL National Convention attendees, although the primary purpose is to provide Continuing Legal Education (CLE) credit to ARRL Volunteer Counsel and other interested attorneys. The cost of the course materials is $50, but the course is free for convention attendees who do not need the printed course materials.

June 24-25 is Field Day! Get your Field Day publicity package while there's still time. Send your 9 × 12-inch SASE containing four units of first-class postage to ARRL HQ, Special Requests, 225 Main St, Newington, CT 06111. Complete rules appear in May *QST*.

The Technical Department Laboratory has an opening for an engineer or technician with digital and/or RF lab experience. Starting salary range for an engineer with BSEE or equivalent is $26,000 to 28,600 depending on experience. Starting range for a technician with ASEE or equivalent is $22,022 to 24,224, depending on experience. For further information, contact Jon Bloom, KE3Z, or Chuck Hutchinson, K8CH, at HQ.

The ARRL Outgoing QSL Bureau at HQ sorted and mailed nearly ***a million cards*** to foreign QSL bureaus during the first quarter of 1989.

There is still time to contact your ARRL Director concerning the the report of the committee to examine a ***possible codefree license.*** The report appears on page 56 of May *QST*. At its July meeting, the ARRL Board of Directors will be considering whether the report, with or without modification, will become League policy. Contact your Director and let your voice be heard.

ARRL HQ will host an open house Sunday, June 11 from 10 AM to 4 PM. If your club would like to schedule a visit, please contact Membership Communications Services at HQ.

Good news for 17-meter fans! BBC vacated its 18.080 MHz broadcasting frequency when it shifted to the spring schedule. David Evans, G3OUF, Secretary of the Radio Society of Great Britain (RSGB), contacted BBC at the ARRL's request and reports that the move is intended to be permanent.

The Digital Orbiting Voice Encoder (DOVE) Microsat will be launched from French Guyana in the Fall of 1989 by the European Space Agency (ESA) aboard an Ariane 4 launch vehicle. DOVE is sponsored by AMSAT's Brazilian counterpart, BRAMSAT, and its sun-synchronous orbit will allow ground stations to hear two morning passes transmitting on 145.825 MHz. For further information, see the Microsat article beginning on page 53. The satellite is intended for use in classroom exercises; a packet of information is available from Rich Ensign, N8IWJ, 421 N Military, Dearborn, MI 48124.

The 1989-1990 Repeater Directory is hot off the presses with over 13,000 listings including over 1400 digipeater listings and new beacon listings! Get 'em while they're hot!

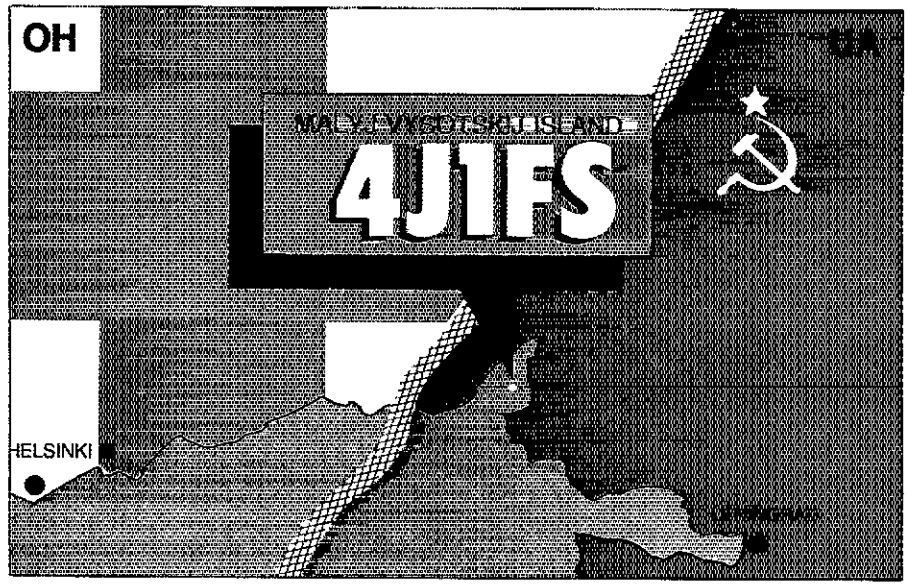
Three new ARRL publications available! *The ARRL Data Book* is back by popular demand. Doug DeMaw, W1FB, has expanded and revised the material in this handy reference for the RF design engineer, technician, radio amateur and experimenter. The new (12th) edition of *Hints and Kinks for the Radio Amateur* is out! This publication features the best of the popular *QST* Hints and Kinks column from 1982 through 1986. *Murder By QRM* is the sixth and final ham radio adventure by Walker Tompkins, K6ATX, now a Silent Key.

East Meets West—"M-V Island" is on the Air!

Take two international neighbors, add one autonomous regional authority, stir in an 18-year-old letter, add a pinch of glasnost, combine with Soviet and Finnish hams—what do you get? A brand new DXCC country!

By Martti Laine, OH2BH
Nuottaniementie 10 D 20
02230 ESPOO 23, Finland

As we went to press, a second joint Soviet-Finnish expedition to M-V Island was scheduled for May 22-30, tentatively to include four stations operating 24 hours a day.



The location of Malyj Vysotskij, in Soviet territorial waters near the Bay of Vyborg, is shown on the 4J1FS QSL card.

Where were you in November, 1970? Armas Valste, president of the Finnish Amateur Radio League (SRAL) was in his office in Helsinki, reading a letter from the American Radio Relay League. The island of Malyj Vysotkskij, a piece of land in the Bay of Vyborg between Finland and Soviet Russia, qualified as a DXCC country!

To DX chasers around the world this would mean a new challenge, a New One to work. To adventurous hams, Malyj Vysotkskij (M-V Island) represented a different kind of challenge: putting the New One on the air. To Estonian DXer Enn Lokhk, UR2AR, and the author, it was to be the beginning of an 18-year quest to mount an expedition to the New One.

Every DXpedition to a new or rare DXCC country presents its own set of problems. International politics is always a factor, erecting barriers to licensing, entry, or landing permission, and specifying terms of operation. Brave DXers have lost their lives in attempts to put New Ones on the air.

But how could M-V Island, an uninhabited, unused, one-mile-long island in safe waters, pose any such problems? After all, one of the greatest hurdles—ensuring the New One met ARRL's stringent requirements for DXCC status—already had been met. And Amateur Radio licensing was a snap. How, indeed.

Whither M-V Island?

The average DXer, not to mention the ordinary person, has never heard of M-V Island. Even some geographers might be at a loss to pinpoint it. Yet today, thanks to Amateur Radio and DXCC, thousands of DXers can know about it.

Even before our four-day operation in July 1988 was finished, one of the questions DXers were asking was were we in Russia, in Finland, or where? The answer, as you shall see, is that we were on a Soviet island, leased to Finland, accessible only by entering and then leaving Soviet territory!

M-V Island is found at the southern end of the Saimaa Canal, which links the Finnish Lake District with the Gulf of Finland. Since the Middle Ages both business and military needs have made such a canal a great dream. The first attempt to build a canal, in the 16th century, failed. In 1843 a formal decision was made to construct the canal, and it officially opened in 1856.

Traffic along the waterway expanded rapidly until ceasing abruptly in 1940, when the southern section was lost to the Soviet Union in World War II. Today, M-V Island still abounds in stark reminders of the 1939-1940 Winter War.

In 1962, the Soviet Union agreed to lease—to Finland—that section of the Saimaa Canal belonging to the Soviet Union, as well as the island of Malyj Vysotskij. The refurbished canal reopened on August 5, 1968. Today, the Saimaa Canal—27 miles long, lined with a 100-foot buffer zone, and incorporating eight locks—serves as a gateway for shipping from the Finnish Lake District to the Gulf of Finland and the Baltic Sea, just as it was envisioned four centuries before.

M-V Island stands alone, in the Bay of Vyborg, apart from the rest of the Saimaa Canal region. The Soviet border is heavily guarded and Finns have no access to that area except as tourists—entry requires a visa and statement of purpose for your visit. The area is of great strategic importance, since the bay protects the city of Leningrad and is dotted with Soviet Baltic Fleet bases. Naval vessels operate from the

Gulf of Finland to the gateway to the Atlantic Ocean.

M-V Island—20° 34'E and 60° 38'N—was intended, as part of the 1962 lease, to be a reloading port and storage facility for small ships navigating the canal, as well as for larger oceangoing vessels. But these plans never were carried out, and M-V Island was left uninhabited, inside Soviet territorial waters.

The Quest Begins

Interest in new DXCC countries was at a fever pitch in 1970. DXCC rules had recently been tightened to ensure the integrity of Amateur Radio's most prestigious award, making ARRL's approval that year of M-V Island as a New One of great significance. It was a siren call to DXers, especially in Finland and the Soviet Union. Unfortunately, M-V Island's proximity and apparently easy accessibility turned out to mean nothing. It might as well have been the moon.

As is often the case, politics barred the door to our Field Day on M-V Island. Only glasnost finally opened that door.

In 1962, both Finland and the Soviet Union named commissioners to implement the terms of the new Saimaa Canal lease. To expedite use and management of the canal region, the Finnish government appointed the Saimaa Canal Authority (SCA) to administer the leased territories. A Finnish commissioner would serve as chairman of the SCA, with offices in the town of Lappeenranta—right at the Finnish end of the canal area.

The SCA presides over the canal region in all areas of activity—including Posts and Wireless—and radio operations from the leased territories are overseen by the SCA, not by Finnish telecommunications authorities. As these things go, the SCA occupies a position equal to or higher than that of Finnish ministries. And because the leased region lies outside the borders of Finland, the SCA communicates with the Finnish government through the Finnish Foreign Ministry!

Access to M-V Island is complicated because, apart from SCA permission to land, it is necessary to cross critical USSR territory to get there. While a few small storage buildings built by the Finns for occasional use are located there, Finnish or Soviet citizens are not allowed on M-V Island without proper authorization by the SCA.

Getting the Radios Aboard

Since Amateur Radio operations are not related to the stated purposes of the Saimaa Canal region, existing procedures had to be specifically extended to permit our DXpedition. But from the beginning, in 1970, this never was a problem for us.

The first 1988 M-V Island operation was authorized in full by the SCA, including taking radio transmitting equipment onto the island and operating the equipment there. But getting to M-V Island requires crossing critical USSR territory—in fact, entering and then leaving Soviet territory before landing on M-V Island. And bringing radio equipment to the USSR is specifically forbidden under their law, but we found an exception: our "Glasnost Loophole."

This exception to Soviet radio law allows participants in international competitions to bring and use their own equipment when necessary. Radio sport "foxhunters" can bring their own sniffers with them. In our case, the IARU HF World Championship—a competition officially recognized in the USSR—appeared to serve our purpose. It was scheduled for July 9 and 10, 1988, and we would have to move quickly!

We immediately proposed a joint competition operation with both Finnish and Soviet operators taking part—the first East-West DXpedition. We would merely be transporting our radios through the Soviet Union on our way to a recognized radio sport competition site.

Our licenses and authorizations from SCA were complicated by general reluctance on the part of the Finnish Frontier Guard, Customs, and security authorities. It took "the highest Soviet authority" to allay both Finnish and SCA worries, by "godfathering" the permits issued by the SCA. You probably can appreciate that a powerful mouse, when confronting an elephant, listens carefully before making up its mind. Some of the "suggestive" documents from the Soviets, addressed to the SCA, are confidential. . . but suffice it to say they did suggest no opposition to the SCA authorizing our operation.

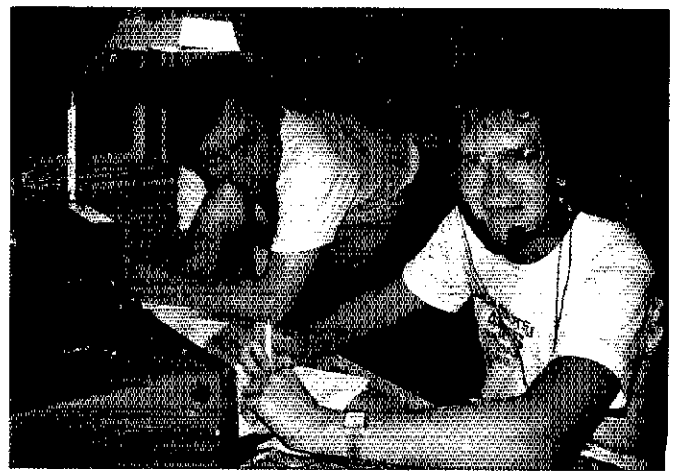
The most critical permit—only somewhat related to our radio objective—was the one from the TVH, a government transportation agency, for crossing Soviet territory and for handling the shipment of all the necessary equipment to the island. Boris Stepanov, UW3AX, International Officer of the Soviets' Radio Sports Federation, handled this from Moscow. He did an outstanding job ensuring that we would be able to sail untouched through a heavily armed military region to M-V Island. He deserves a lot of credit for that.

All this may look like a house of cards that can be blown away by the slightest breeze. Well, no one has argued that East-West relations are not complex. Everyone agrees that glasnost is only in its infancy and much of it is conditioned or constrained by old legislation. Actually, a point of contention appeared where we least expected it.

Deciding on a Call Sign

Another of those questions asked by DXers was, "Were we licensed by Finland or by the Soviet Union?" Smart DXers knew ARRL would be asking this question, and the fate of our New One would lie in the balance. The answer is we were licensed neither by Finland nor by the Soviet Union! We were *licensed* by the SCA; our call sign was *authorized* by Moscow.

The calm, cool and collected 4J1FS team: OH2RF, OH2BH, UZ3AU, UW3AX, UR2AR, and OH5NZ.



UW3AX is pensive as OH2RF works through the 20-Meter pileup.

Some 800 pounds of equipment, including enough drinking water and gasoline to last four days, had to be ferried to the island.

Pertti, Gene, and Martti on the border in the Saimaa Canal region, where the Iron Curtain separates Finland and European Soviet Russia.

Recall that the SCA has complete jurisdiction over radio licensing on M-V Island; however, the SCA has no ITU call sign allocation, and the Finnish licensing authority covers only the territory of the Republic of Finland (prefixes OF through OJ)—not the leased territories. But many other islands and continental areas have no ITU allocation, and the Amateur Radio community has long accepted such unofficial call signs as A15AA (Abu Ail) and the likes of 4K1F and LU6UO/Z, both operating from the South Shetland Islands, a group of islands under British jurisdiction.

So, while the SCA issued permission for us to take radio equipment to M-V Island, and to transmit, what call sign to use was open to question.

The lack of an ITU allocation for M-V Island surfaced in a series of meetings between the SCA, Soviet authorities, and officials of the RSF. The 4J1FS call sign ultimately used for the operation technically was a call sign assigned to the USSR as follows:

The Radio Sport Federation and its *Radio* magazine were authorized, by the Soviet PTT, to host an IARU HF World Championship contest team. The team would use the call sign 4J1FS, symbolizing the first (1) joint (J) Finnish-Soviet (FS) Amateur Radio event. The call was issued to a Soviet organization—not to individual participants, either Soviet or Finnish. None of the *operators* was issued a Soviet license (nor a Finnish one, for that matter) for M-V Island.

Representatives of the RSF were careful to make clear that the 4J1 prefix could not be construed as implying a claim for Soviet sovereignty. This simply mirrored the procedure followed in authorizing operations from other islands with a Soviet interest (such as Antarctica), as well as from jointly administered territories such as the VP8 islands in the South Atlantic.

All this—especially the Soviets' use of

Murphy Foiled on M-V Island Expedition

[This is a translation of a report by Deputy Editor-in-Chief UW3AX which appeared in the Soviets' Radio *magazine. Translation courtesy Dexter Anderson, W4KM.—Ed.]*

Malyj Vysotskij Island has long been recognized as meeting the requirements for a "country" on the ARRL DXCC list. Initial attempts in the 1970s by Martti Laine, OH2BH, and Enn Lokhk, UR2AR, failed, as did later attempts by both Soviet and Finnish amateurs.

In May 1988, the editors of *Radio* magazine received a number of suggestions for events in connection with the 40th anniversary of the Agreement on Friendship, Cooperation, and Mutual Assistance between Finland and the USSR. One of these was a radio expedition to M-V Island. Since there was so little time—and based on previous experience—it seemed unlikely that all obstacles could be overcome. But the positive attitudes at the State Telecommunications Inspectorate, the canal administration, and other organizations, finally enabled 4J1FS to become a reality.

Soviet team members UR2AR, UZ3AU, and UW3AX gathered in Vyborg the morning of July 7, 1988, to be greeted by Soviet border guards, who informed us that our Finnish colleagues had left for the island on the launch *Veera* and would arrive within half an hour. So we were able to relax and enjoy the warm summer weather, thinking that finally we were on the verge of realizing our dream.

But one hour passed, then two, with no sight of the *Veera*. We paced, along with the border guards, until the *Veera* at last came into sight, moving slowly and noticeably listing. About a kilometer off shore it stopped. Anxious signs from those on board told us the situation was serious. The border guards towed the *Veera* to shore with their own launch.

Later Martti, OH2BH—who has traveled over almost half the world and has been in places where, in case of some catastrophe, no help would be available—admitted to me that only after several hours on the air did he stop to realize that they had been on the verge of a tragedy. Perhaps there would not have been any loss of life, but the launch could have sunk. It had sprung a leak and the water could not be bailed out fast enough.

Luckily, these problems faded in our memories as we set ourselves for nearly 100 hours of operating, and 14,385 contacts. We used an operating style now accepted for such expeditions: listening for calls over a wide range of up to 20-30 kHz on either side of our frequency. This system is very democratic, not only spreading out QRM for the prey, but also giving a QRP operator a realistic chance of making his contact, if he is skilled.

It should be pointed out that many of our (Soviet) shortwavers were ill-prepared for this style of operating, often from a purely technical standpoint, being able to offset only 2 or 3 kHz. From time to time we tried to accommodate them by listening close to our frequency. But this method reduced our contact rate and was not optimal.

Even worse, when we switched to 7 and 3.5 MHz on the final day of the operation, to work stations in the dead zone, it became apparent that many of our 2nd- and 3rd-class licensees don't know how to operate split. The level at which our shortwavers are trained for serious DX operation should be a subject for a separate discussion.

And finally, we noted from the many contacts made that our four days on M-V Island must have been a holiday for hams all over the world, just as it was for our six operators!

4-series call signs to meet the exceptional requirements of their licensing authorities—seemed to suit our own requirements perfectly. Prefix numbers 1 and 0 are allocated for activities outside territorial USSR—normally in the Arctic and Antarctic regions. The 4J1FS call sign was only considered to serve as a framework for this unique operation, to satisfy the need not for licensing but for a call sign; a call sign keeping with the spirit of the international operation.

Since conditions established by the SCA for licensing and call sign had been satisfied, we proceeded on the assumption this would be acceptable to the DXCC authority—ARRL.

And We Get There

With all necessary paperwork in hand, the actual operation seemed almost an afterthought! Logistically, this would be a simple operation, as SCA authorities would permit only one signal on at any time. We took one TS-940S transceiver, two linear amplifiers, a 40-foot aluminum tower, a triband beam, and a few tools.

As important as radio gear were personal items. While we did have use of a government building, we otherwise were to be self-sufficient. Thus, a generator, gasoline, tables and chairs, food and other essentials were required.

First to cast off from the end of the canal, on the 50-foot motorboat *Veera*, was our Finnish team:

- Pertti Turunen, OH2RF, who became the first amateur radio operator to set foot on M-V Island. Pertti, youngest member of the team and DX manager and columnist for SARL, was ready to operate the entire 100 hours if necessary.
- John Ahlbom, OH5NZ, had coordinated our negotiations on the Finnish end, as well as on earlier attempts. He is a lawyer and foreign relations liaison of SARL.
- The author, OH2BH, anticipating putting his fourth New One on the air, the previous three having been Annobon, Market Reef and Western Sahara.

SCA authorities took us on the two-hour trip to M-V Island in two groups, first the Finns, then the Soviet hams. This final leg of our journey took us through Karelia, a former battlefield and spot remembered by old-time DXers as having once been itself a DXCC country (UN1).

Both groups were under strict orders not to approach Russian land. We sailed right past the city of Vyborg, once the capital of that part of Finland and hometown of OH2BH's parents. At the Uuras Coast Guard base, just across the bay from M-V Island, we entered and then left Soviet territory "at the same time."

Uuras was the checkpoint where our Soviet teammates boarded the *Veera*. They were:

- Gene Shulgin, UZ3AU, technical director of the Central Radio Club's "Box 88" QSL bureau operation and responsible for laboratory operations at RSF. Unable to contemplate making field repairs on our commercial gear, Gene still proved to be a useful man for any expedition, with his strength and dexterity. A serious hand injury did not deter him.
- Boris Stepanov, UW3AX, USSR Radio Sports Federation officer, was on his first DXpedition. He is deputy editor-in-chief of the RSF magazine *Radio*, with a circulation of 180,000.

Enn Lokhk, UR2AR, is executive officer of an ongoing, first-ever joint Finnish-Soviet business venture. During frequent business trips to Finland he labored to obtain our critical permission to cross USSR territory enroute to M-V Island. Many years ago UR2AR was the first Soviet ham to visit the United States; he spoke to the Northern California DX Club. He, like the author, worked for many years to arrange an M-V Island operation.

Finally on the Air

We came on the air at midnight M-V Island time. UW3AX made the first QSO, with SM3EVR. OH2BH took the first watch, after a ceremonial contact by each team member. Our Soviet partners at first occupied themselves getting used to our Western ham gear, with its bells and whistles.

With operation exclusively on 20 meters to maximize the number of different stations worked (except for 40- and 80-meter operation the last day to work nearby stations in the dead zone), there always was plenty of time for the rest of the team to conduct "East-West talks." Along with planning for another operation, speeches were made to pledge eternal friendship and comradeship, and to stress the commitment to peace and international solidarity.

Some 96 hours later, our New One came to an end. We had produced over 14,000 contacts, including 5000 each in the United States and Europe and some 2500 with Japanese amateurs. Our lovely boat *Veera* arrived right on schedule, and tear-down and loading were anticlimactic.

Looking to the Future

Many hurdles had to be overcome on the road to the first M-V Island operation. Even with full authorization from the SCA, the lack of a distinctive prefix and the need to cross USSR territory presented a complex set of issues that had to be addressed. In the eyes of the SCA, the actual operation worked out very well indeed; Finnish and Soviet authorities in fact helped to pave the way for future operations.

The outlook for future Amateur Radio operating from M-V Island was discussed at a meeting with SCA officials on September 1, 1988. They were pleased with the outcome of the first operation and they foresaw no difficulties in supporting Finnish-based operations in the future, provided such operations would be carefully organized and would occur at reasonable intervals. Another operation may have taken place shortly before you read this.

While impressed by Amateur Radio and its relation to issues such as M-V Island, Finnish authorities were surprised at the debate triggered by the 4J1FS call sign. Understandably, their major concerns lay elsewhere since authorizing this operation presented no problems to them.

The SCA officials now are convinced that, for the next operation, they should have a subassignment from Finnish telecommunications authorities to avoid the kind of debate engendered by the call sign issue. But the call sign question would appear to have no simple solution. The first successful operation certainly will provide a basis for future discussions.

We obviously are prepared to expand visibility of the Finnish connection to M-V Island, and can expect future call signs to be structured accordingly.

Why Do We Do This?

Mounting a successful DXpedition to a new country is always a challenge, requiring devotion and plain hard work. An even bigger challenge is to document what has been accomplished so everyone can share the experience with you. It surely always is an honor to do DX.

The ARRL—through its DXCC program—has been open-minded and ready to accommodate amateur radio-related foreign policy, often without being able to predict the eventual outcome of a given decision. This is what can make DXing so exciting; when nearly 19 years ago the DXCC decision regarding M-V Island was made, who could have imagined the intervening changes in the world which eventually would make a DXpedition possible?.

Of course, M-V Island is a special case in bringing East and West together in a spirit of cooperation. But it should be remembered that the quest for a New One was the spark that lit the fire. New amateurs, and new DXers, will provide the impetus for future "M-V Islands."

And finally, I want to remember Henry, OH1NK, who recently became a Silent Key. Henry had all countries confirmed except one, and he was the only ham operator born on M-V Island. He lived his last 18 years in the hope that his island would finally come on the air.

Henry had enough time to make the contact—but not enough to see the QSL card. *Tempus fugit*. . . in DX even more so.

[In September, 1988, Malyj Vysotskij Island was officially added to the ARRL DX Century Club Countries List, for contacts beginning with the 4J1FS operation in July, 1988. ARRL Headquarters began accepting M-V Island QSLs for DXCC credit on March 1, 1989. (See *QST*, January, 1989, page 76 for additional details).—Ed.]

Propagation Forecasting During Solar Cycle 22

Solar cycle 22 is off to a roaring start, but how good are *QST*'s forecasts of propagation conditions? The surprising answer is—not bad!

By Emil Pocock, W3EP
RR3 Box 70 (Rte 207)
Lebanon, CT 06249

The advent of solar cycle 22 during the summer of 1986 has caused considerable excitement among those who follow radio propagation. As most radio amateurs know, the expected increase in solar activity during the next three years will also bring a rise in the maximum usable frequency (MUF) and the length of time F2-layer skip may be observed each day on the bands above 14 MHz.[1] Most experts predicted that solar activity during cycle 22 would be average, with a 1991 peak less than that of cycle 21 (1979-80) and much below the record peak of cycle 19 (1957-58). These predictions may already be obsolete, as observations during 1988 and the early months of 1989 have revealed that cycle 22 is rising faster than originally predicted. This is shown in Fig 1, which compares the start of the current cycle with others in the recent past.

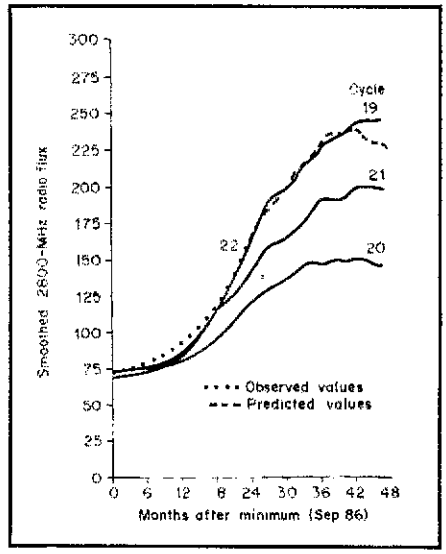


Fig 1—Rise in the solar flux for cycle 22 compared with the three previous cycles. Many experts believe that the steep climb of the current cycle may mean that its eventual peak may be greater than previously expected. Source: *Preliminary Report and Forecast of Solar Geophysical Data*, Mar 14, 1989.

[1]Notes appear on p 20.

Predicting the upturn in solar activity and the consequent rise in the MUF is thus a very uncertain business. Yet, amateurs do want to know such things as when 28-MHz conditions will be favorable to the South Pacific, how late at night 21 MHz may remain usable, or even when to expect worldwide 50-MHz F2-layer skip.

One of the more accessible sources of MUF predictions has appeared in *QST* for more than a decade. Each month the "How's DX" column includes 30 informative charts that provide propagation forecasts for various paths, times and frequencies. One example is shown in Fig 2. These charts seem impressive and authoritative, but I have often wondered how accurate these predictions really were and whether or not they were useful propagation aids. This review seeks to answer those questions and provide some additional suggestions for MUF watching.

Solar Activity and Propagation

The *QST* forecast charts are based on a prediction of the smoothed sunspot number (SSN) for a one-month period. (Sometimes the smoothed SSN is called the 12-month running average.) Such predictions have several inherent weaknesses. One average figure may not be a good representation of the large range in solar activity that is possible over a 28- to 31-day period, even

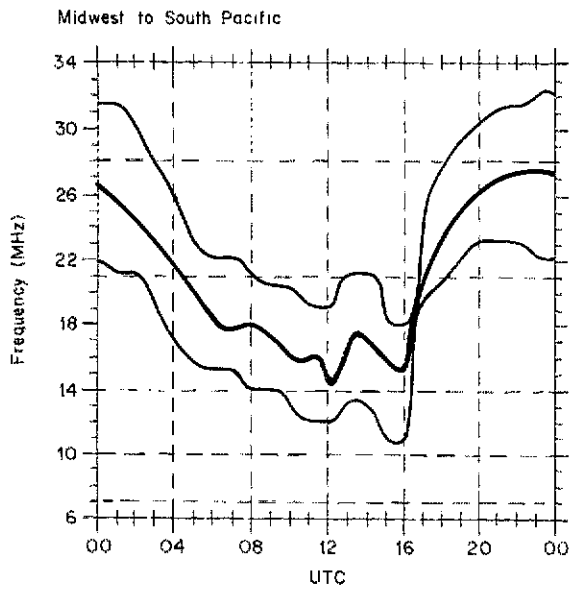


Fig 2—When are the bands open? Shown here is one of 30 charts that appeared in Jul 1988 *QST* for high-frequency radio circuits, this chart for the path between the Midwest and South Pacific. On 10 percent of the days between July 16 and August 15, the highest frequency propagated will be at least as high as the uppermost curve. On 50 percent of these days, it will be at least as high as the darkest middle curve, which corresponds to the maximum usable frequency. On 90 percent of the days, it will be at least as high as the lowest curve. These predictions assume a sunspot number of 115, which corresponds to a 2800-MHz solar flux of 159. Source: July 1988 *QST*, p 67.

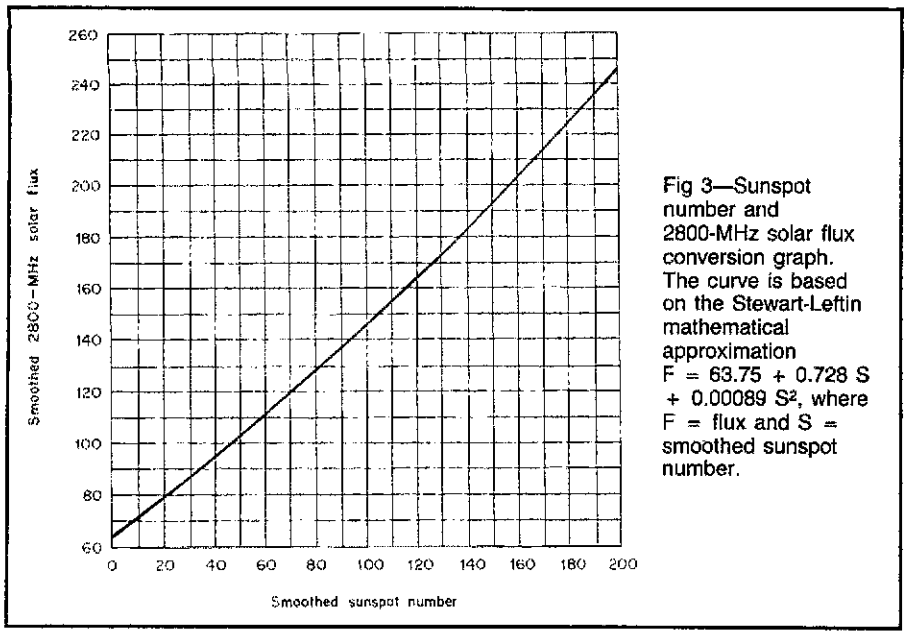


Fig 3—Sunspot number and 2800-MHz solar flux conversion graph. The curve is based on the Stewart-Leftin mathematical approximation $F = 63.75 + 0.728\ S + 0.00089\ S^2$, where F = flux and S = smoothed sunspot number.

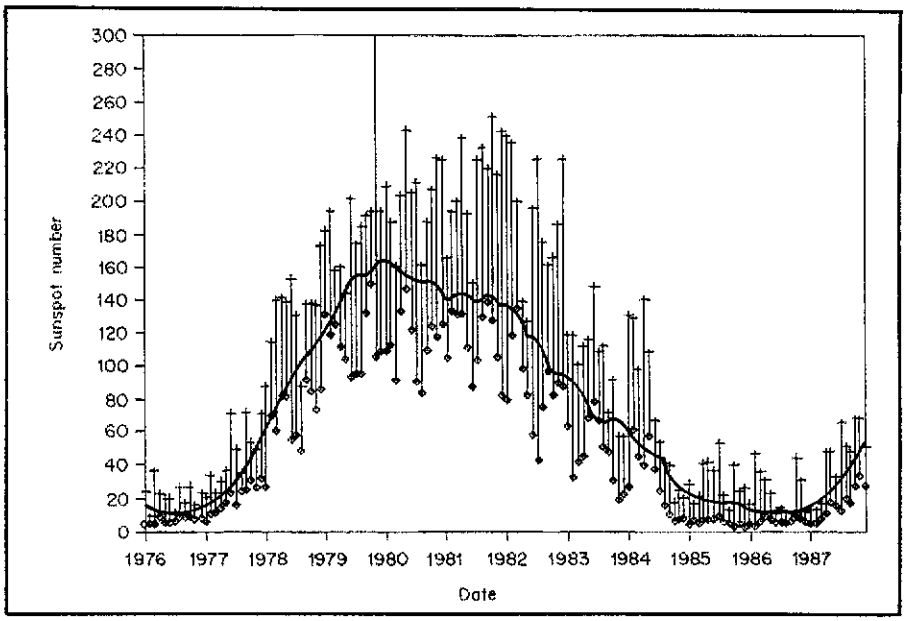


Fig 4—Cycle 21 monthly smoothed sunspot numbers (SSN), heavy curve, compared to the range from minimum to maximum daily solar flux values during the month, vertical lines. (Flux values are converted to sunspot number equivalents; see Fig 3.) The off-scale value for Nov 1979 is 303.7. Note that the daily values vary considerably from the smoothed average, especially when solar activity is high. Note, too, that for some months the range of daily flux values is entirely above or entirely below the smoothed average. *(Graph provided by J. Hall, K1TD)*

though the smoothing attempts to account for such variations. In addition, the forecasts must be made nearly four months in advance of publication. Couple that with the fact that an actual smoothed SSN cannot be obtained until six months after the fact, because of the method by which it is calculated. So, in effect, the *QST* predictions must be made about *10 months* in advance! These considerations are important, because the accuracy of the forecasts depends on the predicted average value of solar activity. If the predicted solar activity corresponds well to the actual levels, the accuracy of the forecasts is good. If solar activity varies significantly from the predicted values, the forecasts suffer. Thus, one way to gauge the reliability of the propagation forecast charts is to compare the underlying assumptions about solar activity with actual data.

Solar activity is measured by various methods. Two familiar statistics useful for MUF predictions are sunspot numbers and 2800-MHz solar flux. These measures are derived in quite different ways: The sunspot numbers depend on a visual counting and categorization, whereas the solar flux is a measure of solar radiation at 2800 MHz. Nevertheless, these measures do maintain a close relationship that makes them nearly interchangeable with a suitable conversion.[2] Solar flux (as measured at Ottawa, Canada) and SSN are both used in this review. A graphic conversion is provided in Fig 3.

There is also a general relationship between long-term average solar flux and MUF that forms the basis of MUF predictions. The higher the average solar flux (usually a single value that represents a 12-month period), the higher the MUF is likely to be over any given path. Unfortunately, average solar flux is only one variable that must be considered in MUF prediction, however important it might be. A solar flux that has been steadily rising contributes more to an average solar flux figure than one that peaks quickly or is actually declining. Daily figures of solar activity, or maximum and minimum values for a weekly or even monthly period, can be quite deceiving, as Fig 4 shows. Generally quiet geomagnetic conditions, and certainly the absence of a geomagnetic storm, are also usually necessary to reach the full potential suggested by the solar flux-MUF relationship. Other considerations include time of the day, season, geography of the radio circuit, D-layer absorption, and presence or absence of E-layer ionization (including sporadic E). Some of these factors are known or can be controlled, but geomagnetic and ionospheric conditions introduce additional unknown variables.

Propagation Predictions in *QST*

Even given all these caveats, how do the solar-flux values used by the *QST* forecasts hold up? Fig 5 shows a simple graphic representation of the actual monthly variation in the SSN with the predicted values used in the *QST* forecasts from over the past dozen years, encompassing all of solar cycle 21. A quick glance shows that there is a good overall correlation between the actual SSN and the monthly predictions. The predicted values corresponded remarkably well during the upside of the cycle, but they consistently underestimated the actual values at the peak and for several years on the downside. Between 1984 and mid-1985, at the end of the cycle, the predictions were higher than actual. As sunspot cycle 21 bottomed out, predictions again ran below actual values; as cycle 22 began its upward swing, the predictions did not initially forecast the remarkably rapid rise the new cycle has shown.

Nevertheless, these differences were not actually very significant when translated into the prediction tables. During January-February 1985, for example, the predicted value for the SSN (35) was nearly 75 percent over the actual value (20.1). When the published *QST* prediction curves, based

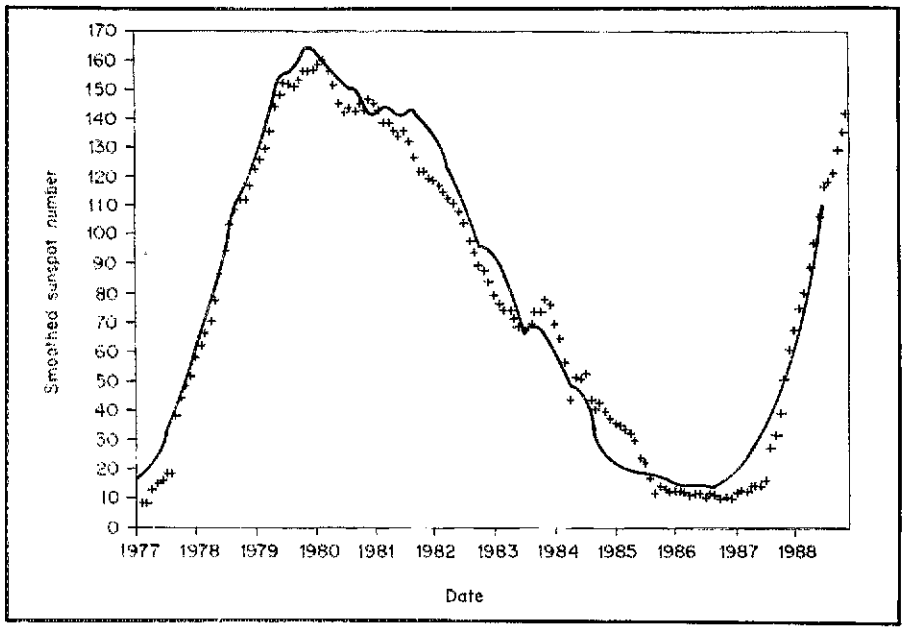


Fig 5—Actual smoothed sunspot number (solid line) compared with the predicted values used in the *QST* forecasts (crosses). Note generally close correspondence between predicted and actual values. *(Graph provided by J. Hall, K1TD)*

on an SSN of 35, were compared with a new set based on the actual value of 20.1, only very subtle differences could be found. The variations due to errors in forecasting the SSN are undoubtedly less significant than other day-to-day factors, such as the condition of the geomagnetic field and short-term variations in solar activity.

Other Forecasts of Solar Activity

The prediction charts thus provide a good general forecast of propagation conditions, but there are several other ways to make more timely MUF forecasts based on predicted or actual solar flux values. Most useful is MINIMUF, a computer program that makes MUF predictions based on the 2800-MHz solar flux.[3] Several sources provide current solar flux data and short-term predictions that may be more accurate than those used in the *QST* forecasts. W1AW transmits a propagation report as part of its regular bulletin.[4] The weekly Preliminary Report and Forecast of Solar Geophysical Data provides predictions of solar flux, A-index and K-index for 30 days in advance.[5] The latter two indexes are useful in assessing solar geomagnetic conditions. At 18 minutes after each hour, station WWV broadcasts current 2800-MHz flux data along with the A- and K-indexes, provides a descriptive statement of solar geomagnetic conditions and makes a generalized one-day forecast. This information is also available by telephone.[6] Reports of near-current solar conditions could also be used to help interpret the *QST* forecasts, especially when actual solar flux varies significantly from the assumed average for the forecast period.

Given the lead time required by publication requirements, *QST*'s MUF forecast charts may be a quite useful guide for planning and following propagation conditions in this cycle 22. For those who want a more timely guide to propagation conditions, current solar flux data might be just the thing, especially when used with a program like MINIMUF. Either way, the big question for many of us remains, when will 50 MHz open for worldwide DX again?

Notes

[1]A good introduction to solar activity and MUF is Carl L. Bixby, "The Art and Science of DXing," *QST*, Jan 1979, pp 11-14. See also "The Role of the Sun," in J. Hall, ed., *The ARRL Antenna Book* (Newington: ARRL, 1988), pp 23-22 through 23-27. More technical discussions may be found in Kenneth Davies, *Ionospheric Radio Propagation* (Washington: Government Printing Office, 1965).

[2]Discussion of the conversion procedures can be found in "Role of the Sun," *The ARRL Antenna Book*, pp 23-24 and 23-25.

[3]R. B. Rose, "MINIMUF: A Simplified MUF-Prediction Program for Microcomputers," *QST*, Dec 1982, pp 36-38 (includes BASIC program listing). A listing for an enhanced version by Brian Satterlee, KD6SC, is available for $2 and a 9 × 12-inch return envelope bearing postage for 4 ounces. Write to ARRL, 225 Main Street, Newington CT 06111. Other programs are available commercially on ready-to-run disks.

[4]Check the W1AW schedule on p 90 of April 1989 *QST*.

[5]Many large university libraries subscribe to the report, but individuals may now subscribe for $26 a year. Send your order to NOAA, ERL, Space Environment Laboratory, R/E/SE, 325 Broadway, Boulder, CO 80303.

[6]Information contained in the WWV propagation bulletins is also available by telephoning Boulder, Colorado: 303-497-3235. QST

QEX: THE ARRL EXPERIMENTER'S EXCHANGE AND AMSAT SATELLITE JOURNAL

The May issue of *QEX* includes:

"The MC68701 Programming Board" by Ed Oscarson, WA1TWX. Ed describes how to program an inexpensive single-chip microprocessor—the Motorola MC68701.

"Receiver Front-End Protection" by Chuck Clark, AF8Z. Protecting your shack and antenna-mounted preamps from lightning and RF radiated from other sources is of concern to most amateurs. Equipped with the information presented in this article, you'll be able to keep your gear alive and well.

"A Simple, Direct-Reading, Digital Inductance Meter" by Robert W. Vreeland, W6YBT. With this simple, inexpensive instrument, you can use a Fluke 8060A (or similar multimeter) to measure inductance values from 0.05 to 400 μH.

"VHF+ Technology" by Geoff Krauss, WA2GFP. Some introductory considerations for operation above 1 GHz.

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is $10 for 12 issues; for nonmembers, $20. There are additional postage surcharges for mailing outside the US; write to HQ for details.

Strays

***QST* congratulates...**

☐ the following radio amateurs on 50 years as an ARRL member.

- John M. Mulligan, W2RTW, of Elmira, New York
- Richard L. Kile, K6CWD, of San Jose, California
- Howard F. Shepard, Jr, W6US, of Encinitas, California
- Richard B. Blanchard, Jr, W6AG, of Valley Center, California
- Gerson A. Levy, W2LAP, of New York, New York
- Richard DeLong, W8EMK, of Manfield, Ohio
- John R. Spark, W4LHP, of Lakeland, Florida
- Robert E. Roberts, K6VK, of Ventura, California
- Leland J. Tangen, of Vashon, Washington

A No-Tune Transverter for 3456 MHz

Building microwave gear used to take exotic parts and a roomful of test equipment. Not anymore!

By Jim Davey, WA8NLC
321 Lake Front Dr
Columbia, SC 29212

The development of easy-to-build equipment for the microwave bands has increased dramatically in the past few years. No longer do you have to have a small fortune invested in test equipment to get the satisfaction of building your own station for the bands above 1 GHz. Nor do you have to rely on the availability of surplus components gathered at hamfests—or be lucky enough to live in a high-tech part of the country where surplus is more plentiful—to home-brew your own equipment.

The recent increase in activity on the microwave bands has been well documented in *QST* and elsewhere. In the past two years alone, amateurs have conquered the difficult EME challenge on 3456, 5760 and 10368 MHz and set impressive distance records on nearly every microwave band through 47 GHz. UHF contest stations now regularly have 2304- and 3456-MHz equipment available. Our knowledge of the propagation characteristics of these bands has also benefited from the increased activity. In the Oklahoma area, Tony Bickel, K5PJR, Larry Nichols, W5UGO, and others have literally written the book on 5760-MHz propagation through their fine efforts on this band.

Commercially manufactured ham equipment from Europe has been available for a few years for the more popular microwave bands, and this equipment has helped to spawn activity. The 3456-MHz band, however, has not been supported by commercial manufacturers as of this writing. Let's not let the lack of commercial equipment stop us from having a little fun! Besides, you can get a lot of enjoyment and personal satisfaction from building your own equipment. I can personally attest to this: My own station uses no commercially manufactured equipment except for the IF rigs.

This article describes a transmitting and receiving conversion module (transverter) for the 3456-MHz band. Any multimode 2-meter transceiver can be used as a tunable IF. The transverter has several features that make it ideal for the newcomer to 3456 MHz and the veteran looking for a simple loaner rig for grid-square expeditions:

- It doesn't require RF alignment or microwave test equipment for proper operation.
- The entire transverter, minus the 552-MHz local oscillator, is contained on one PC board, reducing the need for separate enclosures and expensive RF connectors and cables.
- The transmitter features 10 mW output, and the receiver features a 4-dB noise figure (NF)—performance sufficient for a lot of interesting work on this band.
- Inexpensive diodes and MMIC gain blocks are used to keep the cost low.
- An external receiving preamplifier, transmitter power amplifier and antenna relay can be added to make the unit a high-performance package for fixed or portable operation.
- The transverter can also be used as an IF for the higher microwave bands above 10 GHz.

Background

The straightforward design of this transverter is a result of two fairly recent developments in the amateur microwave field. First, the introduction of cascadable monolithic-microwave integrated circuits (MMICs) several years ago revolutionized the design of microwave amplifiers. Not only are MMICs inexpensive, but most are unconditionally stable and can be cascaded for increased gain or paralleled for greater power output. Al Ward, WB5LUA, authored excellent articles for *QST* concerning the use of these devices.[1] You are encouraged to review these articles for a more thorough treatment of the subject.

The second development contributing to the design of this transverter is my recent work on microstrip band-pass filters that provide the required selectivity for this system without the need for tuning adjustments. These filters were first introduced to amateurs in 1987 at the Microwave Update Conference in Estes Park, Colorado.[2] A later paper reported on further work to improve the SWR of the filters and compared the microstrip filters to other commonly used filters for the microwave bands.[3]

To avoid taxing your wallet or your patience, I used parts that are inexpensive and easy to get. You should be able to get this transverter up and running for less than $200. The idea here is to get you on the 3456-MHz band as easily as possible without relying on unique or hard-to-find components.

Circuit Description

The transverter is divided into three basic sections: transmit mixer/amplifier, receive mixer/preamplifier and local-oscillator multiplier. See Fig 1. Each section is described in the following paragraphs.

Local-Oscillator Multiplier

The transverter requires an external 552-MHz local oscillator (LO) signal that is multiplied by six in the transverter to obtain 3312-MHz injection for the mixers. For the multiplier circuit, I used an idea developed by Rick Campbell, KK7B, who demonstrated that a simple diode multiplier and inexpensive MMIC gain stages can produce a clean microwave local oscillator.[4] Although Rick's design placed each stage in a separate box, I was able to implement the entire multiplier on microstrip using my own printed filters. The printed-filter design idea has since been used to produce a clean 552-MHz LO module that I use as a companion to this transverter.[5]

The transverter requires +16 dBm (40 mW) of 552-MHz energy from an

[1]Notes appear on page 26.

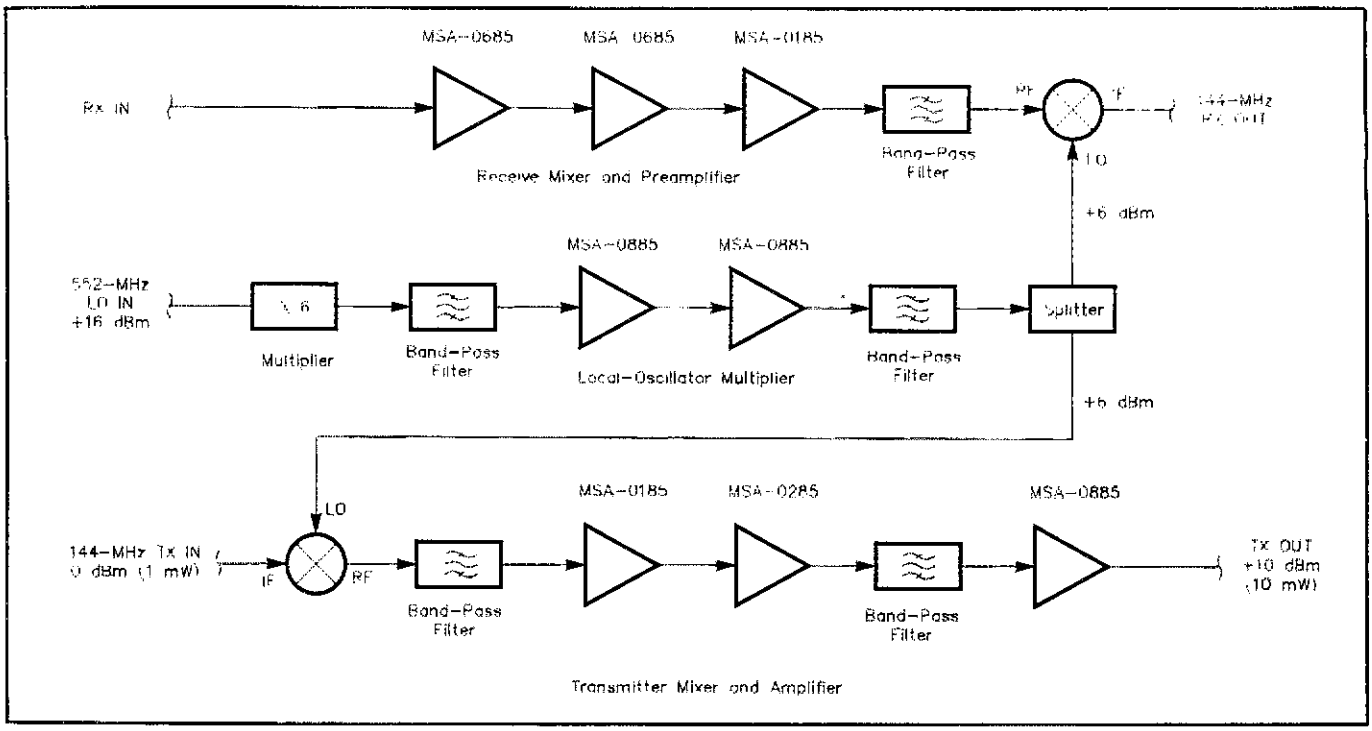


Fig 1—Block diagram of the 3456-MHz transverter.

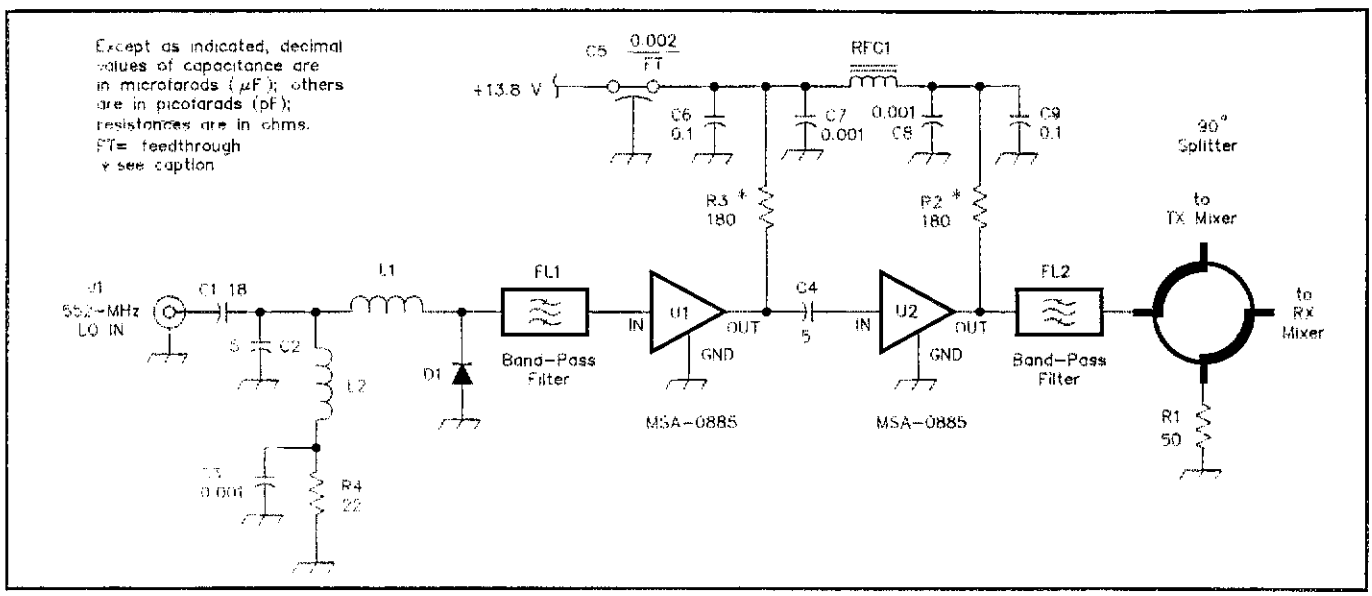


Fig 2—Schematic of the 3456-MHz transverter LO multiplier/amplifier.

C1—18-pF disc-ceramic or silver-mica capacitor.
C2, C4—5-pF porcelain chip capacitor.
C3, C7, C8—0.001-μF ceramic chip (preferred) or disc ceramic capacitor.
C5—0.002-μF feedthrough capacitor.
C6, C9—0.1-μF ceramic chip (preferred) or disc-ceramic capacitor.
D1—Hewlett-Packard 5082-2835 Schottky diode.
FL1, FL2—Band-pass filters printed on PC board.
J1—Female chassis-mount SMA connector.
L1—Inductor printed on PC board.
L2—3 turns no. 28 enam wire, 0.078-in. ID, closely wound.
R1—50-Ω chip resistor.
R2, R3—180-Ω, ¼- or ½-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
R4—22-Ω, ¼-W carbon-film resistor.
RFC1—270 μH subminiature molded RF choke. A suitable alternative is 24 turns no. 28 enam wire on an FT-37-72 toroid core.
U1, U2—Avantek MSA-0885 or Mini-Circuits MAR-8 MMIC.

external LO. As shown in Fig 2, the first stage of the multiplier is a broadly resonant circuit that drives D1, a Schottky-diode comb generator. Following D1 is FL1, the first of two band-pass filters used to select the desired 3312-MHz output. Two stages of amplification (U1, U2) using Avantek MSA-0885 MMICs bring the level up to +11 dBm. A second filter, FL2, is used to further clean up the LO and reduce broadband noise that is generated in the amplifier stages. Following FL2, a 90° hybrid divider splits the LO signal into two equal outputs for injection into the transmit and receive mixers. The LO output level to each mixer

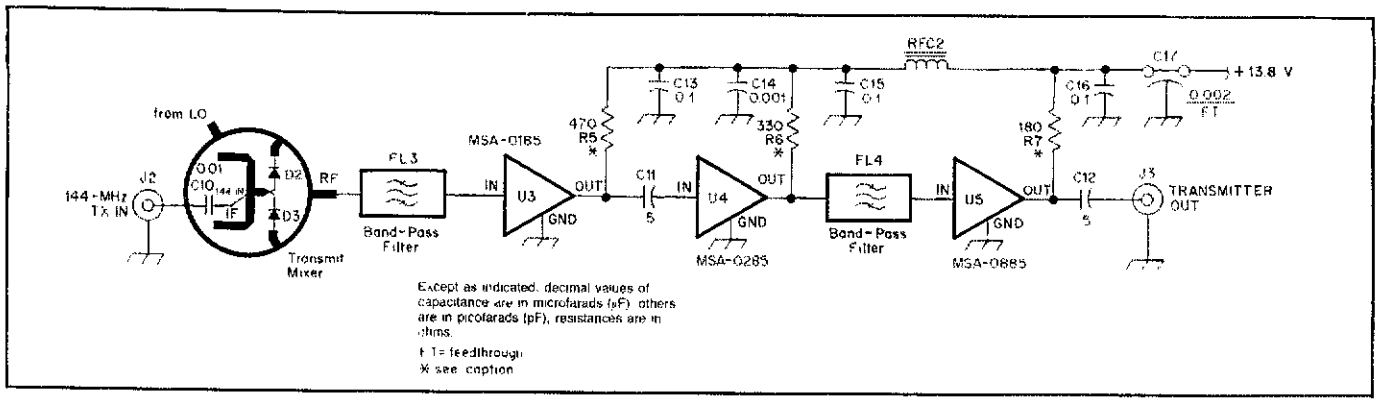


Fig 3—Schematic of the 3456-MHz transverter transmit mixer/amplifier.

C10—0.01-μF disc-ceramic capacitor.
C11, C12—5-pF porcelain chip capacitor.
C13, C15, C16—0.1-μF ceramic chip (preferred) or disc-ceramic capacitor.
C14—0.001-μF ceramic chip (preferred) or disc-ceramic capacitor.
C17—0.002-μF feedthrough capacitor.
D2, D3—Hewlett-Packard HSMS-2822 surface-mount diode pair or matched pair of HP 5082-2835 Schottky diodes. See text.
FL3, FL4—Band-pass filters printed on PC board.
J2—Female chassis-mount connector, builder's choice.
J3—Female chassis-mount SMA connector.
R5—470-Ω, ¼-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
R6—330-Ω, ¼-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
R7—180-Ω, ¼- or ½-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
RFC2—270 μH subminiature molded RF choke. A suitable alternative is 24 turns no. 28 enam wire on an FT-37-72 toroid core.
U3—Avantek MSA-0185 or Mini-Circuits MAR-1 MMIC.
U4—Avantek MSA-0285 or Mini-Circuits MAR-2 MMIC.
U5—Avantek MSA-0885 or Mini-Circuits MAR-8 MMIC.

is +6 dBm. Undesired products in the LO output are 35 dB below the carrier.

Transmit Mixer and Amplifier

The transmit mixer (Fig 3) is a 3/2 wavelength rat-race balanced design from an article by H. Paul Shuch, N6TX.[6] The original article described a 1296-MHz mixer etched on G-10 PC-board material. I developed the 3456-MHz mixer by resizing the line lengths and widths for the new frequency and for a Teflon® -fiberglass substrate. To keep the mixer as efficient as possible and maintain high isolation between ports, I used a matched pair of diodes (D2, D3) in a surface-mount package. (As an alternative, a matched pair of conventional wire-lead Schottky diodes can be used with only a slight reduction in LO-to-RF-port isolation.) Isolation between the mixer's LO and RF ports is greater than 20 dB—about as good as any low-cost commercial mixer. Conversion loss—about 9 dB—is a little higher (worse) than most commercial mixers. Impedance matching was not done at the IF port and did not appear to be necessary with the ICOM IC-202A transceiver I use as an IF rig.

I used three stages of amplification and two filters in the transmit-amplifier chain to reach the final 10-mW-output level. The mixer RF port drives FL3, the first 5-pole band-pass filter. Centered at 3500 MHz, FL3 strips image energy (3168 MHz) from the mixer output and also contributes about 20 dB of rejection at the LO frequency. Rejection at the LO frequency is important. With an LO injection level of +6 dBm and LO-to-RF-port isolation of 20 dB, the level of the LO signal at the RF port of the mixer is −14 dBm. For comparison, the desired signal (the sum frequency at 3456 MHz) is injected at 0 dBm (1 mW) and encounters a 9-dB loss through the mixer to emerge at −9 dBm, only 5 dB above the oscillator feedthrough.

Following the first filter are two amplifier stages (U3, U4) using an MSA-0185/0285 combination. With prototype versions of this transverter, I found that correct MMIC choice for these amplifier stages is critical because band-pass filters (FL3, FL4) are present at the input and output of the amplifier strip. The filters are highly reactive out of band where their return loss is very low (in the range of 0 to 3 dB), so the MMICs used in conjunction with the filters must be unconditionally stable. Another consideration is that the microstrip filters were developed with good 50-ohm terminations on each end. The SWR at the input and output ports of the MMIC should be close to 50 ohms within the passband of the filters to maintain flat filter response and low insertion loss. An examination of the S-parameter data for the MSA-0185 and '0285 shows that they are excellent choices for this application.

FL4 was added in later prototypes to reduce mixing products above 3456 MHz that were present in the output. This filter, a modified version of the filters used in the LO multiplier chain, is centered at 3312 MHz. The combination of FL3 centered at 3500 MHz and FL4 centered at 3312 MHz creates a narrow window at 3456 MHz where the two response curves overlap, giving the effect of a much narrower filter. A single narrow-band, higher-Q filter could be used to accomplish this, but the stop-band rejection for one filter would be inferior to that of two filters. Technical references indicate that the stop-band rejection of a single microstrip filter is only about 40 dB because of surface-wave effects; two separate filters can achieve a total stop-band attenuation of 80 dB. FL3 and FL4 in tandem do a good job of cleaning up the output spectrum.

The final transmit amplifier is an Avantek MSA-0885, chosen for its gain and +10-dBm power-output capability at 3456 MHz. One disadvantage of the '0885 is that it is only conditionally stable: It can oscillate if supply line decoupling is inadequate or if it is terminated in highly reactive loads. U5 should be stable as long as the transmitter-output port is terminated in an impedance close to 50 ohms. If, however, the transverter is used "barefoot" in conjunction with an external antenna relay, I recommend that the dc power to the transmit amplifier section be removed during receive periods so the absence of an antenna load does not cause U5 to oscillate. My prototype units were stable without an output termination, but variations from device to device may cause U5 to oscillate in some transverters. Result: lots of noise in your receiver, making it impossible to hear weak signals!

Receive Mixer and Preamplifiers

The receive mixer (Fig 4) is identical to the transmit mixer. It is preceded by a 5-pole image-stripping filter, FL5, which is necessary to keep the noise energy at the image frequency from being converted to the IF and degrading receiver sensitivity. In a receive application, 20 to 25 dB of image rejection is all that is necessary to ensure that this does not happen. A 5-pole microstrip filter easily provides this much rejection at the 3168-MHz image frequency.

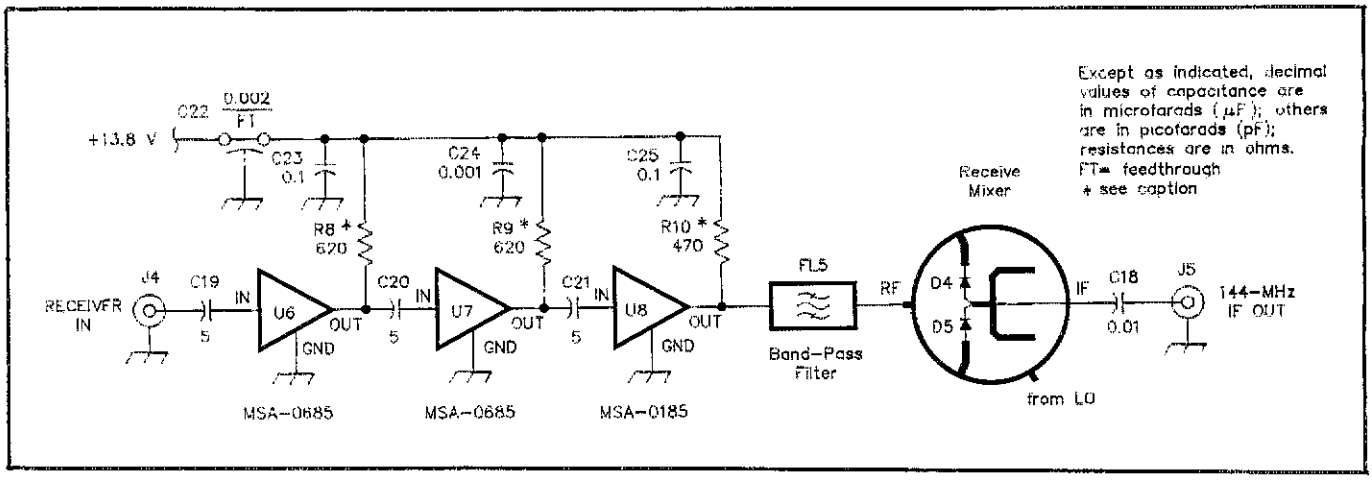


Fig 4—Schematic of the 3456-MHz transverter receive mixer/amplifier.

C18—0.01-μF disc-ceramic capacitor.
C19-C21—5-pF porcelain chip capacitor.
C22—0.002-μF feedthrough capacitor.
C23, C25—0.1-μF ceramic chip (preferred) or disc-ceramic capacitor.
C24—0,001-μF ceramic chip (preferred) or disc ceramic capacitor.
D4, D5—Hewlett-Packard HSMS-2822 surface-mount diode pair or matched pair of HP 5082-2835 Schottky diodes. See text.
FL5—Band-pass filter printed on PC board.
J4—Female chassis-mount connector builder's choice.
J5—Female chassis-mount SMA connector.
R8, R9 —620-Ω, ¼-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
R10—470-Ω, ¼-W carbon-film resistor. Note: This value is for 13.8-V operation. See text for information on operation at other voltages.
U8—Avantek MSA-0685 or Mini-Circuits MAR-1 MMIC.
U6, U7—Avantek MSA-0185 or Mini-Circuits MAR-6 MMIC.

The receiver-preamplifier stages were chosen to have good SWR and low noise figure. Preceding FL5 is an MSA-0185 (U8) that terminates the filter well and has a noise figure of approximately 6.5 dB at 3456 MHz. The front end consists of two MSA-0685 stages (U6, U7). The overall receiver noise figure is about 4.4 dB. An outboard preamplifier can be added to make a state-of-the-art setup. Performance of the transverter is summarized in Table 1.

Construction Hints

The transverter is constructed on 0.031-inch-thick Teflon-glass substrate with a dielectric constant of 2.50. The board is double clad with ½-ounce copper. I get my board material from Taconics Plastics, Ltd, Petersburg, NY 12138, part number TLX-9-0310-R5/R5. A word of caution: The filters require that dimensional tolerances of ±0.001 inch or better be maintained in the fabrication of the board. This is the price you must pay for microwave filters that require no adjustments. Because of the critical tolerances necessary and the many variables involved in the *QST* printing process, an etching pattern is not included in this article. If you are interested in making your own board, send me an SASE for a dimensioned copy of the artwork. Or, if you wish, you can purchase an etched board from me.[7]

Construction is as simple as populating the board with the components and mounting the connectors. A parts layout guide is shown in Fig 5. Lead dress can be seen in the photograph of the completed transverter (Fig 6). All of the parts needed to complete the project are available from amateur suppliers, and kits are available as well.[8]

Be sure to use high-quality porcelain chip

Table 1
3456-MHz Transverter Performance

General	
Frequency range	3456-3460 MHz
IF range	144-148 MHz
Local oscillator required	+16 dBm (40 mW) at 552 MHz
Power required	13.8 V dc at 250 mA
Transmitter	
Output power	>10 mW (+10 dBm)
Spurious rejection	>30 dB
IF drive level	−5 dBm to 0 dBm
Receiver	
Noise figure	<4.5 dB
Image rejection	>25 dB
Net gain	15 dB

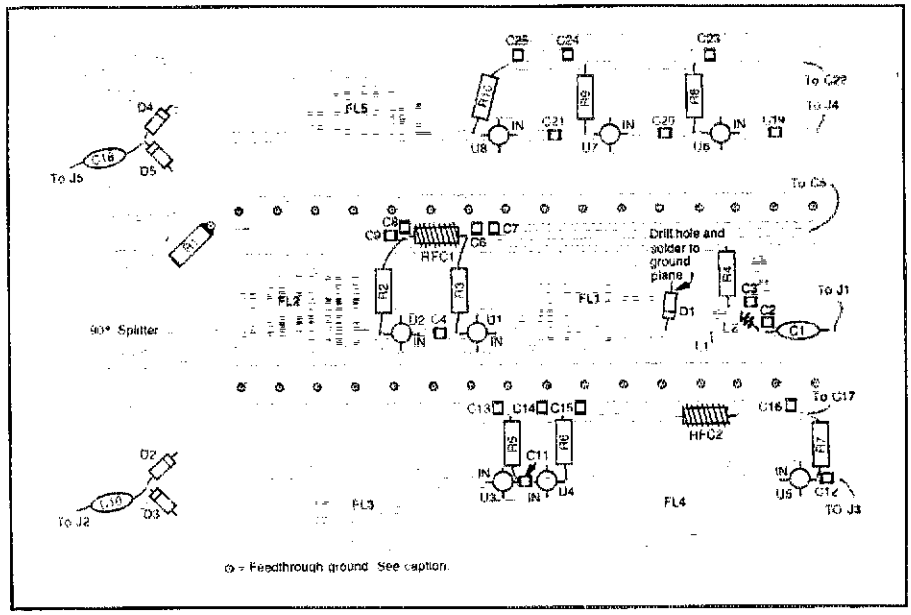


Fig 5—Parts-placement guide for the 3456-MHz transverter (not shown actual size). All components mount on the etched side of the board. Feedthrough grounds, indicated by circles, *must* be installed and soldered top and bottom; see text. See Fig 7 for mounting details for U1-U8.

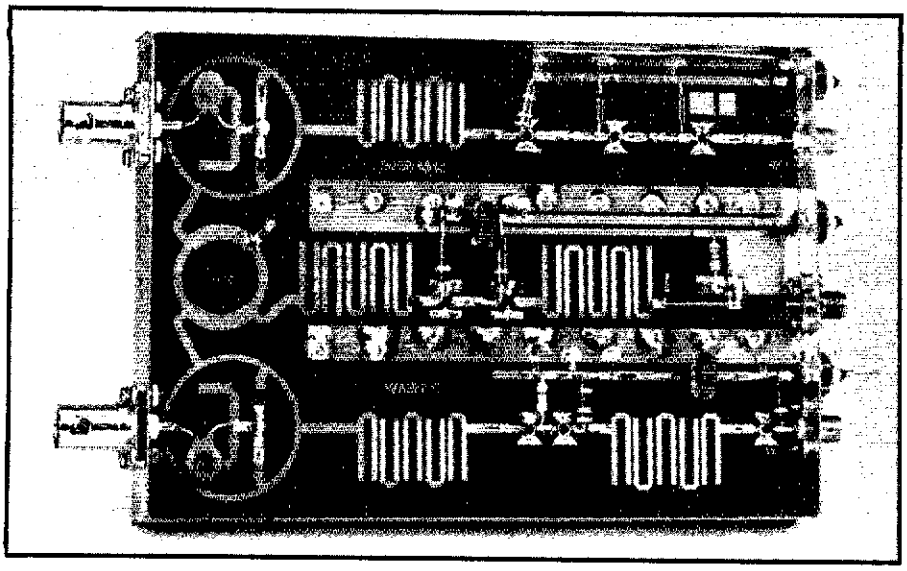


Fig 6—Photograph of a finished 3456-MHz transverter. This unit was built by Zack Lau, KH6CP, in the ARRL lab.

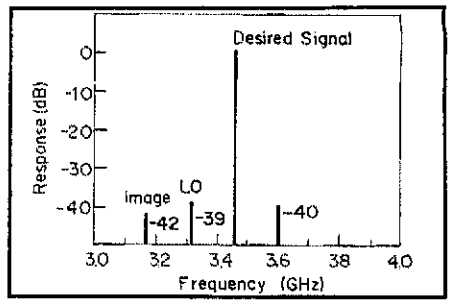


Fig 8—Output spectrum of the 3456-MHz transverter transmitter section.

capacitors for coupling between stages. The remaining capacitors can be less expensive ceramic chips or disc ceramics. I used chip capacitors everywhere I could because they make for a neater layout and cost about the same as the equivalent disc-ceramic capacitors.

Mini-Circuits offers a line of MMICs equivalent to the specified Avantek parts. The corresponding part numbers are easy to determine. The Mini-Circuits MAR-8 is equivalent to the MSA-0885, the MAR-6 to the MSA-0685, and so on.

I strongly recommend that you enclose the board in a brass box to support the connectors and provide ground continuity to the top side of the board. I used strips of 0.032-inch-thick, ¾-inch-wide brass available at most hobby stores. The entire perimeter of the inside walls is soldered to the top and bottom of the board. This provides a ground connection to the component side in several places, as well as a ground for the input and output connectors.

The board material is soft and bends easily. It is quite tolerant of heat and rework if you misplace a part. I use a 27-watt pencil soldering iron with good results.

Through-the-board wires are required to tie components to ground, as shown on the parts layout. Tiny brass rivets can be used if you have them available, but I used no. 18 bus wire with good results. The ground leads of the MMICs are grounded to a small piece of copper foil under each lead. The foil is wrapped through a clearance hole under each MMIC lead and soldered to the ground plane below (see Fig 7). The cold end of the 50-ohm chip resistor (R1) on the LO power divider should be grounded in a similar fashion.

Keep the bias resistors and chokes close to the board so they don't act as antennas.

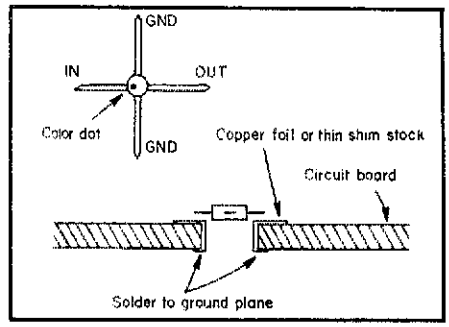


Fig 7—Mounting details for the MMICs.

During testing of the prototypes, I noticed that there is some radiation of RF energy from the surface of the board. This is not a problem unless LO energy gets into the transmitter circuits and shows up in the output. Without any shields at all, the LO is more than 30 dB below the carrier. Best results were obtained when a single cover was placed over the entire open side of the box. Surface-wave energy is reduced when the cover is in place, and the resulting ½-inch height of the cover above the board causes a "waveguide-below-cutoff" effect for the propagation of energy from one part of the circuit to another. The spectrum analyzer display of the transmitter output, shown in Fig 8, was obtained with the cover in place.

In the parts list, I have shown bias-resistor values for 13.8-V operation. If only 12-V operation is planned, the bias resistor values should be changed to maintain the correct operating current through each MMIC. Be sure to check resistor dissipation and use ½-W resistors as necessary. The bias current for each MMIC is as follows: MSA-0185, 17 mA; MSA-0285, 25 mA; MSA-0685, 15 mA; MSA-0885, 32 to 35 mA. On one portable expedition, I noticed that the receiver began oscillating after the transverter had been on for a while. I later found that the dry-cell battery had dropped more than 2 V, causing a corresponding drop in the bias current in each MMIC. When operated at lower than rated current, the MMICs are not unconditionally stable. If battery operation is planned, it is a good idea to regulate the power source to the transverter at 10 V or so and adjust the bias resistors accordingly.

For best performance, the mixer diodes should be a matched pair in a microstrip or surface-mount package. The recommended surface-mount pair is the Hewlett Packard HSMS-2822. This part is available from Microwave Components of Michigan (see note 8). I tried wire-lead Schottky diodes like the HP 5082-2835, but the LO rejection was greatly reduced because of imbalance. Although a matched pair of '2835s should work well, I did not have any matched units to test. If you have some microwave mixer diodes you want to try, go ahead and do it—just make sure the diodes are connected cathode to anode, as shown in Figs 3 and 4. The LO rejection can be measured with a power meter at the transmitter-output port by noting the difference between full carrier output and the residual oscillator level.

Accessories

You will need a few outboard accessories to complete your 3456-MHz station. First, a means of reducing the transmitter output power of your IF rig to 1 mW is required. A recent circuit published in *QEX* not only takes care of attenuating the transmitter, but also provides protected TR switching of the IF line.[9]

On the other end of the transverter, some sort of RF antenna relay is needed. Meeting this requirement may be a little more difficult, because good relays for this band are scarce. I have been fortunate enough to find small SMA-type relays at hamfests in the past, but larger relays with N connectors will probably work. Don't overlook relays equipped with TNC connectors. They are often good to well beyond 3456 MHz. You can take care of any connector mismatch in the jumper cables to the transverter. If you are unsure about

the suitability of a relay for this frequency, ask a knowledgeable friend for advice. Remember, just because a relay has good microwave-quality connectors doesn't mean it will provide low loss and operate at an acceptable SWR at 3456 MHz.

If you can find one used, a circulator makes a neat TR switch. Isolation between the transmitter and receiver ports won't be as good with a circulator as with most relays, but at least you won't need the dc source necessary to operate a relay. If you can't find a circulator, you can use an isolator. I have converted many isolators to circulators by removing the isolator load resistor and installing a coaxial connector in its place.

Several types of antennas are popular at 3456 MHz. The most common 3456-MHz antenna is a small dish in the 2- to 4-foot-diameter range. A recent article in *QEX* shows how to build efficient feed systems for the 3.4, 5.7 and 10.3-GHz bands.[10] For respectable performance without the wind load of a dish, you can now buy loop Yagis for 3456 MHz.[11]

Feed-line losses are severe at 3456 MHz. For home-station installations, and even for portable operations, a good Hardline, such as Andrew Heliax®, is mandatory. Also, don't overlook the G-line.[12] I have used a G-line for a couple of years now, with very good results.

Station performance can be greatly improved with the addition of an outboard receive preamplifier and transmit power amplifier. A state-of-the-art receiving preamp that makes an excellent front end for this no-tune transverter was described in *QST*.[13] Preamps of this design have been duplicated by many amateurs; they deliver good performance without requiring tweaking on a noise-figure meter.

Several options are available for the transmitter. Some amateurs have found surplus traveling-wave tubes (TWTs) to be a great way of generating lots of power on this band. TWTs typically require only a milliwatt or so of drive for full output, so you will have to attenuate the output of the transverter by about 10 dB. I prefer solid-state, however. A receiving-type GaAsFET like the Avantek ATF-10135 can yield up to +17 dBm quite easily at low cost. Don Hilliard, WØPW, published several good ideas on how to bridge the gap between 10 mW and 1 W.[14] Don shows how, for about $30, you can break the 100-mW level with an Avantek AT-8110 FET. I have built his circuit using a similar device (an Avantek AT-8250) with good results.

Summary

What can you expect to work on the 3456-MHz band? A recent article in *QST* discussed the various modes of propagation at 2304 MHz.[15] Everything said about propagation there applies just as well to 3456 MHz. Free-space path loss will be a little higher on 3456 MHz (about 3.4 dB higher for a 100-mile path), and foliage losses will likely be greater. Stations using aperture antennas (dishes) have the advantage of increased antenna gains, however. For example, a 4-foot dish has 3 dB more gain at 3456 MHz than at 2304 MHz. The bottom line is that workable distances on 3456 MHz are on par with those on 2304 MHz. All it takes to prove this is a little more activity!

Notes

[1]A. Ward, "Monolithic Microwave Integrated Circuits," Part 1: *QST*, Feb 1987, pp 23-29, 32; Part 2: *QST* Mar 1987, pp 22-28, 33.

[2]J. Davey, "Microstrip Bandpass Filters," *Proceedings of Microwave Update '87* (ARRL, 1987), pp 42-53. This book is available from ARRL for $10 (plus $2.50 postage and handling, or $3.50 for insured parcel post or UPS) or from your local dealer.

[3]J. Davey, "Microwave Filter Update," *Proceedings of Microwave Update '88*, pp 1-8. This book is available from ARRL for $12 (plus $2.50 postage and handling, or $3.50 for insured parcel post or UPS) or from your local dealer.

[4]R. Campbell, "A Clean Microwave Local Oscillator," 1296/2304-MHz Conference Proceedings, Estes Park, CO, Sep, 1985.

[5]An article describing a companion 552-MHz local oscillator will be featured in an upcoming issue of *QST*. Complete parts kits for a suitable local oscillator, as well as assembled units, are available from Down East Microwave, Box 2310, RR 1, Troy, ME 04987, tel 207-948-3741.

[6]H. Shuch, "Rat-Race Balanced Mixer for 1296 MHz," *ham radio*, Jul 1977, pp 33-39.

[7]Etched boards for this project are available from the author for $40 each. Foreign orders should include $5 for additional shipping.

[8]Most of the small parts for this project are available from Microwave Components of Michigan, PO Box 1697, Taylor, MI 48180, tel 313-753-4581. Complete parts kits and assembled units are available from Down East Microwave (see note 5).

[9]Z. Lau, "A VHF/UHF/Microwave Transverter IF Switch," *QEX*, Aug 1988, pp 3-4.

[10]D. Hilliard, "Antenna Ideas For 3.5, 5.8, and 10.4 GHz," *QEX*, Jan 1988, pp 3-5.

[11]Loop Yagis are available from Down East Microwave (see note 5).

[12]R. Dryden, "G Lines for 1296, 2304 and Above," *Proceedings of Microwave Update '87*, pp 54-62. See note 2.

[13]A. Ward, "Simple Low-Noise Microwave Preamplifiers," *QST*, May 1989, pp 31-36, 75.

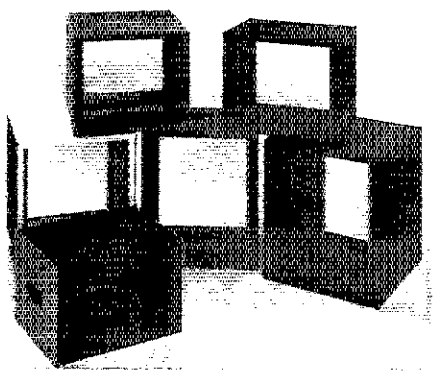
[14]D. Hilliard, "2 GHz to 6 GHz Power Amplifiers," *Proceedings of Microwave Update '87*, pp 8-92. See note 2.

[15]E. Pocock, "Getting From Here to There on 2304 MHz," *QST*, November 1988, pp 15-16.

New Products

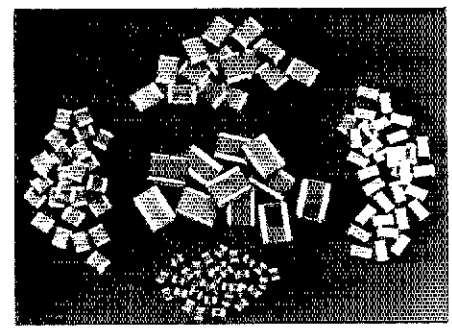
PFT DESK-RACK CABINETS

☐ Precision Fabrication Technologies, Inc, has introduced the Mod-U-Desk line of desk-rack enclosures. Mod-U-Desk cabinets meet EIA standards for 19-inch rack cabinets and cover a size range from 12 to 22 inches (height) and 17 to 23 inches (depth). Adjustable mounting rails allow for flexibility. Suggested retail pricing from $245. For more information, contact PFT at State Road 16 W, Monon, IN 47959, tel 800-558-7297 (outside Indiana), or 219-253-6666.—*Rus Healy, NJ2L*



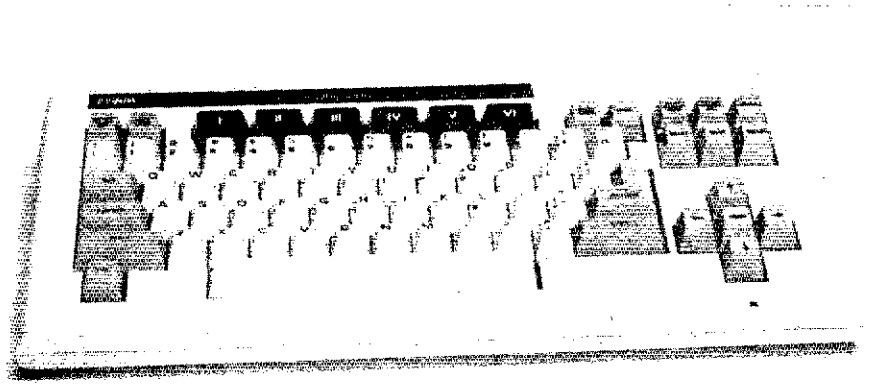
SPRAGUE HIGH-TEMPERATURE CHIP CAPACITORS

☐ Sprague® has introduced a new line of chip capacitors designed for high-temperature applications (range: −55 °C to 200 °C). Type 14C Monolythic® multilayer ceramic chip capacitors are produced using a wet-process ceramics technology to allow good uniformity, performance and reliability. Sprague's 50-V Monolythic capacitors meet EIA X8S, and 25-V capacitors meet EIA X9T. Capacitance range is 390 pF to 0.56 μF. Tape-and-reel packaging is available. More information is included in Sprague Catalog WF-100A, available from Sprague Technical Literature Services, PO Box 9102, Mansfield, MA 02048-9102, tel 508-339-8900.—*Rus Healy, NJ2L*



A Morse Code Keyer Using the Coleco ADAM Keyboard

By Ed Oscarson, WA1TWX
Route 2, Box 349A
New Hartford, CT 06057



Here's a simple and inexpensive CW keyboard that you can get ready to go in a few hours. Similar in design and operation to the popular CW6805,[1] this project doesn't require you to build or buy a case; it already has one. This CW keyboard provides features found on more expensive commercially available units and has a few twists of its own:

- Low total cost (under $70 for parts)
- 64-character type-ahead buffer in CONTEST mode
- 240-character type-ahead buffer in RAGCHEW mode
- Four-digit contact (QSO) counter
- Keyboard-programmable speed, spacing and weighting
- Up to six message memories (depending on memory device used) in CONTEST mode; no messages in RAGCHEW mode
- Message memories are nonvolatile (messages aren't erased when the keyboard is shut off or power is lost)
- Keyer configuration can be saved and is automatically recalled on power-up
- Use of a single, low-current, 9-14 V dc power supply
- No PC-board production is required
- Preprogrammed microprocessors are readily available

The Coleco ADAM™ keyboard is used as the heart of the keyer. These keyboards are available on the surplus market at very reasonable prices (about $20).[2] The ADAM keyboard is housed in a plastic enclosure similar in appearance to that of many other computer keyboards (see the accompanying photos). Keyboard electronic components are mounted on a PC board that is contained within a shielded enclosure inside the case. What makes this keyboard very attractive from a modifier's point of view is that the keyboard's original MC6801 mask-programmed, single-chip microprocessor is socketed, and can be replaced easily with another microprocessor programmed to do what you want it to do!

Keyboard Differences

Though similar in operation to the CW6805, there are some major differences between this keyboard and its predecessor.

This keyboard uses single-keystroke message transmission, offers the ability to backspace and correct typos when entering a message into memory, uses its WILD CARD key in lieu of the TI keyboard's FCTN key, and has the ability to save and recall modifiable keyboard default parameters. Also, the messages in this keyboard are *not* cascadable (a single message cannot be longer than 240 characters). Longer messages can be handled by sending two or more messages in sequence.

The keyboard default settings are recalled automatically when power is applied to the keyboard. If the default parameters have never been modified (such as when the keyer is first constructed or a new EEPROM IC is installed), the keyer defaults to a speed of 10 WPM and normal spacing, dot/dash ratio and weighting. A new set of default parameters can be saved any time the keyboard is not transmitting, and will overwrite the standard default parameters in EEPROM. Saving new default parameters will not affect the message(s) stored in EEPROM.

The prosigns and functions supported by this keyboard are expanded over those supported by the CW6805 (see Tables 1 and 2). $\overline{BT}$ is now sent using one of two keys: the ENTER or _ (underscore) key. The $\overline{BT}$ produced by the underscore key can be included in a stored message, but the ENTER key cannot be used for this purpose because it is used to terminate the entry of the message being stored. The hyphen (-), SHIFT 6, sends $\overline{BA}$, and the + key sends the error code (eight dots).

A Bit About the Microprocessor

Motorola offers a programmable version of the MC6801, the MC68701. This microprocessor has 2 kbytes of memory and has the ability *to program itself* with little external hardware.[3] You can plug the 68701 right into the 6801 socket on the ADAM keyboard. No hardware changes are required to support the 68701.

I programmed a 68701 with software that scans the keyboard in a manner similar to that used by the original keyboard microprocessor.[4] Now, instead of producing ASCII when the keys are pressed, the 68701 produces Morse code!

Circuit Description

Refer to the schematic in Fig 1. Components removed from, or added to, the original keyboard circuit are contained within shaded lines. The modifications are confined to the data I/O line and the addition of a message EEPROM and power-supply voltage regulator.

Key Line Interface

The circuit handling the data-output line of the microprocessor (U2, pin 21) is modified and used to drive the transmitter-keying line. The microprocessor provides a TTL low when the key is down. This output line is buffered by a comparator (U1D) to drive the optocoupler, U7. An H11G2 optocoupler provides electrical isolation and easily connects the keyboard to many different transmitter keying circuits. The H11G2 can operate with key lines that are less than ±80 V dc with the key up, and can be used to drive most transistor keying circuits. *(Note: U7 cannot be used to directly drive cathode-keyed circuits!)* A cathode-keying circuit that can be driven by U7 is shown in Fig 2.

The 1-kΩ resistor (R14A) connected between the base and the emitter of the

[1]Notes appear on p 34.

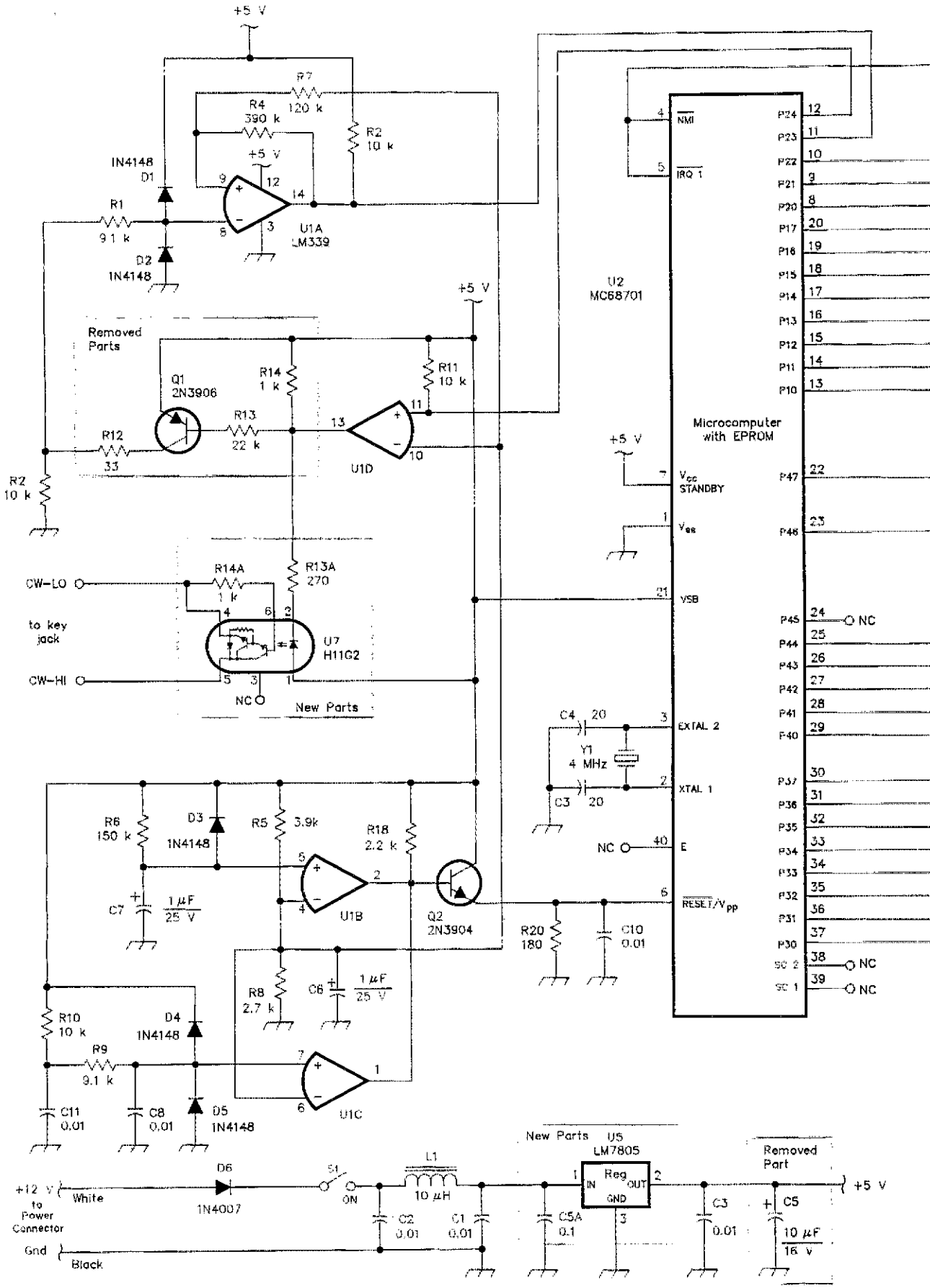
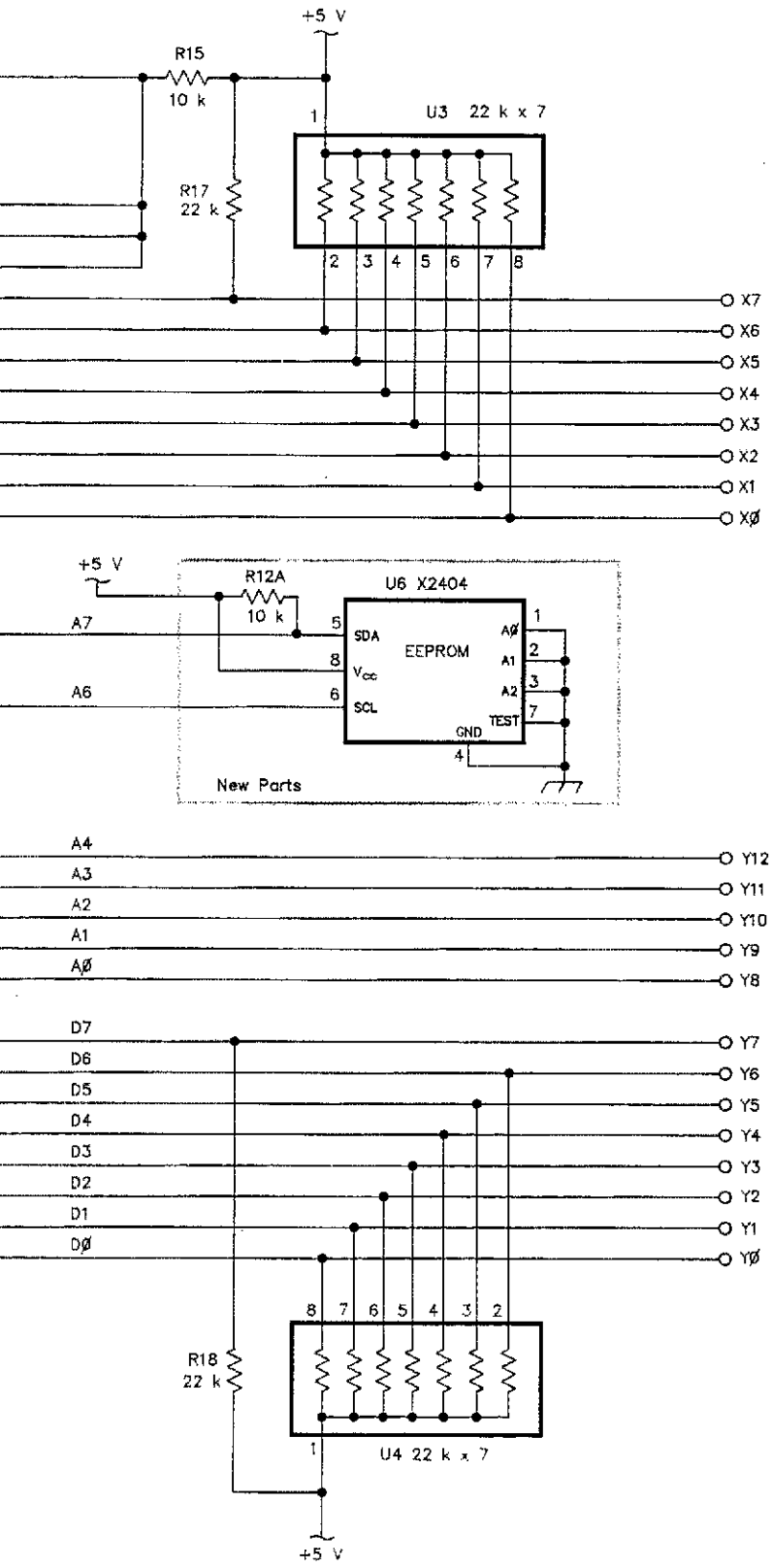

+5 V
R7
R4 390 k
120 k
R2 10 k
IN4148 D1
R1 9.1 k
D2 1N4148
U1A LM339
Removed Parts
Q1 2N3906
R14 1 k
R11 10 k
R13 22 k
R12 33
U1D
R2 10 k
R14A 1 k
R13A 270
CW-LO
to key jack
CW-HI
U7 H11G2
NC
New Parts
U2 MC68701
Microcomputer with EPROM
NMI
IRQ 1
VCC STANDBY
VSS
EXTAL 2
XTAL 1
E
RESET/VPP
C4 20
Y1 4 MHz
C3 20
R6 150 k
D3 1N4148
R5 3.9k
R18 2.2 k
C7 1 µF 25 V
U1B
Q2 2N3904
R20 180
C10 0.01
R8 2.7 k
C6 1 µF 25 V
R10 10 k
D4 1N4148
R9 9.1 k
C11 0.01
C8 0.01
D5 1N4148
U1C
New Parts U5 LM7805
Reg
IN
OUT
GND
Removed Part
+12 V to Power Connector
White
Gnd
Black
D6 1N4007
S1 ON
L1 10 µH
C2 0.01
C1 0.01
C5A 0.1
C3 0.01
C5 10 µF 16 V
+5 V

Fig 1—Schematic of the CW keyboard.



Except as indicated, decimal values of capacitance are in microfarads (μF); others are in picofarads (pF); resistances are in ohms; k=1000, M=1000 000.

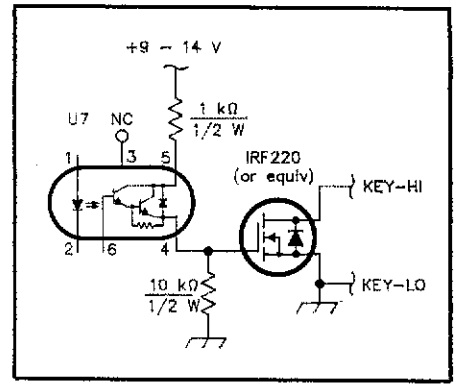


Fig 2—Diagram of the optional cathode-keying circuit.

optocoupler's transistor is used to guarantee that the optocoupler's transistor turns off when the LED is off. This precaution is taken because the transistor in the optocoupler has high gain, and its leakage current may be enough to keep the transistor turned on even after the LED is off. With resistance values less than 4.7 kΩ at R14A, U7 can sink 2.5 mA. Rigs with low key-line voltages (5 V or less) may not need R14A. With a resistance value of 47 kΩ or more at R14A (or eliminating R14A entirely), U7 can sink up to 30 mA.

Message Memories

Two of the I/O lines that were unused in the original keyboard design (U2, pins 22 and 23) are now employed to access a Xicor® X2402, X2404 or X24C16 electrically erasable read-only memory (EEPROM) at U6. Respectively, these remarkable chips contain 256 bytes, 512 bytes or 2 kbytes of memory in an 8-pin DIP! (See the sidebar, "The Serial EEPROM.") The EEPROM is used to store prepared messages for later transmission. You can elect to build the keyer without the EEPROM, but you will not be able to store any messages. As mentioned earlier, the message information is nonvolatile; the messages are not lost when the keyboard is turned off or power is lost.

An X2404 provides two message buffers. The X24C16 has 2 kbytes of memory, is a CMOS device and has room for up to eight messages. However, only six messages can be accessed by the keyer. All versions of the X24xx EEPROM have the same pin connections, and the microprocessor software configures itself to work with any of the three EEPROMs.

Modifying The Keyboard

Turning the computer keyboard into a CW keyboard is relatively simple. Basically, it amounts to removing a few components from the PC board to make room for the optocoupler and EEPROM ICs, adding a few components and making some wiring changes.

Table 1
Coleco ADAM CW Keyboard Functions

Keys	*Function*
BACK-SPACE	Backspace in the type-ahead buffer or when entering a message.
\	Send DE; can be embedded in a message.
SHIFT C	Sends the number in the QSO counter, then increments the QSO counter; can be embedded in a message.
SHIFT H	Backspace in type-ahead buffer.
SHIFT Q	Sends CQ six times; can be embedded in a message.
SHIFT T	Send PARIS test message.
SHIFT ENTER	Warm-start reset (stops transmission); does not change any keyer parameters or operational mode.
WILD CARD D	Decrements the QSO counter by one.
WILD CARD Gn	Set letter/word spacing, where n = 0 to 9. 0 = normal, 9 = maximum.
WILD CARD Mn	Program message number n, where n = 1 to 6. The message entry is terminated by pressing the ENTER key. Messages are 240 characters long and should not be programmed while in the RAGCHEW mode.
WILD CARD Pnnnn	Set the QSO counter to nnnn, where nnnn = 0000 to 9999; four digits must be entered.
WILD CARD SHIFT R	Reset all functions. Speed = 10 WPM; weighting = 1:3; spacing = normal; mode = CONTEST.
WILD CARD Snn	Change transmission speed; where nn is a two-digit number between 05 and 99.
WILD CARD Wn	Set weighting (dot/dash ratio), where n = 0 to 9. 0 = 1:2, 4 = 1:3 (normal), 8 = 1:4.
WILD CARD ESCAPE	Set the keyer speed to 15 WPM with 5 WPM spacing.
WILD CARD I (SHIFT \)	Save the keyer setup in EEPROM.
WILD CARD SHIFT I	Select the CONTEST mode of operation. Type-ahead buffer = 64 characters; six 240-character messages.
WILD CARD SHIFT II	Select the RAGCHEW mode of operation. Type-ahead buffer = 240 characters. Message function disabled.
I, II, III, IV, V, VI	Send messages 1 to 6 (number of messages available depends on the EEPROM type installed.

Note: The I, II, III, IV, V and VI keys are the six black keys at the top of the keyboard. SHIFT-key sequences are made by simultaneously pressing the SHIFT key and the key assigned to the desired function. The WILD CARD key is a single keystroke.

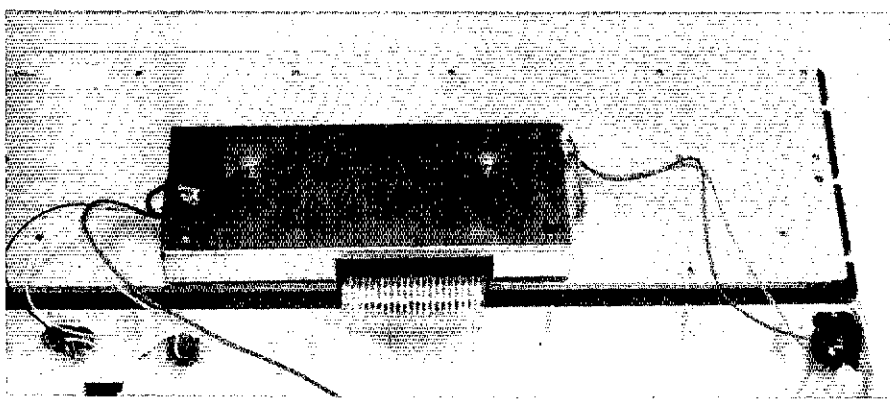


Fig 3—An inside view of the keyboard with the keyboard assembly turned upside down at the top of the photo, showing the shield covering the PC board. On the back panel, from left to right: the power connector, on/off switch and key-line jack. The hole below and between the power connector and on/off switch was occupied by the ADAM keyboard connector.

Components Needed

First, collect the parts you'll need: a dc power connector; key jack; ON/OFF switch (an SPST switch will do); an LM7805 +5-V regulator; a 0.1-μF, 50-V disc capacitor; a 1N4007 silicon diode; and one 6-pin and one 8-pin IC socket (or two 8-pin sockets, one of which will be modified later.) You'll also need three ¼-W resistors—one 270 Ω, one 1 kΩ, one 10 kΩ —and some hook-up wire.

Disassembly

Disassemble the keyboard by removing the six screws on the bottom of the unit. Remove the top cover. Remove the screws that hold the keyboard in place (two on each side). Lift out the keyboard. Remove the multiconductor keyboard connector from its slot in the back panel. Beneath the keyboard is a metal shield; remove the two nuts and lock washers that secure it. Next, remove the four nuts and four plastic spacers that are used to attach the PC board to the keyboard. You are now ready to make the changes.

Modification Procedure

Drill mounting holes on the back panel of the bottom of the case (see Fig 3) for the power connector, key jack and ON/OFF switch (S1). When you install the key jack, power connector and ON/OFF switch, be sure that their physical placement doesn't interfere with the reassembly of the keyboard. I used a ¼-inch key jack and found that mounting the connector on the far right-hand side of the back panel of the bottom of the enclosure works best. If you use a single-hole-mount phono jack, you can fit it almost anywhere. The dc power-input connector is at the left of the back panel, and the ON/OFF switch is to the right of the connector. Install D6, the reverse-polarity-protection diode. A good location for D6 is between the ON/OFF switch and the power connector. (D6 was not installed in the prototype board shown in Fig 3.) D6 protects the keyboard from incorrect power-supply polarity.

Refer to Figs 4, 5 and 6 during the modification procedure. The PC boards used in the manufacture of the ADAM keyboard are fundamentally the same, but

Table 2
Coleco ADAM CW Keyboard Keystrokes and Prosigns

Key(s)	*Prosign or Code Sent*
# (SHIFT 3)	$\overline{AR}$ (end of message)
$ (SHIFT 4)	$\overline{SK}$ (end of work)
% (SHIFT 5)	$\overline{BK}$ (break; go ahead, transmit)
- (SHIFT 6)	$\overline{BA}$ (hyphen or dash)
_ (underscore)	$\overline{BT}$ (double dash) can be embedded in stored messages —see text
ENTER	$\overline{BT}$ (double dash); *cannot* be embedded in stored messages—see text
& (SHIFT 7)	$\overline{AS}$ (wait)
* (SHIFT 8)	$\overline{AA}$ (all after)
((SHIFT 9)	$\overline{KN}$ (left parenthesis)—Also used commonly as "go ahead—you only," an invitation to the station with which one is in contact only to transmit, all others stand by.
) (SHIFT 0)	$\overline{KK}$ (right parenthesis)—Commonly used for both left and right parenthesis.
+	Error code (8 dots)
= (equals sign)	$\overline{SN}$ (understood)
SHIFT I	Question mark
SHIFT O	Apostrophe
SHIFT P	Quotation marks

Note: SHIFT-key sequences are made by *simultaneously* pressing the SHIFT key and the key assigned to the desired function.

differ in minor ways. For instance, some PC boards may have axial-lead capacitors instead of radial-lead capacitors. Some PC boards have component designations beside each component, other boards have none.

Remove C5, Q1, R12, R13 and R14 from the PC board. You'll need a 6-pin IC socket for U7. If you don't have a 6-pin socket, modify an 8-pin IC socket by pulling out (or cutting off) the rearmost two pins (4 and 5). Using the socket as a template, mark three holes near the right-hand (Q1-edge) of the PC board, spacing the new holes 0.3 inch from the existing Q1 mounting holes. Use a small drill bit (a no. 56-68 bit is recommended). Make sure that the three holes do not cut the foil trace on the bottom of the PC board. Install U7's socket, orienting it so that pins 4-6 are near the right-hand edge of the board. Solder pins 1, 2 and 3 to the PC-board pads vacated by Q1. Bend socket pins 4, 5 and 6 toward the outside edge of the PC board.

Install a 270-Ω resistor in place of R13 (this resistor is labeled R13A in Fig 1), and solder both leads to the foil. Insert one end of a 1-inch piece of bare wire (W5) into the hole vacated by R14 that is farthest from R13 (this hole is labeled A in Fig 5). Insert the other end of the jumper into the hole (closer to the right-hand end of R13) vacated by R12; this hole is labeled B in Fig 5. Solder both ends of the jumper to the foil pads. Beneath the PC board, solder a 1-kΩ resistor (R14A) between pins 4 and 6 of U7's socket.

Prepare two 12-inch-long wires (no. 22 stranded wire works fine; use different colors, if possible, for ease of identification). Use these wires to connect U7 to the key jack. Strip 1/8 inch of insulation from one end, and 1/4 inch of insulation from the other end of both wires. Twist the wires together. Route the wires through the hole at the upper-right-hand corner of the PC board and tie a knot in the wires. (If there is no hole at this corner of the board, drill a 1/8-inch hole at a spot away from any foil traces.) Leave at least two inches of wire on the wire ends that are stripped 1/8 inch. Connect one of the wires to pin 4 of U7's socket, and connect the other wire to pin 5 of the socket.

The second 8-pin socket is used for U6. Bend pins 5, 6 and 8 to the side. Place the socket on the PC board near the existing jumper wire (W4) so that pin 8 is close to the jumper. Using the socket as a template, mark the spots where pins 1, 2, 3, 4 and 7 touch the board. Drill out the holes at these locations as you did for U7. Bare the copper ground foil around the newly drilled holes by scraping off the green coating. Install the socket on the component side of the board and solder pins 1, 2, 3, 4 and 7

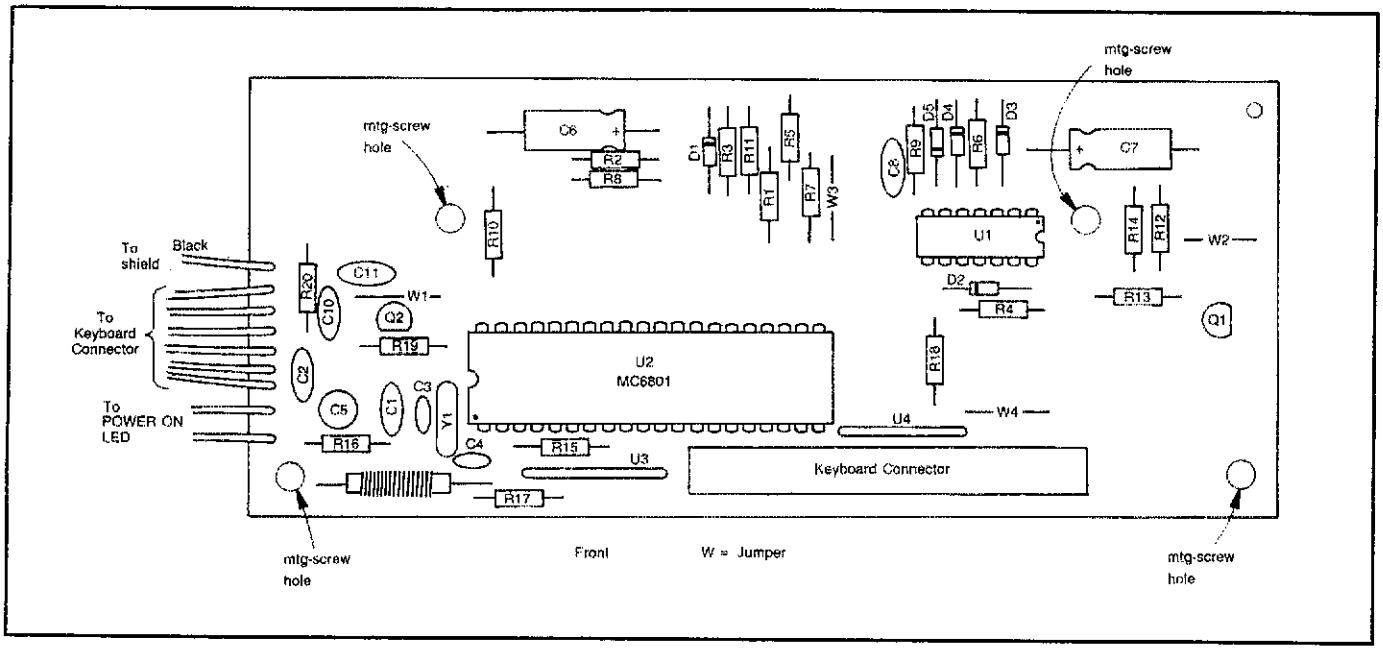


Fig 4—Parts placement on the unmodified ADAM keyboard PC board. Parts identification is made according to that on the revision C board. (There is no capacitor labeled C9.) Compare this drawing to that of Fig 5 to identify the placement of the removed and added components.

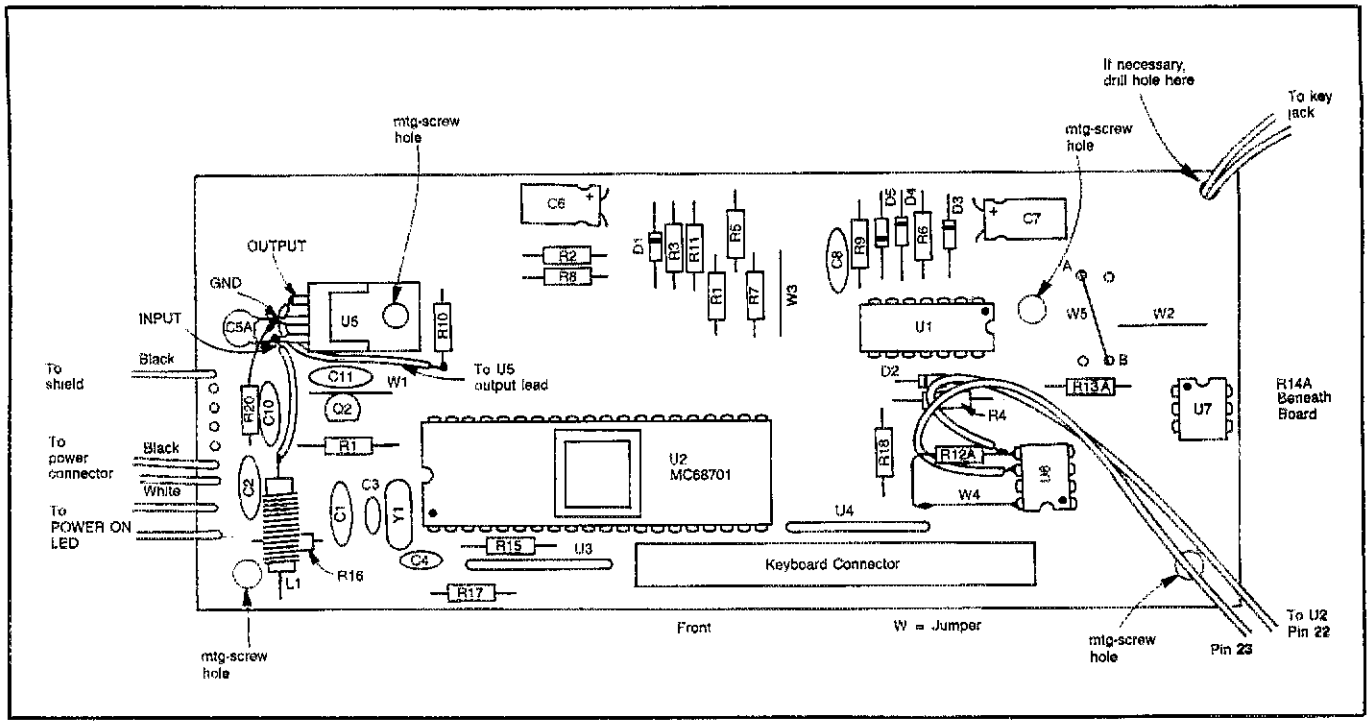


Fig 5—Parts-placement guide for the modified PC board.

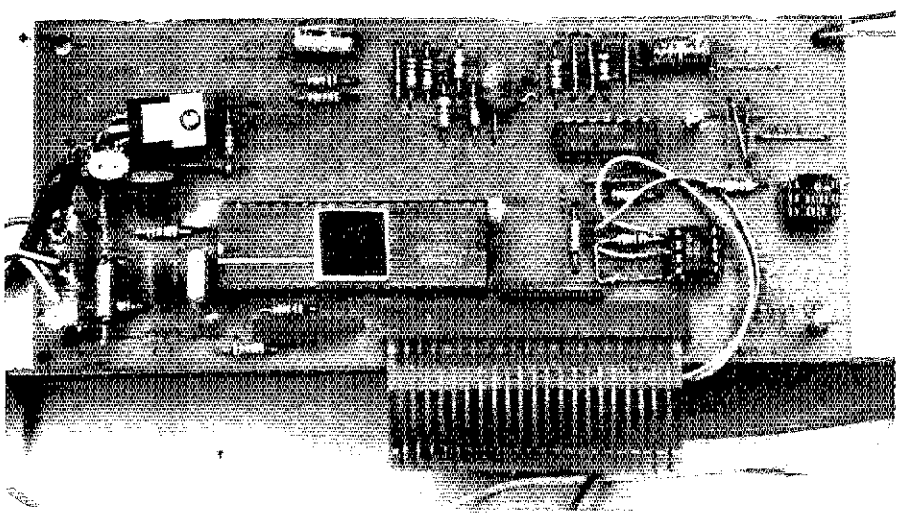


Fig 6—This photo shows the modified PC board.

to the ground foil. On the component side of the board, solder pin 8 of the socket to the jumper wire.

Prepare two 4-inch wires (solid no. 24 works best here) and strip 1/8 inch of insulation from both ends. Solder one wire to pin 5 of U6's socket. Route the other end to the bottom of the board and solder it to pin 22 of U2's (the microprocessor) socket. Solder the second wire to pin 6 of U6's socket. Route the other end to the bottom of the board and connect it to pin 23 of U2's socket. Trim the leads of a 10-kΩ resistor to ¼ inch. Solder this resistor (R12A) between pin 5 of U6's socket and the jumper wire that connects to pin 8 of U6's socket.

Of the six wires that run from the keyboard cable connector to the PC board, only the white and black leads will be needed. *Make sure not to cut the wires from the PC board that lead to the POWER ON LED!* Cut the wires at the back of the connector and discard the connector. Leave the white and black keyboard wires intact, and cut or unsolder the remaining leads from the PC board. The white lead is used for the positive input-voltage lead, the black wire is the ground lead. There's also one heavy black lead that runs from the PC-board ground trace to the PC-board shield—leave it intact.

Unsolder the lead of L1 that is closest to the microprocessor (U2), and remove the lead from the board hole. Temporarily put the PC board back into place on its keyboard mounting screws. Place one of the short spacers removed during disassembly back on the PC-board mounting screw near R10. Install U5 (the +5-V regulator) as shown in Figs 5 and 6 (drawing and photo), using one of the mounting nuts to temporarily hold the regulator in place. Note that the metallic tab on the regulator faces *away* from the PC board. Mounted this way, the regulator will make contact with the metallic PC-board shield and use it as a heat sink when the unit is reassembled. Apply a small amount of heat-sink compound to U5's tab; more *is not* better here. Bend U5's leads down toward the PC board. Solder the center (ground) lead of U5 to the R20 lead closest to U5 (it's the same lead to which the heavy black wire is connected). Using a short piece of wire, connect the output pin of U5 (the lead farthest from Q2) to the end of R10 that is closest to U2's socket. Solder the connections.

Solder a 0.1-μF capacitor (C5A of Fig 1) between the input and ground leads of U5. Strip ¼ inch of insulation from both ends of a 1-inch piece of wire. Wrap one end of the wire around the free lead on L1 and solder the connection. Insulate the lead with sleeving or tape. Solder the other end of the wire to U5's input terminal (the lead

The Serial EEPROM

The X24xx serial EPROM is a small part that contains a large amount of memory. The small physical size of the IC is achieved by eliminating *parallel* address and data lines and their associated pins from the package. A shift register is included on the device as a means of addressing the IC and getting data into and out of the device. For data, the shift register is bidirectional. Two pins are required for the shift register data and clock. Up to four X2404s can be on the two-wire bus, typically controlled by a bus master (such as the 68701). Two more pins of the X24xx are used for power and ground connections. One of the remaining four pins is a test pin, the others are address inputs on the smaller devices (they are not used on the X24C16).

The data format used to access the X24xx employs a multibyte transmission consisting of the upper address bits (external and internal to address a 256-byte page), followed by the lower address bits, followed by data. START, STOP, and acknowledge (ACK) sequences are used to separate the data transfers. These sequences are shown in Fig A.

The START sequence initiates the transfer of data to or from the IC. This is followed by the slave address (256-byte block address) with the read/write bit set to 0 to indicate a write. The IC issues an ACK on the data line when the address transfer is done and the part is ready for the next byte. The address within the 256-byte block is sent next, for which the IC sends another ACK. At this point, data can be read from or written to the X24xx. Because the read and write sequences are different, I'll describe each one separately. Refer to Fig B, which shows the data bus timing for each operation.

Write Sequence

The ACK for the slave address is followed by the data byte to be written to the IC. The X24xx issues an ACK to indicate that the byte was written into its internal latch. Up to seven additional bytes may follow, each followed by an ACK from the X24xx. A STOP is then issued to the X24xx to initiate the data write. After data is written to the X24xx, it will not respond to its slave address for approximately 10 milliseconds.

Random Read Sequence

Once the address ACK is received, another START must be issued to terminate the dummy write cycle that latched the address, and to start the read cycle. (No data is changed by the dummy write cycle.) The read sequence uses the latched address as the pointer to the data within a 256-byte block of the memory. A START is issued to the X24xx followed by the slave address with the R/W (read/write) bit set to 1. Next, the X24xx issues an ACK. After that, the data can be clocked out. An ACK is issued by the X24xx after each data byte is read, and the internal address is automatically incremented. Successive data bytes can be read with another eight pulses on the clock line, each byte followed by an ACK. When done, a STOP is issued to the X24xx by the master; in this case, the 68701.

Current-Address Read

The data pointed to by the internal address latch can be obtained at any time by issuing a START followed by the slave address with the R/W bit set to 1, followed by the data and a STOP command. This mode should not be used when multiple interrupt-driven tasks are accessing the EEPROM because each task usually requires its own address pointer.—*Ed Oscarson, WA1TWX*

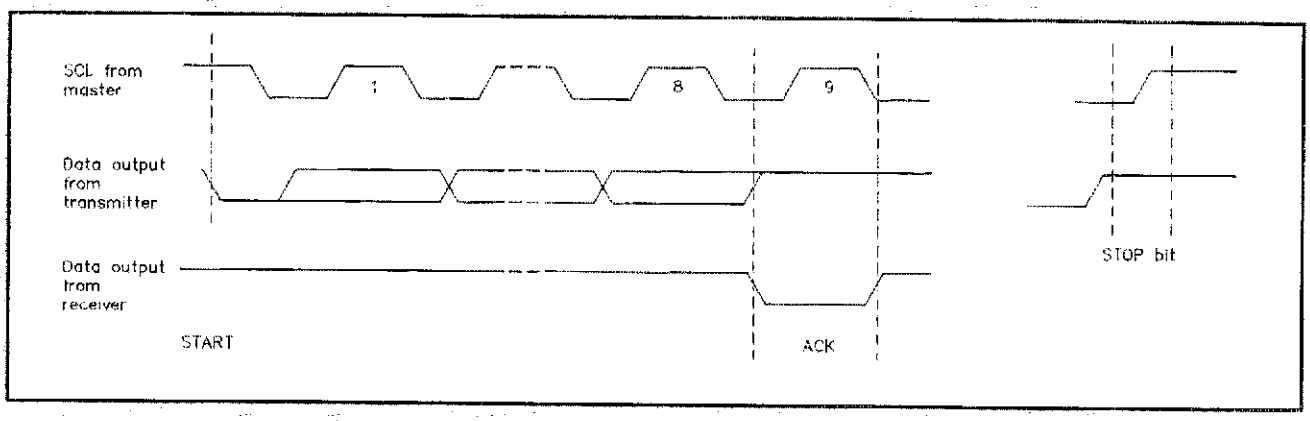


Fig A—X2404 control timing diagram.

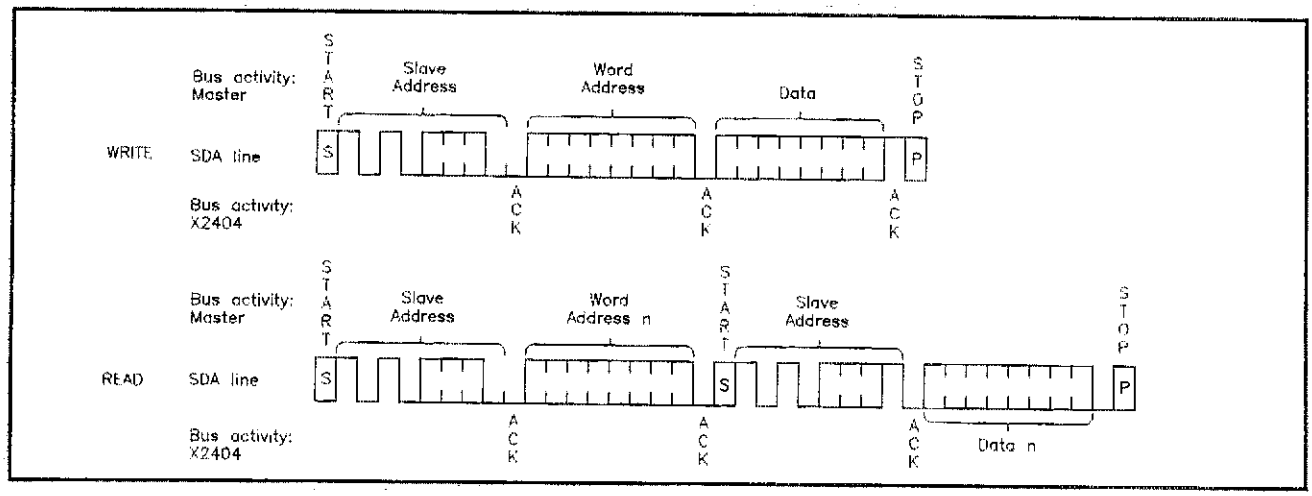


Fig B—Data bus operations.

nearest Q2). You are now done with the board changes.

Reassembly and Check Out

Remove U2 (the MC6801) from its socket. Attach a voltmeter between ground and the output pin of the regulator, U5, and apply power (9 to 12 V dc). You should measure +5 V.

Before installing the ICs, disconnect power from the keyboard. *When installing ICs, be sure to orient them correctly!* Carefully insert the MC68701 into its socket and make sure it's seated. The notch in U2 (the pin 1 end) should point toward the crystal on the PC board. Install U6 and U7. Remove the nut holding U5 in place, place the remaining spacers on their screws and reinstall the metal shield and secure it with the holding nuts. At the upper-right-hand corner of the board, cut or bend out the shield corner to prevent it from chafing the insulation on the newly installed wires at that point.

Route the white and black wires out through the rubber grommet in the metal shield. Connect the key lines to the key jack. Solder a 0.005-μF, 100-V capacitor across the key jack terminals. Connect the power lines to the power connector and ON/OFF switch. Remember, the white wire is the positive-voltage line.

Remove the BACK-SPACE keytop from the keyboard and swap it with the UNDO key. (The BACK-SPACE key is used to delete incorrect entries in the type-ahead buffer.) Finally, attach the keyboard to the bottom of the case. Then connect a tone oscillator and power source to the keyboard. Make sure the power supply you attach to the keyboard is polarized correctly.

Several keys on the modified ADAM keyboard have no function or code assigned to them. These keys include the exclamation mark (!) and at sign (@), the cursor-pad keys at the lower right-hand side of the keyboard (arrow and HOME) keys), the UNDO, LOCK, tilde/caret (~ ^) keys, and the six keys in the upper right-hand corner of the keyboard: MOVE/COPY, STORE/GET, CLEAR, INSERT, PRINT and DELETE. Also, the curly/square bracket keys ({} [ ]) duplicate the left and right parenthesis keys, and the single/double quotation mark key sends $\overline{\text{AF}}$, the double quotation mark. The comma and period keys in their normal and shifted positions (< >) send the comma and period, respectively.

A list of the keyboard functions is presented in Tables 1 and 2. Press each key and check for correct operation. Change the keyboard speed to 20 WPM (WILD CARD S 20). Then enter the sequence WILD CARD SHIFT \ to save the keyer speed change in EEPROM. Turn the keyboard power off, then back on. The keyer should start up at 20 WPM instead of the standard 10-WPM default speed.

The black I through VI keys send messages 1 through 6 (depending on which EEPROM, if any, is installed), and the WILD CARD key replaces the FCTN key used on the TI keyboard of the CW6805 keyer. Test the memory IC by entering messages (no sidetone is heard during the message-entry process) and sending them. To test message no. 1, for instance, enter WILD CARD M I followed by the message text. When you're done entering the message, press the ENTER key. Now, send message I by pressing the black I key. Turn the power off, then back on. Send the message again—it should not have changed. If that works, your modifications have been done correctly.

Reassemble the keyboard in the reverse of the order of disassembly.

On The Air

Sending CW with the keyboard is similar to typing on a typewriter or computer keyboard. If you've never used a keyboard before, it may take some practice to get used to keying in information while code is being sent by the keyboard. The space bar is used to separate words just as it would be on a typewriter or computer. The many functions that can be selected and/or changed by the operator make sending CW a breeze!

Notes

[1]E. Oscarson, "The CW6805—An Inexpensive Morse Keyboard," *QST*, Dec 1988, pp 24-30.

[2]ADAM computer keyboards are available from American Design Components, 62 Joseph St, Moonachie, NJ 07074, 1-800-524-0809.

[3]An MC68701 programmer is described in *QEX*, May 1989, pp 3-7.

[4]The following items are available from Single Chip Solutions, PO Box 680, New Hartford, CT 06057: programmed MC68701, $35; X2404, $12; X24C16, $22; H11G2 optocoupler, $2; ADAM keyboard, $30; complete kit of parts for a two-memory version, including keyboard and wall-transformer power supply, $85 (for six-memory version add $10); assembled, two-memory keyboard with wall-transformer power supply $110 (for six-memory version add $10); program source code on a PC-DOS formatted disk, $50; add $2.50 for shipping and handling ($3.50 for complete kits or assembled units); CT residents add 7.5% sales tax.

New Products

BALUNS BY K2RAG

☐ Antenna Systems, Inc, run by Chris Bednarek, K2RAG, has introduced two ferrite baluns. The RAG-1.1A is a 1:1 transformer built for use in 50- and 75-Ω systems, and the RAG-4.1A has a 4:1 transformation ratio. 50- and 75-Ω feed lines can be used with the '4.1A. Common characteristics of these baluns include coverage from the 1.8- through 28-MHz amateur bands (the RAG-1.1A also covers the 50-MHz band), maximum legal Amateur Radio power-limit ratings, light weight, strain relief for feed lines, all-stainless-steel hardware and low loss. Price: $29.95.

Other products available from Antenna Systems include complete dipole and sloper antennas and a center insulator. For more information, contact Antenna Systems, 14465 SW Hazelhill Dr, Tigard, OR 97224, tel 503-684-5350.—*Rus Healy, NJ2L*

LTA INDUSTRIES 10-METER MONOBAND YAGIS

☐ Tim Duffy, K3LR, of LTA Industries, has announced a series of 10-meter monoband Yagi antennas. These antennas use high-grade aluminum tubing, stainless-steel hardware and vibration-damping ropes inside the elements for long antenna life and good performance. LTA Industries antennas are available in three- through eight-element versions. Model number format is LTx10, where x represents the number of elements. Specifications are given below.

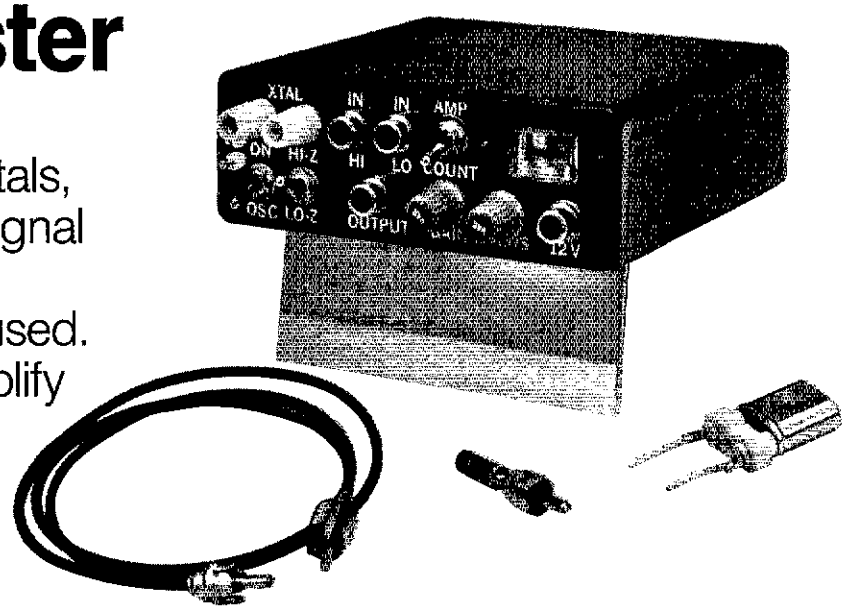
Other products available from LTA Industries include weatherproofing kits, dipoles, baluns, stacking kits and Drake R4C modifications. VISA and MasterCard are accepted. To order, or for more information, contact LTA Industries, PO Box 92, 281 Dartmouth Dr, Canfield, OH 44406, tel 216-533-0087.—*Rus Healy, NJ2L*

LTA Industries 10-Meter Yagis

	LT310	*LT410*	*LT510*	*LT610*	*LT710*	*LT810*
Boom length (ft)	11.5	16	26	31	37.5	40
Boom diam (in.)	1.5	2	2	2	2	3
Turning radius (ft)	9	12	16	18.5	21	22
Wind area (sq ft)	2.0	3.0	4.1	4.8	5.8	8.1
Weight (lbs)	14	25	35	39	44	60
Price	$92	$149	$189	$269	$329	$489
Shipping charges	$13	$17	$21	$23	$25	†

†LT810 shipped freight collect.

Multipurpose Instrumentation Amplifier/Tester



This useful circuit tests crystals, generates a 150-mW test signal and amplifies low-level RF voltages when a scope is used. It may also be used to amplify signal energy too weak to trigger a frequency counter.

By Doug DeMaw, W1FB
PO Box 250
Luther, MI 49656

How many times have you tried to measure the operating frequency of oscillators that had insufficient output voltage to provide a frequency count? If you experiment as much as I do, I'm sure this is a common and annoying experience! The same frustrating event is commonplace when trying to use a scope with very low RF voltages. The broadband amplifier in this tester yields roughly 40 dB of gain from LF to VHF, and is reasonably flat (has constant gain) from 250 kHz to 80 MHz. It has a low-Z (50 Ω) and a high-Z (1 MΩ) input jack to permit attachment to high- or low-impedance circuits.

This unit also contains a JFET Pierce oscillator that may be used to test fundamental crystals for activity. Overtone crystals can be checked also, but at their fundamental frequencies. I use this part of the circuit for matching crystal frequencies when I build IF filters. A microammeter is included to provide visual indication of crystal activity.

A switching arrangement allows you to route the crystal oscillator output to the input of the broadband amplifier. I find this feature especially useful when I need to generate a low-level signal up to 150 mW. The broadband amplifier has a gain control that enables me to vary the amplifier output power.

Circuit Details

Fig 1 shows the schematic diagram of my tester. Q1 is switch-selectable by way of S1. Q1 provides a high-impedance input for use when sampling high-impedance circuits. If we were to use J2 for this purpose, the 50-Ω input impedance of Q2 would load the circuit being sampled and disrupt its operation. D1 through D4 are used to protect the JFET in the event too much RF voltage is applied at J1. The Q1 output impedance is set at 56 Ω by means of R4. This provides a match between Q1 and Q2. Q1 serves as an "impedance buffer" between J1 and the low impedance of the base of Q2.

You may question the use of discrete devices for Q2, Q3 and Q4. Shouldn't the more modern MMICs (monolithic microwave integrated circuits) be used for the broadband amplifier? Indeed, they are fine for use in a broadband, 50-Ω amplifier. I chose the transistors in order to make the circuit easier to duplicate without battling potential instability (self-oscillation). Also, MMICs require strip-line PC-board construction, especially for proper VHF and UHF performance. This means that the PC-board foils between the stages should be dimensioned to act as 50-Ω transmission lines. This is not required for the circuit in Fig 1.

Inexperienced builders should have no trouble making this circuit function. The broadband amplifiers use feedback to enhance stability, provide a 50-Ω input characteristic and to keep the gain of each stage relatively constant over a wide frequency range. R11 serves as an amplifier gain control. Circuit boards for this project are available.[1]

[1]Notes appear on page 38.

Q5 is a Pierce crystal oscillator. C19, C22 and C23 are feedback capacitors for ensuring oscillation. C22 and C23 also form a capacitive divider to provide a low-impedance sampling point for the rectifier diodes, D5 and D6. These diodes operate in a voltage-doubler circuit. S3, when set for COUNT, enables us to measure the approximate crystal frequency (dependent upon the load capacitance for which the crystal is made) with a counter at J7 and J8. This is helpful when matching crystals for use in a ladder or lattice filter.

When S3 is in the OSC AMPLIFY position, we can route the oscillator output voltage to the input of Q2. This allows us to generate a crystal-controlled test signal. Output is taken from J4 at up to 150 mW. The output signal will contain substantial harmonic energy, so beware! A 50-Ω low-pass filter can be made easily for use in laundering the amplifier output energy. Normalized filter tables for developing a simple harmonic filter are published in the transmitting chapter of *The ARRL Handbook*, and related material appears in the Electrical Fundamentals chapter.[2]

Fig 1B shows an RF "sniffer" probe that I use for making frequency measurements without a direct connection to an oscillator or low-power amplifier. Do not use this probe in the PA stage of your HF transceiver or linear amplifier! Avoid placing the probe near any high-voltage circuit. The small inductor at the end of the probe cable (L1) is placed near an RF choke or tuned circuit. Use J1 for the probe connection to the tester. A similar probe may be made from a length of RG-174

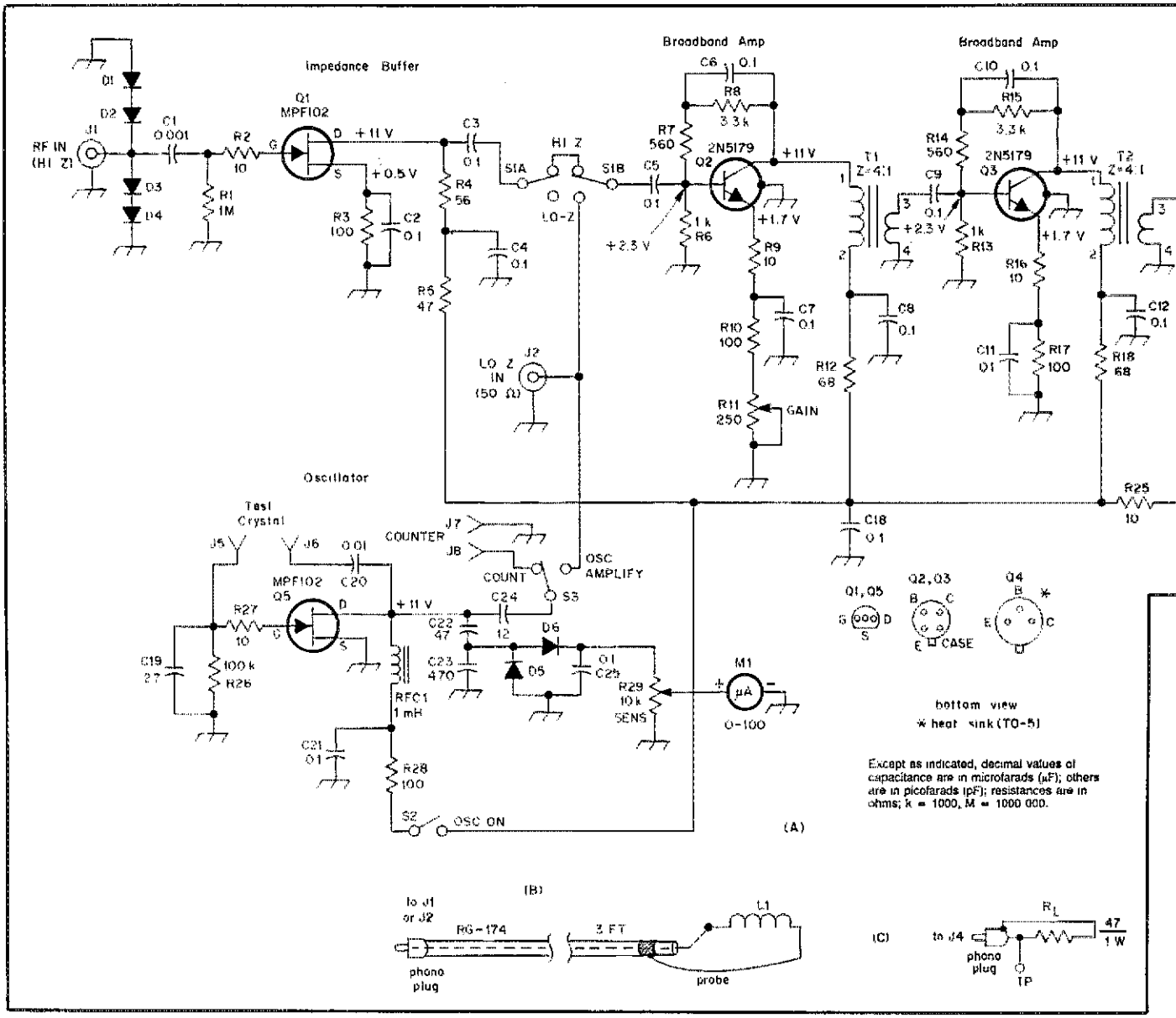


Fig 1—Schematic diagram of the tester. Capacitors are 50- or 100-V disc ceramic or miniature dipped ceramic. C17 is electrolytic or tantalum. Resistors are ¼-W carbon composition except where otherwise indicated. Dc voltages are noted at key points.

D1-D6, incl—Small-signal silicon diode, type 1N914 or equiv.
J1-J4, incl—Single-hole-mount phono jack or jack of builder's choice.
J5, J6—Miniature binding post.
J7, J8—See text.
L1 (Fig 1B)—8 turns of no. 20 enam wire, closely wound, 3/8 inch OD on insulating form.
M1—Dc microammeter, 50 or 100 μA.
R11—Linear-taper, carbon-composition control, panel mount.
S1—DPDT miniature toggle.
S2—SPST miniature toggle.
S3—SPDT miniature toggle.
T1, T2—Broadband transformer. 14 turns of no. 26 enam wire on an FT-37-43 ferrite toroid. Secondary has 7 turns of no. 26 enam wire.
T3—12 turns of no. 24 enam wire on an FT-50-43 ferrite toroid. Secondary has 6 turns of no. 24 enam wire.

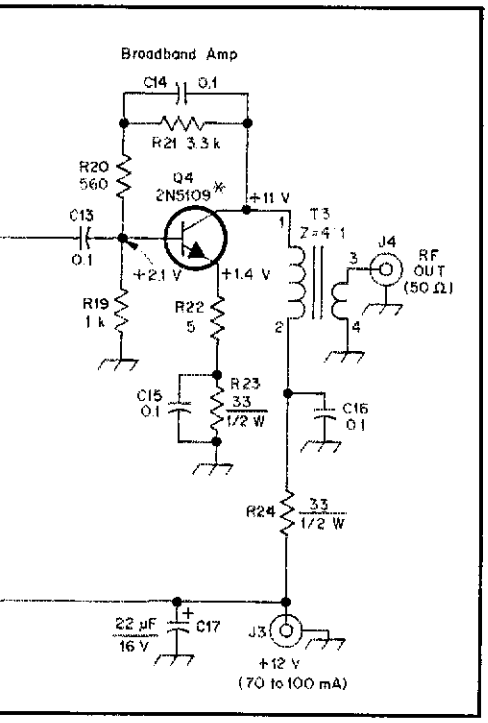
Note: Ferrite toroids are available at Amidon Associates, Palomar Engineers, Radiokit and other outlets. See *QST* ads.

coaxial line. L1 is eliminated and the center conductor of the cable is equipped with a 100-pF capacitor. One lead hooks to the cable and the other capacitor lead is used to probe RF points in the circuit when making frequency measurements. The shield braid of the cable is connected (use an alligator clip) to the ground bus of the circuit being probed. This probe is effective when the inductance probe can't be coupled to an RF choke or a tuned circuit.

Fig 1C shows a dummy load that can be attached to J4 when you want to make frequency measurements at the amplifier output. It may be used also for measuring the RMS or P-P output voltage of the amplifier across a known load. I recommend that this resistive load be connected to J4 at all times when the amplifier is not connected to an external circuit. This will prevent the amplifier from operating without a proper load, which might damage Q4.

Construction Data

Fig 2 shows an interior view of my unit. The title-page photograph provides an exterior view of the tester. Although the front panel is crowded, there is space to spare inside the cabinet. I used a Radio



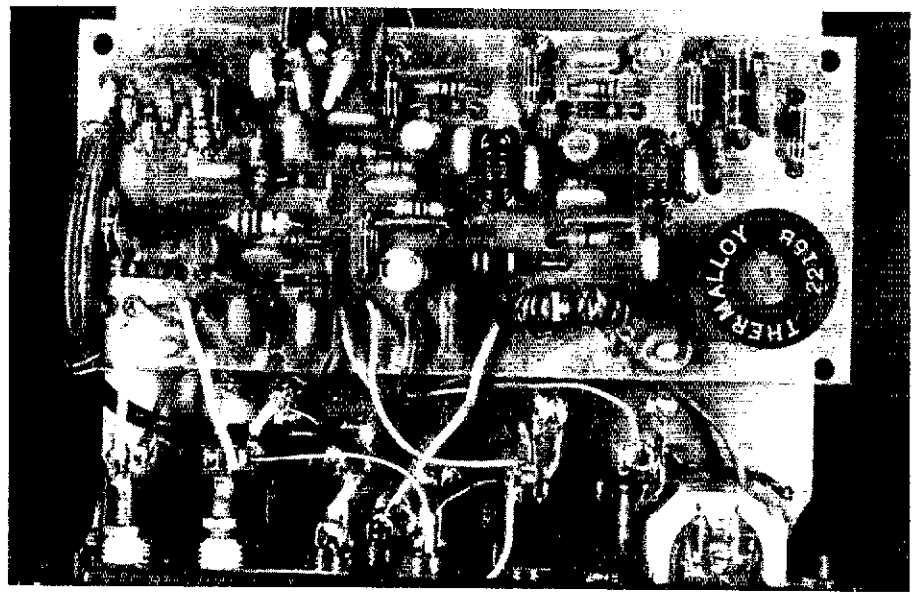


Fig 2—Photograph of the assembled PC board. The broadband transformers are mounted upright. RG-174 coaxial cable is used for the long signal leads (see text). A piece of double-sided PC board serves as the base for the circuit module, which is supported on four metal spacers.

Shack® box that is no longer listed in the catalog. It measures 1½ × 4½ × 4¾ inches (HWD). A Radio Shack cabinet (no. 270-238—3 × 5-1/4 × 5-7/8 inches) will allow plenty of space for this project, plus a small 12-V dc power supply.

Double-sided PC-board material is used to help ensure circuit stability, especially at the upper end of the HF range and at VHF. Mount the PC board on the chassis by using metal spacers. The screws should have lock washers under their heads to prevent loosening later on. Poor ground connections can cause instability and intermittent operation.

If you use a larger cabinet than I did, it will be possible to work with larger jacks, switches and potentiometers. I was forced to use small hardware in order to fit everything on the tiny front panel.

Q4 of Fig 1 needs to have a crown heat sink to ensure cool operation. Any of the small TO-5 types of heat sink are suitable. I allowed sufficient room on the PC board for the larger Thermalloy two-piece heat sink that is visible in Fig 2. Coat the case of Q4 with a thin layer of silicone grease or heat-sink compound before installing the sink.

All signal leads in excess of 1 inch should be made from RG-174 coaxial cable. The shield braid should be grounded at each end of the line. Long, unshielded leads disrupt the line impedance and can cause instability and random signal radiation.

M1 in my tester is a surplus relative indicator that has a 200-µA dc movement. The Q5 oscillator will deflect the needle to ⅓ scale when R29 is set for maximum gain. I have, therefore, specified a 100-µA meter for M1. A 50-µA meter will provide even greater deflection, should you have one on hand. The meter deflection may be increased by making C23 of Fig 1 lower in value. However, the lower the capacitance of C23 the greater the D5-D6 loading effect on the oscillator. Excessive loading can cause the oscillator to stop oscillating.

The press-on white lettering used for the panel labels was applied and then sprayed with clear lacquer prior to mounting the panel hardware. A homemade L bracket is attached to the bottom of the cabinet to raise the front of the instrument. This makes it easier to read the function labels. J7 and J8 (left center of panel) are small Teflon® press-fit, feedthrough bushings. I bought them at a flea market. If you use a larger panel you may prefer to substitute small binding posts for J7 and J8. A ½-inch no. 4-40 screw may be used for J8, since it is only a connection point for circuit ground. BNC connectors, space permitting, represent a better choice than the phono jacks I use on my unit. A physically larger

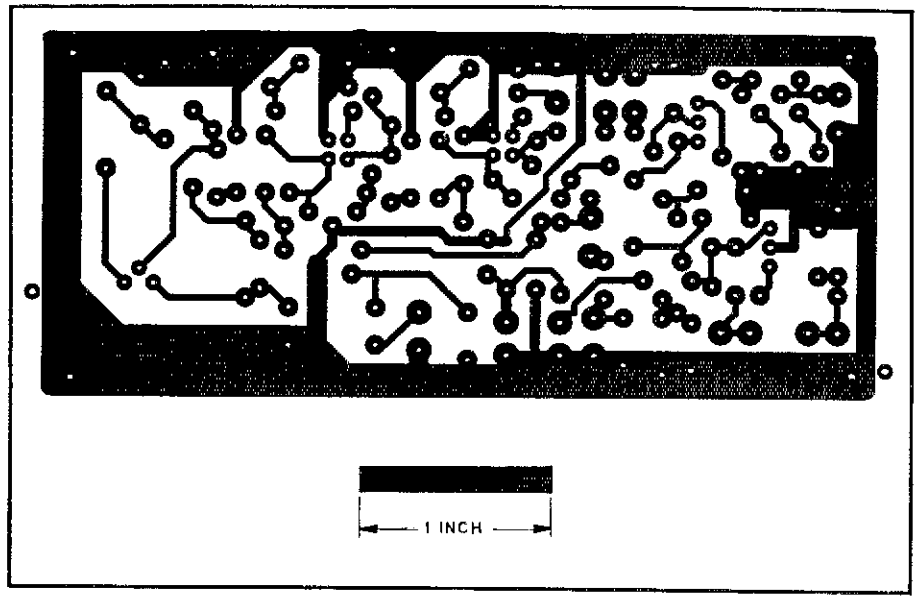


Fig 3—Circuit-board etching pattern for the amplifier/tester. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper.

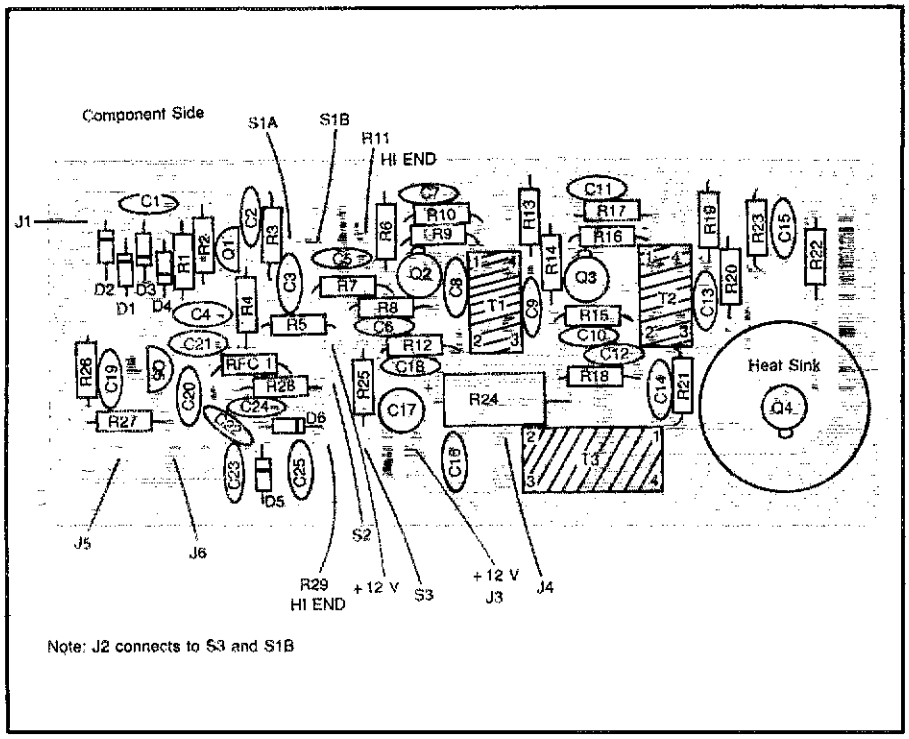


Fig 4—Parts-placement guide for the amplifier/tester, not to scale. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

meter will enhance readability, should that be your preference.

The title-page photograph shows a crystal in a socket that has wire leads attached. You may construct this style of assembly for the various crystal holders in use today. The leads on the crystal socket attach to binding posts J5 and J6.

Closing Thoughts

Figs 3 and 4 provide circuit-board pattern and parts-placement data. You may prefer to use only portions of the Fig 1 circuit, or you may want to make changes or incorporate additional features. If so, you can copy the pertinent parts of the board pattern and integrate them into a layout of your choice. Certainly, there are many variations possible. My circuit was designed for my particular needs. I would be interested in receiving information concerning possible improvements and additions, based on your completed and tested project.

Notes

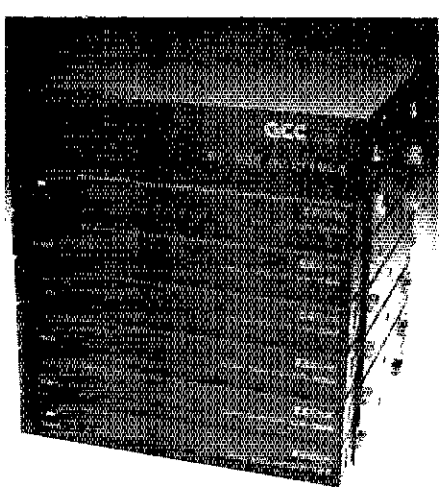
[1]Far Circuits, 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431, evenings. Board price: $12.50 postpaid to US addresses.

[2]*The 1989 ARRL Handbook for the Radio Amateur*, available from ARRL for $21 plus $2.50 shipping and handling, $3.50 for insured parcel post or UPS (please specify), or from your local dealer.

New Products

ACC INTERFACE FOR ICOM IC-900 BAND MODULES

☐ Advanced Computer Controls (ACC) has introduced the FC-900: a device that can be used with some ACC repeater controllers to use IC-900 band units as remote-base and link transceivers. The ICOM fiber-optic controller and interfaces aren't needed—just the band units. DTMF remote-frequency control is available, and amateur bands from 28 to 1300 MHz are supported. Using the FC-900 and ICOM band modules, you can assemble remote bases and links to extend the ranges of repeaters, link repeaters together and so on. Price: $225. An optional, programmable CTCSS encoder is available for $25. Manufacturer: Advanced Computer Controls, Inc, 2356 Walsh Ave, Santa Clara, CA 95051, tel 408-727-3330.—*Rus Healy, NJ2L*

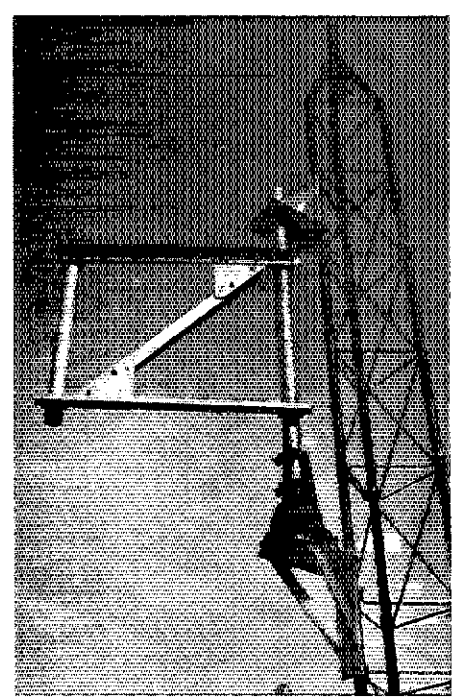


FIRST STEPS IN RADIO: EN FRANÇAIS

☐ Radio Amateur du Québec, Inc (RAQI), has produced a French-language edition of ARRL's popular book, First Steps in Radio, by Doug DeMaw, W1FB. Entitled *Premier Pas en Radio*, the book contains reprints from DeMaw's *QST* series, and is available from ARRL for $8 plus shipping. For more information, contact Publication Sales, ARRL, 225 Main St, Newington, CT 06111, tel 203-666-1541.—*Rus Healy, NJ2L*

ROTATABLE SIDE MOUNT FOR BEAM ANTENNAS

☐ IIX Equipment, Ltd, makes a side mount for rotatable antennas. This heavy-duty mount is completely hot-dip galvanized, allows for 300° of antenna rotation and is provided with a rotator-mounting bracket (drilled for hy-gain® rotators). All necessary hardware is supplied, except for the 2-inch antenna and rotator masts and the rotator. Price: $159.50. Shipping is via UPS. For more information, contact IIX Equipment, Ltd, 4421 W 87th St, Hometown, IL 60456. —*Rus Healy, NJ2L*

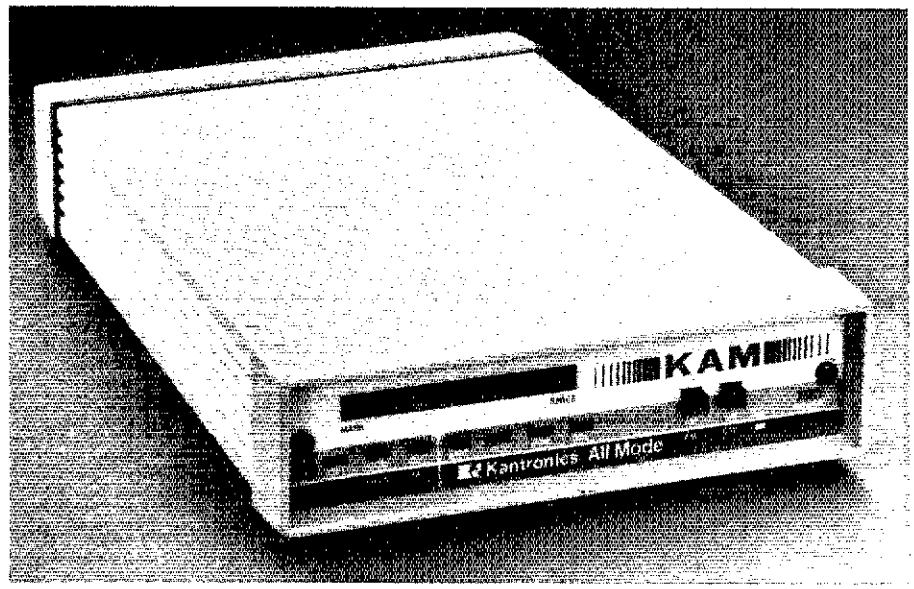


Product Review

Conducted By James W. Healy, NJ2L
Assistant Technical Editor

Kantronics All-Mode™ Communicator

Reviewed by Larry Wolfgang, WA3VIL



What exactly is an all-mode communicator? If you are not familiar with packet radio or other modern digital communications methods, that term might puzzle you. The term *all mode* is even something of a misnomer, because the unit does not have a speech synthesizer or digital voice recorder. It also doesn't send or receive any of the television modes. Still, the KAM™ is quite a powerful device. It is a full-featured packet-radio terminal-node controller (TNC) that includes ports for an HF and a VHF radio.

The TNC includes a personal bulletin board system and a Gateway™ feature that enables the HF and VHF ports to be linked. The KAM sends and receives Baudot, ASCII and AMTOR radioteletype, and Morse code. In addition, the KAM demodulates weather-facsimile signals. (You need a computer program that is able to interpret and display the data in order to see these pictures, however.) The review unit included 32 kbytes of RAM, but did not include the optional battery backup for this RAM.

Table 1

Kantronics All-Mode Communicator, Serial No. 74146

Power requirements: 12 V dc at 300 mA from plug-in transformer (included).

Terminal interface: RS-232-C interface with DB25 connector. (Only six lines are used for the computer connection. Other lines provide an alternative 12-V dc input and mark/space output for an external oscilloscope.) Autobaud data selection rates of 300, 600, 1200, 2400, 4800 and 9600 bauds.

HF radio interface: 8-pin DIN connector provides connections for AFSK output, FSK output, audio input, push-to-talk (PTT) line, key out, ground and squelch.

VHF radio interface: DB9 connector provides connections for AFSK output, PTT line, audio input, ground and squelch. There is also an alternative 12-V dc input line.

Dimensions: 1-3/4 × 5-7/8 × 9 inches (height, width, depth).

The Owner's Manual

Before you attempt to operate a unit like the KAM, read the manual. This 104-page document explains how to make all the appropriate connections, and explains how to use the various operating commands. In addition, there is quite a bit of useful operating information for the various modes. Because the KAM has evolved quite rapidly, there were two update booklets included with the review unit. These booklets cover updates for versions 2.8 through 2.84. Updating earlier KAMs is accomplished by replacing an EPROM. If you are updating an early version of the KAM, you may also have to cut a trace on the circuit board and install a jumper at another place. (The review KAM had the version 2.84 EPROM installed.)

The portions of the owner's manual associated with connecting the KAM to your radios and computer are clear and easy to understand. The discussion of each command and what it does is a bit more complicated if you are not familiar with the commands for a packet-radio TNC. The explanations are quite thorough, however, and I learned a lot about packet-radio operation by reading through this text.

The sections of the manual devoted to operating information contain a lot of good instructions about operating on the various modes. There is at least some bad information as well, however. For example, in the discussion of Gateway operation (a link between the HF and VHF radio ports), the manual correctly states that FCC rules do not permit Gateway operation for unattended station operation. I found no mention that it would be a rules violation to allow HF digipeating with an unattended station without Special Temporary Authority (STA) from the FCC. There is a rather strong warning that "Some amateurs in your VHF local area network may not have operating privileges in the HF band...you must...exclude their use of your system." Actually, a Novice or Technician operator *can* legally use the gateway provided by a higher-class operator to gain access to HF packet-radio operations.

One complaint I might make of the KAM owner's manual is that it is difficult to find a particular piece of information for quick reference. Several times during the review period, I scrambled through the manual to find out how to perform some operation. Having read through the entire manual once, I knew the information I needed was in the book, but if I didn't remember the correct name of the command, I couldn't find the explanation. I'm not sure how the book could be organized better, but this problem is rather frustrating. Eventually, as I became more familiar with the commands and the manual, I was able to find the required information a little faster. There is a lot of information in this manual, and you will refer to it often as you learn to operate the KAM on its various modes.

Getting Ready for Operation

You can select either TTL or RS-232-C signal levels for connection to your computer. The Commodore VIC-20™, C64 and C128 computers require TTL signal levels, and the Apple® II series and IBM® PC and compatible computers require RS-232-C signal levels. You'll need a terminal program for your computer to communicate with the KAM. The manual includes listings of sample BASIC terminal programs for use with several popular computers.

The front panel of the KAM is neatly laid out and simple to understand. Two push-button switches make up the entire comple-

ment of operating controls! One of them turns the KAM on and off; the other (AM/FM) switches limiters into the demodulator for radioteletype reception (FM) or out of the line for CW operation (AM). The AM/FM switch can be in either position for packet-radio operation. One red and three green LEDs indicate the operating conditions on the VHF radio port. One red LED and two green LEDs indicate conditions on the HF port. A green LED on the right side of the unit serves as the power indicator.

Perhaps the most important portion of the front panel is the tuning indicator. This is a row of ten green LEDs that light to show when a signal is tuned properly on the HF port. I'll explain later how this works for each operating mode.

The rear panel is also easy to understand. There is a power connector, a DB9 connector for the VHF radio port, an 8-pin DIN connector for the HF radio port and a DB25 connector for the serial computer interface. The connectors are clearly labeled, and the owner's manual provides full details about wiring them. The KAM comes with cables for each of the KAM's connectors. All you have to provide are the appropriate connectors for your radios and computer.

The HF and VHF Radio Ports

What is the difference between the two radio ports? First, the VHF port is only set up to operate packet radio. The HF port is designed to work on all of the KAM's operating modes. There are also two modems in the KAM, optimized for their specific operations. The VHF modem uses standard Bell 202 tones of 1200 and 2200 Hz, and operates at 1200 bauds.

The HF modem is a versatile unit, with many user-selectable characteristics. You can select standard shifts of 170, 425 or 850 Hz. In addition, you can set the mark and space frequencies to use other shifts. You can set the signaling speed in 1-baud increments, up to 300 bauds. The default settings for HF packet-radio operation are 1600- and 1800-Hz tones, providing a 200-Hz shift, at a signaling rate of 300 bauds.

If there are only two front-panel controls on this piece of equipment, how can you control all of these operating conditions? Answer: software. You issue the various commands from your computer or terminal, and the KAM makes the appropriate changes. Those familiar with the command set of a TAPR TNC 2 will notice that most of the KAM's operating commands are identical to those of a TNC 2. This is not to say that the KAM *is* a TNC 2, however! Some of the commands are different, and the way the KAM performs some packet-radio functions is quite different from a TNC 2. In all, there are 165 commands that control various aspects of the KAM's operation.

Packet-Radio Operation

Most hams who consider purchasing a KAM will be interested in using it on packet radio. The KAM is, primarily, a TNC. I won't go into detail on packet-radio operation, nor on the operating commands for all of the packet-radio parameters. I will discuss some of the unique features of the KAM, however.

Depending on the value set with the MAXUsers command, you can have as many as *26 simultaneous connections* on the VHF port *and* 26 simultaneous connections on the HF port. This would be an interesting experiment! How many different simultaneous conversations can *you* carry on? I had as many as three simultaneous connections, but it gets pretty confusing trying to keep track of which stream each station is on, and switching between streams to transmit to the right person each time.

The operation of the personal packet-radio mailbox is very similar to packet-radio bulletin board stations (PBBS). Although not intended for use as a large community bulletin board station, the Kantronics Personal Packet Mailbox™ provides limited message storage and retrieval. Many of the commands are similar to those used with larger bulletin boards. You can store messages for other stations on the PBBS, and they can read your messages or leave messages for you or other operators. One drawback of this system is that the length of any message that you enter from your terminal is restricted to 255 characters. I found it easier to use another station as a digipeater when I wanted to store a message. I'd connect to the bulletin board in the KAM through the digipeater, just like any other station would. Other functions, such as listing, reading and removing (killing) messages are easily handled directly from your computer or terminal.

Another interesting feature of the KAM is the KA-NODE™. If you aren't familiar with the operation of packet-radio nodes, read on. When you connect to a KA-NODE, the node sends you a short list of commands that you can use to perform certain functions. The CONNECT command allows you to contact another node or station. You can request a list of all other nodes heard using the NODES command. The JHEARD command lists all stations that the KA-NODE has heard.

Perhaps the most powerful command is the XCONNECT command. This command allows transmission on the HF port of a signal received on the VHF port, making use of the KAM's Gateway feature. The Gateway feature can also be used by designating the Gateway (via the secondary-station identifier) as a digipeater for connection to stations on the HF port. (Stations on HF can also use the Gateway to connect to other stations on the VHF port.)

When you connect to a node and then instruct the KAM to connect to another station, you'll get a CONNECTED TO message just as if you had connected through a string of digipeaters. But there's a difference: The node receives your packets and acknowledges correct receipt of them. The node then sends the information to the other station. If the receiving station does not receive the packet correctly, the node retransmits the information. Your station does not have to retransmit the information, however, because the node has already acknowledged correct receipt of the information.

Another packet-radio operating mode is called KISS.[1] In KISS mode, the TNC really only functions as a modem and packet assembler/disassembler. You turn on the KAM's KISS mode by typing KIssmode ON at the cmd: (command) prompt. You must then use the RESet command, or one of several other commands listed in the manual, to begin KISS operation. Turning the KAM off and then on again restores normal operation.

If you issue the PErmanent command after turning KISS mode on, the KAM will only operate in that mode. You'll have to follow the owner's manual instructions to reset the EEPROM using the TEST/NORM jumper on the circuit board to restore normal operation. More information about KISS-mode operation of the KAM is given in the KAM owner's manual.

Some radios (especially hand-held radios with electret-capacitor microphones) require simple interface circuits to allow TNCs to key their push-to-talk (PTT) lines. (See the Kantronics KPC-2400 review in November 1987 *QST* or the ICOM IC-μ2AT review in May 1987 *QST* for examples of simple interface circuits.) The owner's manual describes a simple circuit modification that allows the KAM to work with such radios. This modification involves cutting one circuit trace and installing a jumper. I used the KAM with a Santec 2-meter hand-held transceiver and an Azden PCS-5000 2-meter radio for VHF packet radio. I did not have to provide any different interface circuitry to use either of these radios.

Because VHF/UHF packet-radio operation is effectively channelized (per the ARRL VHF and UHF band plans), there is no need to fine tune VHF and UHF packet-radio signals. Therefore, the KAM's tuning indicator does not operate in this mode. I used the KAM for HF packet-radio operation with a Kenwood TS-140S. The KAM's owner's manual provides all the information needed to connect the KAM to the TS-140S. Tuning of HF packet-radio signals is done by watching the tuning indicator LEDs. When a signal is tuned properly, the far right- and left-hand LEDs light, indicating correct tuning of the mark and space frequencies. I found this indicator easy to use, and it gives a positive indication of proper tuning. HF packet-radio operation is a bit different than that on VHF, mostly because there are more live operators and fewer bulletin-board systems.

To initiate an HF connect request, you have to type the HF stream-switch character, @, along with the letter of one of the active HF streams. Remember, if

[1]KISS stands for that old familiar saying, keep it simple, stupid, and was probably chosen to describe this mode of operation because of its inherent simplicity.—*Ed.*

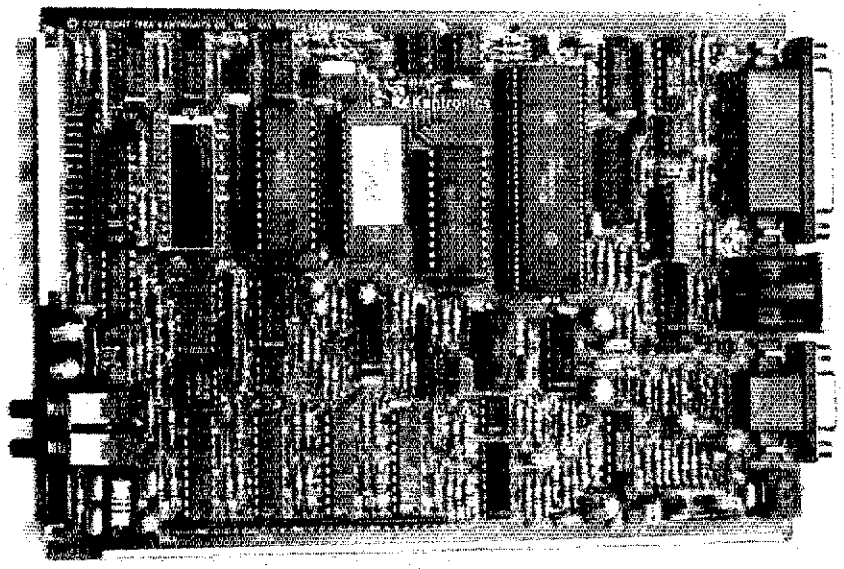


Fig 1—This view of the KAM's PC board shows the front- and rear-panel switches, displays and connections.

MAXUsers is set to something greater than 1, you can have multiple connects. Don't be surprised if someone else connects to your station shortly after you announce, "this is my first HF packet-radio connect!" And, of course, you may get a connection (or several) on VHF at the same time. It can really keep you hopping for a while.

CW Mode

When you change to the CW mode, you can set the KAM's Morse code sending speed to anywhere between 5 and 99 WPM in 1-WPM increments. The sending speed also serves to set the receive speed. The receiving program tracks speed within ±20 WPM of the set sending speed, but the closer you set the receive speed to the speed of the code you are receiving, the faster the program locks on and begins to copy. The KAM copies Farnsworth-spaced CW as letters with spaces between them; it locks onto the character-sending speed, not the word-sending speed. The KAM can't generate Farnsworth-sent CW. I found the KAM's CW mode to be the best machine copying system I have ever used. It is amazing how accurately the KAM copies well-timed CW, even in QRM and QRN.

In addition to the CW sending speed, you can change parameters to set the filter bandwidth, the center frequency of the filter and the way characters are echoed to the screen. The KAM has built-in, user-programmable switched-capacitor CW filters with excellent filtering characteristics. You can easily fine-tune the filters to different radios and operator preferences. You start by setting the filter center frequency to match your radio's CW offset. If you properly tune in a CW signal on your radio, the far-right LED of the KAM tuning indicator should light with each dot or dash. If it doesn't, you can easily change the filter center frequency. Changing it by a few hertz at a time, you can observe some rather dramatic effects.

After you have set the center frequency, you can adjust the filter bandwidth. The narrower you make the bandwidth, the more critical the tuning is, so there are some practical tradeoffs. I was able to get the KAM to copy Morse code through some fairly difficult interference conditions by carefully adjusting the filters. You will probably want to reset the CW bandwidth to a wider value before you leave the CW mode, or you may find that it is almost impossible to tune in another signal later.

The KAM uses a reed relay to ground the key line to your radio. This should work with both positive- and negative-keyed radios. I had the KAM connected to several HF radios, and it worked flawlessly with all but one. For some reason, the relay would not key a Uniden® President™ HR2510 10-meter transceiver. The KAM's schematic shows a 100-Ω resistor in the key line, and I suspect that this resistance prevents the key line from being pulled low enough to key the '2510. It should not be too difficult to build a simple transistor keying circuit to go between the KAM and a radio that needs lower keyed-state resistance than the KAM provides.

One criticism I have about the KAM's CW operation also applies to radioteletype and AMTOR operation. There's no provision for split-screen operation with the KAM. Other Morse and RTTY programs I've used provided a split-screen system in which the received copy is displayed at the top of the screen and the bottom of the screen offers a type-ahead buffer. This does not seem practical with the KAM, however: Either received data continues to be displayed as you type a reply (which causes all the characters to be mixed together on the screen), or display of received data halts when you begin to type a reply. Some terminal programs may be able to provide split-screen operation.

Radioteletype

Baudot and ASCII radioteletype operation at a variety of signaling speeds and frequency shifts is possible with the KAM. You can select any desired signaling rate, in 1-baud increments, up to 500 bauds. You can also select any standard frequency shift; 170, 425 and 850 Hz. If you select the "modem shift," the MARk and SPace commands set the desired mark and space frequencies.

A signal is properly tuned when the far left and right LEDs on the tuning indicator are lit. The biggest problem with receiving radioteletype signals is that several speeds are in fairly common use, and until you've gained some experience with the sounds of these various signals, it is difficult to know what speed to set the KAM to. Some stations also transmit on upper sideband instead of the conventional lower sideband, which results in signals that are "upside down." So there are a few variables that all have to be correct before you get readable copy on your screen. Once you've found the right combination for a given signal, though, the KAM does an excellent job of copying, even through fairly deep fades and some interference.

Fourteen KAM commands control various RTTY operating parameters, such as the signaling rate, the addition of automatic carriage returns and line feeds, and the autostart feature. With AUTOStart on, the unit only responds to RTTY signals that are preceded with the call sign set in MYcall. A series of four *N*s to signify "end of message" turns the unit off again, as does more than 30 seconds of inactivity.

The owner's manual incorrectly states that HF RTTY produced by feeding audio tones into the microphone input of an SSB transceiver is audio-frequency-shift keying (AFSK). (The designator for this emission is F2B.) Actually, F2B is only permitted above 50 MHz. When frequency-shift-keyed audio tones are fed into an SSB rig, frequency-shift keying (FSK) is produced. This emission is J2B and is identical to F1B, which *is* permitted at HF.

AMTOR

AMTOR operation is fairly straightforward with the KAM. AMTOR is a form of RTTY, and the same commands control basic AMTOR operating parameters as are used for Baudot and ASCII RTTY. The owner's manual includes basic operating suggestions that will get you started. AMTOR provides virtually error-free communications, and I find it to be a *fun* mode.

If AUTOStart is set to on, the KAM responds only to AMTOR signals that are preceded with the selective calling identifier (usually known as a *selcall*) set with the MYSelcall command. This autostart opera-

(continued on page 62)

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

FINE TUNE THE SPEED OF YOUR YAESU FT-757GX TRANSCEIVER'S INTERNAL KEYER

☐ The FT-757's keyer SPEED slide control is difficult to use because it crams the keyer's 5- to 30-WPM range into only 3/8 inch of travel. The 757's SPEED control is also quite nonlinear, covering the range from 20 to 30 WPM in the last fraction of its travel. Here's my solution to these problems—and how I modified the FT-757GX's keyer-speed-control circuit for operation at speeds higher than 30 WPM.

Investigation of the FT-757GX schematic shows an 82-kΩ resistor in series with the speed-control line. This resistance sets the maximum keying speed: The lower the resistance, the higher the maximum keying speed. I decided to increase my 757's maximum keyer speed by bridging a resistor across the 82-kΩ unit.

Implementing a fine-resolution SPEED control is easy, too. Because I rarely use the 757's noise blanker at my location, I decided to rewire its NB control to act as a FINE KEYER SPEED control and retain the slide SPEED control for coarse speed adjustments.

You can do either or both of these modifications. You'll need a Phillips screwdriver for the FT-757's cabinet screws; a low-wattage soldering iron with a small tip; solder; needle-nose pliers; two feet of light-gage, stranded, insulated hookup wire; and plastic tape suitable for insulating splices in light-gage wire.

1) *Open the cabinet.* Remove the four screws that hold the top half of the radio to the main chassis. Gently raise the front of this assembly until you can reach and unplug the speaker leads. (A third hand is helpful here.) Lay the top half upside-down behind the bottom half of the transceiver, being careful not to strain the wires that connect the two sections. (If you don't want to increase the maximum keyer speed, skip the next step and go to step 3.)

2) *Increase the maximum keyer speed.* Remove the 11 screws that hold the sheet-metal shield to the top section of the transceiver. Lift the adhesive-backed padding that holds several small wires to this shield; then, remove the shield and set it to one side. You now have access to the keyer circuit board (mounted right below the speaker). Locate R08, an 82-kΩ resistor, on the circuit board. Tack-solder a high-value resistor across R08 to raise the maximum keyer speed. (In my transceiver, paralleling a 100-kΩ resistor with R08 gave a maximum speed of somewhat more than 60 WPM; a 1-MΩ resistor gave a maximum speed of about 42 WPM.)

After you've completed this step, replace the shield, taking care not to pinch any wires. (If you want only to increase your FT-757's maximum keyer speed, reassemble the transceiver now. If you want to rewire the '757's NB control as a fine-resolution SPEED control, proceed to step 3.)

3) *Turn the NB control into a fine-resolution SPEED control.* The small yellow wire that comes from the keyer PC board is the speed-control line. Unsolder it from the SPEED-control PC board, solder a 1-ft length of hookup wire to the yellow wire, and insulate the splice. Strip 1/8 inch of insulation from the free end of the extension wire. We'll call this W1 from now on.

Solder a 1-ft length of light-gage stranded wire to the SPEED-control-board terminal where the yellow wire had been connected. Strip 1/8 inch of insulation from the free end of this wire, and mark it W2 for later reference.

4) *Reassemble the top part of the transceiver.* Carefully lower the upper section of the transceiver into place, reconnecting the speaker leads as you do. At the same time, feed W1 and W2 between the lower circuit boards and the FT-757's front panel. With the top section back in place, replace the four mounting screws that you removed in step 1 (the two longer screws go in the back). You've completed the hard part of the modification; the rest is a piece of cake.

5) *Connect the NB control into the keyer-speed-control line.* Place the transceiver upside-down with its front panel facing away from you. Remove the eight screws that hold the bottom cover in place. Grasping the rig's carrying strap with one hand and steadying the rig with the other hand, remove the cover by gently pulling out and up on the strap as if the cover were hinged on the opposite side. Set the cover aside.

The PC board visible with the cover off is the RF Unit. Locate J06—a small, plastic, two-conductor jack mounted near the edge of the RF Unit, just behind and between the '757's headphone jack and MODE switch. Its accompanying plug terminates two wires; one wire is brown, the other, red. Carefully remove the plug from J06 by pulling on the plug body and not the wires. Locate W1 and W2, and pull them toward the plug until they just reach it.

Assuming that you want your FT-757's keyer speed to increase with clockwise rotation of the control, insert W1 into the brown-wire socket of the J06 plug. Insert W2 into the red-wire socket of the plug. (Lightly tin the ends of W1 and W2 if the wire you used isn't stiff enough for insertion into the J06 plug.) Once you've made these connections, tape the plug, W1 and W2 together so they won't come apart, and tuck them out of harm's way.

6) *Jumper the noise-blanker level-control circuit to minimum.* Short J06's two recessed pins by wrapping light-gage bare wire around them. (I used needle-nose pliers to do this; a wire-wrapping tool might be better.) Place a small piece of insulating tape over J06 when you're done; this will keep the jumper from coming loose and causing a short circuit in the transceiver circuitry.

7) *Try out the modification(s).* Using the coarse and fine keyer SPEED controls is easy: Just set the original SPEED control to the approximate speed you want and make fine adjustments with the NB control. Because I like to know my approximate sending speed, I calibrated my '757's FINE KEYER SPEED née NB control for a speed of 30 WPM at 12 o'clock by using computer-generated code as a standard. Calibrated in this way, my FT-757's FINE KEYER SPEED control allows me to vary the keyer speed from about 18 to 42 WPM—and the hash marks around the control skirt correspond to keyer-speed increments of about 2.5 WPM.—*Roger Burch, WF4N, Rte 3, Box 235, Central City, KY 42330*

DOES YOUR SOLID-STATE TRANSCEIVER REDUCE ITS OUTPUT POWER WITH RISING SWR *BECAUSE* IT'S SOLID-STATE?

☐ You've probably heard that, in general, amplifiers, transmitters and transceivers that use vacuum-tube RF power amplifiers "don't care" what SWR they operate into. You've probably also heard that commercially manufactured, solid-state, Amateur Radio amplifiers, transmitters and transceivers reduce their output power as SWR rises. In print, at club meetings and on the air, the story seems to be that solid-state gear "has a problem with SWR" and vacuum-tube gear doesn't. What gives? How much of solid-state gear's famed inability to deal with rising SWR is myth, and how much of it is fact? What does tube gear have that solid-state gear doesn't?

Fact: *Whether or not a transceiver or transmitter reduces its output power in response to rising SWR is not* necessarily *related to the type of active device used in its final amplifier stage.* Many current, commercially manufactured Amateur Radio transceivers *do* reduce their output power in response to rising SWR. This feature is generally built into the RF power amplifier section of amplifiers, transmitters and transceivers that use *bipolar junction transistors (BJTs)* as RF power amplifiers.

BJTs require such protection if they cannot tolerate the collector-voltage peaks that can occur in the presence of significant load mismatches. The BJTs used as final RF power amplifiers in today's commercially manufactured Amateur Radio gear generally require such protection.

SWR-driven output-power-reduction circuitry is not always *necessary when solid-state devices are used as final RF power amplifiers.* A bipolar junction transistor operated at a collector supply that is sufficiently low relative to its maximum-collector-voltage rating may not need load-mismatch protection. (And BJTs can be protected against load-mismatch-related overvoltage by means other than SWR-driven power reduction, such as power-supply current limiting or a Zener diode connected between the final-amplifier collector[s] and ground.) RF power MOSFETs are generally *immune* to load-mismatch-related damage if properly applied. *Solid-state transmitters that reduce their output power in response to rising SWR do so because of the presence of SWR-driven power-reduction circuitry, not because solid-state devices are used in their finals.*

Fact: *Many transmitters that use vacuum tubes as output amplifiers contain SWR-driven final-amplifier-protection circuitry.* Such circuitry is *common* in broadcast transmitters, for instance, regardless of whether solid-state or thermionic devices are used in the RF output stage. *Vacuum-tube transmitters that reduce their output power in response to rising SWR do so because of the presence of SWR-driven power-reduction circuitry, not because thermionic devices are used in their finals.*

If you're sufficiently convinced that the presence of SWR-driven "power foldback"—as it's sometimes known in telecommunications jargon—is not necessarily related to the type of device used in a transmitter's output stage, we're in a position to explode another myth: The belief that vacuum-tube-final transmitters and transceivers are generally able to work into a wider range of output impedances than modern solid-state gear *because they use vacuum-tube finals.* Yes, many recent, commercially manufactured, tube-final Amateur Radio amplifiers, transmitters and transceivers *are* capable of operating into load impedances somewhat above and below 50 Ω even in the absence of an external matching network, *but this is so only because the impedance-transformation ratio of the output network in such equipment is designed to be adjusted by the operator.* Most current, commercially manufactured Amateur Radio transceivers are designed to operate into a 50-Ω RF load *only;* some current transceivers include antenna tuners to get around this limitation. That such equipment tends to be solid-state is incidental. (Radio amateurs who remember the Heath® HW-16 CW transceiver, for instance, may recall that the HW-16 was designed to operate into an RF load impedance of 50 Ω *only;* the HW-16 had a vacuum-tube final.)

I can't resist blowing up a related myth: That only solid-state circuitry is capable of "broadbandedness," that transistors are the key to achieving a "no-tune" transmitter.[1] Several transmitters manufactured in the 1950s by Central Electronics, for instance, could be operated in a broadband mode—and some current commercially manufactured, vacuum-tube-based external power amplifiers feature broadband output-network tuning. *Vacuum-tube-final Amateur Radio transceivers, amplifiers and transmitters capable of working into a range of RF load impedances can do so only because they have been designed to do so, not because they use thermionic output devices.—AK7M*

MORE ON A CHEAP, CRUSHPROOF CARRIER FOR DXPEDITION ANTENNAS

☐ Concerning Tom Frenaye's antenna carrier ("A Cheap, Crushproof Carrier for DXpedition Antennas," *QST*, May 1988, p 41), I offer these suggestions:

Domestic airlines limit baggage length to 6 ft, but, having flown the Pacific carriers, I caution that:

1) International flights generally accommodate only *two* pieces of baggage;

2) *Total* dimensions of *both* pieces cannot exceed 107 inches (width + height + length); and

3) Neither of the two pieces can exceed 64 inches (so 6-ft pieces are *out*).

I use PVC-pipe antenna carriers on all of my DXpeditions, and suggest using 6-inch-OD pipe 52 inches long (for a total carrier length of 64 inches) to be safe. A 6-inch-OD carrier can contain a three-element beam if you carry the beam traps, mounting plate and guys in your second piece of luggage. (You can remove manufacturer's lettering from PVC pipe with acetone, by the way. Also, it may be worth your while to ask around at building sites for carrier material; you may be able to obtain usable scrap pipe free of charge.)

Instead of pipe end caps, I seal my antenna carrier with ¾-inch-thick plywood disks and self-tapping screws. These add strength to the assembly and reduce its weight over that of a pipe-cap-sealed version.

To make the carrier more "carryable," attach an inexpensive luggage handle (or a piece of rope) to the carrier with stainless-steel hose clamps. If you expect to walk a considerable distance with the carrier, carry a suitable shoulder strap in your luggage and attach it to the carrier as appropriate.—*James Sansoterra, K8JRK, 801 S Oxford, Grosse Pointe Woods, Detroit, MI 48236*

AK7M: A call to ARRL's travel agency netted the following: Although the "no more than two pieces" limitation is more or less standard for international flights, baggage size and weight limitations may vary with the carrier and route, and with the aircraft used. Bottom line: If you're planning a DXpedition, work closely with your travel agent to be sure you can bring the gear you need.

EASIER BNC- AND N-CONNECTOR INSTALLATION

☐ Getting all the cable-shield wires through the clamp can be difficult during installation of BNC and N connectors; usually, a few braid wires end up getting squashed under the clamp. Solution: Hold the wires down by wrapping them with electrical tape. Don't tape beyond the braid wires onto the coax outer jacket; just tape the braid itself.—*Zack Lau, KH6CP, ARRL Laboratory Engineer*

HOW TO STRIP LIGHT-GAGE ENAMELED WIRE

☐ The small wire wheels available for hobby motor tools can be used to "skin" small-diameter stranded wires. (Standard, designed-for-application skinning devices are apt to break or cut some strands.) Simply place the wire up against a fairly hard surface (a block of wood will do) and wire-brush the insulation off.—*Willard Bridgham, W1WF, Box 103, Windsor, MA 01270*

REDUCING THE CHANCE OF GENERATOR FIRE ON FIELD DAY

☐ Don't refuel a running generator without taking special precautions. Gasoline's ignition temperature is low enough for a fuel spill on a running engine to result in disaster for the engine and the person filling the fuel tank!

Falmouth Amateur Radio Association member Jim Leavitt, KC1KM, suggests this means of keeping gasoline-driven generators fire-free on Field Day: Remove the generator fuel tank from the engine and mount it on a stanchion at a distance from the generator. Run a hose (rated to carry gasoline) between the tank and generator. For added safety, equip the hose with a drip loop at the tank, mark the hose with ribbons at intervals, and ensure that no one can trip over or walk into the hose. Have another club member stand ready with a fire extinguisher when the tank is refueled—and don't refuel the generator alone, or when you're tired or sleepy.—*James J. Priestly, KA1LIK, ARRL PIA, 55 Neshobe Rd, New Seabury, MA 02649*

[1] *No-tune* and *automatically tuned* are gradually coming to mean the same thing—probably because more and more "no-tune" gear includes automatic antenna tuners—but (in Amateur Radio parlance, at least) *no-tune* seems to have started out life as a synonym for *broadband* or *broadbanded.* I use *no-tune* as a synonym for *broadband* or *broadbanded,* not *automatically tuned.*

USING SOLID-STATE TRANSCEIVERS WITH UNTUNED-INPUT AMPLIFIERS

☐ The untuned input circuit of my Dentron Clipperton L amplifier caused my new transceiver's SWR-driven final- amplifier-protection circuitry to significantly reduce the transceiver's output on all bands. The problem was so bad that I couldn't use the amplifier *at all* on 10 meters. (The transceiver, a Kenwood TS-930S, contains an automatic antenna tuner, but the amplifier input impedance is evidently outside the tuner's matching range.)

To solve this problem, I installed a homemade pi matching network (two variable capacitors and a roller inductor) in the coax line between the transceiver and the amplifier as shown in Fig 1. (My station already included a matching network between the antenna and the amplifier [between the antenna and the transceiver with the amplifier off-line]. I'll refer to the antenna-to-amplifier matching network as Network 1 from now on. The transceiver-to-amplifier network will be referred to as Network 2.) Properly adjusted, this network allows the TS-930S to drive the Clipperton on all of my bands of interest, including 10 meters. (The TS-930's ability to meter output power and SWR is something new to me. If you use an amplifier, and you've never monitored the SWR between your exciter and amplifier with the amplifier operating, you may be in for a big surprise! From now on, I'll refer to SWR Meter between the amplifier and antenna as SWR Meter 1; the transceiver SWR meter is SWR Meter 2.) I ran a series of tests to find the necessary settings for Networks 1 and 2, and recorded these settings for later reference. Now I can change bands quickly without on-air testings by presetting the matching networks to the recorded values.

Smooth amplifier in/out switching was my next concern. I couldn't just leave both networks in the line at all times; switching the amplifier off-line connects both networks in series and allows them to interact. To get around this, I modified the Clipperton L amplifier as shown in Fig 2 and connected Network 2 as indicated. Now, Network 2 is used only to match the transceiver to the amplifier. At other times—during receive when the amplifier is in line, and during transmit *and* receive when the transceiver is used on its own—only Network 1 is present between the antenna and the transceiver.

I adjust the system for equal SWR in the "amplifier in" and "amplifier out" modes as follows: With the amplifier switched off and the transceiver producing about 30 W output, adjust Network 1 for minimum SWR as indicated by SWR meter 1. Turn on the amplifier and tune it up at reduced output power. Adjust Network 2 for minimum SWR as indicated by SWR meter 2.

A closing speculation: Some vacuum-tube power amplifiers include grid-current metering. Grid current can serve as an indication of drive, but I don't think it can reveal conditions of unacceptably high amplifier-input SWR. Reason: Even though the impedance of my Clipperton L's input circuit is not 50 Ω, I had no trouble driving the amplifier sufficiently—as indicated by grid current—with TS-520S and -820S transceivers.—*Martin L. Cardwell, NB3T, 4600 White Ave, Baltimore, MD 21206*

AK7M: Martin is right. The presence of rated grid current in an amplifier tube indicates only that the tube is receiving enough drive to cause that grid current to flow. How well the tube is matched to its driver must be determined by other means.

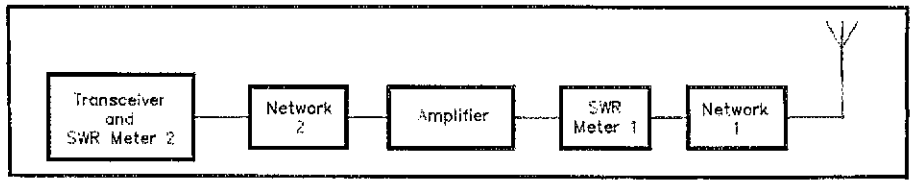


Fig 1—Martin Cardwell's addition of a transceiver-to-amplifier matching network (Network 2) to his station cured problems related to impedance mismatch between his transceiver and untuned-input amplifier. Network 1 matches the antenna to the amplifier output or the transceiver's antenna input. This arrangement is somewhat inconvenient because Network 2 must be switched out of the line when the antenna is to be connected directly to the transceiver. Martin solved this problem by modifying his amplifier and reconnecting Network 2 as shown in Fig 2.

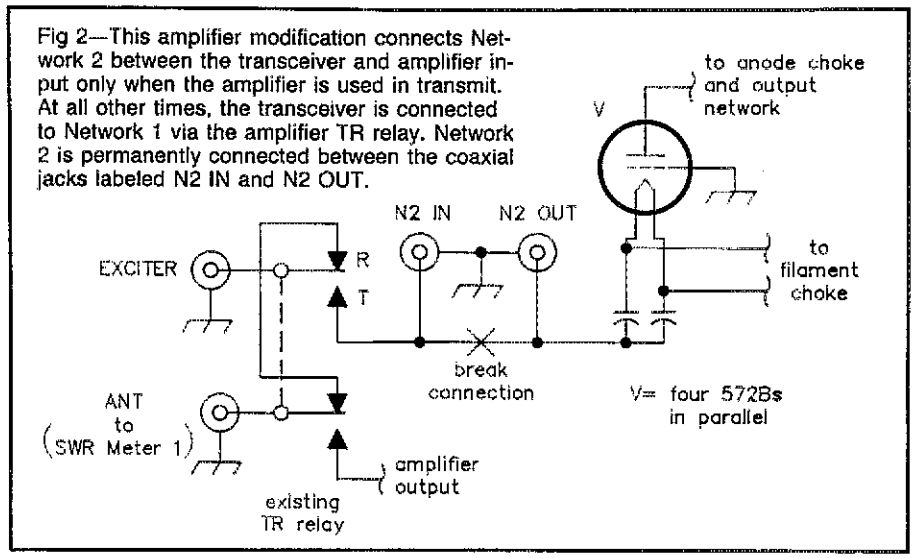


Fig 2—This amplifier modification connects Network 2 between the transceiver and amplifier input only when the amplifier is used in transmit. At all other times, the transceiver is connected to Network 1 via the amplifier TR relay. Network 2 is permanently connected between the coaxial jacks labeled N2 IN and N2 OUT.

GARAGE-DOOR-OPENER RFI

☐ The other day, my neighbor called me over the back fence and told me that he was having a problem with his automatic garage-door opener (an Ultra Life Model 800): It was opening and closing without him giving it any commands. Even though a serviceman had been out several times and had changed the opener unit, the problem persisted.

When my neighbor told me the time of day and night the door operated on its own, I was almost sure that *my transmitter* was the cause. I contacted my radio club's RFI group—of which I'm a member!—and scheduled some interference tests. In the meantime, I checked my local library for information on garage-door openers. No luck.

Inspecting my neighbor's door opener, I discovered the problem quickly: Almost 30 ft of wire connected a push button at the garage door to the opener. This long stretch of wire acted as an antenna, picking up enough energy at 14 MHz to cause false triggering of the door-opener control circuitry. (My antenna is about 70 ft from the affected garage-door opener. The interference occurred only when I operated at the maximum legal Amateur Radio power limit with my beam pointed toward the door opener.) I solved the problem by connecting a 125-pF mica capacitor across the opener's switch terminals. This capacitor exhibits a low enough reactance at 14 MHz to short circuit the switch terminals for RF and stop false triggering.

In a spirit of cooperation, and hoping that my information might be of use to others, I wrote the garage-door-opener manufacturer, telling of the problem and how we cured it. (Surprisingly, my collection of RFI-proofing literature contained nothing on an interference fix of this kind.) Last, but not least, the Lee De Forest Radio Club got some good publicity for its fast action in solving the problem.—*K. C. Jones, W6OB, 25085 Howard Dr, Hemet, CA 92344*

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Associate Technical Editor

HARMONIC ATTENUATION OF TRANSMATCHES

☐ High on the circuits wish list of many radio amateurs is a Transmatch that has low loss and offers high harmonic attenuation. But achieving high harmonic attenuation in a Transmatch is not as easy as one may first think.

Suppose you know the precise load impedance at a particular operating frequency and adjust your Transmatch appropriately. Assuming you dislike resistive matching and use only capacitors, inductors and transformers in the matching network, you can calculate the impedance presented to the load by the Transmatch/transmitter combination. Merely by making the load have a complex conjugate impedance at all the harmonic frequencies, the harmonic attenuation will be zero. This, of course, is the worst case. However, this situation is quite realistic because the impedance presented to the Transmatch at the harmonic frequencies is usually unknown to the Transmatch designer. You *could* design Transmatches for use with particular antennas, but who wants to build a Transmatch for *each* antenna?

This train of thought also applies to typical low-pass filters. Most low-pass filters are meant to operate with 50-ohm input and output impedances. With a high SWR at the harmonic frequencies, the filter performance won't be the same as it is under ideal laboratory conditions. (This explains why low-pass filters don't seem to work in some cases.) At this point, things may appear pretty bleak for ensuring that minimal harmonic energy gets to the antenna.

The solution is to go back to the basic assumptions and change them. By using resistive elements, it's possible to design a filter that will actually dissipate harmonics as heat.[1] For those of you interested in designing such a filter, the topic of diplexer networks may be worth investigating.

One can argue that a Transmatch can be designed to include traps to present infinite impedances at the harmonic frequencies. But the number of traps required would be prohibitive. And—what do you do when you change frequencies?

Actually, with most modern rigs, just obtaining a load that looks like a dummy load at all the harmonic frequencies may be all that is needed. Most modern transceivers I've used show excellent harmonic attenuation when their output is fed into the attenuators used at the ARRL lab.

By concentrating on the true purpose of Transmatches—that of obtaining the largest desired-signal power transfer possible, perhaps better Transmatch designs will be used. Usually, these efficient designs put the least electrical stress on components, allowing the use of cheaper components for a given power level. (Not everyone can afford 15-kV vacuum-variable capacitors!) I prefer to use the simple L network, which uses just one coil and capacitor, and can match any HF antenna —provided you can come up with practical components to match the (sometimes unwieldy) values required for L-network impedance transformation. Networks that use many parts may support circulating currents that put more stress on the components. Because such designs often allow more easily realizable component values, they may be more practical in some situations.—*Zachary Lau, KH6CP, ARRL Lab Engineer*

[1]B. Hale, ed., *The 1989 ARRL Handbook*, (Newington: ARRL), "An Absorptive Filter," p 40-9 to 40-10.

HOW ABOUT A REAL NOISE BLANKER?

☐ As a former design engineer for Hallicrafters (back in the 40s and 50s), I'd like to address a problem I find in today's modern transceivers—a problem we solved years ago: the inclusion of a *real* noise-suppression circuit.

I own a Kenwood TS-430S, and I used to own a Yaesu FT-757GX. Both transceivers have the same problem—the noise blanker, limiter, clipper or whatever they call it —doesn't do much to eliminate line noise. I'm talking about the noise generated from high-tension lines (220 kV to 440 kV). My station is located about 250 feet away from such a high-tension tower, and my line noise is a steady 30 dB over S9, on all bands. Only loud signals make it through!

Years ago, Hallicrafters developed a noise limiter for use in the SX-101 receiver. That noise limiter—a series-shunt circuit —practically eliminated such line noise, yet S2 CW signals were readable. Surely, modern engineers could put (on a chip) the equivalent of a Lamb noise silencer, or a circuit similar to the one in the SX-101. —*Clarence N. Zornes, W9TAL, 7432 Wheeler Dr, Orland Park, IL 60462*

KENWOOD TS-140S SIDETONE

☐ I recently purchased a Kenwood TS-140S. After using it on CW for about a week, I decided to try it on SSB and AM. When I pushed the AM and SSB mode switches, I heard a constant audio tone emanating from the rig. As I disconnected the rig—preparing to return it to the factory—the tone stopped. Investigating the circuit diagram, I noted that the CW key has to be unplugged to kill the sidetone. There is no mention of this in the instruction manual. Perhaps my experience may save others the frustration I encountered.

Also, amateurs should pay attention to the proper use of receiver noise blankers. I know of instances where operators were handing out reports of distorted signals to others, only to discover that it was their improper use of the receiver noise blanker that was producing the distortion.—*Ed Marriner, W6XM, 528 Colima St, La Jolla, CA 92037*

READ THE LABEL—REVISITED

☐ In response to the article "Read the Label,"[2] I can say I discovered, in much the same manner as Eddie, that WD-40® can spell disaster if used improperly. Well, I found a solution: a product called LPS1® greaseless lubricant. I have used LPS1 in automotive distributors, high-voltage switches, etc, and I've never had a problem yet!

I suggest that anyone needing a lubricant that will be used in an electrical environment not be caught without LPS1! The company makes LPS® contact cleaner, LPS1 greaseless lubricant, LPS2® general-purpose lubricant and LPS3® heavy-duty rust inhibitor!—*Nicholas L. DeCarlo, PO Box 534, Park Rapids, MN 56470*

[According to a manufacturer's representative, these products are available from industrial, automotive, aviation and electrical supply houses. Only authorized distributors may order directly from the manufacturer, and a minimum order of six cases is required. For more information, contact the Holt Lloyd Corporation, LPS Laboratories, Inc, 4647 Hugh Howell Rd, PO Box 105052, Tucker, GA 30084, tel 800-241-8334, or 404-934-7800.—*Ed.*]

TR-5 MODIFICATIONS

☐ I own a Drake TR-5 transceiver, which is basically a fine piece of equipment; it does have some shortcomings, however. There are a significant number of birdies in the receiver, there's no way to properly spot another station when operating CW, and when operating RTTY with the transceiver's mode switch in the LSB position, the 500-Hz CW filter can be inserted, but the TR-5's LSB BFO-frequency-to-IF relationship does not allow recovery of mark and space signals at their

[2]E. Bertram, "Read the Label," Technical Correspondence, *QST*, Feb 1989, p 47.

standard frequencies (2125 and 2295 Hz, respectively) when this is done.

I've performed some modifications to my TR-5 that eliminate many (not all) of the birdies. I've modified the BFO circuit so that I can spot a CW station and can use the 500-Hz CW filter with the high-frequency tones when operating RTTY.

I'm willing to send the modification information to anyone interested. Please include a business-size SASE.—*Clifford J. Appel, WB6AWM/7, PO Box 241, Electric City, WA 99123*

Table 1

Formulas for Calculating Wire Diameter

GAGE = INTEGER ((LOG(325) − LOG(DIAMETER)) / LOG(1.123)) (Eq 1)

DIAMETER = 325 / 1.123 ^ GAGE (Eq 2)

where the diameter is expressed in mils, or 1/1000 of an inch. If you're working in millimeters, the formulas become

GAGE = INTEGER ((LOG(8.225) − LOG(DIAMETER)) / LOG(1.123)) (Eq 3)

DIAMETER = 8.225 / 1/1.123 ^ GAGE (Eq 4)

CALCULATING WIRE DIAMETER

☐ In writing computer programs, I've struggled for years with the problem of coming up with an algorithm for determining wire size from a calculated wire diameter. All of my efforts resulted in programs that were cluttered with wire tables to make conversions from wire size to diameter and vice versa. After much research, I've found the simple relationship between wire size and diameter. This relationship was found, not in any electrical text, but in a *mechanical* engineering book. The electrical handbooks gave tables only (many of them inaccurately stated), and not basic relationships.

In a wire table, the diameter changes by a factor of 1.123 from one wire size (gage) to the next. The starting diameter corresponds to size 0000. This is not an easy number to use in computer programs, and too large a size for most amateur use. Therefore, I started with size 0, which is 0.325 inch, or 325 mils, in diameter. These two factors, starting diameter and ratio, form the basis of the formulas shown in Table 1.

These formulas are valid for American Wire Gage (formerly Brown and Sharp) gages 0 to 40. It makes no difference if your computer or calculator uses logarithms to the base 10 or base E, as the logs are for ratio calculation only.

Note: The wire sizes are for bare copper wire at 20 °C, and do not account for insulation thickness, if any. Insulation thickness varies too widely among wire types and manufacturers to include such variations in the calculation. For insurance, use one wire size smaller for closely wound coils.

I used 20 °C as a standard temperature because this figure is used in most scientific work as a reference. It seems that it is relatively common engineering practice to use 25 °C as a reference, perhaps because it is closer to everyday application temperature. The resistance of copper changes linearly with temperature over the range of 0 °C to 100 °C.[3] The change of resistance from t_1 to t_2 is given as:

$$R_{t2} - R_{t1} ((-T_0 + t_2) / (-T_0 + t_1)) \quad \text{(Eq 5)}$$

where T_0 is the temperature of zero resistance, −234.5 °C for copper. From this expression, the change in resistance of a copper wire is calculated to be 0.39292% per °C.—*Allen B. Harbach, WA4DRU, 2318 S Country Club Rd, Melbourne, FL 32901*

[3]A. Gray and G. Wallace, *Principles and Practice of Electrical Engineering* 6th ed (New York: McGraw-Hill, 1947), pp 29-30.

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

New Products

UNIDEN PRESIDENT HR2600

☐ Uniden® has introduced the President™ HR2600, a ten-meter mobile transceiver based on, and offering several improvements over, the popular HR2510 (see Product Review, May 1989 *QST*). The '2600's features include an 800-Hz CW offset, selectable FM-repeater offset, shorter semi-break-in delay, switchable RIT with a center-detented control and a CTCSS-tone encoder. Uniden has also eliminated some features included in the '2510: the public address system and the end-of-transmission beeper. The '2600 is similar to the '2510 in most ways: It has 25 W output on SSB and CW, 10 W on FM and AM, up/down tuning from the microphone or front panel, a noise blanker and built-in SWR metering.

Suggested retail price: $489. For more information, contact Uniden Corp of America, 4700 Amon Carter Blvd, Fort Worth, TX 76155, tel 817-858-3340.—*Rus Healy, NJ2L*

MOCAP SILICONE WEATHERPROOFING TAPE

☐ A recently developed, heat-resistant silicone tape is available from MOCAP. This tape is unique: It fuses to itself in a short time and permanently bonds to itself within 24 hours. This tape is ideal for sealing connectors used outdoors and has excellent electrical and physical properties. MOCAP silicone tape can be stretched to 300% of its normal length, has a 400-V/mil insulation rating, absorbs almost no water and can be used in extreme environments (−45 °C to 200 °C). MOCAP silicone tape can be easily removed—leaving no residue on contact surfaces—with a sharp knife.

Available in small quantities from Reid Tool Supply Co, 2265 Black Creek Rd, Muskegon, MI 49444, tel 800-253-0421, this tape costs $14.50 per 1-in. × 36-ft roll for 1 to 5 rolls and $13.05 each for 6 or more rolls. Larger quantities can be ordered directly from MOCAP. For more information, contact MOCAP, 4605 McRee Ave, St Louis, MO 63110, tel 314-664-4441.—*Rus Healy, NJ2L*

The ARRL Advertising Acceptance Policy

The League's advertising policy exists to serve you, the member. But you still must be a careful and informed consumer.

By Bruce O. Williams, WA6IVC
ARRL Advertising Manager

As ARRL Advertising Manager, I am often involved in trying to resolve disputes between ARRL members and the advertisers in ARRL publications. Am I just a busybody, or do I have a good reason for meddling in other people's business affairs?

I'm not just a busybody. ARRL, unlike many publishers, has a strict policy covering advertising in League publications, and my job is to administer that policy. The present policy evolved over a period of several years, and although some may feel that it is now a "dinosaur," there are plenty of good reasons to continue it. The biggest problem with our policy, however, is that very few members understand it, how it benefits them, or what support they can reasonably expect from their membership organization.

QST is certainly the most familiar ARRL publication. It isn't just a magazine, it's the monthly journal of our organization. It is distributed to our members as a membership benefit. In addition to *QST*, we publish two other periodicals in which advertising appears: *QEX*, published monthly as our experimenter's exchange, and *NCJ, The National Contest Journal*, published bimonthly. The *ARRL Repeater Directory*, issued annually, contains advertising that is directly of interest to repeater users, and *Tune in the World with Ham Radio* features ads directed at the pre-Novice and the Novice operator.

Why do we accept advertising? The reason is simple. Our members tell us that they want it! They want to read about the the latest Amateur Radio equipment and services because they want to buy them. The revenues we collect from advertising not only offset the cost of printing our publications, they make it possible for the League to offer many services that would not be possible without the additional income. Advertising income represents almost a third of the total ARRL budget.

Who Started the ARRL Advertising Policy?

It was 1933—not a good year! The US was well into the great depression of the '30s, and nobody held out much hope of recovery. The Federal Radio Commission reported that as of June 30, 1932, there were 30,374 licensed amateur transmitter stations, up from the 1931 total of 22,739! Amateur Radio, in spite of the depression, was enjoying a boom! *QST* was full of hints on how to save money in constructing Amateur Radio equipment. (In those days, almost all equipment was home-brewed.) We suggested making equipment fuses out of lead Christmas-tree tinsel or the foil from cigarette packs ("just cut a strip about 1/8th of an inch wide"). In 1933, fuses were a dime apiece—and you could get a *big* hamburger for a nickel.

Most transmitters were crystal controlled —Bliley offered "20-m quartz power crystals within 50 kc" for $12.75, and "10-m or 5-m doubler crystals within 200 kc" for $11.25. (Imagine spending a week's pay for a crystal today!) The new 10th edition of the *Radio Amateur's Handbook* was available at $1, postpaid anywhere.

The lead article in January was George Grammer's "Rationalizing the Autodyne," reporting the development of a three-tube regenerative receiver "of unusual performance." In March, James J. Lamb, Technical Editor, published the third article in the series on his revolutionary "Single Signal Superheterodyne" receiver design using a crystal filter in the IF. Another hint from March: "Junk yards that store *passe* Cadillacs and Pierce-Arrows should be broached, for these cars have aluminum bodies and a few cents, plus paint remover, transforms this junk into aluminum panels as large as four feet square." It certainly was not ham radio as we know it.

The *QST* editorial for April was written by F. Cheyney Beekley, W1GS, ex-W1KP. Beekley was *QST* Advertising Manager, and this editorial is the first mention of an ARRL Advertising Acceptance Policy (see the sidebar). This editorial was followed in May by an announcement in the Ham-Ads: "Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised." You might compare this statement with the one that currently appears in the Ham-Ads. Beekley apparently perceived the Ham-Ads as different from display advertising. It took more than 20 years to change that concept: Now we vouch for the integrity of commercial advertisers, and for the grade and quality of their goods and services.

Beekley also wrote an eight-page tract, "Some Notes on the Advertising Policies of *QST*." This pamphlet, written in traditional Victorian style, has been the ARRL advertising "bible" since its publication. Even today, the requirements of our current Advertising Acceptance Policy reflect some of the language of Beekley's mid-30s notes. The Advertising Acceptance Policy has remained essentially unchanged since 1933. I often wonder if Beekley could foresee the impact his effort would have.

What is Today's Advertising Acceptance Policy?

The ARRL Advertising Acceptance Policy allows advertising that meets our members' desires, and at the same time preserves the delicate symbiosis between our members and the manufacturers and dealers that supply equipment. Although many people have the mistaken idea that the League determines who can, and who cannot, do business in Amateur Radio, today we do everything possible to encourage the manufacture and sale of good ham radio equipment. Our hobby needs the equipment suppliers as much as they need us as customers.

Our members tell us they want advertising in League publications to pertain to Amateur Radio or be of interest specficically to radio amateurs. We respect that view, though we don't go so far as to require a regular advertiser to expunge all references to nonradio products if most of his ad is relevant to Amateur Radio. We also accept job opportunity ads that may be of special interest to some of our members, and we accept advertising from commercial radio manufacturers because the ads reflect the latest state of the art and many of our members are employed in that business.

Many of our members use computers in their stations, so we have many computer or software ads in each issue. Ads for coffee mugs or gold rings with call signs, or any other merchandise that is of special interest to amateurs, are acceptable. In our advertising media kit, we make the statement that all advertising "must pertain to Amateur Radio," but each ad must be considered on its own merit.

Advertisers must meet our standards for integrity and responsibility. We exhaustively check out potential advertisers for reputation, financial status and acceptable business practices. We refuse to accept advertising from firms that we have reason to believe are less than honest and responsible. Even if a firm's advertising has been accepted, it can be terminated if their business practices become questionable.

Advertised equipment must meet the manufacturer's specifications as well as any applicable FCC requirements. If there is the slightest room for doubt, we require equipment be submitted to ARRL Headquarters for advertising-acceptance inspection. Practically, of course, we don't have the physical resources to test every type of equipment. Because we lack antenna-testing facilities, our checkout of antennas is limited to visual inspection, a data review and, if necessary, an operational test by Headquarters staffers. We do 100% inspection on products from advertisers that are new to Amateur Radio; only when we are familiar with the manufacturer's design practices and reputation do we consider waiving inspection. Even then, we reserve the right to call any piece of equipment for inspection if problems subsequently occur.

All advertisers agree, in writing, to respond appropriately to complaints, and to stand by and support all claims and specifications mentioned in their advertising. It is because of this requirement that I become involved in arbitrating disputes. The advertiser must respond appropriately; he need not necessarily accede to the demands of the customer. Disputes in business are not uncommon, and Amateur Radio is no exception. There will always be misunderstandings over the terms of a transaction. My function is to ensure that there is an appropriate response, not to be judge or jury, or to adjudicate disputes. We can make no guarantee of *satisfaction* to our members in the event of a dispute; all we can guarantee is fair treatment.

All advertisers agree, by placing advertising in an ARRL publication, to abide by all applicable Federal Trade regulations, as well as ARRL policies. They agree, as required by Federal law, that when a deposit is accepted and the product is not available within the stated time, or within 30 days, the prospective purchaser will be given the opportunity to cancel the order and receive a full refund. The advertiser must notify the prospective purchaser of the delay, and provide a free means of reply. If the delay is more than 30 days, the prospective purchaser must give *express* consent to the delay. The advertiser must return the deposit at the end of the first 30 days unless this express consent has been given!

THE EDITOR'S MILL

ALWAYS has *QST* been "choosey" in admitting advertisers to its columns. Many an advertising contract has *QST* rejected. As in any other business, there are bad practices in the radio trade. *QST* takes pride in avoidance of would-be advertisers who fail to meet its standards.

To follow such a policy during years of prosperity is easy. To judge the reliability of advertisers and products under abnormal depression conditions is difficult. To refuse advertising when advertising is scarce is heartbreaking. To judge always correctly is impossible.

An increasing number of letters from members of the League, which tell us of inferior or misrated merchandise or unethical business practices, has shown us the necessity for still more stringent requirements for eligibility. Accordingly, we will be even more strict, more "choosey," than heretofore.

From *QST*'s new advertising rate card, effective with this April issue, we quote as follows:

"Advertising is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

Those who buy from QST are secure in the knowledge that each advertiser and each piece of apparatus is approved by the American Radio Relay League.

This cannot mean that *QST guarantees* its advertisers — all business transactions are subject to normal hazards. It does not mean that only apparatus of superlative quality and consequent high price may be advertised in *QST* — price is of course a factor in judging the value of any apparatus. But it does mean that we have investigated and are confident of the honest intent of each advertiser; that each piece of apparatus is known to us and in our opinion suitable for the service for which it is intended; that the American Radio Relay League conceives it its duty to do everything within its power to prevent the exploitation of radio amateurs by firms who sell inferior and misrepresented merchandise or whose business principles are not of the highest order.

Amateurs may buy with confidence from those firms who advertise in *QST*. They are fortified by the knowledge that the League will defend the buyer's interests. In self-protection, amateurs should buy exclusively from *QST* advertisers.

Approximately half of the League's support comes from the sale of advertising space. The continuance of this support for *your* League depends on *your* support of *QST* advertisers. Directly in proportion to your patronage is the extent to which they, by their *QST* advertising, will help support the League.

H. C. B.

April, 1933 7

What Happens to Advertising Complaints?

Each year we receive several hundred letters with complaints about advertisers. In many cases, we receive only a copy of a letter to the advertiser, with "cc: ARRL" or "cc: ARRL Advertising Manager" at the bottom. We see this as informational, not as a request for intercession. We won't take any action at this point. We become involved *only* if we receive a written request for assistance from the complainant, with complete facts and copies of any correspondence, etc.

Over 50% of the disputes in which we are involved result from poor communications between the two parties. Once the communication path is opened, the problems are usually resolved. In about 40% of the cases, the problem results from loss of records, faulty recollection of the facts, conflicts with dealer personnel or other factors that result in delayed deliveries or refunds. Most of these problems are eventually resolved.

In a very small percentage of cases, the complainant tries to use the League's influence to get something for nothing, or to take vengeance for an imagined wrong. Needless to say, we won't be a party to these disputes. Finally, there are a few disputes that just can't be resolved. The parties simply refuse to change their positions. Unless the advertiser is violating his own policies or accepted business ethics, there is nothing more we can do.

What Should I Do to File a Complaint?

First write a letter to the advertiser advising him of your problem. Direct your letter, if you can, to the appropriate individual by name, rather than to "Manager," or "Complaint Department." Include copies

of any pertinent documents, such as your order, cancelled check or credit card receipt, repair order number, etc. Tell him what you expect him to do to correct your problem. Send the letter by certified or registered mail, return receipt requested, to eliminate any argument that he didn't get your letter. You should allow at least two weeks, or even up to a month, for a reply.

If you have no reply within a month, write to the ARRL Advertising Department, 225 Main Street, Newington, CT 06111 and specifically request assistance. Include copies of all the documents you have, together with a brief, objective account of the transaction and any telephone calls or letters you have received.

On receipt of your letter, we will contact the advertiser on your behalf, either by letter or by phone, and request a response from him within 30 days. If you hear from him directly within the 30-day period, please advise us immediately, and if you don't hear from him, also advise us. We, in turn, will advise you if we hear from him.

Must I Be an ARRL Member to Receive Help?

Although *QST* is distributed to ARRL members, we realize that many nonmembers rely on the ARRL Advertising Policy and enter into transactions on the basis of faith in our policy. You need not be an ARRL member to request our assistance in a dispute, and we will not handle your problem any differently than we would the complaint of a member. We don't check our membership records when we get a complaint—our interest and commitment is to Amateur Radio, not just our members.

What Sorts of Complaints Can I Expect Help With?

We attempt to ensure that both parties to a dispute are fair in their positions, and that the ultimate resolution is fair to both parties. Our requirements are not above the usual standards for transacting business. We don't require that our advertisers give up any of their rights to disagree. Neither do we demand that they conform to a standard of conduct. In any dispute, tempers can flare, harsh words may be used, the usual politeness that we all expect may not be evident. Because we realize (from many of our own disputes) that complaints about the demeanor of one or the other party can be biased and questionable, we generally won't get involved in this type of complaint. That's not to say that we are not concerned about facts that indicate problems, but complaints based *solely* on alleged "bad attitude" or rough language on the part of the advertiser are generally not addressed. As I said before, the Amateur Radio business is no different than any other commercial enterprise—the normal competitive environment in the marketplace determines the fate of any business that doesn't treat its customers civilly. We can't really help by being in the middle of a "he said, and I said" type of problem.

In considering complaints, we make a distinction between *quality* problems and *design* problems. We will investigate complaints about the quality of a product. We won't become involved in questions about the design of an item, unless the alleged design deficiency involves FCC regulations or not meeting the manufacturer's own specifications. We are unable to test member's equipment to see if it meets requirements, or to verify that complaints are justified. We don't have the necessary resources. Thus, if the new rig you just bought meets the manufacturer's and FCC specifications, but it does not operate the way you think it should, we won't become involved. Any piece of equipment must be designed to sell at a specific price. You can't expect a Rolls-Royce at a Chevrolet price.

Keep in mind that normal business practices apply to Amateur Radio. When you purchase an item, you don't necessarily have any right to return the equipment and receive a full refund. If you buy a television or an automobile, you don't have the option to return it for another, or to get your money back if you decide later that you don't like it. You do have the right to expect your new item to operate properly and in accordance with the manufacturer's specifications, however, and to return it to the manufacturer or dealer for warranty repair or service. If the dealer does agree to accept the equipment back, expect him to charge you a restocking fee. He can't resell the equipment as new, and he has the additional expense and responsibility to check it out before he tries to resell it. It's a good idea to ask about the dealer's return policy *before* you make your purchase.

In Summary

If you have a valid complaint about the quality of a product that you have purchased on the basis of an advertisement, in an ARRL publication, or you have not received timely delivery of such a product, and cannot get an appropriate response from the advertiser, the ARRL Advertising Department will intercede in your behalf. First, however, attempt to resolve the problem yourself. Write a letter to the advertiser and define your problem objectively; tell him what you expect from him, and allow him a reasonable time to answer. If you receive no response within a reasonable time, direct a letter to the Advertising Department requesting assistance, and include all pertinent documents or records.

Remember that the advertiser has agreed to respond as a prerequisite to the acceptance of his advertising. There's no guarantee that he will agree with you, nor will ARRL demand that he do so. He does have an obligation to respond, however. If he fails or refuses to respond, the only action that ARRL can take is to withdraw his privilege of advertising in ARRL publications. That's not an action we take lightly or frivolously. The possibility of that happening, however, is usually incentive enough for any ethical advertiser to respond properly. Most advertisers have a strong commitment to Amateur Radio and to their customers. For every unpleasant transaction between a member and an advertiser, there are hundreds of smooth and pleasant ones. If you select your equipment and your dealer with normal care, chances are good that I'll never hear from you unless you want to pass along a compliment —which are always welcome. QST

Strays

RUSSIAN PHRASES FOR AMATEUR RADIO

A new 20-page syllabus has been compiled by W6HJK to help amateurs better communicate with their Soviet colleagues. You need not be an expert in Russian, only interested in trying.

The booklet provides (1) English words and phrases for QSOs, accompanied by (2) the Russian translation and (3) the English transliteration, to assist you in pronouncing the Russian.

The syllabus follows the natural sequence of a QSO. There are additional sections on the Russian alphabet, phonetics, CW characters, numerals and given names. Suggestions are made for addressing mail to the Soviet Union.

The author undertook this project out of a personal interest in improving the quality of his QSOs with Soviet hams and to enhance US-USSR relations. This booklet is provided *free of charge,* with the first printing and mailing funded by Beyond War, an educational foundation to build global dialogue and cooperation. Requests should be sent to: Russian Phrases for Amateur Radio, Len Traubman, W6HJK, 1448 Cedarwood Dr, San Mateo, CA 94403, USA.

I would like to get in touch with...

☐ anyone with a manual for a Precision signal generator, series E-200C. Harry J Mennella, K4IMH, 4106 18th Lane E, New Port Richey, FL 34655.

☐ anyone interested in the history and lore of the Hallicrafters SX-88 receiver. Bob Forman, W9RJH, Box 68, Monmouth, IL 61462-0068.

☐ anyone with a manual or schematic for a Clegg 22'er MKII 2-meter transceiver. Bill English, N6TIW, 81 Meadow View Rd, Orinda, CA 94563, tel 415-254-6958.

☐ anyone with info on a kit that modified the COMTRONIX 10-meter FM transceiver to provide offset for repeater operation. Alan Wells, K6HA, 270 Chilpancingo Pkwy #22, Pleasant Hill, CA 94523.

☐ anyone who has the formula for recrystaling an ICOM-U12 commercial 460 radio to the 440 band, preferably starting at 437 MHz. Roger Pakulski, WB8ZHQ, 4015 Clover Ridge Ct, Toledo, OH 43623.

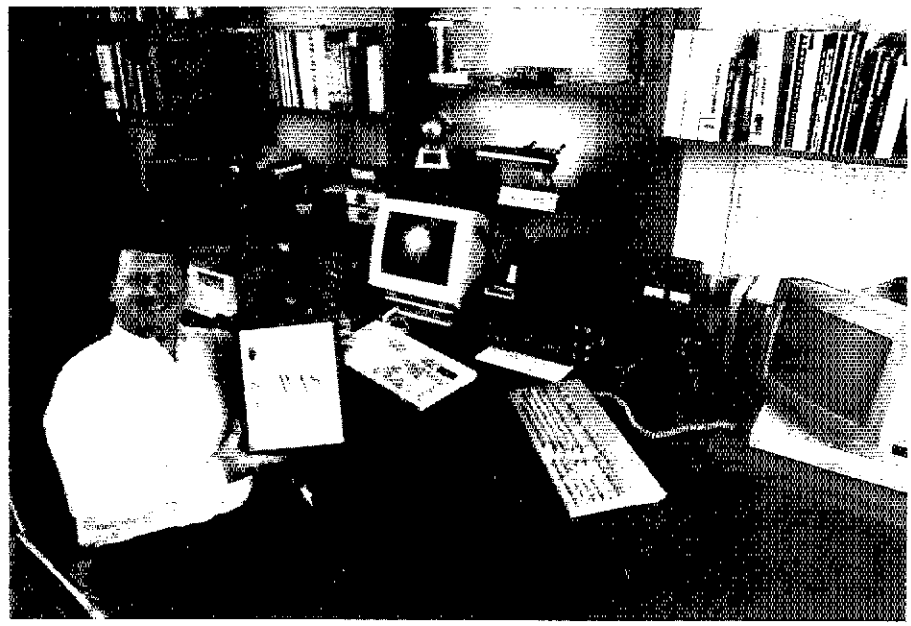
Packet Radio: Worked All States and Beyond

Was the quest for a first Amateur Radio award based on irrational motivation from a $10 piece of wood?

By Robert L. Goodman, AA5FR
6255 Twin Oaks Circle
Dallas, TX 75240

There he was. In the October 1987 issue of *QST*, Art, KF6EE, was proudly holding the plaque for Packet WAS Number 1. He had been the first to use packet, one of the most exciting new aspects of our great hobby, to obtain the ARRL Worked All States award. Below Art's photo was the hook that grabbed my attention—that same plaque was going to be awarded to the next nine hams to match Art's accomplishment.

This article describes my chase for one of the remaining nine plaques—or how a grown man gets irrationally motivated by a $10 piece of wood. I also try to show how you might enjoy packet radio even if you never thought you would see the "ones and zeros" of digital modes as fun. My other goal is to motivate others to join the chase. Based on my last discussion with ARRL HQ, only six of the 10 plaques have been awarded thus far. So you still have a chance, even if you haven't started yet.



Despite delays and roadblocks, the author's pursuit of the ARRL's Packet WAS Award turned into a labor of love. *(photo courtesy Asti Milkovic)*

First Step: Gauge the Competition

I have been licensed for 28 years, from the age of 12, and in all that time had never chased any awards. Having a compulsive, competitive, Type A personality makes that a surprise, even to me. But this award looked interesting. I grabbed a calculator and developed the following algorithm to gauge the extent of my competition:

$COMP_{WAS}$ = (number of active hams on packet) × (% that are ARRL members) × (% of packeteers on HF) × (% wanting the award) × (% willing to hassle with the work to finish)

Although the number derived is left as an exercise for the reader, my calculation, or Packet Factor, showed I had an excellent chance at qualifying for a plaque, even with the limitations of my station. Having a tribander mounted at only 30 feet and maximum power of 150 watts limit any notion I have about being one of the big guns on the ham bands. This was a concern, considering that a majority of HF packet activity is found on 20 meters.

Another concern had to do with my lack of record keeping. Ever since the FCC stopped requiring detailed logging, I had gotten lackadaisical. Although I had been on HF packet for almost a year when I started the chase for WAS, I had logged very few contacts. The result was that I would be starting from about zero.

Even with these concerns, I figured that the chase for a plaque, based on my calculation, ought to be a piece of cake. I thought I could wrap up the whole thing, start to finish, in about a month. I was wrong. My algorithm had not taken certain other factors into account, factors that caused a major impact.

Stumbling Blocks

Even with all the benefits of packet for WAS (see accompanying sidebar), my quest for the $10 plaque was not without challenges. Full disclosure dictates that I mention some of the stumbling blocks I encountered:

- Compared with SSB, and probably CW, there are fewer hams on packet. The last estimate I saw said there were about 40,000 US packeteers. A hefty portion of these are on VHF but not yet on HF. This does not present a problem with working Texas or California because of their high ham populations. However, a state like North Dakota can be a real problem since there are a total of only 1167 hams in the whole state (0.25% of all US hams). If you apply the impact of the Packet Factor shown in the algorithm, you can end up with some very low probabilities.

All of that having been said, it still depends a lot on luck. One of the very first states I worked, and confirmed, was South Dakota. With 1178 hams—11 more than its

neighbor to the north—I suppose I shouldn't be surprised that it was easier to work! Of course, you don't really care how rare a state is; you need only find one ham to contact and QSL in each state. Depending on your own location, you will have your own problem states. With the continuing significant growth of packet, along with more hams adding HF to their existing VHF packet capabilities, the quest for WAS should get easier with each passing month.

• I had technical difficulties that most of you won't have—my wife and I were expecting our first child right in the middle of chasing WAS. With Lamaze classes for 2-3 hours every Saturday for seven weeks, my time for Amateur Radio was significantly impacted. Add to that the time spent looking at cribs, car seats and other non-electronic gizmos, and my weekends were filled with distractions from packet.

• As I mention in the sidebar, Hawaii was a problem state for me. But I had received messages from two stations via SkipNet in response to my plea for a sked. Unfortunately, I could never hear, let alone connect with, the first. That left only one other opportunity—the sked with Earl, WX4J, in Ewa Beach, Hawaii on January 9, with a backup date of January 10.

As January 9 arrived, the baby was 9 days late, not only screwing up my tax deduction, but jeopardizing my sked with Hawaii. In anticipation, I began negotiations. "Honey, there really isn't that much that I can do to help at the hospital. I'm sure the doctor and nurses can take care of everything..." She was not amused and did not share my priorities. However, in the spirit of compromise, she was kind enough to wait until six hours after my successful sked with WX4J to go into labor, with a healthy nine-pound boy arriving on January 10. Although you'll probably be able to avoid the problem of having a baby at such a critical time, you might as well plan on some kind of family or business distraction and factor it into your timetable. This one added a full month to my original time estimate.

• QSLs were a problem. I should have anticipated one fact—not every ham prints QSL cards. Compounding this problem is the fact that not everyone who has QSLs sends them—especially with the same sense of urgency you have. Aggressively pursuing my quest, I used a three-phase approach:

1) Just send a card and hope you get a response. This approach worked 62% of the time.

2) Send QSLs with an SASE. In some cases, I was told during the QSO that an SASE would be needed and I readily complied. For those states that did not return a quick QSL, I sent another card plus a computer-generated card showing their name, address and call, along with an SASE. This was included just in case the other station did not have cards of his own. I also included a personal letter explaining my quest for Packet WAS and how important the card would be to my success. This approach worked nearly every time.

3) Send QSLs via Federal Express with a return Fed Ex envelope charged to me. This is an expensive approach, but fortunately I needed to do this only twice. It worked in both cases, and seemed to communicate my sense of urgency. I have to admit that there is something about this approach that is not reflective of the true spirit of Amateur Radio. But it worked.

These steps work great—assuming you have the correct mailing address for the other station. This was the biggest problem I had completing WAS. As I alluded to earlier, North Dakota was my nemesis, and from the beacons I was seeing on 20 meters, it was an obstacle for WAS for several other stations, too. These beacons from the friendly competition convinced me of what I had suspected—there was no currently

You Can Do It, Too

Packet is one of the most spectrum-efficient modes currently and affordably available to Amateur Radio operators. What other mode allows a dozen or more QSOs to occur simultaneously on one frequency in less spectrum than one sideband contact requires? This is only one of many benefits of packet that should help you obtain WAS. Some tips:

Monitor Several Stations Simultaneously: Packet has, for the most part, become channelized. This applies to HF as well as VHF. What this means on HF is that, by sitting on one frequency, you can see calls from all over the country—and the world—without having to tune around.

One of the secrets for chasing Packet WAS successfully is to track all the calls you see scroll across your computer screen. Even if you have already worked and confirmed Texas, you will still need to know that AA5FR is located there so you don't look him up in the *Callbook* every time you see the call sign.

If you have a computer, you can use a simple data-base program to log each call sign you see on your monitor along with the state (and the page number in the *Callbook* for his address after you work him!). I used a simple memory-resident program called Sidekick that has a very remedial data-base capability. You can then sort all the stations by call area and then by call sign for easy look-up when you see a station scroll across your screen. You can also sort by state. By printing out both sorts, you have an instant reference as you monitor the packet frequencies at some future date. As you see new calls on the monitor, manually add the call, state and so on to your printouts and update the computer data base only when the look-up starts getting difficult.

The usefulness of this step can't be overstated. It will allow you to home in on new calls without having to waste time looking up old ones. Even if you don't want to computerize this step, at least maintain a manual data base. You might consider using a dupe sheet such as those required in contests. Whatever method you use, electronic or manual, your quest for WAS will be greatly facilitated.

One last note: Do not assume that because you have worked and confirmed all states in, say, the third call district, that you can ignore all call signs from that district. My Wyoming confirmation had a 5-land call and my Hawaii contact had a 4-land call.

Bringing Home the Beacon: Packet has a special beacon capability—you can program your equipment to transmit a user-defined message, or beacon, at any set time interval you desire. For example, you might set up your system to automatically send out every five minutes: "Need for WAS: WY, HI, DE, LA, OK." As enticing as this approach may first appear, there are a few caveats. One, unattended HF packet operation is not allowed without specific approval (virtually all exceptions relate to the national auto forwarding message system called SkipNet). So don't get the idea that you can turn on your system, set the beacon, go off to work and then come home and have all 50 states worked, ready for review in your receive buffer. Even when you are in the shack, don't set your beacon for every 30 seconds, either! Depending on channel congestion, you probably shouldn't beacon more often than every 2 to 5 minutes.

Aloha Packeteers: SkipNet is already in place transferring thousands of messages per month between packet bulletin board systems (PBBS). For my location and antenna system, Hawaii was very difficult. With a little research, I found the calls of two Hawaii PBBSs and forwarded a message to both of them addressed to "All." The message said I needed a sked for WAS and listed my "home" PBBS (the one I check into most often). Within a couple of days, I received responses and suggested skeds from two Hawaii stations via SkipNet.

Amateur Radio in Silence: Packet is one of the few Amateur Radio modes that doesn't need sound. This is especially beneficial, since chasing WAS can be very time consuming. With packet, you can listen to music, watch TV, pay attention to your wife and perform other socially redeeming activities while still enjoying ham radio. Who could ask for anything more!

active HF packeteer in the entire state of North Dakota. (This may or may not have been true, but it sure seemed like it.)

Where are You, Warren?

As I said at the beginning of this article, I had not, for the most part, logged my packet QSOs for the first year I was active. But a few contacts had ended up in the log—one being with Warren, KAØKXI, in Grand Forks, North Dakota, back in November 1986. Thank goodness I thought to look back in my old log books. I immediately sent him a QSL, with an SASE and a personal letter. Since I already had all other state confirmations in hand, I started preparing everything for review by the local Awards Manager so that no precious time would be wasted once I received Warren's QSL.

You can imagine how I felt when my envelope was returned—"Addressee Unknown"! The package had been sent to a post office box at "UND"—which I deduced was the University of North Dakota. I checked both current and past *Callbooks*—the address was right. I called Directory Assistance in Grand Forks—but no listing. Now the challenge—how to find a student who had apparently graduated, dropped out or transferred to another school. I pondered the dilemma (another month's delay on my original schedule) and concluded that the only approach was to telephone the registrar's office at UND and try to cajole them into giving me Warren's home address. As I was sitting in the shack one night watching 40-meter packet scroll across the screen while trying to figure out what to say to the registrar's office, I saw KAØKXI working another station! After initializing the packet connection sequence, I took time to mop up the coffee I spilled reaching for the keyboard.

I had seen Warren tell the other station that he was in Forest Lake, Minnesota. After my connection was made, I told him of my quest. He had transferred to the University of Minnesota and had not changed his *Callbook* address. Fortunately, he remembered working me several times and was able to verify our QSOs in his log. I received his QSL card the following Saturday afternoon, completed the Award Manager's review that evening and sent the completed forms to ARRL by Federal Express on Monday morning.

Bottom Line

Having persevered long enough, I am happy to say that I was able to complete Packet WAS Number 3 in about four-and-a-half months, start to finish—a little longer than my original one-month estimate. It took another five months to complete Single-Band Packet WAS Number 1 (I thought I would never get Oklahoma on 20 meters).

If your wife doesn't have a baby and the *Callbook* has all the right addresses, you can probably complete your Packet WAS a lot faster than I did—especially with the ever-increasing number of packeteers on HF. If reading about my experiences has helped pique your interest, the fact that only six of the 10 Packet WAS plaques have been awarded may motivate some of you to reach for your keyboard and start sending directed CQs.

Beyond WAS

As the title of this article suggests, a packet goal comes to mind that goes beyond WAS. According to the last listing I saw in *QST*, there are now at least 107 DXCC countries with some packet activity. As the explosive growth of packet continues to spread worldwide, maybe I'll be the first to accomplish Packet DXCC. Or maybe it will be you. With the sunspot cycle improving every month, this is a great time for the chase.

Bob Goodman, AA5FR, Fun Radio (previously KD5SB), is active on packet HF, VHF, UHF and OSCAR 13. Bob is a member of ARRL, AMSAT, Texas Packet Radio Society, Tucson Amateur Packet Radio and the Dallas Amateur Radio Club. He also enjoys contests, DXing, satellites, RTTY and AMTOR. For those of you who will be attending the Diamond Jubilee ARRL National Convention in June, Bob will be giving a presentation on "HF Packet: Hints & Kinks." Bob's home PBBS is WA5MWD. When the bands are closed and the satellites are out of view, Bob is president of Goodman Group, Inc, a Dallas-based real estate investment company. He has a Bachelor's degree in Engineering Physics from the University of Tennessee and an MBA from Pepperdine University.

Microsat: The Next Generation of OSCAR Satellites—*Part 2*

With this year's launch, the next generation of amateur satellites take to the sky. Will you be ready for OSCAR 20?

By Doug Loughmiller, KO5I and Bob McGwier, N4HY

President, AMSAT-NA
Fairway Drive
Paris, TX 75460

Assistant VP Engineering, AMSAT-NA
15 Cherrybrook Ln
East Windsor, NJ 08520

AMSAT is launching the Microsats on an Ariane 4 rocket from Kourou, French Guiana. This large South American space facility was designed by the European Space Agency and is operated by Arianespace, its commercial arm. Our satellites will be secondary payloads with the SPOT-2 satellite, a French earth-resources satellite with a high-resolution camera on board, capable of resolving surface objects only a few meters in diameter.

AMSAT approached Arianespace with the idea of launching small, secondary payloads. Iterations of the idea went back and forth. The result: Microsats will ride on a small shelf just below the main payload as shown in Fig 4. [When we say small, we mean small! Fig 5 shows a full-scale mechanical model of a Microsat sitting on a desk blotter.]

The SPOT launch will put its payload into a sun-synchronous orbit. This type of orbit was used for UO-9 and UO-11, both launched into sun-synchronous orbits on Delta launchers from Vandenburg Air Force Base. (These satellites are still functional.)

A sun-synchronous orbit is a predictable, nearly polar orbit. The earth is not a perfect sphere, and thus, it perturbs the orbit of a spacecraft from its initial value. If these perturbations are used advantageously, it's possible to achieve a fly-over of the spacecraft at nearly the same time every day. The microsat launch gives us a 10:30 AM-PM sun-synchronous orbit: The best pass each day will occur around 10:30 in the morning and evening, *local* standard time. It will vary slightly, but the average time for the best orbit will be around this period. As they fly over the US, the Microsats will be traveling essentially south to north, or vice versa. See Table 1 for a sample listing of the orbital elements for these microsats. These elements are good only if the satellite is launched on June 15, 1989. (These are not the actual elements; the microsats will most likely be launched in the fourth quarter of 1989.) It is, however, easy to modify the figures to make the orbital element set valid for any launch date, ensuring the availability of orbital elements, regardless of when the launch takes place. The only caveat is that the launcher must perform the insertion as planned!

Table 1

Sample Orbital Elements for a Microsat Launch

Epoch 06/15/89 (time of launch)	014213 UTC
Inclination	98.7376°
RAAN (changes with day of launch)	240.17746°
Eccentricity	0.001338
Argument of Perigee	108.2°
Mean Anomaly	257.5°
Mean Motion	14.19889
Drag	0.0000001

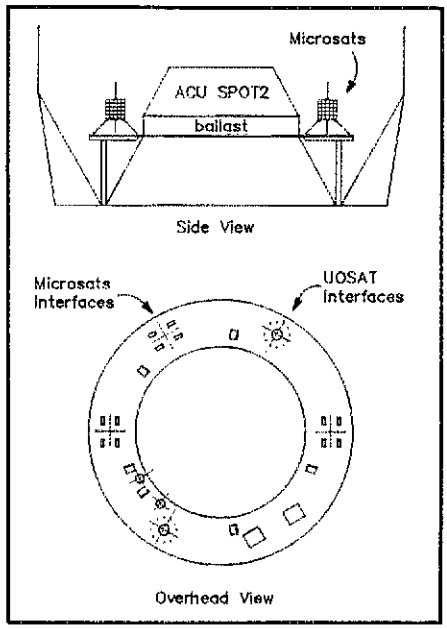


Fig 4—Partial view of Ariane 4 spacecraft interface. The Microsats are launched from a small shelf located just below the SPOT 2 satellite (see upper illustration). The lower illustration is an overhead view of the payload portion of the Ariane 4 vehicle. *(Drawing courtesy of Arianespace.)*

The variables in the orbital information are the right ascension of the ascending node (RAAN) and the date of the launch (not the time). The RAAN is the longitude of the orbital plane on the celestial sphere coordinate system where the orbit crosses the equator going from south to north. As the earth revolves about the sun, this number must change in a predictable way to keep overhead passes occurring synchronous fashion with the sun.

$$\text{RAAN} = 77.50451 + 0.98561228\,T \text{ degrees}$$

where T is the number of days between January 1, 1950 at 0000 UTC and the date of the launch.

This will be a night launch. The valves on the first stage are scheduled to be opened at 01:42:13 UTC. The launch window is a short ten minutes. The launch may be visible from the East Coast of the US during its ascent. We will also be able to hear from the satellites soon after their launch, rather than having an agonizing delay of several hours wondering if "we made it."

The Missions

PACSAT and LUSAT are digital store-and-forward satellites.[15] They will allow

Part 1 of this article appeared in May QST, pp 37-40.

[15]Notes appear on page 70.

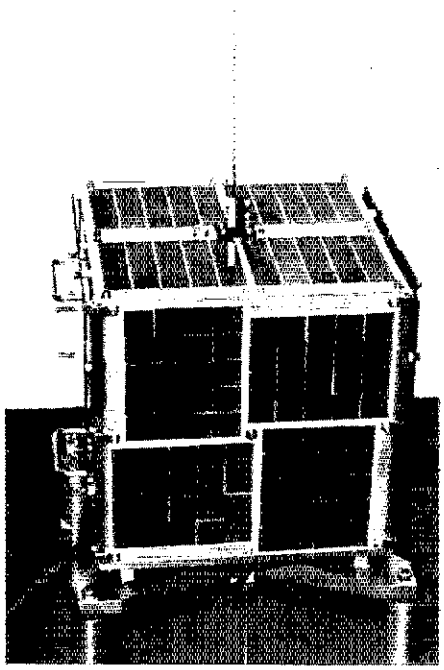


Fig 5—This full-scale mechanical model of a Microsat indicates the extreme small size of our newest satellites. The internal circuit density is quite high. Microsats are the most technologically advanced OSCARs to date.

open access to a packet-radio bulletin board by any amateur who has the necessary equipment. They will use AX.25, HDLC, and NRZI as produced by any standard TNC. Because these are operated in orbit, however, you need to use a better modem than the Bell 202 AFSK modems that are standard in most TNCs.

Both satellites will operate in Mode JD. Mode JD, as defined by the Japanese, is Manchester-encoded FSK on the uplink and BPSK on the downlink. The user will need to have a 2-meter FM transmitter and a 70-cm SSB receiver. A special modem, available from a number of sources,[16,17] is needed to operate at 1200 bit/s. We are planning to move the data rates to 4800 bit/s as the mission progresses (meaning, when the modems are ready!). Fortunately, an effort is under way which guarantees access to the modems needed to operate at 4800 bit/s.[18,19] A number of networking experiments are planned, and the packet-radio mission will evolve over time. We are aiming for a simple BBS to be operational on the day of launch with enhanced capabilities to follow. You will recognize the WØRLI/WA7MBL BBS

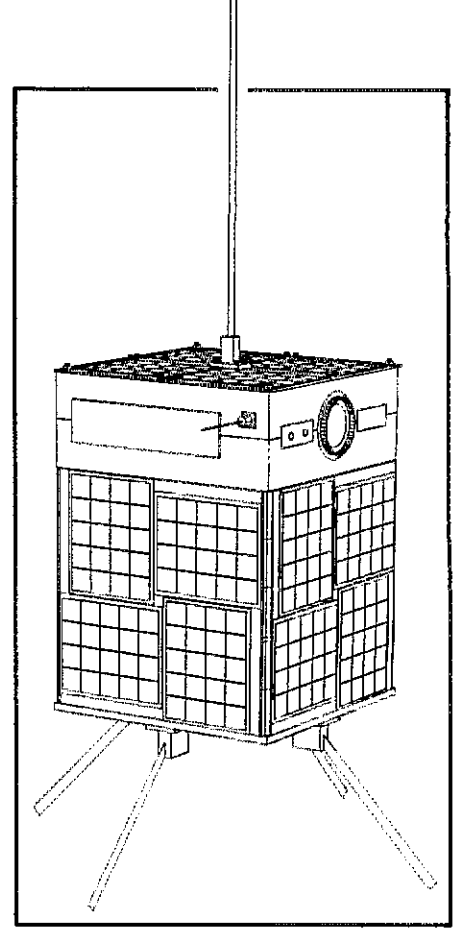


Fig 6—An exterior view of WEBERSAT, a product of the cooperative venture between AMSAT-NA and Weber State College. Note the CCD camera lens in the upper module. See text for the operational details of WEBERSAT. *(Drawing courtesy WD4FAB)*

Microsat Glossary

AFSK: Audio Frequency Shift Keying.

Argument of Perigee: The polar angle locating the perigee point of a satellite in the orbital plane; drawn between the ascending node, geocenter and perigee; and measured from the ascending node in the direction of satellite motion.

AX.25: Amateur packet-radio link-layer protocol approved by ARRL Board of Directors in October 1984.

BBS: Bulletin Board System.

Bell-202: A 1200-baud modem standard with 1200-Hz mark, 2200-Hz space, used for VHF FM packet radio.

BPSK: Biphase Shift Keying.

Eccentricity: A parameter used to describe the ellipse that constitutes the orbit of a satellite.

EIRP: Effective Isotropic Radiated Power.

Epoch: A reference time at which parameters describing satellite motion that vary are specified.

Flash A/D Converter: Analog-to-Digital conversion accomplished using multiple comparator circuits. Flash A/D conversion is much faster than the more conventional technique known as "successive approximation."

Geosynchronous Satellite: A satellite that orbits the earth at an altitude of approximately 22,300 miles, with an orbital period of 24 hours. To an earth-bound observer, the satellite appears to be fixed overhead, hence the term geosynchronous.

HDLC: High-level Data Link Control Procedures as specified in ISO 3309.

Inclination: The angle between the orbital plane of a satellite and the equatorial plane of the earth.

LEO: Low-Earth Orbit.

Manchester-encoded FSK: Biphase-L Frequency-Shift Keying.

Mean Anomaly: An angle that increases uniformly with time, used to indicate the position of a satellite on its orbit. Usually specified at epoch time when Keplerian orbital elements are used.

Mean Motion: A constant included in a satellite's set of orbital parameters. The number of complete orbits a satellite makes in one day.

NRZI: Nonreturn to zero inverted. A binary baseband code in which output transitions result from data 0s but not from data 1s.

PSK: Phase-Shift Keying.

RAAN: Right Ascension at Ascending Node. The angular distance, measured eastward along the celestial equator, between the vernal equinox and the hour circle of the spacecraft's ascending node. One of the Keplerian orbital elements.

TCP/IP: Transmission Control Protocol/ Internet Protocol.

TNC: Terminal Node Controller. A device that assembles and disassembles packets.

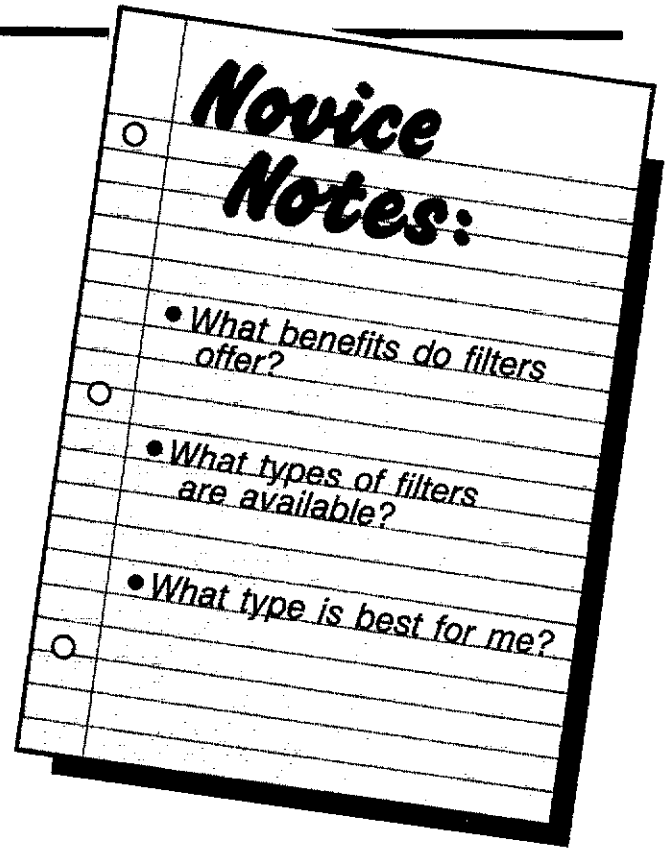
interface. We are planning for these satellites to augment the terrestrial packet-radio message-forwarding system.

On PACSAT, there will be an L-band receiver and a 1-W S-band transmitter. On LUSAT, there will be a 70-cm experimental transmitter and data beacon, constructed in Argentina by AMSAT-LU under the guidance of Carlos Huertas, LU4ENQ.[20] The navigational system on LUSAT is slightly different from that on the other Microsats. On all Microsats, the navigational system is composed of simple bar magnets. On LUSAT, the poles of the magnets are inverted from the configuration used on the other satellites to better optimize it for use in the Southern Hemisphere.

Digital Orbiting Voice Encoder (DOVE) is the dream of PY2BJO. It will use a narrow-band, 2-meter FM transmitter to transmit stored voice messages (output from a Votrax chip) or Bell 202 AFSK tones to send telemetry to command stations. Rather than designing a different receiver and transmitter, we decided to place both the uplink and downlink on 2 meters. The DOVE transmitter will be

(continued on page 70)

Receiver Filters Improve Reception



Separating signals in a crowded amateur band is a challenge. The addition of audio or sharp intermediate-frequency (IF) filters can mean the difference between a solid or unsuccessful contact.

By Doug DeMaw, W1FB
ARRL Contributing Editor
PO Box 250
Luther, MI 49656

How many of your contacts have been ruined by interference? Perhaps you hooked a rare, distant station, only to have your contact wiped out by a loud signal that appeared close to your operating frequency. If you have suffered this agony, you're not alone! Each of us must contend with "that other person" who seems bent upon parking next to us when we are having an otherwise nice contact. A primary rule of courtesy is to make certain the frequency is not in use before we transmit a test signal or call CQ. During phone operation we ask, "Is this frequency in use?" When we are on CW we ask, "QRL?"

Filters are used to help reject signals that are close to our operating frequency. In other words, they tend to separate the signals so we hear only the signal of interest. If another station transmits on or very near to your frequency, chances are that a filter may not be of much help. In fact, it will offer no improvement to reception if the other guy is on the same frequency you are using. In this situation you must either give up your QSO or wait until the interfering station goes away. Neither choice is a pleasant one!

There are two kinds of filter we may use to improve receiver *selectivity*, the receiver's ability to reject unwanted signals close to the desired signal's frequency. One is an IF (intermediate frequency) type and the other one is an audio filter. We will discuss these units and learn their advantages.

IF Filters

Modern receivers and transceivers are equipped with at least one IF filter. There may be places on the filter circuit board to add additional filters, which are generally sold as accessories. Many IF filters contain quartz crystals. There may be as few as four crystals or as many as eight. A four-crystal filter is known as a four-pole filter, a six-crystal filter as a six-pole unit, and so on. Generally, the greater the number of poles, the better the resultant selectivity. More-selective filters often cost more, though.

If your receiver came equipped with one IF filter, it is probably set up to provide SSB selectivity (a bandwidth of approximately 2.4 kHz). If it has an SSB and a CW filter (two filters), it is most likely arranged for a 2.4-kHz SSB bandwidth and a 500-Hz CW bandwidth. You can copy CW just fine through the SSB filter, but the CW filter will make a voice signal unintelligible (restricted fidelity).

IF filters are usually located between the receiver mixer and the first IF amplifier, although some receivers use a second IF filter to improve the selectivity. It is situated at the output end of the IF-amplifier chain. This second filter is sometimes called a "tail-end filter." Narrower filters are available for SSB (with bandwidths of 1.8 kHz or so) and CW (250 Hz). A 1.8-kHz SSB filter helps to discriminate against adjacent signals better than wider SSB filters, but it makes the phone signal sound somewhat tinny, because it restricts the low- and high-frequency voice components. A 250-Hz filter discriminates against unwanted signals better than a wider filter, but it also makes the receiver tuning somewhat more critical (sharper) than with a 500-Hz filter. You must tune slowly when using a narrow filter, lest you tune past signals without hearing them.

Audio Filters

Some audio filters consist of coils and capacitors tuned to a peak frequency (band-pass filter) or a specific cutoff frequency (low-pass filter). There is some signal loss through this *passive* type of filter. Passive filters are not as popular as they once were, although many amateurs build them for home use.

Commercial audio filters are known as RC (resistance-capacitance) *active* filters. An active filter or device is one that requires an operating voltage. RC active filters contain op-amp ICs which serve as filter poles and provide some amplification. The filter gain is usually nominal (a factor of 2 to 5).

Audio filters are plugged into the phone jack of the receiver. You may use headphones or a speaker at the filter output. Panel controls on the filter enable you to choose a peak frequency for CW reception, and you can vary the selectivity to your liking. Under certain conditions, you may encounter what is known as "ringing." The CW signal takes on a pinging sound that makes it difficult or impossible to copy. Static crashes can cause the filter to ring and obliterate a CW signal. Very narrow

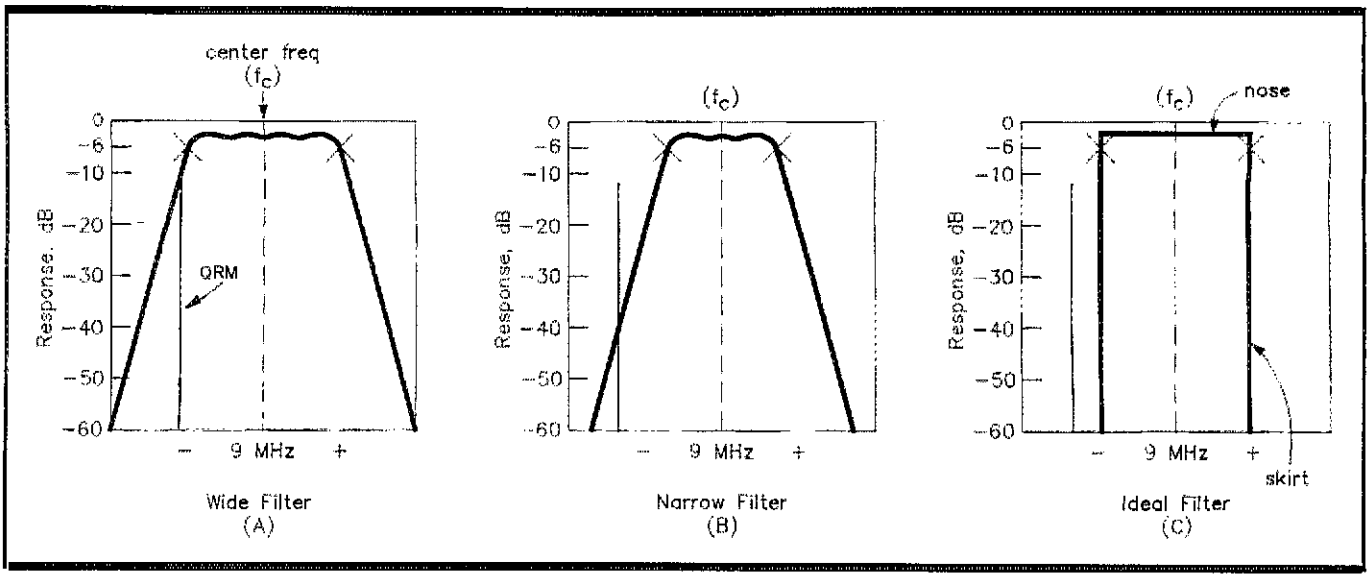


Fig 1—Examples of IF filter response curves. A wide filter is portrayed at A. The vertical line at the left represents an interfering signal. The dashed line shows the filter center frequency. Example B illustrates a narrower CW filter. Note that the interfering signal is attenuated substantially more than it is with filter A (see text). An ideal filter response is shown at C.

IF filters may also ring.

Audio filters may be used in combination with the IF filters in your equipment. For example, if you have only an SSB IF filter, you can add an audio filter to provide CW selectivity without the need to buy an expensive 250- or 500-Hz IF filter. Also, your 2.4-kHz SSB selectivity may be sharpened by using an audio filter in the low-pass mode and increasing the filter selectivity (the filter Q control).

Another advantage of using an outboard audio filter is that the wide-band noise generated after the receiver IF filter is removed by the audio filter. This wide-band noise comes from the IF amplifiers and audio stages in the receiver. It appears at the receiver output as low-level hiss. This unwanted noise can mask a weak CW or SSB signal. The audio filter can "launder" the receiver audio and allow the weak signal to be heard above the noise. A tail-end IF filter does the same thing, but generally a bit better than will an audio filter.

The principal disadvantage of an audio filter is that it does not keep strong signals which are inside the IF-filter passband, but outside the audio-filter passband, from activating the receiver's automatic gain control (AGC) circuit and desensing the receiver.

Another disadvantage of audio-filter use is that the receiver audio output signal can overdrive the outboard filter and cause the signals to sound fuzzy or distorted. Care must be taken to keep the receiver audio gain at a low enough level to prevent overdriving the audio filter.

How a Filter Operates

Fig 1 shows three simple response curves for IF filters. In this example we have chosen 9 MHz as the receiver IF. Various intermediate frequencies are used by builders and manufacturers, so the filter frequency is not important in this discussion.

Fig 1A shows a typical response curve for a wide IF filter. Let's assume we are considering a 600-Hz CW filter. Notice the little dips in the response across the top (nose) portion of the curve. These depressions are known as filter "ripple." The smoother the nose the better the filter quality. If these dips are significant you can detect them on your S meter as you tune across a strong signal: the S-meter reading will fall at each dip. A poorly designed IF filter may have just one deep dip at the center of the filter nose.

Filter response is measured in decibels (*dB*). The −6 dB points (two) on the response curve identify the filter bandwidth. In other words, Fig 1A has a 600-Hz bandwidth between the X marks (−6 dB points) just below the nose of the curve. The farther the received signal is from the center frequency (f_c) of the filter, the weaker it sounds. This is because the farther down on the skirts of the response curve the signal is, the greater the rejection in dB.

Fig 1B enables us to compare the responses of wide and narrow CW filters. For our discussion we shall consider example B a narrow CW filter with a 250-Hz bandwidth. Now, let's consider interference rejection by comparing response curves A and B in Fig 1. The straight vertical line at the left in these examples represents an interfering signal nearby in frequency. Bear in mind that we have tuned in the desired signal so it falls at f_c on the nose of the curve. This is normal procedure (tune for maximum S-meter reading). In example A, the interfering signal is close enough to the filter f_c to be quite loud in the speaker. It is only 12 dB weaker than the desired signal. Now, look at Fig 1B. The same interfering signal is well down on the skirt of the response curve—approximately 40 dB weaker than the desired signal at f_c! The interfering signal may not be heard at all, depending upon how loud it would be if it were tuned in at the center of the filter response curve. Several interfering signals may appear within the filter passband. A narrow filter may eliminate all of them, or at least most of them. The wider the IF filter, the worse the interference problem in a crowded band.

Fig 1C illustrates the response of an ideal IF or audio filter: The nose is flat and the skirts are completely vertical. Most filters for amateur equipment have curves like those in A and B of Fig 1.

Interference problems are a real burden with a wide filter. An audio filter may be added to the receiver to alleviate this problem without the need to buy a narrow CW filter, but best results will be had when you add an accessory CW IF filter to the rig. The more poles the filter has, the narrower the skirts; this is a great help in reducing the effects of interference. A six-pole filter is better than a four-pole unit, and an eight-pole filter is better than a four- or six-pole filter. The cost increases with the number of poles. I use eight-pole, 250-Hz CW filters in all of my receivers.

Earlier, I mentioned a narrow SSB filter (1.8-kHz bandwidth). Although this filter may be helpful in reducing some interference, I have not found it beneficial in most situations. A 1.8-kHz filter, when used in

combination with receiver IF SHIFT, is more helpful than the 1.8-kHz filter by itself. Generally speaking, I do not feel this narrow phone filter is worth the investment for routine operating. For use in more rigorous conditions, such as DXing or contesting, it may well be worthwhile.

It is important to keep in mind that no matter how narrow the filter response characteristic, and no matter how steep the skirts may be, you will not get rid of interference that falls on the nose of the filter response curve. For example, if you have a 250-Hz CW filter and another station fires up just 100 Hz from your frequency, his signal may not be attenuated very much by the filter. However, you may be able to tune your receiver so that the interfering signal falls on the skirt of the filter, while still keeping the desired signal on the nose of the filter's response curve.

Fig 2 shows an IF filter response curve in relation to the location of the BFO (beat frequency oscillator) signal. Typically, the BFO is down 20 to 30 dB on the skirt of the curve. It is on one side of the response curve for USB and on the other side of the curve for LSB, as shown. A 2.4-kHz bandwidth is indicated between the −6 dB points on the curve. The BFO frequency is known also as the "carrier frequency," as noted in Fig 2. The ripple in this example is less than 1 dB.

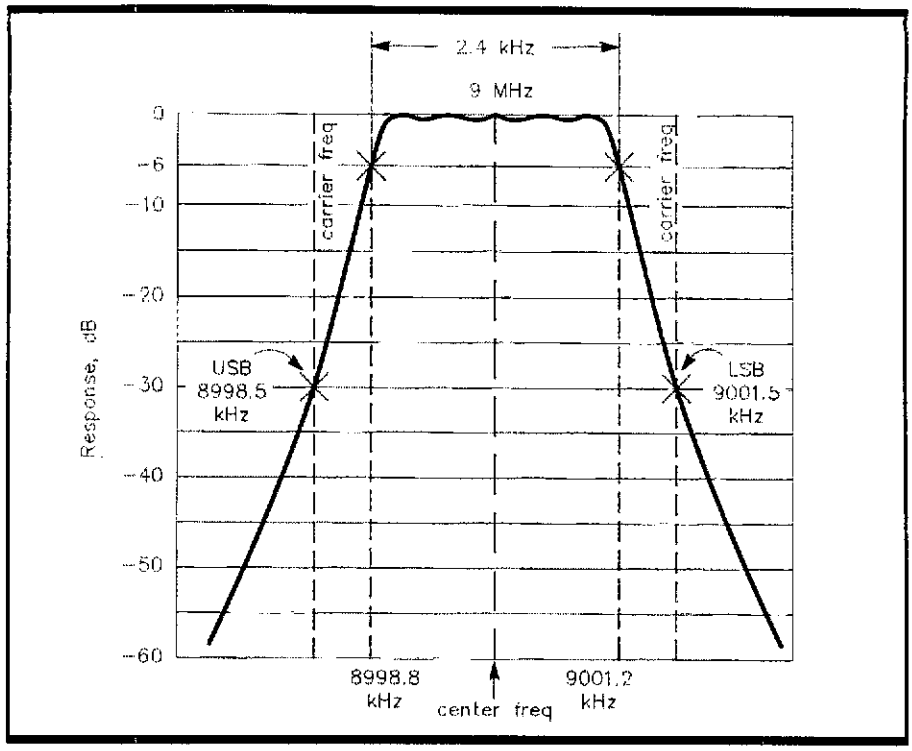


Fig 2—Typical response for a 9-MHz SSB filter showing the location of the carrier frequencies for upper- and lower-sideband reception. This filter has a 2.4-kHz bandwidth at the −6 dB points on the curve.

Operating with Filters

The effective use of active audio filters takes practice, so don't become discouraged if at first things go "bonkers" when you twiddle the controls of your filter. Here are some generic instructions for audio filters (consult the filter's operating manual for more information):

1. Tune in a CW or SSB signal (filter off) and do not change the receiver dial.

2. Turn on the filter and switch it to BAND PASS for CW or LOW PASS for SSB.

3. Adjust the FREQUENCY control for peak CW signal response or audio quality for SSB reception.

4. Adjust the Q or SELECTIVITY control slowly until the filter commences to ring on CW or the audio sounds tinny on SSB. Back the control off until this condition just ceases.

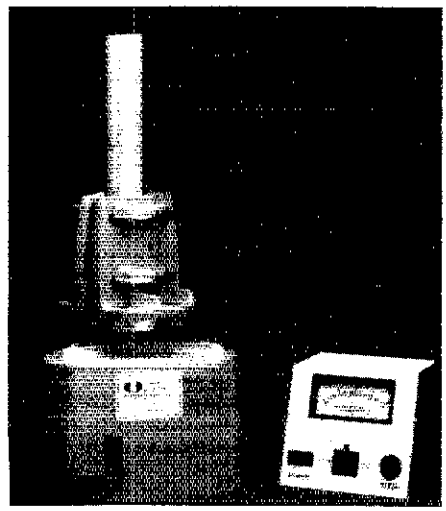
The FREQUENCY and SELECTIVITY controls may interact in some audio filters. If you notice this, you may need to slightly touch up the two controls for best signal quality and response. Active audio filters that have selectable, rather than continuously variable, FREQUENCY and SELECTIVITY settings are easier to use. You may wish to consider this when buying a filter.

When you tune in a CW or SSB signal while using a narrow IF filter, tune the receiver for maximum S-meter reading on the desired signal. This will place the desired signal at the approximate center of the nose of the filter response curve. If you don't have an S meter, tune for maximum signal strength as heard in your headphones or speaker.

New Products

ORION OR-2300 ROTATOR

☐ Orion Business International now manufactures a compact antenna rotator rated to handle a 25-square-foot load. The OR-2300 features variable-speed, worm-gear drive and a case compact enough to fit inside most popular towers. OR-2300 mast clamps have a self-centering guide and accept masts between 1¾ and 3-1/8 inches diameter. A built-in thrust bearing and bronze bearing absorb wind forces and minimize transfer of undesired loading forces to the gearing. The OR-2300 is available through Amateur Radio dealers.



Price class: $859. For more information, contact Orion Business International, Inc, PO Box 9577, Canoga Park, CA 91309, tel 818-888-4927, fax 818-888-5112.—*Rus Healy, NJ2L*

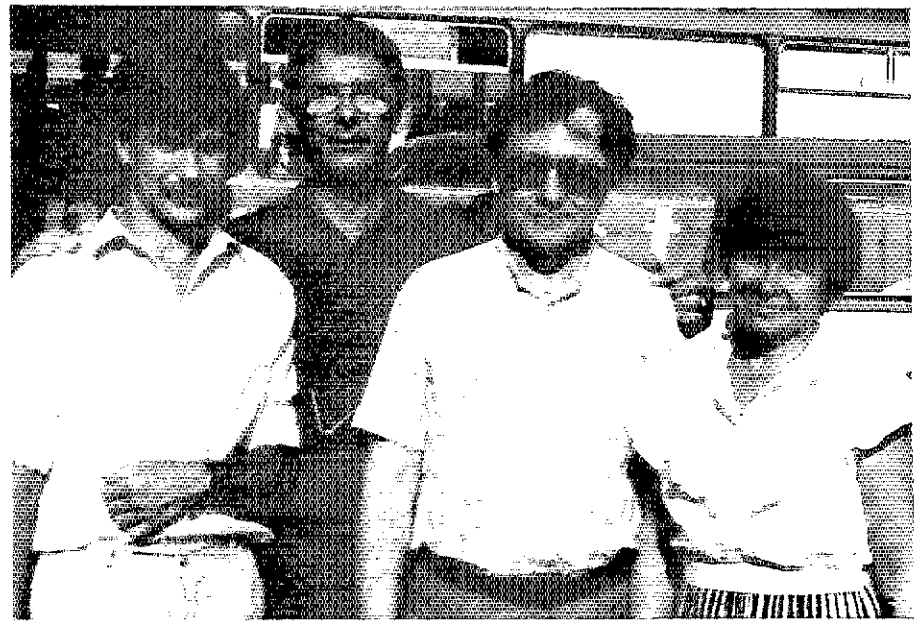
NEVADA TURNS COUNTER

☐ Kilo-Tec now sells the Nevada 48-turn-scale model TC-48 turns counter. The TC-48 is designed for panel mounting and for use with roller inductors or variable capacitors with ¼-inch shafts. Hardware and mounting instructions are included. Price: $25.50 each; quantity discounts available. For ordering or information, contact Kilo-Tec, PO Box 1001, Oak View, CA 93022, tel 805-646-9645.—*Rus Healy, NJ2L*

A Visit to the USSR

Amateur Radio is a great asset when taking a trip to another country. Here's the story of a visit to the Soviet Union that was made more interesting and rewarding by ham radio.

By Elliot Kleiman, WA4YDK
4400 Hillwest Dr #702
Hollywood, FL 33021



Igor, UT4UX; Elliot, WA4YDK; Nicholai, RT4UA; and Nick's XYL, Reisa, see the sights of Kiev. *(photos courtesy WA4YDK)*

It was vacation-planning time. After studying the possible DX locations to visit, my wife, Judy, and I decided on the Soviet Union. We would leave on July 9 to visit Moscow, Kiev, Yalta and Leningrad for two weeks. Since Moscow and Leningrad were reserved for meetings with others, Kiev and Yalta would be my targets for eyeball QSOs.

I started working as many Soviet stations as I could. Using an article by VK3ST in the June 1984 issue of *CQ Magazine*, I tried using Russian as suggested. Although my Russian wasn't very good, it seemed as if it was truly appreciated. I must have made over 100 QSOs.

Through the language barrier and the QRM, I set up my first possible eyeball QSO with Igor, UT4UX. I was to call a friend of his, Nicholai, RT4UA, and let them know at what hotel I was staying.

Later, I worked Nicholai, and Jerry, UT4UZ, who lived near Nicholai and Igor. I had many QSOs with Stan, RB5JZ, in Belegorsk, including one when I was bicycle mobile. Stan said he would meet me in Yalta. I also worked Victor, UA6LA, in Rostov. My last contact with him had been in 1984, when he sent me some books on the Russian language and a New Year's greeting card—all in Russian. Although he lives 600 km from Moscow, he said he would try to fly there or to Leningrad to see me.

Igor, UT4UX, operates the club station.

Jerry, UT4UZ, makes a contact.

Tanya and Judy enjoy the party at Igor and Tanya's apartment in Kiev.

On arrival in Moscow, we went through customs. There were some things that might have been considered contraband, but after reading the postcard from UA6LA, the inspector asked, "Gifts for Russian friends?" I nodded and he motioned to repack our bags and quietly said "Sorry." Thank you again Victor for your greeting card in Russian!

When we got to Kiev, I called Nicholai. He and Igor would meet us in front of our

(continued on page 75)

New-Ham Recruitment: From Pilot Project to Nationwide Program

One-on-one contact and follow-up between volunteers and recruits was a key to the success of Project Suncoast Seniors. A similar approach can work for you.

By Michael R. Riley, KX1B; Mary Schetgen, N7IAL; Rosalie White, WA1STO; Larry Wolfgang, WA3VIL, ARRL HQ

Last year, Project Suncoast Seniors, the ARRL pilot new-ham recruitment project hit the ground running (September *QST*, page 15). The volunteer efforts in Hillsborough and Pinellas Counties, Florida, were by far, the most innovative and dedicated seen in years. The hard work and positive results of these ARRL members were acknowledged by the ARRL Board of Directors during their 1989 Annual Meeting. Now it's your turn!

The localized pilot project is going national as of the ARRL Diamond Jubilee National Convention at Dallas/Ft Worth on June 2-4. This is your chance to go out and beat the proverbial bushes for new members of our fraternity. With the help of the Florida volunteers, the League has developed new recruitment tools targeting nonamateurs of all ages, which should allow you to sign up as many pledges as possible. Here is a summary of ideas that worked in Florida. Later in this article we'll describe some new additions to your recruitment toolbox.

What Worked in Florida?

Amateur Radio is *fun*! The volunteers determined that this premise should be foremost in all recruitment efforts. *How* it can be fun should be secondary. To quote an old sales motto, "Sell the sizzle, not the steak."

The one-on-one friendship and communication between an amateur and a prospective Novice is critical to the success of any recruitment project. People tackle the Morse code and theory to participate in a hobby and have fun. Continual one-on-one contact with prospective hams will substantially improve the chances of nonhams to persevere through the Novice class, pass the license exam, and then get on the air.

Several instructors preferred in-home tutoring, since it allows for more flexible class schedules for the instructors and students. Clark Evans, WA4DLL, says "Over the last 15 years, I have enjoyed helping people get into Amateur Radio. The people I enjoyed helping the most were the people having a problem. Helping them get through their problem areas and get an amateur license is one of the most rewarding things you can do."

New-ham recruitment seems to have struck a responsive chord in the target area. There was nearly a 20% increase in the number of hams involved in Elmering. By the early weeks of the project, between 100 and 150 prospective hams were attending Novice classes. Hams scheduled additional classes to handle the overflow of students. Several clubs are teaching classes for the first time in several years. Clubs are working as recruitment teams, referring prospective hams to each other to better help the students find nearby classes.

Primary ingredients of a successful project include enthusiasm, administrative support and a good product. Outstanding volunteers in this project provided tremendous amounts of enthusiasm. Ruth Hoffman, N4LMC, presented a program about Amateur Radio to a group of about 400 people in a meeting of "Super 60s" at her church. Among other things, Ruth also arranged for a taped radio interview with a news team from the World Service of the *Christian Science Monitor*.

Fred Barmore, AB4FF, regularly canvassed the radio and electronics stores in the Tampa area talking up Amateur Radio and leaving brochures. As a retired salesman, Fred knew just what to do. Fred stressed that the brochures were absolutely the most effective PR tool of all, and that volunteers should personally deliver them to store managers for best results.

Radio Shack store managers must have

Board Applauds Recruitment Efforts

The ARRL Board of Directors, at its 1989 Annual Meeting, adopted the following resolution (Minute 90):

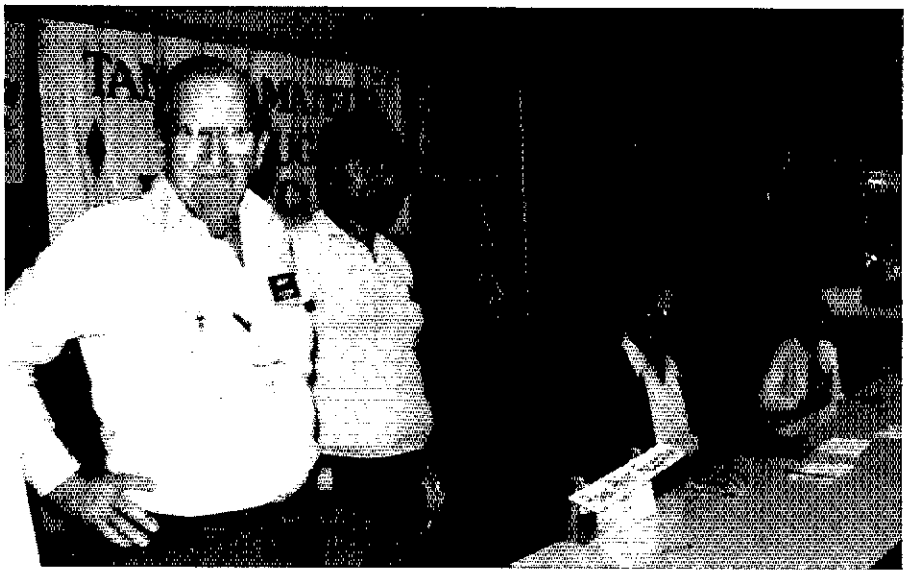
Whereas, the level of positive interest shown by ARRL volunteers involved in the ARRL New-Ham Pilot Recruitment Project in Florida was critical to the success of said project, and

Whereas, more than 130 volunteers enthusiastically supported and participated in the project, and

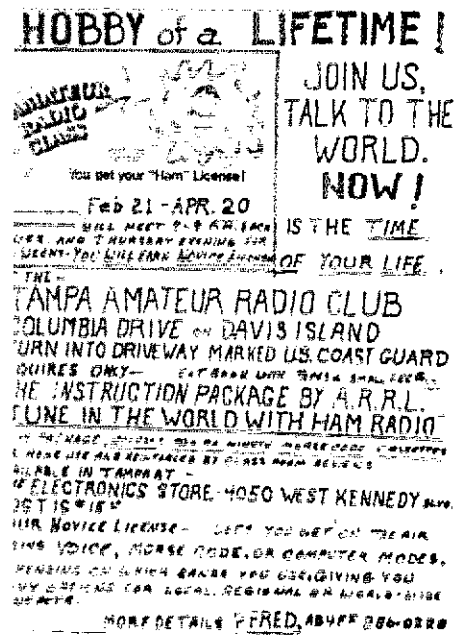
Whereas, the project, having been judged as successful, is to be developed into a nationwide program, now therefore,

Be it resolved by the ARRL Board of Directors, in Annual Meeting assembled, that the ARRL volunteers in Florida who participated in the ARRL New-Ham Pilot Recruitment Project are to be commended for their efforts and recognized as the pioneers of the ARRL New-Ham Recruitment Program.

Nolan Baker, W4VXF, teaches a classroom full of prospective hams during Project Suncoast Seniors. *(W4VXF photo)*



Fred Barmore, AB4FF; Wes Jones III, KA4LBU; Gordon Callender, WB4RHY; and Elsie Callender representing Amateur Radio at the 1989 Florida State Fair. *(photos courtesy AB4FF)*



Talk about American ingenuity! AB4FF made the most of posterboard at the Florida State Fair.

approval from their district managers before they can accept brochures for display in their store. The Educational Activities Branch (EAB) at ARRL HQ will forward to Radio Shack National Headquarters specific requests for each store where you would like to display brochures. Please be sure to list the store name (location) with your request when writing to EAB.

Director Frank Butler, W4RH, Frank Ziegler, K4EUK, and other local volunteers manned Amateur Radio booths at two senior festivals in Tampa, Florida. Over 50 interested people asked for more information about our hobby and about enrolling in a Novice class.

ARRL HQ Supports Your Recruitment Ideas

Brochures

When new-ham prospects ask for more information, wouldn't it be nice if the League supplied a good-looking recruitment brochure, written specifically to explain ham radio to a nonham? Presto! A brochure was tested in Florida. Three new recruitment brochures are now available from ARRL HQ. There is a space on the back of each brochure for listing a local contact person, or attaching a business card for a more professional appearance. The brochures are designed to target youth, 20- to 50-year olds, and those over 50.

Posters

A recruitment program must be advertised to be successful. In this area, the League has printed an eye-catching 17- × 22-inch new-ham recruitment poster. This poster design should appeal to senior prospects. It is suitable for any unused wall or bulletin board at electronics stores, groceries, schools, churches, and community centers. The poster has a space for clubs to list the name of a local contact person. We are considering the design of similar posters aimed at other age groups.

Guidebooks

Early in the pilot project, volunteers were asked what information they needed to make their efforts more successful. In response to their requests, a new-ham recruitment guidebook was written and given to the volunteers. Based on their experience, the volunteers provided extensive feedback for improvements to the guidebook. With this input we have improved the guidebook and revised it for national use, with you, the volunteer, in mind.

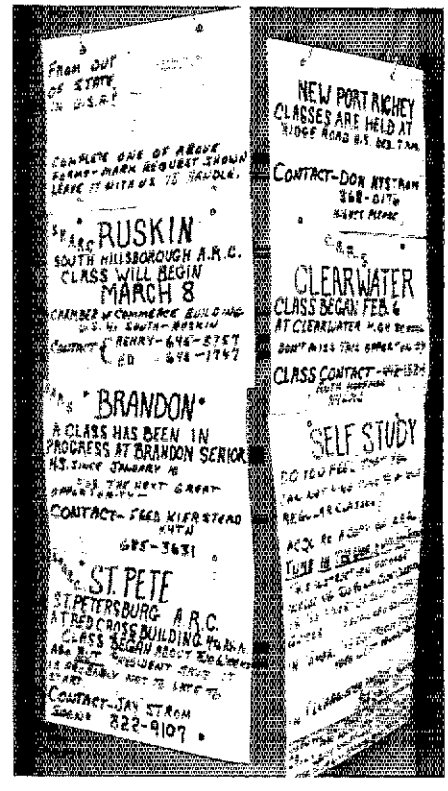
Materials Available for You Now

The new guidebooks, posters, and brochures are available in limited quantities from the Educational Activities Branch (EAB) at ARRL HQ. Send EAB a letter explaining how you will begin a coordinated recruitment program in your area, and we'll be glad to help get you started!

If you're interested in developing a recruitment program and are planning to attend the 1989 ARRL Diamond Jubilee National Convention, you're in for a special treat! New-ham recruitment materials will be available at the convention. Fred Barmore, AB4FF, one of the spark plugs of the pilot project in Florida, will be speaking during the ARRL 1989 Educational Workshop on June 3.

Conclusion: Volunteers Made This Work

One of the most important lessons learned during the new-ham pilot recruitment project was that brochures, posters, and guidebooks alone will not bring new people into our hobby. A successful recruitment program depends, to a great extent, upon the initiative, hard work, and dedication of volunteers who are willing to give something back to a hobby that has given them enjoyment. If you'd like to be part of such a vital and exciting program, let the Educational Activities Branch at ARRL HQ know. We have the tools you'll need.



The Florida State Fair crew thought of everything, including the listing of local Novice classes and self-study hints.

Mike Riley, KX1B, chaired the ARRL HQ Task Force for Project Suncoast Seniors during his tenure as Assistant to the Executive Vice President at ARRL HQ. He is currently employed by the American Red Cross.

The Regional Scholarship—FEMARA Leads The Way!

Here's an excellent example of what a joint club effort can accomplish—and a challenge for clubs in your area.

By Mary E. Schetgen, N7IAL
Secretary
The ARRL Foundation, Inc

In the one year that your Foundation has been meeting with you via this column, you've heard a lot of news about scholarships—their sponsorship, funding and awarding. While the idea of group-sponsored regional scholarships has long seemed an excellent idea to us, we've only recently begun to work with groups whose intent is to sponsor and fund scholarships to benefit hams in their regional areas.

Naturally, it would be helpful to see how the Terms of Reference for a regional scholarship differ from other scholarships we offer. There are two main distinctions:

1) A regional scholarship is *exclusive* to the region offering it and is open for application *only* to those students living in that geographic region.

2) Regional scholarships are often a *joint-club effort* when preference for regional applicants is stated as a condition of award eligibility. Clubs working together can mobilize interest in the scholarship that exceeds an individually sponsored effort. Clubs and associations can use the proceeds from jointly sponsored activities to fund their scholarships, typically resulting in a larger fund base. Also, the local media is attracted to publicizing large-scale group efforts that provide educational opportunities of a state or regional nature. A united ham effort is always newsworthy!

We've provided the Terms of Reference for the new FEMARA Scholarship as a model should your club council or federation want to sponsor a scholarship.

The New England FEMARA Scholarship

Established in 1989 by the Federation or Eastern Massachusetts Amateur Radio Associations, sponsors of the New England ARRL Conventions since 1959, this scholarship is intended to assist New England hams wishing to further their education whether in a two- or four-year college or an accredited trade school. Mail or TV courses are not acceptable. Funds may be used for tuition, room, board, books and /or other fees essential to the advanced education of the recipients.

Applicant requirements:

1) Applicant must be a high school senior or graduate, a current resident of one of the six New England states and the holder of a valid Technician or higher amateur license.

2) Academic merit, financial need and a demonstrated interest in community or school interests will be considered highly important in selecting a recipient.

3) Up-to-date, official transcripts of secondary school and other work must be provided. Newspaper clippings or other reference to community or school service would be helpful.

4) This scholarship is open to all regardless of race, religion, sex or national origin. The applicant must be a citizen of the United States of America or be within three months of receiving American citizenship. The ARRL Foundation Scholarship Committee shall consider all qualified applicants. Upon the Committee's recommendation, the Board of Directors of the Foundation shall disburse funds for the award at the start of the academic year.

The scholarship shall consist of as many $600 awards each year as income permits. No awards need be made, if, in a given year there is no qualified candidate.

SAREX UPDATE

With approval by NASA on March 14, the Shuttle Amateur Radio Experiment (SAREX) is scheduled to be included on the STS-35 Mission and operated by Shuttle astronaut Ron Parise, WA4SIR. Voice and packet-radio communications will be the predominant operating modes, and any ham owning a scanner and living between 46 degrees north and 46 degrees south latitudes should have no trouble hearing them. For additional details see Happenings in this issue, page 63.

WE STAND CORRECTED

Atlantic Division Director Hugh Turnbull, W3ABC, a leading force with the Foundation For Amateur Radio (FAR), has pointed out that scholarships offered by the Quarter Century Wireless Association are administered exclusively through FAR, making it even easier to apply, plus saving you an extra stamp!

A reminder: As we have just now closed the 1989-90 scholarship season, it's not too early to start sending for 1990-91 scholarship applications. Improve your chances for receiving a scholarship by applying to as many programs as early as possible. See

Talk about youth incentive! Here Barrett Amos fine tunes a signal for brother Duncan Amos, whose glazed expression might suggest a rare DX find or contest coup. As dad Alan Amos, KN1O, proudly commented, "Who says you can't get kids interested in the hobby?" Certainly *not* us! *(photo courtesy KN1O).*

April 1989 *QST*, page 57, for a listing of where to apply.

MYSTERY SOLVED! EXPERT NAMED!

In April *QST*, we posed a question to our readers about the nature and function of a mysterious box pictured on page 56. We knew that in all of hamdom, there would be a few brave souls who would not only venture a guess, but would get downright detailed in their explanations about the gadget's use. We're gratified to learn just how closely some of you follow our technical articles, for several sharp-eyed respondents remembered having seen this device, right here in this column, just two months earlier (see Feb 1989 *QST*, page 62).

That's right—the box was the chassis and innards of the control unit and power supplies for the Robot 1200 SSTV system used in the last Foundation-sponsored SAREX mission. Respondent Vic Gomez, W4DN, commented that this trivial pursuit might be an April Fool's joke and suggested hanging this editor up by the thumbs (ouch!). However, our thanks go to Jim Miccolis, N2EY, of Upper Darby, Pennsylvania for his very correct (and early) answer. We crown him the "Definitive Expert." Should you work Jim on the air, show a little respect!

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Jesse Bieberman Meritorious Membership Fund

Arnold Cohen, KF7MK
Mr. Cohen comments: Jesse was a very active sponsor of a model airplane club that I was in during the 1930s. He also first exposed me to Amateur Radio. I have many fond memories of him.

The Goldwater Scholarship Fund

Arizona Repeater Association, Inc
in memory of Dee Southard, N7FVO, Kirk Kirshoff, WA7KQE, Betty Kaiser, WA6HRX, Robert Berge, W7DNR, and Angus MacDonald, KA7EUI

The FEMARA Scholarship Fund

Federation of Eastern Massachusetts Amateur Radio Associations

The PHD Scholarship Fund

PHD Amateur Radio Association, Inc (MO)
Delia Miller
on behalf of Charles U. Miller, WØLQM

The General Fund

Clifford W. Clifford, Jr, W6QMY
in memory of G. Wesley Parr, W6BWG.
Harry D. Bradshaw, W4TPB
William Royal, KA4ZYK
Fred E. Evans, W1JFF
Robert J. Gagne, K1OKX
in memory of Edward G. Olson, W1FZS
Vincenzo Belloni, IØKWX
Emil Calise, KE2R
John Thornton, WA8HQD

As received and acknowledged during the month of **March.**

Product Review

(continued from page 41)

tion receives messages sent in the forward-error-correcting (FEC) mode.

Weather Facsimile Reception

Equipped with version 2.8 software (and subsequent versions), the KAM provides weather FAX reception. A separate terminal program for your computer is required to copy these pictures. In FAX mode, the KAM continuously samples the audio input from the radio, and presents that data to the computer. The computer terminal program must receive the data and use it to turn on and off screen pixels to form the picture.

The manual addendum that comes with the version 2.8-equipped KAMs includes some information about writing your own program to display FAX pictures. Writing such a program is beyond my BASIC programming skills! Kantronics has programs for the IBM PC and compatible computers and for the Commodore 64 and 128 computers. Neither of these programs were included in the review package, so I didn't use the FAX feature of the KAM. Based on the way all of the other KAM features work, I have every reason to believe that the FAX portion of the unit also performs as described.

Summary

I found the KAM to be fun and easy to operate. I enjoyed trying all of the various modes. My wife, Jean, is also licensed; she's WB3IOS. After Jean tried packet-radio operation, I was constantly competing with her for time to use the KAM. In fact, she was more likely to check bulletin boards and send messages than I was. She made several new ham radio friends through her packet-radio activity, and has become more interested in trying other modes.

I initially experienced some minor problems getting all of the packet-radio parameters set for compatibility with my computer and radios. I think this is normal; you have to experiment with some parameters to find the proper settings. Once those parameters were set correctly, everything worked fine.

One other minor annoyance that I ran into was caused by my three sons playing computer games on the KAM's host computer. I allowed the boys to turn off the terminal program when they wanted to play games, but we occasionally forgot to reboot the terminal program when they finished. I left the KAM on continuously to monitor activity. The KAM stores all this received data in its internal memory until the terminal program signals that it is ready to receive information. If the KAM memory fills, the unit locks up and you can't send it any commands. Turning off the KAM for a few seconds was the only way I could regain control of the unit. Of course, this action resets any parameters not PErmed, and wipes out anything in the Personal Packet Mailbox. I believe the optional RAM battery backup would prevent the loss of operating parameters and PBBS information. Based on this, I recommend that option.

If you are looking for a packet-radio TNC, but think you'd like to try some other digital modes as well, the Kantronics All-Mode communicator is worth consideration.

Manufacturer: Kantronics, Inc, 1202 E 23 St, Lawrence, KS 66046, tel 913-842-7745. Price class: $300.

Feedback

☐ In the May 1989 Product Review column (p 54), the caption for Fig 4 contained incorrect information. The caption should have read:

Worst-case spectral display of the ARD 230A amplifier. Power output is 1490 W at 3.5 MHz. Horizontal divisions are each 5 MHz; vertical divisions are each 10 dB. All spurious and harmonic emissions are at least 50 dB below the fundamental output (−50 dBc). The ARD 230A meets current FCC spectral-purity requirements.

We apologize for any inconvenience caused by this error.

Happenings

Conducted By Phillip Sager, WB4FDT
Editorial Manager, Regulatory Information Department, ARRL

Part 15 Low-Power Devices Ruling Adopted—Includes Four Ham Bands!

On March 30, the FCC adopted a First Report and Order in General Docket 87-389, amending Part 15 of its rules governing radio-frequency devices, which, because of their low power, are not required to be licensed.

The Order was released April 18 and there's good news, bad news and ghastly news. The good news is that the leakage permitted from some nonintentional radiating devices (a broad class of devices including radio and TV receivers, VCRs, stereo equipment and the like) will have to be reduced to the more stringent limits now permitted Class B computing devices which are used in the home.

The bad news is that noncompliant devices of this type are "grandfathered" for ten years! Existing TV tuners, for instance, can be designed, built and sold for another decade, having to observe only today's radiation limits. Though the FCC didn't say a word about RFI to consumer devices, the improvements eventually made in front ends of TVs and VCR/TV combinations should result in improved RF rejection, and thus less likelihood of RFI complaints, but we'll have to wait until the next century to know!

The ghastly news is that the FCC adopted seven new "consumer bands" where intentional radiating devices, such as home security systems, garage door openers, wireless stereo speakers and TV "wireless rabbits" (devices which transfer programs to other TVs and VCRs throughout the house) may operate with higher power than otherwise would be permitted. Four of the specified bands, supposedly selected because Industrial, Scientific and Medical (ISM) devices already operate there, are allocated to the Amateur Service on a primary or secondary basis.

These bands are: 902-928 MHz, 2400-2483.5 (the amateur band here is 2390-2450 MHz), 5725-5875 MHz (hams have 5650-5925 MHz) and 24.00-24.25 GHz (of which 24.00-24.05 is exclusively amateur, the remainder shared).

Existing intentional radiating devices which do not comply with the new technical limits are grandfathered for three years in the design phase, five years for importing and marketing. The new devices, including "TV rabbits" and remote speakers, must comply with the standards set out in the Order from the start.

RFI issues are not effectively dealt with in the Report and Order. Manufacturers are not required to include instructions on dealing with interference in consumer guides furnished with their equipment. The only gesture the FCC made toward warning the public about interference is a label saying the device must not cause interference to a licensed radio service and must accept interference which occurs to it from such services. The second part of this label is not required on radio and TV receivers. In any case, simple labeling will do little to appease consumers experiencing RFI interference.

Two days after the FCC Order was adopted, the ARRL Executive Committee voted to seek reconsideration and to seek whatever injunctive relief is necessary to protect amateur interests.

NASA APPROVES SAREX II PROPOSAL

ARRL HQ and AMSAT have received official notification from NASA that the joint ARRL/AMSAT "SAREX II" proposal to provide for Amateur Radio communications on board the Space Shuttle has been accepted.

In a letter dated April 7, NASA Associate Administrator for Communications William Sheehan states that "every effort will be made to respond to your request for first flight on mission STS-35 where mission specialist Dr. Ron Parise [WA4SIR] is available and has agreed to operate the experiment." Mr Sheehan concludes, "Previous amateur radio experiments flown on the space shuttle were very successful, and generated a high degree of public interest. We have every confidence that this new initiative will be even more successful."

AMSAT TO PUBLISH AO-13 BEGINNERS GUIDE

AMSAT-NA announces the availability of a new publication, *AMSAT-NA AO-13 Beginners Guide*, authored by Keith Berglund, WB5ZDP. This guide was written specifically with the first time AO-13 user in mind, and is designed to answer those questions which all beginners have. All aspects of putting a satellite station together are discussed.

Keith designed the *Guide* starting from "antennas down:" antennas, rotators, preamps and coax. He covers equipment currently available, as well as suggestions for laying out a "typical" station.

The *Guide* includes a list of all the AMSAT-NA Regional and Area Coordinators. This was included so the beginner will have additional sources of information and, if the coordinator lives nearby, can also see an operational AO-13 station. The *Guide* is available to all new and renewing AMSAT members.

HRO ACQUIRES EGE

Effective March 1, HRO, Inc (Ham Radio Outlet) purchased EGE Inc. The former EGE stores in Woodbridge, Virginia and Salem, New Hampshire will become part of the Ham Radio Outlet chain, now totaling nine stores nationwide.

1989 DAYTON AWARD WINNERS NAMED

The Dayton Amateur Radio Association (DARA) HamVention® Awards Committee has named Bill Pasternak, WA6ITF, as its 1989 Radio Amateur of the Year. Pasternak was chosen, according to HamVention General Chairman Bill McNabb, WD8SAY, based on "his continuing interest in the promotion of Amateur Radio, his direct participation in the Westlink Amateur Radio News, as the author of Amateur Radio articles and books and as the producer of Amateur Radio related videos including *The New World of Amateur Radio*..."

Chosen as the winner of the Technical Excellence Award is Byron Goodman, W1DX. Goodman was honored for his involvement in the early days of the development of Amateur Radio single-sideband communications and for his contributions to the ARRL DXCC program.

The 1989 Specific Achievement Award goes to Phil Karn, KA9Q. This award recognizes an individual who has made many significant contributions to the Amateur Radio Service.

Phil is a long-time AMSAT member and has been deeply involved in the Phase 3 program and the Phase 4 Geosynchronous Satellite design effort. Phil also serves on the Board of Directors of AMSAT-NA and TAPR.

Most recently Phil has been involved with introducing a packet-radio protocol known as TCP/IP to Amateur Radio.

FCC CHAIRMAN RESIGNS

FCC Chairman Dennis Patrick has written President Bush saying that "the time has come for me to return to the private sector." Patrick indicated that it was his intention to continue to serve as Chairman until his successor was confirmed by the US Senate. Patrick cannot leave immediately since his departure would leave the FCC without a quorum (missing 3 of its 5 Commissioners), rendering the Commission unable to conduct business.

Patrick, 37, joined the FCC from the White House personnel office in 1983.

Patrick says he has no firm plans other than that he does not wish to continue government service, but prefers to reenter the private sector.

JOHN KAMP NAMED FCC INSPECTOR GENERAL

The FCC has named John Kamp, currently Director of the Office of Public Affairs, the FCC's first Inspector General (IG).

Kamp's new duties will be to conduct and supervise audits and investigations relating to the programs and operations of the FCC. The IG will recommend policies designed to promote economy, efficiency and effectiveness, as well as to prevent and detect fraud and abuse in agency programs.

Kamp joined the FCC in 1980 and has previously served on the personal staff of former Chairman Mark Fowler.

PHIL SAGER, WB4FDT, LEAVES HQ

Phil Sager, WB4FDT, who has conducted the Happenings and League Lines columns in *QST* for over 3 years, is leaving HQ to attend graduate school at Louisiana Tech University in Ruston, Louisiana. Phil also edited the *ARRL Letter* in 1986-87, and has been in charge of keeping *The FCC Rule Book* up-to-date since coming to HQ in 1986. During the mid-1970s, Phil worked in the former Amateur and Citizens Division of the FCC in Washington, DC; he served as Virginia Section Manager from 1982-84.

JAY MABEY, NUØX, NEW *REPEATER DIRECTORY* EDITOR

Jay Mabey, NUØX, has taken over as Editor of the ARRL *Repeater Directory* effective May 1. Past Editor Bart Jahnke, KB9NM, has moved to Manager, ARRL VEC. The job of Editor for the *ARRL Letter* will now be handled by Tom Hogerty, KC1J.

Jay's responsibilities as *RD* Editor include upkeep of the national database (established at HQ for use by Repeater Frequency Coordinators throughout the country to update their information) and editing the ARRL *Repeater Directory*. Good luck to all in their new challenges.

FCC-ISSUED CALL SIGN UPDATE

The following is a list of the FCC's most-recently issued call signs as of April 1.

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
Ø	WSØI	KFØBV	NØKJD	KBØEFB
1	NV1Y	KC1OA	N1GKL	KA1TMF
2	WN2Z	KE2MA	N2JDT	KB2HLH
3	NU3H	KD3ME	N3GYP	KA3UJR
4	AB4NO	KM4QA	N4VHV	KC4JSH
5	AA5LA	KG5SW	N5ODB	KB5IWZ
6	AA6ND	KJ6RY	N6URD	KC6COG
7	WY7T	KF7SN	N7MMK	KB7HHI
8	WQ8O	KE8XO	N8KNX	KB8GUB
9	WG9L	KE9PH	N9IHE	KB9CID
Guam	KH2K	AH2CE	KH2DS	WH2AMA
Hawaii	**	AH6JT	NH6ST	WH6CCJ
Alaska	**	AL7KY	NL7QW	WL7BUH
USVI	NP2E	KP2BO	NP2CX	WP2AGQ
P.R.	**	KP4PY	WP4UY	WP4IHS

**Indicates that all 2 × 1 call signs have been assigned in those areas.

U4MIR/U5MIR QRT

Soviet cosmonauts Alexander Volkov, U4MIR, Sergei Krikalev, U5MIR, and Varery Polyakoav packed their bags and returned to Earth at 6:59 AM Moscow time April 27.

The MIR space station had been experiencing problems with its electrical system, and until a repair crew can return in August, will remain in a "parking" orbit of 500 km. This is only the second time the Soviet space station has been unmanned since its launch in February 1986.

A REMINDER FROM MEXICO

It always starts this way. HQ receives a simple telephone call alerting staff to a natural disaster that has just occurred somewhere on the globe. Then, depending on the degree of impact on human beings in and around the disaster area, staff and the amateur community marshal forces to deal with it. From establishing communications channels in support of damage assessment and disaster relief agencies to assisting the media, Amateur Radio plays a major role in most events.

This time, it was a telephone call from Art Feller, KB4ZJ, communications specialist with the Office of US Foreign Disaster Assistance, on Tuesday morning, April 25, to report that an earthquake measuring 6.8 on the Richter scale had struck an area 40 miles east of Acapulco, Mexico, at 10:29 AM Eastern Time. Art asked staff to monitor 15 and 20 meters to gather information from any amateurs in or near the stricken area. Mike Riley, KX1B, a staff member of the Red Cross Headquarters in Washington also called, confirming Art's information.

Humanity was fortunate, this time. Monitoring revealed that the quake hit a remote, sparsely populated area and that there were no reports of injuries or damage according to XE1RFM, an amateur operating near Mexico City. His sources for this information were local radio broadcasts and 40-meter nets. He also reported that there was normal telephone communication in Acapulco, Cuernavaca, Mexico City, Veracruz, Orizaba, and Tuxtla Gutierrez.

A false alarm, but the event gave HQ staff a chance to test its ever-evolving emergency response plans. It also served as a poignant reminder of the shape of things not so benign to come: it's the beginning of hurricane season.

LT GEN FRANCIS H. (BUTCH) GRISWOLD, KØDWC, SK

Air Force Lt General Francis H. "Butch" Griswold, KØDWC, became a Silent Key recently. General Griswold enlisted in the Army Air Corps in 1929 and, after his promotion to Major General in 1946, was Commander of the Third Air Force in Britain.

During the mid-50s, KØDWC and Gen Curtis Le May, W6EZV, put some Collins ham gear in an Air Force plane and flew around the world while keeping in touch with Offutt AFB, Omaha, Nebraska, via Amateur Radio. This project proved the concept of HF SSB for Air Force use, and allowed conversion to this mode without extensive research and development costs to the government.

The amateur community will miss KØDWC. (Tnx to Richard M. Seamon, W3IUS, for the information.)

WHAT'S HAPPENING WITH PRB-3?

ARRL Executive Vice President David Sumner, K1ZZ, told the ARRL Executive Committee at its April 1 meeting in Kansas City that no FCC action had been taken on the possible privatization of amateur call sign assignments (PRB-3), and the likelihood of positive Commission action is waning with the passage of time.

ARRL has reaffirmed its interest in, at minimum, finding a way to resume issuance of club and special-event station call signs.

AUDITED ARRL FINANCIAL STATEMENTS RELEASED

The audited financial statements reprinted below set forth the League's financial condition as of December 31, 1988, as compared to a year earlier. The statements show a net loss of $483,468 on total revenues of $8,724,175 for the calendar year 1988.

The financial statements and supplementary financial information will appear in the 1988 *Annual Report*, which will be available in July. Affiliated clubs that return the request form sent to them in April will be reveiving a copy of the *Annual Report* as soon as it is received from the printer; members may obtain a copy for a $1 postage and handling fee.

One Financial Plaza
Hartford, CT 06103

Telephone (203) 240-2000

Price Waterhouse

REPORT OF INDEPENDENT ACCOUNTANTS

March 24, 1989

To the Board of Directors of
The American Radio Relay League,
Incorporated

In our opinion, the accompanying balance sheet and the related statements of revenues, expenses and changes in fund balance and of changes in financial position present fairly the financial position of The American Radio Relay League, Incorporated at December 31, 1988 and 1987, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles. These financial statements are the responsibility of the Company's management; our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with generally accepted auditing standards which require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for the opinion expressed above.

Our audits were made for the purpose of forming an opinion on the basic financial statements taken as a whole. Schedules I - III are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the audits of the basic financial statements, and in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

Price Waterhouse

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

BALANCE SHEET

	December 31, 1988	December 31, 1987
Assets		
Current assets:		
Cash (including time deposits of $809,754 and $404,791 in 1988 and 1987, respectively)	$ 915,074	$ 968,511
Accounts receivable (less allowance for doubtful accounts of $5,000 in 1988)	629,997	483,461
Accrued interest receivable	15,104	66,638
Inventories	513,552	476,081
Prepaid expenses	142,964	33,334
Total current assets	2,216,691	2,028,025
Life membership assets:		
Marketable securities, at cost	3,874,050	3,331,274
Due from current operations	283,488	693,174
Accrued interest receivable	94,507	40,753
Life membership plaques	-	13,100
	4,252,045	4,038,301
Regular portfolio marketable securities, at cost	1,229,643	2,148,924
Land, buildings and equipment, net of accumulated depreciation	1,424,873	1,193,055
Other assets	50,651	55,969
	$9,173,903	$9,464,274

	December 31, 1988	December 31, 1987
Liabilities and Fund Balance		
Current liabilities:		
Payable for publishing	$ 123,943	$ 110,432
Accounts payable - other	155,539	417,728
Accrued liabilities	461,434	426,084
Deferred term membership fees and subscriptions - current portion	1,479,022	1,431,788
Current portion of note payable	80,000	
Total current liabilities	2,299,938	2,386,032
Deferred membership fees and subscriptions - non-current portion:		
Life members	4,222,045	4,038,301
Term members	338,715	337,375
	4,560,760	4,375,676
Due to life membership assets	283,488	693,174
Borrowings under life insurance policy	-	30,500
Note payable	246,667	-
Contributions restricted by donors	332,094	83,468
	862,249	773,142
Total liabilities	7,722,947	7,534,850
Fund balance:		
Designated -		
Amateur Radio Artifacts	91,159	94,359
Defense of Amateur Radio Frequencies	105,000	105,000
Undesignated	1,249,802	1,730,070
Total fund balance	1,445,961	1,929,429
	$9,173,903	$9,464,279

STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND BALANCE

	Year ended December 31, 1988	Year ended December 31, 1987
Advertising revenue	$2,225,182	$2,052,131
Publications sales	2,710,092	2,440,545
Less: Sales returns, allowances, discounts and credit card collection charges	51,659	78,314
Net sales of publications	2,658,433	2,362,231
Membership dues and subscriptions to QST magazine:		
Term members	2,464,169	2,749,033
Life members, including net investment income of $207,914 and $206,324 in 1988 and 1987, respectively	336,789	331,668
Total membership dues	3,300,958	3,080,701
Interest, dividend and royalty income	198,046	206,435
Membership supplies sales	87,202	157,551
Examination fees	111,973	107,417
Contributions	93,932	6,418
Gain on sale of investments	3,804	12,682
Overseas QSL service income	39,670	25,051
Other	24,975	50,661
Total revenues	8,724,175	8,056,238
Expenses:		
Operating expenses	8,831,746	7,499,229
Administrative expenses - other expenses authorized by the board of Directors	375,897	431,960
Total expenses	9,207,643	7,931,189
Excess (deficiency) of revenues over expenses	(483,468)	125,049
Fund balance beginning of year	1,929,429	1,734,340
Fund balance end of year	$1,445,961	$1,929,429

STATEMENT OF CHANGES IN FINANCIAL POSITION

	Year ended December 31, 1988	Year ended December 31, 1987
Cash and time deposits were provided by (used for):		
Operations:		
Excess of revenues over expenses	$ (483,468)	$ 125,049
Items not (requiring) providing cash:		
Net gain on sale of investments	(3,804)	(12,682)
Depreciation	228,790	186,013
Change in other assets	5,318	10,815
Increase in receivables	(95,003)	(86,398)
Change in prepaid assets	(109,630)	35,066
Change in inventory	(37,471)	(187,382)
Change in current liabilities	(86,846)	249,966
Change in deferred membership fees and subscriptions - non-current portions:		
Term members	1,340	20,186
Life members	184,744	56,216
Net increase in contributions restricted by donors	263,626	5,586
	(142,651)	302,429
Financing activities:		
Repayment of debt	(36,500)	(5,477)
Net borrowings under note payable	246,667	
	210,167	(5,477)
Investing activities:		
Change in other life membership assets	329,032	(516,351)
Change in due to life membership assets	(409,686)	339,532

Net proceeds (purchases) of investments:		
Regular portfolio	923,090	1,153
Life membership portfolio	(546,776)	465,496
Purchase of furniture and equipment	(460,808)	(476,481)
	(120,948)	(127,035)
(Decrease) increase in cash and time deposits	(53,437)	389,964
Cash and time deposits, beginning of year	968,511	578,547
Cash and time deposits, end of year	$ 915,074	$ 968,511

NOTES TO FINANCIAL STATEMENTS

NOTE 1 - ORGANIZATION AND SIGNIFICANT ACCOUNTING POLICIES:

The American Radio Relay League, Incorporated (The League) is a not-for-profit, tax-exempt organization formed to promote interest in amateur radio communication and experimentation. The League publishes documents, books, magazines, newspapers and pamphlets necessary or incidental to its purpose.

The following is a summary of significant accounting policies consistently followed in the preparation of the League's financial statements.

Income Recognition - Revenue from term membership fees and subscriptions is recognized to the extent of acquisition costs when memberships and subscriptions are received. The remaining portion is recognized in revenues on the straight-line basis ratably over the applicable membership or subscription period.

The League recognizes income on donated capital based on the fair market value of the item at the date of donation.

Deferred Life Membership Fees - The by-laws of the League provide for a paid-up life membership in the League for a fee of twenty-five times the annual dues rate. Life membership dues are invested in assets segregated from the regular portfolio. The dues and interest earned on these segregated investments are deferred and recognized in income over the estimated life expectancy of the respective members (approximately 36 years). The amount recognized over the estimated life expectancy is representative of the cost to the League of servicing the life memberships.

Income Tax - The League is exempt from federal income taxes under Section 501(c)(3) of the internal revenue code. The League is subject to any federal income tax due as a result of unrelated business income arising primarily from advertising revenues in the QST Magazine.

Investments - Marketable securities are carried at cost. The League intends to hold fixed income securities until maturity, and as a result does not provide for a reduction in the carrying value of the investment portfolio for any excess of book value over the estimated market value unless such difference represents a permanent impairment of value.

Inventories - Inventories are carried at the lower of cost or market, cost being determined using the first-in, first-out method.

Land, buildings and equipment - Land, buildings and equipment are recorded at cost. Depreciation is computed on the straight-line method for assets purchased prior to January 1, 1981. For assets purchased after that date, an accelerated depreciation method is used. Buildings are depreciated over a 40 year life. Furniture and equipment are depreciated over their estimated useful lives ranging from 3 to 8 years.

Pension Plan - The League has a noncontributory group annuity retirement plan which covers full-time employees. Benefits are based upon years of service and compensation. It is the policy of the League to fund pension cost as accrued. The assets of the plan are primarily invested in a group annuity contract with CIGNA which executes investment transactions and pays all benefits. Effective January 1, 1988, the League adopted Statement of Financial Accounting Standard No. 87, "Employers' Accounting for Pension" (FAS 87) - see Note 6.

NOTE 2 - INVENTORIES:

Inventories are comprised of the following:

	December 31, 1988	December 31, 1987
Booklets	$329,101	$300,119
ARRL Handbook	111,433	97,858
Membership supplies	40,761	24,879
Tune in the World	32,257	53,225
	$513,552	$476,081

NOTE 3 - INVESTMENTS:

Investments restricted to life memberships are comprised of the following:

	December 31, 1988		1987	
	Cost	Market	Cost	Market
Corporate bonds	$1,999,624	$1,905,843	$2,338,545	$2,272,196
U.S. Government and Government agency	551,390	541,436	459,578	448,875
Common stocks	393,538	494,771	176,688	270,581
Preferred stocks	156,342	138,888	156,342	123,001
Certificates of deposit	698,156	698,156	175,121	175,121
Other investments	25,000	69,063	25,000	28,150
	$3,874,050	$3,848,157	$3,331,274	$3,317,884

Investments in the regular portfolio are comprised of the following:

	1988		1987	
	Cost	Market	Cost	Market
Corporate bonds	$ 521,520	$ 501,094	$ 929,388	$ 910,000
U.S. Government and Government agency	-	-	121,113	119,736
Common stocks	308,123	317,076	324,123	296,506
Certificates of deposit	400,000	400,000	774,307	774,307
	$1,229,643	$1,218,170	$2,148,929	$2,100,549

The decrease in unrealized appreciation in the market value of investment securities for the year ended December 31, 1988 was $24,404. The decrease in unrealized appreciation in the market value of investment securities for the year ended December 31, 1987 was $322,953.

NOTE 4 - LAND, BUILDINGS AND EQUIPMENT:

Land, buildings and equipment and related accumulated depreciation are comprised of the following:

	December 31, 1988	1987
Land and buildings	$1,203,049	$1,130,134
Furniture and equipment	2,049,818	1,664,908
	3,252,867	2,795,042
Accumulated depreciation	(1,827,994)	(1,601,987)
	$1,424,873	$1,193,055

NOTE 5 - DEBT:

The League is the owner and beneficiary of a $400,000 life insurance policy donated by a member. The cash surrender value of the policy is $50,651 and $49,969 at December 31, 1988 and 1987, respectively. At December 31, 1987, the League had a $35,500 policy loan against the cash surrender value of this policy which was paid in full in June 1988.

On January 31, 1988 the League signed a $400,000 note payable with Connecticut Bank and Trust secured by a $400,000 certificate of deposit. The five year note bears interest at 9.4% per annum. The note is payable in monthly instalments of $8,867, plus interest, through February, 1993. The proceeds of the note were used to purchase computer equipment.

NOTE 6 - PENSION PLAN:

Effective January 1, 1988, the League adopted Financial Accounting Standard No. 87, "Employers' Accounting for Pensions" FAS 87. Pension costs for 1987 per the June 1, 1987 actuarial valuation report, which provides a reasonable estimate of the cost for the year ending December 31, 1987, were determined in accordance with the provisions of Accounting Principles Board Opinion No. 8 (APB 8). Under APB 8, total pension cost for 1988 per the June 1, 1988 actuarial valuation report, which provides a reasonable estimate of the cost for the year ending December 31, 1988, would have been $154,883, compared to $176,812 under FAS 87. Pension costs for the years ended December 31, 1988 and 1987 were as follows:

	1988	1987
Pension costs	$176,812	$193,082

The components of net periodic pension cost of 1988 are as follows:

Service cost-benefits earned during the period	$134,680
Interest cost on projected benefit obligation	101,335
Actual return on plan assets	(87,164)
Net amortization and deferral of actuarial gains	27,961
Net periodic pension cost	$176,812

The table of actuarially computed benefit obligations and net assets of the plan at December 31, 1988 follows:

Actuarial present value of benefit obligations:

Vested	$ 736,302
Nonvested	101,918
Accumulated benefit obligation	$ 868,220
Projected benefit obligation	$1,615,809
Plan assets at fair value	1,053,931
Projected benefit obligation in excess of plan assets	($561,878)
Unrecognized net (gain) loss	(37,442)
Unrecognized net obligation at January 1, 1988	100,441
Accrued pension costs	$ (498,879)

The average discount rate used in determining projected benefit obligation and rate of increase in compensation levels used in determining net periodic pension cost and related pension obligations as of December 31, 1988 were 7.75% and 6.50%, respectively. The expected long-term rate of return on assets was 9.00%.

The actuarial present value of accumulated plan benefits related to 1987 per the June 1, 1987 actuarial valuation report and the corresponding net assets available for plan benefits as reported by the insurer were as follows:

	1987
Actuarial present value of accumulated plan benefits:	
Vested	$ 588,575
Nonvested	80,554
Total benefits	$ 669,129
Net assets available for benefits	$1,005,245

The average discount rate and rate of increase in compensation levels used in determining the 1987 actuarial present value of accumulated plan benefits were 7.5% and 6.5%, respectively. The expected long-term rate of return on assets was 9.0%.

NOTE 7 - DEFERRED LIFE MEMBERSHIP FEES:

The following is a summary of deferred life membership fees and subscriptions activity:

	December 31, 1988	December 31, 1987
Beginning balance	$4,038,301	$3,978,143
Additions:		
Membership fees received	120,060	85,697
Investment income earned	306,014	310,206
Investment transfer	95,000	
	521,074	395,903
Deductions:		
Net transfer to revenue:		
Life members	128,875	125,344
Investment income	207,914	206,324
	336,789	331,668
Administrative expenses	541	4,077
	337,330	335,745
Ending balance	$4,222,045	$4,038,301

NOTE 8 - DESIGNATED FUND BALANCES:

During 1986, the League received an $85,000 unrestricted bequest to be used pursuant to the approval of the League's Board of Directors. This contribution was designated by the Board for future costs related to the proposed Visitors' Center; however, during 1987 the Board decided that the Visitors' Center would not be built. The remaining unrestricted fund balance was subsequently designated by the Board to be used for the purpose of acquiring, restoring and preserving amateur related artifacts. During 1987, the Board designated $105,000 to be used for the Defense of Amateur Radio Frequencies. This fund will be used to defend the use of radio frequencies by Amateur Radio operators.

Following is a summary of activity relating to the designated fund balances:

	Amateur Radio Artifacts	Defense of Amateur Radio Frequencies
Balance 12/31/86	$ -	$ -
Board designated contribution	94,359	105,000
Balance 12/31/87	94,359	105,000
Expenditures	(3,200)	-
Balance 12/31/88	$91,159	$105,000

NOTE 9 - RELATED PARTY:

The Canadian Radio Relay League (CRRL), formerly the Canadian Division of the League, became an independent organization as of January 1, 1988. The CRRL collects Canadian membership dues, purchases publications from the League at a discount and resells them to its membership. During 1987, the League provided a $5,000 grant to CRRL. At December 31, 1988 and 1987, CRRL owes the League $6,000 and $8,500, respectively, under a non-interest bearing loan.

NOTE 10 - CONTRIBUTIONS RESTRICTED BY DONORS:

The League receives contributions from donors which are restricted for specific purposes as specified by the donors. These restricted contributions are administered by designated officials of the League in accordance with the directions of the donors. Unused contributions aggregated $337,094 and $83,468 at December 31, 1988 and 1987, respectively. Following is a summary of activity relating to these contributions:

	H. P. Maxim Award	T. Hutton Founder Site	Visitors' Center	Promotion of Radio Overseas	Colorado Conservation Fund	Project Goodwill	Exceptional Merit	Legal Research and Resource Fund	Frequency Defense Fund	W1AW Renovation	Technical Development	Total
Balance 12/31/86	$23,839	$10,000	$1,451	$4,909	$5,471	$19,212	$10,000	$ -	$ -	$ -	$ -	$ 74,882
Contributions			1,550					9,765	500			11,815
Income Earned	2,325				969							3,294
Expenditures	(1,165)			(4,909)		(449)						(6,521)
Balance 12/31/87	24,999	10,000	3,001	-	6,440	18,763	10,000	9,765	500	-	-	83,468
Contributions	9,646	-	3,200		75			22,019	1,000	293,452	3,000	332,392
Income Earned	2,315				322							2,637
Expenditures	(11,012)	(2,908)	(6,201)	-		(98)				(61,184)		(81,403)
Balance 12/31/88	$25,948	$ 7,092	$ -	$ -	$6,837	$18,665	$10,000	$31,784	$ 1,500	$232,268	$ 3,000	$337,094

SCHEDULE I

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

REVENUES

	Year ended December 31, 1988	Year ended December 31, 1987
Advertising revenue:		
QST magazine	$2,190,667	$2,033,327
Tune in the World	11,838	-
QEX	12,419	12,569
Booklet	10,258	11,235
Total advertising revenue	$2,225,182	$2,057,131
Publications sales:		
Booklets	$1,575,341	$1,198,380
ARRL Handbook	635,582	646,203
Tune in the World	334,996	376,152
QST newsdealers	106,385	122,082
QEX publication	48,841	54,190
Newsletters	34,078	33,924
Other	24,669	9,614
Total publications sales	$2,710,092	$2,440,545

SCHEDULE II

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

OPERATING EXPENSES

	Year ended December 31, 1988	Year ended December 31, 1987
Publications:		
QST magazine	$1,516,172	$1,275,116
Booklets	586,951	505,668
ARRL Handbook	231,138	200,416
Tune in the World production costs	136,205	185,835
QEX production and other costs	66,251	65,836
ARRL Letter	26,847	18,998
Packet radio newsletter	20,256	20,447
Advertising production costs, net of credits of $18,278 and $14,027 in 1988 and 1987, respectively	2,689	1,478
	2,586,509	2,273,794
Forwarding expenses:		
QST subscriptions	432,911	335,224
QST newsdealers	1,281	7,281
Other publications	273,114	245,194
	707,306	587,699
Salaries	2,866,756	2,460,149
Postage	249,503	155,737
Membership supplies	54,275	90,521
Employee insurance and pension costs	315,359	303,103
Stationery, printing and forms	304,031	211,428
Office supplies and expenses	190,704	163,181
Legal and professional fees	175,806	147,605
Promotion expense	124,673	132,154
Light, heat and water	59,287	58,852
Telephone and telegraph	55,186	46,789
Insurance	38,598	32,921
Temporary employees	-	10,868
Laboratory expenses	17,261	18,829
	4,451,439	3,832,137
Travel expenses:		
Business	64,635	58,336
Membership contacts	16,793	35,877
Overseas	55,490	30,168
	136,918	124,381
Depreciation	228,790	186,017
Payroll taxes	206,331	171,686
Building maintenance expenses	99,175	76,051
Property taxes	61,078	62,691
Computer supplies and maintenance	45,123	30,817
Dues - Region 2 and 3	32,557	29,906
Overseas QSL service	17,633	19,871
Awards	41,893	15,898
Taxes on unrelated business income and other	66,638	-
Interest expense	34,716	-
Service charges	24,237	38,609
Maintenance and repair	11,128	-
Rentals	11,265	-
Other	69,010	49,672
	949,574	681,218
	$8,831,746	$7,499,229

SCHEDULE III

ADMINISTRATIVE EXPENSES - OTHER EXPENSES AUTHORIZED BY THE BOARD OF DIRECTORS

	Year ended December 31, 1988	Year ended December 31, 1987
Division Directors expenses:		
Atlantic	$ 8,691	$ 8,105
Central	6,171	5,363
Dakota	1,827	2,465
Delta	5,102	1,785
Great Lakes	4,316	7,983
Hudson	7,959	5,782
Midwest	5,839	5,535
New England	8,847	7,888
Northwestern	11,997	11,351
Pacific	7,296	9,363
Roanoke	9,100	6,668
Rocky Mountain	5,688	3,529
Southeastern	11,112	9,578
Southwestern	13,027	12,015
West Gulf	6,921	5,095
	113,893	101,985
Section level expenses	75,877	81,969
Board of Directors meetings	90,015	84,777
Executive committee	20,233	26,883
President's expenses	11,279	11,357
Officers' expenses	10,202	8,593
National traffic system	4,737	6,801
Grants to CRRL	-	5,000
Digital Communication Committee	6,540	6,582
QSL manager expense	7,808	7,316
Volunteer resources	6,712	5,032
Legal Strategy Committee	13,214	2,505
Strengthening CRRL	433	2,723
Administration and finance	5,821	5,580
Ad hoc committee on biological effects	2,720	18
Publications	-	1,813
Membership services	3,679	3,535
Other committees	722	2,214
Advisory committees	953	3,277
RFI task force	1,032	-
Educational task force	3,097	-
Ad Hoc elections committee	4,739	-
ANERCOM	2,941	-
	$375,897	$371,960

QST

Moved and Seconded . . .

MINUTES OF THE EXECUTIVE COMMITTEE
Meeting Number 433
Kansas City, Missouri
April 1, 1989

AGENDA

1. Approval of Minutes of December 10, 1988, Executive Committee Meeting
2. FCC matters
   2.1 Review of status of 220-MHz defense
   2.2 Review of status of Part 97 Rewrite (PR Docket 88-139)
   2.3 Review of status of PRB-3
   2.4 Other FCC matters
   2.5 Consideration of Report of the Committee to Study a Possible Code-Free License
3. International matters
   3.1 Consideration of proposal to admit Aruba Amateur Radio Club to IARU
   3.2 Review of preparations for hosting of IARU Region 2 Conference, Orlando, September 4-8, 1989
   3.3 Other international matters
4. Review of progress on Board directives:
   4.1 By the vice presidents and/or chairmen, for the committees –
   4.2 By the Executive Vice President, on Headquarters actions
   4.3 W1AW renovation
5. Actions assigned to the Executive Committee by the Board at 1989 Annual Meeting
   5.1 Minute 80: Review of Standing Orders
   5.2 Minute 81: Action plan for FCC compliance with RFI legislation
   5.3 Minute 105: Action plan for greater FCC enforcement
6. Local antenna/RFI matters
7. Insurance matters
8. Recognition of new Life Members
9. Affiliation of clubs
10. Approval of conventions
11. Date and place of next meeting
12. Other business

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 9:28 A.M. Central Standard Time, April 1, 1989, at the Allis Plaza Hotel, Kansas City, Missouri. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Tom Frenaye, K1KI, Paul Grauer, WØFIR, Stephen A. Mendelsohn, WA2DHF, and Hugh A. Turnbull, W3ABC. Also present were Vice President George S. Wilson, III, W4OYI; International Affairs Vice President Tod Olson, KØTO; Directors Frank M. Butler, Jr., W4RH, John C. Kanode, N4MM, Edmond A. Metzger, W9PRN, and Marshall Quiat, AGØX; and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Mendelsohn, the Minutes of the December 10, 1988 meeting were adopted as printed.

2. FCC matters:

2.1. Mr. Sumner reported on the continuing effort to persuade appropriate Congressional committees to hold hearings to investigate the FCC decision-making process with regard to 220-222 MHz. Mr. Imlay reviewed the status of the ARRL request for oral argument before the FCC on the petitions for reconsideration of the reallocation; no FCC action has been forthcoming on this request, though a number of Congressmen have joined us in calling for oral argument.

2.2. Mr. Imlay reported that the Part 97 rewrite proceeding appears to be the top priority for the FCC Personal Radio Branch in the upcoming quarter, and that careful consideration is being given to the ARRL comments in this proceeding. Ex parte presentations to Private Radio Bureau staff have been made by electronic media interests seeking greater flexibility in using Amateur Radio to support their business activities.

2.3. Mr. Sumner reported that no FCC action has been taken on the possible privatization of amateur call sign assignments, PRB-3, and that the likelihood of positive Commission action is waning with the passage of time. ARRL has reaffirmed its interest in, at minimum, finding a way to resume issuance of club and special-event station call signs.

2.4.1. Mr. Price reported that Counsel Imlay, on behalf of the League, had written to demand a retraction of remarks made by an FCC official at a meeting of radio amateurs in the Washington, DC, area. The remarks had misrepresented the ARRL position on certain matters.

2.4.2. On March 30, the FCC amended Part 15 of its rules to permit non-licensed RF devices to operate in several bands above 902 MHz that are allocated to Amateur Radio, and to make other changes that will aggravate the problems of incompatibility between Amateur Radio and consumer electronics equipment. On motion of Mr. Mendelsohn, the Executive Vice President was instructed to file, without delay, through Counsel, a petition for reconsideration of the First Report and Order in FCC General Docket 87-389. Such petition shall incorporate the following arguments:

1) that the Commission erred in failing to require RFI consumer information in packaging material of RF-susceptible Part 15 devices;

2) that there should be no increase in permitted maximum RF field strengths for Part 15 unintentional radiating devices over present levels;

3) that because of the inevitable incompatibility between residential operation of Part 15 intentional radiating devices and co-channel amateur stations, amateur bands must be excluded from those on which Part 15 intentional radiating devices may operate.

Further, appropriate administrative and judicial injunctive remedies shall be pursued to maintain the status quo in the interim.

2.4.3. In view of mounting concern that the concept of "spectrum auctions" might in some way be applied to amateur allocations, on motion of Mr. Frenaye, the President was requested to research ways of documenting the economic value to the public of the Amateur Radio Service and to report back to the Committee.

The Committee was in recess from 11:20 to 11:31 A.M.

2.5. Mr. Wilson, as chairman, presented the report of the Committee to Study a Possible Code-Free License in the Amateur Radio Service. Following their appointment in January, the committee members had reviewed considerable correspondence received on the subject, including responses to a questionnaire which had been sent to IARU member-societies having experience with a code-free class of amateur license in their countries, and had met in person on March 11. The committee proposed an alternate means of entry into Amateur Radio, with a written examination somewhat broader than the present Technican written examination and with no privileges below 30 MHz, but with full privileges above that frequency except in the two-meter band, where only operation in the 144.9-145.1 MHz segment, using digital modes, would be allowed. Distinctive call signs would be assigned, and examination would be by accredited Volunteer Examiners. On motion of Mr. Mendelsohn, the Executive Committee received the report and discharged the study committee with thanks for having completed its work; ordered that the report be circulated immediately to the members of the Board for their consideration; and further ordered that the report be printed in its entirety in the May issue of *QST*, with emphasis that no ARRL position on the report has been adopted by the Board pending the opportunity for review by the membership. During the course of the above, the Committee was in recess for luncheon from 12:38 to 1:39 P.M.

3. International matters:

3.1. On motion of Mr. Turnbull, the Secretary was instructed to cast an affirmative vote on the proposal to admit the Aruba Amateur Radio Club as a member-society of the International Amateur Radio Union.

3.2. Mr. Olson reviewed preparations for the hosting of the Tenth General Assembly of IARU Region 2 in Orlando, Florida, the week of September 4-8, 1989. Now that the dates of the Conference are firm, planning is moving forward satisfactorily.

3.3. Mr. Butler reported briefly on the meeting of the Executive Committee of IARU Region 2 held in Guatemala City February 10-12, which he had attended in his capacity as a member of the Region 2 EC.

4. Review of progress on Board directives:

4.1.1. Mr. Metzger, as chairman, reported on the meeting of the Administration and Finance Committee, held in St. Louis the previous weekend. The A&F Committee had requested that in its review of the Standing Orders, the Executive Committee both retain and emphasize Standing Order 48B, which states that any Director offering a motion requiring an expenditure of funds for implementation shall include an estimate of the costs involved and the suggested method of funding those costs.

On motion of Mr. Mendelsohn, the Executive Committee endorsed the recommendation of the Administration and Finance Committee to change the ARRL fiscal year, and urged the Board to adopt this change at its meeting in July.

On motion of Mr. Grauer, the Executive Committee concurred in the recommendation of the Administration and Finance Committee that Peat Marwick Main & Co. be retained as auditors.

On motion of Mr. Mendelsohn, ARRL travel policy with respect to participation by League officials with physical disabilities was amended as recommended by the Administration and Finance Committee, subject to a determination by corporate counsel that it is consistent with Connecticut law.

4.1.2. Mr. Quiat, as chairman, reported on behalf of the Legal Strategy Committee. The LSC is developing a strategy to recommend to the Executive Committee in seeking greater FCC enforcement of its rules, as called for at Minute 105 of the 1989 Annual Meeting of the Board. It met on March 18 in the Chicago area and reviewed the restrictive covenant practices of homebuilders in that vicinity.

4.1.3. Mr. Quiat, as chairman, also reported on behalf of the Membership Services Committee. The MSC had met the previous day in Kansas City, and had made considerable progress on the studies assigned by the Board.

Messrs. Metzger and Wilson departed from the meeting at 3:50 P.M.

4.2. Mr. Sumner distributed a summary of action taken to date on assignments arising from previous Board meetings. In view of an inconsistency between the wording of the motion adopted at Minute 44 of the 1989 Annual Meeting of the Board and the responsibilities of committees as defined elsewhere, on motion of Mr. Turnbull, Minute 44 was ordered held in abeyance with respect to the conduct of Section Manager elections pending completion of a review of the matter by the Ad Hoc Committee on Elections.

4.3. Mr. Sumner presented a progress report on W1AW renovation. Demolition of the building interior began on March 9, and completion of reconstruction is expected by mid-July. Bulletin transmitters are due to be delivered in mid-June, with audio and control system integration to be performed in the ARRL lab. Antenna system design is not yet complete, but considerable progress has been made. Contributions continue to be received at an encouraging rate. Rededication of the Hiram Percy Maxim Memorial Station

is tentatively scheduled for July 20.

5. Actions assigned to the Executive Committee:

5.1. The Executive Committee began a review of staff recommendations concerning Standing Orders, completing 21 of the first 22 recommendations before the press of other business forced postponement until its next meeting.

5.2. As an initial fact-finding step in developing an action plan to bring about FCC compliance with Public Law 97-259, on motion of Mr. Frenaye, Counsel was instructed to file a Freedom of Information Act request with FCC seeking statistics on RFI complaints received by FCC from December 1981 to date.

5.3. In connection with its charge at Minute 105 of the 1989 Annual Meeting of the Board, in addition to considering the report of the Legal Strategy Committee rendered earlier, the Committee reviewed a staff report on the Amateur Auxiliary and directed that the report be circulated to members of the Board for their information and consideration.

6. Mr. Imlay reviewed the status of several cases involving zoning regulations or RFI. On motion of Mr. Mendelsohn, Counsel was authorized to take such steps as may be necessary to bring about an ultimate resolution of the Christopher case, involving allegations of interference to a pacemaker.

7. An increase in the number of complaints from members about the ARRL equipment insurance program had been noted. On motion of Mr. Grauer, the Membership Services Committee was requested to consider methods of improving member service in this area, with a report to be rendered to the Board in July.

8. On motion of Mr. Mendelsohn, the names of 66 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in *QST*.

9. On motion of Mr. Grauer, the following clubs were declared affiliated:

Category 1

Coos County Radio Club, Coquille, Oregon
Des Moines Register Amateur Radio Club, Des Moines, Iowa
Endless Mountains Amateur Radio Club, Tunkhannock, Pennsylvania
Franklin County Repeater Club, Greenfield, Massachusetts
Grayson County Amateur Radio Club, Clarkson, Kentucky
Limestone ARES, Athens, Alabama
Mendocino County Amateur Radio Society, Ukiah, California
Namekagon Valley Wireless Association, Hayward, Wisconsin
New Jersey REACT Amateur Radio Club, Secaucus, New Jersey
Souhegan Valley Amateur Radio Club, Milford, New Hampshire
Traveler's Rest Amateur Radio Club, Dade City, Florida
Tri-State Amateur Radio Club, Matamoras, Pennsylvania
Triangle East Amateur Radio Association, Smithfield, North Carolina
Wilson Amateur Radio Club, Wilson, North Carolina
Woodchuck Amateur Radio Club, Lakewood, Ohio

Category 3

Academy Elementary Radio Club, Calhoun, Georgia
Conway Springs Junior-Senior High School Amateur Radio Club, Conway Springs, Kansas
Desert View Elementary School Amateur Radio Club, Sunland Park, New Mexico
High School of Engineering and Science Amateur Radio Club, Philadelphia, Pennsylvania
Marlborough Elementary School Amateur Radio Club, Kansas City, Missouri
OSU Tech Amateur Radio Club, Okmulgee, Oklahoma
Stroke Center Amateur Radio Club, Palm Springs, California
Unatego Junior-Senior High School Amateur Radio Club, Otego, New York
University of Bridgeport Amateur Radio Club, Bridgeport, Connecticut

With the election of these clubs, the League has 1,702 active clubs in Category 1, 24 in Category 2, 128 in Category 3, and 4 in Category 4.

10. Convention matters:

10.1. On motion of Mr. Frenaye, the holding of the following ARRL conventions was approved:

West Virginia State, July 1-2, 1989, Jackson's Mill, WV
Colorado State, July 16, 1989 Golden, CO
Kansas State, Sept. 30-Oct. 1, 1989, Wichita, KS
Mississippi State, Oct. 7-8, 1989, Biloxi, MS
So. Florida Section, Nov. 18-19, 1989, Tampa, FL
So. Florida Section, Feb. 17-18, 1990, Sarasota, FL
Great Lakes Division, Feb. 24-25, 1990, Cincinnati, OH
Nebraska State, Mar. 23-25, 1990, Kearney, NE

10.2. On motion of Mr. Turnbull, the mail vote approving the following conventions was ratified:

Kentucky State, March 25, 1989, Elizabethtown, KY
Tennessee State, May 20, 1989, Knoxville, TN
Louisiana State, May 20-21, 1989, Baton Rouge, LA
Northwestern Division, August 19-20, 1989, Tacoma, WA

11. The next meeting of the Executive Committee was scheduled for June 24, 1989, in the vicinity of St. Louis, Missouri.

12. Several topics were discussed without formal action, including Ham-Ads, ARRL participation in a recent conference on emergency telecommunications sponsored by the United Nations Disaster Relief Organization's Pan Caribbean Disaster Preparedness and Prevention Project, Headquarters operations, membership promotion activities, and marketing surveys.

There being no further business, the Committee adjourned, at 6:18 P.M.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

Strays

YOU CAN MAKE A DIFFERENCE

☐ If you are anything like me, you may feel that the politics associated with the Amateur Radio Service are quite intimidating. NPRMs, Reports and Orders, Petitions for Reconsideration, Resolutions, state and local government laws and ordinances—it's all quite overwhelming. One way the Amateur Radio Service keeps up with and precludes adverse decisions is through the efforts of the ARRL—from our Counsel in Washington to the Regulatory Information Department, down through the Field Organization. But there's one more layer to our "politician watcher squad" that most of us have forgotten about—*you*!

In fact, were it not for your astute observations in the field, many of the rulings would go unnoticed, and we would then be faced with the choice of "Oh well, you can't fight city hall" or reactive panic trying to put together a coherent argument to get a decision reversed. In some cases, we aren't given much choice, but in others, you can make a difference.

Driving home from work the other night, I was told about a bill which had been introduced into the New Hampshire State Legislature which would enable cities and towns to tax antenna towers as real estate. This bill was introduced by State Representative Karen McRae as a result of the proliferation of commercial towers in her district.

Because Bill Carney, KR1D, had noticed two lines buried on page four of a local newspaper and had taken the time to pass the information along, we now had an opportunity to take action before the bill was passed.

I called Rep McRae and introduced myself as president of the New Hampshire Amateur Radio Association. I explained the Association was a statewide ARRL-affiliated council comprised of members (primarily officers) of radio organizations throughout the state. After explaining about Amateur Radio and the personal time and money investments made by amateurs in New Hampshire who were assisting their local fire and police departments, the Office of Emergency Management and the Red Cross, I mentioned our new governor's cosponsorship of the House Concurrent Resolution in support of the Service, which then became law in the form of Section 10 to the FCC Authorization Act. She then conceded that her bill would allow for taxation of those who donated public services to the state. Admitting Amateur Radio was an oversight on her part, she committed to amending the bill to apply to commercial installations only. I have now received a letter from her verifying this was done.

Now, whether this bill will pass is academic. Because of one person's attention, what might have been a catastrophic law that may have forced repeater clubs "out of business" and allowed for the taxation of private equipment used in the public interest, if passed, will not affect antenna towers used in the Amateur Radio Service. You *can* make a difference.

We are experts in the field of communications. All you need to do when you spot a situation like this is to let someone know. If your state has an effective state-level council, such as the NHARA in New Hampshire, call them and your Section Manager. You are the eyes and ears of the Amateur Radio community. Through your efforts, quick action can be taken to stem the flow of our increasingly regulated environment. —*Warren Rothberg, WB1HBB, President, New Hampshire Amateur Radio Association, NH Assistant Section Manager*

Microsat: The Next Generation of OSCAR Satellites

(continued from page 54)

turned off periodically to listen for possible commands. We are planning to use its huge RAM disk to store digitized voice using 4-bit differential encoding. These 4-bit quantities will be fed through an integrator to reproduce the digitized waveform. We also have the ability to run straight 4-bit digitized data with no encoding, bypassing the integrator. Authorized command stations will be able to uplink voice messages, bulletins and other digitized waveforms.

Rich Ensign, N8IWJ, is working closely with PY2BJO to devise an educational program based upon DOVE's capabilities. Rich has produced a packet of material for educators who are interested in using this satellite in the classroom.[21]

The design of the speech encoder experiment was done by W3IWI and N4HY. The software to drive the experiment is by N4HY. The DSP project will be supplying the necessary hardware to do the digitization and encoding of the speech for the stored messages.

WEBERSAT, AMSAT's cooperative mission with Weber State College, will have all the capabilities of LUSAT and PACSAT and an extra module on board for some interesting experiments. This satellite, shown in Fig 6, will have a CCD TV camera in the top module. Its lens will "peek out" the side of the satellite through an opening. The TV image is sent to a high-speed flash A/D converter which will digitize the video signals at a 10-MHz sampling rate. The digitized pictures will be processed by the on-board CPU and stored in the RAM disk. This is an example of an experiment which sits in the V40 memory bus when commanded to switch its bank of memory into the CPU bus. This allows for high-speed transfer and manipulation of video data. The CCD camera has a mechanical iris which is also controlled by the CPU. The camera's field of view will be approximately a 350-km square (from the intended orbit). Also included in this experimental module is a simple spectrometer and some other experiments devised by students working with CAST. An L-band receiver can also be connected to the digitizer, enabling pictures to be taken on the ground and digitized. Extreme EIRP will be needed for this procedure, but we do not hesitate to point out that this infrequent uploading of pictures is done only in short bursts. The Weber State/CAST team includes Bill Clapp, Bob Summers, Stan Sjol, Bob Twiggs, and Chris Williams along with several students. The operating frequencies for all four satellites is shown in Table 2.

Also on board this launch will be the University of Surrey's third and fourth satellites, UOSATs D and E. UOSAT D will carry a packet-radio experiment that will be operating using a special polling protocol, in addition to AX.25. This protocol will run in your computer through a TNC running AX.25 and a special modem. This satellite will operate 9600-bit/s FSK. The modems needed are K9NG compatibles and are available from TAPR and G3RUH.

Table 2
Operating Frequencies

Mission	*Downlink*	*Uplinks*
PACSAT	437.050 MHz	145.900, 145.920, 145.940, 145.960 MHz.
DOVE	145.825 MHz	not announced
LUSAT	437.150 MHz	145.840, 145.860, 145.880, 145.900 MHz.
WEBERSAT	437.100 MHz	not announced.

AMSAT-NA has recently learned that the follow-up mission to FUJI-OSCAR 12, JAS-1B, is scheduled to take place in early 1990. This satellite, with design enhancements for an improved power budget, will round out the current deployment of OSCAR satellites planned for the year's end.

The Microsat group is a large team of talented people. This is as much their story as it is an attempt to describe the new satellites. Other volunteers in AMSAT, TAPR, ARRL, CAST and elsewhere have patiently watched us work and delayed other projects so the tight timetable could be met. TAPR has generously donated funds to cover the cost of PACSAT's electronics (many members of the Microsat team are TAPR members). We appreciate the generosity of the ARRL in allowing the use of the ARRL Lab and personnel to do some critical work on this project.

In addition to these teams, we have recently signed an agreement with AMSAT-I, our sister society in Italy, to produce another Microsat, with construction largely taking place in that country. Alberto Zagni, I2KBD, is the project leader for AMSAT-I.

The future for Microsat is bright. With its small mass and size, it can be launched as a secondary payload on almost any orbital launch. In the not-too-distant future, you should be able to access a packet satellite at any hour of the day or night. OSCAR 20, here we come!

Notes

[15]T. Clark, "AMSAT's MICROSAT/PACSAT Program" (see note 18)

[16]TAPR PSK modem kits are available from TAPR (see note 2) for $110 plus shipping/handling.

[17]AMSAT-UK, 94 Herongate Rd, Wanstead Park, London E12 5EQ, England.

[18]T. Clark and B. McGwier, "The DSP Project Update," *Proceedings of the Sixth AMSAT-NA Space Symposium and Annual Meeting*, November 1988. Copies of these proceedings are available from ARRL for $12 (plus $2.50 postage and handling, or $3.50 for insured Parcel Post or UPS) or from your local dealer.

[19]L. Johnson and C. Green, "Microsat Project—Flight CPU Hardware, *Proceedings of the Sixth AMSAT-NA Space Symposium and Annual Meeting*, November 1988.

[20]Mode-L receiver and Mode-S transmitter frequencies for PACSAT and WEBERSAT have not been finalized as of this writing. The 70-cm frequency for the AMSAT-LU experiment has also not been finalized.

[21]You may obtain these information packets by contacting Rich Ensign, N8IWJ, 421 N. Military, Dearborn, MI 48124.

Strays

WRITE ABOUT YOUR MOBILE OPERATING DESIGN AND TECHNIQUE

☐ Do you have an interest in mobile operation (automobile, marine or otherwise)? With increased solar activity, more and more DX is found on the upper HF bands, and antennas for mobileering are most easily built and/or installed for these frequencies. The result: There's more and more activity—and interest—in mobile operation.

Tell the reader of *QST* about your mobile adventures—equipment design, operating technique and anything else you've experienced. *QST* authors are paid $50 per published page and an additional $6 per page if the article is submitted electronically.

Send manuscripts and/or requests for author's guides to Chuck Hutchinson, K8CH, Technical Editor, *QST*, 225 Main St, Newington, CT 06111, tel 203-666-1541.

How's DX?

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

XX9CT

VS6CT operated the "Macau Mini" DX-pedition during Chinese New Year (Feb 3-8), to the tune of 5000 contacts. The TS-430 plus linear was operated almost full time on 20, 15 and 10, aided by a tribander on top of the apartment building. Six-meter activity utilized 50 watts and a Yagi. VS6WS also operated during this time period as XX9KA. (See photos.)

DK7PE/SV9

Rudi's DXpedition to Heraklion, Crete, took place from Dec 29, 1988 to Jan 3, 1989. Rudi made almost 4000 contacts while concentrating on 160/80. Good top-band openings to JA and W/K allowed plenty of "first contacts." Rudi's QTH was directly on the northern shores of Crete Island and the antennas saw salt water only into EU, JA and W/K. Cards should be sent direct to Rudi's home address. If no SASE is enclosed, the card will be answered via the bureau. Rudolf Klos, Kleine Untergasse 25, D-6501 Nieder-Olm, Federal Republic of Germany. [Some of the best "How's DX?" photos in recent years have come from the lens of the peripatetic DK7PE. —Ed.]

In the May column (p 71), we reported that K9KQ had earned the WAB Diamond Trophy, but his photograph was left out. Congratulations to Jim for his fine achievement. *(photo courtesy K9KQ).*

DK7PE/KHØ.

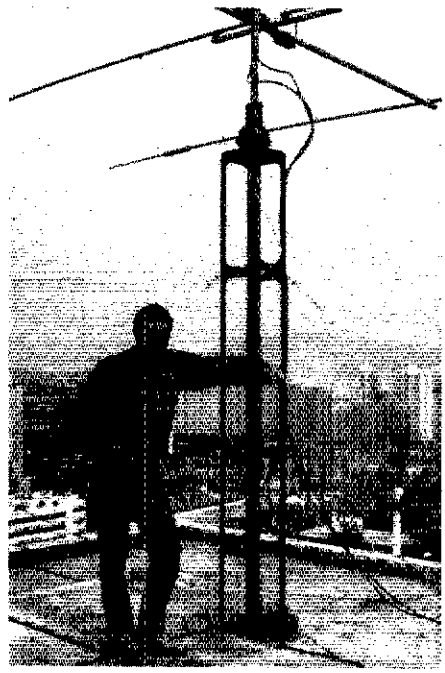
(L-R) VS6CT as XX9CT while Peter Johnson, the real XX9KA, shows off his roof-top view of Macau.

BOTSWANA

Here's a real opportunity to train a budding DXer! Charles Lewis, A22AA/KY4P, will be active for about two years, 40-10 meters, CW and sideband. (A linear and tribander are enroute.) Charles isn't a seasoned DXer and feels he may well become known as "the sloppy operator from Botswana with the Southern drawl!" Let's all show some patience and courtesy and let him have some fun and perhaps set a world's record in becoming a seasoned DXer! SAE to Charles Lewis, A22AA, P/Bag 38, Selebi-Phikwe, Botswana, Africa. (He notes the local post office doesn't accept IRCs, so it might be prudent to use one of the stamp services.)

I LIKE

DL1EV's QSL with the message "Ham Radio Makes the World A Village"...the DX News Sheet (RSGB) DX Calendar feature. Here's a segment: Apr 2-10 Zone 23 by UA9s 1356—the date(s) of the operation, a brief descriptor and 1356 referring to the News Sheet issue carrying the details...K3BNA's note that although Panama is not particularly rare, one very active HP operator has been active for a very long time in providing many a Novice operator and contester a new one. A tip of the hat to HP1AC...ZF8AA'S comments addressed to ZF2 visitors, in the Cayman Amateur Radio Society monthly paper *QRM,* "come stay, beach cottage, quad and rig. Fish or dive if the band folds." [Does the band ever fold at that latitude?—Ed.]



CIRCUIT

☐ **DL7AA:** This savvy active old pro now has worked over 100 countries on 9 bands! Nice going, Rudi!

☐ **EC calls:** N2EIO notes that Spanish Novices must produce a specified number of QSLs from contacts with foreign hams in order to upgrade. Since they're limited to 28.905-29.105, they have a real challenge. Be sure to check this segment frequently!

☐ **Old Sol:** Chores got caught up at this QTH March 13-19 when an enormous number of solar flares literally closed down HF propagation. Probably any number of hams went outside (as did this reporter) to make sure the antennas were still up!

☐ **KL7IK:** "Dr Hal" is a phony, notes Dick, the real holder of this call sign who primarily operates sideband.

(L-R), Jan, K6HHD, and Jay, W6GO, workers behind *The W6GO/K6HHD QSL Manager List. (W1YL photo)*

(L-R) Manny, ZS5WX, with smiling visitor K6QS.

☐ **4Z8UX:** This CQ WPX operation gets confirmed via Danny's regular call, 4Z4UX.

☐ **Unsung heroes:** Here's a great idea (per the "I like" section and HP1AC, above): Who would you like to see recognized as an unsung hero?

☐ **OY7ML:** Martin's pirate troubles have continued for over two years, and the situation is under investigation. If you have any information, please convey it to G4FJN. (Thanks, K8BN.)

☐ **Routings:** HC5MM/HD8EX/HC5J (1988 CQWW), Associacion DX-EX, PO Box DX, Cuenca, Ecuador, SA.

☐ **W1JR:** Joe completed his ninth band for DXCC (17 meters) on March 29. Enroute the ubiquitous W1JR completed band #12 for WAS. Wow!

☐ **17 meters:** WB8TMP is enjoying the new band and reports his fourth QSO netted him a new CW country, Antarctica, OE8NOK/ZL5.

☐ **Misc:** RTØU is UT4WV.

☐ **ZD8BOB:** This Ascension Island station should be QRV for around 3 years, favoring the bottom end of 21 or 28 MHz, 2000-2200Z. He stands by for QRP stations on a regular basis. His manager (his XYL) requests assistance with the return postage for direct return. In fact, ZD8BOB is looking for someone to purchase his reply coupons, not much use to him at his current QTH! Respond via R. W. O'Hara, ZD8BOB, Box 2, Ascension Island.

☐ **Managers:** TU2VE (on or after April 1, 1989) via WB4UBS. VP5V: 1988 via WD4JNS, 1989 via WØAR, include SASE or IRCs. VP5T (NM2Y/G3YDV), Steve Dove, Box 73, Elm, PA 17521. KE9A/DU3 via Bob Johnson, WB9YXY, Route 1, Box 173, Endeavor, WI 53930. QST

QSL Corner

Administered By Joanna Hushin, KA1IFO

The ARRL DX QSL Bureau System (Incoming)

Within the US and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearinghouses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free, and ARRL membership is not required.

How It Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL-Membership Overseas QSL Service. Members send cards to their outgoing bureau, where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus, where volunteer workers sort the incoming QSLs by the first letter of the call-sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an SASE for a prompt reply.

Claiming Your QSLs

1) Send a 5- × 7½-in SASE to the bureau serving your district.

2) Neatly print your call sign in the upper left-hand corner of the envelope.

3) A preferred way to send envelopes is to affix a First Class stamp. If you expect to receive more than 1 oz of cards, please affix postage accordingly.

4) When requesting *any information* from the bureau serving your district, always include an SASE for a prompt reply.

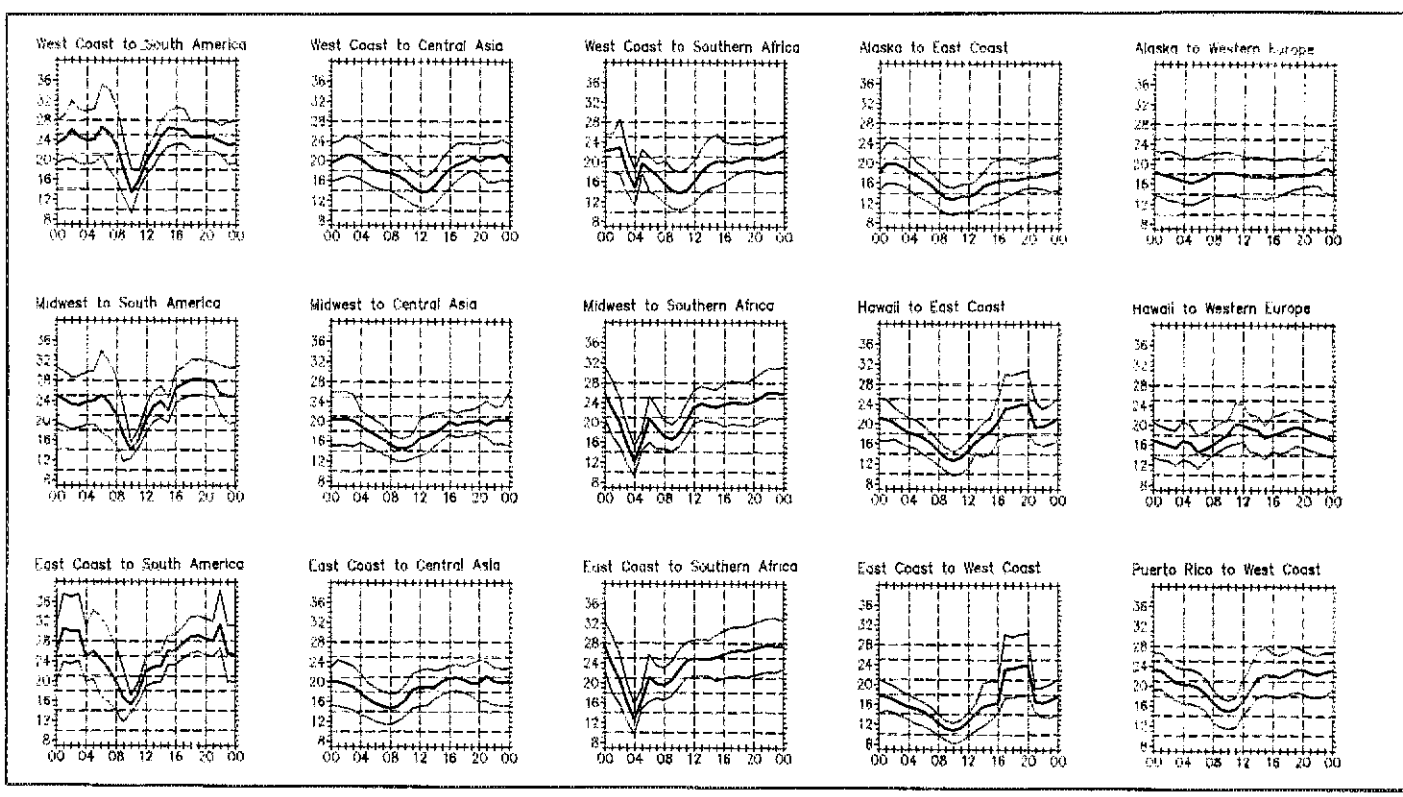
Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of SASEs. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. It may be six to eight months, or longer, before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- × 7½-in envelopes on file at your bureau, with your call in the upper-left corner, and affix at least



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

one unit of First Class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs is the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade. Please send envelopes with old call. Please put only one call on an envelope.

Do include an SASE with any information request to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL Membership Overseas QSL Service" in this column in September 1988 *QST*).

Don't send envelopes to your "portable" bureau. For example, K9CH/4 sends envelopes to the W9 bureau, *not* the W4 bureau.

ARRL DX QSL BUREAU SYSTEM

First Call Area: all calls*—W1 QSL Bureau, Mt Tom Repeater Assn, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls*—NJDXA, PO Box 599, Morris Plains, NJ 07950.

Third Call Area: all calls—C-CARS, PO Box 448, New Kingstown, PA 17072-0448.

Fourth Call Area: single-letter prefixes—Mecklenburg ARS, PO Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes—Sterling Park Amateur Radio Club, Call Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls*—ARRL Fifth (5th) District DX QSL Bureau, PO Box 44246 Oklahoma City, OK 73144.

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

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

Eighth Call Area: all calls—8th Area QSL Bureau PO Box 182165 Columbus, OH 43218-2165.

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

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

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

US Virgin Islands: all calls—Virgin Islands ARC, GPO Box 11360, Charlotte Amalie, St Thomas, VI 00801.

Hawaiian Islands: all calls*—Wayne Jones, NH6GNP P.O. Box 788, Wahiawa HI 96786

Alaska: all calls*—Alaska QSL Bureau, 4304 Garfield St, Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls—MARC, Box 445, Agana, GU 96910.

SWL—Mike Witkowski, WDX9JFT, 4206 Nebel St, Stevens Point, WI 54481.

CRRL DX QSL BUREAU SYSTEM

QSL Cards for Canada (VE, VO and VY) may be sent to CRRL Central Incoming QSL Bureau, Box 51, St John, NB E2L 3X1. Or, QSL cards may be sent to the individual CRRL Incoming QSL bureaus.

VE1*—A. McLellan, VE1ASJ, Box 51, St John, NB E2L 3X1

VE2—A. G. Daemen, VE2IJ, 2960 Douglas Ave, Montreal, PQ H3R 2E3.

VE3—The Ontario Trilliums, PO Box 157, Downsview, ON M3M 3A3.

VE4*—Larry R. Lazar, VE4SL, 30 Bathgate Bay, Winnipeg, MB R3T 0L2.

VE5—B. J. Madsen, VE5FX, 739 Washington Dr, Weyburn, SK S4H 3C7.

VE6*—Norm F. Waltho, VE6VW, PO Box 1890, Morinville, AB T0G 1P0.

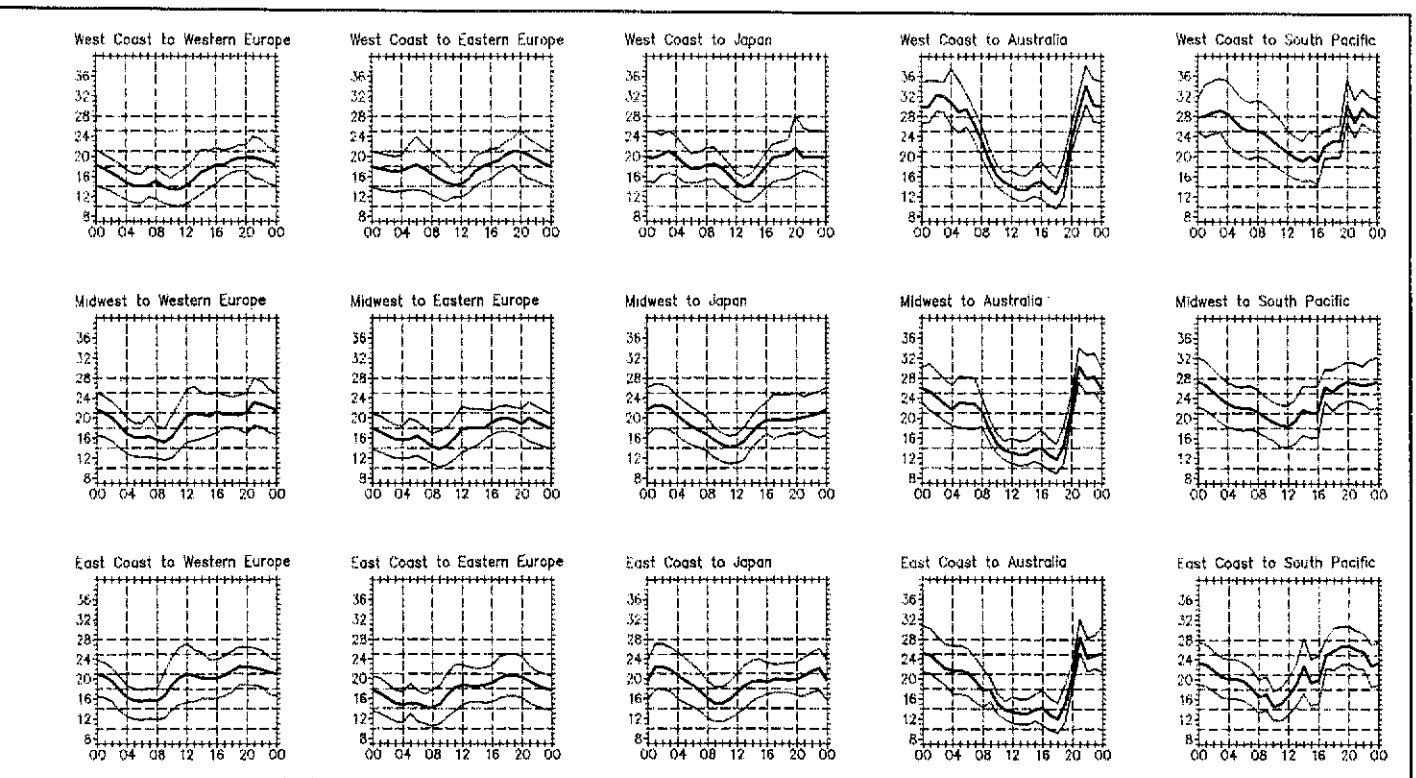
VE7*—Alex Ivsic, VE7CNE, 8922 148 St, Surrey, BC V3R 3W4

VE8*—Rolf Ziemann, VE8RZ, 2 Taylor Rd Yellowknife, NT X1A 2K9.

VO1, VO2—Roland Peddle, VO1BD, PO Box 6, St John's, NF A1C 5H5.

VY1—QSL Bureau, Yukon Amateur Radio Assn, PO Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an SASE to the bureau for further information.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for June 16 to July 15, 1989, assume a sunspot number of 181, which corresponds to a 2800-MHz solar flux of 225.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The Satellite, 160 Meter, and 80 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. The totals shown below are exact credits given to DXCC members from February 8 to February 28, 1989. An SASE will bring you the rules and applications forms for participation in the DXCC program. Send $1.00 to request the ARRL DXCC Countries List.

New Members

Mixed

DF7YT/103, HB9CEX/122, IKØGRS/106, VE6ARE/108, K3EBZ/102, KM4IH/103, W4FQT/176, WA5YKO/100, KE8RO/103
DK1DB/103, HL1ATL/107, JH8MWW/102, VU2YOU/173, N3DTD/109, KY4Q/104, WA4CUG/101, WB5CWZ/101, K9JIQ/120
DLØJU/145, I2HVE/164, OZ9BX/139, 4X1AD/180, N3FYN/107, N4NNZ/109, WN4H/107, KG6VI/133, KB9AIT/129
G3NSY/329, I3UBB/136, SP4CLX/234, WA1SPT/134, NN3E/100, N4QYX/105, N5AXR/132, KK7R/272, W9NQ/181
GM3KJZ/105, IV3WFK/104, VE3PWK/104, KV2I/310, AB4DU/105, N4UA/290, W5QCB/290, KB8CFE/106, WAØKWI/211
HAØDU/307

Phone

CT1CDP/108, HK3GZB/W4/154, IT9SVJ/151, YC6HBJ/111, WB3KTX/102, N4AXQ/102, KB5NR/100, KD9IV/115, WA9LLE/109
DJ9UP/116, HK6IKV/134, JE4DSA/120, YV5JQ/135, KB4SSS/103, N4OQP/113, N5AXR/131, KD9RG/105, KAØZFX/127
DL6RA/130, HL1LW/201, JA5EO/105, 4X1AD/178, KC4CSD/101, N4QYX/104, N5JEB/107, KE9ES/109, WAØKWI/178
GØFWG/159, I6QFH/278, SP4CLX/228, N3DTD/101, KM4FH/112, W4FQT/169, KK7R/267, W9NQ/154, WQØF/103
HAØDU/204, IK8HSM/257, VU2YOU/139, N3FYN/102, KM4IH/103, WB4RFZ/HC7/105

CW

DJ8MH/204, HAØDU/100, OZ1KWG/110, VE3PWK/102, 5H3RB/102, N4UA/171, K6EV/105, WW7D/143, WA8OSE/107
G3HJF/105, I3UBB/125, OZ9BX/130, ZS6NT/105, WB2GFI/117, WB5NXH/109, WS6X/120, ND8D/116, WAØKWI/112
HA1KSL/113, JE3NWQ/109, SM6BGG/203

RTTY

GØAZT/W6/110, N3UN/153

80 Meters

HA8LKE/103, JH3VNC/100, JA5PUL/113, XE1VIC/105, 4Z4DX/248, K4KUZ/168, N6JV/193, K7ZA/127, KW9K/103
JA3CSZ/197, JA4VUQ/106, SM5AQB/111, ZP5JCY/163

10 Meters

HI8LC/100, SM5AQB/156, XE1VIC/105, W6QON/104, K7RQ/194, W8CFG/139, WB8RFN/100, W9OKL/150, KØIIR/117
JH3VNC/132, VE3OZN/103, WB4MAI/191, WB6RZK/109

5BDXCC

HA9RT, LA2CF, IN3DEI, NY2E, WA2LIY, DF2PI, KB1JZ, WA1ICK, 4X4FU
RA4HA, NØIN

New Honor Roll Members

Mixed

312
OH2BDP/326

311
ON5FU/319

ON7EM/315

310
AL7EL/325
DJ6NI/324

SV1PL/314
W2RSJ/326
K3RT/316
K8BTH/314
N8MC/315

Phone
311
I1JS/318

310
DJ6NI/324
ON5FU/318

SV1IW/314
N3US/316

Endorsements

Mixed

DF5OC/128, IT9WGI/307, JA7FWR/289, VE7IU/197, KU2A/177, N3US/321, WA4CMS/202, KI6AD/184, N9BOK/290
DF7VO/295, JA1BNW/303, JA8DJY/254, XE2FL/250, N2WK/182, NM3U/125, WA4NBC/265, NQ6N/296, W9DYG/281
DJ2WF/241, JA1FHK/338, JA8ZO/339, YU4BM/291, WA2ICE/229, NR3Y/251, KA5TQF/264, WA6DHA/177, W9ROK/263
DJ9MH/277, JA1NGM/257, JAØAZE/311, YU7DR/270, WB2QFV/308, NS3K/225, KC5NY/226, WS6F/227, WB9Z/307
DK5WS/314, JH1FDP/307, JAØRWF/207, 4X1KM/276, WB2UZR/131, AA4QE/155, KE5OD/200, WS6X/278, KØII/290
DL1EQ/231, JK1OPL/329, OZ7JB/272, 6Y5HN/259, K3ANS/197, K4FW/274, KF5EA/249, K7OVM/203, KD8RT/151
FE6CFT/262, JA2AH/333, OZ9PP/325, K1VHS/308, K3YGU/262, K4JBY/202, N5DX/337, NB7Q/240, KEØDV/262
G2GM/319, JH2UVL/291, PY4ALC/288, KB1U/305, K3ZO/302, K4LTA/335, W5FIX/203, W7CRT/291, NØEL/327
G3TXF/304, JA3AAW/335, SM1CXE/342, KX1T/176, KC3EK/284, K4NTS/260, W5RJA/256, KE8CQ/252, NØJW/292
HA5DQ/204, JE3NWQ/260, SM5AQB/341, NM1K/126, KC3X/306, KB4QZH/126, W5SL/277, W8UCI/317, NØRM/240
HA5LV/283, JA4CQS/325, SM6BGG/303, K2AX/281, KE3A/315, KB4YMB/125, W5VCS/150, WB8JEY/320, NBØQ/128
HA8UB/259, JH4GNE/205, SM6JHO/270, KA2HTU/128, KE3Q/283, KC4B/310, WA5TOS/281, K9ZXG/289, WØRI/340
HG9R/204, JA5AQC/319, SP2AJO/329, KA2UFA/278, KY3T/130, KC4MJ/225, WC5I/265, KA9CFD/276, WAØSTV/250
HL1LW/205, JA5EN/331, VE3JKZ/288, KB2QN/304, KZ3H/272, N4CID/305, K6UJS/310, KA9FCZ/150, WBØB/167
IK8EPC/291, JA5JGY/291, VE3NI/310, KS2G/181, N3ED/332, N4GDJ/163, KA6IYE/226, KB9MI/250

Phone

AL7EL/299, G3NML/177, JE1ZSK/209, PY2DSC/330, KS2G/179, N3ED/316, K5TSQ/306, WO6R/167, W8IQ/209
CT1AHU/207, G3TXF/274, JA2AH/330, SM5AQB/327, N2WK/128, KA4GYU/228, KA5TQF/242, WS6X/264, WJ8C/263
CT1AIF/260, G4XTA/149, JH2UVL/250, SM6BGG/300, W2CQR/176, KB4YMB/125, N5DX/307, K7TJH/225, K9JSK/202
CT1BH/336, GØAHC/199, JE3NWQ/256, VE3EGO/200, WA2ICE/229, KC4MJ/225, W5RJA/252, N7EYG/151, K9ZXG/250
CT1CFH/156, HA8UB/139, JH4GNE/205, VE7IU/197, WB2QFV/200, N4BHJ/292, W5SL/238, W7CRT/262, KB9MI/250
CX4BW/226, HK6IMU/181, JA5AQC/316, XE2FL/249, K3ANS/178, N4CID/301, K6ICS/178, W7FXI/294, KC9YX/280
CX7BV/290, I1TBE/325, JA7FWR/274, ZL1BOQ/291, K3PA/207, N4RFN/229, W6ESJ/216, K8BTH/310, W9ROK/226
DJ3ND/249, I2PHN/332, JA8ZO/328, ZS6BBP/337, K3RT/281, WA4CMS/158, W6NLG/306, K8WWA/290, KØVRW/309
DJ9MH/250, IK8EPC/291, JH8GWW/300, 4X1KM/266, KC3EK/279, WA4YLD/233, WA6LFN/299, KE8CQ/251, NØRM/166
DK5WS/314, IT9KZW/321, OZ1HPS/131, K1VHS/301, KE3A/313, WD4AIE/235, WE6H/271, NS8R/131, NKØN/270
F8ZQ/127, JA1NGM/246

CW

DL9IE/158, JH2UVL/212, SM5AQB/251, 6Y5HN/156, K3PA/210, N4RUM/132, W5SL/238, N8MC/298, KB9XG/273
G3TXF/269, JA8DJY/236, SM6JHO/211, AI1N/203, KC3X/257, WC4B/262, N6IC/270, WB8JEY/303, KG9Z/151
HA8UB/249, JA8ZO/307, SM7OYP/180, K1KOB/199, KE3A/231, KA5TQF/192, NQ6N/266, K9ZXG/174, W9ROK/125
I1SBU/301, KL7HBK/157, WL7BEM/150, K1VHS/293, N3ED/280, NF5Z/251, W6SCC/251, KA9TNZ/125, NØRM/158
I3ZRL/251, LA3GI/125, 4Z4DX/300, N2WK/130

RTTY
W5SL/135 W8SEY/200

160 Meters
WB9Z/157

80 Meters
SM6CVX/209 VE7DX/190 VK6HD/260 W3MFW/298

10 Meters
SM6CVX/235 W1YY/263 N2HJZ/123 WE6H/156 N8HUR/139 K9ZXG/125 W9WHM/250 W9YSX/252 WØHBH/179
VE7DX/128

The following is a list of those amateurs who have qualified for 80 Meter DXCC during the period from November 1, 1988 to January 31, 1989. For those members whose applications were received by November 1, award number is shown, followed by member's call sign and total number of DXCC countries confirmed on 80 meters. The award number has been omitted for awards earned after November 1, 1988.

Complete applications received by November 1, 1989

1. ON4UN/326
2. W4DR/304
3. W3MFW/294
4. W9ZR/288
5. W8AH/284
6. N4WW/283
7. K4MQG/282
8. W1NH/281
9. K4DYY/279
10. K5UR/276
11. WØZV/275
12. N4JJ/273
13. W1NG/271
14. K2RR/268
15. K1MM/267
15. JA2AAQ/264
16. VK6HD/258
16. K4CIA/258
18. K1MEM/255
19. JA1ELY/254
20. SMØAJU/251
21. K2FL/250
22. OZ1LO/241
23. K4PI/235
24. OK1MP/234
25. K5OVC/233
26. K1IU/231
27. W1JR/230
28. JA1XAF/229
28. W4VQ/229
30. W4MGN/227
31. JA1UQP/224
32. VE7SV/220
33. HB9RG/219
33. W8UVZ/219
35. K1XM/218
36. KA1XN/215
37. WØPGI/213
38. DL1PM/212
39. W3AP/209
40. K3FN/208
40. K2TQC/208
42. SM7CVX/203
43. K3UA/200
44. OZ3SK/198
44. K1EFI/198
44. WB2P/198
47. K5TSQ/197
48. JA1GTF/195
48. KB1BE/195
50. DL3RK/194
51. OZ3PZ/189
52. KB8DB/187
53. VE7DX/186
54. K5UC/185
54. K7UR/185
56. W1RR/181
57. VE7AHA/180
58. SM6BGG/177
58. W1WAI/177
58. K6EID/177
61. SMØDJZ/176
61. WB4MAI/176
63. W1AX/175
63. N4MM/175
65. W6ISQ/173
66. N9US/172
67. W5IO/169
68. KQ1F/167
69. KE9A/166
70. AB9O/165
71. K2UO/164
71. N2LT/164
73. W2FR/163
73. K4XO/163
75. W2HZ/162
76. N6ET/161
77. W2FCR/158
78. PAØXPQ/157
79. DJ5JH/154
80. WA2UUK/152
80. K7SP/152
82. NS7Z/151
83. I1JQJ/150
83. K5KLA/150
85. W1GL/147
86. K1NTR/145
86. K5AQ/145
88. K1ZZ/142
88. W7ZI/142
90. NS8T/141
91. W1KSZ/139
91. KS3L/139
91. KZ4V/139
94. K3ND/138
94. WØIJR/138
96. AE6H/136
97. W4WJ/133
98. KAØCDN/132
99. JH7LVK/130
99. W4FRU/130
101. DK5WL/128
102. W1ENE/126
102. WB2DND/126
102. K4XG/126
105. NØZA/125
106. WØIZ/124
107. JR1TNE/123
108. NE4A/122
108. KE7LU/122
108. N7US/122
111. K2OVS/121
111. K6MA/121
113. W6KPC/116
113. K8CH/116
115. WØHBH/115
116. WØJF/114
117. WØSR/113
118. W4BKP/112
118. WF5E/112
120. DL5SBA/111
120. ZS6BCR/111
120. WB8ZRL/111
123. DL9TJ/110
123. N2CIC/110
123. W2KKZ/110
126. KM1D/109
126. K2RIH/109
126. W6TUI/109
129. K6SIK/108
130. WA4QMQ/107
130. WØYDB/107
132. N2KW/106
132. K9ALP/106
134. VE7FPT/105
134. K7NN/105
134. KC7V/105
137. NG8T/104
138. K1KOB/138
139. K1CLN/102
139. W8LWU/102

Applications received from November 7, 1988 to January 31, 1989

K4II/177 K5OTI/103 K2SHZ/171 AA6AA/245 I2QMU/106 SM5AKT/183 YBØJH/106 K2POF/106 WØYK/136
W1YY/176 W6QL/101 YBØABV/105 KBØG/129 AA4V/163 W4OUE/120 K4XI/129 K4SE/109 W8YA/200
JA1HQT/143 OH1XX/296 SP3GEM/266 W7FP/118 K4MF/123 LX1EL/105 KA9TNZ/105 W3GG/209 KI4LP/110
K9IW/113 JA8DNV/221 DL1EV/113 NX7K/120 AK5Q/100 W8ZSD/110 K9FD/127 NY5F/104 GMØCWR/129
W6KG/104 K6YRA/197 AA4DO/105

DXCC Notes
The DXCC Honor Roll Listing will appear in the July 1989 issue of *QST*.

A Visit to the USSR

(continued from page 58)

at 1900 and go back to Igor's for a little party. It was easy to recognize them, since Igor was wearing a baseball cap with UT4UX on it.

Igor lived in a 14-story building, on top of which was his antenna farm. The flat was modest but comfortable. Igor's shack was compact, with room for one operator.

At the party were Igor and his wife, Tanya, RT4UA and UT4UZ. We talked mostly in English, with the occasional help of a dictionary that I brought. We also used a lot of Q signals when natural language failed. When referring to geographic areas, we used the prefix of the area rather than its name.

I was taken to the roof to see the antennas. Igor showed me the rotator for his new beam. It was about three feet tall and looked like it could turn the building.

The hospitality of the Soviet amateurs is overwhelming. Tanya put out a delicious spread and baked a cake. There was enough for 20 people! There was also vodka and Russian wine. When it was time to leave, they rode the train back to our hotel with us. The next day, Igor, Nick and their XYLs took the day off from work to take us on a walking tour of Kiev.

Stan, RB5JZ, drove two hours to Yalta to meet us. He came with his charming 10-year-old daughter, Paulina, and his mother-in-law. He took us to a coffee house and then on a boat ride.

While in Leningrad, I received a long-distance phone call from UA6LA. He tried to get a plane ticket to Leningrad but was unable to because of the amount of tourist traffic.

Our trip to the USSR was greatly enhanced by the personal contacts afforded by Amateur Radio. The people are warm and hospitable, and just like us in most ways, always striving for rare DX and waiting patiently for QSL cards.

Strays

I would like to get in touch with you...

☐ anyone who has a manual or schematic for an EICO model 710 grid dip meter. Charles Crank, KAØLFS, 9854 Glenwood, Overland Park, KS 66212.

☐ anyone who served with the 5th Communications Group, USAF and/or the 934th Signal Battalion in Korea during 1950-54. Charles Crank, KAØLFS, 9854 Glenwood, Overland Park, KS 66212.

☐ anyone with info on early experimental radio/TV broadcasts and amateur, commercial and educational uses of radio in South Carolina, with particular focus on the University of South Carolina, Prof A. C. Carson, W4MN, and the U.S.C. School of the Air. Mel Jenkins, SCBA Broadcast Archives, McKissick Museum, University of South Carolina, Columbia, SC 29208, tel 803-777-7251.

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Editor

I'M AGAINST A CODE-FREE LICENSE

☐ First, many of the comments so far appear to have little validity with regard to the central issue and are spurious comments which are more a reflection of the writers' own personal frustrations. Some valid comments, such as that of KR7L note that we still do not know what attracts people to Amateur Radio. He suggests directions to take in the effort to recruit more amateurs. I cannot think of any reason why anyone cannot learn CW. Learning CW does not demand great intellect, but it does demand persistence and consistent practice, much like other mechanical skills such as touch typing. If you are willing to copy CW daily, you will learn CW. It is as simple as that.—*Dr Paul A. Grayce, K3LLH, Bridgeton, New Jersey*

☐ Back in school days, I was instructed in algebra, Latin, geometry and literature, most of which has not been necessary for my day-to-day life, but it was required for a well-rounded education. The few times I have needed this instruction, I was glad I had the background.

To go to a no-code license would be unfair, not to Amateur Radio in general, but rather to the ham himself. He deserves to know the code in order to be well-rounded. Let's not make the mistake of watering down the soup to make more bowls. Nobody wins and everyone loses. —*Paddy Liles, W9LOH, Dawson, Illinois*

☐ I too am writing in response to the code or no-code debate. I'm not an amateur, nor have I yet become a member of the ARRL, but thought you might want a viewpoint from someone who's ready to take his Novice exam.

Novice Enhancement definitely perked my interest enough to have a go at it! Yeah, the code is definitely the slowest and most difficult (for me) portion to prepare for, but, those are the rules and if you want to join the hobby, you learn 5 WPM or else! The more I thought about the code, the easier it became for me to accept it. Why? Because it's part of the heritage of Amateur Radio.—*Michael Holgate, Lake Oswego, Oregon*

☐ There are good reasons for keeping the code: tradition, discipline and controlling the quality of operators. What's the most troublesome to me is many of the no-code advocates seem to be saying let's "lower our standards, get more numbers or bodies" to protect the bands from commercial takeover.

This is purely a political attitude, and there must be another way. It doesn't take much research to tell you what this type of action can do; in fact, you can probably ask a friend if he doesn't know of a club, organization or a business that has lowered its standards and eventually ceased to exist. You can't honestly compare the United States with other countries. The people here are more free thinking and much more independent.—*Fred "Skeets" Senter, N6SZT, Long Beach, California*

☐ Dropping the Morse code requirement will not fix our problem. Youngsters will not sign up in droves just because the code is gone. It's still true that what we each get out of ham radio is in proportion to what we invest in it, so why cheapen it? Let me suggest a solution—one that I try to implement myself. My Elmer, WA5RQP, gave me as a youngster the gift of a lifetime, so I try to find one new Novice every year. Get them *Tune in the World*, show them my station and what I like to do on the air, nurse them through their first CW contact and loan them my old Heathkits for a few months. Many are interested in computers. Show them packet or contesting or awards or even Morse code. If we invest as much effort in finding new hams as discussing no-code, how much growth would we have?—*Wayne E. Wright, W5XD, Round Rock, Texas*

PUBLICITY: THE ANSWER?

☐ If any one subject can start a fight on the air waves or in print, no-code is the one. First, we need to become a little less hard-headed and get rid of our attitude problems and view all arguments deserving merit with an open mind. Second, with these arguments and our problems in mind, can we maintain a proper Amateur Radio Service in the event of rapid growth? I have been an amateur for over 10 years and had known of Amateur Radio for more than 10 years before I became an amateur. Why didn't I become an amateur earlier? I did not know any enthusiastic amateur to act as my teacher and mentor, tests were not given nearby, the beginning level did not have voice privileges, and I was not interested in learning the code. I feel we should improve our image and make the public more aware of Amateur Radio. In so doing, we will have a chance for good growth in the Amateur Radio Service.—*Gordon L. Anderson, N8CCC, Dayton, Ohio*

☐ The bottom line is the fact that it is not the code requirement that has this fine hobby in the doldrums, it's a public relations problem. I know of no effort to use public radio and public television stations across the country to publicize the purpose of ham radio.—*Charles M. Seay, Sr, Dickson, Tennessee*

A CODE-FREE LICENSE: HAM RADIO'S SALVATION

☐ Once again the pages of *QST* are filled with somber news concerning the loss of VHF amateur frequencies and various proposals to rekindle growth in the ranks of Amateur Radio. As darkness follows sunset, the voices of "CW forever" proponents are again forecasting doom and CB-type chaos in the amateur bands if a "no-code" VHF/UHF license becomes a reality.

Part of the problem of losing amateur frequencies is simply due to the fact that far too few code-leery newcomers are joining the ranks, and we are underutilizing our frequencies. Like real estate, frequency spectrum is no longer being made, and the FCC simply allocates spectrum to those with the greatest need and clout to get it. Already the FCC is considering the selling of spectrum. Now, don't get excited. I doubt there are many entities interested in taking away our temperamental HF frequencies, but look out for the possible loss of additional VHF, UHF and SHF amateur frequencies—that's where the action is and will continue to be. All sorts of new digital technologies are coming to the forefront there. These frequencies are reliable 24 hours per day, and that's why commercial interests want and need them. It's as simple at that.

Let's get off our collective duffs, leave our emotions at home and recognize the seriousness of this problem. We must lobby for legislation that will enable a no-code VHF/UHF license for all these young kids with computers who are itching for new challenges via Amateur Radio and would thereby populate these frequencies. Meanwhile, being a hard-core CW type, you will find me most often down on the HF bands dit-dahing with my cronies awaiting that final call to join the ranks of Samuel F. B. Morse.—*Ed Vosicky, WØJT, Overland Park, Kansas*

☐ At the outset, it is important that all concerned recognize the primary issue, namely the current stagnant number of US amateurs and the need to develop a procedure to increase our number in a way that will provide for a continued viable hobby.

While other efforts to achieve growth must be continued, the opportunity to expand by offering a no-code license is the most promising and must be pursued vigorously and without delay! It is, of course, understood that such a license would require passing of an appropriate written examination and that the operating privileges would be limited to VHF and UHF bands. Hopefully, the examination would be such that subsequent passing of

the 5-WPM code test would qualify the individual for Novice or Technician privileges, thus encouraging upgrading.

We can continue on our present course and do nothing, but if we do, US Amateur Radio will continue to shrink and diminish in importance, especially in the eyes of the FCC. We must not allow this to happen. —*Walter Bollinger, AF3V, Pittsburgh, Pennsylvania*

☐ I wonder how long Jean Eskridge, NØJZH (Correspondence, March *QST*) has been into ham radio. She states, "...look at the CB band after all licensing was dropped there! It is now a mess which will never be brought into line again. Let us not bring these 'computer people' into ham radio by easing the requirements. What we'll end up with is a CB mentality in our operators."

Well, this is a fine example of several "mentalities." First, the licensing program for CB never amounted to any more than tracking numbers of operators and equipment and served as a token acknowledgment that the op read Part 95. It was an easy source of revenue for the FCC until the sheer number of applicants, coupled with the lack of staff, forced the Commission into deregulation. There never was a standard for entry into that service—it was "pay and go." The mentality she radiated (no pun intended) is "open mouth, insert foot." Come on people, let us use our brain before we speak! I am not writing to degrade the code proponents, and I apologize to Jean, but how can one be respected for speaking half-truths?

No one is saying "let the code die." What some of us are saying is "it's 1989 not 1929." We have two valuable bands, 902 and 1240, which could be given to other services if we do not use them to our advantage. A huge incentive to manufacturers to make and promote new gear for these bands would be to open a part of it to a new class—one which is limited to FM or SSB and digital communication. The characters on 75-meter phone don't have to go there if they don't want!

In conclusion, I want to remind all of you to pick up a pencil and compose a letter. It might be like this or it might just say "yes code" or "no code," but please, let the ARRL know how you feel, send a copy to your ARRL Director and your Section Manager. If we don't make some decisions soon, we'll only have 75 meters left and only ourselves to blame!—*James Kaplan, N7LXQ, Puyallup, Washington*

☐ As an ARRL member for 20 years, I vote for an entry-level VHF/UHF no-code license. The time has come; let's go for it!—*Brian Davis, W9HLQ, Tinley Park, Illinois*

☐ I'm in favor of the idea [of a code-free VHF/UHF license]. Why? Young people of today who have been raised on computers could care less about the code. May I remind you that the average age of US hams is in the 50s? It doesn't take a genius to see that we need young people to sustain the healthy survival and growth of ham radio. Code only allows fewer hams into the hobby.

I don't feel that ham radio would go down the tubes with a no-code license. Japan, Canada and many other nations have or will soon have no-code licenses, and they haven't seen the demise of ham radio. Neither will we.—*Mark C. McCarty, KA2UIC, Howell, New Jersey*

☐ I wanted to let you know that I am in favor of a no-code entry license. I have been licensed 21 years, and I can still copy at 20 WPM, but I really can't justify having to learn it as a newcomer. The code is the biggest block to anyone wanting to become a ham. I probably would have been able to get two of my children licensed already if the code wasn't a prerequisite. It seems that most people who would become hams don't because of the code.

What type of code-free license should we have? The proposed Canadian system looks good to me, but I'm not sure that the majority of hams would want the no-code licensees on the 2-meter repeaters. It wouldn't bother me. If having no-code hams on 2-meter FM wouldn't work out, I would hope that they at least could use 222 and 440 MHz.

I am 35 years old and hope that ham radio is around as long as I am. We need to grow. I hope the ARRL supports a no-code license [for VHF/UHF] in the very near future.—*Ben Johnson, NY0O, Winfiend, Iowa*

☐ The no-code issue is of great concern to us all. I used to be opposed to it, but have finally come to realize that if we amateurs want this hobby to continue, we must make some changes.

Don't get me wrong—CW definitely has its place in Amateur Radio, but not at an entry-level class. Let people get into ham radio and get their feet wet first. Remember, we are not talking about eliminating the code requirements on all levels or on HF, just at the entry level.

We would all benefit. We all know what the no-code ticket has done for Japan. The number of hams in Japan is much larger in comparison to the US. We need numbers in order to save the bands we do have left. Being involved in the commercial two-way radio business, I know what kind of competition we will be facing in the future for space in the valuable frequency spectrum. Also, look at the number of technicians and the electronic technology in Japan.

I know several people who have been interested in ham radio for a long time and who would really be a benefit to the hobby, but CW is their only stumbling block. Of course, they would still have to be knowledgeable in basic electronic theory and operating practices. They would take pride in their licenses and follow procedures already in practice on the band. I can't say that the CW requirement has kept our operating practices up to par by listening to the bands. Let's all consider this very carefully, as it may very well decide our future—or no future—in Amateur Radio.—*Larry D. Shaunce, WDØAKX, Hollandale, Minnesota*

☐ We, as members of this very special group, have a responsibility to ensure growth of our hobby and to make sure more people have the chance to become amateurs. Recently, I have not seen that responsibility showing in amateurs. Is this because we are getting old? Are we falling behind in keeping our ranks current in the technological world we are in now? From what I see, the answer is yes.

I hope people are happy about the possible loss of 220 MHz. We did not have enough people on the 220-222 MHz band to effectively retain it. So, are we just going to sit around and let it happen again? No way, we need a no-code license now—one that is not a freebee to get. Why not let a class of operators learn electronic and especially digital theory, operating procedures, rules and regulations, everything we had to learn except Morse code? These new people who would be coming into the ranks are the future. We should allow them to use their computers, mathematical knowledge and young inventive minds to protect and carry on our favorite hobby. We have very much to learn from the young, just as they have much to learn from us older people. It's time to accept a change and renew the growth that Amateur Radio has been longing for.—*Nicholas L. DeCarlo, KA7VLH, Park Rapids, Minnesota*

ELECTROMAGNETIC FIELD EFFECTS

☐ The December 1988 issue of *QST* contains an article entitled "Inside Antennas" which has warnings about RF "hot spots," but it makes no mention of possible field effects on human health.

We are in an era of great uncertainty regarding possible bioeffects of nonionizing radiation. Indoor antennas present a number of problems including: (1) Concentration of Electromagnetic (EM) fields (power density) from indoor antenna radiation; (2) Specific absorption rate of the radiation in those persons (the operator and others) who are exposed; (3) Contribution of this type of radiation to specific human health problems such as cataract formation and possible promotion of cancer.

ANSI has set standards and exposure criteria for nonionizing radiation. Do we know if indoor antennas would meet such criteria and, if so, what would be the recommendation as far as distance of the operator from the antenna, shielding and maximum usable power?

I propose that future articles of this nature: (1) Contain some discussion of the risks of EM nonionizing radiation; (2) Contain information concerning research done looking at what, if anything, constitutes safe operation of indoor antennas; (3) Compile a list of hams who have been operating with indoor antennas for various periods of time and try to ascertain whether a health hazard exists.—*Joseph R. Salvatore, MD, N1DJH, Warwick, Rhode Island*

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

Methyl Bromide Gas Spill

By Gary Arnold, WB2WPA

Two days before Thanksgiving Day 1988, Tropical Storm Keith kept everyone on the Gulf Coast of Florida on alert for nearly 72 hours. In the Naples area, on the extreme southwest coast of Florida, we were lucky; three times on the night of November 22, the anemometer at the Emergency Operations Center recorded gusts of nearly 75 mi/h.

One of those gusts damaged a Ringo Ranger halfway up the 48-foot tower atop the Collier County Government Center used by the Collier County Emergency Net and Civil Air Patrol. That was the extent of the communications damage at the EOC during Keith, but this story is *not* about the storm.

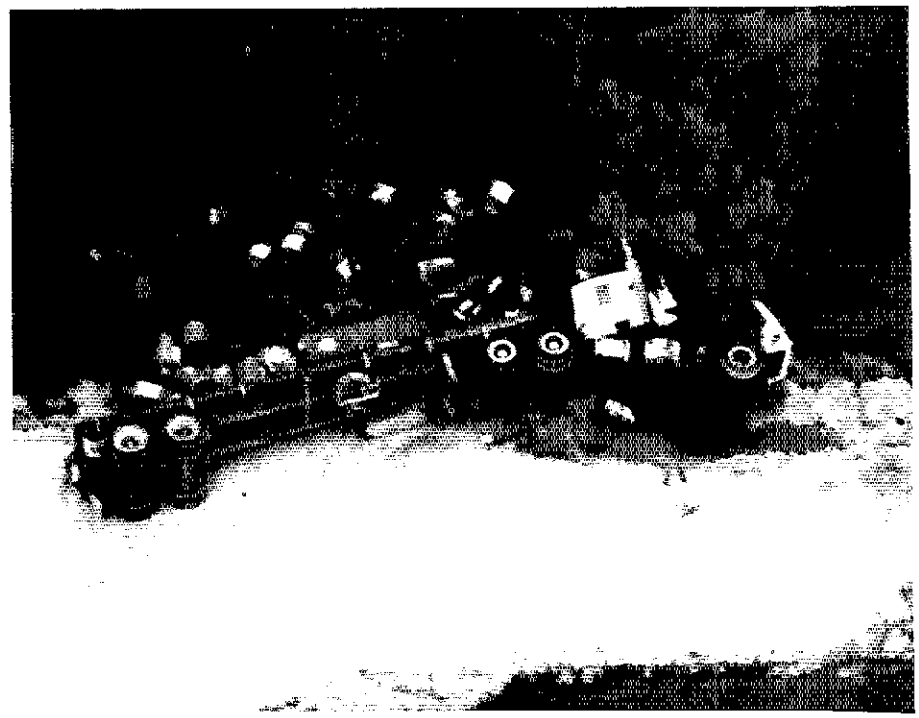
At 11:45 AM on November 30, I was on top of the building with the tower crew. Their job was to repair the Ringo and inspect and tighten the tower, antennas and guys after the storm. My job was to try not to get too dizzy eight stories above the ground—then my pager went off.

For the next 90 minutes, our office was involved with gathering and relaying information to fire, police and EMS units responding to an accident. A tractor trailer carrying deadly methyl bromide gas had rolled over in a remote area of the county, about 15 miles east of Naples. Thirty-two 1500-pound cylinders of the gas had been scattered along a rural roadside. There was a leak and people were getting *very* sick.

As Emergency Management Coordinator for Collier County Florida, I was asked to respond to the scene by Big Corkscrew Island Fire Chief Bob Siebold, the incident commander. Since our Director was out of town, I took my own car, which by chance contained an ICOM IC-22U and a Mirage 80-W amplifier.

In the spring of 1988, our county-sponsored Spectrum 1000 2-meter repeater was virtually rebuilt with a new receiver, exciter and 75-W amplifier. An ACC RC-96 was also installed. The entire system had been tested routinely with ARES drills, as well as the biweekly Collier County Emergency Net, in preparation for the real thing. Well, this was certainly it!

In any potential disaster, communications can certainly be a problem, especially in the initial stages. In our county, the Sheriff's dispatch center handles EMS and fire dispatch on a single repeater separate from police dispatch. That repeater, known simply as "control," was overloaded with the spill and other emergency calls. The dispatch center does not have phone-patch capability.



Collier County (FL) hams provided emergency communications when a tractor trailer carrying methyl bromide gas rolled over in a remote area. An autopatch put the fire chief in direct contact with CHEMTREC, a special emergency center established by the Chemical Transporters Association.

When the first fire and EMS units arrived, the truck driver, a Highway Patrol trooper and an auxiliary trooper were already injured by the leaking gas. The driver was trapped, and the area had to be evacuated or more people would be in danger.

Fire crews wearing protective clothing and special breathing equipment removed the driver and the troopers. Others began to feel the respiratory problems caused by the gas. It was time to secure and withdraw.

Chief Siebold asked about the autopatch on the repeater, a service installed for just this type of event. Several miles from ready-access to a phone, the patch worked beautifully. A three-digit access code activated the RC-96 emergency dialer, CHEMTREC (a special emergency center established by the Chemical Transporters Association) was called and the Chief was able to speak directly to the center. This minimized the chance for error in the communication of critical information.

After the first call to CHEMTREC, Chief Siebold looked at his assistant and asked, "Why can't we do this?" I just smiled to myself and dialed the next number.

Once crews found the name of the shipper at the accident site, the regular patch was used to call the company in North Carolina. Since long-distance calls are usually inhibited, switching to a preprogrammed emergency command set enabled long-distance dialing, changed the repeater courtesy tone and started a voice-tail message indicating that the repeater was in emergency operation. Routine communications were shifted to WA4HWN/R, operated by the Amateur Radio Association of Southwest Florida.

By talking directly with the shipper, the Chief was able to directly impart the tone of urgency that would likely have been lost through an intermediate relay. The information exchanged was again completely clear and free of potentially fatal misunderstandings.

Meanwhile, the emergency net was placed in limited operation, with one volunteer manning the 2-meter position in

the EOC. W9OAO monitored the calls made through the repeater, keeping our department up-to-date and relaying needed information at the scene as quickly as it arrived in the EOC.

As dusk fell, it appeared that things were under control. More emergency responders, mostly Sheriff's deputies, had been treated for signs of the gas and hospitalized. The shipper was contacting a specially equipped cleanup crew to remove the cylinders. The crew would be on the site by daybreak and would go to work at first light. Enter Murphy.

Shortly before 8 PM, another Sheriff's deputy was hit by effects of the gas. It did not necessarily mean that gas was spreading over the controlled area: Methyl bromide symptoms may not appear for 24 to 48 hours and may worsen up to four days after exposure. To be on the safe side, the evacuation zone was extended to cover several square miles of sparsely populated woodlands. Emergency crews pulled back.

Chief Siebold asked that the EOC's Mobile Command Post be activated at the scene, now about two miles upwind of the spill. The request was sent over the repeater to the EOC staff. County Manager Neil Dorrill and Emergency Management Director Ken Pineau were advised of the situation via the patch and more ARES and emergency net volunteers were called.

Communications Officer WD4AQW and ARRL Emergency Coordinator N4KNP responded with the van, while WB4FUS responded to the EOC's request to reopen the station which had been closed a few hours earlier when things appeared to be secure. Other hams were available on standby for what now appeared to be a long night. Those basic hazardous materials training sessions of two months earlier were comfortably fresh in everyone's mind.

By 10 PM, the command post was up and operating. An Azden 3000 and a 5-element beam were solid into the repeater. Other radios in the van were checked out and made operational. A schedule of ARES members was put together to man both command post and the EOC during the night.

Shortly before 11 PM, we made our second call to the Miami Weather Service office for an updated forecast of overnight winds. The winds were determined to be out of the north, increasing as a cold front approached during the night. We were safe, but the decision was made to extend the evacuation area farther south to Alligator Alley, a total of 10 square miles.

The EOC contacted the Collier County public schools about opening an elementary school as a shelter. The principal asked to talk with someone at the scene and was immediately patched through. The shelter was open in 45 minutes with WB8RAZ in position as communicator when the principal arrived to open the door.

After midnight, there were light showers and some gusty winds from the north. Another call to Miami weather provided the latest information. The county manager was updated again via the patch.

There was little change overnight until a group of farm workers, unable to evacuate without passing directly by the contaminated area, were discovered. Word was relayed to the EOC via the repeater. They were later safely removed.

By morning, much of the communications had shifted to other frequencies. A low-band local government frequency took much of the sensitive traffic off the repeater. Routine traffic, such as contacting the Red Cross for assistance, was still handled on 2 meters.

Just before noon, the National Transportation Safety Board investigators arrived, and within an hour, had a need to reach Washington with an urgent request. The autopatch again performed flawlessly.

The removal team found that just one cylinder was leaking and was almost empty. By midafternoon, the wreckage of the flatbed truck had been removed. The cylinders—one leaking and empty, 32 intact (and nine of them full!)—were carefully loaded onto another truck and removed. The residue in the leaking cylinder was so strong that no one stood downwind very long as it was examined from a distance.

By 5 PM, the spill site was secured. The danger had passed and the evacuation had been lifted. The Mobile Command Post was secured, the net was closed, and the repeater went back into regular operation.

The Amateur Radio Service received glowing marks from emergency responders, both in terms of technical and personal effort. They haven't even seen packet yet, but they will! Our small but dedicated group came through once again, making a real contribution to a dangerous situation and perhaps even saving a life or two. Methyl bromide is a colorless, odorless gas used in agriculture, and can be fatal in the concentrations seen in this incident. Had the wind been blowing 60 to 90 degrees more toward the south, the driver probably would have been dead before help arrived.

The total estimated cleanup costs will be in the tens of thousands of dollars, but as always, our services were provided without charge—yet another example of the true value of the Amateur Radio Service to our communities.

David Boland, W9NWY, with radio in hand, watches as Bill Hill of the National Weather Service observes the radar screen at the Neenah, Wisconsin radar site. Boland was one of 25 Winnebago County ARES/RACES operators who took part in an April 6, 1989 statewide tornado drill. Boland's employer, Kimberly-Clark Corporation, has given him permission to leave work to operate from the radar site when the threat of severe weather occurs. A ham would provide communications to the Winnebago County Safety Building communications room when the County's telephone-line radar feed is disrupted.

Field Organization Reports
March 1989

ARRL Section Emergency Coordinator Reports

Twenty-eight SEC reports were received, denoting a total ARES membership of 14,109. Sections reporting were: EPA, GA, HI, IA, KS, KY, MI, MN, MO, NFL, NM, NV, OK, OR, ORG, RI, SD, SDG, SJV, STX, UT, VA, WNY, WPA, WV, WWA, WY.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	100	80.60	506	1040
TCC Central				
TCC Pacific	106	85.48	433	803
Summary	206	83.04	939	1843
Cycle Three				
TCC Eastern				
Cycle Four				
TCC Eastern				
TCC Central	61	82.40	364	792
TCC Pacific	110	88.71	554	991
Summary	171	85.55	918	1783

TCC Roster

TCC Eastern Area, Cycle 2: KW1U, Director. K1EIC WA1FCD KT1Q W1QYY WA1TBY KW1U WA2FJJ W2FR NN2H WB2MNA W2MTA WA2SPL KA2UBD N2XJ N3AZW N3EMD NC3V WA3YLO AA4AT WD4FTK W4FRR N4GHI WB4PNY N4SS W8PMJ WB8YDZ VE3ORN.

TCC Central Area, Cycle 4: K5GM, Director. WB5J KM5L K4MXQ WZ5N WF5O N5TC K5TL W5TNT KB5W W9CBE WB9UYU AIØO KSØU

TCC Pacific Area, Cycle 2: ND5T, Director. W3GL W5JOV KB5UL K6UYK WF6O VE6CHK W7AMM VE7EIL KF7R W7TGU W7IGC NØHFZ NØIA WAØOYI WAØYNP.

TCC Pacific Area, Cycle 4: KØDJ, Director. N2IC W5QVK ND5T K6LL W6EOT W6VZT K7GXZ W7EP W7GHT W7VSE KA7CPT KN7B NN7H NR7E KØEZ KØTER NØHFZ KCØD KJØG.

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep to Area	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	1057	34.10	.957	94.1	
CAN						
PAN*	62	511	8.24	.523	94.0	
Region Nets						
1RN	62	423	6.82	.378	100.0	96.8
2RN	60	423	7.10	.465	88.3	93.6
3RN	31	129	4.16	.390	91.1	96.8
4RN	62	516	8.32	.470	68.0	93.6
RN5	62	643	10.37	.432	87.0	
RN6	49	137	2.79	.264		82.2
RN7	60	401	6.68	.530	86.7	100.0
8RN	62	332	5.35	.315	97.8	96.8
9RN	58	395	6.81	.395	94.0	
TEN						
TWN	57	210	3.68	.375	74.0	100.0
ECN						
Cycle Three						
Area Net						
EAN	31	221	7.13	.402	79.7	
Region Net						
1RN	31	97	3.13	.256	93.6	83.8
2RN	31	132	4.30	.391	100.0	87.1
3RN	29	56	1.93	.246	82.8	90.3
4RN						70.9
8RN						96.7
ECN						61.3
Cycle Four						
Area Nets						
EAN	31	1351	43.58	1.393	97.7	
CAN	30	833	27.77	1.381	100.0	
PAN	31	802	25.87	.856	85.6	
Region Nets						
1RN	62	484	7.81	.496	95.9	100.0
2RN	34	175	5.15	.540	54.2	100.0
3RN	62	221	3.55	.353	96.8	96.7
4RN	62	668	10.77	.385	100.0	96.7
RN5	62	601	9.69	.700	100.0	100.0
RN6	62	289	4.66	.454	98.4	
RN7	62	452	7.29	.608	90.1	
8RN	62	401	6.47	.394	97.0	96.7
9RN	62	377	6.08	.431	96.0	100.0
TEN	62	508	8.19	.595	83.1	100.0
TWN	55	294	5.35	.488	90.3	
ECN	52	133	2.56	.413	63.0	
ARN	31	64	2.06	.062	100.0	96.7

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, ENY, EPA, GA, HI, IL, IN, KS, MDC, ME, MI, MN, MO, NC, NFL, NH, NNJ, NTX, OH, OK, OR, ORG, SB, SC, SD, SDG, SFL, STX, UT, VA, VT, WI, WMA, WNY, WPA, WTX, WVA, WWA.

Public Service Honor Roll

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, upon sending written notification to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

303
W8AKF
166
WG9J
157
WD8V
146
KA8BBY
141
WA9W
WB2OWO
140
WA2SPL
137
N4GHI
136
NØDPF
129
WB4DVZ
W2MTA
127
W2QNL
125
WA4QXT
WBØFVV
124
N2EIA
121
KF5BL
WX4H
120
WB7WOW
119
KA3DLY
116
N4KFU
N1CPX
115
W7TVA
W9YCV
WA1TBY
113
ND2S
112
K4ZK
WA4PFK
N4EXQ
111
WB2ZJF
N5MEA
110
WA9VND

109
KJ4VT
107
W7VBE
N9BDL
W9CBE
106
WB1HIH
KAØPDM
KT1Q
KA7AID
WA2JBO
W1PEX
K9CNP
105
W4ANK
WB1GXZ
KØBXF
WF6O
104
WB2EAG
KA1NXT
KW1U
W4JLS
103
NR9K
K2VX
WAØHTK
102
KD8HB
KAØKPY
N3EMD
WB2VUK
KA2QOO
WA2ERT
NM1K
101
W4PIM
WA4JDH
WB6DOB
WB4WII
WG7H
WB8SYA
100
WA4EIC
W7GHT
K4NLK
99
KØERM
K2ZVI
WB4ZTR
98
K5UPN
97
W4CKS

KD7ME
N2XJ
N3DRM
KI4YV
96
KT9I
NØFOO
N4MEJ
KA1GWE
WD8KQC
95
W3FA
94
W2RRX
92
WB2UVB
KB9LT
KB1AF
WB4KSG
91
WA2FJJ
90
WB4WQL
N6NLW
AC5Z
K4MTX
89
W9DM
WD5GKH
W6VOM
W1KX
88
WØOYH
W1RWG
N8FPN
87
KA1JXH
86
W3YVQ
KA7EEE
WA3UNX
KA8WNO
KA2ZKM
KB4WT
85
NW8M
84
K5MXQ
W5CTZ
KQ3T
83
WB6QBX
WT7A
KC2HJ

82
WD4KBW
WA1JVV
K4BGZ
WA9VLC
81
NDØN
NO3M
W9HBI
80
W7LBK
W5YQZ
N3AZW
N8HSC
79
WA4RUE
WA2CUW
N8GPU
78
KA2INE
77
KA1IFC
N3EGF
N7BGW
W4TZC
76
KJ4NK
KAØARP
NØIYE
WAØTFC
KAØUEO
N8JPR
75
WB8YPG
74
WBØZNY
K3RXK
WB1BTJ/T
KA1GEP
73
KI6ZM
KK4FV
AA4AT
72
W1KK
WDØGUF
N2DXP
NOØA
WB5J
K2YAI
N4KSO
K8CQF
71
WA4YYQ
WA8DHB

NY8W
70
KA4HHE
KJ9J
69
KØPCK
NC9T
68
N8FWA
N5KCL
NC3V
NZ5J
KA7SYG
NS9O
KB2EPU
67
KD8KU
WA3YLO
NG1G
N4SMB
K1EIC
66
KA4FZI
W9UMH
KC3Y

N2IYA/T
NJ3V
65
N4MWR
W6OUD
K3GHH
AA4HT
WB2QIX
KA1KML
64
N4ORZ
KA1S
K8JDI
WB8KWC
WB2FTX
KDØYL
K4IWW
WB8R
63
N8CEI
KA1RVN/T
N3COY
KV7F
KA2ZNZ/T
KA9QXI

62
WA4TXT
KJ3E
WS7U
WØKK
KC4GRU
KI4W
N1FNN
61
W4RWB
WBØWNJ
WA4RNP
N1DHT
WB5YDD
KA7WFW
WB4TZR
60
K9ZBM
WC2R
KF7FF
WD8KBW
KD3JK
N2ABA/T
W2FR
KA1BBU

WB7WVD
59
KA9CTW/T
57
N2IKR/T
54
KA2CDB/T
53
KA9TVU/T
50
N5NZH/T
49
KA2CQX/T
KA1OFV/T
WA1CRE
48
KA1HPO/T
44
N2EVG/T
43
N6ADV/T
KA8HJK/T
40
N8HRW/T

The following station qualified for PSHR during the month of February but was not listed in last month's PSHR column: W8AKF.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US 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.

Call	Orig	Rcvd	Sent	Dlvd	Total
W8AKF	426	2703	2991	291	6411
W3CUL	714	798	1254	161	2927
WB9YPY	0	1242	108	769	2119
W1PEX	0	622	1118	22	1762
WBØTAX	0	757	757	0	1514
WA2SPL	4	582	567	39	1172
WBØWNJ	255	160	740	7	1162
W3VR	241	277	441	31	990
KA1IFC	12	467	386	34	899
WD4IIO	360	45	367	39	811
KC9CJ	7	433	18	277	735
WA9VND	3	347	345	26	721
N4GHI	53	320	294	36	703
N3AZW	9	328	319	26	682
WA4QXT	69	270	297	24	660
K1UGM	329	0	329	0	650
WX4H	12	300	318	12	642
WB1BTJ	0	193	445	0	638
KB4N	0	326	312	0	638
WF6O	16	293	33	9	631
K4DOR	53	250	291	12	606
WA4JDH	4	284	314	0	602
W8ZOL	---	---	---	---	588
N2EIA	2	272	273	23	569
WB2QMP	245	262	42	15	564
N1CPX	23	214	308	15	560
WA1TBY	244	24	284	7	559
NR9K	104	124	310	14	552
K6IYK	13	253	269	5	541
WB5J	2	281	238	2	523
W3IWI	0	254	253	0	507
KT1Q	1	255	241	5	502

BPL for originations plus deliveries:

WD4KBW	189
K1TQY	150
W1FYR	149
AA4FG	145
W4ILE	141

The following station qualified for BPL during the month of January, but was not listed in the April BPL column: N3AZW 593 (Total points).

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Transmitting Society	27	346	360
Central Gulf Coast Hurricane Net	31	133	3397
Clearing House Net	28	136	213
Empire Slow Speed Net	31	451	73
Great Lakes Emergency Traffic Net	30	69	1080
Golden Bear Amateur Radio Net	31	117	1528
IMRA	27	871	1840
Mission Trail Net	31	187	950
Northern California Net	93	338	1152
NYSPTEN	31	70	424
West Coast Slow Speed Net	31	87	496
20 Meter ISSB Net	27	877	4270
75 Meter Interstate SB Net	31	517	1209
7290 Traffic Net	50	346	3443

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to HCR 5 PO Box 574-334,
Tierra Linda Ranch, Kerrville, TX 78028
or call 512-257-1296 to record late-breaking information.

The Great Aurora of 1989

This is one of those times that it is impossible to chronicle more than just a few of the happenings during a report period. The huge aurora of March 13/14 produced so many worthwhile reports for all of the bands from 50 to 902 MHz that anything more than a passing reference to some of the more notable occurrences would more than exhaust the limited space available. In the interest of covering as many reports as possible, the usual lead material will be skipped this month.

Just to put the event into perspective, WWV gave a K reading of 9 for two successive periods. That's on a scale of 0 to 9! The big aurora of February 8, 1986 produced a 9 during one 3-hour period. In our hemisphere, visual displays were reportedly seen as far south as the Isle of Pines (south of the main island of Cuba), as well as in the Central American country of Belize. In the southern hemisphere, the southern lights were apparently observed as far north as the Northern Cook Islands. Television news stories in many parts of the US told of people calling their local fire departments to report massive blazes somewhere north of their homes. Power outages were experienced in Quebec and the HF bands were useless. But it's a very ill wind that doesn't blow someone good. In this case, it was the VHFers who profited, many with their first experience with auroral propagation. Auroral-E propagation was common on 6 meters and apparently occurred even on 2 meters. Aurora signals were reportedly detected as high as 903 MHz.

ON THE BANDS

6 Meters—With the high activity currently taking place on 6 meters, our lowest-frequency VHF band produced a lot of the reports received on the radio effects of this massive geomagnetic disturbance. One of those reporting, W3OTC, near Washington, notes working stations as far south as Dallas, TX and southern Georgia and as far north as Quebec. Bob says that many of the 50-MHz signals sounded more like E_s than aurora. That's a comment that appears frequently in many of these aurora reports. KB3PD in Delaware notes working WD5K EM12 at 2200Z March 13 and KN5S New Mexico DM62 45 minutes later. W5VBP Marquez, TX was watching Channel 3 in nearby Bryan/College Station when the picture "went to pieces." A check of 6 meters brought forth some of the loudest signals Neil had ever heard from the 8th call area. He went on to work a dozen stations in the 8, 9, Ø and 7 call areas. Only after that did he return to the TV to hear of the news reports of the widespread and intense aurora. K7ICW Las Vegas, NV, as well as working a number of stations out to 800 miles, was also able to hear, but not work, WB2OTK/4 in South Carolina. Another interesting letter comes from WAØGOZ Stillwater, MN EN35. Henry says that the evening of March 13 was a dream for him. Apparently everyone needed EN35 as he was generating a real pile-up every time he stood by. The night's work netted 76 stations in 21 states and 2 Canadian provinces and 38 grids. One station worked in Washington, DC was running 10 W to an inside dipole.

Perhaps the most unusual report comes from KA1MFA Warwick, RI. The aurora began for Dave about 1600Z March 12 with QSOs with 1s, 2s, 3s, 8s and VEs. The buzz signals were up and down for the rest of the day and evening and still in at 0500Z on the 13th when Dave quit for the night. The next day, he says it got really interesting about 2100Z when he worked N5KW in Oklahoma with 59-plus signals, without the auroral characteristic, followed by a number of other 5s and 4s, some with auroral buzz, but others with none. About 2200, signals began to revert to more northerly beam headings, with aurora characteristic present. Dave decided to check for the OX3VHF beacon on 50.045 and, to his surprise, he heard it. His father, K1IKN, listening to 28.885, heard G4GLT working other Europeans on CW. A call to the British station to ask him to listen for KA1MFA's CQ on the low end of 6 brought an immediate response. G4GLT was 559 and he sent back a 579. G4GLT's 50-MHz signal had no auroral buzz but did have a "hollow" sound K1IKN said was reminiscent of the signal he heard from VE8BY when he worked that station in 1962. KA1MFA says that the beam heading was about 15 to 20 degrees north of the usual path to the UK. This contact is probably a result of auroral E, which is also a likely candidate to explain the T-9 characteristic of other signals widely reported during this event.

As is often the case, some very good long-haul propagation accompanied the aurora. W5OZI Junction, TX (this conductor's nearest 6-meter neighbor, 50 miles to the west) says that on March 14 beginning at 2218Z, when he arrived home from work, he worked VK5ZJB S8, VK4ALM S7, 5W1GP S9 plus 20, 5W1GW also S9 plus, ZL2CD S5, ZL2AGI S7, FO5DR 559 (only station worked on CW), VK3XQ S9 plus 10 and VK2ZXE 5x5 at 0006 on the 15th. Many have been asking, "where was W3XO/5?" Regretfully, my commitments to AMSAT required that I attend a meeting in Houston March 14th on plans for the next "Ham in Space" operation. We stayed in Houston visiting relatives the rest of the week and thus missed the whole affair. My thanks to those who attempted to alert me via the answering machine. Alas, their efforts were to no avail.

The antics of 6 meters were not confined to these few days, or to aurora-induced propagation. Openings, especially on north-south paths, have been almost daily occurrences in many parts of the world. An example of this is the experience of ZS3E, supplied by his QSL manager K8EFS. Andy says that, since the first of the year, ZS3E has had 686 QSOs—mostly with European stations. Kosie has worked as far north as LA3EQ in Norway, and many of the other European countries permitting 50-MHz operation. A particularly interesting station worked was signing YU5ØMHZ! The 30th was one of his better days in March, netting VE1YX at 1407Z, W5EU at 1711, FC1MCY at 1720, T7ØA at 1723, CT1DTQ at 1745 and FC1CG and SZ2DH at 1800. April 6 was another particularly good day, with KH6HI at 0730Z, KH6VP 5 minutes later and 10 French stations later in the day.

The period around April 1st was particularly productive for stations in and around the Caribbean. Several stations such as P43AS, 8R1AH and FY5AU were able to work halfway around the world to YBØARA. Generally, these contacts took place about 1200Z. The region has also been experiencing a field day with New Zealand and Australia in the afternoon hours. Again, K8EFS comes through with some details—this time from the log of DL3ZM/YV5. April 1 was Jerry's best day for this propagation. Between 2242 and 2328Z, he worked 18 VKs and 7 ZLs, the latter all above 51 MHz, plus FK1TS. The next day was almost as productive. Beginning at 2115Z, DL3ZM/YV5 hooked up with NI6E/KH6, KH6FOO and KH6JJI. At 2132, it was ZD8MB and at 2155, TR8CA. Again to the west, Jerry worked VK2BBR at 2205, FK1TK at 2208, VK4ZJB at 2226 and VK4ASB at 2227. Beginning at 2320, he worked FOØAQ, FK8EB, VK2MZ, VK4DDG and VK4PU. The following day, it was 4 more ZLs beginning at 2000Z.

Adding even more life to the active 6-meter scene has been the trip by W6JKV to T3Ø, West Kiribati, and T2Ø Tuvalu. As T3ØDJ between March 27 to April 6, Jim worked many JAs, ZLs, VKs plus a number of Caribbean stations. On only a few openings to the US he hooked up with quite a few W6s, with his most easterly contacts being W5FF/K5FF. The T2ØJT operation is just underway as this is being written.

There have been many other notable contacts on 6 meters in various parts of the world, too numerous to report in the space available. I hope that no one feels slighted if his or her report does not appear.

2 Meters—An aurora as massive and widespread as the one which occurred March 12 through 14 would be certain to have a significant effect at bands higher than 50 MHz. This one certainly did. One of the most complete reports for 2 meters is submitted by W2CRS/Ø Woodland Park, CO in DM78. Doug says his QTH is about 8 miles north of Pike's Peak at 9,000 feet. His log shows that, beginning at 0615Z March 13, he completed contacts with 88 2-meter stations in 24 states

EME Annals

Figures are number of different stations (not total QSOs), number of US states, number of DXCC countries, all worked via EME. Compiled April 9, 1989. Deadline for next update is April 1, 1990. Those not heard from over a two-year period are subject to being dropped from the list. They will be reinstated upon submission, in writing, of expression of continued interest in moonbounce on the particular band(s) along with a summary of current figures including all needed information, ie stations, states and countries worked. It is not necessary that additional EME contacts have been made over the past two years to be reinstated. A special new form is available to list information. Send an SASE to the address at the head of the column.

The Beginnings

January 27, 1953: First reception of amateur signal echoes from the moon—W4AO and W3GKP. Frequency 144 MHz.

July 27, 1960: First amateur two-way contact via the moon—W1BU and W6HB. Frequency 1296 MHz.

April 11, 1964: First 144 MHz two-way moonbounce contact—W6DNG and OH1NL.

May 20, 1964: First 432 MHz two-way moonbounce contact—W1BU and KP4BPZ (followed shortly by a number of other contacts by KP4BPZ using the 1000-foot dish at Arecibo, Puerto Rico.)

March 15, 1970: First 220-MHz two-way moonbounce contact—WB6NMT and W7CNK (followed by a contact the next day between WB6NMT and K2CBA.)

October 19, 1970: First 2304 MHz two-way moonbounce contact—W3GKP and W4HHK.

July 30, 1972: First 50-MHz two-way moonbounce contact—K5WVX (now K5CM) in conjunction with W5WAX (now K5SW) and WA5HNK in conjunction with W5SXD.

April 5, 1987: First 3456-MHz two-way moonbounce contact—W7CNK/5 in conjunction with KA5JPD and WA5TNY in conjunction with KD5RO.

January 22, 1988: First 902-MHz two-way moonbounce contact—K5JL and WA5ETV.

August 27, 1988: First 10-GHz two-way moonbounce contact—WA5VJB in conjunction with KF5N and WA7CJO in conjunction with KY7B.

6 Meters (50 to 54 MHz)

WA4NJP	9	5	3
W6JKV	7	4	3
W7HAH	3	3	1
K6MYC/KH6	1	1	1
W7FN	1	1	1
KH6HI	1	1	1

2 Meters (144 to 148 MHz)

W5UN*	1093	50	76
VE7BQH*	635	50	72
K1WHS*	430	47	43
DL8DAT	411	49	66
W7FN*	349	50	44
WA1JXN/7*	344	50	43
KB8RQ*	339	—	50
W4ZD	311	44	47
SM7BAE*	306	50	65
W7HAH*	301	50	45
OH7PI	269	44	44
WA6MGZ*	276	50	45
OZ1EME*	274	44	44
N5BLZ*	260	45	47
W7IUV*	248	46	34
WA4NJP	235	—	36
N4GJV*	233	49	40
KD8SI*	233	43	38
Y22ME*	230	46	44
SM2GGF	222	—	31
OK1MS*	215	46	42
SM4GVF*	214	43	—
UA1ZCL	200	—	25
VE1UT*	194	48	36
HG1YA*	193	33	34
KB7Q*	170	40	36
YU3USB	170	—	42
WD9ACA*	168	40	37
W5LUU*	166	43	35
KI3W*	165	50	39
WA4LYS*	159	43	46
KF0M	138	43	30
JA6DR	138	—	25
SM2CKR*	127	22	27
HG1W*	126	32	36
WA4MVI*	120	37	20
ZS6ALE	119	31	27
F6CJG	118	—	62
SM4IVE	110	—	45
UA3TCF	110	—	40
HB9CRQ*	108	16	27
K2OS*	107	27	28
WB8PAT*	104	39	28
WA1JXN/C6A*	102	32	26
W5SUS*	102	—	34
K6HXW	100	27	25
F6BSJ	99	—	55
W7ID	97	39	23
YU32V	97	—	52
KH6HI	96	44	20
SM2CEW*	94	21	37
OZ4MM	92	18	27
LZ2US	90	—	23
WB2NPE	87	29	23
PA0VST	87	28	24
WD4DGF	87	26	24
W5UWB	86	36	25
KG6DX	83	22	27
AA4FQ	82	43	26
DL8OAT	82	—	52
N1BUG	75	24	23
K2UYH	72	16	11
SM3LBN	65	15	22
W1JR*	62	25	20
WD5AGO*	61	23	19
LU7DZ	61	12	16
JA9JCJ	61	—	—
GM4JJJ	60	17	25
K6MYC/KH6	60	—	14
WA7KYM	59	28	13
G3NAQ/P	59	17	16
WB5LUA*	50	26	17
ON7RB	50	—	38
K9SR	48	15	14
DK1PZ	48	—	12
W5FF	47	26	11
JA4BLC	47	—	16
KC3LZ	44	17	12
WA7TDU*	43	22	13
Y23RD	43	9	17
AF1T	41	23	11
SM2ILF	40	—	25
I2MBC	39	19	11
PA3DZL	37	7	17
DJ5MS	37	—	—
W0VB	35	16	14
N8AXA	35	10	8
W0RT	34	19	9
SP5CJT	34	11	14
SM2JAE	34	—	19
SM0MXR	33	8	15
SM5CFS	33	—	—
OH5IY	30	—	29
K5FF	29	21	9
WA5VJB	29	14	7
SM0PYP	29	7	14
KB3PD	28	17	10
VK3UM	28	9	144
4U1ITU	27	7	11
DL8GP	26	—	—
UA3MBJ	26	—	—
WA1OUB	23	10	10
OZ1GFX	23	7	9
W8WVM	22	12	7
I4EAT	21	12	7
DL6LFU	20	2	13
VK4AUU	19	4	9

1¼ Meters (220 MHz)

K5FF	55	40	5
W5FF	47	38	4
WB5LUA	29	34	4
W1JR	27	27	2
K9XY	16	16	3
K2UYH	12	6	1
WA4MVI	10	7	2
W0VB	6	5	1
WB6NMT†	3	3	1
N6AMG	3	2	1
K7NII	2	1	1
W4WD/7	2	1	1
K2CBA	1	1	1
WB2BYP	1	1	1

70 Cm (420 to 450 MHz)

K2UYH*	338	50	45
K5JL	337	—	36
DL9KR*	303	50	40
I5MSH*	250	44	41
LX1DB	221	—	38
N4GJV*	219	45	40
W1JR*	208	49	38
N9AB	194	—	—
G3LTF	192	42	33
WB5LUA	185	45	33
K4QIF*	183	39	25
JA6CZD	183	—	—
K1FO	177	43	32
YU1AW	176	—	30
VE4MA*	169	32	29
F1FHI	164	31	45
DF3RU	162	32	31
OK1KIR	161	35	31
OE5JFL	159	—	22
W7GBI*	152	39	29
SM3AKW	151	—	—
W0HHE	150	37	9
JA4BLC	145	26	27
W0RAP*	140	43	30
KL7WE*	135	40	26
JA9BOH*	135	32	24
FD1FHI*	135	30	38
K5AZU	133	30	21
W0RRY/5	133	24	29
W0SD	127	31	23
F9FT*	126	12	48
W7FN	120	45	30
F1ELL	120	—	—
F2TU*	119	30	23
SM4IVE	118	—	—
DK1PZ	115	25	—
SM0PYP*	114	24	31
G3SEK	113	20	—
W5FF*	109	48	19
DL7YC	109	—	—
K8WW*	107	30	25
FC1FHI	106	24	—
W7HAH*	104	42	23
WA4MVI*	104	35	15
OE9XXI	103	24	28
SM6CKU	102	24	26
G3LQR	100	25	26
HB9AB	100	—	—
YU2RGC	98	25	23
GW3XYW*	97	—	23
K5FF*	95	47	21
Y22ME	95	24	42
N7ART	93	40	18
KU4F	93	24	16
DL6WU	92	22	23
WA3FFC	90	—	—
ON4DY	89	25	20
HB9G	89	—	24
W3IWI/8	85	21	21
W8IDU	83	22	15
I2COR	82	—	31
DK5AI*	81	18	22
VK3UM	81	16	29
N6AMG	77	28	20
W9IP/2	73	14	10
WA4ZTK	72	28	12
SM6EWP	71	21	23
WB5AFY	70	11	5
OE9HHV	68	—	—
W7JF	67	39	14
DL7APV	67	13	26
ZL3AAD	67	—	21
DF7VX	66	16	18
DJ9BV	65	—	—
W0MDL*	59	29	16
VE3CRU	57	28	16
YV5ZZ	55	—	—
XE1XA	55	—	—
OH2DG	53	9	14
SM0OJW	50	—	—
W8YIO	49	24	12
LA1K	49	11	13
OE5EFM	48	8	16
DJ9DL	48	—	—
KB3PD	47	31	11
PA3DZL	46	—	—
WA9FWD	44	25	6
SP5CIC/S	41	12	14
DL7QY	39	—	—
G3RRS	39	—	—
SO1MN	38	10	17
DL2CJ*	38	6	13
G4HUL	37	—	14
ZL2AQE	37	—	9
JA3AIF	36	—	—
DF3CY	34	—	—
PA3AEF	32	—	—
KD0GT	30	10	9
K0ALL	30	—	—
K9UIF	30	—	—
UA9FAD	29	—	—
KB3QM	29	—	—
WD5AGO	27	17	5
HB9CRQ	27	4	10
DL7VX	27	—	—
PA3CSG	25	—	—
DF9CY	24	—	—
YU1IQ	24	—	—
NC1I/1	23	8	11
HB9BM	23	—	15
DJ4AU	22	—	14
LA8AE	22	—	—
JH0YSI	21	7	12
JH3EAO	20	4	—
Y23BD	20	—	—
ZS6JT	17	—	—
K6KE	17	—	—
ON4UV	14	5	5
W7ID	14	—	—
UA3CTF	14	—	—
RB5LGX	13	—	—

33 Cm (902 to 928 MHz)

K5JL†	2	2	1
WB5LUA	2	2	1
KD5RO/2	2	2	1
WA5ETV†	1	1	1

23 Cm (1240 to 1300 MHz)

OE9XXI	58	10	21
K2UYH	56	26	21
WB5LUA	52	11	21
LX1DB	49	7	20
G3LTF	48	10	19
OK1KIR	46	8	19
K4QIF	45	24	15
OE5JFL	41	—	33
SM6CKU	40	4	17
HB9BM	39	6	17
HB9RM	36	3	15
F2TU	35	5	17
GW3XYW	35	4	16
SM0PYP	30	6	15
SM6FHZ	28	2	11
ZS5JJ	26	—	13
WD5AGO	25	10	11
VE4MA	25	—	—
G3WDG	22	5	13
YU1AW	22	—	13
G4CCH	21	2	13
W3IWI/8	18	7	8
WB0DRL	18	—	9
VK3AMW	17	3	12
DF0EME	16	—	11
I2COR	16	—	11
KD5RO/2	15	6	7
JH3EAO	14	1	11
SP5CIC/S	12	2	10
HB0BM/P	11	—	9
ZL3AAD	9	—	6
DL7YC	7	—	—
ZL2AQE	5	—	3
PA0SSB	4	2	3

13 Cm (2300 to 2450 MHz not continuous)

OE9XXI	11	4	7
W3IWI/8	11	3	7
WA2WEB	6	1	6
W4HHK†	5	4	2
WB5LUA	4	2	3
OK1KIR	4	1	4
SM6FHZ	4	—	—
DF0EME	2	1	2
F2TU	2	1	2
LX1DB	2	—	2
WB5LUA	1	1	1
VE4MA	1	1	1
SM0PYP	1	1	1

9 Cm (3300 to 3500 MHz)

W7CNK	1	1	1
KD5RO	1	1	1
K0KE	1	1	1

5 Cm (5650 to 5925 MHz)

KD5RO/2	1	1	1

3 Cm (10,000 to 10,500 MHz)

WA7CJO†	3	2	2
KY7B†	3	2	1
WA5VJB†	1	1	1
KF5N†	1	1	1
WA5TNY	1	1	1
W7CNK/5	1	1	1

*Worked all continents.

†Participated in first EME contact on the band.

—Information not provided.

and 54 grids (not including his own). Some of the farthest contacts to the east include K8RZB Conover, OH EN70, W2GU/4 and KC4YO Signal Mountain, TN EM75, N4AR Nicholsville, KY EM72, all at about 1100 miles. To the west, K6PVS DM14 and K6CH DM13 appear in the log. Despite the DX nature of these contacts, Doug notes that one of the highlights was working K5CM/mobile. Doug says that, at one point, he had turned his beam east to work stations. He notes that he missed the big aurora of February 8, 1986, so he can't compare this one with that. Lacking this comparison, he ranks this event as the best of the decade, if not the century.

Another who had a ball with the aurora is WA9O Milwaukee, WI. Jerry does his VHF/UHF hamming from his car with directional arrays fastened above the roof. When he wants to rotate the beam, he just turns the car. On detecting the aurora, he mounted the 2-meter 5-element Yagi on the car and headed for his favorite lake QTH. He began operating about 2300Z March 13 with contacts in Iowa and Minnesota—par for 150 W and 5 elements on aurora from that part of the country. Noticing some T9 signals, first

thought to be tropo from across Lake Michigan, he turned the car, only to hear W1JR in Massachusetts. After dropping his sandwich and almost smashing up the car, he regained his composure in time to work Joe, followed quickly by KB1GR in Maine. Both stations were S9 plus. He heard a few other T9 signals, including a VE1, but failed to work them. Another reporting what appears to be auroral E is K9VGE, also in Wisconsin, who also worked W1JR plus some VE1s. He wonders if this is a first for this propagation mode on 2 meters. It does occur quite frequently, in the northern climes on 6 meters, but I do not recall ever hearing of it on 2 meters before. Any comments? Nor was the aurora confined to the northern states.

One of the most unusual features of the event was its wide geographical distribution. A good example is the results turned in by K5SW Muskogee, OK. Sam shows contacts with 54 grids from Arizona to south Florida and as far north as the Great Lakes. From another southerly location, W5SXD near Houston says that this is the first aurora he has experienced in 25 years. Another southerner, WD4AHZ Sarasota, FL in EL87 had considerably better results this time than in 1986. Then, Ron could make only a single contact. This time, he made 11 with the best DX being K2GAL in Southern New Jersey FM29. KC5IJ EM12 and K5SW EM25 were also worked. Ron also reports that W4EMB Miami was able to work a station via the buzz mode.

1¼ Meters—Several reports have been received for this band. One is from WB5LUA near Dallas. Al did not have much time to ham during the aurora but did work WC2K in New Jersey on this band for a new state and possibly a new aurora record for the band. WB5LUA notes that he runs 1200 W from an 8877 to a 4.2-wavelength Yagi at 80 feet and that WC2K runs 800 W to six 17-element Yagis at 90 feet. Who says VHFers are not serious about 220 MHz? From the other end of this contact, WC2K says that he tried to make the most of the superb conditions. Rick first worked the aurora on Sunday evening March 12 on 2 meters and found that band still open the next morning before going to work. On returning home that afternoon, he worked a few stations in the Midwest before deciding to try 220. A CQ on that band at 2210Z brought a response from W3UJG near Washington, DC. This was followed quickly by a QSO with K5CM EM25 Oklahoma, whose signal was 59A and peaked at 315 degrees. At 2219 WØFY EM48 answered Rick's call. His signal peaked at 310 degrees. Rick noted that this is the first time he has ever found aurora signals on this band peaking farther west than 315 degrees. At 2222, he worked W9XA EN51 on the same beam heading, followed by N4MW EM55 and WQ4V EM95 with 59A signals. At that point Rick knew that something great was taking place. At 2250 he worked WBØWAO/8 followed by N5KW EM25, KMØA EM48, and WB9OJR EN50. Signals peaked farther and farther west, with WAØTKJ EM18 worked at 2321 at a heading of 300 degrees followed by W5RCI EM44, WB4KNF and N4VC both EM66. Finally, at 2351Z it was WB5LUA EM13 with 55A to 59A signals on a heading of 274 degrees. At this heading, Rick continued to work stations: K1BKK FN44, WB4DBB FMØ7, WB4SLM EM82, WA9JFM EN52, WB8PAT EN81 and finally, at 0328Z on the 14th, W8IDU EN83. In other 1¼ meter reports, K9VGE says that he worked K5UR in Arkansas for a new state. Once again it has been demonstrated that VHFers are there with good equipment on 220 MHz when conditions are right. One wonders how much of this work would have been accomplished on a 3-MHz-wide band jammed with FM signals.

WC2K did make a quick check with KD5RO/2 near Rochester, NY on 33 cm. Although auroral signals were heard both ways, no contact was completed. Rick blames his haste to get back to 220 for this lack of follow-through.

CENTRAL STATES VHF CONFERENCE ANNOUNCEMENT

The annual conference held by the Central States VHF Society is always one of the high spots of the VHF/UHF year for both hams and their families. This year's conference will be held at the Holiday Inn, Rolling Meadows, IL July 27 through 30. The hotel is located adjacent to the junction of Interstates 90 and 53 and provides van service to and from Chicago's O'Hare Airport, so it should be convenient to almost everyone. This year's Society President, Chuck Clark, AF8Z, and his fine crew of assistants promise both technical and family programs that are up to the excellent standards this affair has set over the past 22 years. Membership in the Society is open to anyone truly interested in VHF or UHF and is very reasonably priced. For further information about the conference, send an SASE to Chuck Clark AF8Z, 4N560 Powis Rd W, Chicago, IL, 60185. CU there!

W1AW Schedule

April 2-October 29, 1989 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300, 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300; TThSSn: 2300; S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CDT	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MDT	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PDT	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from January 1989 *QST*, pages 9 and 100" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 100.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2230 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EDT and on Saturday and Sunday from 3:30 PM to 1 AM EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on May 29, July 4 and September 4.

Major reconstruction at W1AW is in progress. Some or all of the scheduled transmissions and visitor operating periods *may* be preempted at times. Check W1AW bulletins for up-to-date information.

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

Hardware-Size Conversions

In a recent issue of *FEEDPOINT* (the journal of the North Texas Microwave Society [NTMS]), Carl Napper, KA5JPD, pointed out the problems encountered when converting screw sizes specified in construction articles from European sources to US-available equivalents. Carl also gave some of these equivalents. Table 1 is based on Carl's idea (but any errors are mine!). The UK series of BA (British Association) screws, taps and dies are difficult to find in the US, but metric parts can be obtained if needed. For almost all constructional purposes, US hardware can be substituted with no ill effects. Of course, this assumes that the material of the substituted hardware is the same as the specified hardware. The only uses where some differences may be noticed are, for example, where the screws are part of critical tuned circuits, such as in waveguide filters. Even in these cases, there is almost always enough tuning range to allow the use of close equivalents.

If you have no local source of screws, taps, dies and drills, you can obtain many US and metric sizes (all that you'll be likely to need) from Small Parts, Inc, 6901 NE Third Ave, PO Box 381736, Miami, FL 33138, tel 305-751-8856. Small Parts fills small orders, and they sell a large assortment of sheet- and bar-metal stock and tubing in sizes suitable for many construction projects. Also, for those who *really* want to know everything about screw-size conversions, Small Parts has a 17.5- × 23-inch chart with UNC, UNF (US), ISO (metric) and BA (UK) information (Small Parts stock no. ICSC-A).

Other size-conversion information that may be useful is that for waveguide and coaxial cable. This information is given in Tables 2 and 3, respectively. Although there are no exact coaxial-cable equivalents, Table 3 identifies cables that are interchangeable in most applications.

Table 1
Equivalent Hardware Sizes

US no.	UK	Metric	OD (inches)	Tap drill no.	Clearance drill no.
1-72			0.073	53	48
		M2	0.079	52	46
2-56			0.086	50	43
	8BA		0.087		
		M2.5	0.098	45	36
	6BA		0.110		
4-40			0.112	43	32
		M3	0.118	39	31
6-32			0.138	36	27
	4BA		0.142		
		M4	0.158	29	18
	3BA		0.161		
8-32			0.164	29	18
	2BA		0.185		
10-32			0.190	21	9
		M5	0.197	18	4
	1BA		0.209		
		M6	0.236	7	¼"
	0BA		0.236		
¼-20			0.250	7	F

Lightwave Information

I have received a number of requests for a source of practical information on lightwave communications systems. One such source that I have seen is a book called *Amateur Lightwave Communications*, by Steve Noll, WA6EJO, and published in 1988. This is a 120-page, spiral-bound book containing much practical information on building such items as lasers, modulators, detectors, power supplies and optical receivers. Also listed are suppliers of optical components and a number of references to the optics field in general. This book should give you enough information to build the equipment needed for a practical lightwave communications system. For more information, contact Steve J. Noll, WA6EJO, TiC Scientific, 1288 Winford Ave, Ventura, CA 93004.

In his book, Steve refers to another book that may be of interest: *Light-Beam Communications*, by Forest M. Mims III, published by Howard W. Sams & Co, Inc (Indianapolis, Indiana) in 1973. I have not seen this book (it is out of print), but it may be of interest.

Commercial Spread-Spectrum Operation in Microwave Ham Bands

Readers of *QST* may have heard reports concerning section 15.126 of the FCC's rules, under which commercial spread-spectrum operation is permitted at a maximum output power of 1 W in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. As of now, the only band for which these commercial systems are known to be planned is 902-928 MHz. Section 15.126(c) requires that these systems not cause harmful interference "to any other operations which are authorized the use of these bands under other Parts of the Rules." Amateur Radio operations, therefore, have priority—despite their secondary status with respect to some other services in these bands.

Interference from these low-power spread-spectrum systems is unlikely, but amateurs operating in these bands should be aware of such possibilities. More information can be found in this month's *QST* Happenings column.

Table 3
Comparable Coaxial Cables

US designation	UK designation
RG-58	UR 43, UR 76
RG-8/RG-213	UR 67
RG-17/RG-218	UR 51
1/2" Hardline (RG-237)	UR 83
7/8" Hardline (RG-232)	UR 79

Signal Generators

Lee Groff, WW5B, has acquired a number of microwave signal generators (VHF through 7 GHz). He would like to get these pieces of gear into the hands of microwave enthusiasts who are willing to use them (or parts from them) in Amateur Radio projects. Most of his collection consists of TS403s (similar to the HP616B), which cover 1.8 to 4.2 GHz. Lee also has a few VHF/UHF sweep generators and some other miscellaneous items. Contact Lee for further information at 713-934-4659, or write to him at PO Box 460, Brookshire, TX 77423.

Tuning Sticks

A tuning stick is composed of a chip capacitor attached to the end of a nonconductive holder. These devices are used to test different capacitor values in microwave (usually microstrip) circuits without having to solder capacitors into the circuit. You can make your own tuning sticks, or purchase them. One manufacturer of tuning sticks is American Technical Ceramics, 1 Norden Ln, Huntington Station, NY 11746-2102. Their kit no. TS1001 consists of ATC 100 "Superchip" capacitors in 20 values from 0.1 to 1000 pF (most are in the 1- to 10-pF range); the kit is priced at $49.95. For those who do a lot of RF circuit development, this sounds like a useful product.

New Product

Bill Olson, W3HQT, recently reported (in his *QEX* column, ">50") that Mitsubishi has a new linear-amplifier module, the M67715, which produces 3- to 4-W output for 10-mW drive at 1296 MHz. This module replaces the NEC5874 and is intended for use in the output stages of 1290-MHz hand-held radios.

Table 2
Waveguide Equivalents for the 3.4, 5.7, 10 and 24-GHz Amateur Bands

Frequency (GHz)	ID (inches)	UK WG no.	US WR no.
2.60 - 3.95	2.84 × 1.34	WG10	WR284
4.90 - 7.05	1.59 × 0.795	WG13	WR159
8.20 - 12.40	0.9 × 0.4	WG16	WR90
18.0 - 26.50	0.42 × 0.17	WG20	WR42

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

The Mt Livermore Expedition

For a few hours on a cold, windy afternoon in January, several hams rose to the top of their hobby in Texas. Hams from Midland, Odessa, Fort Davis and San Angelo, Texas literally became the top hams in Texas as they scaled the 8385-foot elevation of Mt Livermore to install a solar-powered, UHF-linked, 2-meter repeater for thinly populated West Texas. Mt Livermore, located west of the University of Texas' McDonald observatory in the Davis Mountains on the northern edge of the Big Bend of Texas, is the state's second highest mountain. To install the repeater, the group left Midland-Odessa at 5:30 AM like a band of fishermen and drove 120 miles to the Observatory visitor center. The repeater and link radios are GE MASTR II and Executive II, mounted in a (pickup-truck bed) toolbox with deep cycle batteries, control circuitry, duplexer and insulation against weather extremes. The toolbox had been modified with adjustable pipe mounting legs that doubled as lifting hooks and leveling legs.

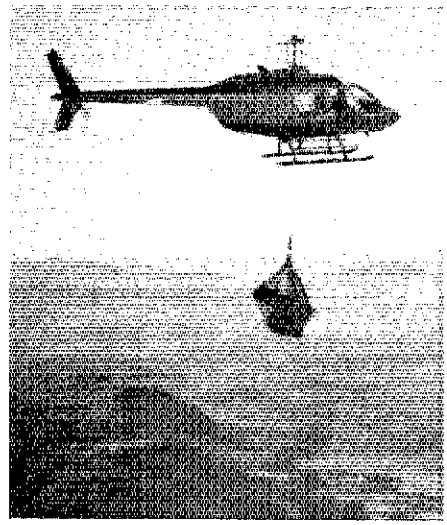
After rigging the self-contained repeater package into separate loads, the ground party took off for the 8200-foot staging area in two four-wheel drive vehicles for the two-hour drive, sometimes at angles as great as 45 degrees. Waiting at the visitor center below for the group to arrive in position was Aubrey Price, WB5RXA. He waited for the party to climb to the summit so that he could fly the two loads, slung below his Bell JetRanger helicopter, to the top of the mountain.

The final 185 feet to the summit were a steep, rocky climb that left everybody gasping for breath. The air was so thin (and the hams so out of shape!), it would have been difficult to muster sufficient wind even to work Albania. Unfortunately, that also presented a technical and safety problem for the helicopter lift. The thin air, heavy twisting load, and stiff, unpredictable winds made the task extremely dangerous. With the wind back in the ground crew's lungs and in their face at about 35 mi/h, Aubrey carefully lowered the equipment into place on top of the mountain with a demonstration of a feather touch that made his task look easy.

Once everybody was on top, the solar panels were mounted and the batteries were connected. The Livermore machine was fired-up and linked into a system of 16 other stations in West Texas and southeastern New Mexico called the "West Texas Connection." According to Jim Jeffrey, WA5QMJ, of Odessa, trustee for the West Texas Connection, "Livermore extends coverage of the 'Connection' about a hundred miles in all directions, including coverage of the Big Bend National Park, the Davis Mountains State Park and stretches of Interstate 20 back toward the Permian Basin to Monahans. The expanded system now covers portions of West Texas out of range even for the Texas Department of Public Safety and Border Patrol."

Public Service Tool

Coverage of the West Texas Connection has come in very handy for public-safety and emergency communications. Last year, during the tornado that destroyed the tiny town of Saragosa, the Connection provided early warning and then over 36 hours of emergency communications after the tornado struck and before official emergency channels could be established.



Like a stork making a delivery, WB5RXA prepares to deposit the makings of a repeater atop 83851-foot Mt Livermore to provide 2-meter coverage over 85,000 square miles of West Texas.

But what is unique about the West Texas Connection is its interconnection of 18 VHF repeaters and remote base stations from Snyder and San Angelo on the east through Midland-Odessa to Fort Stockton, Alpine and Balmorhea on the west. The system permits a 25-W mobile on Interstate 10 in Van Horn to communicate to Abilene, 500 miles to the east or any point in between in the 50,000-square-mile coverage area. Plans now include extending the Connection by fiber optics into Dallas, Austin, San Antonio and Houston. Each of the repeaters are linked together on the 440-MHz band and interfaced to the system hub at Odessa by an Advanced Computer Control RC-85 controller that incorporates features such as automatic gain control and CTCSS squelch at each link receiver and transmitter. Each of the 18 repeaters and remote bases can be added or dropped from the system in any combination from anywhere in the system. The flexibility and capability of the system gives civil authorities, law enforcement agencies and the National Weather Service offices a resource they count on frequently to augment their emergency strategies. And since the region covered by the system is the spawning ground for weather activity that threatens "tornado alley" through the central part of the US, the information and early warning received from SKYWARN operators using the West Texas Connection will hopefully prevent the loss of life in other parts of the country experienced by the residents of Saragosa.

Amateur Radio Tool

So, when the weather is good and you happen to be traveling between coasts, remember the West Texas Connection. It will cover 500 miles of Interstates 10 and 20 from near Guadalupe Peak east to Abilene. Since there generally is not much else to do during that part of your trip, you might as well meet some nice folks and help your trip go by a little faster. Don't forget, when you talk, you are covering 85,000 square miles on 2 meters, about 200 hams and countless jackrabbits and oil wells. So, when a "local" invites you to stop for coffee, be sure to ask him where he is. Otherwise, you might have to drive two days out of your way to take him up on his offer.—*Joe Milam, NI5F*

Strays

I would like to get in touch with you...

☐ anyone who has knowledge of home-brew techniques in the design and fabrication of vacuum tubes and/or semiconductors for small QRP projects that would truly be home brew. Chris Hazlitt, KL7FB, 3741 Gary Cooper Cir, Anchorage, AK 99507.

☐ anyone who has info about the radar unit FURNO model FRS 36E 12-V dc for operation and restoration of the *USS Mohawk*. R. Weaver, KA3NLV, 15 Varmar Dr, New Castle, DE 19720.

Amateur Satellite Communications

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

A Switch In Satellite Directions—Part 1

"Why," you could reasonably ask, "would one opt to place a satellite in a low earth orbit (LEO) when a higher orbit offers so much better coverage?" This is a reasonable question and one that strikes at the very core of satellite-mission definition and spacecraft design: the choice of the orbit itself! For years, because of the overwhelming costs involved, choice of orbit has been mostly beyond the means of OSCAR builders. But that may now be changing. And with these changes may come new ways to plan satellite missions and payloads as well as how the spacecraft are used.

In the scientific, military and commercial space world, the spacecraft mission definition (its operational objective) largely determines its orbit. The orbital characteristics in turn affect the spacecraft design, its complexity and, ultimately, its cost.

For example, if the spacecraft is to be a communications satellite, most likely it will be placed in a geosynchronous (GEO) orbit. If it's to be an earth-resources-imaging satellite, it will likely go into a LEO. A navigation satellite might have an altitude in the 10,000-mile range, between that of LEO and GEO satellites.

In general, what you want to do with the payload—that is, its mission definition—determines where you put it (the orbit). After that, many of the major spacecraft architectural features are dictated by the orbit itself. Thus, a high orbit normally means using high-gain antennas on the spacecraft. In turn, the use of high-gain antennas requires close attitude maintenance lest the antennas' beams miss the target. The attitude and stabilization systems add complexities to the spacecraft. These complexities—and the concomitant costs—could be avoided had the mission called for a lower orbit where high-gain antennas were not required.

Traditionally, OSCARs have come into being through a fundamentally different process. Characteristically, a launcher that had excess payload capacity was identified. If it appeared the launch agency was friendly (or could become so), the orbital characteristics of the primary payload were studied to determine if the orbit (or one very similar to it) could be of use for a future OSCAR.

Thus, the contrast in mission planning emerges. In the professional arena, where the primary spacecraft owner pays for the launch, he chooses the orbit to suit the mission definition. Then, the engineers design a suitable spacecraft for that mission definition and that orbit. With the pros then, the design sequence is summarized: Mission definition drives orbit, orbit drives overall spacecraft design, spacecraft design drives subsystem, and so on.

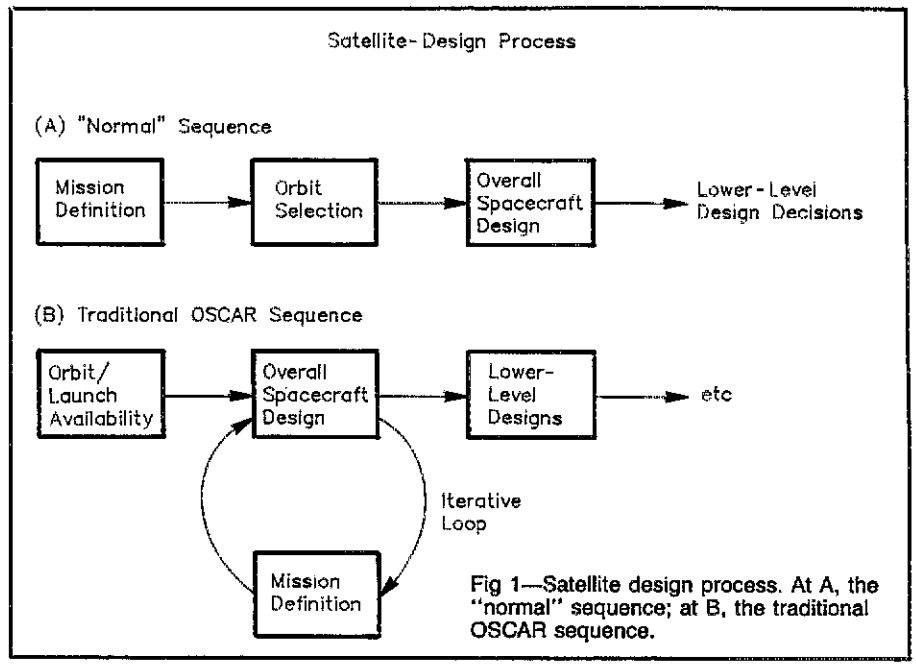


Fig 1—Satellite design process. At A, the "normal" sequence; at B, the traditional OSCAR sequence.

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.

On the other hand, with OSCAR builders being perpetually strapped with limited budgets, a free launch (instead of the mission definition) was the primary driver. With the free launch came the orbit that the primary payload was destined to fly in—like it or not! Thus, the OSCAR planners have traditionally been obliged to back into a mission definition instead of using it as a point of departure for other design decisions. In other words, given that the value of the launch usually exceeded (by a substantial degree) the actual cost of the satellite to be launched, the launch itself was the most valuable resource. And, because OSCARs flew "space available," their owners had no say in determining the orbit. Thus, we found the given orbit determining the spacecraft design, and the spacecraft design determining the mission definition, rather than the mission definition determining the orbit and the orbit determining the spacecraft design. Fig 1 contrasts the two design-process procedures.

Now, however, with new, miniature satellites in the offing, the OSCAR designer has essentially a new formulation. This is one of those "good news, bad news" scenarios. The good news is that these new little satellites are small enough that you can stick 'em on a wide variety of launchers, in little nooks and crannies where no one ever thought to put a satellite before. The bad news is that everyone now wants to do it. So, what was a great idea for a very short time—and which could be realized for peanuts—is now a very popular idea. With the competition for these nooks and crannies, the price inevitably rises. But the final good news is that in spite of the price rise for these niches, the cost of placing one of the new breed of OSCARs in orbit will apparently remain accessible to OSCAR builders for a while longer at least. So that means OSCAR builders can follow the preferred sequence of mission definition determining orbit, orbit determining spacecraft design, etc.

Summarizing to this point: Because launches are expensive, OSCAR planners have had to tailor their mission definitions and spacecraft designs to a given orbit. This constraint is now mitigating since miniature spacecraft can be launched relatively

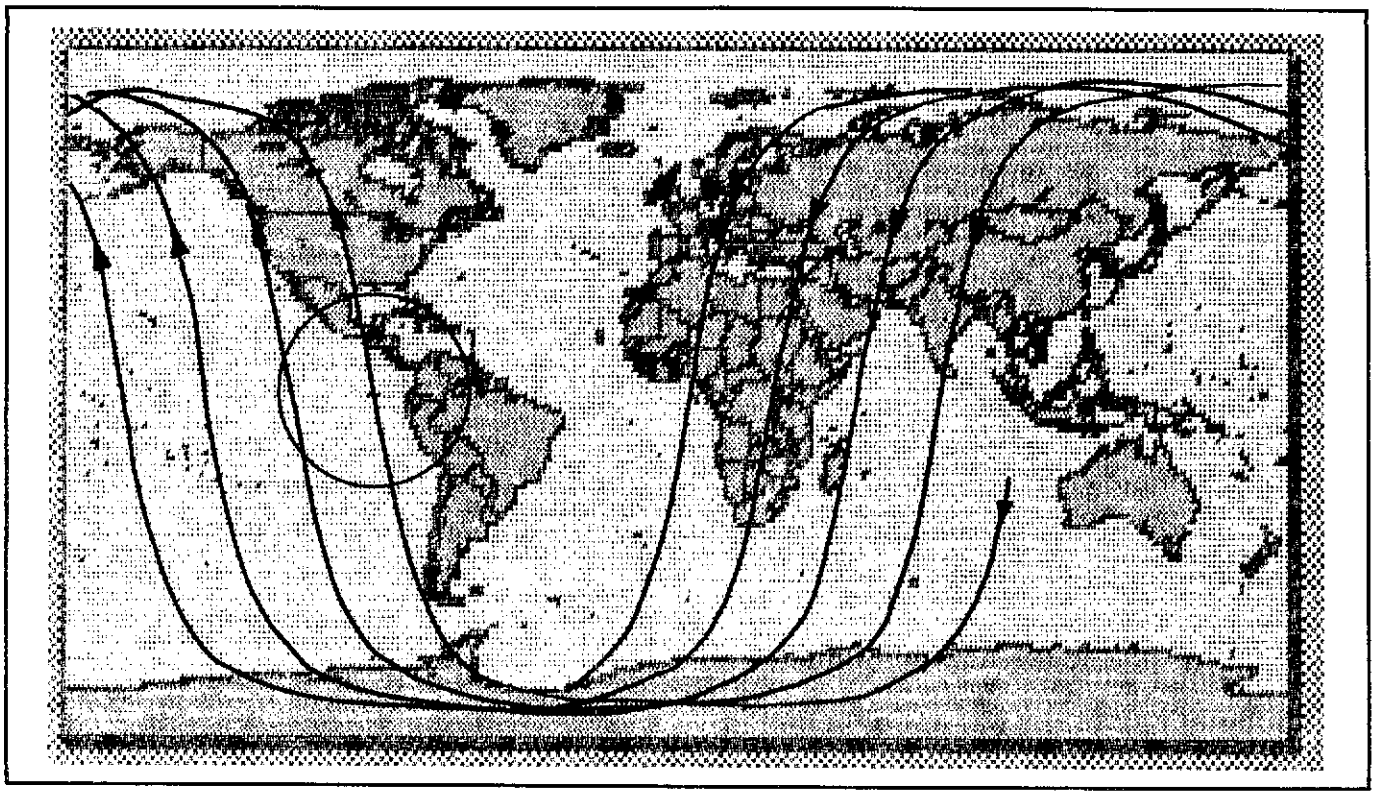


Fig 2—Ground track and footprint for a typical LEO OSCAR. Shown are 4½ orbits of UO-11, which orbits at 700 km (435 mi). The footprint, centered on the Galapagos, is 5718 km (3554 mi) in diameter. The arrows on the ground track show the direction of satellite movement.

Table 1
Satellite Footprint Diameter v Orbital Altitude

Satellite Height		*Footprint Diameter**	
kilometers	*miles*	*kilometers*	*miles*
100	62	2243	1394
200	124	3152	1959
500	311	4891	3040
1000	622	6715	4173
2000	1243	8994	5590
5000	3108	12,437	7730
10,000	6215	14,922	9274
20,000	12,430	16,906	10,507
35,866	22,291	18,086	11,241

*Surface distance. D = 2R arccos (R ÷ [R + h]), where D = surface distance in kilometers across footprint, R = radius of earth (6371 km), h = height of satellite in kilometers, and arccos is expressed in radians. (See *The Satellite Experimenter's Handbook*, p 9-6.)

inexpensively. Reverting then to our opening question, if OSCAR planners now have the option to choose an orbit, why choose LEO when it's obvious that the higher you get, the better the coverage? Table 1 depicts various satellite footprint diameters compared to the satellite's altitude. Now, take a peek at Fig 2, and think about that last question. There'll be more on this subject next month. Stay tuned! QST

Hams Are Hams The World Over

☐ Ham radio can show you just what a small world we live in. We belong to a great and unique fraternity. Many people have interesting stories about people they've met on the air; here's one of mine:

I was licensed as W2JAJ in September 1935. In November 1935 I was accepted as a medical student by the University of Edinburgh, Scotland. I knew very little about Scotland; I had many questions. In particular, I was curious to see if the English they spoke would be intelligible to an American. It occurred to me that a British ham might be able to answer my questions. After all, isn't "promoting international good will" an important part of ham radio?

I called CQ GM and CQ G for a few days and nights on 40 meters and finally contacted a station in London. I asked my questions and Stanley answered them all. Before we signed he asked me to telephone him when I reached London on my way to Scotland.

I met Stanley when I got to England. He was 17 years old and had very recently become a ham. I met his family, his Elmer, some of the other hams; I spent so much time with him that I missed my train! I remained over that night, sleeping in his shack. The next day I took the train to Scotland and, I'm sorry to say, forgot all about him.

In July 1987, G6ZY/EA6 called me as I completed a CW QSO. After the preliminaries he asked me "if my call was an original one." "Why yes," I replied, "since 1935. Why do you ask?" "Maurice," he answered, "do you remember staying with me in 1936?" Then I remembered everything; I realized who he was and that he remembered my call letters after a lapse of fifty-one years. I humbly apologized for having forgotten the whole incident, and asked him how he had remembered everything for so long. "Well," he explained, "you were the first American I met, and a ham at that. I was very impressed. Throughout these many years I often thought about you and wondered what had become of you." I was pleased that we found each other after so many years, and we became friends. We now maintain a weekly schedule on 20 meters. —*Maurice Sasson, MD, W2JAJ*

Strays

I would like to get in touch with...

☐ any hams who operate VHF or HF while bicycle mobile or by other self-propelled means, ie canoeing, skating etc. Hartley R. Alley, NAØA, Box 4009, Boulder, CO 80306.

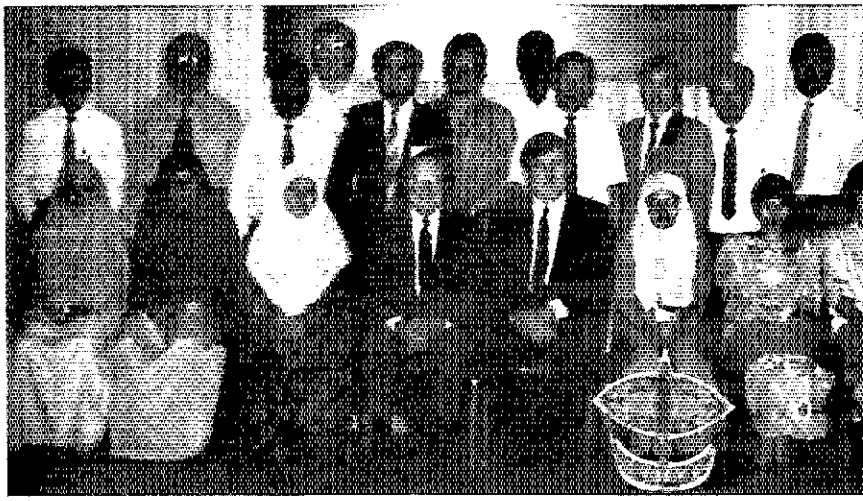
☐ anyone who has figured out the communications protocol between the Kenwood RC-10 and the TM-221A series transceivers. Don Pomplun, K2BIO, 521 Van Buren Pl, San Ramon, CA 94583.

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

Images of Malaysia

These two young ladies, Rashimah and Norizan, were responsible for much of the administrative support from the Malaysian Telecoms authorities. Rashimah (l) was a participant in the course when it was presented in Tokyo in 1986.

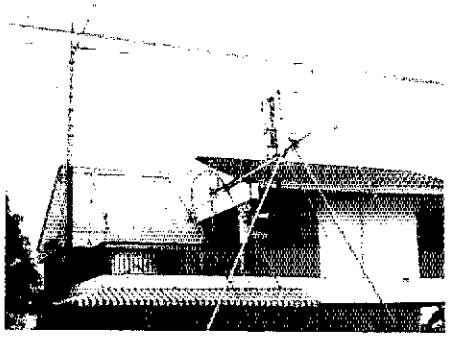


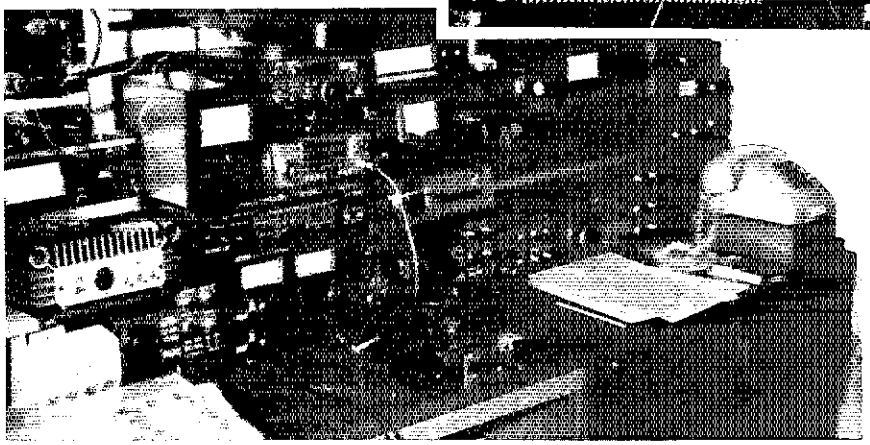
These are the participants in the Amateur Radio Administration course presented in Ku Lumpur February 13-17, 1989.

Participant Tran Duc Thong, from Vietnam, took back to his administration a better understanding of how Amateur Radio could be valuable to his country and why it should be supported.

Participant Zhu San Bao from the People's Republic of China. Mr Zhu expects considerable growth in Chinese Amateur Radio in the next few years.

MARTS members took course participants on visits to their homes, so that Amateur Radio stations could be seen in action. These two photos show the inside and outside of 9M2CS, the station of Charles Symons. Charles is a gung-ho amateur who is particularly interested in VHF and UHF.





Sangat Singh, 9M2SS, and Colin Richards, 9M2CR, compare notes. Sangat is secretary of the Malaysia Amateur Radio Transmitting Society and provided a great deal of administrative support for the course. Colin is a retired ITU expert who gave a superb lecture on amateur satellites.

A closing editorial note of appreciation—the support of the course by the Malaysian authorities and by MARTS was outstanding. The atmosphere was congenial, the facilities were excellent, and our hosts from Malaysia outdid themselves in hospitality. It was a rewarding experience for all concerned. —*W1RU*

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

XE1MMJ Returns to Mexico and the Earthquake

(Continued from last month)

The Martins returned to Mexico in 1981, but due to license renewal problems, Maria, XE1MMJ, was off the air for some time. In 1985, an earthquake hit Mexico City.

"Groups of people began appearing at my house begging me to send messages to their families because international telephone lines were not in service. Those first few days I was wringing my hands in despair. My Mexican friends went to bat for me, and I was given special permission to run health-and-welfare, priority and emergency traffic," said Maria. For six weeks, she suspended her teaching duties and worked 16 hours a day, leaving the rig only to eat a sandwich. "The first few days, working alone, I was frantic. I had no one to help me call the hundreds of telephone numbers that I had accumulated. Many stateside operators waited five hours for their turn to get one telephone call through to me. A friend came to my rescue and organized me! He began calling numbers as fast as they came in, and organized the ones I already had noted. We had no computer, so everything was done by hand. He put the radio operator's call and name on a card, the name of the person or persons they were inquiring about, the phone number and the name and telephone number of the inquirer in the states. Later we began taking the radio operator's phone number."

For several weeks, five to seven US operators stayed on the air with Maria. One operator had a toll-free line, and a US company issued a communications line to another operator to be used for disaster service. "This allowed us to pass the traffic faster and facilitated our confirming much more traffic than usual," said Maria. Long after the Mexican government canceled emergency conditions, she continued to receive hundreds of calls daily. "We had some happy, sad, emotional, as well as funny, experiences," noted Maria.

Because of Maria's bilingual talents, she was contacted by Red Cross groups from many states wanting her to confirm their lists. One Red Cross agency gave her over 80 names with telephone numbers to confirm. There were also various consulates, especially from New York, with long lists. Through an operator in Florida, contacts were made for the Mexican Aid Society in London and for people in other countries such as Israel, Spain and Italy. Some US operators made calls to other countries for Maria, so she didn't have to take time to turn her beam.

"They would report back to me the next day, so I knew their relatives have received the messages. Other US operators made long-distance calls and sent telegrams at their own expense. This they did willingly and without asking for reimbursement. The cooperation from radio operators everywhere was outstanding! I could not have made the valuable contribution without their help, the help of my OM and our friends. My estimate is that we made over 1000 confirmations and were unable to confirm less than 100. To be able to help people in this terrible time of disaster through my hobby was the most thrilling, yet humbling, experience of my life."

At the present time, Maria and her husband, Mack, teach at the Baptist Theological Seminary of Mexico. Maria teaches voice, piano and is the pianist for the Seminary choir. Although her commitment to the Seminary and music appear to be more than a full-time occupation, she does find time for radio as well as traveling, swimming, tennis, reading, photography and stamp collecting. Look for her on 20 meters and ask her about her collection of American Indian books and jewelry.

Marla Martin Jones, XE1MMJ, shares her musical talents with the people of South and Central America and her love of Amateur Radio with all of the world. *(photo courtesy XE1MMJ)*

Fried Heyn, WA6WZO, Southwestern Division Director, says, "Not many people know the great work that my XYL, Sandi, WA6WZN, does for Amateur Radio that I, much too often, get credit for. Sandi chaired the Orange County Council of Amateur Radio Organizations, was YLRL's president in 1983 and president of the YL Radio Club of Los Angeles. Her many ARRL positions have included being Orange Section Manager." *(photo courtesy of WA6WZO)*

1988 YL-OM Summer SSB Sprint Results

YL Scores

KA6V/7	50,895	KB6WVZ*	1,134
WE7B	34,164	N4LZL	1,020
WA8FSX/Ø	16,065	WF7Y*	957
VE1BWP*	10,944	GØEIX*	78
KK4OK*	5,712	N7GLQ	405
KA2ANF*	3,216	KAØBAT	315
NØCBG*	2,967	NM7N	294
KD8SC*	2,276	WD8IKC	182

OM Scores

N4PUQ	486	W6HAL*	216
W7ULC	434	KAØBHO*	150
WØIZV	384	KD2PC*	74

*Denotes district, province or country certificate winners

Conducted By Rick Palm, K1CE
Field Services Manager, ARRL

Clubs: Adopt Your Local School

It's no news that the future of Amateur Radio hinges upon getting new, young amateurs into the fold. Only by meeting this need will we ensure a sound, secure future for our service.

The question is, how do we unlock the door to youth? There are many keys, but a major one is the local school, full of young, bright students, eager for new challenges. School clubs are great for introducing these young people to Amateur Radio.

Adopt your local school! Go to your local schools to find existing school clubs. Offer to help club sponsors with plans and programs. Invite them to join in your own club's activities such as mall displays, message centers, communications events, Field Days and so on. Explain the benefits of active League affiliation and help them complete the simple forms. Be a big brother. You'll probably find that your association with a school club will result in a rebirth of interest within your own club too!

Starting from Scratch

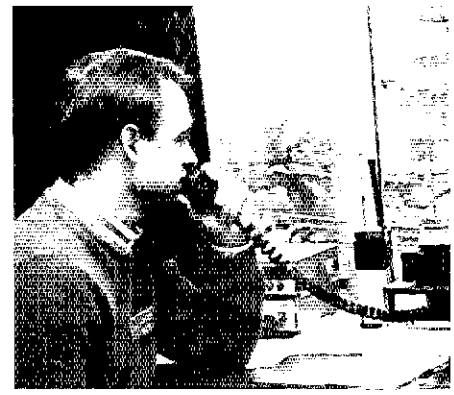
Of course, there will be many schools that do not presently have an Amateur Radio club. In these instances, you will have to start from scratch. To plant the seeds for a new club, try to find an insider, an amateur working within the school administration or faculty, to champion your cause. Tell him that you're ready, willing and able to set up demonstrations for students, provide equipment loans for a school station and even sign on as official sponsor of the club. Tell him that interested students can join your Novice classes, or better yet, offer to hold Novice classes at the school during or after school hours. Provide League video tapes as programs for science classes.

There is a host of things you can do to get a club started in your local school. Once formed, in cooperation with your Affiliated Club Coordinator, help the club prepare and file the ARRL affiliation application. Once affiliated, you can count the creation of the club as one more good deed done for your community's youth —and for Amateur Radio's future.

How to Affiliate A School Club

School and youth group clubs are eligible for affiliation with the League. The only requirements are that the club sponsor, trustee, president or faculty advisor must be a full member of the League, and the club name must clearly indicate that it is a school or youth group.

1. Obtain "club kit" from ARRL HQ. The kit contains application forms and instructions.
2. Complete the forms and forward, along with a membership roster and copies of the club's constitution to ARRL HQ.
3. ARRL HQ reviews the application for completeness, and forwards it to the Division Director.
4. The Director reviews the application, and returns it to HQ with his approval or disapproval.
5. If approved, the application is forwarded to the ARRL Executive Committee for consideration.
6. The EC elects the club to affiliation, and the club is notified of the action by ARRL HQ.
7. The club receives a handsome Charter of Affiliation, and numerous other benefits.



Athens Radio Club members provided communications for the Winter Special Olympics this past February. Communications links were established between a net control located in the Olympic "nerve center," five different event sites and the local emergency medical station. Besides routine and priority traffic, several calls to the EMS for assistance were handled. The club received praise from the event committee and EMS personnel. Here, Marty Williamson, KB4ZUN, operates the net control station. *(Tnx Greg Brooks, N4ULL)*

Amateur Radio spans three generations—thanks to Anne Arundel Radio Club (MD) classes. (l to r) Andy Phillips, N3GEF, Robyn Law, KA3TDE, Andy's daughter, and Peter Law, KA3TDF, Robyn's son. All are new hams and are members of the AARC class of '88! The club sports an enviable record of recruiting an average of 25 new hams each year for the past several years! *(Tnx Holly Bevan, N3BMB, MDC Section PIO)*

The Fort Venango Mike & Key Club (PA) recently combined efforts with N8IWJ, in Dearborn, Michigan to link together students from two high schools through OSCAR 13. Students at the Crestwood High School in Dearborn exchanged comments on economics, school curriculum, geography and other topics with Venango Christian High School students through a gateway/link-up with the satellite. K3MHB oversees the Pennsylvania end. *(Tnx Sheryl Clinefelter, N3CKN)*

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th 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.

Alberta (Red Deer)— June 16-18. *Sponsor:* Central Alberta Radio League. *Place:* Burbank Campsite, from Hwy 2 North or South, take the Blackfalds turnoff east on secondary road #597 towards Joffre, follow the CARL signs. *Talk-in:* 146.40/147.00, 147.330 simplex. *Admission:* $15 plus $5 for private campsite (register at the communications bus). *Contact:* P. Fitzgerald, VE6QT, tel 403-746-2621, or D. Miller, VE6XF, tel 403-886-4883.

†**California (Santa Maria)—June 18.** *Sponsor:* Satellite ARC. *Time:* 9 AM-3 PM. *Place:* entrance from Hwy US-101, 1.6 miles south of Clark Ave. *Features:* swap tables, games, barbeque dinner adults $7.50, children $3.50. *Talk-in:* 146.34/94. *Admission:* free. *Contact:* Hank Korczak, W6PME, 917 W Anthony Way, Lompoc, CA 93436, tel 805-736-1761.

California (Weed)—June 17. *Sponsor:* AMSAT. *Time:* 9 AM-4 PM. *Place:* College of the Siskiyous. *Features:* AMSAT and project OSCAR items for sale, displays of tracking software and satellite communications equipment. *Talk-in:* 444.350/449.350. *Admission:* free. *Contact:* SASE to SHASTA SPACECON 89, c/o Bob Dalleske, W6AMW, Box 220, McCloud, CA 96057.

†**Colorado (Loveland)—June 10.** *Sponsor:* Northern Colorado ARC. *Time:* 8 AM-4 PM. *Place:* Larimer Co Fairgrounds, from I-25 to Hwy 402 West. *Features:* ARRL, PS NCARC forums, nonham demonstrations, VE exams, special station. *Talk-in:* 146.25/85, 144.515/145.115, 147.795/195. *Admission:* no advance, door $3. *Tables:* swap tables $7. *Contact:* Pendell Pittman, NØDZA, 5569 N County Rd 29, Loveland, CO 80538, tel (D) 303-679-4200, (N) 303-679-4250.

†**Connecticut (Newington)—June 11.** *Sponsor:* Newington Amateur Radio League. *Time:* 9 AM-2 PM, dealers 8 AM. *Place:* Newington High School, Rte 173 (Willard Ave), just north of Rte 175 (Cedar St). *Features:* VE exams, refreshments, guided tours of ARRL HQ, no outdoor flea market. *Talk-in:* 144.85/145.45, 223.24/224.84, 146.52. *Admission:* no advance, door $2. *Tables:* $10, $8.50 before May 27. *Contact:* exams, Tom Namnoum, KM1O, tel 203-666-1615, tables and other info, Les Andrew, KA1KRP, 23 Grove St, West Hartford, CT 06110, SASE please.

Georgia (Athens)—June 3. *Sponsor:* Athens RC. *Time:* 8 AM-4 PM. *Place:* Athens Technical School, Hwy 129 north. *Features:* flea market, VE exams 10 AM-12 PM walk-ins. *Talk-in:* 146.145/745. *Admission:* free. *Contact:* Don Bullard, WA4IMI., tel 404-742-7261 after 6 PM.

Illinois (Granite City)—June 11. *Sponsor:* Egyptian ARC. *Time:* flea market setup 6 AM, public 8 AM-3 PM. *Place:* Egyptian ARC Clubhouse, Rte 3 at I-270. *Features:* radio and computer flea market, forums, displays, refreshments, VE exams, ample free parking. *Talk-in:* 146.19/79, 442.400/447.400. *Admission:* advance 6/$5, door 3/$5. *Contact:* Tom Gibbons, W9EYB, 931 Surrey Ct, Edwardsville, IL 62025-3806, tel (H) 618-656-6445, (W) 618-288-4177.

Illinois (Martinsville)—June 3. *Sponsor:* Eastern Illinois ARC. *Place:* Martinsville Fairgrounds. *Talk-in:* 147.63/03, 146.52. *Admission:* $3, 12 and under free. *Contact:* Mike Bumpus, N9GIK, RR 2, West Union, IL 62477, tel 217-279-3840, or Bryan Chrysler, KA9ILL, 110 N Randall, Martinsville, IL 62442, tel 217-382-4640.

†**Illinois (Willow Springs)—June 11.** *Sponsor:* Six Meter Club of Chicago, Inc. *Time:* gates open at 6 AM. *Place:* Southwest of Chicago at Santa Fe Park, 91st and Wolf Rd. *Features:* large swapper's row, plenty of parking, refreshments, AFMARS meeting, picnic grounds, displays in the pavillion, overnight camping not permitted by Santa Fe Park Mgt. *Talk-in:* 146.52, 146.37/97. *Admission:* advance $3, door $4. *Contact:* Mike Corbett, K9ENZ, 606 South Fenton Ave, Romeoville, IL 60441.

†**Kentucky (Erlanger)—June 11.** *Sponsor:* Northern Kentucky ARC. *Time:* setup 6 AM, public 8 AM-4 PM. *Place:* Erlanger Kentucky Lions Park, I-75 to exit 184-B (Rte 236 East), go two miles to Dixie Hwy (US Rte 25 and 42) turn right and go south one mile to Sunset Ave, right on Sunset to the end of the street. *Features:* ARRL, packet and antenna forums, indoor exhibit area for major vendors, outside flea market, refreshments, flea market spaces are $2 each, tables not provided, major vendor indoor space is $15 per table (provided). *Talk-in:* 147.855/255, 147.975/375 *Admission:* advance $4, door $5, children under 13 free. *Contact:* N4OEB, Northern Kentucky ARC, PO Box 1062, Covington, KY 41012, tel 606-331-3258.

Louisiana (New Orleans)—June 17-18. *Sponsor:* Jefferson ARC. *Time:* 8 AM-5 PM Saturday, 9 AM-12 PM Sunday. *Place:* Bonabel High School, take I-10 to exit 223 onto Williams Blvd, go north one block on Williams to Bruin St, then turn right and go 8 blocks. *Features:* refreshments, forums, new dealers, swap tables, walk-in VE exams 9 AM Sunday. *Talk-in:* 146.01/61. *Admission:* $2. *Contact:* Jerry Wilkinson, WB4ICV, PO Box 73665, Metairie, LA 70033, tel 504-469-9871.

Louisiana (Pineville/Alexandria)—July 1. *Sponsor:* Central Louisiana ARC. *Time:* 9 AM-3 PM. *Features:* forums, VE exams, special-event station June 1-3 on 80 meters General portion. *Talk-in:* 147.93/33. *Admission:* free. *Contact:* Robert Guin, KD5RW, PO Box 716, Jena, LA 71342-0716, tel (D) 318-992-6106, (N) 318-992-5076.

Maryland (Frederick)—June 18. *Sponsor:* Frederick ARC. *Time:* 8 AM-4 PM. *Place:* Frederick County Fairgrounds. *Features:* tailgaters $5 for each 10 ft space. *Admission:* $4, wives and children free with one paid admission. *Tables:* exhibitor indoor tables $10. *Contact:* Dave Durkovic, N3BKD, 7128 Limestone Ln, Middletown, MD 21769.

Michigan (Grand Rapids)—June 17. *Sponsor:* Independent Repeater Assn. *Time:* setup 6 AM, public 8 AM-4 PM. *Place:* National Guard Armory, 44th St, ½ mile west of US 131. *Features:* refreshments. *Talk-in:* 147.765/165. *Tables:* free tables for dealers and sellers (reservations required for tables). *Contact:* for table reservations, The Independent Repeater Assn, 562 92nd St SE, Byron Center, MI 49315, tel 616-455-3915.

†**Michigan (Midland)—June 10.** *Sponsor:* Central Michigan ARA. *Time:* setup 6 AM, public 8 AM-1 PM. *Place:* Community Ctr, follow signs for the Civic Ctr. *Features:* refreshments, VE exams. *Talk-in:* 147.60/00. *Admission:* $3. *Contact:* Central Michigan ARA, PO Box 67, Midland, MI 48640.

†**Michigan (Monroe)—June 18.** *Sponsor:* Monroe County Radio Communications Assn. *Time:* 8 AM-2 PM. *Place:* Monroe Co Fairgrounds, M-50 at Raisinville Rd. *Talk-in:* 147.72/12, 223.18/224.78. *Admission:* advance $3, door $4. *Contact:* Larry Lindner, KB8AIZ, 2001 Ida-Maybee Rd, Monroe, MI 48161, tel (D) 517-265-4313, (N) 313-587-3663.

Michigan (Petoskey)—June 17. *Sponsor:* Straits Area ARC. *Time:* 8 AM-1 PM. *Place:* 4H Bldg on the Fairgrounds, 2 blocks west of US 31 and US 131 intersection. *Features:* self-contained RV parking on grounds. *Talk-in:* 146.085/685, 146.52. *Admission:* no advance, door $2.50. *Tables:* $3 for 8 ft, splits allowed. *Contact:* Irene, N8HBT, tel 616-539-8986 or Clark, KA8TIL, tel 616-582-6455.

†**Missouri (Columbia)—June 10.** *Sponsor:* Central Missouri Radio Assn. *Time:* 6 AM-4 PM. *Place:* west of Columbia at Midway Exposition Facility, I-70 exit 121. *Features:* statewide packet organizational meeting, VE exams, forums. *Talk-in:* 146.16/76. *Admission:* $2.50. *Contact:* Jesse John Lyons, NØFPI, tel 314-474-8257, or Benton Smith, KØPCK, tel 314-443-5168.

Nebraska (Chadron)—June 3-4. *Sponsor:* Pine Ridge ARC. *Time:* Saturday 6 PM-9 PM, Sunday 9 AM-4 PM. *Place:* Saturday Camp Red Cloud, Sunday Camp Norwesca. *Features:* Saturday evening dinner, donations accepted, Sunday potluck at noon, swap tables. *Talk-in:* 146.04/64 or 147.96/36. *Admission:* nominal registration fee. *Contact:* Lynn Bilyeu, KØODF, 406 Henkens Dr, Chadron, NE 69337, tel 308-432-2297.

New Hampshire (Deerfield)—June 3. *Sponsor:* Hoss Traders. *Time:* setup anytime, public all night Friday and Saturday. *Place:* Deerfield Fairgrounds. *Features:* refreshments, flea market (6 AM Saturday morning), Friday night camping starts at 4 PM (no camp fires), profits benefit the Boston Burns Unit of the Shriner's Hospital for crippled children. *Talk-in:* 146.40/147.00, 146.52. *Admission:* $5. *Tables:* no extra charge. *Contact:* SASE to Joe Demaso, Star Rte, Box 56, Bucksport, ME 04416.

New Jersey (Dunellen)—June 17. *Sponsor:* Raritan Valley RC. *Time:* 8 AM. *Place:* Columbia Park. *Features:* refreshments. *Talk-in:* 146.025/625, 146.52. *Admission:* $4, spouse and children are free, advance tickets may be purchased from any club member. *Tables:* no tables supplied, sellers' spots are $6 for one space or $12 for multiple spaces. *Contact:* Dave, KA2TSM, tel 201-763-4849 or John, WA2C, tel 201-968-5070.

†**New York (Alexander)—July 9.** *Sponsor:* Genesee Radio Amateurs, Inc. *Time:* 6 AM-5 PM. *Place:* on Rte 98, 8 miles south of thruway exit 48, Batavia. *Features:* ARRL forum, VE exams, antenna program, flea market, rag chewers area. *Talk-in:* 144.71/145.31, 146.52. *Admission:* advance $3, door $5. *Contact:* Knute Carlson, N2DRX, 26 Burke Dr, Batavia, NY 14020, tel 716-343-5580.

†**New York (Old Westbury)—July 9.** *Sponsor:* Long Island Mobile ARC. *Time:* 9 AM-4 PM. *Place:* New York Institute of Technology. *Features:* refreshments, VHF tune-up clinic. *Talk-in:* 146.25/85. *Admission:* no advance, door $3. *Contact:* Mark Nadel, NK2T, tel 516-796-2366 or Hank Wener, WB2ALW, tel 201-694-1811.

North Dakota (Dunseith)—July 7-9. *Sponsor:* 26th International Hamfest Committee. *Place:* Peace Garden, located on the international boundary, 14 miles north of Dunseith on Hwy 281. *Features:* camping facilities, flea market, VE exams, special-event station, ham and nonham activities. *Contact:* Tom Williams, WDØATI, 612 S 11th St, Bismarck, ND 58504, tel 701-258-1947.

†**Ohio (Bowling Green)—July 9.** *Sponsor:* Wood County ARC. *Time:* 7 AM-4 PM. *Place:* Wood County Fairgrounds. *Features:* refreshments, VE exams. *Talk-in:* 147.78/18. *Admission:* free. *Contact:* Bob Willman, WB8NQW, 14118 Bishop Rd, Bowling Green, OH 43402, tel 419-353-6221.

Ohio (Akron)—June 11. *Sponsor:* Goodyear ARC. *Time:* setup 7 AM, public 8 AM-4 PM. *Place:* Goodyear Wingfoot Lake Park. *Features:* flea market, $3 per vehicle. *Talk-in:* hamfest directions and check-in 146.985/385, mobile checkins end at 1 PM. *Admission:* advance $4, door $5. *Tables:* $6, advance registration suggested. *Contact:* Bill Dunn, W8IFM, 4730 Nottingham Ln, Stow, OH 44224, include SASE, tel 216-673-8502.

Pennsylvania (Harrisburg)—July 4. *Sponsor:* Harrisburg ARC. *Time:* vendors 6 AM, public 8 AM. *Place:* Bressler Picnic Grounds, take exit 1 off I-283, follow PA 441 and signs. *Features:* refreshments, tailgating $2, no overnight camping. *Talk-in:* 147.90/30, 146.52. *Admission:* $3. *Tables:* advance $5, at site $6. *Contact:* Dave Dormer, KC3MG, tel 717-939-4957.

†**Pennsylvania (Milton)—June 11.** *Sponsor:* Milton and Central Susquehanna ARCs. *Time:* 8 AM-4 PM. *Place:* Winfield Fireman's Fairgrounds. *Features:* demonstrations and contests during the day, tailgating $1 for each 6-ft area. *Admission:* no advance, door $4. *Tables:* inside tables with electricity $2 per 6-ft area. *Contact:* Jerry Williamson, WA3SXQ, 10 Old Farm Ln, Milton, PA 17847, tel 717-742-3027, or Bob Stahl, 452 4th St, Northumberland, PA 17857, tel 717-473-7050.

†**Pennsylvania (Pittsburgh)—July 9.** *Sponsor:* North Hills ARC. *Time:* 8 AM-4 PM. *Place:* Northland Public Library, 300 Cumberland Rd, between US Rte

†ARRL Hamfest

19 and McKnight Rd. *Features:* tailgating space, refreshments, VE exams 8 AM, handicap/wheelchair accessible. *Talk-in:* 147.69/09. *Admission:* free. *Contact:* for VE information send SASE to John Rosenwald, NM3P, 400 Stevens Dr, Pittsburgh, PA 15237, tel 412-931-2651, for hamfest information send SASE to Bob Ferrey, Jr, N3DOK, 9821 Presidential Dr, Allison Park, PA 15101, tel 412-367-2393.

†**Pennsylvania (Wilkes-Barre)—July 2.** *Sponsor:* Murgas ARC. *Time:* 8 AM-3 PM. *Place:* Ice-o-Rama at the Coal St Sports Complex, I-81 exit 47, turnpike exit 36. *Features:* refreshments, ARRL table, VE exams. *Talk-in:* 146.01/61, 52.81/53.81, 52.61/53.61, 146.52. *Admission:* $3. *Contact:* Mike Benish, K3SAE, tel 717-388-6863, after 5 PM weekdays, weekends anytime.

Texas (Abilene)—July 5-8. *Sponsor:* Mobile Amateur Radio Awards Club, Inc. *Place:* Kiva Inn, 5403 S 1st St, tel 915-695-2150, cut off date for registration is June 15. *Features:* tour of the Dyess Air Force Base, barbecue at the home of W5ILR, convention banquet, plenty of campgrounds. *Contact:* Chuck Dobbins, 1902 Mission Creek Cir, Houston, TX 77084, tel 713-579-7932 (leave message) or listen to the County Hunter Net frequency of 14.336 daytime or 3.865 nighttime.

†**Virginia (Manassas)—June 4.** *Sponsor:* Ole Virginia Hams ARC. *Time:* setup 7 AM, public 8 AM. *Place:* from DC-495 to I-66 west to Manassas, 234 south to Prince William County Fair. *Features:* refreshments. *Talk-in:* 146.37/97. *Admission:* no advance, door $5. *Contact:* Joe Schlatter, K4FPT, c/o Ole Virginia ARC, PO Box 1255, Manassas, VA 22110, tel (N) 703-368-8599.

Wisconsin (Oak Creek)—July 8. *Sponsor:* South Milwaukee ARC. *Time:* 7 AM-2 PM. *Place:* American Legion Post 434, 9327 S Shepard Ave. *Features:* parking, refreshments, VE exams, free overnight camping on grounds. *Talk-in:* 146.58. *Admission:* $4. *Contact:* South Milwaukee ARC, PO Box 102, South Milwaukee, WI 53172-0102.

Wisconsin (Stevens Point)—June 18. *Sponsor:* Central Wisconsin Radio Amateurs. *Time:* 9 AM. *Place:* University Student Ctr. *Features:* free parking, tailgaters welcome, refreshments, tables available, commercial vendors, exhibits, VE exams walk-ins welcome. *Talk-in:* 146.385/985, 146.07/67. *Admission:* free. *Contact:* Art Wysocki, N9BCA, 3356 April Ln, Stevens Point, WI 54481, tel 715-344-2984.

Wyoming (Cheyenne)—July 8-9. *Sponsor:* Shy-Wy ARC. *Time:* Saturday 8 AM-5 PM, Sunday 8 AM-3 PM. *Place:* Holiday Inn, I-80 at US 85 exit. *Features:* dealer exhibits, indoor swap tables, forums, seminars, VE exams. *Talk-in:* 146.175/775, 146.22/82. *Admission:* advance $3, door $4. *Contact:* Fred Dumire, N7JPR, PO Box 6262, Cheyenne, WY 82003.

Coming Conventions

GEORGIA STATE CONVENTION

June 16-17, 1989, Albany

The Georgia State Convention will be sponsored by the Albany, Georgia ARC. It will be held at the Heritage House Motel & Convention Center, 732 W Oglethorpe Blvd (US Hwy 82). Doors will be open on Friday from 5 PM-9 PM and Saturday 8 AM-4 PM. Admission is $3. Features will include free parking, flea market, forums, VE exams (Saturday morning 10 AM, all walkins, no preregistration). Talk-in will be on 146.22/82, 444.5/449.5. For more information contact Albany ARC, PO Box 1205, Albany, GA 31702, Mon-Fri 9 AM-5 PM, tel 912-883-7910, for motel reservations tel 800-476-5193.

WEST VIRGINIA STATE CONVENTION

July 1-2, 1989, Jackson's Mill

The West Virginia State Convention will be sponsored by the West Virginia State Radio Council. It will be held at the Jackson's Mill State 4-H Camp, 1½ miles from Rte 19, south of Weston. Doors will be open on Saturday from 9 AM-9 PM, and Sunday 9 AM-4 PM. Admission is $4 in advance. Features will include ARRL Forum, DX Forum, SEC Meetings, Net Meetings, CW Contest. Talk-in will be on 144.79/145.39, 146.52. For reservations contact Bill Pace, KB8ZM, 2005 Massey Cir, Charleston, WV 25314, for general information contact Hal Tate, N8FXH, 121 East Olive St, Bridgeport, WV 26330.

CENTRAL DIVISION CONVENTION

July 8-9, 1989, Indianapolis, Indiana

The Central Division Convention will be sponsored by the Indianapolis ARA. It will be held at the Marion County Fairgrounds. Doors will be open 6 AM both days. Admission is $6, children under 12 free. Features will include new equipment, computer software dealers, large electronic flea market, technical forums, camping on grounds with free hookup, and refreshments. For more information tel 317-356-4451

June 16-17
Georgia State, Albany

July 1-2
West Virginia State, Jackson's Mill

July 8-9
Central Division, Indianapolis, IN

July 16
Colorado State, Golden

July 28-30
West Gulf Division, Oklahoma City, OK

ARRL NATIONAL CONVENTIONS
June 2-4, 1989—Dallas Fort/Worth, Texas
June 8-10, 1990—Kansas City, Missouri

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext. 283.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting fpr meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

Strays

From Spark to Space . . . to Jennys and Jets. Members of the Fox Cities Amateur Radio Club presented Experimental Aircraft Association President Paul Poberezny with a plaque expressing the club's thanks to the Association for their efforts in enhancing the operation of the W9ZL special-event station.

The Fox Cities Club (Appleton, WI) has operated a special-event station for the last four years during the annual International Experimental Aircraft Association Fly-In and Convention in Oshkosh, Wisconsin. See next month's Special Events column for the details on how to work W9ZL during the upcoming Fly-In this summer. Pictured (l to r) are Rick Kosiorek, N9ALF; Don Baker, NB9J; EAA President Paul Poberenzy; Wayne Pennings, WD9FLJ; Mike Jackson, WB9BBI; and Ron Pohlman, KE9MV. *(Photo by Larry Siebers, KD9IA)*

Silent Keys

Administered by Nancy A. Slipski

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

W1BME, Warren J. Stevens, Medford, MA
KA1KGO, Laszlo Deutsch, Bridgeport, CT
K1MRV, Robert J. Denning, Chelsea, MA
K1UNO, Clyde M. Smith, Phillipston, MA
W2CHW, Herbert W. McKinley, Forked River, NJ
KA2DFI, Frederick C. Rowley, Huntington, NY
W2DNL, R. B. Hintenach, Syosset, NY
W2EDT, Frank R. White, Wappingers Falls, NY
W2IES, Douglas H. Randall, Danville, VT
W2IFV, Robert J. Kopp, Farmington, MI
K2JH, Frank J. Hatler, Roselle, NJ
W2JJN, Keith S. Mummery, Zephyr Hills, FL
WB2OPC, William B. Gates, Bolton Landing, NY
WA2SAS, Frederick J. Serfis, Norwood, NY
W2TN, Fred S. Liddle, Bradenton, FL
W2UPT, Jacob W. Schroh, Sidney, NY
WB2VCK, Norman C. Tew, Mount Laurel, NJ
W3BQS, Alfonso J. Hozempa, Edwardsville, PA
N3COW, Albert Smith, Seneca, PA
WB3DCH, Roy A. Nelsen, Dundalk, MD
W3DLL, Forrest E. Fried, Breinigsville, PA
W3MRR, Robert E. Baluta, Bethesda, MD
K3SSX, Raymond A. Ryan, Perryville, MD
W3TCV, Morton Kizner, Maitland, FL
K4AP, George S. Turner, Boca Raton, FL
K4AV, George E. Hoffstetter, St Petersburg, FL
K4AVK, Grover L. 'Bud' Kitchens, Birmingham, AL
KA4BBT, Ross K. Gessford, Sr, Bradenton, FL
WA4CIZ, John H. McGuire, West Jefferson, NC
K4EEF, Tully P. Parker, Salem, VA
W4EN, Wade M. Rogers, Conyers, GA
W4FZ, Earle F. Cook, Arlington, VA
K4GWE, John Gerfy, Beverly Hills, FL
W4GY, Robert R. Brewin, Atlanta, GA
K4HAK, Donald C. Williams, Birmingham, AL
W4IWF, John D. Norris, Jacksonville, FL
W4KEJ, Roland A. Spinks, Jr, Houston, TX
N4PBD, Carlos D. Smith, Ellabell, GA
W4PKM, Harvey G. Cross, Hillsville, VA
W4QQ, Robert P. Conner, Dahlonega, GA
K4UEM, Curtis D. Hamby, Belton, SC
W5AVK, John M. Nelson, Norman, OK
KB5BJI, James Lefebvre, Fredericksburg, TX
K5BW, W. C. 'Billy' Jepsen, Tunica, MS
KB5CKX, William C. Aaker, Dallas, TX
K5ECO, E. W. Kersten, Albuquerque, NM
WD5HEV, Jerry J. Earp, Jr, Tulsa, OK
W5MN, Richard W. Bellew, Sr, El Dorado, AR
W5RAD, George W. Rodenberg, El Paso, TX
W5RHE, Samuel B. Galloway, Valparaiso, FL
W5RO, Howard H. Brokate, El Paso, TX
W6BRT, Grover C. Chaffin, Paramount, CA
WD6BZQ, Loren F. Young, Grass Valley, CA
W6DM, Curtis W. Reedy, Lawrence, KS
N6FVF, Lucius C. Davis, Ventura, CA
W6KWU, Harris Strassner, Santa Cruz, CA
K6LLF, Russell Lake, Jenks, OK
W6LXV, Charles V. May, Pacific Grove, CA
W6MJY, Albert L. Beardsley, Fremont, CA
W6NXO, John P. Kemp, Los Angeles, CA
WB6OWT, Joe M. Ajax, Glen Ellen, CA
W6QIR, Howard A. Bowman, Los Angeles, CA
WA6QMW, Merton J. Thomas, Moreno Valley, CA
W6SOE, William T. Schwartzman, Apple Valley, CA
W6TDL, Clara M. Dishong, Hemet, CA
N7AIS, James B. Anderson, Salem, OR
K7CRO, John A. Buchanan, Tucson, AZ
W7GKD, Harold L. Shafer, Ashland, OR
W7IJH, Melvin E. Lewis, Salem, OR
W7KCM, Kenneth A. Rodrigues, Phoenix, AZ
KA7MRZ, Audrey M. Colvin, Marysville, WA
K8BUX, Tom E. Ball, Sr, Hinton, WV
WB8DUO, Robert W. Jeffery, Cupertino, CA
W8FQK, Paul Barnes, Shelby, OH
WA8HBZ, Malcolm O'Dell, Saginaw, MI
W8JAP, Otto W. Stockman, Bradenton, FL
W8JL, Sidney B. Ehrlich, Marietta, GA
K8JQI, Charles F. Lawson, Huntington, WV
NQ8K, Thomas J. Dorsey, Mansfield, OH
WD8MAS, Robert K. Higginbotham, Paden City, WV
KA8SOM, Frank L. McIntosh, Salineville, OH
W8TMO, Robert F. Zelenka, Fenton, MI
W8VTW, Robert W. Dunham, Lorain, OH
W8ZEA, Earl D. Fleming, Uniontown, OH
W9FIJ, Carl V. Anderson, Ottawa, IL
K9GG, William G. Lindeke, De Pere, WI
W9GGK, Thomas B. Nisbet, Kendallville, IN
N9GYC, William R. Engle, Waukesha, WI
W9HSY, Clyde 'Coffee' Downing, Madison, WI
K9LAU, Jack B. Young, Mesa, AZ
KA9OGK, Kim G. Smrstick, Arpin, WI
K9ONG, Eugene Blundy, Champaign, IL
WØBJF, Floyd Stanley Elkins, O'Neill, NE
WØBSR, Lester L. Gates, Carlisle, IA
KØCVB, Frank M. Golden, Nebraska City, NE
KØDWC, Francis H. "Butch" Griswold, Laguna Hills, CA
NØFXP, Henry J. Luhrman, Jr, Bloomington, MN
WØGS, Alfred E. Schwaneke, Rolla, MO
KBØIO, Henry A. Anderson, Pelican Rapids, MN
WØJKO, Francis W. Holloway, Jr, Minneapolis, MN
WØLDI, Rene R. Repasky, Burnsville, MN
WØNQG, Frank E. Johnson, Glen Haven, CO
KAØPWB, F. Duane Tooley, Harlingen, TX
WØQKA, John A. Gratner, Lynchburg, VA
WØRUG, Eugene E. Baldwin, Las Cruces, NM
KØSLN, John Felix, Woodland Park, CO
KØTUH, Francis Bigley, Scottsbluff, NE
KØVIY, Carl J. Haney, Portland, ME
WØYIQ, Don W. Moore, Creston, IA
VK5NPS, Peter J. Slattery, Plympton Park, Australia
LA6RB, Johan Eggen, Lillesand, Norway

*Life Member, ARRL

Notes: 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*.

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. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111.

50 Years Ago

June, 1939

☐ Fierce competition in the broadcast receiver industry has led to cutting corners in design and manufacture, and hams are being unfairly blamed for increasing BCI. Editor Warner says the problem is cheap sets, and argues that since they are not of "modern design" as defined in F.C.C. standards, the "quiet hours" regulation should not be invoked.

☐ W1KK's "five and ten" converter gives good mobile reception on those two bands, working into (and with power from) the automobile receiver.

☐ By Goodman took a survey among top DXers to determine which antenna systems seem most effective in raising those rare and elusive countries. Plenty of Sterba curtains and lazy-Hs, but no one skywire appears to have a complete edge.

☐ A committee to set up programs to preserve amateur bands, a study of Hdq. operations, and a poll to determine amateur sentiment on opening 7200-7300 kc. for voice, are among actions of the Board of Directors, meeting in San Francisco this year.

☐ The sound principles of regenerative mixing and a crystal filter contributed to W3GFZ's successful design of a compact superhet, not much larger than the dimensions of *QST*.

☐ The Western Union Telegraph Company is added to the list of those agencies (e.g., Red Cross, weather forecasters) served by the Amateur Radio Emergency Corps, through a program of informal understanding and cooperation.

☐ The list of DXCC members is a bit shorter this month; a few near the top tried forging some choice QSL cards but were caught—and thrown out of the club.

☐ The new regulations on 56 Mc. should not be a hardship if you follow W1IPL's lead in using receiving tubes for a good e.c.o. and suppressor grid modulation.

☐ Strong complaints by the Reseau des Emetteurs Francais and from the League through our Department of State have caused the French government to shut down its "Paris Mondial" powerhouse which has been disrupting 7280 kc. for us.

25 Years Ago

June, 1964

☐ Sixteen societies in the Americas convened (some by proxy) in Mexico City to form the Region II Division of the International Amateur Radio Union, an accomplishment long sought by our League president W6ZH.

☐ In a package roughly 9 by 9 by 6 inches, VE2AES has built a 25-watt, plate-modulated mobile transmitter covering 10 through 80 meters, a converter, and a transistor power supply, all operating from the car's battery.

☐ Oscar III is being readied for launch with great anticipation because its translator system will allow amateurs to communicate over several thousand miles using only the two-meter band.

☐ More space activity: After months of trying, W6DNG and OH1NL finally made a two-way contact using moonbounce techniques.

☐ WØVTP uses a three-foot-diameter loop feeding an audio (yes, audio) amplifier with readout into a c.r. tube to take bearings on distant electrical storms and, hopefully, to make weather predictions on the storm's path.

☐ A special reserve of $100,000 for conference preparation and associated work for the protection of amateur radio frequencies was a highlight of the League's Board meeting in Hartford. Plans to add incentives to the licensing structure were strongly endorsed by Board action after extensive discussion of this controversial subject.

☐ W6SAI decided to determine for himself the truth about all the rumors and misinformation flying around concerning the incentive licensing proposal and spent a day in the docket reading room at FCC. Purely counting noses, he found that sentiment divided about evenly between pros and cons, but found also that much of the opposing viewpoints were based on untruths, or at least, misinformation.

☐ W1ICP presents his latest version of the transmatch, flexible enough to handle a wide range of matching conditions, yet without complicated switching, and able to handle up to a kilowatt.—*W1RW*

Results, 1989 ARRL VHF Sweepstakes

"ARRL contests are very well-planned, including another well-placed aurora opening on Sunday. Just as things were beginning to get dull, then ZAP, ZWAM, ALAKAZAM, a great opening and ten new grids."—NM8X

By Billy Lunt, KR1R and Phil Rice, WB9JKI
Contest Manager Assistant Contest Manager

Never say never. In last year's VHF Sweepstakes contest report, we said that conditions in January are always a bummer. Not so this year, as contestants K3ZO and WBØWAO/8 ascribed clairvoyance to the ARRL schedulers: "It seems like the ARRL staff has a direct line to the creator of auroras. This is the second VHF contest in a row which featured aurora. The result was six new grids on 2 meters."—*K3ZO*. "Who scheduled the aurora? Whoever it was, thanks! How do you operate four bands with openings on all of them?" —*WBØWAO/8*.

More comments were received with this year's 1989 VHF Sweepstakes logs held in January than any VHF contest in memory. Here is a scattered sampling of some comments regarding the outstanding aurora conditions. "WOW! The aurora made this contest fun! Best DX was FN48, proving that contests provide excellent opportunities to work DX grid squares." —*W1QK*. "The Sunday aurora was incredible; one of the hottest January contests in years."—*WA2BPE*. The auroral curtain dipped pretty far south, as represented by this four-land comment by KB4XK: "Thanks to the aurora for putting me over 100 grids on 2 meters for VUCC!" "Who says 220 MHz has little activity? The signals were knee deep Sunday evening during the aurora. I tried eating my spaghetti dinner while running CW on 220 MHz during the aurora. It can't be done!"—*KB8JI*. "The Panadapter Scope looked like 20 meters during Sunday's aurora opening. Even SSB signals were 20 over S9."—*WA8SAJ*. "The aurora was like low-band DXing; it gave me a buzz!"—*WB8TCZ*. Coping with Au buzz for the first time can be an exciting experience as noted by NU9H: "First time that I ever heard an aurora. I was amazed at hearing stations all up and down the band as it got under way." Thus, it can be a tremendous learning experience: "The

Affiliated Club Competition

Club	Score	Number of Entries	Single op Winner
Unlimited Category			
Mt Airy VHF Radio Club	2,181,861	54	WA3NUF
Hampden County Radio Assn	759,581	51	WA1VRH
Medium Category			
Rochester VHF Group (NY)	1,122,717	47	KD5RO
Delaware Valley VHF Society	651,481	16	K2SMN
Yankee Clipper Contest Club	250,892	4	K1DH
Four Landers VHF/UHF Group	87,114	6	WB4SLM
South Jersey Radio Assn	75,675	11	K2YY
Warminster ARC	66,755	19	N3EXA
Granite ARA	61,733	7	NI1W
Six Meter Club of Chicago	50,018	19	K9MBX
Michigan City ARC	23,403	4	K9DZE
Catskill Mountain ARA	21,978	3	KB2DYB
Rochester ARA	11,481	11	KA2J
Genesee ARC	9,820	3	WB2JFL
Potomac Valley Radio Club	8,861	3	W3GN
Mobile Sixers RC	7,590	11	K3RTU
Rochester (MN) ARC	7,359	49	WØVB
Ventura County ARC	5,182	9	NS6X
Rochester DX Association	2,479	5	KB2WN
North Texas Contest Club	2,091	16	WB5VZL
Rochester Amateur Packet Society	1,316	3	KE2DI
Squaw Island ARC	854	5	K2TDZ
Local Category			
Murgas ARC	454,594	4	WA2FGK (K2LNS,op)
Crystal RC	127,007	4	N2BJ
Minnesota Wireless Assn	78,556	6	WØUC/9
Overlook Mt ARC	10,634	7	W2XL
Anne Arundel RC	10,232	6	WB2TNL
Wheaton Community Radio Amateurs	9,246	5	N8HWK
Hubert Heights ARC	5,008	3	N8CCC
York Radio Club	2,558	9	KA9ZQW
Farout ARC	167	3	W8XT

Top Ten

Single Operator

Call	Score
WA2TEO	172,095
K2SMN	147,659
WA2FGK (K2LNS,op)	147,154
N2BJ	125,488
WA3NUF	118,992
KD5RO	110,856
KB3QM	102,060
W1GCI	99,528
W3IP	93,726
N2CEI	89,680

Single Operator—QRP Portable

Call	Score
K6LMN	4,800
NS6X (DM15)	2,576
WB2ODH/6	1,424
WA3YYC	528
KB6MEG	350
KE2DI (FN12)	312
KA2JKI	196
NJ2L	120
NS6X (DM05)	78
NS6X (DM04)	70

Multioperator

Call	Scores
WC2K	557,130
KA1ZE	421,264
W2SZ	349,418
WB3CZG	301,032
WA3AXV	287,492
K1TR	227,103
W3KWH	208,926
N2WK	202,148
VE3LNX	188,055
WC2F	165,288

Division Leaders

Single Operator

Call	Score	Division
K2SMN	147,659	Atlantic
VE3ASO	76,563	Canada
WØUC/9	60,214	Central
WAØBWE	12,566	Dakota
K5UR	55,350	Delta
KB8ZW	87,642	Great Lakes
N2BJ	125,488	Hudson
NØLL	36,356	Midwest
WA2TEO	172,095	New England
KE7CX	5,372	Northwestern
WA2YWP/6	3,726	Pacific
W2CRS	8,514	Rocky Mountain
K2UOP/4	61,560	Roanoke
WA4NJP	36,630	Southeastern
W6CPL	19,776	Southwestern
K9MK/5	30,780	West Gulf

Multioperator

Call	Score
WC2K	557,130
VE3LNX	188,055
W9YB	5,428
KØDD	17,557
N4VC	17,112
NM8X	148,104
W2SZ	349,418
WBØDRL	129,048
KA1ZE	421,264
NU7Z	10,950
WB6LRV	11,873
KXØO	6,105
K4LVV	52,756
—	—
K6UY	5,568
KE5CO	7,567

Peter, NN9K, looking for grids on 220 MHz.

aurora on Sunday evening was just incredible. Never imagined I would work 33 grid squares in one weekend with my station setup. I sure learned a lot also."—*KAØZSU.*

More Qs in the logbook is the goal, as W5FYZ noted: "I've been working these VHF contests for 30 years. There was more participation by far in this one than in any prior January contest. All 35 grids worked were within a 500-mile circle, but I worked a lot of old friends and made a lot of new ones. I had a ball!" And K6HXW observed from the West Coast: "This is the most activity in many years."

Some stations worked some pretty good DX (as defined on HF): "It's not very easy to get EME stations to send grids. I Worked All Continents on 1296 during the contest!"—*K2UYH.* Congratulations, Allen. WD4AHZ and W4FF found working CO2KK on 2 meters the highlight of the contest, while K7ICW worked XE2GFH on 432 MHz, making his day. The QRP portable category was extended to this contest for the first time and drew some hardy entrants, mostly out West. KB6MEG simply exclaimed that "QRP portable is great." While N6TY detailed: "I operated for about three hours at the 3500-foot elevation on Mt Hood just east of Portland. It snowed over six inches in that time period." WB9AJZ "operated portable and mobile on top of Elsinore Peak," noting that "it sure gets cold earlier in January," while WA3YYC "logged by the light of the campfire operating QRP on the side of North Mountain."

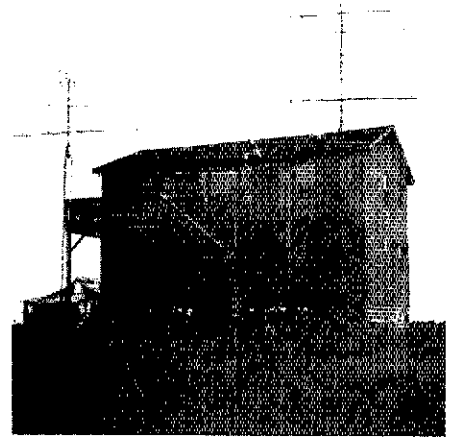
Looking at the scores, WA2TEO followed up on his September top-scoring single-op effort, outdistancing all comers with 172k points. K2SMN and K2LNS (at WA2FGK) made up the next tier in that order at 147k. The Top Ten was an all-East-Coast-Corridor affair, not unusual for this contest.

On the other hand, the top-ten QRP portable category was dominated by West Coast stations led by K6LMN at 4.8k. Kudos to those who braved the harsh elements in this rugged category.

The multi-ops were again led by the well-equipped WC2K station at 557k points. KA1ZE finished a strong second at 421k from his impressive arrays overlooking the Connecticut River valley.

The Mt Airy VHF Packrats made their usual top showing in the unlimited club competition with 2+ million points—no small feat! The Rochester (NY) VHF Group more than doubled their last year's efforts at 1.1 mil to capture first place in the medium-club category. Good going, Western New York. In the local club category, Murgas ARC just had more gas than all the rest—first at 454k points.

As we close the record books on one of the more successful VHF Sweepstakes, we see what participation can do for the fun factor for all. With the June VHF Contest at the doorstep (June 10-12), and expected wide-open conditions on 6 meters, don't miss any of the fun. Also check out the new plaques (see UpFront, this issue) now being offered in the June contest. So plan your calendar for a full season of VHF-UHF activity, starting in June, followed by the



A view of the antennas at multiop station W4IY.

UHF Contest in August and the September VHF Contest. With participation fueling the activity level, how about introducing a friend to the joys of VHF contesting this season? You'll do him (or her), as well as yourself and everyone else worked, a favor. Good luck!—*W1XX*

SOAPBOX

Sunday's aurora eased the pain of Saturday's blown GaAsFET (WA1VRH). Aurora on 50 through 432 MHz... What's a single op to do? (WA1YHO). Up until the aurora Sunday evening, this was one of the slowest Jan VHF SS contests (WA1HYN). This contest gave me my first experience with an aurora. It was lots of fun! (NQ1C). Order me some aurora for next year, with a side order of E-skip (N1DJB). As you can see by my score, my contesting had all the impact of a Water Pik on the Chicago Fire (WA2YEI). I continue to be surprised with my results using an indoor 5-element Yagi and 80 watts! (WA2E). I ruined 2 rotors in the contest, but had a lot of fun working the aurora. Lucky thing that the second rotor broke aimed north! (WB2JLR). Don't share a contest station with your son, KA2RDO (W2ONP). Being sick + 1st time out = Low Score. Watch out next year! (K2JD). Log submitted to show contest support; not a serious contest entry (WA3LKT). Will there be an aurora for the June Contest? (K3NXH). Overall this was the best January contest I've been in for several years

QSO Leaders By Band

Single Operator

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz	
W9OEH	275	KA1KRJ	401	N2CEI	110	K1FO	216	K2SMN	29	WA3JUF	44	WB3DNI	19
VE3RM	250	W1QK	388	WB2YEH	99	K2TXB	150	WB3JYO	23	K2SMN	41	WB2YEH	18
N2CEI	243	WA3HMK	377	WA2TEO	94	K2UYH	128	WB2YEH	21	WA3NUF	41	WB3JYO	18
WA1TRE	238	WB2QOQ	372	N2BJ	91	N2BJ	117	N3CX	20	K2UYH	41	WA3NUF	16
WA1VRH	231	K3NXH	352	WA3NUF	88	K2OS	113	WA3NUF	20	WA4VHF	40	N3CX	16
W3EP/1	226	WA2TEO	348	WA3YUE	88	K2GAL	101	WA3JUF	20	WB3JYO	39	WA3YUE	13
N3BBI	223	KA2WKA	340	W3CL	87	WA2TEO	94	KD5RO	19	WB3DNI	37	WA3JUF	13
AC3T (KA3B,op)	219	WA2FGK (K2LNS,op)	332	WA3JUF	79	K3IUV	91	WA3YUE	19	K2TXB	33	N3AOG	12
WA2TEO	215	WA2ODO	321	W2EIF	76	K2SMN	91	W2EIF	19	W2EIF	32	WØRSJ	9
VE3DDW	202	K2GAL	320	K2OWR	72	WB2YEH	90	N3BBI	18	WB2YEH	30	AK3O	9
WA2CWA	201	N3EAX	305	K3DMA	72	N3CX	87	K2TXB	16	WA2FGK (K2LNS,op)	30	WB1FKF	7
KB8ZW	182	WB1BXS	304	K3IUV	70	WA3NUF	86	WØRSJ	16	N3CX	28	W2EIF	7
WA2BPE	180	N2BJ	298	N3FUJ	68	W3IP	86	KB3IB	15	N2BJ	28	K3BPP	6
K1RZ	172	N2CEI	297	W3IIT	68	KD5RO	86	W3GXB	15	W3IP	28	NI1W	5
W2HRW	166	K2SMN	296	WB3JYO	68	WB3ESS	83	WA2FGK (K2LNS,op)	14	K1FO	27	KD5RO	5
WØUC/9	165	K3ZO	294	K2SMN	66	W3HMU	81	KA2WKA	14	KF6AJ	26	WA2FGK (K2LNS,op)	5
WB8IGY	165	K2TXB	282	WA3AQA	65	KF6AJ	80	WB2JHG	14	WA2TEO	26	WA3ETD	4
K3ZO	164	WB2JLR	269	WA1HYN	64	WB3DNI	79	KF6AJ	13	WA3YUE	25	W1GCI	4
NW5E/3	163	K3ONW	259	K3LOM	62	WA3YUE	76	K3GYS	13	KD5RO	24	W1RIL	4
WB2LRU	161	VE3ASO	254			WA3JUF	76			WB2YZV	24		
										N2GHR	24		

(KK4NO). It was very slow going. No activity at all Sunday morning and afternoon (WD4AHZ). Thanks to WB5VZL and KB5CUS for activating so many grids! (N5WS). I'm going to a higher mountain next year! (WB2ODH/6). The 6-meter band was the worst we have ever seen. The aurora shut down most of the long-haul stuff all weekend (NU7Z). Ice conditions hampered the contest here. The aurora Sunday night was a welcome addition (WA8R). The aurora sure makes a dull contest start to hop in a hurry! (WB9MSV). The first time I have ever heard aurora. I didn't know what was going on at first (N8HWK). I smoked my 1296-MHz transverter. No contacts on that band (K9VGE). The first VHF contest for me. Everyone very friendly, but expected more activity (KØSRL). Where were all the openings? It was cold and lonely on that North Dakota hilltop (KA9IZP). Wow! The aurora on Sunday night was phenomenal (VE3VET). All QSOs, except for one, were made via aurora (VE5UF).

QSO Leaders By Band

Multioperator

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz	
WC2K	326	WC2K	578	WC2K	181	KA1ZE	233	WC2K	43	WC2K	60	WA3AXV	24
KA1ZE	317	KA1ZE	547	KA1ZE	155	WC2K	206	WA3AXV	33	WA3AXV	60	WC2K	22
K1TR	271	WC2F	493	WA3AXV	146	WA3AXV	156	WC2F	25	WB0DRL	35	W2SZ	13
W2SZ	252	W2SZ	442	W1NY	110	WC2F	121	KA1ZE	24	KA1ZE	32	W3KKN	13
WB3CZG	240	W1NY	439	W2SZ	109	K1TR	113	N2WK	21	W2SZ	31	VE3LNX	8
WA3AXV	211	K1TR	404	W3KKN	104	N2WK	109	W2SZ	21	W3KKN	28	WB3CZG	7
NA2O	202	WA3AXV	358	W2MMD	102	W1XX	108	VE3LNX	16	K1TR	23	N2WK	3
VE3LNX	200	W1XX	355	K1TR	100	W2SZ	103	W1XX	13	WC2F	22	KW2T	3
W3KWH	190	VE3LNX	345	WB3CZG	93	NM8X	85	K1TR	12	N2WK	22	WB2PSI	2
W3KKN	186	WB3CZG	324	N2WK	89	WB3CZG	83	WB3CZG	12	W3KWH	22	NU7Z	2
N4EQT	180	N3ADC	323	WB2PSI	82	W3KWH	74	W3KWH	11	W1XX	21	W3KWH	1
W1NY	173	MNM8X	313	WC2F	80	WB2PSI	70	KW2T	10	WB3CZG	20		
N2WK	167	W3KWH	310	W3KWH	63	W1NY	66	WB2PSI	8	VE3LNX	18		
N2HZW	167	N2WK	283	WB6LRV	63	WB0DRL	66	NA2O	7	N3ADC	15		
W1XX	154	N2WM	237	KW2T	59	N2HZW	64	NM8X	6	WB2PSI	12		
WB2PSI	146	N2HZW	229	W1XX	57	WB3LNZ	61	N2WM	6	N2WM	12		
WA8DQR	141	WB2PSI	226	NA2O	57	NA2O	60	WB0DRL	3	NU7Z	11		
KW2T	132	KW2T	204	NM8X	54	VE3LNX	56	NU7Z	2	NA2O	10		
KA1WX	129	W2MMD	194	K1CPJ	49	N2IKB	56	KX0O	1	KW2T	8		
W2MMD	128	WA3FOF	186	VE3LNX	44	W3KKN	55	WB5VYE	1	KX0O	8		
				N2WM	44								

Multiplier Leaders By Band

Single Operator

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz	
W9OEH	96	N8DEJ	69	WA2TEO	35	K1FO	55	KD5RO	12	N0LL	16	KD5RO	5
W0UC/9	79	WA3HMK	66	NN9K	33	K2UYH	40	K2SMN	8	K2UYH	15	WB3DNI	3
WA1TRE	69	WB9MSV	62	WA2TMC	28	K5UR	33	WB2JLR	7	KD5RO	14	WA3NUF	3
VE3RM	64	K3ONW	62	K8DIO	26	K2OS	33	WA2FGK	6	WD5AGO	14	WA3JUF	3
WB8IGY	63	N3EAX	61	KD5RO	26	N5WS	30	(K2LNS,op)		WA4VHF	12	WB1FKF	3
KB8ZW	61	K9VGE	60	WA2TIF	26	WA2FGK	29	N3CX	6	W3IP	11	WA2FGK	3
WA2BPE	56	WA4VWV	60	W1GCI	25	(K2LNS,op)		KB8ZW	5	WA2TEO	11	(K2LNS,op)	
W3EP/1	55	WB8IGY	59	K2SMN	24	K2TXB	29	KB3QM	5	K2SMN	10	W1RIL	3
N2CEI	55	WA2FGK	59	N2CEI	24	K8DIO	28	WA3NUF	5	WA3NUF	10	WB2YEH	2
K1RZ	54	(K2LNS,op)		N2BJ	23	W9IP/2	28	W1GCI	5	K2GAL	10	WB3JYO	2
W9IP/2	54	K3NXH	59	KB8JI	23	KB8ZW	28	K2UOP/4	5	K1FO	10	N3CX	2
K3ZO	53	K2GAL	58	K1LPS	23	WB3ESS	27	KF6AJ	5	N2GHR	10	WA3YUE	2
VE3ASO	51	WA8TJL	57	K9VGE	22	K2GAL	27	W0RSJ	5	KB3QM	9	N3AOG	2
VE3DDW	50	WB0YWW	57	WB0WAO/8	22	WB9MSV	26	N3BBI	5	N2BJ	9	W0RSJ	2
WB2LRU	50	AA9D	57	WA3NUF	22	WB4SLM	26	WA1MBA	5	WA2FGK	8	AK3O	2
KC2GZ	48	K3ZO	56	VE3ASO	21	WB0YWW	26	WB1FKF	5	(K2LNS,op)		W2EIF	2
WA2TEO	47	VE3ASO	56	W0UC/9	21	K2SMN	25	NI1W	5	WA3JUF	8	K3BPP	2
WA8HPY	47	KA2RDO	54	W3ZZ	21	N0LL	25	WB3JYO	5	K2TXB	8	NI1W	2
WA4NJP	46	WB2QOQ	54	WA1HYN	21	W3ZZ	24	W1RIL	5	W6CPL	8	WA3ETD	2
		VE3PCW	54			N3CX	24	VE3ASO	5	WB9MSV	8	W1JR	2
		WB0SWD	54			W3TMZ	24			K1RZ	8	WA1MBA	2
												WA7PXD (DN30)	2
												W3VIR	2
												WA4GPM	2

Multiplier Leaders By Band

Multioperator

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz	
W2SZ	75	NM8X	74	WC2F	41	KA1ZE	46	WC2K	14	WB0DRL	30	W2SZ	7
N4EQT	71	WB0DRL	71	W3KWH	38	WB0DRL	42	N2WK	13	W3KWH	17	WB3CZG	6
WC2K	69	VE3LNX	70	KA1ZE	37	WC2K	41	KA1ZE	12	WC2K	15	WA3AXV	4
W8BI	63	W3KWH	68	WB3CZG	36	NM8X	34	W2SZ	12	W2SZ	15	WC2K	4
WB3CZG	62	W2SZ	65	W2SZ	31	W3KWH	31	W3KWH	10	WA3AXV	14	VE3LNX	4
K1TR	60	WC2K	60	N2WK	31	W2SZ	31	WA3AXV	10	KA1ZE	13	N2WK	3
VE3LNX	59	KA1ZE	60	W1NY	31	N2WK	29	WC2F	10	N2WK	11	W3KKN	2
KA1ZE	58	N2WK	60	NM8X	30	WB3CZG	28	VE3LNX	10	W1XX	10	KW2T	2
WB0DRL	55	WB3CZG	57	W1XX	30	W1XX	27	WB3CZG	8	VE3LNX	9	WB2PSI	2
W3KWH	52	W1NY	56	NA2O	30	K1TR	25	NM8X	6	WB3CZG	9	NU7Z	1
NA2O	52	K1TR	54	K1TR	29	WA3AXV	25	K1TR	6	K1TR	9	W3KWH	1
MM8X	52	WC2F	54	WA3AXV	29	WC2F	24	KW2T	6	WC2F	8		
WB2PSI	48	K0DD	52	WC2F	28	VE3LNX	22	W1XX	5	WB2PSI	6		
N2WK	47	W1XX	51	KW2T	28	WB2PSI	18	WB2PSI	4	KX0O	6		
K4LVV	47	N4EQT	49	WB0DRL	27	W4IY	17	N2WM	4	W3KKN	6		
W1XX	45	W8BI	47	WB2PSI	26	W1NY	16	WB0DRL	3	N2WM	4		
K0DD	45	N2WM	46	VE3LNX	25	NA2O	16	NA2O	3	NA2O	4		
KW2T	43	VE3OLN	46	N4EQT	23	K4LVV	16	WB5VYE	1	W4IY	4		
WA8DQR	42	W0RPK	41	W3KKN	22	W0RPK	15	KX0O	1	K4LVV	4		
WA3AXV	41	K4LVV	40	N4VC	16			NU7Z	1				
W1NY	41												

Scores

Each line score lists call, QSOs, multipliers, bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; 9 = 902 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign indicates a QRP-portable station; an (N) after the call indicates a Novice. Band winners are printed in the bold type.

1

Connecticut

WA2TEO 172,095- 777-165-ABCDE
KF6AJ 85,860- 542-108-ABCD9E
WA1VRH 51,552- 508- 96-ABD
W3EPI/1 37,620- 384- 90-ABD
K1FO 35,100- 243- 65-DE
W1QK 19,400- 388- 50-B
K1DH 11,128- 204- 52-ABC
N1EA 8,760- 219- 40-AB
AB1U 8,400- 117- 50-BCD9E
WB1BXS 7,600- 304- 25-B
K1VYU 5,394- 174- 31-B
W1NU 4,061- 98- 31-ABDE
W1FAJ 3,395- 78- 35-ABCD
WA2SPO/1 3,072- 128- 24-AB
W1WHL 2,730- 91- 30-A
WA1GTP 2,349- 72- 29-ABC
AA2Z 1,927- 114- 41-ABCD9E
N1ABY 1,919- 101- 19-A
WB3IJO 1,760- 88- 20-B
KH6CP/1 1,311- 51- 19-ABCD9E
K1WVX 936- 72- 13-B
WA1NYU 818- 93- 6-BD
K1CYD (FN31) 249- 83- 3-B
*NJ2L 120- 17- 6-BD
N1AEH 86- 43- 2-B
KA1NXI 36- 9- 4-B
NI1L 36- 12- 3-B
KA1ZE (+N1DPM,NC1I,WA1UQC,WB1FVS) 421,264-1308-226-ABCD9E
KA1QAS (+K1CPJ,KA1QAR,NR1L) 7,232- 184- 32-ABCD
K1CPJ (KA1QAS,N1FEN,NR1L,ops) 6,496- 147- 29-ABCD
KA1QAR (+K1CPJ,KA1QAS) 216- 27- 4-C

Eastern Massachusetts

WB1FKF 24,684- 178- 68-ABCD9EFG
KX1C 10,653- 168- 53-ABCD
W1GXT 6,450- 122- 43-AC
K1DAT 5,066- 149- 34-A
K1TQ 4,636- 108- 38-ABCD
K1VZI 4,147- 102- 29-ABCDE
WA1LBK 4,123- 110- 31-ABD
KB1KM 4,088- 115- 28-ABCD
W1JR 3,396- 43- 36-ABCD9EF
AA1O 2,781- 103- 27-B
WA1NQV 1,540- 55- 28-AB
N1EWB 1,152- 48- 16-BCDE
W1ZNY 944- 59- 16-B
NQ1X 756- 54- 14-B
WA1CRE 532- 37- 14-ABC
KA1AMR 390- 30- 13-AB
K1DS (FN42) 15- 5- 3-B
W1XX (+K1s GX,JX,WB1AVA) 163,800- 708-168-ABCD9E

Maine

W3HQT 19,360- 190- 80-ABCDE
WA1TRE 16,422- 238- 69-A

New Hampshire

WA1YHO 34,710- 354- 78-ABCD
NI1W 30,375- 232- 75-ABCD9EFL
AC1J 23,270- 268- 65-ABCDE
K1KA 9,266- 226- 41-B
W1ENE 5,760- 180- 32-B
W1JSM 2,350- 87- 25-BD
WA1NIE 2,001- 81- 23-BD
WA3ETD 1,464- 32- 12-B9EFI
N1DNC 224- 26- 8-BD
KC1LW 140- 16- 7-BC
*KA1LMR 65- 11- 5-ABCD
N1FIL 52- 9- 4-BC
K1TR (+K1s AR,BA,DG,EA,N1AFQ,NR1E, WA1PBU,K3WM,KM3T) 227,103- 923-183-ABCD9E
KC1HH (+N1FJF) 672- 56- 12-B

Rhode Island

WA1HYN 24,320- 258- 64-BCD
W1EYH (K1DS,op) 1,121- 45- 19-ABCD
K1DS (FN41) 168- 21- 8-AB
KA1WX (+K1IKN,KA1MFA) 21,508- 261- 76-ABD
W1AQ (K1s AGA,CH,JI,KM1X,NO1U, WA1VPC,WA2KFE,ops) 7,080- 170- 40-ABD

Vermont

W1AIM 12,264- 147- 73-ABCD
K1LPS 8,357- 97- 61-ABCD
KB1EM (+WA1s HAH,GXR,TMZ,ZPI,W2MCF) 5,250- 175- 30-AB

Western Massachusetts

W1GGI 99,528- 518-132-ABCD9EF
WA2TIF 28,420- 295- 70-BCD
KA1KRJ 16,040- 401- 40-B
K1ISW 14,176- 227- 46-ABCDE
NO1C 12,636- 276- 39-ABCD
W1RIL 12,032- 98- 64-ABCD9EF
WA1MBA 11,172- 136- 42-BD9EF
WB1ETS 9,435- 209- 37-ABCD
KA1MPS 6,048- 150- 32-ABCD
WB1FIP 5,208- 140- 31-ABCD
W1JP 3,322- 151- 22-AB
NA1W 2,224- 94- 16-BDE
W1UWX 2,100- 110- 14-BCD
N1DOP 2,100- 125- 14-BC
N1ABJ 2,010- 116- 15-BC
WA3EEC 1,692- 94- 18-AB
N1PF 1,581- 82- 17-ABD
WA1JUJ 1,300- 100- 13-B
W1CJK 1,260- 110- 10-BC
WA1ZUH 1,236- 103- 12-B
N1DJB 1,040- 52- 20-AB
W1NMQ 1,007- 47- 19-ABCD
K1NWE 968- 88- 11-B
K1BXE 768- 69- 8-BCD
K1JG 564- 47- 12-B
WB1APD 550- 50- 11-B
K1JDL 420- 105- 4-B
KA1JWG 402- 49- 6-BCD
W1DGJ 344- 86- 4-B
N1FUS 280- 56- 5-B
AC1T 252- 54- 4-BD
KB1MU 249- 83- 3-B
K1MAL 246- 82- 3-B
WB1FIQ 225- 35- 5-BC
KA1MEW 216- 36- 6-B
K1BE 188- 39- 4-BD
WB1DLH 180- 60- 3-B
WA1HFF 180- 27- 5-BD
NC1B 160- 36- 4-BD
WA1ALL 156- 52- 3-B
KA1DTR 120- 30- 3-C
WA1YYK 116- 58- 2-B
KB1TH 110- 55- 2-B
W1MM 92- 46- 2-B
KA1ONV 64- 16- 2-C
K1CYD (FN32) 62- 31- 2-B
WA1PGT 60- 19- 3-BD
N1CQT 40- 20- 2-B
W1NY (AC1T,K1s BE CYD KA1KPH,N1AEH, NC1B,NO1Z,W1KK,ops) 138,816- 788-144-ABCD

2

Eastern New York

N2BJ 125,488- 690-124-ABCD9E
K2CBA 22,908- 236- 83-ABCDE
WA2BAH 13,764- 191- 62-ABCD
WA2MJP 8,946- 219- 42-B
W2XL 8,008- 163- 44-ABD
WA2ALV 3,906- 107- 31-ABD
KD2IX 3,600- 150- 24-B
W82WHD 3,536- 115- 26-BCD
W2AWF 1,888- 59- 32-B
KG2H 1,674- 62- 27-B
WB2IQ 1,102- 58- 19-AB
K2MME 880- 42- 16-ABD
WA2EHI 615- 38- 15-BD
WA2RUW 572- 29- 11-BC
KU2Q 408- 34- 12-AB
K5NA 264- 22- 12-AB
KB2EEU 105- 15- 7-AB
KB2DYB 50- 8- 5-BCD
WA2ZNO 24- 4- 4-ABCD
KA2IBV 24- 8- 3-B
W2SZ (WA1ZMS,K2TR,KA2FWN,KB2FDR,N2s DCM,DU,GXH,HPA,HUC,WA2AAU, WB2KMY KA3TXG,N3GIA,ops) 349,418- 975- 24-ABCD9EFG
WA2FUZ (+KB2EMV,N2EUT,WB2UYR) 21,904- 241- 74-ABCD
WD2V (+KB2GHW,N2HWV,WA2ZNU) 175- 25- 7-AB

NYC-Long Island

WB2YZV 33,655- 230- 57-ABCDE
N2GHR 19,776- 274- 48-BDE
N2GAZ 17,458- 213- 58-ABD9E
WA2ODO 13,803- 321- 43-B
WB2CMI 13,152- 266- 48-ABD
WA2SLY 6,364- 172- 37-AB
WB2ZSY 5,697- 211- 27-B
WA2EIO 3,850- 125- 25-BD
N2FXE 1,512- 108- 14-B
KA2CKV 1,500- 100- 15-B
WA2EUS 1,157- 41- 13-BDE
N2GGB 742- 53- 7-D
WA2YEI 612- 51- 12-AB
N2HZW (+KB2FDZ,WB2OHP) 38,252- 460- 73-ABD
N2GZD (+KB2BUY,NY2BI) 2,850- 150- 19-B

Northern New Jersey

N2CEI 89,680- 650-118-ABC
K2GWR 71,369- 479-107-ABCDE
WB2QGQ 20,088- 372- 54-B
WA2UDT 18,228- 250- 62-ABCD
WA2CWA 8,643- 201- 43-A
N2BMN 6,409- 221- 29-AB
N3AHF 5,730- 191- 30-B
KA2IVS 5,724- 212- 27-B
K4BNC 5,652- 119- 36-ABD
WB2FGZ 2,808- 117- 24-B
WA2IF 550- 50- 11-B
WB2ONA 324- 24- 9-B9E
*KA2JKI 196- 23- 7-AC
N2WM (+NV2D) 53,056- 429-112-ABCD9E

Southern New Jersey

K2SMN 147,659- 824-149-ABCD9E
K2GAL 81,158- 509-119-ABD9E
WB2YEH 74,022- 546- 73-ABCD9EF
K2TXB 66,908- 481- 86-BD9E
W2EIF 57,276- 438- 74-ABCD9EF
KA2WKA 56,212- 496- 86-ABCD9
K2YY 32,712- 416- 58-ABCDE
K2UYH 29,106- 206- 63-BCDE
W2PAU 27,430- 360- 66-ABD
W2HRW 24,633- 322- 69-ABD
WB2JHG 20,808- 227- 51-BCD9E
K3GYS 17,056- 295- 41-ABCD9E
WA2ONK 12,950- 269- 37-BD9
WB2VLA 5,229- 178- 21-ABCD
W2EA 5,022- 188- 27-ABD
W2EKB 4,898- 202- 23-ABCD
KA2KFO 3,074- 122- 17-B
W3NSI 2,071- 94- 19-BCD
KS2T 1,600- 100- 16-A
WA2WJL 1,404- 117- 12-B
W2BLV 988- 38- 26-B
W2FGY 621- 69- 9-B
W2GGB 608- 123- 4-BC
N2BCF 216- 54- 4-B
W2SPV 145- 29- 5-B
N2AWC 80- 40- 2-B
W5KI 48- 24- 2-B
N2CQ 30- 15- 2-B
WC2K (+N2s ASC,SB,WA2VYA,WB2RVX, WB8ZAR) 557,130-1417-245-ABCD9EFG
WC2F (KA2VAO,KC2TA,KX2O,KY2T,N2HOX, N3GEX) 165,288- 822-142-ABCD9E
W2MMD (KN2W,N2s AIV HZM,W2GSN WB2CAK ops) 29,952- 473- 48-ABCD

Western New York

KD5RQ 110,856- 420-149-ABCD9EFGI
W9IP/2 74,936- 387-152-ABCDE
WA2IMG 62,068- 373-118-ABCD9EF
K2OS 40,180- 347- 82-ABDE
WB2JLR 38,136- 374- 84-ABCD9E
WB2ELB 31,185- 304- 81-ABCD
NM2J 31,040- 309- 80-ABCD
KA2RDO 30,411- 327- 93-AB
K2AN 28,341- 330- 67-ABCD
WA2ZNC 25,690- 304- 70-ABCDE
WA2BPE 23,848- 271- 68-AB
KC2GZ 23,718- 327- 67-ABD
N2HXJ 21,831- 302- 57-ABCD
WB2KIW 18,200- 267- 56-ABCD
K2SPO 17,990- 223- 70-ABD
W2CNS 15,795- 243- 65-AB
K2GK 13,632- 150- 64-ABCDE
AF2K 12,792- 282- 41-ABD
KA2ENE 12,642- 255- 42-ABD
K2MPE 11,032- 183- 56-ABD
K3MP 8,372- 160- 52-ABD
W2ONP 8,352- 174- 48-AB
KU2A 8,201- 103- 59-ABCD9
WB2LRU 8,050- 161- 50-A
W2HPF 7,544- 184- 41-B
WB2JFL 7,000- 200- 35-AB
N2DKP 6,936- 192- 34-ABD
K2KWK 6,764- 169- 38-BC
W2VVG 6,405- 183- 35-AB
WA2MSA 5,824- 199- 28-ABD
WA2FTK 4,896- 131- 34-BD
W2UAD 4,225- 169- 25-B
W2WGL 4,080- 102- 40-B
W2HG 4,060- 116- 35-BD
N2GDD 3,960- 146- 24-ABD
KD2TJ 3,537- 131- 27-AB
KA2J 3,536- 172- 16-ABCD
WB2SUN 3,497- 200- 18-BCD
K2JA 3,009- 154- 17-ABD
W2EQW 3,006- 157- 18-ABD
WA2YPT 2,958- 151- 17-ABD
KA2JRK 2,754- 138- 17-BD
WA2CBU 2,210- 130- 17-B
WB2FNF 2,130- 118- 15-ABCD
WA2URE 1,726- 114- 15-ABD
N2HJD 1,710- 82- 16-BCD
WB2WBT 1,650- 50- 33-AB
N2HKO (FN13) 1,440- 121- 9-BD
KB2CHV 1,272- 138- 8-BD
WB2EKP 1,216- 134- 8-BD
K1JUL (FN13) 1,206- 102- 9-BD
KD2KO 1,190- 170- 7-B
KA2KFV 1,144- 79- 11-ABD
KB2WN (FN13) 1,064- 99- 8-BD
N2JC 970- 90- 10-BD
WB2MKN 870- 52- 10-ACD
WA2MYG 864- 65- 8-BCD
K1JUL (FN12) 735- 82- 7-BD
KA2QNT 690- 115- 6-B
KE2DI 672- 84- 8-B
WB2UTX 640- 50- 10-ABD
N2HKD (FN12) 624- 82- 6-BD
KB2SE 600- 100- 6-B
KB2NU 595- 85- 7-B
KE2T 560- 52- 10-BC
NQ2O 540- 54- 6-AD
N2BKS 512- 32- 16-B
N2EZS 504- 75- 6-BCD
N2EVG 480- 96- 5-B
K2TDZ 480- 48- 10-B
W2DHV 425- 85- 5-B
KD2LZ 371- 50- 7-BC
WA2NFY 360- 90- 4-B
KM2P 352- 88- 4-B
K1JUL (FN03) 343- 35- 7-BD
KE2DI (FN13) 332- 83- 4-B
*KE2DI (FN12) 312- 39- 8-B
W2PHT 304- 76- 4-B
N2HKD (FN03) 276- 34- 6-BD
KA2AAP/N 224- 28- 4-C
N2IDM 210- 42- 5-B
N2BUL 180- 45- 4-B
N2IJH 174- 58- 3-B
KA2YEJ 171- 57- 3-B
WA2UKX 168- 28- 6-B
KB2WN (FN12) 164- 41- 4-B
WB2YJH 160- 40- 4-AB
KJ2P 93- 31- 3-B
KA2PJN/N 72- 12- 3-C
K1JUL (FN02) 24- 8- 3-B
N2HKD (FN02) 21- 7- 3-B
K2ANC 20- 20- 1-B
KB6CSP 18- 9- 2-B
WA2YTM 8- 1- 1-I
KA2QCV 2- 1- 1-C
N2WK (+KA2s HSK,PXZ,KB2SE,NQ2O, WA2s LAQ,MOP,SHN,WB2MKN) 202,148- 694-194-ABCD9EF
WB2PSI (+K2s OEO,SPO,KA1AVC,KD2OM, KE2CP,N2s AJX,AJY,EZY,W2AV,WA2s OMZ,ZKD,ZQN,WB2s KAO,QCJ) 110,396- 546-143-ABCD9EF
NA2O (+KA2ZYE,KD2YB,WB3JSU) 91,494- 481-138-ABCD9EI
KW2I (+WA2YTM,WB2EIY) 80,518- 458-127-ABCD9E
N2UG (+KB2I,N2s BHL,CMF,JJI) 6,380- 184- 29-ABCD
K3JD (+KA2PJN,NS9E,NV2Y) 4,446- 192- 18-ABCD
WB2WXQ (+KA2s GPJ,KFV,KB2AUD) 1,958- 138- 11-BD

3

Delaware

KB3QM 102,080- 522-135-ABCD9E
AC3T (KA3B op) 8,103- 219- 37-A
KC3BC 1,352- 104- 13-B

Eastern Pennsylvania

WA2FGK (K2LNS,op) 147,154- 629-162-ABCD9EF
WA3NUF 118,992- 603-111-ABCD9EF
N3BBI 76,291- 497-107-ABCD9E
WA3YUE 72,228- 539- 78-ABCDEF
WA3JUF 55,400- 427- 75-ABCD9EFG
WB3JYO 51,479- 452- 69-ABCD9EF
W3RSJ 42,712- 300- 76-ABCD9EF
N3EAX 42,394- 408- 94-ABD
WB3DNI 42,168- 380- 58-ABCDEF
K3LOM 37,960- 443- 66-ABCD
N3CX 35,392- 228- 56-BCD9EF
W3IIT 33,856- 415- 64-ABCD
K3IUV 32,065- 375- 53-ABCDE
AK3O 28,557- 310- 57-ABCD9EF
KB3HE 26,571- 372- 51-ABCD9
WA3HMK 24,882- 377- 66-B
KB3IB 24,584- 287- 56-ABCD9E
KB3NQ 19,943- 357- 49-ABD
N3AOG 18,620- 300- 35-ABCDEF
W3HMU 18,368- 321- 41-ABCD
W3CL 18,278- 344- 37-ABCD
KZ3X 17,629- 237- 61-ABD
WA3AQA 17,346- 309- 42-ABCD
K3ONW 16,056- 259- 62-B
N3EXA 14,700- 340- 35-ABCD
K3DMA 14,212- 303- 34-ABCD
K3BPP 13,767- 200- 39-ABCDEF
KY3T 12,495- 262- 55-BCD
KB3KG 12,036- 261- 34-ABCD
WB3IGR 12,000- 293- 30-ABCD
W3CXU 11,736- 184- 38-ABCDE
WB3EPU 10,956- 279- 33-BC
N3FUJ 8,878- 318- 23-BC
K3EBZ 8,636- 251- 34-ABD
K3ACR 8,468- 232- 29-ABC
WB3ESS 7,854- 113- 33-CDF
K3OQ 6,601- 210- 23-ABCD
KA2TVA 6,160- 133- 35-ABCD
KA3EEO 5,880- 87- 49-ABCDE
W3UBO 5,760- 164- 30-ABD
WA3NWL 5,600- 132- 25-BDE
W3GAD 5,214- 237- 22-B
W3HK 4,860- 178- 20-ABCD
KA3QYH 4,840- 182- 20-ABCD
WA3IAC 4,736- 197- 16-BCD9
W3HFY 4,168- 125- 21-ABCD9E
K3GAS 3,800- 153- 19-ABCDE
WA3IWT 3,132- 97- 18-ABCDF
W3BRU 3,128- 184- 17-B
K3RTU 2,565- 125- 19-ABD
KU3A 2,520- 109- 20-ABD
W3VIR 2,346- 72- 23-ABD9F
K3PHY 1,782- 122- 9-BC
K3ARR 1,664- 64- 26-A
K3LYB 1,599- 123- 13-A
WA3TSW 1,551- 93- 11-BCD
W3AWA (WA3KFT,op) 1,352- 91- 13-ABC
N3EMQ 1,298- 118- 11-AB
W3JS 1,220- 122- 10-B
N3ELS 1,215- 135- 9-B
KC3ZG 1,106- 88- 14-BD
KA3OXN 1,072- 89- 8-ABCD
WA3ADI 900- 81- 9-ABCD
WA3NUG 804- 67- 12-AB
WA3VFM 768- 83- 8-BC
KD3DI 637- 91- 7-B
WA3JMM 590- 82- 8-ABC
WB3HHO 588- 104- 4-BC
*WA3YYC 528- 44- 12-AB
WA3HIT 476- 78- 4-BC
N3AHP 424- 47- 9-ABC
WD9EOD 408- 73- 4-BC
N3FZH 360- 55- 4-BC
WB3KNU 310- 42- 5-ABC
KA3LCF 300- 50- 6-B
KC3LM 238- 34- 7-B
WA3NBS 224- 24- 8-ABC
N3BPJ 213- 71- 3-AB
K3DLS 208- 52- 2-C
W3DCT 130- 65- 2-B
KA1CLH 124- 28- 4-BD
W3MJR 108- 54- 2-B
KA3QBB 102- 51- 2-B
K3VEQ 80- 20- 4-AB
K3GZT 76- 16- 4-ABC
W3RCL 74- 37- 2-B
*K1CHY/3 52- 26- 2-B
N3GNW 52- 26- 2-B
WD0ESL 48- 16- 3-B
WA3NAO 30- 15- 2-AB
KA3AFY 27- 9- 3-A
W3TDZ 14- 7- 2-B
KA3KSD (FN10) 9- 3- 3-B
KA3KSD (FN20) 3- 3- 1-B
WB3CZG (+K3MKZ,N2HR,NA2T, WA1MKE,WA3YON,WB3s FAA,IWZ) 301,032- 811-222-ABCD9EFGHIJ
WA3AXV (+WB3KRW) 287,492- 990-184-ABCD9EFG
W3KKN (+W3ZD) 91,464- 554-103-ABCDEF
N3ADC (+KA2WMQ,K2OJL) 38,254- 491- 62-ABCDE
N2IKB (+KA2WFS) 17,616- 295- 48-ABCD
WB3LNZ (+KB3ZSI) 16,514- 273- 46-ABCD
WA3FOF (+K3s DLS,HWI) 9,380- 282- 30-ABC
W3H7U (K3GDI,KA3ATH,KT3A,N3s GKP,GLN, W3s AXC,HMS,SST,WA3USG,WB3AWJ ops) 9,212- 173- 49-ABD

Maryland-DC

W3IP 93,726- 508-127-ABCD9E
NW5E/3 68,154- 504-111-ABCDE
K3ZO 49,922- 458-109-AB
W1ZZ 46,725- 315-105-ABCDE
WB2ONE 35,600- 331- 88-ABD
K1RZ 28,364- 238- 78-ADE
K3NXH 20,768- 352- 59-B
K3AKR 9,790- 146- 55-ABCD
W3IFM 8,975- 155- 45-A
W3GN 6,164- 123- 46-ABD
W3TMZ 4,620- 82- 35-ABD
WB2TNL 4,495- 121- 31-BD
W6AXX 2,592- 108- 24-B
WA4VHF 1,920- 40- 12-E
N3EOD 1,568- 98- 16-B
N3EUC 1,411- 53- 17-B
KA3POP 1,386- 77- 18-B
N3EOB 1,120- 70- 16-B
N3FHD 630- 63- 10-B
W3MSN 528- 41- 11-ABD
WA3FAE 408- 34- 12-B
KA3CXG 360- 30- 12-B
WA3GYW 348- 29- 12-AB
K3YDX 253- 23- 11-B
W3DCN 252- 36- 7-B
WA3LKT 225- 25- 9-A
W3XE 105- 21- 5-B

Western Pennsylvania

KA3RWP 9,381- 177- 53-B
W3GXB 6,069- 200- 21-BC9
W3KJM 900- 50- 18-A

AF1T/3 144- 16- 9-AB
KA3TRP/N 60- 15- 2-C
KA3KSD (FN00) * 3- 3-B
W3KWH (KA3KSD,N3EQP,W3SVJ,WA3YFYJ, TTS,WB3EML) 208,925- 676-219-ABCD9EFHI

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Alabama

WA4EWA 5,098- 88- 49-**ABD**
N5AYD 1,425- 46- 25-ABCD
N4AHJ 70- 14- 5-A
WA4VUG 30- 10- 3-B

Georgia

WA4NJP 36,630- 245-111-**ABCDEI**
WB4SLM 36,408- 230-111-**ABCDE**
WS4F 19,440- 160- 80-ABCD**9E**
K4CKS 12,354- 145- 71-ABCD
N3AHI 2,580- 65- 37-AC
WD4MBK 1,512- 42- 18-D
WB4NMA 1,071- 49- 21-AC
W1JA 260- 26- 10-A

Kentucky

KK4BD 5,520- 120- 46-**B**
AA4FQ 5,162- 62- 56-**ABD**
N4EQT (+ KA4SSB,W8UC,WF8Z) 60,150- 360-150-ABCD

North Carolina

KB4XK 13,072- 141- 76-**ABCD**
N2CJP 2,772- 73- 33-ABCD
AB4JA 700- 35- 20-B
K4LVV (+ AA4s SC ZZ,K4MCG,KS4S,WA4sUNZ,VCC,WB4s PCS,TLX,W7W4T) 52,756- 356-121-ABCDE

Northern Florida

WA4JNE 912- 42- 19-**ABD**
W4NVV 380- 29- 12-**A**
WB5MAC/4 4- 2- 2-B

South Carolina

WQ4V 26,093- 182- 97-**ABCDE**
KK4NO 13,530- 143- 68-ABCDE
WA4LDU 3,562- 77- 37-ABCD
N4OBF 714- 34- 21-B
N4NFR 252- 18- 14-B

Southern Florida

WD4MGB 3,264- 84- 31-**ABD**
WD4AHZ 1,482- 60- 19-BD
K1FJM/4 1,062- 48- 18-**ABCD**
K5RY 952- 46- 17-ABD
W4FF 768- 54- 14-**B**
*K2OVS/4 5- 5- 1-A

Tennessee

WB4JGG 18,675- 205- 83-**ABD**
W2GU 17,172- 146- 81-**ABCDE**
KC4YO 6,174- 126- 49-**B**
KF4FL 2,924- 70- 34-ABD
N4VC (+ WB4KNF) 17,112- 150- 93-ABCD

Virginia

K2UOP/4 61,560- 343-120-**ABCD9E**
N4HB 13,600- 172- 68-ABCD
W4DQ 12,540- 175- 57-ABCD
K9QYD/4 8,694- 135- 54-BD
K4FTO 6,670- 128- 46-ABD
WD8BYA/4 4,704- 147- 32-**B**
KB4NFY 3,196- 84- 34-B
N4MM 2,079- 64- 27-ABD
ND1V 912- 48- 19-B
N4BG 903- 39- 21-BD
WA4SBC 630- 26- 18-ABCD
KB4VIR 242- 22- 11-AB
WA4MMP 6- 3- 3-B
W4IY (K4HWG,KA4CKI,K8RI,ops) 27,141- 244- 83-ABCDE
NS3T (+ WB2KQG) 135- 27- 5-AB

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Arkansas

K5UR 55,356- 277-150-**ABCDE**
WB5IGF 2,990- 52- 35-ABDE

Louisiana

WB5NAA 11,814- 150- 66-**ABD**
W5FYZ 3,955- 113- 35-**B**
N5KWB 1,950- 61- 30-BC
N5NHZ 1,482- 57- 26-B
WD5EJU 1,210- 55- 22-B
WA5UFH 192- 16- 12-A

Mississippi

W5RCI 12,719- 106- 79-**ABCDEF**
N5JYX 7,808- 98- 64-**ABCD**

New Mexico

N5JHV 2,436- 58- 42-**AB**
W5FF 2,220- 60- 37-AB
KA5EBL 1,260- 41- 28-**ABD**
WS1XR 260- 22- 10-**ABC**
KN5S 110- 11- 10-AB
WB5AOX 84- 21- 4-B

North Texas

K9MK/5 30,780- 269- 81-**ABD9E**
N5WS 21,581- 195- 73-**BDE**
AA5AM 11,977- 163- 59-**ABCD**
*WD5K 950- 50- 19-A
WB5VZL (EM04) 306- 18- 14-ABD
WB5VZL (EM13) 63- 8- 7-ABD
WB5VZL (EM12) 45- 7- 5-ABD

Oklahoma

WD5AGO 11,781- 107- 63-**ABDE**
K5SW 10,944- 122- 72-**ABCD**
W5UGO 4,400- 88- 40-BD
AA5DS 1,769- 61- 29-B
WB5VZL (EM14) 135- 12- 9-BD
WB5VZL (EM05) 30- 5- 5-BD
N5NDV (+ W5NZS) 3,854- 73- 41-ABCD
NO0Y (EM06)(+ KF0M) 240- 11- 10-BDE
NO0Y (EM16)(+ KF0M) 70- 7- 5-BDE

South Texas

N5HHS 21,920- 231- 80-**ABCD**
WB5OBS 14,640- 182- 61-**ABCDE**
W5OZI 1,576- 43- 32-AB
WB5VZL (EM01) 416- 21- 16-ABD
WB5VZL (EM00) 28- 6- 4-ABD
WN4KKN/5 4- 2- 2-B
KE5CD (+ WB5NI) 7,567- 139- 47-ABD

West Texas

W8CM 6,160- 115- 60-**ABD**
WB5VZL (DM90) 288- 21- 12-ABD
WB5VZL (EM02) 260- 17- 13-ABD
WB5VZL (DM94) 160- 13- 10-BD
WB5VZL (DM91) 126- 13- 9-ABD
WB5VZL (EM03) 90- 13- 6-BD
WB5VZL (DM93) 60- 9- 6-ABD
WB5VZL (DM92) 48- 6- 6-ABD
WB5VZL (DM95) 30- 5- 5-ABD
WB5VYE (+ KB5ZH,WA5ZKO) 6,384- 105- 48-ABD9

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East Bay

WB6LRV (KB6OWL,WB6PFJ,ops) 11,873- 268- 31-ABCD

Los Angeles

W6CPL 19,776- 225- 48-**ABCD9EFI**
N6RMJ 7,120- 106- 40-**BDE**
WA6RAY 3,144- 101- 24-ABD
*WB2ODH/6 1,424- 89- 16-**B**
WB6JHC (WU6L,op) 1,092- 66- 13-BD
N6VI 884- 53- 14-ABCD
*NS6X (DM84) 70- 13- 5-ABC
W6PFE 35- 7- 5-AB
*NS6X (DM14) 20- 4- 4-ABC

Orange

WB6FCS 7,949- 130- 47-**ABCD**
N6NJI 4,760- 94- 40-ABCD
*NS6X (DM15) 2,576- 65- 28-**ABCDE**
W6GAJZ (DM13) 2,325- 77- 25-ABD
W6NGN 912- 76- 12-B
K6IBY 260- 17- 10-BC
N6QYQ 228- 38- 6-B
*NS6X (DM05) 78- 11- 6-BC
*NS6X (DM14) 8- 3- 2-BC
*NS6X (DM04) 4- 2- 2-B
K6UY (+ KA6CIA,KB6TMW,N6RUB,WA6BCN) 6,568- 157- 32-ABCD

Santa Barbara

K6HXW 884- 52- 17-**B**
WD6BCN 615- 35- 15-**ABD**
K6VMN 357- 43- 9-B

Santa Clara Valley

WA2YWP/6 3,726- 109- 27-**ABCD**
KB3LY 3,588- 110- 28-**ABCD**
KG6AO 952- 59- 14-ABC
WY6U 315- 39- 7-BC
WB6W (+ K3QM,KA6S,N6PHW,WA6s OCV,PWW) 6,168- 191- 24-ABCD

San Diego

*K6LMN 4,800- 112- 30-**ABCD9E**
WA6BNH 4,770- 104- 30-**BCDE**
W6OYJ 1,944- 53- 14-BCD9I
WB9AJZ (DM22) 888- 37- 16-BD
WB9AJZ (DM23) 432- 27- 12-BD
*KB6MEG 360- 24- 10-BC
KI6SG 264- 33- 7-BC
WB9AJZ (DM12) 40- 8- 5-B

San Joaquin Valley

N6MQK 3,040- 75- 32-**ABD**
WB6UYG 648- 36- 18-AB
WB6YIY 630- 45- 14-**AB**

Sacramento Valley

N6TIB 52- 13- 4-**B**
WA6IKE (+ WA6PTL) 10,222- 213- 38-ABCD

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Arizona

WB7OHF 144- 16- 9-**A**
NW7O (+ N7CFC) 936- 47- 17-ABD

Idaho

KC7IJ 70- 10- 7-**A**

Nevada

W7LQV 1,760- 64- 22-ABD
W7KYT 1,220- 55- 20-**ABD**
K7ICW 342- 19- 9-**D**

Oregon

KE7CX 6,372- 127- 34-**ABCDE**
N7DB 1,218- 54- 21-**ABCD**
W7UDM 508- 26- 11-ABCD
N6TY 190- 18- 10-ABD

Utah

WA4GPM 1,584- 40- 24-**ABDEF**
WA7PXD (DN30) 700- 23- 14-ABDEF
NJ7A 171- 19- 9-AB
WB7VLJ (DN40) 15- 5- 3-AB
WB7VLJ (DM49) 12- 4- 3-AB
WB7VLJ (DM39) 6- 3- 2-B
WA7PXD (DN40) 4- 1- 1-E

Washington

WA7VHW 1,809- 67- 27-**AB**
WB7UUP 1,800- 73- 20-**ABCDE**
W67ATP 168- 24- 7-B
W7IDZ 15- 5- 3-A
NU7Z (+ K7ND) 10,950- 239- 30-ABCD9EFIJ
N7COU (+ KA7ICT,N3EGI) 1,248- 62- 16-ABCDE

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Michigan

KU8P 20,833- 214- 83-**ABDE**
WB8WAO/8 20,398- 166- 94-**ABCD**
KB8JI 14,536- 141- 79-**ABCD**
N8DEJ 13,938- 202- 69-**B**
WB8CPW 6,968- 134- 52-B
WB8TGY 6,696- 103- 54-ABD
WB8AAX 6,564- 107- 52-B
N8FEH 4,680- 104- 45-B
N8FUJ (EN62) 2,920- 64- 40-BD
N8FUJ (EN72) 465- 31- 15-B
NM8X (+ AC8W,KA8VDX,N8s CQA,HTG,NR8S,NT8V,W8IDT,VE3s CKU,DGR) 148,104- 582-198-ABCD9E

Ohio

KB8ZW 87,842- 412-162-**ABCD9E**
WB8IGY 55,566- 345-147-ABCD
WA8TJL 34,965- 291-105-**ABCD**
KC3CL 34,500- 265-115-ABCDE
K8DIO 32,865- 226-105-**BCD**
WB8TCZ 12,348- 176- 63-BCD
WA8R 10,948- 146- 68-ABCD
WA8TMK 10,738- 174- 59-BD
WA8SAJ 10,070- 177- 53-BD
WA8TTE 9,936- 131- 69-ABDE
K8DW 8,127- 107- 63-ABCD
KE8FD 6,384- 112- 57-AB
K8FF 5,828- 124- 47-B
N8CCC 4,061- 103- 31-ABCD
WA8HPY 3,901- 83- 47-A
K8MR 3,003- 77- 39-B
WB8NJR 1,881- 67- 33-B
WA8RCN 990- 45- 22-AB
WD8DCX 844- 60- 16-ABD
K3ZAP 936- 57- 11-ABCDE
WD8JPP 814- 50- 11-ABCDE
K8TL 328- 21- 8-ACDE
W8XT 87- 18- 3-BCD
W8MMM 80- 16- 5-B
N8JLT 72- 14- 3-BCD
N8HMY 12- 5- 2-BD
KA8GJZ 8- 4- 1-C
N8IOH 7- 7- 1-B
WB8I (K8DZ,KB8ZR,N8ZM,W8ILC,WA8sMSF,SVV,WB8RKM,WD8MSF,K9ZK,KA9OKH,WB9SAN,ops) 37,440- 272-117-ABCDE

West Virginia

KT8W 832- 26- 16-**D**
WA8DOR (+ K8s DM,JF,LG,WV,N8OIR,WA8YCG,WD8AFJ) 17,111- 241- 71-AB

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Illinois

WB9MSV 56,581- 300-137-**ABCDE**
K9MBX 20,370- 233- 70-ABDE
NN9K 13,804- 150- 68-**ABC**
WA9FIH 13,185- 246- 45-**ABCD**
AA9D 11,799- 207- 57-**B**
NA9Q 6,400- 128- 50-B
WD9GJK 4,950- 160- 30-ABC
KA9UMG 4,416- 162- 24-ABCD
NB9WK 4,089- 141- 29-B
KA9RQC 4,028- 91- 38-ABD
K9YHB 3,768- 129- 24-ABCD
KA9ZHM 3,432- 131- 22-BCD
W9AVB 2,380- 148- 14-ABD
WA9CJZ 1,540- 127- 11-ABD
N9JF 1,325- 51- 26-B
KA9ZQW 1,130- 109- 10-ABC
WA9RLI 972- 109- 8-AB
K9JAU 742- 99- 7-BCD
N9HYP 658- 83- 7-BCD
WA9CCQ 416- 104- 4-B
W9NHX 412- 103- 4-B
WA9QYX 400- 50- 8-AB
WB9MXX 360- 36- 10-AB
K9USW 354- 59- 6-AB
KA9TGP 325- 56- 5-BC
K9IOG 312- 52- 6-AB
W9ZZU 304- 76- 4-B
N9GCF 295- 59- 5-AB
WC9D 280- 70- 4-B
WA9MJJ 276- 36- 6-ABC
WA9OHU 256- 64- 4-B
WB9GKA 231- 18- 11-BD
WA9GQK 138- 46- 3-B
K9ENZ 136- 34- 4-AB
WD9IUF 108- 36- 3-B
N9DEX 62- 31- 2-B
W9KBU 58- 29- 2-B
N9GVR 54- 18- 3-B
W9PMJ 51- 17- 3-B
KB9AUM 40- 20- 2-B
WA9GOB 36- 18- 2-B
KA9ZNL 20- 10- 2-B
KA9ITY 20- 10- 2-B

Indiana

W9OEH 26,400- 275- 96-**A**
K9DZE 19,296- 205- 85-ABD
WA4VWV 13,620- 227- 60-**B**
WA9PKL 2,546- 67- 38-A
NY9B 2,010- 67- 30-B
NA9N 1,728- 64- 27-B
NU9H 370- 35- 10-BD
KA9HPK/9 198- 11- 9-**C**
KA9ZFG 126- 15- 7-BD
W9YB (KA9s CCN,CCR,KC9RG,KM9R,N9NC,ops) 5,428- 108- 46-ABD

Wisconsin

W9UC/9 60,214- 313-151-**ABCDE**
K9VGE 46,991- 286-137-**ABCD**
N9OO 6,579- 129- 51-B
WA1UJU/9 6,550- 131- 50-B
KA9HKL 4,976- 106- 46-B
N8AKC 4,272- 88- 48-AB
N9BXA 3,960- 79- 42-ABD
KD9TH 3,230- 95- 34-B

0

Colorado

W2CRS 8,514- 134- 43-**ABCDEI**
WBETT 799- 47- 17-AB
N0HHE 120- 20- 6-AB
KX0O (+ W0MXY) 6,105- 104- 37-ABCD9E

Iowa

WB8YWW 17,264- 169- 83-**BD**
W0RAP 11,765- 111- 74-**BDE**
WB0SWD 7,506- 139- 54-**B**
KA8TLJ 6,630- 170- 39-B
N8CIH 4,598- 91- 38-ABCD
WA0DCB 2,349- 74- 29-ABD
KD0ZY 1,914- 51- 33-**ABD**
N0GPD 1,624- 46- 28-ABD
KA0EIV 828- 36- 23-B
KA5RL 280- 28- 10-B
W0RPK (+ KA0JOF,N0s GHY,JAR,JAS,WA0sBGU,JFS,WYW,WO0V) 10,608- 127- 68-ABDE

Kansas

N0LL 38,356- 185-122-**ABCDE**
W0RT 10,988- 142- 67-ABD
K0SMI 10,660- 101- 65-BCDE
WB0HYV 9,060- 118- 60-ABD9E
K0VUA 3,678- 66- 38-BD
WD0G 2,409- 75- 53-AB
N0IGZ 2,077- 67- 31-AB
K0TLM (EM08) 800- 24- 20-ABCDE
K0TLM (EM19) 660- 23- 20-ABCDE
K0TLM (EM07) 544- 18- 16-ABCDE
K0TLM (DM98) 351- 15- 13-ABCDE
K0TLM (DM97) 325- 15- 13-ABCDE
K0TLM (EM89) 300- 14- 12-ABCDE
K0TLM (DM99) 253- 13- 11-ABCDE
K0TLM (EM18) 231- 11- 11-ABCDE
WB0DRL (+ N9BD,AJ0E,KB0HH,NJ0X,WA0TKJ) 129,048- 357-228-ABCD9E
NO0Y (EM07)(+ KF0M) 84- 9- 6-BDE
NO0Y (EM17)(+ KF0M) 7- 3- 1-B

Minnesota

WA0BWE 12,566- 168- 81-**ABD**
WB0GGM 10,675- 155- 61-**ABD**
W0VB 4,212- 90- 38-**BCD**
N0HJZ 4,050- 90- 45-AB
KA0ZSU 3,762- 114- 33-**B**
KC0P 884- 50- 17-ABD
N0JF-H 710- 61- 10-BCD
KB0ZO (EN34) 540- 34- 15-ABD
N0CET 266- 38- 7-B
N0RSG 171- 57- 3-B
K0TS (EN34) 126- 39- 3-BD
KB0ZO (EN25) 105- 13- 7-BD
KB0ZO (EN35) 80- 14- 5-BD
N0HZN (EN34) 70- 35- 2-B
KC0BZC 66- 22- 3-B
KB0ZO (EN24) 60- 10- 6-BD
N0UEP 52- 26- 2-B
WA0WTV 50- 25- 2-B
KB0IYI 46- 23- 2-B
WB2V 44- 22- 2-B
N0HZN (EN33) 44- 22- 2-B
W0PLD 42- 21- 2-B
K0KTY 40- 20- 2-B
W0OHU 30- 15- 2-B
W0MXW 30- 15- 2-B
N0GHG 30- 6- 5-B
WB0YEL 28- 14- 2-B
N0HBK 28- 14- 2-B
N0GUP 22- 11- 2-B
NU0C 22- 11- 2-B
DL5HAN/W0 20- 10- 2-B
WO0Z 18- 9- 2-B
WD0M 16- 8- 2-B
NU0M 16- 8- 2-B
KC0Z 14- 14- 1-B
WD0HEB 12- 5- 2-BD
KE0UB (EN34) 12- 6- 2-B
N0EJP 11- 11- 1-B
N0JIX (EN34) 10- 5- 2-B
WE0K 10- 10- 1-B
WB0RZI 8- 4- 2-B
K0TS (EN33) 6- 6- 1-B
KE0UB (EN33) 6- 6- 1-B
WB0RHV 5- 5- 1-B
W0KIN 5- 5- 1-B
N0HXJ 5- 5- 1-B
N0JIX (EN33) 4- 4- 1-B
WD0ETA 4- 4- 1-B
WD0GNK 3- 3- 1-B
N0IKC 2- 2- 1-B
WA0VEB 2- 2- 1-B
KC0RV 1- 1- 1-B
N0DOS 1- 1- 1-B
N0DJB 1- 1- 1-B
N0HZO (+ KC0FI68- 17- 4-B
N0HBS (EN34)(+ K0EN) 52- 26- 2-B
K0EN (EN34)(+ N0HBS) 50- 25- 2-B
K0EN (EN33)(+ N0HBS) 30- 15- 2-B
N0HBS (EN33)(+ K0EN) 28- 14- 2-B

Missouri

N0FQW 1,613- 122- 79-**ABD**
W0URP 4,800- 84- 48-ABCD
WA0WPJ 2,030- 48- 29-**ABCDE**
W0AV 720- 36- 20-B
N0IXH 44- 8- 4-ABCD

North Dakota

NT0V 100- 10- 10-**A**
KA9ZP 40- 10- 4-**B**

Nebraska

N0GTN 6,642- 93- 54-**BCD**
W0EMS 1,782- 47- 33-BD
KD0HE 483- 23- 21-**AB**
K0TLM (EN10) 324- 15- 12-**ABCDE**
K0TLM (EN00) 288- 13- 12-ABCDE
K0TLM (DN90) 231- 11- 11-ABCDE

South Dakota

K0DD (+ NS0N) 17,557- 181- 97-AB

VE

Maritime—NFLD

VE1YX 3,762- 99- 38-**A**
VE1APG 1,560- 60- 26-**A**

Quebec

VE2DUB 7,124- 105- 52-**ABCDE**
VE2FUT 1,950- 75- 25-**B**
VE2BKL 522- 29- 18-**AB**

Ontario

VE3ASO 76,553- 457-141-**ABCD9E**
VE3DDW 39,091- 403- 97-**AB**
VE3RM 18,907- 259- 73-**AB**
VE3KKL 15,549- 196- 79-**ABD**
VE3PCW 11,718- 217- 54-B
VE3DSS 7,803- 128- 61-**ABCDE**
VE3SMA 5,481- 111- 49-**ABD**
VE3OAT 5,332- 124- 43-B
VE3OJ 2,496- 66- 32-BD
VE3VET 1,656- 72- 23-B
VE3EMS 1,080- 45- 15-D
VE3FVW 817- 37- 19-**ABD**
VE3BXY 341- 31- 11-B
VE3UOT 84- 14- 6-B
VE3LNX (+ VE3s ADJ,NSQ) 188,055- 687-199-ABCD9EF
VE3OLN (+ VE3ZCO) 18,578- 226- 74-AB
VE3UOW (VE3s NPB,OIL,PYH,RKS,WNR,ops) 2,640- 66- 33-ABD

Saskatchewan

VE5UF 437- 23- 19-**A**
VE5LY 195- 15- 13-**AB**

Alberta

VE6AFO 3,537- 107- 27-**ABCD**
VE6BQJ 1,972- 97- 17-**BD**
VE6SW 360- 20- 15-ABD

British Columbia

VE7ASI 434- 28- 14-**ABCD**

DX

England

G4UPS 360- 39- 10-**A**

Mexico

XE2GFH (WA5LIG,N6XO,ops) 1,584- 82- 22-ABDE

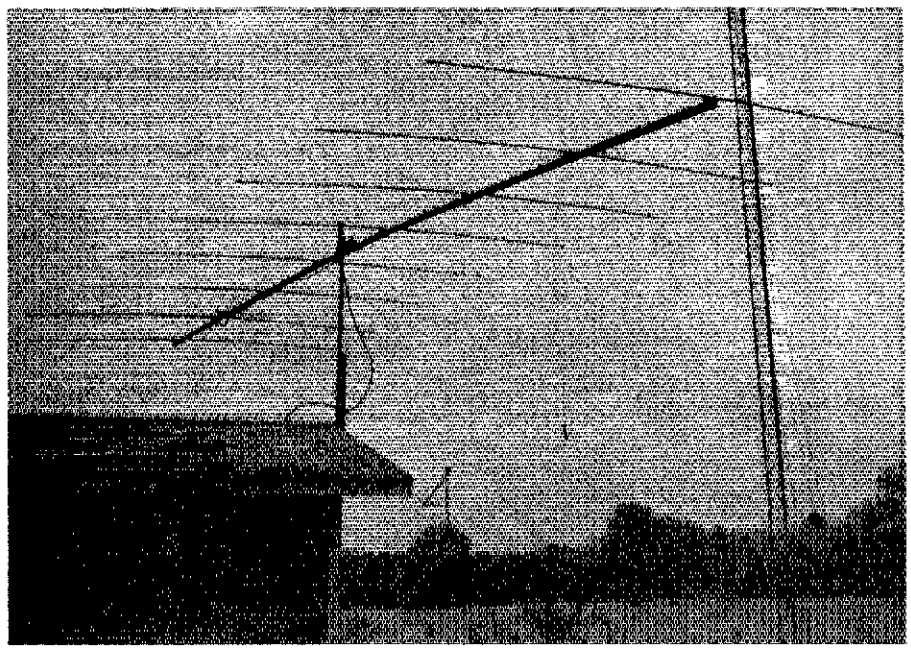
Checklogs

W2HAX, KA3MLY, W8YCV

Results, 1989 Novice Roundup

"I never would have believed contesting could be so much fun!"—KB6UXI/T

By Billy Lunt, KR1R
Contest Manager
and
Phil Rice, WB9JKI
Assistant Contest Manager



A view of the 8-element monster Yagi used by Don, KB5HMH/N, to make over 1600 10-meter QSOs.

This year's Novice Roundup was held from Jan 28 to Feb 5, 1989. NR has come and gone, leaving in its aftermath Novices and Technicians feeling a sense of accomplishment. There is a feeling of confidence about operating procedures, increased code speed and log books bulging with completed QSOs.

The nine days of NR are some of the most enjoyable days for many beginners and old-timers alike. NR represents many different things to different people. Whether your interests are in CW, phone, DXing, rag chewing or just plain contesting, there is plenty of activity on all bands and modes. David, N5MRX, says, "It is a great way to meet many new ham friends and work toward awards." Walter, WB3CDX, claims to have "started NR with a LAØ and ended with a KL7 and lots of fun in between." Ron, KA1NJW, is working toward his DXCC and says, "I had lots of fun and worked my 100th country when a ZS answered my CQ." KB6WGT was spurred on by her boyfriend. Constance explains, "What a nervous, exciting experience. It was my first time contesting. During a pileup, I pulled out J52US and JP1BJR. What a thrill on 15 meters! I didn't think that I could do a contest, but my boyfriend kept saying, 'you can do it.'"

Not everyone accomplishes record-breaking tasks or works all states during the contest. Gary, KA9SKS, spelled out, "My wife and I have been hams for nearly five years. Ham radio has been a long and hard struggle, but this year we decided to do the Novice Roundup. We never made many contacts, but we are very happy and thrilled with the QSOs that we made with our little station. It has been a real ice breaker for us." Whatever the case, everyone has a great time.

This year HQ received 386 entries: 132 Novice, 174 Technician, 42 others and 38 checklogs. These figures represent a slight increase over last year's totals. This year's contest was the second year hosting the new Novice Enhancement privileges. Contacts reported in the 1989 NR totaled 63,585.

Dee, N8JLT/T, getting ready to operate NR from OH.

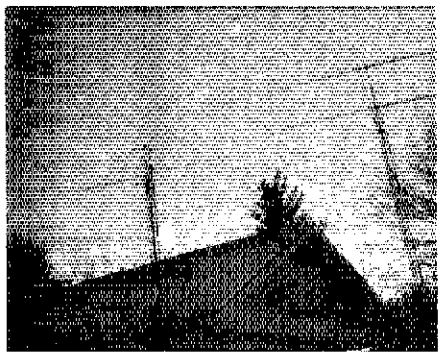
Scott, KA2YVU/N, is one well-dressed contester.

Suzy, KB6WGT/T, logging one of her CW QSOs.

This represents a breakdown of 58% phone and 42% CW. Now that band conditions are on an upswing, activity is increasing right along with the scores. Will 1990 be even better?

When looking through the Top Ten boxes, a few familiar calls from last year's Top Ten can be found. For the Novices, KA8JBK bettered his last year's score by 30k and captured second place this year up from fourth place in '88. Both KAØSIX and KA2YVU increased their scores slightly this year but slipped in the standings. KAØSIX moved from third in '88 to fifth this year, and KA2YVU went from seventh in '88 to ninth this year. Newcomer KB5HMH topped all, scoring 232k points for an impressive first-place win. KB6PJU finished third with 136k points and WD5GJS fourth with 114k points. In the Technician standings, WB2VBV improved his score by 23k and finished third this year from 7th in '88. KA8OAT increased his score 36k to finish fifth this year, up from eighth place last year. N7FIY ran away with 127k points to win first-place Technician. KL7YY scored 86k points for second place. A hardy applause to all who participated in the 1989 Novice Roundup and made it a great success! Certificates for all Novice and Technician entrants will be out soon. Get ready for next year's NR and see you then!

Ted, KAØUQT/T, and Burt, NØFYR, relaxing after a long NR.



Jasen, KB9AAW/N, put these antennas to good use with a first-place finish in the IL Section.

Novice Top Ten

Call	*Score*
KB5HMH/N	232,806
KA8JBK/N	146,340
KB6PJU/N	136,867
WD5GJS/N	114,304
KAØSIX/N	113,440
KB7AGY/N	112,056
KA1SQC/N	111,999
KA8RLD/N	102,648
KA2YVU/N	75,118
KA1RPQ/N	72,956

Technician Top Ten

Call	*Score*
N7FIY/T	127,411
KL7YY/T	86,260
WB2VBV/T	85,916
KA8OAT/T	84,192
KA2OEE/T	73,950
N4UOH/T	60,300
KA7RFD/T	54,234
KB6HWZ/T	53,430
KB5FYV/T	51,786
WB3CDX/T	50,467

Division Leaders

	Novice	**Technician**
Call	*Division*	*Call*
KA2YVU/N	Atlantic	WB3CDX/T
KB9AAW/N	Central	KA9IWP/T
WDØCXB/N	Dakota	NØFYR/T
WD5GJS/N	Delta	KB5ECK/T
KA8JBK/N	Great Lakes	KA8OAT/T
KA2KRT/N	Hudson	WB2VBV/T
KAØSIX/N	Midwest	KBØANP/T
KA1SQC/N	New England	KA1NJW/T
KAØSVY/N	Northwestern	KL7YY/T
WB6SZZ/N	Pacific	N7FIY/T
KB7AGY/N	Rocky Mountain	N5LQO/T
KA8RLD/N	Roanoke	N4UOH/T
WB4GBY/N	Southeastern	N4UQD/T
KB6PJU/N	Southwestern	KA6MUV/T
KB5HMH/N	West Gulf	KB5FYV/T

One of the 800-plus SSB QSOs being racked up by Roy, KB7AGY/N.

SOAPBOX

Even with my low score, I had fun (WB2MJG/T). This was a QRP entry with a 10/15-meter dipole in my room and a 40/80-meter antenna in the attic. I will not win but I like it! (KA1NJW/T). My most prized catch was YIØVP in Baghdad. I'll be looking forward to the writeup! (KA1RAZ/N). A great contest! I had a lot of fun. Where were AZ and WY? Can't wait until next year and my new beam (KA2ZIU/N). The contest was enjoyable. I look forward to receiving my certificate and completing enough contacts for my ARRL Diamond Jubilee Award (KB2GZV/N). It was my first Novice Roundup and I had a lot of fun. Amazing that so many CA and TX amateurs had no idea what ARRL Section they were operating from (N3FOG/T). I'm age 10 and just got my license two days before the contest. I caught chicken pox the first day of the contest. I had a lot of fun and hope to participate in other contests (KA3UBJ/N). The contest was very good CW practice. I really enjoyed it! Lots of fun! (KA3MMG/N). An FB contest. Didn't do too bad with just an old-tired SB100, 50 ft of wire tied to the wife's clothesline and an Isotron 40-meter antenna tied to the back porch (N3GLK/T). Really enjoyed my first attempt at a contest (KA3SRH/T). Thanks to all the hams holding General-class-and-above licenses who took the time and participated. Conditions were great. I was able to increase my score from last year by a multiple of 3. I don't know if I won my division, as I did last year, but I had a great time and was able to add to my DXCC total (N4UQD/T). Thank you for providing the Novice Roundup. I didn't set any records, but I certainly enjoyed the action and participation. I worked many new states and a few new countries that would not have been possible if I did not compete in the contest. The contest rules say listening time counts as operating time. Does falling asleep at the rig count as operating time as well? HI! (KC4BUK/N). I was probably crazy to try to operate with such a poor station during mid-terms week. It was fun anyway, and I learned a lot about good operating practices. Thanks for a FB contest! (KC4GLA/T). The Novice Roundup was great this year. John, KC4GVJ, enjoyed it so much that he helped me put up a 15-meter antenna. I operated my HW9 QRP rig. (AA4RD). Thank you very much for running the contest. I enjoyed it very much. I get the biggest kick out of CW and all my contacts were made using a straight key (N4UOH/T). I enjoyed the contest, but where were the Delaware and Hawaii stations? Next time, watch out North Florida! (KC4EOD/T). I received my license in the mail on the afternoon of the 1st contest day. I had a great time! (N4UUT/T). I didn't have much time for the contest. I had to study for the General-class exam. I enjoyed it though and hope to work some future contests (KC4IHN/N). I was not planning to participate in the Novice Roundup until my Elmer talked me into it (N4UIO/T). I enjoyed the NR contest last year as a Novice and decided to give it a try this year as a Tech. I had a lot of fun with wonderful band openings. I also completed my WAS (KB5EPG/T). My brother, WD5JZL, finished second place in last year's NR. He has since upgraded to General. This year, I decided it was my turn to enter the Roundup! This was my first ever NR. I had a great time! I hope it will spur me on to upgrading as well! (WD5GJS). I very much enjoyed this year's NR. It was a good way to gain some experience. I hope to upgrade within the next month or so (KB5HVV/N). It was my first contest in 18 years of hamming. I enjoyed the contest, but it's hard to work many stations while holding an active 15-month-old daughter! (WB4UHI/T). I'd like to say that I really enjoyed participating in this year's NR. It took a lot more work than I had imagined, but I really had a blast! I worked several new countries and was especially pleased to work some of the ARRL Section Managers, Division Directors and even a few of the HQ staff! Do you guys have an award for working all HQ staff members? The contest was really a lot of fun. I hope to be passing out contacts next year instead of begging for them! Thanks for a terrific contest and 73 to everyone at HQ (KB5HMH/N). I have been an amateur less than a year and thoroughly enjoyed the NR. I just wish I had more time to operate in the contest (N5MRX/T). This was my third consecutive NR, but my first from Hawaii. What a difference the QTH makes! (WD6CQV/KH6/T).I had a wonderful time from my new QTH, but constant interruptions from two sick kids and my wife didn't help much! 73 and CU next year (KB6PJU/N). I enjoyed the NR and was able to work over 28 hours of on the air time. It was nice to work all of the US multipliers, but I did not get all of the Canadians. I wish the contest would have been longer (KL7YY/T). Thanks for a great contest. I worked all continents and almost worked all states, but missed DE and SD. Propagation sure was great on 10 and 15 meters (KB7AGY/N). Thanks, I had a good time (KA8OAT/T). The NR is a fun and friendly contest (N8JLT/T). I'm a new ham and enjoy CW. The contest was a real pleasure (N8KBE/T). I always have a ball in the NR. Hams are the friendliest people. I didn't have an antenna this year so the Van Kirks (KX8Y, KA8MSE and N8HOG) let me use their station. The station and room service there was great (KA8RLD/N). This is the first contest that I have ever worked. I enjoyed it immensely. (KB9BLA/N). This was my first single-operator contest. I don't know if it was the weather or the contest, but it put me home from work for 4 days with a respiratory infection. I'm sure it must have

been the weather. Otherwise, I would have been diagnosed with a radio bug (KB9BJM/N). My son Ted, KAØUQT, and I enjoy the hobby together. This year we were both competing in the same license class. The competition made us more aggressive, but also closer (NØFYR/T). This was my first contest and I accomplished my objectives: learn contest procedure and have fun! (KBØDGP/N). I'm 10 years old and received my Novice license in Sep of '88. The NR was lots of fun. I got real excited when I got a pileup on me. Everyone should be in the Novice Roundup. Next year I want Dad to log for me so I can work more stations. Ham radio is the most fun thing since TV (KBØDGA/T).

Scores

Score listings indicate call sign, score, number of QSOs, multipliers (number of ARRL Sections + DXCC countries) and total hours.

1

Connecticut

KA1RPQ/N	72,956	587	92	30
WA1ZFD/N	72,372	489	74	29
KA1SYN/N	31,186	319	62	29
KA1SNS/N	28,500	250	57	21
KA1SYU/N	24,820	195	68	28
KA1RRG/N	20,072	386	52	27
WB1EPO/N	10,945	199	55	20
KA1RIZ/N	5,280	76	40	20
N1FNV/T	1,081	47	23	30
KA1RLX/T	1,056	44	24	17

Eastern Massachusetts

KA1SFJ/T	34,952	257	68	15
N1DZJ/T	27,306	245	82	25
WL7BKW/1/N	864	48	18	3

Maine

KA1SQC/N	111,999	973	111	30
WB1EAD/T	29,700	396	75	21
KB7ECP/1/N	29,200	235	60	30
KA1SSU/N	22,330	300	70	26
N1AHG/T	5,969	126	47	19
K1FUY/T	1,225	49	25	11

New Hampshire

KA1OEO/N	43,416	603	72	29
KA1CUC/N	37,592	268	127	30
KA1RYI/T	34,030	410	83	27
KA1QDL/T	435	29	15	4
KA1SRC/N	208	16	13	2
WB2MJG/T	50	5	5	4

Rhode Island

KA1NJW/T	36,000	213	90	30
KA1SQV/N	28,008	243	72	18
N1FWG/T	4,235	121	35	9

Vermont

KA1RAZ/N	72,576	444	108	22
KA1SYJ/T	24,242	373	62	22
KA1RRX/N	924	25	21	14

Western Massachusetts

KA1QHG/N	11,520	130	48	17

2

Eastern New York

KA2KRT/N	51,612	392	66	28
N2ILT/T	49,932	347	73	30
WA2UMH/T	1,534	59	26	7
KB2GKY/N	640	20	16	11

NYC—Long Island

WB2VBV/T	85,916	457	94	28
KA2ZIU/N	28,615	255	59	8
KB2FER/N	22,176	308	72	26
KA2RSJ/N	4,515	70	35	12
KA2IYI/T	4,368	112	39	16
KA2JAK/T	1,750	35	25	19
KA2GRH/N	390	15	13	6
KB2GZV/N	78	13	6	5

Northern New Jersey

KA2OEE/T	73,950	542	85	30
KB2HBS/N	12,324	122	52	22
KB2BVP/N	6,542	83	34	20
N2IRY/T	3,564	80	33	14
KB2GXM/N	874	23	19	11

Southern New Jersey

KA2TQC/N	26,740	229	65	30
WB2YEH/T	11,270	115	49	27
KB2GLO/T	9	3	3	2

Western New York

KA2YVU/N	75,118	584	71	30
KB2FBE/N	18,300	200	60	23
KA2SJG/N	17,160	165	52	12
KB2GIR/T	8,400	109	42	11
KB2BSV/N	6,000	75	40	14
KB2FXF/T	2,739	83	33	18
KB2DVZ/T	2,240	80	28	3
KA2AWE/T	924	42	22	22

3

Delaware

KA3SGF/T	416	18	13	2

Eastern Pennsylvania

KA3QLF/N	59,584	393	98	27
KA3DLV/N	39,900	285	70	23
N3FOG/T	11,220	255	44	28
N3FTI/T	11,169	126	51	12
KA3TBK/T	5,520	71	40	19
N3DIZ/T	1,407	67	21	14
KA3RZE/T	1,222	47	26	27
KA3TRU/T	612	31	18	12
N3FOV/T	555	36	15	30
N3GJT/T	121	11	11	5

Maryland—DC

WB3CDX/T	50,467	483	109	30
KA3SSV/N	42,108	319	66	28
KA3UBJ/N	18,070	208	65	23
KA3TOI/N	17,572	193	46	5
N3FRT/T	7,020	78	45	13
WB2BZR/T	6,642	123	54	29
KA3MMG/N	6,500	120	26	18
KA3RSQ/T	1,104	69	16	12
KA3QNM/T	532	28	19	7
KA3CXG/T	280	20	14	30
KA3TUE/N	54	6	6	1
KA3TVK/T (+ KB5BGU)	3,240	90	36	26

Western Pennsylvania

KA3SOL/N	34,320	264	65	30
KA3SUM/N	22,631	182	61	18
N3GLK/T	17,702	171	53	30
KA3PBB/N	9,156	109	42	13
N3GTO/T	8,490	142	30	30
N3GHT/T	1,392	35	24	10
KA3SRH/T	390	30	13	13

4

Alabama

N4UQD/T	50,304	524	96	30
WB4GBY/N	29,696	238	64	27
KC4BUK/N	4,329	72	39	18

Georgia

KC4GLA/T	1,656	35	24	14
N4JKS/T	1,368	35	24	23
KC4GVJ/N	1,122	51	22	14

Kentucky

KC4DWT/N	61,098	326	102	30
N4ONL/T	26,746	311	86	29
N4TLC/T	21,912	249	88	22
KB4VCT/T	18,900	210	45	27
KA4HKS/N	8,648	89	46	13
N4THE/T	1,900	50	38	12
N4STW/T	264	22	12	4

North Carolina

N4UOH/T	60,300	402	75	29
KC4DPC/T	12,772	201	62	25
N4UAJ/T	8,468	102	58	24
N4UMI/T	4,953	70	39	19
KB4QAL/N	2,592	48	27	8
WD4CNZ/T	1,215	45	27	5
KC4CFG/T	800	40	20	13
KC4FGG/T	4	2	2	2

Northern Florida

N4TUA/T	35,072	280	64	26
KB4FOS/N	19,448	160	68	30
KC4EOD/T	640	32	20	5

South Carolina

KC4IGY/N	18,678	208	66	30
KB4CUQ/T	5,289	72	41	18
N4UCR/T	3,990	53	38	12
KB4VZM/T	90	9	5	2
N4UQM/T (+ WB4UBS)	5,040	120	42	12

Southern Florida

N4TXR/T	38,625	365	75	16
N4URP/T	6,200	155	40	20
N4TVQ/T	1,800	60	30	26
N4OPC/T	1,344	56	24	25
KC4HLF/T	300	20	15	7
N4UUT/T	256	16	16	6
KC4IHN/N	168	14	12	3

Tennessee

N4UIO/T	72	10	6	4
KC4HYD/N (+ K4WOP)	5,700	75	38	7

Virginia

KC4AUV/N	17,812	148	61	30
KC4DOW/N	5,112	93	36	16
KC4GSD/N	4,992	78	48	26
KB4VIR/T	3,360	80	42	18
KA4IHK/N	2,400	44	32	12

5

Arkansas

N5NAQ/T	35,224	259	68	29
KB5EHR/T	25,803	376	61	28
N5NKZ/T	23,780	205	58	27
KB5CDN/T	11,774	203	58	27
KB5IDB/N	5,577	165	33	27
KB5HPH/N	3,876	102	38	13
N5NOI/T	3,290	93	35	12
KA5KHV/N	1,886	41	23	7
KB5HBC/T	756	63	12	6

Louisiana

KB5EPG/T	37,950	550	69	30
KA5KHE/N	6,232	82	38	10
N5MWR/T	4,588	62	37	23
KB5GVA/T	3,960	73	33	14
N5MLJ/T	1,972	68	29	14

Mississippi

WD5GJS/N	114,404	871	94	30
KB5ECK/T	42,225	499	75	28
KB5HVV/N	9,828	148	52	11

New Mexico

N5LQO/T	47,265	507	69	25
N5JUQ/T	2,257	61	37	22

North Texas

N5MFH/T	25,694	443	68	17
N5MFI/T	7,293	187	39	7
N5LYS/T (+ N5MTS)	32,760	488	65	30

Oklahoma

KB5HNV/T	41,405	331	65	27
KB5IED/N	20,033	275	67	29
WB4UHI/T	756	36	21	8

South Texas

KB5HMH/N	232,806	1618	138	30
N5LYG/T	18,096	484	39	13
KB5HOE/T	11,704	114	56	21
N5NPP/T	11,322	204	61	8
N5MRX/T	4,692	138	34	19
KA5ZNX/T	4,329	81	37	18
N5MNK/T	4,130	117	35	14
KB5GIM/T	464	58	8	4

West Texas

KB5FYV/T	51,786	822	63	22
KB5BCR/T	10,246	218	47	14
KB5EOF/T	5,660	185	36	9

6

East Bay

W6ESZZ/N	48,990	340	69	30

Los Angeles

KB6VIE/N	63,656	854	73	20
KB6WGT/T	28,084	242	59	22
N6OPA/T	19,341	233	63	30
KB6UUA/T	17,584	307	56	17
KC6BPB/N	3,096	68	43	7
KC6BOY/N	1,728	50	32	5
KC6BOW/N	1,728	53	32	6
KC6BOZ/N	1,305	42	29	6
KC6BPA/N	350	23	14	3

Pacific

NH6GJ/T	7,536	137	55	20
WD6COV/KH6/T	3,306	55	38	14
WH6BXK/T	2,170	62	35	10

Santa Barbara

KA6MUV/T	29,928	516	58	10
KB6UXI/T	24,808	443	56	20
N6TME/T	23,954	410	58	16

San Diego

KB6PJU/N	136,867	1386	97	30
KA6WBQ/N	2,013	61	33	8

San Joaquin Valley

KB6ZKP/N	26,816	211	64	24
KB6EEK/N	4,360	109	40	2

Sacramento Valley

KB6HWZ/T	93,430	822	65	23
N6SCB/T	8,925	175	51	16
N6OTA/T	374	22	17	24

7

Alaska

KL7YY/T	86,280	866	95	28
NL7PH/T	6,300	150	42	14

Arizona

KB7GLO/T	8,580	195	44	28
N7JWM/T	187	16	11	3
N7LOK/T	20	5	4	1

Idaho

KB7FSO/T	345	23	15	5

Montana

KA6SVY/N	37,700	290	65	30
KB4ITR/7/N	2,240	70	32	8

Nevada

N7FIY/T	127,411	884	103	29
KB7GAP/N	25,978	419	62	20
KB7GNA/N	512	32	16	8

Oregon

KA7RFD/T	54,234	786	69	22
KA7OAJ/T	28,990	224	65	30
KB7FXJ/N	4,600	115	40	11
N7LVK/T	2,720	80	34	20
KB7FMD/T	1,288	28	23	20
WB7QMC/T	620	31	20	8

Utah

KB7AGY/N	112,056	1052	92	28
KB7EEG/T	4,930	140	34	9
KB7DUX/N	3,888	144	27	4
N7KXG/T	9	3	3	2

Washington

KB7DUC/N	30,888	281	66	24
KA7VXN/N	3,456	54	32	9
KB7GMV/N	1,638	63	26	24
KB7GHP/N	1,210	55	22	3
N7LGQ/T	180	15	12	9
N7LXO/T	143	13	11	7

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Michigan

KA8JBK/N	146,340	876	108	30
KA8EBE/N	58,240	365	76	30
KB8ECG/T	40,040	286	70	26
KA8HWF/N	36,722	301	61	13
KB8FSN/N	12,972	141	46	27
KA8JJN/T	11,124	112	54	25
KA8OKQ/T	8,460	90	47	27
KB8DXE/T	663	39	17	11
KB3FPZ/T	660	28	22	16
KB8FQN/N	300	20	15	13
KB8CHW/N	286	14	13	6

Ohio

KA8OAT/T	84,192	502	96	28
KA8YOL/N	29,568	311	48	24
KB8FOK/N	27,206	223	61	18
KA8UFG/N	25,774	283	49	30
KB8GAE/N	17,840	223	40	23
KB8ATH/N	16,872	176	57	29
N8JYU/T	9,198	126	73	20
KB8DFV/N	8,640	100	48	30
KA8VPL/N	7,980	112	57	20
N8JI T/T	2,001	59	29	30
N8KBE/T	1,430	35	22	30
KA8VLR/N	1,102	29	19	11
KB8FZH/N	864	27	16	8
KB8FWV/T	560	28	20	14
KB8DWL/N	20	5	2	3

West Virginia

KA8RLD/N	102,648	801	84	30
KA8CGU/N	56,950	335	65	26
N8HTR/T	1,029	28	21	12

9

Illinois

KB9AAW/N	65,860	370	89	24
KA9UBC/N	62,480	440	71	30
KA9UZH/N	26,727	219	59	30
N9HFP/T	5,535	123	45	30
N9GMW/T	4,635	61	45	20
KB9AGE/T	3,780	80	47	22
KB9BSN/N	1,850	42	25	10
KB9BSM/N	1,311	30	23	5
KB9BLA/N	1,092	52	21	7
KB9ANM/T	608	38	16	11
N9HRM/T	171	10	9	5
KA9OBZ/T	16	4	4	8
KA9SKS/T (+ N9GGP)	1,484	52	28	15

Indiana

KA9IWP/T	35,584	278	64	29
KA9HKB/N	21,854	391	54	21
KB9BGV/T	14,877	257	57	30
N9GSP/T	30	6	5	11

Wisconsin

KB9BJM/N	45,899	561	79	28
KA9YSO/N	21,982	204	58	27
KA9RFN/T	20,478	456	45	22
KA9PAF/N	7,483	257	29	27
WD9EGC/N	6,598	194	34	21
N9HXX/T	465	31	15	12

0

Colorado

KB0UGV/N	60,590	415	73	30
KAØNND/T	10,105	110	47	12
KB0DJZ/N	9,152	104	44	27
KAØYXI/T	2,958	46	29	4

Iowa

KAØZOA/N	25,704	204	63	16
KBØBUV/T	8,874	111	51	11
NØJPV/T	6,519	155	41	20

Kansas

KAØSIX/N	113,440	699	80	30
KBØBTF/N	19,398	183	53	30
WDØCBT/T	9,525	145	45	29
KAØREN/T	1,196	26	23	9
WØLB/T (KAØMIQ,NØICV,ops)	11,936	109	52	22

Minnesota

WDØCXB/N	48,912	367	68	21
NØFYR/T	34,970	269	65	28
KAØUQT/T	31,964	262	61	19
KAØYEG/T	17,490	159	55	12
NØJSQ/T	7,788	170	44	30
NØBGO/T	4,680	103	36	27
KAØZTE/N	4,440	74	30	20
KBØCZW/N	2,538	94	27	3
KBØDGP/N	384	32	12	7
KB7DBN/N	220	20	11	5
KBØDAH/T (+ NØJSJ)	750	27	18	8

Missouri

KBØDTA/N	50,163	409	68	23
KBØANP/T	18,792	346	54	28
KAØYZT/N	4,536	81	56	14
NØHDL/T	4,440	60	37	15
KAØQCY/N	4,030	60	31	30
KBØDGA/T	1,847	56	27	11
KBØDVZ/N	187	15	11	9
KBØDAX/T (+ WØNKO)	6,594	138	42	8
KBØBFJ/T (+ WØNKO)	1,040	52	20	4

North Dakota

KA9IZP/T	7,200	120	45	29
KBØAHP/N	2,592	81	32	10

South Dakota

KAØVME/T	726	33	22	24

Non-Novices

K3TX 50,630, WA1VEK 22,620, KM1X 19,020, HP1AC 12,480, WB8TCU 11,180, W7HO 9,856, KA1MPF 6,400, WBXT 6,364, KA5GIS/1 5,735, KB1VL 5,304, WA2EYA 4,851, W4YOK 4,672, WB0Z 4,620, KH6CP/1 4,422, K7SHC 4,329, WBØB 4,191, WØOGS 3,638, KY3M 1,804, WA2YEI 1,716, NØJMT 1,625, N9GGE 1,440, W6YVK 1,430, KT7U 1,296, NFØQ 1,224, WDØE 1,134, N9GBB 1,064, KA1S 896, K6ICS 882, WAØTGH 800, KA3PVD 714, W9UIX 408, N3DPV 360, KBØQN 322, WA3EEE 240, KC1MP 40, JH4UHW 15, JI1JVG 12, N7LWU (+ KA7EGQ,KD7OD) 39,176, KB8ENJ (+ W8KTO) 19,152, K9GXU (KA9ZTJ,N9BPK,ops) 18,468, WCØS (+ NØJDI) 10,914, KA9CAI (+ WA9DIP, WB9JJI 1,633

Checklogs

KA1EAP, KA1SPO, N1AKS, NI1Y, WA1QGC, NK3O, AB4LX, KC4IDR, KJ4EK, N4LM, N4REE, WV4Y, KA5WGL, KB5EIA, KB5EWE, W5NR, KA6VQV, N6ERR, N6BKE/6, W6PLJ, KA7NCY, N7KFI, NN7A, KA8YKI, KB8DMZ, KB8EHY, N8FUP, W8VUV, KA9VHJ, N9GPF, KAØUSE, KBØCWV, NØSB, NØYC, NØJWI, VE4AAU, VE7AKS, J52US

Announcing the Fourth ARRL 10-GHz Cumulative Contest

Object: To promote amateur microwave activity.
Region: USA and Canada.
Eligibility: Licensed amateurs operating in the above region.

Rules

1) **Object:** To work as many amateur stations in as many different locations as possible from as many locations as desired on the 10-GHz band.

2) **Contest Period:** 8 AM to 8 PM local Saturday and 8 AM to 8 PM local Sunday for the weekends of Aug 19-20 and Sep 16-17.

3) **Categories:** Entries are not broken down into any categories.

4) **Exchange:** Six-character Maidenhead Locator (see Jan 1983 *QST*, p 49, or write to Special Requests at HQ for a reprint). Signal report is optional.

5) **Miscellaneous**

A) Scheduling contacts is both permissible and encouraged.

B) Stations are encouraged to operate from more than a single location. For purposes of the contest, a change of location is defined as a move of at least 16 km (10 miles). A station may be reworked for additional credit by either end of the contact moving to a new location.

C) Contacts may not be duplicated on the second weekend (that is, at least one end of the QSO must be from a different location).

D) Contacts must be made over a minimum distance of 1 km.

E) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period. The intent of this rule is to prohibit "manufactured" contacts.

F) Contacts with aeronautical mobiles do not count.

6) **Scoring:**

A) Distance points. The distance in km between stations for each successfully completed QSO is calculated. Distance = distance in km.

B) QSO points. Count 100 QSO points for each different unique call sign worked. Portable indicators added to a call sign are not considered as making the call sign different and unique.

C) Total Score = Distance Points + QSO Points.

D) There are no multipliers.

E) In making the distance calculations, a string (or ruler) and map may be used. However, calculations by computer program are preferred. Several such programs are available in the commercial market, including The ARRL World Grid Locator Atlas ($4). For purposes of making calculations, stations are defined as being located in the center of the 6-character locator sub-square (most computer programs make this assumption).

F) Scoring example. On the first weekend, KB9NM operating from Mt Greylock, MA works W1VD (distance 97 km) and W1LJ/1 (distance 107 km).

On the second weekend, KB9NM/1 operating from Pack Monadnock, NH works th following stations: W1VD (154 km); W1XX/2 (205 km); W1LJ (157 km); and AA2Z (147 km).

Distance points = 97 + 107 + 154 + 205 + 157 + 147 = 867

QSO points = 100 × 4 = 400 (W1VD, W1LJ, W1XX, AA2Z)

Final Score = 867 + 400 = 1267

7) **Scheduling and Reporting:**

A) Schedules may be set up by use of the HF calling frequency of 3818 kHz on the evenings of Tuesday, Wednesday and Thursday before the contest weekends starting at 7 PM local. Also, 144.230 and 146.55 MHz can be monitored during the contest to arrange schedules with other stations. Paired stations should move off these frequencies once contact has been made.

B) Logs should indicate the exchange information plus distance of contacts in km.

C) Logs must be submitted no later than 30 days after the end of the contest to ARRL Contest Branch, 225 Main St, Newington, CT 06111.

8) Awards: Suitable awards will be presented.

9) Disqualifications: See Jan 1989 *QST*.

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	May 1989, p 70	Packet-Radio Frequency Recommendations:	
Club Contest Rules	Jan 1989, p 104	Below 225 MHz	Sep 1987, p 54
Considerate Operator's Frequency Guide	Jan 1989, p 77	Above 225 MHz	Mar 1988, p 51
DXCC Annual Listing	Jan 1989, p 71	QSL Bureaus	
Frequency/Mode Allocations	Jan 1989, p 77	Incoming	This issue, p 72
17 Meters	Apr 1989, p 58	Outgoing	Mar 1989, p 68
License-Renewal Information	Jan 1989, p 76	Reciprocal Operating Agreements	Oct 1988, p 63
Major ARRL Operating Events and Conventions—1989	Jan 1989, p 65	Third-Party-Traffic Agreements	Oct 1988, p 63
		VUCC Annual Listing	Dec 1988, p 85
		What is Amateur Radio?	This issue, p 52

Contest Corral

Conducted By Phil Rice, WB9JKI
Assistant Contest Manager

JUNE

6

West Coast Qualifying Run, 10-40 WPM at 0400Z Jun 7 (9 PM PDT Jun 6). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

10-12

ARRL June VHF QSO Party, May *QST*, p 105.

Delaware QSO Party, May *QST*, p 107.

World Wide South America CW Contest, May *QST*, p 106.

ANARTS World Wide RTTY Contest, sponsored by the Australian National Amateur Radio Teleprinter Society, from 0000Z Jun 10 until 0000Z Jun 12. Single ops operate no more than 30 hours. Bands: 80, 40, 20, 15, 10, all digital modes permitted. No satellite QSOs. Entry classes: Single-op, one transmitter; multiop, one transmitter; SWL Printer. Exchange RST, time and zone. Scoring: as per CARTG Zone chart, multiplied by the number of countries worked, multiplied by the number of continents worked (max 6). World stations then add 100 points per VK worked on 20; 200 pts on 15; 300 pts on 10; 400 pts on 40, and 500 pts on 80. Countries count per ARRL list, except that VK, JA, VE, VO, W/K districts count separately. Own country counts zero points for multipliers. Separate logs for each band. Logs must show date, time, call sign of station worked, message sent and received. Logs must be received by Sep 1. Send entry to W J Storer, 55 Prince Charles Rd, French's Forest, New South Wales 2086, Australia.

11

Portuguese National Day Contest, phone only, sponsored by Rede dos Emmissores Portuguese, 0700Z-2400Z Jun 11. Everybody works everybody on 80, 40, 20, 15, and 10. Single operator, all bands. Exchange signal report and serial number (CT1 and CT4 stations send district abbreviation). Scoring: QSOs with Portugal or Spain are 2 points and other stations 1 point. Contacts with the same country count as multipliers only. Total QSO points X number of Portuguese districts + DXCC countries for final score. Logs must be postmarked by Jul 30. Send to: Rede dos Emissores Portugueses, Apartado 2483, 1112 Lisboa Codex, Portugal.

14

W1AW Qualifying Run, 10-40 WPM at 0200Z Jun 15 (10 PM EDT Jun 14). Transmitted simultaneously on 3.580 7.080 14.070 21.080 147.555 MHz. See Jun 6 listing for more details.

18-19

All Asian DX Contest, phone, sponsored by the Japan Amateur Radio League, from 0000Z Jun 18 until 2400Z Jun 19. (CW contest will be Aug 27-28). 160 through 10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No crossband QSOs. Single ops may have only one transmitted signal at any given time. Multiops may have a maximum of one signal per band. Exchange signal report and a two-digit number denoting the operator's age. YL stations may send 00. Count 1 point per QSO with Asian stations on 7 through 28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by the number of different Asian prefixes (WPX Rules) worked per band. Note: JD1 stations only on Ogasawara count for Asia. Use separate logs for each band. Mark multipliers the first time worked. Provide a complete summary. JARL Asian Countries list: A4 A5 A6 A7 A9 AP BV BY EP HL/HM HS HZ/7Z JA-JS JD1 JT JY OD S2 TA UA/UN/UV/UW-UZ/RA/RN/RV-RW/RZ9-0 UD UF UG UH UI UJ UL UM V85 VS9M/8Q VU XU XV 3W XW XX9 XZ YA YI YK ZC4 5B4 1S 4S 4W 4X/4Z 7O 9K 9M2 9N 9V and Abu Ail. Enclose SAE and IRC for results. Mail logs to arrive by Sep 30 (Nov 30 for CW) to JARL, PO Box 377, Tokyo Central, Japan.

SMIRK QSO Party, sponsored by the Six Meter International Radio Klub, from 0000Z Jun 18 to 2400Z Jun 19. Exchange call sign, SMIRK no., and grid square. No crossband, multiop, or partial contacts allowed. Scoring: 2 points per SMIRK contact made, 1 point per non-SMIRK contact. Total points multiplied by total number of different grid squares equals claimed score. Only new contest log forms acceptable. Provide a legal-sized SASE for copy of log. Certificates issued for high scorers in ARRL sections/foreign state/province/prefecture/UK shire county/region/country. Must be paid-up SMIRK member to receive contest award. Others may exchange SMIRK no. for points. Failure to provide name, call, SMIRK no. on log are grounds for disqualification. Send log requests with SASE and logs (postmarked no later than Jul 6) to Lisa Lowell, KAØNNO, Box 547, Hugo, CO 80821.

24-25

Field Day, May *QST*, p 103.

28

W1AW Qualifying Run, 10-40 WPM at 1300Z Jun 28 (9 AM EDT Jun 28). See Jun 14 listing for more details.

JULY

1

Canada Day Contest, sponsored by the Canadian Amateur Radio Federation, 0000Z-2400Z Jul 1. Everybody works everybody. 160-6 meters, phone and CW. Entry classes: single op, all bands, mixed mode; single op, all band, CW; single op, all band, SSB; single op, single band, mixed mode;multi-operator, single transmitter; multioperator, multi-transmitter. Work stations once per mode on each band. No crossmode contacts. Exchange operator's name, RS(T), serial number and province/state/country. Multi-multi entrants use separate numbers for each band. Count 10 points per VE QSO, 4 points for other countries. VEØ counts as Canada and 1 multiplier. twenty-point bonus for working any CARF stations using TCA or VCA suffix. Multiply by total VE provinces worked per band on each mode (VO1/VO2 VE1-PEI VE1-NB VE1-NS VE2-8 VEØ VY1; max 26/band, each band). Suggested frequencies: 1.825/1.875 3.525/3.775 7.025/7.070/7.155 14.025/14.150 21.025/21.250 28.025/28.500 50.040/50.125 MHz. Awards. Summary sheets available for an SASE. Mail logs within 30 days (include SASE or SAE/IRC for results) to CARF Contest, c/o Mr John Clarke, VE1CCM, 16 Keefe Ave, Sydney, Nova Scotia B1R 2C7 Canada.

1-2

Venezuelan Independence Day Contest, phone, sponsored by the Radio Club Venezolano, from 0000Z Jul 1 until 2400Z Jul 2 (CW—from 0000Z Jul 29 until 2400Z Jul 30). 80-10 meters. Classes: single operator, single band; single operator all band; multioperator, single transmitter; multioperator, multitransmitter. Exchange RS(T) and QSO number. Count one point for contacts between stations in same country, three points for contacts on same continent and five points for contacts on different continents. Multipliers: one for each YV call area contacted on each band and one for each different country on each band. Multiply total QSO points by total number of multipliers for final score. Plaques and certificates. Be sure to include a summary sheet and signed declaration of rule observance. Mailing deadline for phone is Sep 30; CW, Oct 30. Send to Radio Club Venezolano, Concurso Independencia, PO Box 2285, Caracas 1010-A, Venezuela.

5

West Coast Qualifying Run, 35-10 WPM at 0400Z Jul 6 (9 PM PDT Jul 5). See Jun 6 listing for more details.

6

W1AW Qualifying Run, 35-10 WPM at 0200Z Jul 7 (10 PM EDT Jul 6). See Jun 14 listing for more details.

8-9

IARU HF World Championship, see Apr *QST*, p 87.

9

ARCI QRP Summer Homebrew Sprint, CW, sponsored by QRP ARC International, from 2000Z Jul 9 until 2400Z Jul 9. Single band or all band. Work stations once per band. Exchange signal report, state/province/country and ARCI number if member or power out if nonmember. Suggested frequencies: 1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. If station worked is using homebrew add 5 points per QSO. Multiply QSO points by states/provinces/countries worked per band by power multiplier (1-5 W output × 7; 0-1 W output × 10). More than 5 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Bonus points for using home-brew equipment (HB): add 2000 points for each band an HB transmitter is used; add 3000 points for each band an HB receiver is used; add 5000 points for each band an HB transceiver is used (maximum of 5000 points/band on which QSO is made). Include description of homebrew equipment, commercial equipment and antennas used and indicate which equipment was used on which bands. Awards. Mail entry (SASE for results) before 30 days after the contest to Red Reynolds, K5VOL, QRP ARCI Contest Manager, 835 Surryse Rd, Lake Zurich, IL 60047.

15-16

CQ World-Wide VHF WPX Contest, sponsored by *CQ Magazine*, from 0000Z Jul 15 until 2400Z Jul 16 (48 hours). Use all authorized bands from 50 MHz through 1296 MHz (6 meters through 23 cm). Use all modes, except no repeater or satellite contacts. Classes are: single operator, single band; single operator, all band; single operator, single band, low power; single operator, all band, low power; single operator, portable (with temporary power source); multi-operator, single band; multioperator, all band; multioperator, portable (with temporary power source); FM only. Low power is defined as 25-W PEP output or less. Exchange call sign and 4-digit grid square. A station in a call area different from that indicated by his call sign is required to sign portable. Count 1 point per QSO on 50, 70 or 144 MHz; 2 points per QSO on 220 and 432 MHz; 4 points per QSO on 902 and 1296 MHz. Work stations once per band, regardless of mode. Multipliers are the prefixes worked per band. Multiply total QSO points times the total number of prefixes worked (the sum of the prefixes worked per band). Trophies and certificates. Send entries postmarked no later than Aug 31 to be eligible for awards to CQ VHF WPX Contest, c/o SCORE, PO Box 1325, Eatontown, NJ 07724, or to *CQ Magazine*, 76 North Broadway, Hicksville, NY 11801.

Colombian Independence Contest, sponsored by the Liga Colombiana de Radioaficionados from 0000Z Jul 15 until 2400 Jul 16. Only phone or only CW/digital modes. Single op, single band; single op, multiband; multiop, single transmitter. Bands: 160, 80, 40, 20, 15, 10. Exchange RS(T) and serial number (HK send 179). Score 5 points per QSO with HK-HJ stations; 3 points per DX station; 1 point with same country. Multipliers are DXCC countries and HK districts per band. Final score is total QSO points times total multipliers. Awards. Send logs before Aug 30 to LCRA, Apartado 584, Bogota, Colombia.

SEANET Contest, CW, sponsored by the Singapore ARTS. Work Southeast Asia stations, from 0000Z Jul 15 until 2400 Jul 16. (Phone portion will be held Aug 19-20.) 160-10 meters, single operator-single

(continued on page 104)

Special Events

Conducted By Phil Rice, WB9JKI
Assistant Contest Manager

Chillicothe, Ohio: The Scioto Valley ARC will operate W8BAP **May 27-28,** 1400Z-2200Z each day, to celebrate its annual Feast of the Flowering Moon festival. Suggested frequencies: SSB—lower 25 kHz of the 40- and 15-meter General and 10-meter Novice bands. For a certificate, send QSL and SASE to Ron Cade, WK8N, 747 Jefferson Ave, Chillicothe, OH 45601.

Mauchline, Ayrshire, Scotland: The Scottish tourist board will operate GB2RB **May 27-28** from the Burns House Museum. Suggested frequencies: phone 14.240 21.250 28.400; CW—10 kHz from band edges; RTTY—14.085 21.090. A special QSL will be sent out for each QSO.

Buckhannon, West Virginia: The Buckhannon ARC and the West Virginia Wesleyan College ARC will operate W8WVM on **May 28** from 1400Z until 2200Z to celebrate the 48th Annual West Virginia Strawberry Festival. Suggested frequencies: 7.250 14.250 18.150 28.350. For a special QSL, send QSL and SASE to West Virginia Strawberry Special Event, PO Box 65, Buckhannon, WV 26201-0065.

Hammondsport, New York: The Keuka ARA will operate KV2W from 1500Z **May 29** until 0030Z **May 30.** Operation will be SSB and CW in the lower 20 kHz of the General bands. For special certificate, mail QSL and SASE to James White, KV2W, PO Box 391, Hammondsport, NY 14840.

Karlsborg, Sweden: The Swedish Air Force will operate 7S6DO **May 29-Jun 4** for the 50th anniversary of the Vastgota Flygflottilj. They will be QRV 25-30 kHz up on CW. QSL to Bengt Hogkvist, SM6DEC, Blaberstigen 11B, S-546 00 Karlsborg, Sweden.

Scottsbluff, Nebraska: The Tri-City RAC will operate WØVQN **Jun 2-4** to celebrate the Centennial of Banner County. Suggested frequencies: SSB—3.920 7.240 14.250 21.300 28.400; CW—3.725 7.125 14.050 21.120 28.130. For QSL and certificate, send SASE to PO Box 925, Scottsbluff, NE 69363-0925.

Arlington, Texas: In celebration of the 75th anniversary of the ARRL, the Metrocrest ARS will operate W5AW from 1700Z **Jun 2** to 1800Z **June 4** during the ARRL National Convention. Suggested frequencies: SSB—28.300-28.500, 5-10 kHz into the General bands on 15, 20 and 80, and 7.230 up; CW—28.100-28.200, 5-10 kHz into the General bands; Novice/Tech bands. Send SASE for QSL to MARS, PO Box 117381, Carrollton, TX 75011-7381.

Everett, Washington: The Sno-Isle Skills Center will operate W7KZE from 1500Z **Jun 2** to 0800Z **Jun 4** in celebration of the Washington Centennial. Suggested frequencies: CW—7.100 14.050 21.100 28.100; SSB—lower 100 kHz of the General 40-20 and 15-meter bands plus Novice 10 meters. Send your QSL and a large SASE to Larry Luchi, c/o Sno-Isle Skills Center, 9001 Airport Rd, Everett, WA 98204.

Johnstown, Pennsylvania: The Conemaugh Valley ARC will operate WA3WGN **Jun 3** to commemorate the centennial of the flood of 1889. Operation on the lower General phone bands of 20 and 40 meters, plus the Novice-phone band. QSL to the Conemaugh Valley ARC, 194 Barron Ave, Johnstown, PA, 15906.

Sedalia, Missouri: The Central Missouri ARC will operate WAØSDO 1500Z-2300Z on **Jun 3** in commemoration of the Scott Joplin Ragtime Festival. Suggested frequencies in the lower portion of the General bands on 80, 40, 20, and 15. The upper portion of Novice 10. For QSL, send no. 10 to WAØSDO, 3700 S. Kentucky, Sedalia, MO 65301.

Portsmouth, Virginia: The Portsmouth ARC will operate W4POX from the Portsmouth Seawall Festival starting at 1400Z **Jun 3-5.** Suggested frequencies: 7.230 14.290 21.290. For a special QSL, send QSL and SASE; or for a certificate a 9-x 12-in SASE to W4POX, 2836 Greenwood Rd, Chesapeake, VA 23321.

Madison, Ohio: The Wireless Institute of Northern Ohio sponsored by the Lake County ARA will operate KO8O to commemorate Ohio Wine Month from 2300Z **Jun 3** until 0300Z **Jun 4** on 7.235 and 14.235; and 1500Z-1900Z **Jun 4** on 14.235 and 21.310. For certificate, send a legal-sized SASE to KO8O, 10418 Briar Hill, Kirtland, OH 44094.

North Olmstead, Ohio: The Westpark Radiops will operate W8VM from 0000Z **Jun 3** to 1500Z **Jun 4** to celebrate All Scouts Weekend. Suggested frequencies: lower portions of the General 80-10 meter phone; Novice CW and 10 meter phone. Send QSL and SASE to W8VM, c/o Glenn Williams, 513 Kenilworth Rd, Bay Village, OH 44140.

Glasgow, Kentucky: The Mammoth Cave ARC will operate KD4SS from 1100Z **Jun 3** until 2000Z **Jun 4** for the 4th annual Glasgow Scottish Highland Games. Suggested frequencies: CW—28.025; SSB—28.350, and also the lower portions of the General bands 80-15. For certificate, send QSL and a large SASE to Mammoth Cave ARC, PO Box 858, Glasgow, KY 42141.

Dade City, Florida: The East Pasco ARS will operate AB4LN from 1400Z **Jun 9** through **Jun 11** to celebrate the centennial of Dade City. SSB operation will be 10 kHz up from the lower edge of the General bands and the Novice 10-meter band. RTTY operation will be in accordance with the band plan. For certificate, send QSL and 9- × 12-in SASE to EPARS Centennial, AB4LN, PO Box 942, Dade City, FL 34297-0942.

Cooperstown, New York: The Otsego County ARA, Oneonta ARC and Chenango Valley RA will operate a special-event station **Jun 10** in conjunction with the 50th-anniversary celebration of the National Baseball Hall of Fame and Museum, and the 150th anniversary of baseball. Operation will be SSB in the Novice 10-meter band and General bands. For QSL, send QSL and SASE to the station contacted, c/o Postmaster, Cooperstown, NY 13326.

New Philadelphia, Ohio: The Tusco ARC will operate W8ZX 1700Z **Jun 10** to **Jun 11** from New Towne Mall to celebrate the 50th anniversary of our club. Suggested frequencies: 3.945 7.265 14.300 21.340 28.400. For QSL, send SASE to W8ZX, PO Box 725, New Philadelphia, OH 44663.

Taunton, Massachusetts: The Pilgrim AWA will operate KA1DTA **Jun 10-11** from city hall to commemorate the 350th anniversary of the founding of Taunton. Operation will be in the General phone bands. For QSL, send QSL and SASE to PAWA, Box 245, Raynham Center, MA 02767.

Madison, Indiana: The Clifty ARS will operate W9EFU from 1500Z-2100Z **Jun 11** to commemorate its 2nd Annual Novice Graduation. Operation will be 25 kHz up from the bottom of the Novice bands. Send QSL and 9- × 12-in SASE to Clifty ARS, PO Box 452, Madison, IN 47250.

Billings, Montana: The Yellowstone Radio Club will operate K7EFA from 1600z **Jun 10** to 0400z **Jun 11** and 1600Z-2300Z **Jun 11** from the area of the Battle of the Little Big Horn in commemoration of the defeat of General George Armstrong Custer and celebrating the Montana Statehood Centennial. Suggested frequencies: 7.265 14.265 21.365. For a certificate, send QSL and 9-×12-in SASE to Verlon Cox, K7AEZ, 1124 Parkhill Dr, Billings, MT 59102.

Chicago, Illinois: The Amoco ARC will operate W9GT from 1300Z **Jun 17** to 0100Z **Jun 18** to commemorate the 100th anniversary of Amoco. Operation will be CW, SSB and packet 80-10 meters plus VHF. For certificate, send QSL and SASE to Amoco ARC, Mail Code 0802, 200 E Randolph Dr, Chicago, IL 60601.

Joliet, Illinois: The Joliet ARS will operate W9OFR from 1400Z to 2200Z **Jun 17-18** at the Old Canal Days. Suggested frequencies: phone—7.265 14.265 21.365 28.365 and 146.52 FM. For certificate, send a no. 10 SASE to W9RCJ, 317 E 2nd St, Lockport, IL 60441.

Indianapolis, Indiana: The Nazarene AR Fellowship will operate WAØHPW/9 or NQØB/9 on **Jun 22-27** from the Indianapolis Convention Center and Hoosier Dome to commemorate the 22nd General Assembly of the Church of the Nazarene. Suggested frequencies: 7.275 14.305 21.385 and 28.383. For QSL, send QSL and SASE to K9HCT, 1130 Willowdale Ave, Elkhart, IN 46514.

Prince Edward Island, Canada: The Slemon Park ARC and the Provincial Assn will operate VE1PEI and/or VE1CFB Jun 23-25 during the World Junior Softball Championships. Operation will be on all bands. All contacts will be confirmed by the bureau upon receipt of a QSL.

Prince Georges County, Maryland: The Prince Georges ARES will operate a special-event station at the Prince Georges Worldfest from 1500Z **Jun 17** to 0200Z **June 18** to celebrate the 293rd anniversary of the county. Frequencies: SSB—3.982 7.225 14.338 18.160 21.440 28.340 and 50.130. Send QSL and SASE to PG-ARES, Prince Georges OEP, 7911 Anchor St, Landover, MD 20785.

Pasco, Washington: W7LA will celebrate the Washington State Centennial on Field Day weekend **Jun 24-25.** Operation will be 25 kHz up from the bottom of General bands. For QSL, send 4- × 6-in SASE to KE7PB at his *Callbook* address.

New York, New York: The Radio Club of Junior High School 22 will operate WB2JKJ 1100Z-2000Z **Jun 26** in recognition of the first day of summer vacation. Operation will be on 7.238 and 21.395. For QSL, send QSL to The Crew at 22, PO Box 1052, New York, NY 10002.

Crathie, Aberdeenshire, Scotland: The Scottish tourist board will operate GB2RBC **Jun 24-25** from Balmoral Castle, the Royal Residence. Suggested frequencies: phone—14.240 21.250 28.400; CW—10 kHz from band edges; RTTY—14.080 21.090. A special QSL will be sent out for each QSO.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Jul 1** to make the **Sep** issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

Contest Corral

(continued from page 103)

band, single operator-multiband and multioperator-multiband categories. Send signal report and serial number beginning with 001 on each band. SEANET country prefixes: A35 A51 AP BV BY C21 DU FK8 FR FW8 HS HL HS H44 JA-etc. JD1 KA KC6 KH2-through-Ø KX6 P29 S2 S79 T2 T3s VK-all VQ9 V85 VS6 VU2 VU7 XU XV5 XW8 XX9 XZ2 YB YJ8 ZK ZL-all 3B6-through-9 3D2 4S7 5W1 8Q7 9M2 9M6 9M8 9N1 9V1 1Z9. Contacts with SEANET countries count 2 points on 20-15-10 meters; 5 points on 40 and 80 meters; and 10 points on 160 meters. Double the preceding point values for bonus prefixes: DU HS YB 9M2 9M6 9M8 9V1 V85. (SEANET to SEANET contacts count 1, 3 and 6 points, respectively). Contacts within one's own country do not count. Multipliers are the number of SEANET countries worked × 3 for others, (× 2 for SEANET to SEANET countries). Send 2 IRCs for results. Send your entry to SEANET 89, Maxwell Rd PO Box 2728, Singapore 9047.

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W1AW Qualifying Run, 35-10 WPM at 2300Z Jul 29 (7 PM EDT Jul 29). See Jun 14 listing for more details.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Jul 1** to make the **Sep** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Hal Low, WA3WIY—ASM: Walt Dabell, KD3GS. ASM: Bill Ryan, WB3DPJ. Congratulations to Mark Miller (WB3KIS) and the Skyline Middle School ARC. They were just awarded $500.00 from The ARRL Foundation to promote education through Amateur Radio. Mark has worked long and hard to get SMSARC off the ground and has about 50 signed members. Novice classes are under way and should be a fine source of new hams. Good luck Mark and keep up the good work. If you have questions or need help from the ARRL, there are several volunteers in the state you can turn to. The Section Manager or either of the two Assistant SM's listed above can be a good first source. If they can't answer your question or give help, they know where to look. Other major volunteer positions in the state are: Section Emergency coordinator—Carl Schulak, NS3G District EC/ New Castle County—Jim Lanahan, WA3PHT District EC/ Kent County—Richard Brannen, KA3JCA District EC/ Sussex County—Jim Richardson, N3EZY Section Traffic Manager—Bill Rutherford, KA3GRQ Technical Coordinator—Jim Sevast, AF3R Bulletin Manager—Bill Martin, KD3GB Public Information Officer—Bob Reinhardt, KC3OQ State Government Liaison—Bill Remington, W3XU Affiliated Club Coordinator—Hal Low, WA3WIY. Not mentioned are Assistant EC's, Official Observers, Net Managers, Official Bulletin Stations, and Official Relay Stations. These people have volunteered their time to serve the needs of hams in Delaware. If you need them, they are there. If you would like to volunteer your time to help, contact the SM (see page 8) or either of the two ASM's. Net Report for March: DTN stns 343 tfc 33 in 23 sessns, DEPN stns 41 tfc 10 in 4 sessns, SEN stns 62 tfc 10 in 4 sessns. TOTALS: WB3DUG 34, K3YBW 32, WA3WIY 31, KA3GRQ 29, W3FEG 19, W3PVO 15, KQ5G 15, KD3GS 12. Late RPTS: Dec. W3PQ 75, Jan. W3PQ 45, Feb. W3PQ 50.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—Please write your evaluation of the no-code entry-level license proposal published in the May QST to W3ABC for his consideration now. Setting aside personal operating likes/dislikes, what is in the overall best interests of Amateur Radio? This is a time for reasoning, not emotional outbursts—for responding to what we have read, not to what is rumored. Before the Board meeting next month, Hugh wants to know what Eastern Pennsylvania's ARRL members think, after we read the proposal carefully. Time for Field Day fun again. Field Day messages to the SM must be in ARRL radiogram format (see the Field Day rules), no matter what mode is used. Messages may be sent to KC3LM via the nets or at either KB3UD or WB3JOE PBBS. RF Hill ARC has become an ARRL Special Service Club. Welcome our 3 new Affiliated Clubs: Endless Mountains, Tri-State (of Pike Co.), Phila. High School of Engineering & Science. KC3LM's visits to the Dauberville DXers and TRIAC were enjoyable, as was the annual Pack Rats ARRL Night with W3ABC. PARA's new officers are K3ITH, K3HLN, N3AYT, W3DJL and WA3CQU. Put the Central PA Ham/Computerfest on June 11 at Winfield on your list of things to do this month. There are some early July hamfests also: Murgas on July 2, and Harrisburg on July 4. On the appointments roster, we've added WA3CQU as OBS/PIA, WB3EVL as ORS, and KA3PLC as OES. Time to recognize the Section Staff in English instead of the usual alphabet soup! The Assistant SM's are Bob Josuweit WA3PZO (Havertown), Jim Post KA3A (Wilkes-Barre), Steve Phillips KO3B (Williamsport), and courtesy appointment John Brochon K3ZFD from TPARC frequency coordinators. Then we have Section Emergency Coordinator Bob Stanhope KB3YS (York), Affiliated Club Coordinator Brian Beitler KC3QB (Reading), Official Observer Coordinator John Obradovich W3IS (Camp Hill), State Government Liaison Steve White WA3IAO (Cheltenham), Section Traffic Manager and Bulletin Manager Tom Teel KB3UD (East Bangor), Public Information Officer Gene Pressler W3ZXV (Maple Glen), and Technical Coordinator John Thomas W3FAF (Holland). These gentlemen work very hard helping our Field Organization volunteers and Affiliated Clubs. D6ARES NM WA3CKA commends KU3R for managing the net while Joe attended to personal obligations. W3TWV, KA3KMH, N3EMI, and N3FGC completed training as D6 Net Controls. Traffic (March): N3AZW 682, N3DRM 366, N3CD 152, KD3AO 130, W3JKX 85, N3COY 79, KU3R 66, AA3B 64, W3KAG 60, KA3DLY 53, W3IPX 52, K3TX 45, KA3SKT 42, N3EFW 38, W3DP 27, WB3EVL 24, W3KOD 21, W3VA 21, W3AQN 17, WA3CKA 17, KA3MVM 14, W3CL 14, W3GJC 8, K3NB 7, K3ARR 6, N3FGC 5, W3ADE 5, W3FAF 5, KA3RGF 5, N3ERE 3, W3HK 3, K3WPI 3. Nets (March QNI/QTC): SEPATN 85/20, MARCTN 185/48, MARCARES 69/5, D6ARES 89/7, SCESN 82/3, D8ARES 73/1, EPAEPTN 623/196, EPA 475/151, PTTN 246/64.

MARYLAND: SM, Philip E. Battey, W3FZV—The new SM in this section will be Ken Cohen, NI3F, who was proclaimed the winner in March. Ken is an enthusiastic ham who is eager to get started with his new job; in fact, the current SM has already started giving him small tasks so that he can "get his feet wet." Please give him your support during his term, which begins July 1. The no-code issue is heating up and your input to the League will be very valuable. There are several questions: what freqs, power and difficulty of exam should "no code" persons have? Let's hear it! EC, Nancy Alley, is now NT3Z, and Jerry, ex-K2ILQ, signs NU3D. Congrats to them and to all who achieve the ham world's highest class of license! Our ACC, WA3YLO, spoke at the MD Mobileers ARC and recognized KO4A for his work in traffic handling. The AARC is sponsoring a county-wide (AA) picnic open to all ham clubs in the area. RCARA and the Peninsula Radio Operators Club have renewed as Special Service clubs. Recent events include the QCWA old-timers dinner in Bethesda, the Atlantic Div. Convention in Rochester, NY, and the National Conv. in Dallas. Upcoming is the Memorial Day Hamfest at the Howard Co. Fairgrounds. MARC News is one of the best of club bulletins with great articles. KJ3E is still Packeteer #1 around these parts. Now he's busy talking about the no-code issue by means of computers. And, he's using a landline network with high-speed links. N3ESR is a busy ham—speeches, articles, emergency work, and more. WB4APR likes ATV in the Annapolis area and KB3HH likes solar power. David McMillion is the new director of the MD Emerg. Management and CD Agency. Don't forget, June 24-25 is Field Day. A schedule of upcoming amateur exams appears each month in Auto Call. KW3X likes the idea of an LGL (Local Government Liaison). There's a new BBS in Salisbury on 145.01 with call KD0M. BAARS recently graduated 12 new hams. WITH THE NETS: NET/MGR QND/QTC/QNI: WITH THE NETS MSN/KC3Y 31/48/385, PON/WB3BFK 27/23/276, MDD/W3FA 62/215/549 (TOP BRASS NC3V/94 WA3YLO/84 K3GHH/81), MEPN/K3RXK 28/90/792, HOCARES/WA1QAA 2/3/25, MAVEN/W3YVQ 1/0/4. TRAFFIC W3IWI 507(BPL), KN1K 401, NC3V 248, K3GHH 166, NB3P 162, K3RXK 154, KC3Y 116, W3FA 113, KJ3E 88, W3YVQ 78, WA3YLO 75, N3EGF 73, K3NNI 71, NT3S 54, NC3Z 33, WB3BFK 28, W3LDD 22, K1BGT 21, W3EAX 21, NF3X 20, W3DQI 18, W3FZV 18, K3USO 18, KC3ZJ 13, KD0M 12, WA3GYW 11, W3ZNW 11, AG3L 9, KD3JK 8, WA1QAA 7, N3GDF 7, KA3DXX 7, N1FJW 6, KK3F 3, PSHR W3FA 95, W3YVQ 86, N3EGF 77, K3RXK 74, NC3V 68, WA3YLO 67, KC3Y 66, K3GHH 65, KJ3E 62, KD3JK 60.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: KA2RAF. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATC's K2JF, KA2RJA and WB2MNF. VE testing June 15, 7 PM sharp in the Basement Training Room at the Bellmawr Community Bldg. on Browning Rd. For further info, contact Bill Helmetag, WA2VQG at (609)546-7710 or (609) 939-3032. SPECIAL VE SESSION by the Cape May County ARC on June 11, (Sunday) at 10 AM at the Social Services Building, Rts 9 and 47 in Rio Grande. Talk-in will be on 146.01/.61. For further info, contact Mary, AE2Y at (609) 886-6739. Field Day weekend is the 24-25 of this month. Please don't forget to take advantage of the bonus points your group can collect by sending me a piece of traffic stating your group's name, FD location, the class you operating and the number of ARES operators participating. I'll be monitoring 145.05 MHz on packet and I'll be on the section traffic nets throughout FD. BCNU on FDI Until next month. 73. Traffic: WB2UVB 185, WB2ZJF 175, WA2CUW 119, KB2CDB 24, WA2GYF 18, NG2R 18, KA2CQX 18, W2FFE 12, K4FFM 10, WA4JRP 10, WA2HEB 4, WA2JAN 4, WA2JSG 4, N2AEP 2, WB2SYJ 1. PSHR: WB2ZJF 111, WB2UVB 92, WA2CUW 79, KB2CDB 54, KA2CQX 49.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. BM: K2KWK. PIO: WA2PUU. SEC: NN2H. TC: K2QR. STM: N2EIA. SGL: WB3CUF. OOC: W2MTA (A). ASM: W2GLH. Public Service Honor Roll: N2ABA N2EIA N3EVG WA2FJJ W2FR KC2HJ N2IKR N2IYA W2MTA WB2OWO WB2OIX KA2QOO ND2S NJ3V K2YAI KA2ZKM KA2ZNZ. March BPL: N2EIA W2MTA WB2OWO. Appointments: (OO) KA2MOO, (OES) KC2HJ, WA2IDA, KA2MOO, (PIA) KC2HJ, (STM) N2EIA, (ASM) W2GLH. Many thanks to W2AET who has served as Official Observer Coordinator for over five years . . . W2MTA will act in the interim, since Bob has stepped down as OOC. W2GLH has turned over the reins to N2EIA in Section Traffic Management, Dick continues as Assistant Section Manager. Silent Key: With deep regret we report the passing of Assistant Technical Coordinator W2AWB. Club Officers: Chenango Valley ARA: KI2Y N2GVB KA2AOT W2RME. Western New York Section League membership is up to 3375. Traffic matters: WB2ACV and KC3BQ continue as Section Packet Node Stations. Both W2ICZ and NA2B have had to curtail SPNS operations. EVENTS AHEAD: NY State/Atlantic Div. Convention, Rochester May 19-21. Lancaster June 4, Rome June 4, Cortland June 17, Batavia July 9, Traffic handlers picnic at Verona August 12, Liverpool ARC September 16, Elmira September 23?, Syracuse October 14. INTERESTING QUOTE: WE'VE FORGOTTEN THE QUESTION!" by KB6TWP. "The real question is, 'What can be done to bring new people into Amateur Radio?' " Now I'm not claiming that Amateur Radio should be marketed as an exclusive group or even advertised, "Amateur Radio, you gotta learn Morse Code, but it's worth it!" In fact, I support a no-code license with VHF only privileges. (Very little CW up there anyway.) My point is, however, that Amateur Radio should be marketed. Novice Enhancement failed for the same reason that a no-code license will fail—A LACK OF ACTIVE RECRUITING! Not one Amateur Radio organization bothered to put the news in Boy's Life, Popular Electronics, or even Model Airplane Builder. I don't think younger members of today's society are as interested in world-wide HF communications as I was in 1955. . . they would be interested in world-wide communication via an Amateur Radio Satellite, or getting their computer on the radio . . . young people today would be pretty interested to find out we have our own satellites that they could use to communicate. Tell a high-school computer class about packet radio. The bottom line is that Amateur Radio is one of the best kept secrets in the country."

NYSEMO	SSB	105/009/04	NYSR	CW	013/004/04
NYS/M*	CW	318/226/31	NYS/E*	CW	336/222/31
WDN/M*	FM	501/290/31	WDN/E*	FM	568/233/31
NYP*	SSB	220/253/30	TIGARDS	FM	050/004/04
NYPON*	SSB	609/366/31	BLUELINE	FM	170/015/30
ESS	CW	451/073/31	VHF THIN	FM	064/000/05
NYSPTEN	SSB	424/070/31	BRVSN	FM	302/005/31
LCARES	FM	034/000/04	CNYTN*	FM	300/095/31
OCTEN/E*	FM	677/089/31	OCTEN/L*	FM	250/043/31
Q NET	FM	416/003/31	WDN/L*	FM	520/140/31
STAR*	FM	205/037/29	NYS/L*	CW	287/235/31
PFN	FM	264/003/30	ORTN	SSB	024/000/05
JCRACN	FM	235/005/30	OARCN	FM	060/004/05

*NTS Net. Traffic: W2MTA 639, WB2OWO 613, N2EIA 569, NJ3V 432, WB2IJH 361, KC2HJ 337, WA2FJJ 327, KA2ZKM 227, ND2S 222, KA2QOO 188, KA2DBD 172, K2YAI 130, N2IYA 129, N2ABA 127, W2FR 125, NN2H 119, WB2QIX 107, KA2ZNZ 101, WB2OEV 75, KG2D 42, WB2NLU 42, W2UYE 42, K2QR 37, W2PPS 32, AF2K 28, N2DLN 24, N2EVG 24, KA2TWY 24, N2IKR 20, KA2DQA 10, KE2EA 8, WA2OEP 6, WA2JPB 2. (Feb.) K2QR 139, W2GJ 32, WA2JPB 16, WB3CUF 4. (Jan.) W2FR 153.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO & ASM: N3DOK.

Net	QNC	QTI	Sess	kHz	T/D
WPACW	241	109	31	3585	7:00 P/D
WPAPTN	503	124	31	3983	6:00 P/D
KFN	163	81	23	3983	1:30 P/D
PFN	187	103	31	.28/.28	5:00 P/D
WPA2MTN	337	58	31	44.53/45.133	8:00 P/D
NWPA2MTN	589	45	29		9:00 P/D

The NOARA drill in our area on April 4 was to all who participated a success. There are still many rough spots to be cleared up. We do have a fine group in the weather station in Pittsburgh's Weather Office. About 30 stations checked in to the Net Control Station. W3TZW was net control with an assist from K3KL. One major problem was 75 meters. It is not conducive to good reception and was worthless during the day. Stations next door had problems copying each other. I personally think we should try to make the necessary changes to make for better communications. Herb, WB3EHR, who is assigned the local weather station, is in the hospital and was not able to help KA3COX. He did a fine job at the site. The RED CROSS station was also manned and they did an excellent job. Contact was made with surrounding counties, so the drill answered questions. Packet was tested between Pgh and Johnstown. It is good for point to point in a fixed location. The University of Pittsburgh has some amateurs who are trying to get the club station back into life. If you can help, please do. March traffic: N3EMD 347, KQ3T 271, WB0KN 164, N3FM 132, WA3UNX 126, N3AES 78, NO3M W3NGO 66, KA3OEM 52, K3SMB 52, WA2QXA 46, W3RUL 43, KD3AC 15, KA3EGE 15, KC9HR 15, NR3T 8, N3KB 4. (Jan.) W3OKN 284.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9UBQ. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. DEC: WD9EBQ Illinois Section Sets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 220 DAILY
ITN	3705	1900 DAILY
CTN	149.69/09	2100 DAILY
ILARES	3905	1630 1ST & 3RD SUNDAYS

Illinois Independent Nets

IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCPN	3915	0700 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

The Great Lakes ARC recently held a ham radio seminar at the Naval Training Center, Great Lakes. Ham radio history, licensing, examinations, and an upcoming Novice course were presented. Three fully operational stations were set up by GL-ARC President WV7T. The first Novice license class had 3 attendees, one of whom was Rear Admiral Calhoun, Commanding Officer of Naval Training Center-Great Lakes. We welcome the following recent upgrades of the WIARC Novice class to ham radio: KB9CEO, KB9CET, KB9CEP, KB9CEQ, KB9CER, KB9CES and KB9CEU. BARS (Bolingbrook Amateur Radio Society) reports that the mayor of Bolingbrook will declare the week leading up to this year's Field Day as "Ham Radio Week." The York Radio Club provided valuable assistance to the Cystic Fibrosis Foundation for their "Climb-A-Thon." Thanks to WA9OHU, NU9B, KC9BD, K9BFU, W9KBU, N9GYR, KA9WSC, WB9ASX, WA9RIJ, N9HRU, KA9WZZ, KA9TTY, and WD9DOS for their participation. This is the fourth year that York Radio Club has helped with this event. Field Day is fast approaching, and I'm sure most groups are well on their way to planning a successful weekend. Field Day messages, as well as any other traffic may be sent to me on packet @ N9GTM, or by telephone at 312-741-6093 (Answering machine). I will be operating FD with the Elgin Amateur Radio Club this year under the call W9IKN, and can take traffic there also. Remember that FD messages must be sent during the FD period to count for the bonus!

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: WA9OHX. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Managers: ITN KA9EIV. QIN KJ9J. ICN KD9ER. VHF W9PMT. IWN KA9ERC. March Net Reports:

Net	Freq	Time	Daily	UTC	QNI	QTC	QTR	Ses
ITN	3910	1300/2130/2300		2704	358	1796		62
QIN	3656	1430/0000/0300		432	211	1108		62
ICN	3705	2315		104	34	518		30
IWN	3910	1310		1200		343		31
IWN VHF	Bloomington			728		310		31
IWN VHF	Kokomo			826		184		30
IWN VHF	FM Ligonier			739		320		31
Hoosier VHF Nets (22)				5868	321	5415		352

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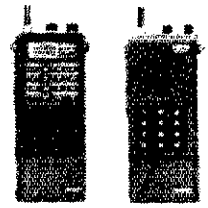

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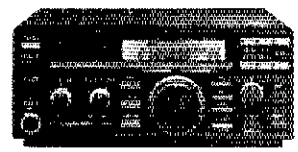

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D9RN for March 395 QTC 58 ses. IN 93% by N9DWU, K9ZLS, K9GBR, NX9I, WA9OHX, K9CGS, NR9K, KA9OZH, W9QVH. CAND 979 QTC in 31 SES. D9RN 100% by N9DWU, K9ZLS, NR9K, K9CGS, WA9OHX. WA9OKK Early Bird Wet Net Report for March 266 QTC in 2340 minutes and 26 ses. Silent Key: Henry "Hank" Stock, Gary In. Member ARRL, QIN, ITN, and IWN Hank will be missed. Appointments: EC Jefferson County, Theadore A. Winkel, WB9AHJ, Madison In. ORS Dan Steill, KE9OV Lafayette In. OBS Terry Gossman, N9GNF, Lafayette In. OBS William K. Kern, K9BEH, Bedford IN. Thanks to everyone who participated in the NWS tests on March 16. At 19:07 Z we had 127 checkins representing 18 counties. There were more checkins in the evening. Tornadoes touched down in Indiana on April 3 in the Evansville and Fort Branch areas. Congratulations to the Clark County Amateur Radio Club upon becoming a Special Service Club. The 23:00Z ITN on 3910 was reactivated with the time change April 2. The net is necessary. EC reports for March: W9BTZ N9DTG WA9DOL W9CFI KW9D KA9WJF N9FQA KA9VNK KA9RTD KD9RTD KD9HB KA9WCQ WD9BKA WA9JNC N9DUZ KB9AVS KA9SHM KA9FDF N9FQF KA9QME N9GYO KC9ZN WB9FLK WB9AHJ WA9SGA N9DUZ N9ENC W9EPT K9EFY N9FMO NO9G WA9HEE WD9HII NX9I W9KGE WB9LRR K9LMJ W9NPA WB9NCE WA9OQT WD9X K9SBW KA9FFO W9SIO N9DFU. Packet BBS Reports: W9ZRX 5216, N8GTC 1869, WA9UXP 1632, N5AAA 932, N9BAC 403, and WB9SYK 22. Traffic handling for the month of March 1989: KJ9J 229, K9ZLS 182, N9BS 178, W9UMH 127, WB9TFD 108, W9ZGC 104, N9DWU 103, WA9OHX 92, N9HZ 66, K9SBW 59, WA9QCF 42, W9PPO 39, WB9QPA 37, W9OCL 36, KA9ERC 29, WB9OZZ 27, K9FEI 26, N9DOR 24, KD9DU 23, KA9QMI 22, KB9SU 21, K9GBR 20, KB9HH 18, WB9IHR 18, WD9DWD 16, W9PMT 15, N9ENC 14, K9OUP 14, WA9OKK 12, K9ZBM 12, WD9HII 12, NX9I 12, W9BTZ 8, KA9RTD 8, WA9QVH 7, N9FMO 7, WD9CIV 7, W9CNE 7, NX9A 6, WB9NCE 6, N9DTG 6, KA9ZOD 5, WA9JNC 4, AB9A 4, K9DIY 3, KB9GK 3, W9OZJ 3, W9KMY 2, WB9AJY 1, W9BDP 1, NZ9S 1, KA9FFO 1, KD9ER 1, WA6OIZ 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9EP. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Milwaukee RAC exam on June 7th at Wauwatosa East High School, contact KE9JJ for details. MRAC has W9RH club station net control Fridays at 9 PM on 28.4 MHz. June 10th Wisconsin Chapter 55 QCWA meets for a delicious dinner, delightful meeting, radio-museum slide show, and junk-box auction at Wisconsin Rapid's Chalet Motel Restaurant, social hour begins 11 AM, guests and visitors are welcome. Racine Megacycle Club congratulated WD9DSZ as Ham of the Year, will meet June 12th at 7:30 PM with program to include Emergency Government official Pete Jensen. June 17th Dunn County ARC exams in Menomonie, KD9T for info. June 18th, Central Wisconsin RA will hold its Swaptest and Family Picnic at Stevens Point's Bukolt Park including Wisconsin Nets Association meeting, contact N9JW if you plan to take an exam. June 19th Wisconsin Chapter 162 QCWA meets for a show-and-tell meeting. On June 24th and 25th, Field Day, earn 100 bonus points for sending a proper message to either me or W9ZAG, Section Emergency Coordinator. Sorry to report Silent Keys KA9OGK and W9THN. New officers Madison ARA: Pres. KB9AQQ, V. Pres. WB9YSD, Sec. N9DRA and Treas. WD9HEX. N9HAL new President of Watertown ARC. W9NGT giving many club talks on tornado spotting. Milwaukee ARES fixing up communications trailer, issuing photo ID cards and promoting new public service ideas. New full featured repeater in Hayward area on 444.85 MHz is operated by N9EGE with 100 watts. Namekagon Valley Wireless Association has started quarterly newsletter called Wireless Communique. KD9FC used a computer to work at home. N9BMK graduated from U.W. Eau Claire. West Allis RAC is conducting newsletter article contest among club members to stimulate information exchange. The more an item costs, the farther you have to send it for repairs. WB9YPY 2119, KC9CJ 735, WA9W 633, WG9J 409, W9CBE 331, W9KLN 258, W9YCV 248, K9GDF 242, KA9BHL 194, WA9WYS 188, N9BDL 143, KA9KLZ 103, W9UCL 100, W9CXY 89, AG9G 72, N9BCX 70, W9NGP 65, K9AKG 63, AD9X 46, WB9ICH 44, KA9RII 42, K9FHI 35, K9UTQ 33, KG9B 32, KA9FVX 29, W9ODV 26, KA9TTM 26, K9JPS 24, W9UW 17, W9PVD 2.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—Well, we survived a month of wicked band conditions on 75/80 meters, especially the daytime nets. It wasn't easy, but hang in there, gang! As it turned out, March was a pretty good traffic month after all with a traffic count of 3,450, a very respectable total with 19 stations reporting. However, we need reports from all traffic handling stations and I know we are missing a few that are "traffic" active. So, we will look for an upsurge in SAR's next month. Welcome back to Judy, WBØWNJ, as Net Manager of MSPN/N following a month's leave of absence. Thanks Judy and glad you are back at it. I don't have the records at hand, but I think Judy, WBØWNJ has been a BPL qualifier for something like 30 months continuously! And, it is a pleasure to announce that Roger Schmidt, WØVBD, of North Mankato is the March Amateur of the Month. Congratulations Roger, keep up the good work and hope you get that new antenna system (tower) on the air soon. Riley, WAØCEL, of International Falls, reports that his daughter Debbie, also of International Falls, now is a Novice class licensee with the call, KBØEEM. Thanks Riley, and congratulations to Debbie. Thanks Gang, and until next time, 73 es GL. Jim Swisher, KAØEPY, STM.

NET	FREQ	TIME	QNI/QTC/SESS	NET MGR
MSN/1	3685	5:30P	360/96/31	NRØS
MSN/2	3685	10:00P	269/74/31	KDØNH
MSSN**	3710	6:00P	465/62/31*	KAØSBY
MSPN/N	3860	12:05P	302/207/31	WBØWNJ
MSPN/E	3860	5:30P	883/266/30	KCØT
MAW	3860	8:00P	311/189/21	KDØCI
PAW	3925	9:00A	2589/271/120	WDØBAC

*Additionally MSSN sent 89 Training Messages. Traffic: WBØWNJ 1162, WAØTFC 383, KAØEPY 379, KT9I 231, WØGRW 214, KAØPDM 199, NØFOO 159, KAØSBY 153, W9DM 94, NØCLS 86, NRØS 81, KDØCI 62, KØOGI 55, KCØT 42, NØJP 41, KAØARP 39, NØIYE 29, WDØGUF 26, WØKYG 15. Total traffic: 3,450.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—Peace Garden Hamfest July 7 to 9. Lots of fun for the whole family at the Peace Gardens. Lots of camping space, Flea Market, Meetings, Dance, Tests Xmitter Hunts, Sunday breakfast, Women's and Children's activities. Communications help is needed for the party of the Century 1 to 4 in Bismark—contact me. And for the KVRR Red River Canoe Marathon, June 10 to 19, Fargo to Winnipeg, contact KAØCHX or NØCBV. Silent Keys are WBØSJG in Az. and WØCDO. WØCDO's hamming days go back to spark. (In fact, Hugh showed me one of his spark-gap transmitters.) He was also long-time Net Mgr for the Goose River Net. Good turn out for the Fargo Moorehead Hamfest. SM presented WBØVHW & NØFAZ with the Certificate of Merit for their work in the Superlink Project. WØKZU, WAØHPN, WBØNAD, NØEPK, & WCØM went to the Mtn states Communications Conference in Rapid City. Also a big thank you to WAØLRE for providing packet BBS service to the upper Red River Valley. Now afte: 2½ years is closing down the BBS, but plans to stay active in packet. Traffic:

NET	FREQ	TIME	SESS/QNI/QTC	MGR
Goose River	1990 kHz	9 PM Su	3/60/0	
Data	3941 kHz	6:30 da	30/698/19	NØJR
Wx Nets	3885 kHz	9 AM- 12:30 PM	46/516/30	WØGFE
Storm Net	3941 kHz	DURING STORMS ONLY		WCØM

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—Asst SM: NØABE, WAØFPR. SEC: KAØKPY. STM: KDØYL. Congratulations to the Pierre Radio Club on their new newsletter. Mobridge Area delegation motored to Aberdeen to attend the Hub City ARC April meeting and we promoted the S. Dak. Centennial Wagon Train and attended a program put on by WDØHWL. When you read this, the Wagon Train will be on the road, so be sure you have signed up to operate on it. LARK area club member Jerry, KZØE, made contact with the SOVIET Space Station MIR-due to band conditions, the noon net has been moved to 40 meters on 7.250 MHz at 1815 UTC. Elmer, NØBUC, has won a trophy for his QSL card display at the all Hobby show in Aberdeen. Send SASE to NØABE in Sioux Falls for a map of Packet stations in South Dakota. Total traffic reported for March was 1429.

DELTA DIVISION

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5KR. SGL: KD5SL. TC: W5RWF. OOC: WB4ICV. Packet: NE5S. Recently elected officers of the Acadiana ARA in Lafayette are: Pres: Nick, K5QJX. VP Carolyn, KA5IJU. Sec: Betty, KA5DKF. Treas: James, N5KNX. The monthly newsletter, "The Pile Up" published by the Arcadiana DX Assoc. is much appreciated. The Ozone ARC in Slidell reported in their monthly newsletter of a recent experimental link between the Slidell repeater and the 440 repeater in Arcadia, California by accessing both autopatches via Ma Bell. Both groups enjoyed the roundtable between their members and are now thinking of trying it again with a group of linked repeaters up and down the California Coast. Ei, W5MD, president of Baton Rouge QCWA Chapter 109 had the recent pleasure of presenting the QCWA Diamond Jubilee Award to Ernest McNeil, W5MI, marking the 75th anniversary of his first amateur license as 5AW in 1914. Ernest is now 94 and still very active on CW. How about that. A note or card of congratulations would be a nice gesture. Recently elected officers of the Jefferson ARC in Metairie are: Pres: Jerry, WB4ICV. VP: Larry N5JZP. Sec: Bob, KB5GQ. Treas: Al, WD5CFC. Now is the time to get ready for their 1989 New Orleans Hamfest on June 17 & 18 at the same location in the Bonnabel High School in Metairie, La. Last year was a big success. Dealer and swap table advance reservations indicate it will be even bigger this year. More details listed in *QST* Hamfest Calendar. Thanks to the NTS traffic volunteers: DRN-5 Mar 89 643 msg in 62 sessions with La rep 69% by WA5WBZ, K5WOD, KF5BW, N5CNK, N5LRZ, K5ABD. 73 & GL de K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. PIO: NM5D. BM: W5EPW. ACC: NC5Y. SGL: KA5WRX. BM: KB5W. OOC: KK5K. TC: KF5DE. Due to severe Wx moving into the state, KK5Z, SM, activated the Miss SEC Fone Net into emergency session at 0115Z/5 Mar 89. With N5DVR as NCS, some 40-50 stations in Miss and Al assisted in relaying info to NWS, NOAA, and to those stations in the projected path of this activity. The Net stayed in session until it was evident that these storms had moved out of Mississippi. Lives were saved due to this action by our Mississippi Hams. "Well done" to all participants. Net mgr N5HBB for the Mag Sec Net, has initiated a program, with the help of W5VZF, That once each month, stations which can op on emergency power, check into the net with their call followed by "slash E," indicating that they are operating on battery, solar or generator power. This indicates to all exactly what could be accomplished during the real thing. Gud job, "Biscuit" and Jim. Mag Sec Net (N5HBB) sess 31, QNI 794, QTC 7. Miss Sec Fone Net (KF5DE) Sess 31, QNI 2002, QTC 47. Miss Tfc Net (KB5W) Sess 31, QNI 177, QTC 73. Tfc: KB5W: 0-3, S-171, R-204, D-5, Tot: 383. DRN5: (WB5YDD) Sess 62, QTC 643. MS rep 100% by KB5W, KT5Z, NS5M and W5HKW. Again, welcome to KF5DE, new SM. Thanks to all for your help and support for last two years. 73 de KK5Z.

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO: W4TYU. Central Assistant SM: WA4GLS. Western Assistant SM and ACC: K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. Newspaper publicity for TN hams has been much heavier than usual this month! The Morgan County ARC finally received permission from the state to install a repeater atop Frozen Head Mountain. The governor, forestry and park officials, state representatives and senators, the sheriff's office and many other groups and individuals were to be thanked for their efforts on behalf of the club. The March, 1989, CQ Magazine honored the Ricky Givins family of Pleasant Shade. Ricky, KA4BOT, his wife Vicky, KC4DQT, 11-year old Robin, KC4DQU, and 10-year old Hope, KC4DQV, were featured on that publication's front cover. The Knoxville News-Sentinel and the Oak Ridger reported on four TN hams working the Russian "MIR" orbiting space station. Betty, Oakberg, N4ZLZ, Doc Emerson, W4ITJ, and N4PUQ, Jim Kerns worked the cosmonauts on Friday, March 24 at 4:04 AM. Then Steve Wallace, N4PWO, made contact on Sunday, March 26. Congratulations to these Oak Ridge and Oliver Springs hams for some fine publicity for our hobby. DRN5 Net Manager WB5YDD reports TN represented at 79% of its 62

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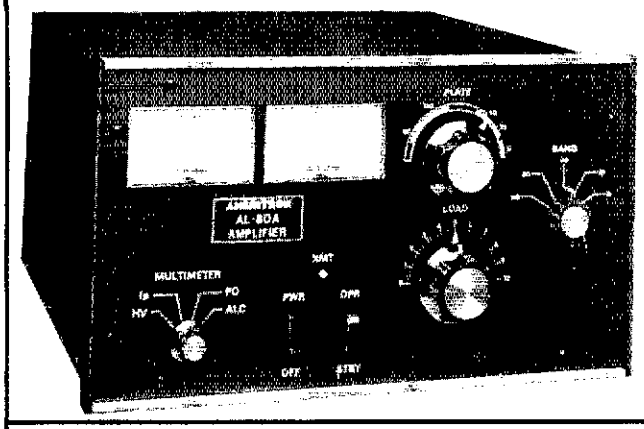

AL-80A LINEAR AMPLIFIER

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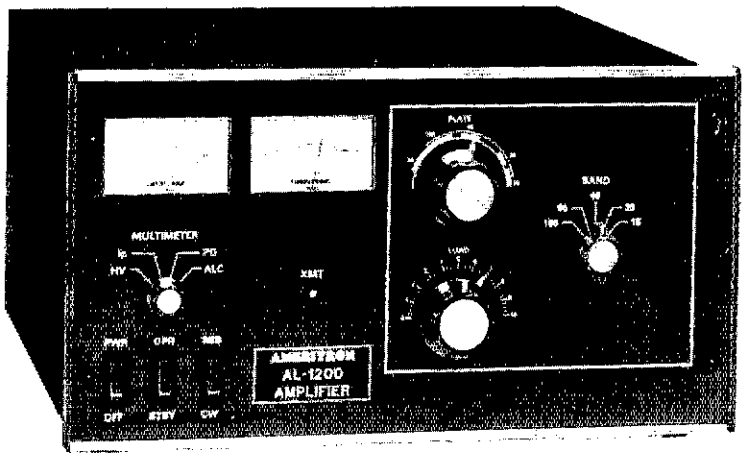
The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

Size: 15½"D. x 14"W. x 8"H. Wgt. 52 lbs.



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Full legal output with 100 watts drive.

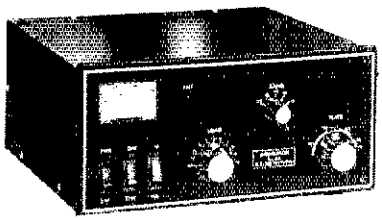
AL-1500 LINEAR AMPLIFIER

8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs.



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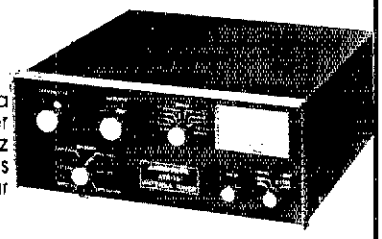
The **Ameritron AL-84** is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

Size: 11½"W. x 6"H. x 12½"D. Wgt. 24 lbs.

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 allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

Size: 6"H. x 13¼"W. x 16"D. Wgt. 14 lbs.

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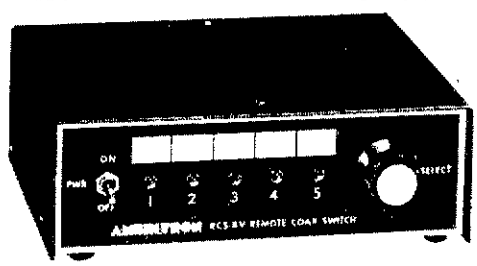
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum.



RCS-8V FOR SPECIAL APPLICATIONS

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Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

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sessions by K4WWQ, NG4J and WD4GYT. Morning 75-meter Net Manager W4PFP reports 31 sessions, 2009 QNI and 61 QTC. Evening 75-meter Net Manager WA4HKU reports 23 sessions, 1677 QNI and 360 and QTC 14. West TN WX Net had 31 regular sessions, 1 Emergency and 1 Simulated Emergency session with QNI 925, QTC 515. Traffic: WA4FMR 133, WA4GZZ 88, W4DDK 78, KA5KDB 71, W4MI 49, K4WOP 47, W4TYV 46, K4WWQ 40, W4PFP 28, WA4HKU 27, WB4LAL 26, K4CXY 24, W4PSN 6.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (March) I enjoyed meeting some of you at the Mammoth Cave and Elizabethtown Hamfests. The ARRL Forum was very informative with comments on no code by League VP W4OYI. If you are for or against no code, now is the time to let your voice be heard. The next hamfest is in Erlanger on June 11th. See you there. WA4EBN is doing a fine job with the Novice net. WD4RWU reports increasing activity for the MKPN. We can still use some help with NCS slots for KTN. The OO program continues to grow under the able leadership of KC4WN.

Net	QNI	QTC	Sess	Mgr
MKPN	1434	200	31	WD4RWU
KTN	919	111	30	WD4RWU
KYN(both)	312	143	62	K4AVX/KZ8Q
TSTMN	417	37	31	KZ8Q
KNTN	240	85	39	WA4EBN
KRN	613	21	—	K4NLY

SAR (Mar): WD4RWU 317, K4VHF 176, KI4QH 85, KB4UJA 72, N4PET 62, WA4EBN 45, K4AVX 39, KA4MTX 33, WA4SWF 28, WA4NOG 17, KC4WN 13, WB4AUN 12, W4TPB 11, WD4CQF 8, N4PEK 7, WA4HLW 7, WM4T 5. PSHR KI4QH 99, KA4MTX 65.

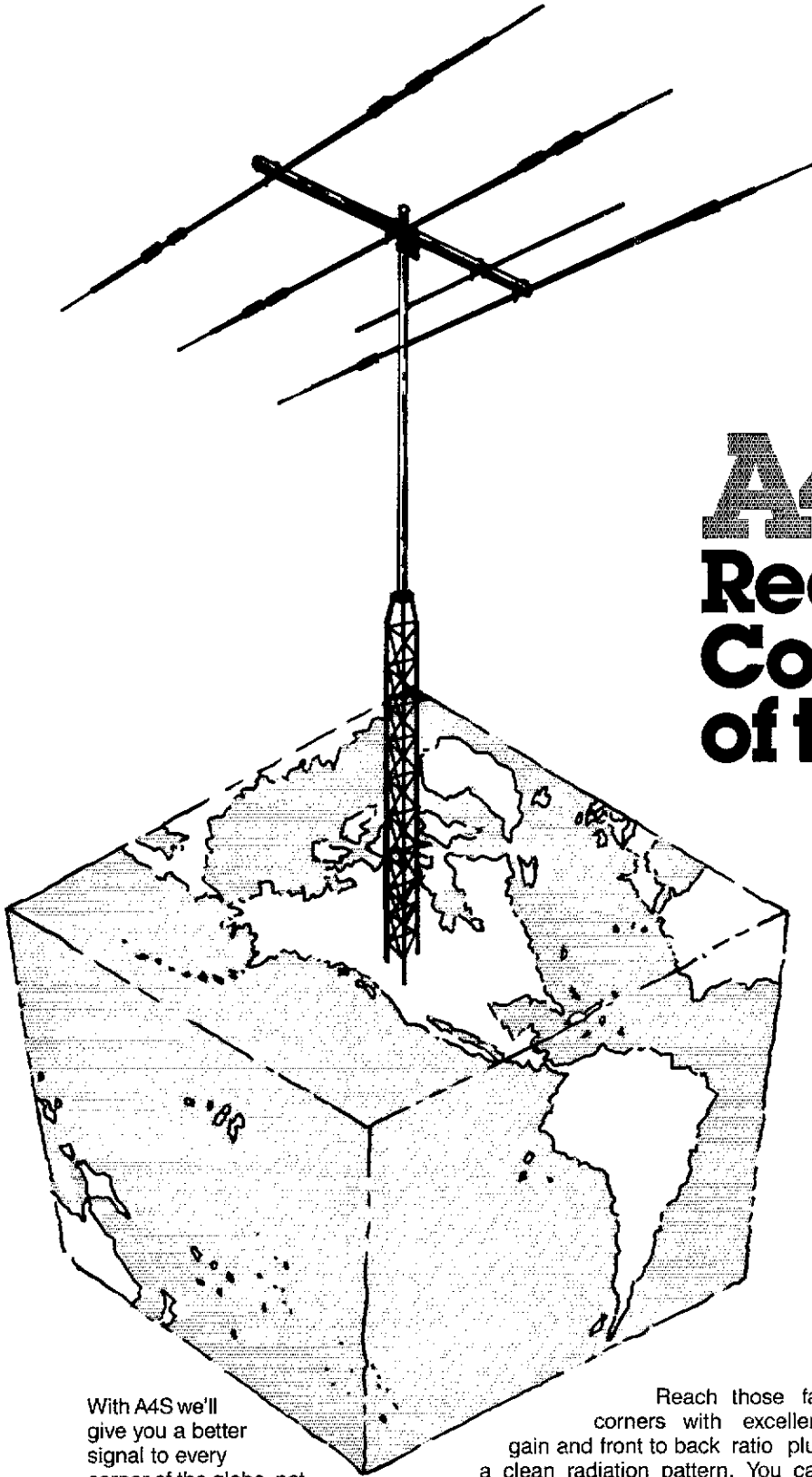
MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—ASM: WA1LRL (@WA1LRL). STM: WD8KQC (@NT8R). SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. ACC: N8JVA. PIO: KA8ZOV. BM: WI8W. This month's guest columnist: WD8KQC. Silent Keys, with great regret: K8KM and K8KF. I should like to join our SM/SEC, WB8BGY, in thanking retiring ECs Daun Yeagley, N8ASB, Mike Cleary, N8EQD, and Ed Irwin, KA8QVH, for their many years of fine service to the Michigan Section. Jim Hundley, N8AYQ, has taken the reins as EC of Grand Traverse County in addition to his role as DEC for District 7. Congratulations and "welcome aboard" to newly appointed ECs Larry Austin, KA8PWB, of Kent County and Dale Schnepp, N8IIC, of Oakland County. Dale is also Ass't NM of the very busy Southeast Michigan Traffic Net. It is gratifying to note yet another example of a Michigan Section official performing dual ARPSC roles in ARES/RACES and in the NTS. This versatility greatly enhances our overall public-service communication effectiveness. "Well done!" to those ECs who have already completed the ARRL Emergency Coordinators' Training and Certification Course. This course is highly recommended for present and prospective ECs and DECs. Course materials are available from WB8BGY as SEC. Congratulations also to Dick Kowitz, W8RCM, the new HF Awards Mgr of the Motor City RC, an ARRL Special Service. Kudos to John Shook, N8IUM, for his FB article "Getting Reconnected to the World" in the Spring issue of HANDI-HAM World. Outstanding achievements like these make me proud to be a Michigan Amateur. The Allegen County ARC celebrated a highly successful first year of operation and has announced the following new officers: Pres. Bryan, N8HRN. VP Ron, WB8AHL; Sec. Jim, N8DAG and Treas. Ken, N8KOC. More new club officers: Bay Area ARC: Pres. Bob, N8BBR; VP Early, WB8SIJ; Sec Bob, WG8X; Treas. Bob, KD8TR; Central Michigan ARA: Pres. Greg WB8LZG; VP Harold, WA8LAY; Sec. John, NG8L and Treas. Michael, WD8DIX. A productive meeting at the Marshall Hamfest, chaired by Tom, WA8URE, was attended by SYSOPs of many "full-service" Michigan Packet BBSs. Representatives of your Section Staff and Packet SYSOPs from neighboring states and Ontario, Canada. Be on the lookout for major enhancements in packet networking in and around Michigan in the near future. We need to take better advantage of the enormous public-service resource this mode represents; please help get the word out. Judging from the Club newsletters available to me, preparations for Field Day (June 24-25) are in full swing. In view of the widespread concern over amateur census/growth consideratons, this year would be a most opportune time to emphasize the publicity/public-relations aspect of Field Day. Have a safe, enjoyable Field Day. 73. Please support the following MI area Nets:

Net	Freq	Time/Day	QNI	QSP	Sess	Mgr
UPN*	3921	5:00PM Dy	1266	68	35	WA8DHB
MACS*	3953	11:00AMM-Sa	310	44	31	K8OCP
MiTN	3953	7:00PM Dy	625	194	31	WD8EIB
QMN*	3683	6:00PM Dy	736	166	59	WB8R
SEMTN	145.33	10:15PM DY	368	95	30	N8HSC
MNN*	3722	5:30PM Dy	327	61	62	KA8SBY
GLETN	3932	9:00PM Dy	1080	89	29	NW8M
WSSBN	3935	7:00PM Dy	539	25	31	W8NDI

QMN Fast- 6:30 PM Dy; QMN Late-10.00 PM Dy; MNN-8:00 PM Dy; MACS-1:00 PM Sun; UPN-12:00 PM Sun. Traffic for March: KA8CPS 283, KA8BBY 214, WD8KQC 175, WB8SYA 123, WA8OOH/BBS 114, NW8M 111, WA8DHB 98, N8FPN 97, K8GXV 86, NY8W 74, N8IIC 73, N8CNY 67, N8HSC 61, WB8BGY 58, WB8R 54, N8JAT/BBS 48, WB8YPG 40, WD8EIB 35, K8CQF 32, K8UPE 31, KD8LZ 31, W8YIQ 29, K8OCP 24, W8RNQ 24, WN8H 24, WD8MJB 23, K3UWO 17, N8FTY 16, KA8BYK 15, K8ZJU 13, WI8J 12, K8VA 12, KI8Q 10, W8MVH 9, W8CSO 8, W8URM 7, NX8S 6, W8YZ 5, KN8JDN 4, N8EXS 4, WB8WJV 4. Feb. Traffic: K8GXV 78, WB8WJV 6.

OHIO: SM, John Haungs, WA8STX Phone: (513) 563-7373—ASM: David Kersten, N8AUH, Ph (216) 221-6740. SEC: WD8MPV. STM: KF8J. ACC: KJ3O. ACT. BM: W8PH. TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QDE. March 1989:

Net	QNI	QTC	Sess	Time (Local)	Freq	Mgr
BN(E)	229	92	31	1845	3.577	WD8C
BN(L)	232	118	31	2000	3.577	K8TVG
BNR	264	732	31	1800	3.605	W8EK
BSSN	241	132	31	1900	3.873	K8OZ
OSN	382	73	31	1810	3.708	WD8KBW
OSSBN	1955	1036	93	1030 1815 1830	3.9725	KA8CQF
OSSN	192	116	31	0845 M-F	3.577	KD8HB
OSSN	—	—	—	0800 S-SU	3.708	KD8HB



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OHIO SECTION AREA NET 1700 SUN 3.875 WD8MPV

Dayton HamVention was as usual a mass of Amateur Radio operators again this year. The ARES Forum was well conducted and held the attention of those in attendance. Emergency Planning was discussed and new information was handed out. Now that the HamVention is over, the summer public-service activities can start. This will keep the Public Information Officers and Assistants busy informing the public what the amateurs are doing. Most club activities seem to slack off during the summer so it takes a little more effort to get the amateurs out to meetings. It is a good time to have a fox hunt or a Simulated Emergency Test and end up at a picnic location for the end-result critique. Let's hope we don't have too many summer emergencies. Champaign-Logan ARC news letter editors, N8JZC and N8JZB did a great job on Tornado information and reporting Tornadoes in the March-April issue. Paul, KC8NM, has put a lot of work into the ARES Emergency Response Plan. I am sure Larry, WD8MPV, the Section Emergency Coordinator will be interested in seeing the total plan. The OH-KY-IN Amateur Radio Society celebrated its 28th Anniversary. The 1989 "Ham of the Year" honor was a joint award to Brad, WD9HDZ, and Susie, N8CGM. The OM and XYL team were proud recipients. It is time to make plans for the ARRL annual Field Day activity. Let's hope we don't have another record 103 degree Sat this June. Make plans for publicity by having your local Mayor declare it "Amateur Radio Week" and have a copy for your local newspaper. Don't forget to originate a standard ARRL format message from the club president to the SM or SEC stating the club's name, the number of operators and number of ARES members participating. To help conserve our frequencies, we must be prepared to live up to the FCC rule on one of the purposes of Amateur Radio, of providing communications during disasters. To show your support, sign up in your local ARES organization. We are sorry to report that the Section Bulletin Manager, Bob Zimmerman, W8ZM, passed away on March 30. Bob was very active on the nets with the latest bulletins. Bob was also active on packet and into satellite communication. DARA is planning a Scholarship Fund in Bob's name. Doug Horner, W8PH, from Dayton, has volunteered to act as Bulletin Manager in the interim. Larry Solak, WD8MPV, reports a new EC appointed for Lake County, James Goffos, WB8ZGM. Traffic: W8ZOL 588, KD8KU 351, W8BO 321, KD8HB 292, K8JDI 291, W8PMJ 246, WD8IKC 230, WD8QXT 215, W8QZK 211, WA8SSI 207, N8IIP 192, WD8KFN 163, W8SKP 163, KA8GJV 131, WB8JGW 134, KA8CGF 130, KC8YV 125, W8LDU 125, KA8HBN 114, K8ALV 112, W8CXM 111, WA8HED 102, N8FWA 94, W8EK 90, K8IOW 84, K8DHD 76, K8CMR 75, N8XX 71, KA1S 66, N8GPU 59, KA8BNQ 58, WD8RIB 54, W8PBX 52, KC8TW/PBBS 50, WA8EYQ 47, NS8C 46, WB8HHZ 45, WB8KWC 42, KA8SON 41, K8ES 32, WB8FSV 31, KA8YIT 30, N8GOB 29, NC8Q 28, W8LDQ 28, W8BDC 27, KC8UR 27, N8EFB 27, KE8WK 27, N8CEI 24, KE8CV 24, WB8VNV 23, N9AUG 22, KA8DRR 21, N8FPH 21, N8CW 19, KC8XL 17, KB8ABO 16, N8JYV 15, KB8ESU 15, N8AJU 14, WD8JYE 13, K8CKY 11, WA8NZE 10, W8GDQ 10, WD8PWG 10, N8HRW 9, W8FPA 9, KA8DQF 9, N8JSN 9, KA8RIX 9, N8HJB 8, KA8RQX 8, N2NS 7, NW8E 7, K8LQM 6, KD8IC 6, K8WZX 6, KB8EEX 6, W8RG 4, KA8VYT 4, W8XT 4, K8DXZ 4, N8GIO 4, KE8DQ 4, K8EF 2. (Feb) WB8VNV 31, N8CDN 10, N8HRW 9, W8RG 2. (Jan) WD8CSP 1. (Dec.) KA8GJV 80.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM. STM: WB2EAG. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. ASM & NWSLTR ED: WB2NHC. ASM/PACKET: N2FTR. NET REPORTS FOR MARCH(QSP): AESN 2 CDN 63 ESS 73 HVN 51 NYP 253 NYPON 366 NYSE 222 NYSL 235 NYSM 226 SDN 107. CLUB NEWS: Albany ARA: had Q & A session in April. WA2YBM reported that WA2YBM W2CJO KA2VAH KA1PRT WB2BEJ N2HBG assisted in an 8k race on Mar. 12. They welcome new members W2IJC N2HFV WD8DSL.Catskill Mtn. ARA reports on KB2EMQs tower problems. WB2EAG made a presentation on traffic handling at Rip Van Winkle ARS. Saratoga RACES heard W2JVF talk on contesting and experimentation on the GHZ bands. Schenectady ARA learned about CAP and Ham Radio from WB2BEJ in March and heard about fox hunting and skunk hunting in April from W2XL and N2LL. They report new members KB2FTU N2ITZ KB2BOZ WA2SRP KA2QID KA2WHE WA2JND. W2SZ is busy linking repeater to 10 meters, holding packet classes by WB2KMY, held open house. They heard WA2AAU on u-wave propagation and equipment. WARA heard about shack accessories. WECA learned about CAP. Yonkers ARC had a presentation by WB2NVR on TFC and Emer.Comm. WB2NVR, EC, WEST. made presentation to West. Cty Fire Chiefs about ARES/RACES. PEARL will have message fair on June 3/4 at Put.Comm.Hosp. 25 anniversary. WA2YBM reports April 2 White Water Derby had Albany Saratoga, Rensselaer and Schenectady working together with KN2I KM2I WB2CNS WA2GYY KA2VAH KA2ADM KA2AFL KA2DYQ WA2YBM W2CJO N2GXH KA2AXN WB2ZCM KA2VAR KB2GPX all helping. WB2EAG is available in ENY to talk on Traffic handling. March PSHR: N2MEA WB2EAG WB2VUK WA2JBO K2ZVI WB1BTJ KB2EPU WB2NVR. March BPL: WB1BTJ. March traffic: WB1BTJ 638, N5MEA 298, WB2VUK 212, WB2EAG 195, K2LYE 162, WB2IIV 145, WA2JBO 112, NQ2H 106, K2ZVI 95, KB2EPU 86, N2HIF 86, K2HNW 47, WD2K 42, WA2GYY 38, WB2NVR 20, WF2M 13, N2HTT 12, W2CJO 9.

NEW YORK CITY-LONG ISLAND:
SM, Walter M. Wenzel,KA2RGI—ASM:N2GQR ASM VE:W2NL ACC/PIO:KA2LCC SEC:WA2UJI STM:K2MT OOC:NB2T TC:W2QUV BM:W2JUP The following are traffic nets in and around the section that handle NLI:

Net	Freq	Time	Day	Mgr
BAVHF	145.350/R	2000	DLY	K2TWZ
NCVHF	146.745/R	1930	M-F	N2IMP
SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3913 kHz	1700	DLY	KA2UBD
NYS/M	3677 kHz	1000	DLY	N2EIA
NYS/E	3677 kHz	1900	DLY	KU2N
NYS/L	3677 kHz	2200	DLY	KU2N
NLT	28450 kHz	2100	WED	N2IMP
ESS*	3590 kHz	1800	DLY	W2WSS
PNS	145.01	24hr	DLY	AI2Q-4
PNS(Alt)	145.03	24hr	DLY	WB2IBO-4
PNS(Alt)	144.79	24hr	DLY	W2HPM-4

*Independent Net, recognized by NTS, all times are local. VE

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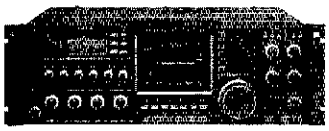

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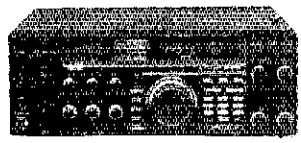

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IC 32 AT
Dual band

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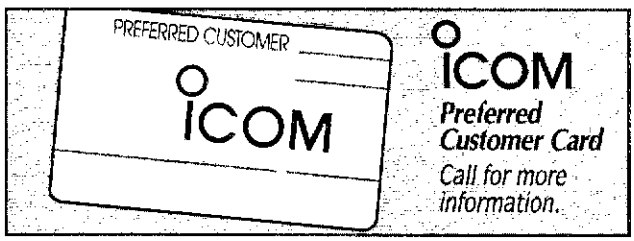

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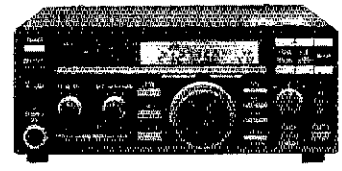

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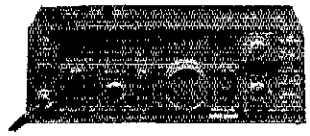

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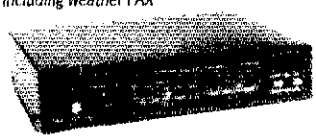

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LISTINGS: LIMARC-second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology,Old Westbury-contact Al Jones,W2ZDB 516-676-5790 SUFFOLK COUNTY VE TEAM -second Saturday of each month at 9:30 AM at the Suffolk County Community College, Selden- contact George Sintchek,WA2VNV 516-751-0894; GRUMMAN ARC- second Weds. of each month, until June, at 5 PM at the Bethpage High School, Bethpage, starting July, second Tuesday of each month, at 5 PM at the Grumman Recreation Center, Bldg. 800, South Oyster Bay Road, Hicksville- contact Howard Liebman W2QUV 516-354-6861; GREAT SOUTH BAY ARC-fourth Sunday each month at 12 Noon at the Babylon Town Hall Annex, North Babylon-contact Walter Wenzel, KA2RGI 516-957-5726; MAARC-last Thursday each month at 6:00 except July, Aug. and Dec., at the Robert Wagner JHS, Manhattan-contact Rubina Asti, KD2IZ 212-838-5995. If your group holds regularly scheduled license exam sessions and/or classes let me know so they can be added to this listing. It is with deep sadness that I report the passing of Dom K2YQK who was not only the Big Apple Net Manager but also very active in MARS and other traffic nets. Dom will be missed by all who he has touched and aided. Recent appointments within the section include: Harry Morton Jr., W2NIP, Harry Morton III, WB2IBO, Norman Wesler, K2YEW, Robert Trepanowski, N2HZW, Marty Miller, NN2C, Tom Giblin Jr., NY2S, Robert Wexelbaum, W2ILP, and Norbert Wengler, K2DOD, as Assistant Technical Coordinators, Marty Goldstein, N2FDK, as a Public Information Assistant, and Rich Panzer, K2TWZ as Net Manager for the Big Apple VHF Traffic. I also want to wish the best of luck to Bryson Davis, WB2BFE as he moves out of the area and steps down as EC for Smithtown and I also want to welcome Bill Savarese, N2HII, as he steps up and takes over the reins from Bryson as EC. My special thanks to Joe Kolb, W2NL who has held the position of Assistant Section Manager for VE Testing since the start of the program here in NLI. Joe, may you and your family have much happiness in your relocation plans to go down south. The section is still looking for people to assist in the capacity of ATCs, PIAs, and OOs. If you are interested please contact me for more information.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs NW2L (NE), N2CXX (SE), N2WM (NW), WB2NQV (SW), N2XJ ((Cen) and VE), SEC WB2HBZ, STM K2VX, OO/AAC KA2RZS, ACC K2BJG, SGL W2KB, TC K2BLA, BM WA2UPK and PIO NW2L. NNJ Ham Radio Info Line 201-680-1585 Appointment endorsements for the next two-year term starting 06/89 are: Herb Eldert, KA2DAU District Emergency Coordinator (DEC) for Union County. Also, OES. New appointments effective 04/89 are K2GVC EC for Bloomfield. Applications for Emergency Coordinator (EC) certification have been distributed by our SEC to all DEC's. If you are now a NNJ EC and wish to be certified, please contact your DEC. The Irvington RAC is working towards Special Service Club status. Congratulations to the following who were newly licensed or upgraded during March sessions conducted by: Northeast NJ Testing Asso. (11/21), Sussex County ARC (15/30), NNJ VE Board (21/31) and Bergen ARA (7/30). Novice (10): T Anderson, C Gordon, D Lilly, J Bobrow, C Cartwright, A Del Re, D Gill, M Gupta, T Sandler, M Zador. Technician (13): KB2AML, KB2CUI, KB2DCV, KB2EFT, KB2EZY, KB2GHT, KB2GVJ, KB2EYB, KB2GUN, KB2GUO, KB2GUY, KB2GVB, KB2GVC, KB2GVD, KB2GXS, S Duff, M Osborne, KB2GBA, KB2GCV, KB2GRO, KB2GQR, KB2GXR, KB2HAG, KB2HAL, KB2HGN, G Mazmanian and J Rosenberg. General (8): N2IRY, N2IUK, KA2UPD, KB2GVE, K Mandell, KB2ERX, KB2GIJ and KB2HAK. Advanced (3): KB2EVB, KB2FZA, N2JUG, KB2FBJ and KB2HBT. Extra (2): WA2EXX, KB2HBS KE2LG and KA2NYW. Total applicants (112). Correction to December 1988 column: W2QGA upgraded to Extra in November. Total New or Up-Grade (60), 53.6% Traffic nets and statistics for March 1989 follow.

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3695	1000	Dy	32	258	120
NJPN	W2CC	3950	1800	Dy	35	346	127
NJ/E	W2ONL	3695	1900	Dy/P	31	294	146
NJN/L	WA2OPY	3695	2200	Dy/P	31	140	45
NJVN/E	WB2FTX	146.895	1930	Dy/P	31	702	101
NJVN/L	N2FGC	146.49	2230	Dy/P	31	289	164
NJSN	KA2INE	3735	1830	Dy	31	180	44
OBTTN	W2RRX	147.12	2000	Dy	31	282	126
NJTTN	N2DXP	223.88	2100	Dy	31	169	39
NNJ/PL	W2ONL	145.01	24 hr	via		WA2SNA-1	

Packet NTS activity: Total 156, WA2SNA-1 auto forward (76) plus liaison (80) by NZ2T (11), W2ONL (60), W2KB (1), WA2EXX (1), WB2FTX (5) and KC2YG (1). SAR/PSHR: W2RRX 170/94, K2VX 175/103, W2ONL 387/127, N2XJ 276/97, N2DXP 408/72, KA2INE 109/78, W2FTX 137/64, WA2MHA 14/40, W2XD 17/-, KA2KJF 163/-, KE2JX 72/-, WA2EPI 18/-, ND2K 10/34, N2DIY 15/35, KB2QO 117/-, WB2QMP 564/-and W2CC 25/-. BPL: WB2QMP. (His 4th!) WB2QMP has also completed WAS on 80 and 40.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIR. TC: KØDAS. KØAAR is the new president of the Scotland Amateur Radio Club. The 3900 Club has 996 members and hopes to top 1000 soon! The Collins Amateur Radio Club is currently boasting 144 members. The Cedar Valley Amateur Radio Club and Eastern Iowa DX Association are revising their respective constitutions and bylaws. The Des Moines Register ARC has been approved as an ARRL affiliate club. The Davenport HAMFEST '89 had record breaking attendance! The Des Moines HAMFEST '89 is July 8. WØPRF is the DMRAA Ham of the Month. The RAGBRAI XVII route has been announced and plans are under way to provide amateur radio coverage of the entire route. Regretfully, WØUPX and KAØOND became Silent Keys this past month. WDØFRE has been awarded the Linn County Sheriff's Department Award of Merit for his help in saving the life of a 16 month old child. Jim is a volunteer deputy and talked the child's mother through mouth-to-mouth resuscitation over the telephone before rescue help arrived. Congratulations, Jim! Recent VE exams in Cedar Rapids yielded two new Novices, three new Technicians, NØJSU upgrading to General, new licensee NØKJE to Advanced, KFØAD upgrading to Extra and one brand-new Extra. Traffic: KØGP 102, WØYLS 99, WØSS 98, KØIPT 79, KAØADF 61, WBØAVW 31, KØKQJ 10, KAØVBA 8.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. Net Manager KSBN/KPN, WØFRC. Net Mgr

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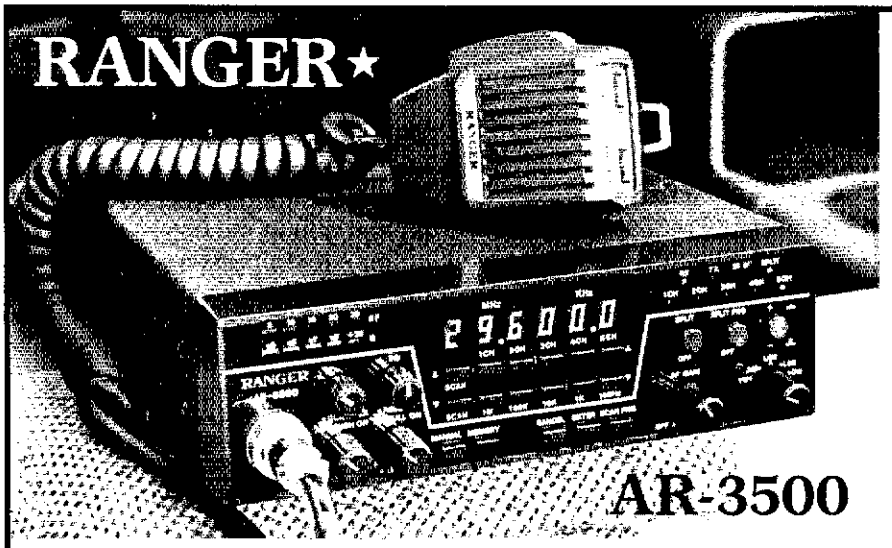

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QKS, WBØZNY. Ks RTTY Mgr, open. District Emergency Coordinators are WØOAG, WBØYJT, WØEB, WØFRC, NKØV, WAØCVR, WBØMDF. STATE Govt. Liaison NØBLD. Tech Co-Ord. KAØHEP. Bulletin Mgr KØJDD. ACC, KØBXF. PIO: WBØWSG. Manager of QKS-SS is WØMYM. Wx Net Manager, WBØYWZ. Packet Coordinator NXØR. Rewards are there for those who seek them. WØYMY reports helping to open up the 17-mtr band by making his first 2 QSOs (1 CW, 1 SSB) with operators who were first licensed in 1933, same year as Ed. WAØTJU has been appointed an Official Emergency Station. EC's should look closely at your resource of operators and recommend the appointment for your most active/reliable person/persons. Net activity for Feb is as follows: KSBN QNI 1543 QTC 138. KPN 404/17. KMWN 748/574. KWN 1024/734. CSTN 2172/58. QKS 239/67 and QKS-SS 24/2. A lot of new Novices are appearing among us. How about taking one in tow and teaching him/her the ropes about correct operating procedures, and what better place to start than the Kansas Slow net 3735 kHz M-W-F 0130Z. Still need that volunteer to help get the RTTY gang coordinated. If interested, drop a line to KØBXF. Traffic: KØBXF 301, WØFIR 260, NZØM 162, KSØU 137, WØFRC 105, WØOYH 88, WAØTJU 83, WØFDJ 59, WBØZNY 57, KAØRCH 56, WØQMT 50, NØBDG 26, WØMYM 16, WØCHJ 9, WAØYXK 8, WØBBO 7, WØRBO 4.

MISSOURI: SM, Ben Smith, KØPCK—Newly elected officers for the Tri-Lakes ARC and the McDonnell Douglas ARC are: for Tri-Lakes. Pres. KEØKI, VP. WØQGN, Sec. WAØQHM and Treas. WØUM and for McDonnell Douglas; Pres. N6MLW, VP WGØZ, Treas. KAØYTN, Sec. N8AFD, MAC Councilor, NØILX and Club Trustee, AKØW. The Kimberling City ARC has been awarded a certificate for their second place finish in the 1988 Zero District QSO Party. The Northwest St. Louis ARC is sponsoring a Missouri QSO Party the weekend of Saturday, August 19, 1989, and Sunday, August 20. For more information, contact KØGSV. Nets:

Net	Sess	QTC	
MEOW	31	649	141
MON	62	222	94
MOSSG	31	838	71
HAMBUTCHERS	23	468	21
CARL	5	33	0
St.L. ARES	4	289	2
PAUL REVERE	4	182	0
MIDCONT QCWA	5	86	0
RRABN	28	284	6
HARC	5	130	16
KCARES (JAN)	4	66	0
(FEB)	4	65	1
(MAR)	5	84	1
PHD (FEB)	4	139	11
(MAR)	4	119	11
ZAEN	5	55	0
CMEN	6	84	1
KCARC	4	132	25
SWMSWN	4	108	4
MEXARES	5	32	0

Traffic: WAØYJX 549, AIØO 145, NDØN 141, WAØHTN 120, KFØBM 98, KOORB 92, KØPCK 68, WØOUD 43, WBØCJB 20, WRØR 9, KEØAH 6, WAØKUH 3,

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK— Legislative Bill 58, which reduces the additional fee for Amateur Radio vehicle license plates, becomes effective August 25, 1989. Nebraska Governor, Kay Orr, signed the bill which was passed by the Unicameral. The bill did not contain the emergency clause so the bill becomes effective three calendar months after adjournment of the legislature. Effective August 25, 1989, the additional fee for Amateur Radio license plates will decrease from the present ten dollars to five dollars. If your current plates expire before August 25, the current additional fee, of ten dollars, will apply. Thank you to all of the many amateurs that took time to write to their state senators, to those who testified before the transportation committee and to our section State Government Liaison, Bob Mitchell, WBØRJJ, of Lincoln, for his time and efforts, in getting LB 58 enacted into law. Our condolence to Charlie Rodgers, WØQQN, of Omaha, on the death of his wife Alma. Alma Rodgers was a dedicated volunteer of the Zero District QSL Bureau for many years. Alma was an honorary life member of the AK-SAR-BEN radio club of Omaha. Field Day is this month, please send your Field Day reports to the Section Manager via radiogram. Packet Radio works well for this. Also, by originating a message to the section manager you can show those who have not handled traffic before how it is done. The monthly Lincoln QCWA meeting is now held at Buffy's Buffet, 2900 North 70th, in Lincoln. Contact WØWVE or WØKVM, in Lincoln for details on date and time. The Cornhusker State games are scheduled for July 12-16 in Lincoln. The Lincoln Amateur Radio Club along with many other clubs will be handling communications during the event again this year. The Victoria Springs Hamfest is July 28-30 at the Victoria Springs State Park near Anselmo, Nebraska. Of course, the regulars will be camping in the park at Victoria Springs up to at least a week ahead of time. For those of you who have been to Victoria Springs, it is a great opportunity to enjoy a very nice park in the Sandhills of Nebraska and have eyeball QSOs with many hams from Nebraska, Wyoming, South Dakota, Iowa and possibly other states. You can also enjoy one of the best steakfrys of the summer on Sunday, July 30. Traffic: KØDKM 235, WØKK 80, KAØBCB 48, WAØBOK 24, WBØGQM 13, WDØEWH 12, NOØA 4, WCØO 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. SEC: N4GAA. OOC: NA1I. ACC: NK1J. BM: N1EEE. PIO: WA1CMF. TC: KC1Q. SGL: K1AH. Well folks, this is it. Field Day is here. I wish all groups good luck and an enjoyable Field Day. CT Section had 90.3% rep in 1RN, Cycle 3. I am continuing to visit many clubs and am meeting many hams in the Section. I am happy to report that our hobby is doing well in our section. This time of year is my favorite. The weather is great for those antenna modifications and projects. Please remember, safety first. I have been asked about 10 meter nets. Here's one: SARC 10-meter net meets every Tuesday night at 7:30 around 28.485. Why not check in and say HI. The annual CT traffic-handlers dinner was a blast. Really enjoyed myself. For those of you who have packet, and are not sure how to handle traffic, KY1T, our sysop for the Connecticut Section Traffic Node, has much training info on his 145.07 BBS. Find out what it's all about and join in. Also, in CPN newsletter, there are some great helpful hints

on traffic handling. If you haven't seen it, connect Dan, KY1F. I am sure he can get you a copy. The Stratford Amateur Radio Club is back and active again under the leadership of Al Thorpe, K1TMW. We all wish them well and good luck. Remember, Al, N1API, is the new CT Section Bulletin Mgr, and runs a PBBS on 145.05. Check in for the latest and the greatest. WHARA has a new news letter editor who seems to have it together. Good luck Dave, WB8TZM. In addition, the WHARA conducted another simulated emergency drill for their area and continued to show their area how beneficial Amateur Radio can be in a time of disaster. Keep up the good work. Also, welcome Coastline Amteur Radio Club as an Affiliated ARRL Club. Pres, WA1YQE. 73 for now...Caesar.

Net	Sess	QNI	QTC	NM
WESCONN	31	370	137	KA1GWE
NVTN	31	620	289	
CN	62	326	192	
CPN	31	453	143	KY1F
CSN	23	98	40	WB1GXZ
RTN	31	209	83	
TMRCN	4	81	2	

CT Section Traffic Node, KY1T BBS: 176 QTC, N1DCS-4 176. Traffic: NM1K 484, W1EFW 320, WB1GXZ 240, KY1T 214, KA1GWE 140, N1DMV 128, KA1ROL 122, K1EIC 116, KY1F 109, N1GFM 72, N1GBP 62, N1FNN 44, W1WP 42, N1FQO 29, W1BDN 27, W1KYD 26, K1HEJ 26, WA1NLD 26, N1BOW 18, W1YOL 13, N1API 13.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA— STM: WA1TBY. PIO: K1HLZ. BM: KA1NOI. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. ACC: KA1SAO. EMass Hotline: 617-437-0111

Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY			
EMRIPN	WA1FCD	3880	1730	DY			
EM2MN	N1DUB	63/23	2000	DY			
NEEPN	K1BZD	3945	0830	SUN			
HHTN	N1FLO	04/64	2230	DY			
EMRISS	N1GVE	3715	1600/2030	DY			
CITN	KB1AF	7.45/045	1930	DY			

Field Day is coming...Field Day is coming. Don't forget that you get bonus points for sending an NTS message to me in the proper format. If it is not in the proper format, no points will be given. I want to visit as many Field Day sites as I can, so if you want me to be there, send me directions, and I will come. I can be reached at the N1BGG packet BBS as well as by regular mail. The Northeast part of the section (CD Area 1)had a RACES Drill to test earthquake preparedness, and many things were learned. The RACES program needs more volunteers. Currently only about 30% of the communities in Eastern Mass participate. We still have to show our public officials that we are a valuable service. In one of the non-participating towns, the CD director was contacted by a local ham, and he said "who needs radio?" The voters of this town need to be told of such attitudes!! But it is up to YOU to do it. If our elected officials have attitudes like this, when it comes time to defend our antennas, and our right to operate, we will surely lose!! Especially now that the "new" part 15 will allow low power equipment to operate on our bands, and subject to ham interference. What will happen if the consumers complain, and our elected officials are not aware of ham radio?? SHUTDOWN!!! Again, it is up to the local groups to "sell" ham radio to the public officials, and the general public. This is the season for public-service events. When you participate, as a club or group, let the public know you are a ham!!! I wish to thank those who do public service communications, especially the "high" visibility events like the Boston Marathon and the Charles River Canoe Race. With the severe weather season upon us, the Skywarn Net will start up again. It will meet at 6:00 PM on the 145.27 repeater. The net will meet daily and offer severe weather training, and will meet in emergency session when alerted by the NWS in Boston. The National Weather Service really needs our help because many stations are being shut down. If your club wants SKYWARN training, call NWS Boston and they will set up a time for the training. Bill Ledder, KA1NOI should have been listed as the new Section Bulletin Manager. N1BGG will be the section Packet Bulletin Manager. Sorry for the mixup!! Have you done anything to enhance ham radio's reputation this month?? Please express your opinion on Amateur Radio issues to you section or division staff. We appreciate your input.

MAINE: SM, Ted Bonesteel, WA2ERT—Gov. McKernan proclaims July 15th Maine Amateur Radio Day honoring our public service and ARRL 75th anniversary. RACES officially sanctioned by Maine Emergency Management Agency. Danny Morris, KA1RFB appointed State RACES Director Conducted statewide exercise on Mar 23rd. About 200 amateurs participated representing all 16 counties. Many volunteers serve Maine and ham radio. The majority don't hold official positions and quite often don't receive any recognition. Your efforts and work are very much appreciated. Keep it up! Bulletin stations xmtd 37 bulletins in Feb and 105 in Mar. I've received a great deal of positive feedback about our bulletin service. Pen Bay ARC will provide comms for the 1989 Whitewater Open Canoe Downriver Nat'l Championship in July. Contact KX1I. Net Act: Sea Gull /27/806/144; Pine Tree/31/260/111; Kennebec Cty ARES/5/86/2; Hancoc Cty/4/39/4; Cumberland Cty ARES/11/55/3; Aroostock Emerg/4/69/15; Oxford Cty RACES/4/55/22; Central Maine Emerg/9/159/6. Station activity: W1KX 228, KA1JOJ 90, W1ISO/83, WA2ERT/82, KA1REB/58, W1RWG 57, W1JTH/46, WA1YNZ 46, ND1A 42, W1BMX 40, N1BJW 30, K1UNO 27, KA1ODT 18, N1BCF 13, W1OTQ 9, NR1F 8, N1FPP 5.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—SGL: N1AIX. PIO: WA2MBQ. Let's start right off with a big official welcome to the Souhegan Valley ARC as our newest Affiliated Club! They just received official notification from HQ, and I know that pres W1FJH and all who are working so hard to make SVARC successful are pleased! If you missed Dayton this year, you missed a program on Amplitude Modulation moderated by Dale, KW1I, from Bow. And congratulations to Chris, KA1LMR who received WAS 1 on 17M! I got to visit 3 clubs in March and also spoke to the PC/Ham users group of the Boston Computer Society on Amateur Satellites. This group is working to introduce ham radio to computer folks and is doing a series of programs to show the computer/ham radio possibilities open to them. We should consider any group with a technical/scientific/computer interest as "fair game" and an opportunity to find new hams. The NARC meeting was highlighted by a program on an Arctic motorcycle DX-pedition presented by Dennis, K1YPP, (how do you train a polar bear to hld one end of a dipole?!). Dot and I returned from a short vacation in London later in March and went right to the GSARA meeting in Manchester. The program was an excellent presentation and demo on color SSTV by Lyle, K1DMU. And then we attended the PCARC annual banquet in Durham along with our son Verne, N5IEP (visiting from PA). NHARA pres Warren, WB1HBB, and wife Donna, KA1RWZ. An excellent evening and good chance to chat with many people. Thanks to club pres Norm, KA1LFJ, and Sec Dave, W1FYZ, for the chance to be there. It was evident from visiting these clubs that Hams would be heavily involved in local Walk-A-Thons, Bike-A-Thons and other public- service *activities as well as* Field Day. Shifting subjects, I see quite a few requests for information on affiliating a club with the ARRL from Hams around the section. If you know of a group or club in NH that might be interested in exploring affiliation, you can contact our Affiliated Club Coordinator. Pete, KI1M, or drop a note to Vicky Armentano at Hq, or drop me a note. Either way, an information package will be provided to the requestor. SVARC reports that their 220 repeater is now on 224.76- a change implemented just recently. Is your club looking for programs? Based on personal observation and reports, you should consider: Rich, KB4N, STM and his talk on NTS, Bill, K1BH, with his real, live spark-gap transmitter for a taste of early radio, and Johnny, W1JY, our Technical Coordinator-who can handle technical subjects with good humor and wit. From, CNHARC—Bill, W1WNJ, training officer has a Novice class. It is in session with over 20 students! CNHARC has a new meeting place in the Lakeport Fire Station on Elm St. on the first Tuesday of the month. Vol exams were held in both Nashua and Newport in March with many more new upgrades resulting. The GBRA newsletter "Standing Waves" has included repeater maps of Maine and NH in the past two issues. Very helpful for a quick reference if you are traveling in these states. Contact editor Bob, N1FIA, for more information. A good article on local CATV leakage in the Twin State newsletter authored by Dave, WA1ZCN. And on the training front, Dot, KA1LDS reports 6 new Novices in the Nashua area—thanks to efforts by NO1Q for one-on-one sessions with individual students. Traffic report: Nets: GSFM 181, GSPN 135, NHN 43. Stations: W1PEX 1762, KB4N8 38, N1CPX 560, K1TQY 421, W1FYR 317, KA1NXT 84, KK1E 66, W1ALE 58, KA1LMR 48, N1ALM 36, KA1ROH 29, NE1J 26, WB1EAE 23, KI1M 13, KA1HPO 12, NU1A 11, KC1AF WA1YZN 6, KA1KFX 1. BPL: W1PEX, KB4N, N1CPX K1TQY, W1FYR. PSHR: N1CPX W1PEX, KA1NXT KA1HPO/T. I regret to report the passing of John Ton's (NE1J) mother last week. Our sympathies to John and his family.

RHODE ISLAND: SM, William M. Foss, KA1JXH—NRIRC Providence County South ARES Net meets 1st and 3rd Wednesdays at 9 PM on 28.405, 146.55, 224.92 and 447.525. Everyone is invited to check in. KA1PBQ's Ocean State Young Amateur Net has been on the air for over a year now. It meets every Thursday at 8 PM on the 70 repeater. Everyone is invited to check in. EMRI meets at 7 PM & 10 PM on 3658. EMRIPN meets at 5:30 PM on 3880. EMRISS meets at 9 PM on 3715. Jim, KA1KML. Thanks all ORS for all the work they do. Traffic: W1EOF 313, KA1JXH 162, PSHR 87, KA1KML 153. PSHR 65.

VERMONT: SM, Jonathan P. Maguire, N1CQE—ASM (RFI): W1CTM. ASM: (Education). WB2MIC. ASM (Packet): K1AUE. SGL: WB1AJG. STM: KT1Q. TC: W1AIM. PIO: WA1YOY. OOC: WB1BWV. Field Day is this month—are you set? Contact your local club and volunteer! Bob, WB1AJG, has reported that our license plate bill has made it through the House and is on the way to the senate. By the next column, we will know if it passed. I'd like to thank Bob, and all those who have supported this important piece of legislation. KA1KAQ will take over as editor of OFQ, the CVARC newsletter. I'll have a slate of officers for CVARC next month. WA1PDN reports that the Vermont QSO Party was a great success. Top in state was KC1BT, followed by W1AIM and N1EBT. Good work. Contact WB1GXM for information on testing in the Connecticut River valley area. The Morse code issue is upon us again. ARRL needs YOUR input to do what the membership wants. Please drop me a line and let me know your feelings. I'll pass them along. Tom, N1ENH, has taken over as editor of the BARC news. Good work to Roger, WA1OZE, for years of dedicated effort in putting the BARC news out. Congratulations to new Grandma N1DLE. There has been some CW practice on the 146.94 repeater of late. Contact NB1C if you are interested. The BARC Annual Hamfest is scheduled for August 18th at the Essex Fairgrounds. Contact K1AUE. Interested in ATV? Did you know that Vermont has one of the largest ATV concentrations in the country? Contact N1QG, KA1LEX or N1CVA and find out how you can get in on the fun. VT representation on 1RN/2 98.4%, 1RN/3 100% (only section!) 1RN/4 96.8% PSHR stations for March: WA2SPL, KT1Q, WA1JVV and N1DHT. March traffic: WA2SPL 1172 (BPL), KT1Q 50z (BPL), WA1VXW 412, WA1JVV 141, N1DHT 126, KC1KI 26. Net reports: CN 27/549/41, CVFMN 4/98/9, VTN 31/133/127, TwinSFMEN 4/57/1, TriSFM 5/65/7, VPN 4/66/6, GMN 27/525/34.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI. N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. What does the "third-party country" list mean? It means that our government has established agreements between the listed countries that Amateur Radio operators can handle third-party messages of a non-commercial nature to and from these countries. Of course, these agreements mean nothing to a computer. Here is what has been happening. You want a message to go to a non-authorized country. Put it on your local packet BBS. It will be autoforwarded to a country that has an agreement with the banned country. From that country it is legally forwarded to the country we do not have an agreement with. The responsibility is still that of the originating station. If someone asks you to get a message to a non-authorized country, explain to them that amateurs in this country are not permitted to send messages to that country. If it is an emergency, commercial facilities will guarantee delivery. There is no excuse for breaking the law. Each time we let a message get through, we are putting our licenses on the line. This "underground " illegal traffic has to be stopped!! If you are involved with a BBS, check your autoforward program to see that traffic of this kind is flagged for the SYSOP to check before it is forwarded . Always remember, a computer is as "dumb as dirt." It will only do what we tell it. MARA has an in organization contest for the design of a club QSL. Prize isn't bad either. A new call

book. CMARA has new software for their club BBS (W1BIM .03). It's a great outlet for southern and central Worcester Country traffic. Jean (KA1IFC), Joy (KA1EXJ) and Art (W1KK) are working on a NTS/AREC family picnic this summer. A wonderful opportunity for WMA people to get to know each other. Traffic: KA1IFC 1072, KA1EXJ 115, KA1QFV 59, WB1HIH 35, KA1LZC 9, K1JHC 26, W1SJV 54, W1KK 69, W1UD 236, W1OPN 6, W1ZPB 2, KA1RVN 74, KA1MEW 78, KB1KX 35, KC2IU 52, KI2L 4, WB2CGK 33, NM1U 27, KC1DI 6, W1GQP 5.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—ASM: K7REX, OOC: WB7CYO. STM: W7GHT. ACC: N7BI. *PIO: WG7E. Well*, spring has finally arrived in Idaho. With spring comes new antenna and tower projects. Before you start your climbing, you should be sure to check all guys, turnbuckles, and be sure to check your climbing belt for wear. Also it is time to start your planning for Field Day in June. I am going to award a plaque to the highest scoring group in Idaho who goes into the field. Submit your scores to me by Aug 1 to qualify for the first Idaho Field Day Award. Traffic: W7GHT 325, KA7WZM

NET	SESS	QNI	QTC	MNGR
Farm	31	2392	96	WA7GSM
CD	23	747	15	K7UBC
IMN	31	265	206	KA7EEE
NWT	31	846	39	N7LMA

MONTANA: SM, Ken Kopp, KØPP—Welcome to our newest ARRL affiliated club. The Laughing Water Ranch Mountaineers (Fortine). Glacier-Waterton Hamfest July 14-15-16 at Three Forks Campground. Canada hosts this year. GHRC's (Bozeman) W7JMX apt'd by Gov. Stevens to Montana Board of Pardons and Parole. VARC's (Glasgow) N7FFA now in charge of Wx stn for 8-county area. LYARS (Glendive) gave their largest VE exam ever on Feb. 12. W7QYAs OM, W7VMB SK Apr 4th. Also W7JVN, KA7NCK, K7RVF recent SKs. This is my last Section News column. My sincere THANKS to those who supported my appointees and me the last two years. 73! Traffic: KA7YYR 249, WB7WVD 60 (PSHR).

NET	SESS	QNI	QTC	MGR
MSN	4	78	0	KØPP
IMN	31	265	208	KA7EEE
MTN	31	1906	120	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. ASM: W7FBP. STM: W7VSE. SEC: KV7F. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. Now that summer is here I have a few stories about how hams helped during the very cold February. On Feb.5 at 5:45PM Klamath Falls lost power in the north end of town so the Red Cross set up emergency shelters and the hams were called upon to establish communications. With Ed, KF7KE, as net control they had thirty nine checkins and Don, W7IEO, was the operator at the Red Cross shelter. The power finally was restored totally at 10:30PM and everyone got to go home. Then on Feb 16th, still in Klamath Falls, a building collapsed on some people and the hams were called again for help in communications. Rosie, K7JIY was the person who handled the communications on the building incident. The Benton County Emergency services had so many requests for transportation that they asked the Benton County ARES to help transport medical personell to and from the hospital and nursing homes. This lasted for 3 evenings for a total of 12 hours and some 1500 miles traveled. The net controls were Mike, KF7DQ; Lew, WB7NML; Dale, WB7PJX. The drivers were Minor, KD7YJ; Russ, WA7L; Al, NU7N; Skip, KH6DUT; Mike, KA7HBB; Alesa, KA7OGQ; Judy, K7KZC; Jim, N7CFT and Don, KA7IPO. A great job done by everyone and in some of the worst conditions . Also in the Month of February the Emergency Manager in Tillammok County activated the Tillamook ARES group as there was a huge cold front moving down from the arctic. They maintained a net for 72 hours and handled two potentially serious incidents plus some minor problems. Thanks Archie, WT7A and Ed, N7ILJ, plus the other hams for a good job. A thought on Field Day. I wish that it didn't come across as a contest so much and more for trying new ideas and letting the public know what we are doing out there. It seems funny that a lot of us go out of town and on the highest peaks we can find but in reality I don't think that is where the emergency would occur. Traffic (P) = Packet W7VSE 456, WB7VMS 308P, KA7EEE 296, N7BGW 271, WG7H 252, WT7A 190, WB7EMO 137, N7DTX 191, KA7SYG 79, W7ODG 60, KV7F 49, KA7AID 47, KA7WFW 34, W7LNE 15, WA6DIM 11, W7BDU 15. Late Jan N7CPA 60P. Late Feb WE7A 77, N7APC 22 W7LNE 10.

EASTERN WASHINGTON: SM, Tom Plaisance, KC7PH—STM: W7GB. SEC: WB7CBX. OOC: W7LKR. New appointees for this Section include Assistant Section Manager Dale Avery, KC7MM, from Spokane. Also from Spokane is Pat Dockrey, NQ7M, the new Affiliated Club Coordinator. Frank Price, KD7AC, is the State Government Liaison from Olympia and the only Section Appointee we share with the Western Washington Section. Good luck to all those participating in Field Day, and let's make the new Eastern Washington Section easy to find on the bands. The section needs more qualified volunteers including a Technical Coordinator and a Public Information Officer. Several counties in Eastern Washington have no Amateur actively involved in the Amateur Radio Emergency Service. Contact Bernie Frazier, WB7CBX, if interested.

WESTERN WASHINGTON: SM, Ed Holloway, KA7INX, (@KE7OM): STM KD7ME, (@WØLVJ), SEC NM7N, TC: W7GNR. OOC: N7DVR (@WØLVJ), SGL: KD7AC. BM: N7CAK. (@WØLVJ). PIO: N7FKV. ASM: W7UOF. ASM: K7CLL (@K7IFG). ACC: KR7L (@WØLVJ). Twas a sad day that Brad, KR7L, decided to resign! However, not all is lost. I cornered him and appointed him ACC. (Never let a good man fade into the crowd!) Thanks to Mary Lou, NM7N, as the new SEC. See her slide show on her DXpedition if you get a chance. Another one to Mauri, W7GNR, for taking the TC job. Tis the month of Field Day and preparations for same. Clean up the Old Vibroplex, tune the antennas and gas up the generators and get out there and make a million QSOs. I haven't been on the job long enough for the section clubs to send me their monthly newsletters etc but will be glad to receive same so I will know what will be happening and what different clubs are doing. I need at least 90 days advance if they are to be in the appropriate month. Rush, W7RM, had his cabinet meeting at the Radio Club of Tacoma. Most of the Asst Directors were there along with parts of Eastern and Western Washington Section Staffs. No code and other subjects were discussed and this info will be coming out in

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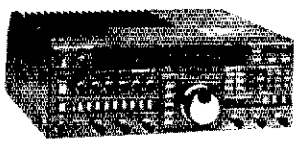

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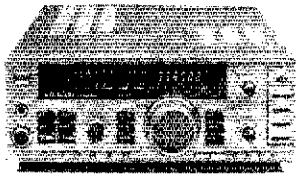

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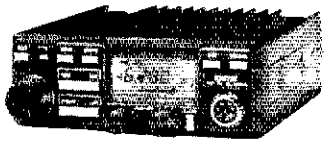

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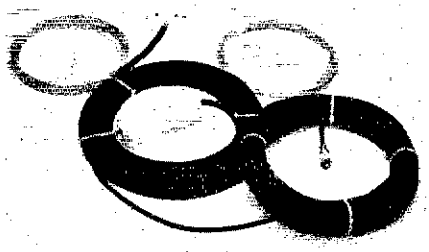

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future QSTs. Jefferson County ARES group completed a Shack at Tri-Area Community Center. This will be a satellite station for the Jefferson County EOC. KA7SLA (Thurston County AEC) threw in 12 hours working on their communication van. King County reports 305 hours PS. Cowlitz 10 hours PS. Thurston County ARES provided a display at the Red Cross open house. Traffic: K7AJT 42, K7CLL 3, KA7CRN 18, N7EQZ 77, KR7F 185, KF7FF 89, N7GGJ 82, W7IGC 184, W7LG 120, KA7MPD 32, W1PRT 17, K7SUX 110, KA7TTY 39, W7TVA 322, K7UQH 54, WB7WOW 207. PSHR WB7WOW, W7TVA, KD7ME, KF7FF.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. If you would like to see news of your EB club in this column, please have your newsletter editor add me to the mailing list at the address shown on page 8. HRC new officers are N6OJJ/Pres, KI6XE/VP, NA6Q/Sec, WA6BLG/Treas, N6HWJ/Sgt at Arms. They welcomed new members Ray Pearce and K6QDJ. BARC has a new PIO/Historian, N6TZB, and a new Training Officer, K2GMY. Their latest meeting featured each member there building a J-pole antenna from 300-ohm twinlead. The CCCC has passed the 100-member mark. Their newest members are: KB6FFF, WD6FSH, KB6SJS, KC6BPI, KC6BQR, N6TZZ, & KB6ZOP. MDARC membership is almost 300 with these additions: N6CPG, KC6AZV, KA6OHW, Dave Newman (SWL), & Carlos Puig, who is awaiting receipt of his Advanced call. Don't forget our Section nets: NCNV - 1930 on 145.41 and 145.91, NCN1 - 1900 on 3630, NCN2 - 2030 on 3630 (slow-speed session), RN6 - 1945 and 2130 on 3655, and PAN - 2030 on 3675 (all times PDST). Mar tfc: WB6DOB/204, W6VOM/126, WB6UZX/41.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. LVRAC will sponsor a public relations demonstration at Meadow's Mall again this year, June 10. Contact N7JMG if you can help. Even if you can't help, stop by and see what's going on. Most clubs in Nevada are sponsoring Field Days again this year. Please help your local club get organized. SIERA is providing communications in Nevada for the Pony Express in lieu of Field Day. Contact K4CTZ regarding this event. Thanks to all who helped with the Special Olympics in Northern Nevada. LVRA has had a major effort replacing a tower on Mt. Potosi which was taken down by the severe ice storm. Thanks KE7JX and the crew. As I start my third term as Nevada SM, I would like to thank everyone for their continued support. Any info you would like to see in this column must reach me by the first of the month and will appear in the issue approximately two months later.

PACIFIC: SM, Wayne Jones, NH6GJ—Greetings from all of us to all of you! The month has been a fairly routine one except for the visit of the Pacific Division Director, Rod Stafford, KB6ZV. He had some interesting things to say! I know everyone who met with him enjoyed his visit. Next time, maybe he can stay longer! The Maui Marathon and the Guam Marathon were the two big Public Service events for the month. Maui amateurs AH6AZ, WH6BLZ, WH6BYK, WH6C, AH6EE, NH6EV, AH6GP, K6GSS, KH6H, KH6HHG, N6HPQ, NH6ID, AH6IF, KH6SQ, KH6UU and VE7QO provided the necessary support. Guam amateurs who worked their event were W1YRM, KH2D, KA6VIP, and WH2AEN. Word has also been received that the Guam Club has decided to discontinue the incoming KH2 QSL bureau for bulk mail, effective Dec 31, 1989, because of the excessive amounts of cards that were being sent to the KH2 bureau erroneously, or for amateurs who would operate there while on holiday and then leave no forwarding address when they departed. As you know, all QSL cards should be sent to the operator's "home" bureau rather than their temporary operating location. If you want a card from Guam, you are going to have to go direct! So, until next time, Aloha from all of us to all of you! Traffic: KH6GMP 30, KH6S 1, KH6R 16. Nets: 85.

SACRAMENTO VALLEY SM, Bob Watson, W6IEW—Additional blows to the emergency organization of the section have been the resignation of two more of the district Emergency Coordinators. Walt Cross, KE6EP and Ron Menet, N6AUB have both done very outstanding jobs as DECs in addition to service in other positions in the past. Walt and Ron, many thanks for all you have done and hope you will find the time to help out again in the future. OO Coordinator John Canaris, WY6O who is putting together an effective OO team, held a meeting of OOs from the Sacramento area. It was a pleasure to meet them. The Section NET is the first Sunday of the month at 8 P.M. on WD6AXM/R-the Yuba/Sutter repeater, 146.085 MHz, input up .600. Speaking of Yuba/Sutter, I was invited to speak there last month so had a chance to thank them in person for the use of their repeater for the net. Finally, I am very saddened to have to report that Loren Young, WD6BZQ is a Silent Key. Loren served in so many ways that it is not possible to list them all, but a rather trivial item illustrates how dedicated he was to doing a good job. As I have noted before in this column, he was the most faithful of all Appointees in the Section in sending in his monthly reports. The best summation is by Nevada County President, Arne Winters, KD6SG who said "Would that his devotion to service could be emulated by us all." Traffic: WA6WJZ 188, WA6ZUD 86, WA6EBI 62, N6DOJ 52, W6CFQ 51, K6SRF 27, WB6SRQ 10, W6RFF 10, KB6WIJ 3.

SAN FRANCISCO: SM, Dick Wilson, K6LRN—Current appointees are: ORS W6BIP, WB6HZO, K6TP, N6KM, W6GGR, W6RLN, N6FWG, NA6T. OBS- KE6IT, WW6D, KB6LO, WA6AUD, K6TP, W6GGR, NA6T. DEC's: W6DTV, WA6MGK, KE6LF. ECs N6PTM, WD6DQC, KA6OQJ, KB6FIW, NK6Z, WA6QXV, WG6Y and KA7JAN. TC is N1AL. ATC's are W6DTV and NA6T. NM and STM is K6TP. BM is W6GGR. OO's are KE6LF, NA6T, W6VV & W6RQ. WB6PER and his fine RACES outfit participated in Sonoma cty's Quake Drill April 6, with many people taking time away from work, family, etc. Thanks to all. KC6AAN, KC6AAH, WA6PAC, WA6VOI, KA6VEU, KA6BQF, WB6TKD and K6LRN provided communications for the Marin Cyclists' Road Races on April 10. SFRC has purchased an emergency generator and celebrated W6PW's 70th anniversary on May 19. Send FD messages to SM via K6GWE-1 BBS on 145.05. NCN is still meeting every night at 7 PM (local) 3.630 and 8:30 (local). Traffic: K6TP 116 (Feb.) Support YOUR LOCAL CLUB—USE CLUB NUMBER WHEN RENEWING YOUR MEMBERSHIP (All who are reading this are ARRL members...aren't you??)

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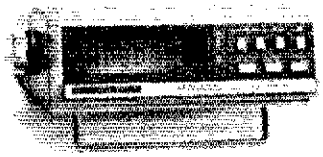

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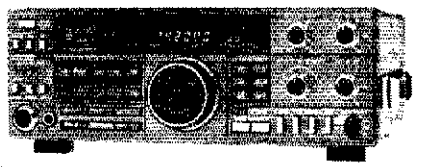

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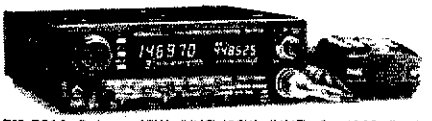

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SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6. STN: N6AWH. TC: WA6EXV. Asst SMs: W6TRP and K6YK. 1989 officers of the CCAC are Pres WA6ZBL, VP WA6HMB. Sec WB6JIT, Treas WA6JII. WB6STB and KA6UYY are SILENT KEYS. WA6YLB is Extra. KB6ZBE and WA6ZTJ are General. KB6WGH is Tech. N6HEW earned DXCC. W6DPD qualified for the ARRL Diamond Jubilee Award by contacting 75 section. KA7MXO has an IC 38A. N6DYJ has a HTX 100. WA6OQV has a TS 940S. WA6KLE has returned to the SJV and is living in Fresno. This is my last report (number 151) as your Section Manager. I have enjoyed the last 12½ years in the position. I thank those Amateurs who have served in the many Section Leadership and Field Organization positions over the last 12 years. Your new ection Manager is Jimmie Wakefield, AH6CO, 2215 N Winery, resno, CA 93703., (209) 453-1584. Please send your reports to him. 73 de W6DPD. AR traffic: W6AWH 198, WA6YAB 29, W6DPD 3 (Feb.) K6RAU 10 (Jan.) N6MXG 6.

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: KM4OX. SGL: KE4ML. PIO: AB4FW. Special message from the TC, KM4OX: "Check your license renewal date so you don't get awarded a new (and unsolicited) call sign." Some clubs put the license expiration date on the newsletter mailing label or have a reminder procedure. Might save a lot of headaches if more did that. It was a lot easier to remember to renew when the license period was shorter. [BT] I had hoped to be able to do a short biography of our OOC by now, but this important appointment remains unfilled. Any recommendations? [BT] WA9FCH will be navigator & KO4T "sparks" operating /MM2 from a sailboat with a crew of 8 headed for a week of /VP9 relaxation in late May. N4PY will navigate on the return leg, joined by KC4ACE ("1st mate") & AB4W. Both crews will be keeping a sked with AB4S and checking into NC NTS nets. No ARES or SKYWARN activity is desired on this trip! [BT] FIELD DAY is June 24-25. I hope that ALL NC Amateurs (Novice to Extra; active or inactive; club members or not; etc.) will join in this important and enjoyable emergency exercise. Clubs can make a special effort to extend an invitation to ALL local hams, especially those who are inactive and new Novices. FIELD DAY is an opportunity for clubs to make a significant contribution to emergency preparedness. Try to get ALL the bonus points. The extra points for publicity are especially important. A major goal of FIELD DAY is improving public awareness of our capabilities, so put your "best" operators at the Information Booth (not just on 40 CW). Write and distribute your press releases well ahead of time with the emphasis on the national exercise - NOT your local efforts - the local media will bring out your group's role. Include information about the other groups & clubs in your area which are participating. When speaking to the public, stress AMATEUR RADIO, not your club, group or self; your efforts are more significant (and more likely to be published or aired) when viewed within the context of an ARRL-sponsored national emergency exercise. Send FIELD DAY messages to the SEC, N4MYB or AB4W for bonus points. Be sure FIELD DAY reports are sent in to document our section's extensive participation. But most important; Have a Good Time! [BT] FARC sponsored Winston-Salem Hamfest June 10. [BT] Silent Keys: WA4CCK, WA4BFT & WA4YSK [BT] Quarterly traffic report, Jan - Mar '89 (note comparison with last year's totals - good work!):

NET	QNI	QTC	TFC	QND	SES	NM
NCEN	1573	416	347	1572	90	WB4WII
NCMN	994	349	253	950	90	WD4MRD
CN	1869	868	821	3836	180	K4IWW
CSN	623	107	103	1467	90	AA4MP
CNCTN	2846	265	209	1422	90	WA4MNR
PCTN	1507	698	553	1610	90	AB4EO
RARS	1067	75	73	1633	90	K4ABJ
M2MEN	1013	87	84	889	90	KF4MZ
CFARS	1618	94	89	1504	90	W4EHF
PETN	1020	155	137	1034	86	WB4HRR
THEN	865	82	73	667	87	N4JRE
ACAN	132	17	17	128	14	K4ULA
Totals	15,127	3,211	2,759	16,712	1,087	
(1988	15,131	2,919	2,608	16,840	1,109)	

[BT] March traffic: K4NLK 302, WD4HTE 154, KI4YV 153, N9CGD 127, K4IWW 112, WB4DAR 76, KA4EYF 74, WB4WII 72, N4UE 67, N4RGG 50, KC4GRU 45, WD4MRD 44, WA4MNR 44, N4SVZ 36, KA4KGZ 32, W4EHF 32, KA4KGZ 32, WD4LOO 30, WA9NEW 29, N4LST 25, K4YJB 19, N4JTG 16, KB4NOZ 14, WA2EDN 14, NT4K 9, KM4BN 8, W8KLS 8, AB4W 7, KC4BJB 4, WD4BCX 4, WD4LSS 3, AJ5F 3, N4TCN 2, N4TCH 2 [AR]

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—BM: K5DVD. OOC: W4NTO. PIO: AB4ID. SDM: KA4GUT. SEC: K8AFP. STM: W4ANK. TC: WA4UNZ. AIRS: W4DRF. ACC: & SGL: N4FVU. We can all participate this month in an amateur radio activity that is beneficial to us individually and collectively. Participation in Field Day is a test of our skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio. To receive 100 points for message origination refer to the QST Field Day Rules. Messages for your SM may be filed via Packet to: N4FVU @ WA2GYM or NTS traffic nets, WB4MBC (7:00 PM 3915 kHz SCSSB Net), & KA4UIV (12 noon 7250 kHz SCNT Net). On June 6 & 7 four S.C. County EOCs: Fairfield, Lexington, Newberry & Richland will be participants in the FEMA monitored V.C. Sumner Nuclear Plant Emergency Exercise. Radio Amateurs that can participate are requested to contact an EC, DEC, or this SM. March traffic: W4ANK 105, N4MEJ 96, KA4LRM 96, W4DRF 9.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. PIO: AA4VP. TC: WX4C. SGL: W4UMC. There have been no changes in the section's net managers or net listings. See last month's QST for full listing of section NTS nets. N4EXQ reports the EC certification examinations are moving along. All ECs are urged to complete the exam and send the forms to Earl. WA5FAC has been appointed EC for the city of Roanoke. By agreement of the SEC and the DECs involved Wythe county has been moved from District 14 to District 13. It is with deep regret that I report W4FZ as a Silent Key. Gen. Cook retired as the Army's chief signal officer, had been an active amateur since 1926 and was an active QCWA and MARS member. WB4ZTR, Frederick County EC sez his ARES members active

Rob, WA3QLS

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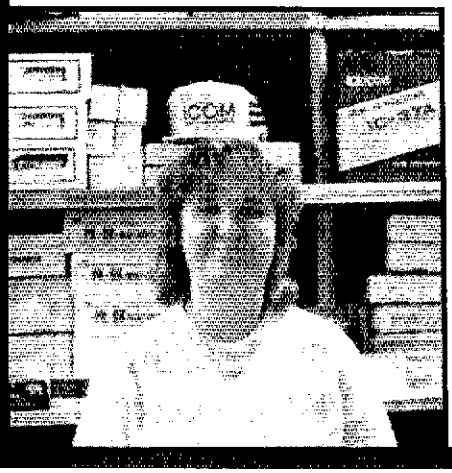

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Katherine, KA3IYO

planning communication support for the move of the Winchester hospital to their new building in August. A Local Memorandum of Understanding (LMOU) between the city of Winchester emergency disaster officials and ARES is in the final stage of preparation. The Richmond group will supply communications for the summer Special Olympics June 3-4th. KF4OW, VE exam coordinator for "SPARK," reports a very successful VE exam session. A staff of 10 VEs gave 46 exam elements to 22 candidates. Total exams passed 32, 19 new licenses were approved and 20 CSCEs were issued. The total operation lasted 4 hours, 45 minutes. Outgoing Division Dir. W4UG, was saluted by a "This is Your Life" program by the Va. Century DX club. Some upcoming VE exam sessions: June 3—Virginia Beach contact KA4UNC. June 17, Manassas contact W4PVA. By this time, you should have seen the report of the ARRL committee to study a Possible Code-Free License. It is imperative that all send their comments and suggestions to our director, N4MM, for his consideration at the July Board meeting. WBØTAX sez over 20 packet ops met at his residence in April. Topics covered included the latest software for SYSOPs and interfacing of Packet operations into existing NTS traffic flow patterns. Progress continues in the installation of a 220 MHz backbone between the Tidewater area and Richmond. It is planned to have this link operational in time for the Boy Scout Jamboree at Fort A.P. Hill in August. Traffic activity continued to be high in spite of the normal after-Valentine Day letdown. A total of 42 stations reported a traffic count of 6226. I want to thank the many clubs who are sending me copies of their newsletter. This is the best way for me to be kept informed of your local activities. Traffic: WBØTAX 1514, N4GHI 703, K4DOR 606, N4EXQ 354, N4HOG 322, W4JLS 309, W4SOQ 214, AA4AT 201, WB4QOJ 192, W3ATQ 174, K4MTX 173, WD4MIZ 118, KK4FV 112, KJ4VT 109, WD4MIS 105, KB4WT 101, KK9L 94, WB4KSG 87, WB4EDB 72, WB4ZNB 69, WD4FTK 64, WB5ZTR 62, N4KSO 59, N6ANQ 57, W4TZC 55, K4BGZ 48, K4JM 37, KI4W 34. WB4KIT 29, W4HDW 24, K4GR 24, KI4VU 20, N4SMB 16, WA4TVS 14, N4TJT 14, KB4OPR 13, N4FNT 9, K4KDJ 6, W4HU 6, N8GVG 3, WB6DQZ 2, K4VWK 1.

WEST VIRGINIA: SM, Karl Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. ACC: WD8EBH. Repeater Coord: WB8GDY. Remember Roanoke Division Planning Mtg. in Ripley on May 20 & 21. This is the place to air your views and concerns about League policy and Ham Radio matters. All hams are urged to attend. Clarksburg hams were active in flood relief on March 6th. Things are shaping up for a big hamfest at Jax. Mill on July 1 and 2. Tech forum promises to be very good. Plan now to meet your friends at Jax. Mill this year. I can be reached via packet @ WB8CQV in So. Chas

Net	Freq	Time	QNI	QTC	Sess	NM
WVFN	3565	6:00	1130	174	31	WD8DHC
WVN	3567	7:00	323	98	31	KZ8Q
WVMD	7235	11:45	821	99	31	WD8V
WVRN	3640	6:30	209	28	28	K8LG
WVNN	3730	7:30	109	35	31	KA8ZGY
HILLBILLY	14290	NOONsu	146	6	4	W8YP

Traffic: KA8WNO 452, W8YP 446, WD8V 370, N8JPR 166, W8FZP 119, WD8CHC 55, WD8LDY 34, N8FXH 33, K8KT 32, KA8OGF 28, WD8EBH 19, KA8QHC 14.-

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edie Sheffield, KØMQA—SEC: WBØTUB. STM: KBØZ. ACC: WBØDUV. PIO: WBØFQB. TC: WØLJF. OOC: KAØCDN/WØIJR. SGL: WDØHNQ/WDØHNP. BM: KAØVKM. Recently, there has been much discussion on Amateur No Code Licenses. If you have some ideas or thoughts on the matter, now is the time to inform your Division Director of your views. The annual Health Fair is in progress this week, and is utilizing 200 to 250 amateurs around the section. Congrats to KAØEFM, the co-ordinator of the Health Fair communications for another year of a job well done. LARC participated in the Adopt a Highway Program, and picked up trash along Colo Highway 119. Recently, Mile Hi Red Cross sponsored a Disaster Communications Training Class with several amateurs participating as speakers, along with three of our ECs, KBØCHT Dist 13, WB4ETT Dist 22, and K8VQC Dist 24. Excellent program which was also well attended. Look for the Rocky Mountain Packettest to be held June 3rd this year. Contact KØYUM or WØGVT for info. Supertest will be held June 10th at the Larimer County Fairgrounds in Loveland, Co. 8:00 AM to 4:00 PM. Contact NØDZA for info. NETS: Col: QNI 1207, QNF 1095, QTC 40-172, Sess 31. CWN: QNI 81, QNF 313, QTC 48, Sess 27. CWXN: QNI 1660, QNF 2790, QTC 1305, Sess 31. HNN: QNI 1887, QNF 954, QTC 142-723, Sess 31. NCTN: QNI 161, QNF 313, QTC 40, Sess 22. Traffic: NØBQP 1663, WØLVI 643, NØHFZ 530, KØYFK 524, KAØWIE 207, WBØFVV 142, NØGVC 139, WDØAUN 138, KØHOA 100, KØCNV 25, KBØZ 24, WØNFW 5.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 125 msgs with 159 checkins. NM Roadrunner Net meets daily, 3939 @0100 UTC, handled 121 msgs with 1056 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 132 msgs with 834 checkins. Yucca 2-Mtr Net , 78/18 handled 17 msgs with 380 checkins. Caravan Club 2-mtr Net, 66/06 with 87 checkins. SCAT Net, 66/06 handled 6 msgs with 716 checkins. Info Net 12/72, with 92 checkins. ZIA Sunday Noon Packet Net with 64 checkins. Looking forward to the Flagstaff, Ft. Tuthill Hamfest July 28-30th. Tnx to all who helped with the revised Ham License Plate Bill. So very sorry to report the passing of W4OCZ and W4OLF. They will certainly be missed!! Traffic: KN5D 138, W5DAD 72, KB5UL 33 & KN5D BBS 1570.

UTAH: SM/STM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. Congrats to NS7K, who will be taking over as SM this July. He was unopposed. I have been SM for 4 years, and will support Rich fully in his new job. A RACES conference was held in Salt Lake on March 22; approx 100 hams attended It was sponsored by FEMA and Utah CEM. Look for more RACES activity this coming year. 73 de NA7G. Traffic WA7MEL 74, WA7KHE 71, N7IUN 66, NA7G 28, N7JLC 25, N7ASY 18, NS7K 14.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. Traffic: NN7H 175. W7SQT 135.

NET	FREQ	MST	QNI	QTC	SES	NM
Cowboy	3923	545 P M-F	836	9	23	KC7AR
Pony Ex.	3923	8:00 A Sun	180	0	4	W7MZW
State ARES	3923	9:00 A Sun	154	0	4	W7TVK
2mtr ARES	—	varies	147	0	4	—

State Hamfest coming up in Cheyenne on July 8 and 9. Lets get our and join in on the fun. We don't want to be outnumbered by our Colorado neighbors, hi! Would be interested in hearing from the clubs around the state offering suggestions on how to attract more youngsters to our ranks. If you have something of interest for the good of all, suggest u send ur article to SHY-WY club for printing in their newsletter. Contact KD7AN or WC7S. They are doing a great job issuing a nice letter with statewide distribution.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. The 1999 tornado season in Alabama was one of the most active in a decade. Severe storms and tornadoes have occured over most all of our ARES districts and amateurs have responded with long hard hours of storm spotting and follow-up emergency communications. I wish I could name all the amateurs that helped—but that would take much space! Good to hear Harris. WA4JDH, back on the nets after a stay in the hospital. Harris has made BPL for every month over the past 12 years! All amateurs are invited to check into the new Alabama Section Emergency Net that meets after the ATNM on 3965 kHz each Monday night. This is a great way for DECs, ECs and ARES members to get together on a Section level. Congrats to the Birmingham ARC for putting on another FB hamfest! We look forward to the Huntsville fest in August. The central Alabama Packet Net has been organized and meets Tuesdays at 8:30 PM on 145.03 MHz in the Birmingham area. Check in "unproto" using either SHL3 or BHM1. New Birmingham ARC President is Bill Levey, WA4FAT. VPs are WD4BXH, K4UPL, and KB4BED. Attention south Alabama amateurs - hurricane season is here! Let's hope it isn't as active as tornado season! BPL: WA4JDH. PSHR: WA4JDH 602, W4PIM W4CKS WA4RNP. Traffic: WA4JDH 602, W4PIM 219, W4CKS 91, WA4RNP 50, W4ZJY 34, WO4W 10, WB4TVY 6.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: KC4MJ. SEC: NC4E. STM: WB4WQL. Packet: W4QO. ACC: KM4IH. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Finally we have the info on the 1990-1994 tag cycle. There will be a GEORGIA STATE AMATEUR RADIO SERVICE tag. The tag will be embossed with "AMATEUR RADIO SERVICE" and ur call letters and will be in the same colors as the regular tag. An MV-tag application form which should be available around May 1 must be filed between June 1 & July 31 along with a copy of ur FCC license and a check for $25.00 with the MOTOR VEHICLE DIVISION in Atlanta. We tried to have the fee lowered but to no avail. Our sincere TNX to WB4UVW, KK4OJ, NC4E and all who helped to get this made possible. Remember this is the mo for the GA STATE CONVENTION in ALBANY on June 16th & 17th. This is a Fri afternoon and Sat affair. Sat was a super day in attendance at Columbus but Sun was Easter and it fell off. TNX to all who made it. Three SILENT KEYS to report: K4THC, K4EOG & N4FWX. Our deepest sympathy to their families and friends. QCWA net meets on Sat at 9 AM on 3855. Come join the gang. Training sessions on the GA SSB NET were outstanding. TNX to WB4WQL, KI4MQ, N4OCQ AND WB4LBM. Congrats to the following SPECIAL SERVICE CLUBS: AMATEUR RADIO CLUB of Savannah, CONYERS AMATEUR RADIO GROUP and LANIERLAND ARC. Gud luk to u and all ur members. There are many benefits in being an SSC. Won't your club or group try. If need any info, please contact our section ACC, Sharon Foster, KM4IH. PSHR honorees for March are: WD4DVZ, WB4WQL, KJ4NK, WA4YYQ, KA4HHE, N4MWR, WA4TXT, W4RWB. Tornadoes ripped thru the state agn on Apr 4th. TNX to those who helped their fellow citizens. This is what HAM RADIO is all abt. I receive abt 50 club newsletters a mo. PSE when ur club or group elects new officers and u want them in this column sent them on a card etc and I will put them in. I just rcvd word that W4AFG of Griffin became a SILENT KEY. If ur club or group deserves recognition for WX related or other emergencies PSE send me all the info with names, calls & any valuable items. 73 & God bless...Eddy. Traffic: WB4DVZ 164, KC4BHX 108, KA4HHE 92, WB4WQL 73, WA4YYQ 64, KJ4NK 51, WA4TXT 42, W4AET 36, K4JNL 33, N4UZ 29, N4MWR 15, W4RWB 12, K4BAI 3.

NORTHERN FLORIDA: SM, Roy, N4ADI. Digital: A I, K4CY. OOC: John, AB6I. TC: Ed, WØRAO. BM: Dave, N4GMU. SEC: Rudy, WA4PUP. SGL: John, KC4N. PIO: Petey, WA4PUO. STM: Cotton, KB9LT. ACC: Dick, W4BIH. ASM: Bill, KB4LB. A recent letter from John, WD4FHD, says that BARS has elected Bill, KA4OBP, as Pres, Steve, WA4NKA, for VP, Rusty, KC4AOI to be Secy, and Karl, WD4SGB, for Treas. OARC has reelected K4AHO, Jim as Pres, Mike, N4LQQ for VP, Allan W4UFY for Treas and Doug, NS1A as Secy. We wish all these Officers and the Club they represent a productive year in the pursuit of our great hobby. Our OOC states that we are getting more people interested in the OO/AA program and the first step to forming a Local Interference Committee in the Orlando area has been taken. A team has been selected and as soon as the Chairman of the group receives his OO/AA Appointment, they will be authorized by the SM. It is the desire of AB6I, our OOC, that all OOs send their monthly reports to him as evidence of listening time on the airwaves, whether or not any advisory notices have been sent. Listening is the key to the success of the program. Any others who are concerned about the misuse of our bands are encouraged to contact John, AB6I, in Casselberry. 73, Roy. Traffic: WD4IIO, WA4QXT 660, WX4H 642, KB9LT 397, AA4HT 363, AA4FG 331, WC4D 285, W4ILE 282, N4SS 266, W7YWF 214, K4CY 201, W4KIX 113, WA4EYU 85, W1UKR 79, N2AOX 72, WA4MGO 71, KI4CQ 61, NF4O 54, N4DY 46, N4JAQ 44, AA4WE 43, N4QYS 43, N4JHI 35, N4UF 31, W4DTV 30, N4ADI 28, KF4SP 26, WB4FJY 26. WB4TZR 20, WA4PUP 19, WA4ZXW 17, WA4STZ 17, KJ4HS 15, KB4FDV 12, N4OZD 9, WB4JJH 8, W8IM 8, WA8APQ 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—STM: K4ZK. SEC: W4SS. TC: KI4T. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. Packet Manager: K4CY. This is my second effort at writing this—the weekend before the weekend of the Orlando hamfest I had every disk wiped clean of all my reports for ARRL and had to start from scratch! But computers are great! AB4EA is now back in Ontario, but sent a message thanking QFN for its support.

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- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
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- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
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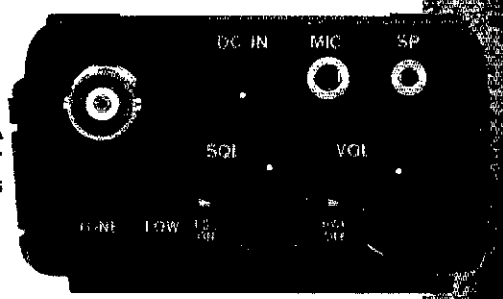
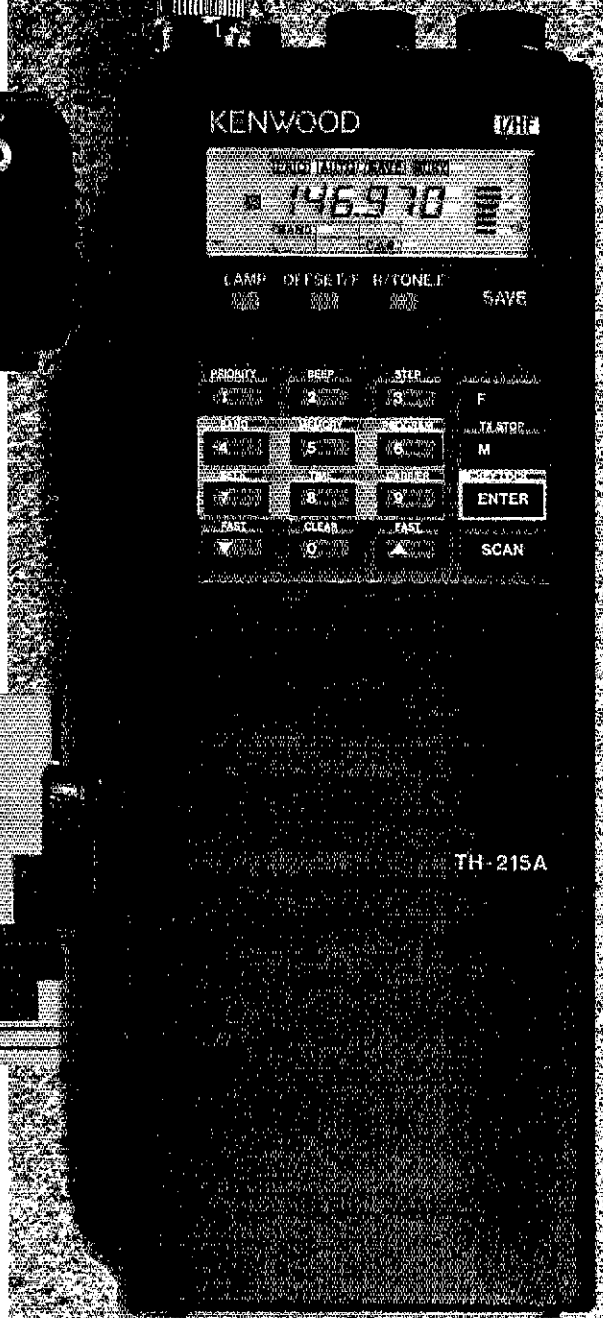
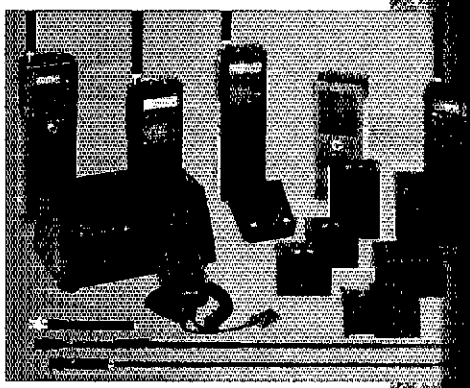
- **Nine types of scanning!** Including new **"seek scan" and priority alert.** Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.





- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.



Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 compact battery charger • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier (1-4 W input) • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V extra DC cable • PG-3D cigarette lighter cord with filter

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Eric was very active in originating traffic from the campground where he stays in Seminole. N1NJM is back in CT but promises to return to Bonita Springs next December. WD4CHC is leaving for Indiana but will return to Lee County later this summer for a couple of weeks. W4UIO in Fort Myers is now back in Tennessee for the summer. K4FQU, Net Manager of the Southwest Florida Traffic Net, writes that if the net had an operator of the month award, it would have to go to WA4EIC. Blaine serves as a rep, NCS and OBS for the net and of course Blaine is equally valued on the HF nets where he provides the same sort of services. On QFN he willingly takes traffic for relay to the areas covered on the phone nets. K4FQU also stated that the SWFTN had an excellent traffic total for the month due to the Lehigh Springs Festival. The Martin County ARA Common Emitter stated that W4PHL, Emergency Management Coordinator, Palm Beach County, addressed the group. He has worked with the County Commission to allocate funds for amateur radio equipment for several years—the county has now appropriated a total of over $200,000. The latest include the purchase of a complete Amateur ATV System for disaster observations from on-site Sheriff's helicopter and an EOC Communications Van. The Everglades ARC Beam said AA4CH has received Tune in the World and code keys and buzzers for his class. The time for the classes will be decided when a location has been found for them. The Manasota Repeater newsletter indicates that the new repeater has arrived. It will be the program highlight at the March meeting of an on-site demonstration. If no problems, it will go on line the next day. N4PBF reports that 80 hams will be assisting the Dade County Walk America event for the March of Dimes. Ki4T is the coordinator and is in his 15th year working with this event. Other newsletters received included the Palmetto ARC Bug Juice, Gator Chapter QCWA, Englewood ARS, South Brevard ARC Spark and The Tampa ARC Communicator. The following is from Director's Newsletter No. 2001, March 9, 1989 and written by K1ZZ. "For as long as I've known there was such a thing as Amateur Radio, and probably much longer, W1AW and ARRL code practice tapes have used so-called "Farnsworth spacing" at speeds below 13 words per minute. This meant that the individual Morse characters were sent at a faster speed, namely 15 words per minute, with exaggerated spacing. At 13 wpm, we reverted to normal spacing—which resulted in the individual character actually being sent slower at 13 wpm than at lower speeds. After giving the matter considerable study, when the Morse instruction tapes were revised for the current edition of Tune in the World we elected to use Farnsworth spacing with the characters sent at 18 wpm. We've had excellent response to this change over the almost two years it's been in effect. Accordingly, we have adopted 18 wpm characters with Farnsworth spacing as the ARRL standard for all speeds below 18 wpm and will use it for all future Morse tapes, whether for practice or examination use. When the new W1AW software is brought on line, our over-the-air code practice will conform to this standard." KD4GR writes that the Broward Amateur Radio Digital Society was so impressed with the Palm Beach Packet Group that they petitioned for permission to be a Broward subset of their organization. KD4GR also reports that the really good news is that the PBPG Board of Directors has unanimously accepted the proposal. WD4KBW reports 65 bulletins received and 107 sent by W4DL 40, WA4EIC 40, WT4F 40, K4IEK 21, WD4KBW 16 and WA9VND 15. The ARRL Information Net meets on 3940 each Saturday at 8 AM. 73 de WA4PFK. Traffic: W3CUL 2927, W3VR 990, WA9VND 721, WD4KBW 466, WA4PFK 455, AA4BN 406, K4ZK 382, K4IA 334, WA4EIC 332, K4EUK 307, W4NFK 271, K4FQU 257, N4HAP 252, K4SCL 238, N4KFU 227, W1NJM 227, KA4FZI 203, WA4RUE 191, AB4EA 178, KD4GR 128, WB0HOX 119, WB4WYG 115, N4ET 107, N4OIA 85, W4DL 81, N4ORZ 80, N4MML 80, WA4NBE 75, W4UIO 73, KA4YHS 65, WT4F 65, W4DWN 61, W3TLV 61, KF4RL 52, K3KT 45, KA4AJR 43, N1EGN 43, KC4GHT 41, AB4BC 39, KA4NXF 39, KA0GYF 37, AA4CH 36, KC4HDJ 36, N4HAS 34, KA4SIH 33, K4JI 32, KB4UIA 31, WB4GCK 30, KB4MON 28, WA4HDH 28, W4MPV 19, KB4UHC 19, KA9AKY 18, KB6ECH 17, N0ABC 13, W4VQE 11, K9ALX 10, KA4GDU 7, WA4PIL 6, WA4VWJ 5, KA0RUL 5, K9EHP 4, W4MFD 4, N4RHJ 4, N4EVU 4, N8ITP 3, N4IXO 2, W4NSY 2, AA4IF 1, W3IJR 1, N4PSV 1. (Feb) WB4GCK 28.

VIRGIN ISLANDS: SM, Ron Hall, KP2N. ASM: KV4JC. SEC: NP2B. STM: NP2E. It is with deep regret that I inform all that Randy, KV4CQ, is a Silent Key. Spring has arrived in the islands with increased activity. KP2A and group returned from KP5 with 35,000 QSOs. KV4JC and KP2BI held ham radio demo at science fair on St. Croix. The St. Croix ARC to hold Field Day for first time. KP2V & KP2BH in charge. Plans in final stages for Triathelon on April 23 with 40 plus hams involved. W9UKK teaching Tech/Gen classes. St. Croix ARES reports 68 check-ins for March. On St. Thomas/St. John ARES reports 4 sessions with 28 check-ins. Monthly ARES training meeting going well, KV4EY in charge. WP2ABM handled emergency traffic for KP2/VP2MFG involving missing person. VHF/HF packet activity at all-time high with the addition of K5HK's HF Gateway to other Caribbean islands. VP2VI & KP2A active on 6 meters. WP2AGG now NP2CW. This is Carnival time on St. Thomas, so enjoy the festivities. "Good ting, mon." 73 de KP2N

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. ASM: K7OMR. OOC: NJ7E. SEC: KX7P. SGL: KE7WD. ACC: N7ECE. TC: K7KI. BM: W1FJI. Above are listed your Section Leaders who are working hard to help me make the AZ Section the best ARRL Section. Tell them "thanks" once in a while, because their compensation is zilch! hi. Spring has sprung! Your SM has new antenna system up and working. New KLM tri-bander, plus 6-meter Yagi at 50 ft. Works FB and six meters is opening around mid-day to So. America, also ZLs coming in early PM. Jan, K6FM, Flagstaff has been appointed as check point for QSLs for WAZ, WPX, and CQ-DX awards programs. DXers note and send cards to K6FM at callbook address. Superstition ARC being represented before Mesa City Council by Neil Wake, KV7O, in relieving the restrictive antenna ordinance. More later on it. VVARA reports their repeater on 147.22 is working like "gangbusters." Coverage includes Prescott, Ashfork, Williams, Flagstaff, Sun City, Casa Grande, Camp Verde, Payson, Cottonwood, Phoenix and more. FB (TNX, "Feedback.") W7YS still contesting/DXing from Flag. Gave talk on OO program to local club. Navajo Co. ARC reports new officers. WA6IJZ, Pres; KA7VUX, VP;

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KE7GP, Sec-Treas. Newsletter Ed. WA6IJZ. VE3CDM, CRRL President spoke at March meeting of West Valley ARC. Welcome to AZ section, Tom. New EC appointment in West Valley is Bill, W9WFV. Congratulations and welcome aboard. With respect to current discussions on a proposed Code/No Code license, will be glad to receive any and all comments. Will forward them to ARRL HQ. How do you feel? Yes, No or Undecided? False rumors are going around that FCC has all ready ruled on this. Not true, repeat not true! Scottsdale ARC members busily engaged in all kinds of public service events, too numerous to list here. Keep up the good work! (Tnx, ADAW). Jan, N7JWM, wrote FB article on recent Special Olympics in the CARC Newsletter. N7JWM, her OM helped organize operation and a lot of valuable experience was gained that will help in future emergency operations as well as to benefit a fine deserving organization. You all do good work up there in the pine country. Members of OPRC participated in ARRL DX test again this year and ran up a big score, maybe the biggest using call sign 6D2DX in Oberon, Mexico. Your SM and Div. Dir. WA6WZO attended combined meeting with OPRC/TRA. So. Mtn Swapmeet, biggest ever was held in Phoenix, Mar 12. Saw many old and some new friends. Lots of good stuff got traded. Don't forget Ft. Tuthill hamfest July 28-29-30. On Saturday there will be a Section ARES mtg at 1330 hrs, followed by ARRL Forum at 1430. Everyone is invited. Our special guest from ARRL HQ this year will be Larry Shima, W6PAN. See you there. 73, Jim.

NET	Abbrev	QNI	TRAFFIC	SESS	LIAISONS
SOUTHWEST NET	SWN	159	125	31	TWN
ARIZONA CACTUS NET (HF)	ACN	532	47	31	TWN
ARIZONA CACTUS	ACN	181	42	31	ACN (HF)
ARIZONA Tfc & Emerg Net	ATEN	1029	133	31	TWN

Traffic: W7AMM 247, W1FJI 178, W7EP 143, W7LVB 127, WW7P 72, W7OIF 63, WE7G 54, K7VVC 51, K7POF 28, W7JKM 27, N7ETP 25, W7KXE 14.

ORANGE: SM, Joe H. Brown W6UBQ ASM; Riv Co, Bob W6LKN (714-686-3823). ASM; Org Co, Ralph WB6JBI (714-776-9272). ASM, San Berdo Co. Ken WA6ZEF (714-983-1272). Club News, SOARA and BCWS will merge. In a surprise announcement Chairperson Muriel Parker, and President Matt Issacs announced the end of the split between the South Orange Amateur Radio Association and the Beach Cities Wireless Society. Morongo Basin ARC Officer for 1989, Pre Al KB6ISC. VP Geaffry N6CDA. Sec Dorothy N6MKB. Tre Bill KB8EII. HAM of the year, Bill W6BA. The BPARC Pres SEZ. We tend to get into a rut, and things that were fun becoming boring. I discovered the ARRL "Diamond Jubille Award" (see QST Oct 1989, pg 59) The QSL exchange is not required. I highly recommend this award, especially if you are caught in the DX doldrums. The Los Angeles Area Council of AC Inc announces the SW Div ARRL convention, 25, 26 & 27 Aug 89, Check your local club bulletins for further info, The tri-county ARC has a car pool for meetings. If you can P/U someone or need a ride, call Joe WB6UFX. Listen up club officers. This might be a way to pack them hams in. The MVARC offers free membership, any one who becomes a ham or hits the books and upgrades their current license is eligible for one year's free membership in MVARA. The Fullerton RC rpts from WA6IWT has become VP. T-Hunt report, WB6ADC/AF6O the winners. Clark and Jim cat 13.50. Corona/Norco ARC is the proud winner of a Tandy Computer. The award was made in response to the recruiting techniques for new members. A flyer from ARRL HQ started the ball rolling. On Monday 27 March, Mark, Joe Brown, Fred Roberts, Fried Heyne, Sandy Heyne and John Miller accepted the computer from Bill Ghazi, Radio Shack Regional Manager. Congratulations CNARC. The Inland Empire ARC sez Hi-Folks, Field Day is just around the corner and it will be on us before you notice. NTS; A special recognition award was presented to W6NTN (QNI of the yr), K6UYK (RN6 liaison) K6UD (scn2/v), N6WP(NSC) WF6O (OP of the year) SCN/V has its 10 yr anniversary May 1st. After 10 yrs of dedicated service, Ernie WA6QCA and Francis WB6QBZ will retire after April 30th. They deserved the break after 10 yrs of hard work and almost 365 days a year of duty. THEY WILL BE MISSED! BPL WF6O. PSHR WF6O, KA6HJK, N6ADV and KA6TND. Tfc WF60-631, AD0A-169, W6SX-168, WB6OBZ-88, N6OKS-78, KA6HJK-77, N6GOT-54, W6CPB-50,. WA6WKG-46, KD6GX-42, KA6JOB-22, N6HIW-19, KB6VPI-12, W5TZR-12, KA6TND-11, N6ADV-10, KI6X-6, KG6NL-4, K6ZCE-4. de WF6O.

SAN DIEGO: SM, Arthur R Smith, W6INI. TC: N6JZE. SEC: W6INI. STM: N6GW. PIO: N6PKY. The 1989 Southwestern Division Conv will not be held at the LAX Hilton Aug 25-27. Early registration recommended. 1989 officers: Escondido ARS Pres N6KVP, VP WB6UHF, Sec WA6YOO, Treas WJ6U; QCWA Pres K6ZE, VP W6FH, Sec K6CD, Treas K6QM. WI6B and N6RAO were passengers on flight 811 which lost its cargo door, and more, on a flight over the Pacific. For Field Day stations: msgs sent to the SM must be in correct ARRL format. Direct contact with the SM is not required. Via relay stns ok. Send a practice msg on 146.73(-) any nite at 2000 hrs. Palomar ARC put on an Amateur Radio demo at USMC Camp Pendleton for graduates of the radio operators class of the Division Schools. Graduates can handle CW at 18 WPM-proof that the Armed Services still need CW operators. Upgrades: N6SZH, N8TZV to Adv. N6CQW reports his SD Section NTS-BBS handled over 12,000 formal msgs in 10 months. NCTN: 30 sessions, 81 msgs, 415 ck-ins. ARES CW 4 sessions, 9 ck-ins. Traffic: (Jan) WV6K 87; (Feb) N6NR 2038; (Mar) KI6ZH 292, KI6ZM 62, N6GW 46, KB6PCF 36, N6RVO 33, WA1ZEN 28, N6TEP 3

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—We have a Blue Ribbon Committee working on a WHITE PAPER for antenna ordinances. Your input is needed to help convince the public that Amateur Antennas (TOWERS) or in some cases old ordinances that refer to wireless towers are necessary for FCC licensed stations to communicate during emergencies —additional arguments to favor ham antennas should be sent to N6VI, Marty Woll, 17780 Ridgeway Rd., Granada Hills, CA 91344 or call (818) 360 N6VI ASAP. This WHITE PAPER, when completed and tested, will be distributed to other cities for their use. K6YMJ, Hank Magid, and AA6IR, Hank Miller, are also active on this Antenna Blue Ribbon Committee so please give them your ideas on this subject when you can. K6JFX, Warren Pope, editor of the Downey ARC paper called Q5, has an interesting article titled the Great 20-Meter Band Fire that you should read. The punch line is—only you can prevent band fires...don't use more power than necessary!— The Indian

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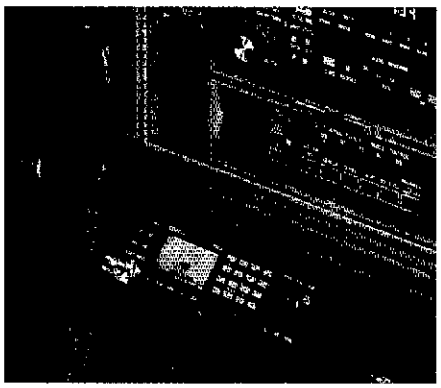
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—**a Kenwood exclusive!**

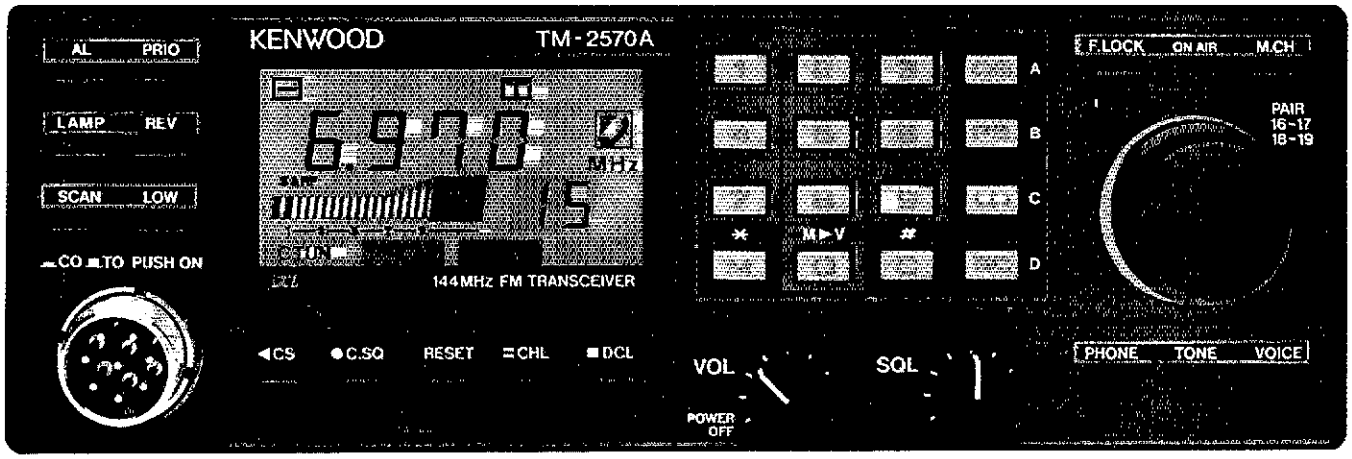


- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)
- Big multi-color LCD and back-lit controls for excellent visibility
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!

DCL Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DWN switch
- **MC-43S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna tuner

Complete service manuals are available for all Kenwood transceivers and most accessories
Specifications and prices are subject to change without notice or obligation
Specifications guaranteed on Amateur bands only

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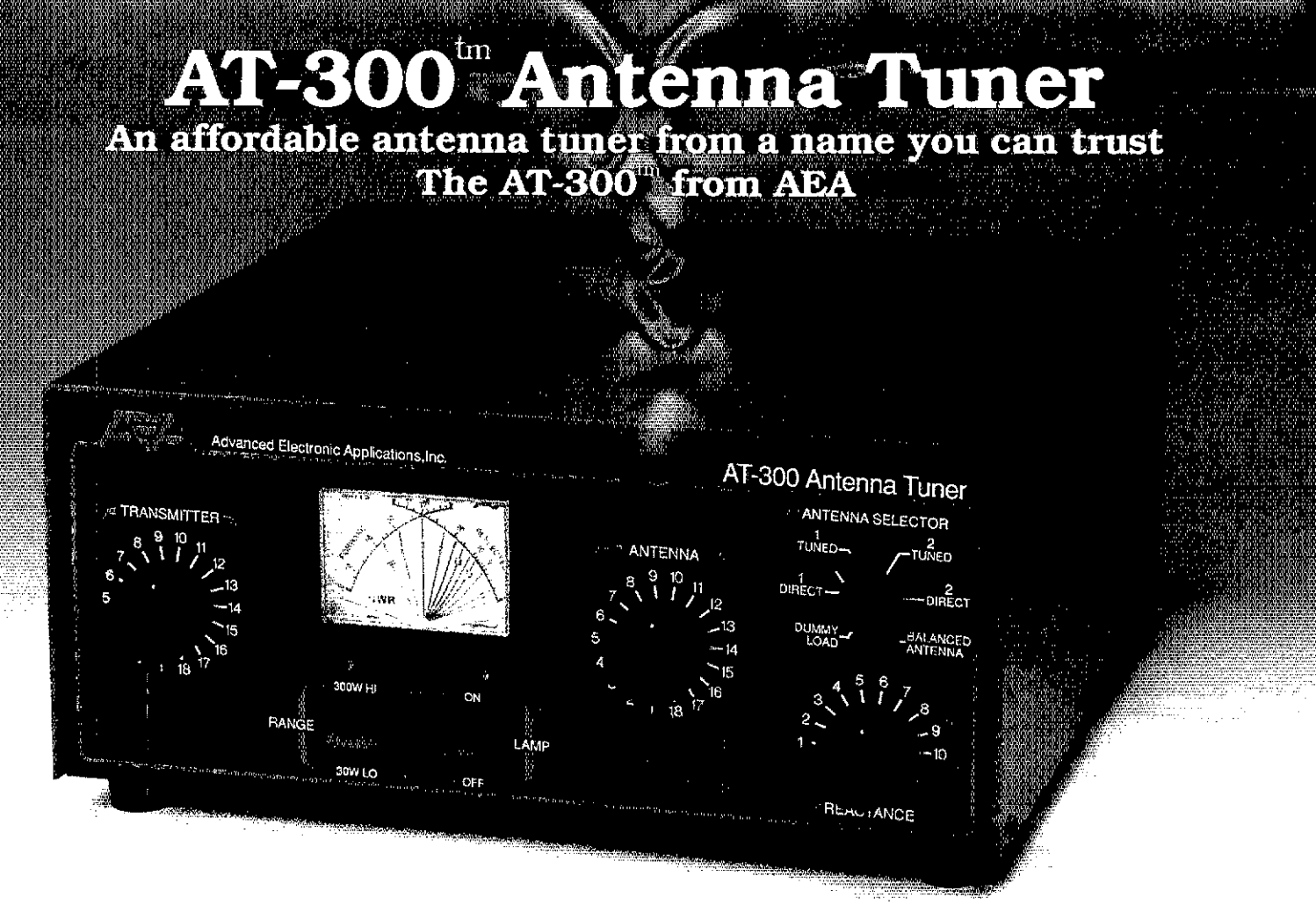
An affordable antenna tuner from a name you can trust

The AT-300™ from AEA



Low Pass Design

The low-pass design of the AT-300 is what you would expect from a company where Engineering Makes the Difference. The low-pass design of this AEA tuner means harmonic attenuation for lower TVI potential. This design also allows matching a much wider range of antenna impedances than the common high-pass designs.

Larger Size

One look at the AT-300 lets you know this tuner is different, it's bigger. While some manufacturers promote the small size of their tuners, AEA knows that performance is most important. The simple reason for the larger size is that smaller sizes degrade the inductors' Q (Quality factor), which results in less efficiency. Less efficiency means that for a given power output from your transmitter, less power will actually get to your antenna.

Easy Operation

The AT-300 tuner features a precision frequency compensated dual- movement SWR meter for ease of tuning. The high and low power front panel switch selects the proper range for the SWR meter. The AT-300 is rated for 300 watt operation. The internal balun and front panel selector switch allows for balanced and unbalanced outputs.

Get maximum performance from your transceiver and antenna by using the AT-300 antenna tuner from AEA. See your local AEA dealer today or contact:

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Amateur Net $219.95

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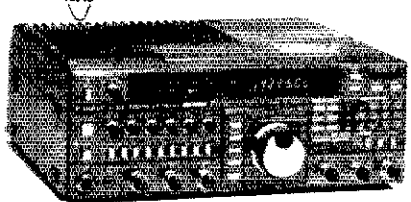
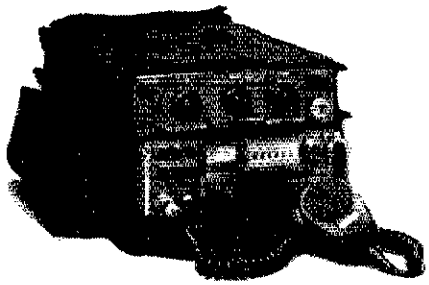


HF Equipment	LIST
FT-767GX 160-10m xcvr/.1-29.99 MHz Rcvr	$1929.95
SP-767 Speaker w/audio filters	79.95
SP-767P Speaker/phone patch	129.95
2M/767 2m module	199.95
6M/767 6m module	199.95
430/767 430-440 module	249.95
440/767 440-450 module	249.95



FT-70G* MANPACK HF xcvr (*Special Order)	1069.95
FNB-70* Extra 12V, 4 amp-hour nicad	299.95
NC-70* Nicad battery charger/base supply	259.95
CSC-70* Canvas carrying case	89.95
FC-70M* Manual antenna tuner	199.95
FC-70P* Preset antenna tuner	199.95
RSL-70* Whip antenna for FC-70P	27.95
MH-17* Speaker/microphone	27.95
YA-70* Tripod antenna	269.95
YH-70* Telephone-type handset	59.95

FT-757GX MkII 9-band Xcvr/SW Rcvr/mic	$1129.95
FP-757HD Heavy duty supply with fan	299.95
FP-757GX Compact power supply	239.95
FP-700 Power supply	239.95
FRB-757 External relay box	12.95
FC-757AT Automatic ant. tuner w/memory	399.95
FAS-1-4R Remote antenna selector	99.95
MMB-20 Mobile mount	25.95
FIF-65A Intertace; Apple IIe	59.95
FIF-232C for VIC-20/TI/most RS-232	79.95
GX Turbo/F01 Software; Apple II	59.95
GX Turbo/C01 Software; C64/128	89.95
GX Turbo/V01 Software; VIC-20	89.95

FT-747GX* Transceiver (Call for Special)	889.95
FP-757HD Heavy duty supply with fan	299.95
FP-757GX Compact power supply	239.95
FP-700 Power supply	239.95
FM-747 FM unit	44.95
MMB-38 Mobile bracket	16.95
FL-7000 Auto. tune HF linear amplifier	1995.00

Misc. accessories	LIST
MD-1B8 Desk microphone	109.95
MH-1B8 Mobile microphone	27.95
YS-60 1.8-60 MHz 2kw PEP wattmeter	99.95
YS-500 140-520 MHz 200w wattmeter	89.95
YH-55 Lo-Z headphones	24.95
YH-77 Lightweight headphones	24.95
FF-501DX Low pass filter	47.95

VHF/UHF equipment	LIST
FT-726R VHF/UHF Xcvr w/2m, FTP mic	$1095.00
HF/726 10-12-15m unit	289.95
6M/726 6m unit	269.95
430/726 430-440 MHz unit (OSCAR)	329.95
440/726 440-450 MHz unit (FM band)	329.95
SU-726 Satellite duplex module	129.95
AD-2 50w 2m/440 duplexer	41.95
FT-736R 25W 2m/430 full duplex xcvr	1749.95
FEX-736-50 6-meter module	259.95
FEX-736-220 220MHz module	279.95
FEX-736-1.2 1.2 GHz module	539.95
Other Accessories for FT-736R	Call

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FT-311RM 25w 220 FM xcvr w/autodial mic	439.95
FT-212RH 45w 2m FM w/autodial mic	459.95
FT-712RH 35w 440 FM w/ autodial mic	499.95
FT-2311R 10w 1.2GHz FM w/autodialer mic	559.95
FT-290R MKII 25w 2m FM/SSB xcvr	599.95
FT-690R MKII 10w 6m FM/SSB xcvr	589.95
FT-790R MKII 25w 430-450 FM/SSB xcvr	799.95
FBA-8 Holder for C-cell Nicads	27.95
NC-26B Wall Charger for FBA-8	11.00
CSC-19 Soft case	10.00
MH-10F8 Speaker/Microphone	29.95
MH-10E8 Hand Microphone	22.95
FTS-7 Encoder/decoder	49.95
FT-2700RH 25w 2m/440 FM w/TTP mic	599.95
FTS-8 Encoder/decoder	49.95
FVS-1 Voice synthesizer	34.95
AD-2 50w 2m/440 duplexer	41.95
FT-4700RH/YSK 50/40W 2m/440 FM/TTP	889.95

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FT-470 2m/440 FM HT/batt/cgr/TTP	559.95
FT-23R 2.5w 2m HT	299.95
FT-23R/TTP 2.5w 2m HT w/TTP	334.95

MH-12A2B or MH-18A2B speaker/microphone only $29.95 with FT-23R or FT-23R/TTP purchase.

FT-33R 5w 220MHz HT	344.95
FT-33R/TTP 5w 220MHz HT w/TTP	389.95
FT-73R 2w 440MHz compact HT	309.95
FT-73R/TTP 2w 440MHz compact HT w/TTP	349.95

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FBA-5A Alkaline batter holder for 727R	14.95
FNB-3 425ma 10.8v batt (comes w/03 series)	49.95
FNB-3A 425ma 10.8V battery for 727R	49.95
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FNB-4A 500ma 12v batt for 727R	64.95
FTS-6 Encoder/decoder; 09-series	49.95
FTS-7 Encoder/decoder; 03-series	49.95
MH-12A2B Speaker/microphone	41.95
MH-18A2B Lapel speaker/microphone	41.95
NC-9B Wall charger for FNB-3	11.95
NC-15 Desk quick charger/AC ps	89.95
NC-18B Wall charger for FNB-4	11.95
MMB-21 Mobile bracket	11.95
PA-3 Mobile adapter and charger	39.95
TA-2 2m 19" telescoping whip ant	11.95
YH-2 VOX headset	29.95
Other Handheld Accessories	CALL

Receivers FRG-9600 FRG-8800	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$759.95
FRA-7700 Indoor active receive antenna	59.95
FRT-7700 Antenna tuner	64.95
FRV-8800 118-174 MHz VHF converter	129.95
FIF-232C Interface; VIC-20/TI/RS-232	79.95
FF-5 500 kHz low-pass filter for VLF	20.00
DC-8800 DC kit	4.50
FM-W/8800 FM-wide kit	20.00
FRG-9600 60 to 905 MHz receiver	699.95
VU-9600 NTSC video unit	25.00
Catpack software (specify computer)	79.95

Antenna Rotors	List
G-500A Heavy duty elevation rotor	$259.95
G-5400B Azimuth & Elevation rotor combo	489.95

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This is Yaesu's FT-747GX.

Whether you're a novice or a veteran, it's a great way to start. And a great way to go.

DX ready. The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30 MHz.

And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

Multimode versatility. The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit—great for watching 10-meter repeaters.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW *and* AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

Lightweight construction. Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7¼ pounds! With the loudspeaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when used with a heavy-duty power supply.

Available options. FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic, Solid-State Linear Amplifier. TCXO-747 Temperature-Compensated Crystal Oscillator. FAS-1-4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket.

Discover the price/performance leader. Check out Yaesu's low-cost FT-747GX at your Yaesu dealer today. Because now, Yaesu puts priceless DX into *your* price range.

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Fill your logbook. Without emptying your pocketbook.

Government may be about to catch a few waves in the Bay of Bengal. Britain's NEL has been designing a 5-Megawatt wave energy converter for the break water of a proposed port at Ennore. The wave-energy converter would work like a five cylinder engine with air pistons, pushing air in and out to turn an air turbine powering an electric generator, according to the Institute (IEEE Spectrum) publication. One comment on the No Code heard the other day was that we have had a No Code Band (CB) for many years! So what else is new! Our Dry Cleaner approached the door the other day with big smile. When asked why the big smile, "Did you get another big raise?" He allowed as how he did—they bought him some elevator shoes for his birthday.—HAMCON 89 IS FOR REAL— If you order prior to HAMCON 89 (Aug 25) you will get a real bargain price of $4.50 (postage free) for the SPECIAL HAMCON 89 Pin. Mail your order now to Western Amateur Radio Association, Box 5403, Huntington Beach, CA, 92646-5403.—KA6ART, Deborah, (you guessed it) is helping with the ART work for the WARA HAMCON 89 PINS—According to the latest HAMCON 89 meeting, WA6ZEF, Ken informed the group that four major prizes like 940's hand-helds and 440's are now confirmed, with prizes and donations ahead of last year for the same period. Your committee is doing everything to see that this is a great hamfest, if you really want to get into the swing of the thing, just attend one of the meetings at the LAX Hilton after the TRW swap meet, the last Sat. of the month. 15 LA Clubs were represented at the last meeting. Programs and activities are still in the planning stages so it's not too late to get a booth or schedule your favorite activity. The So. Cal DX club has a representative now—WU6D, Carl Gardenias. Give Carl a call if you have any great ideas. KJ6LE, "Woody" Gerald Woodward is in charge of exhibits and he really knows what it is all about since Woody did a great job last year. Woody should get a few phone calls of appreciation for all of this good work. After all most of the real income is due to the EXHIBITS. 73, W6BF, Phineas. STM News: Sorry to report that W6DQ is a Silent Key, on Palm Sunday. Herb was one of the early DXers in the Los Angeles section. K6IYK reports heavy load on packet and made BPL. Jim handles our Hawaii outlet and is installing software to facilitate maintaining count of traffic. Traffic: K6IYK 541, AJ6F 300, W6TH 281, N7CSF 139, WB6SAN 76, W6NKE 26.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA — ASM/N.Vntra: N6MA. ASM/S. Vntra: W8AKF. ASM/Sbar-WB6BYU. ACC KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DEC/Vntra: WB6RVA. DEC/S.Sbar: KA6KGF. DEC/N.Sbar: KI6XG. DEC/SLO-WB6IIY. Ventura ARES Telephone Bulletin Board Established: John, WD6BPF, has offered the use of his telephone BBS for ARES, RACES and ARRL information exchange. If sufficient interest exists, this BBS may become a vehicle for intra-Section communications with the SM and other Field Organization officials. The BBS number is (805) 644-6136. Up to 200 users can be accommodated at 300, 1200 or 2400 baud. John is looking for someone who can up/down load information between his system and the statewide Packet network. Anyone in the Ventura area who can help is asked to contact John through the BBS. SBAR Section Field Day Trophy: All clubs are reminded that the Section Field Day Trophy and Novice Station plaques will again be offered. Four Section clubs competed for the trophy last year, and we expect even greater participation this year. ALL SECTION CLUBS ARE ELIGIBLE TO COMPETE, REGARDLESS OF ARRL AFFILIATION. The 1989 rules are the same as last years. Copies have been sent to all clubs of record. If you have not received your copy by now please contact KB5AH or W2KVA. Marilyn Hains, N6LFJ, Emergency Coordinator for Lompoc, and the Lompoc ARES represented amateur radio at the Vandenberg AFB "Safety and Disaster Preparedness" exhibit on Feb. 17. Marilyn's exhibit was very well received and many learned about the ability of ham radio to provide communications when none other is available. Well done, Marilyn! Testing successes in March: Santa Barbara ARC Session (ARRL - 3 March) To NOVICE - Brian Loller, Scott Voight. To Tech. - KC6BVG, KB6RAN, Bob Hennessey (Nov.Pending), Carlo Cozzarelli, I1SCC, To General - KB6WIE, KC6BHM. Administering VEs - KB5AH, AA6EB, AA6JG, KB6ILQ, NU6B. Satellite ARC Session (GLAARG - 3 March) To Tech. - KC6RVY, KC6BPF. To Advanced - N6NJO. Administering VEs - WB6IIY, NM6W, W6ELH, N6UE, N6IR and new VEs W6PIM, WA6VNO, AA6FX. Congratulations to all and special thanks to the VEs. We note with deep regret the passing of the following SBAR Section amateurs: Tom Rivera, K6MXO, Lompoc; John Trueman, K6LZF; Don Duncan, W6MHU, Arroyo Grande. A new general-interest club has been formed - the Santa Maria Amateur Radio Telegraphy and Telephony Club. Officers elected at the first meeting are: Pres. N6OQZ, VP WA6ARG, Sec/Treas WA6VNO and VP for Emergency Communications KI6XG. Meetings will be on the last Thursday of every month. Please contact the officers for more details. Our best wishes for success to the SMARTT club and its officers. Don't miss these HAMFESTS AND CONVENTIONS: Paso Robles ARC, May 21, Paso Robles (W7CB - 434-0643); Santa Maria SWAPFEST (Satellite ARC), June 18, Santa Maria (W6PME - 736-1761); Santa Barbara ARC, Aug. 13, Santa Barbara, (KB5AH - 682-2665); Southwestern Div. ARRL Convention, Aug. 25-27, LAX Hilton (see QST). If your club is planning a hamfest or other event for the amateur community, please notify the Section Manager (address & phone on page 8 of QST), your local Official Bulletin Station, or the Section Bulletin Manager, N6TNG (805) 928-2843. That's all for now. Hope to see you at one of the hamfests or club meetings. Traffic: W8AKF 6411, N6NLW 298, VE3AWE/W6.

WEST GULF DIVISION

NORTH TEXAS: SM, Dan Dansby, W5URI—ASMs: W5GPO, K5MQX. SEC: N0AJP. STM: W5VMP. TC: K5SXK. PIO: K5HGL. BM: W5QXK. OOC: WA5YKO. I would like to thank all of you for electing me your new SM. Kudos to the gang in Johnson Co for handling two emergencies in rapid order. A train derailment involving HD material and then a multi-explosion and fire at Haliburton Plant. 65 Tarrant Co hams did a super job at the Cowtown Marathon & 10K Run. Almost 7000 participants. Rusk was the gathering place for the Annual 7290 kHz picnic. Attending from ARRL HQs was KY1T. Kudos to Arlington ARC for becoming SSC Club. They will be in Maroon Shirts working the Nat Conv. CU there. DFW Tfc Net meets every Tue on 146.72 rptr @1800 local under WB5MRB, K5ZSB. KF5BL. BPL: K5UPN 551, W5TNT 352, KF5BL 325,

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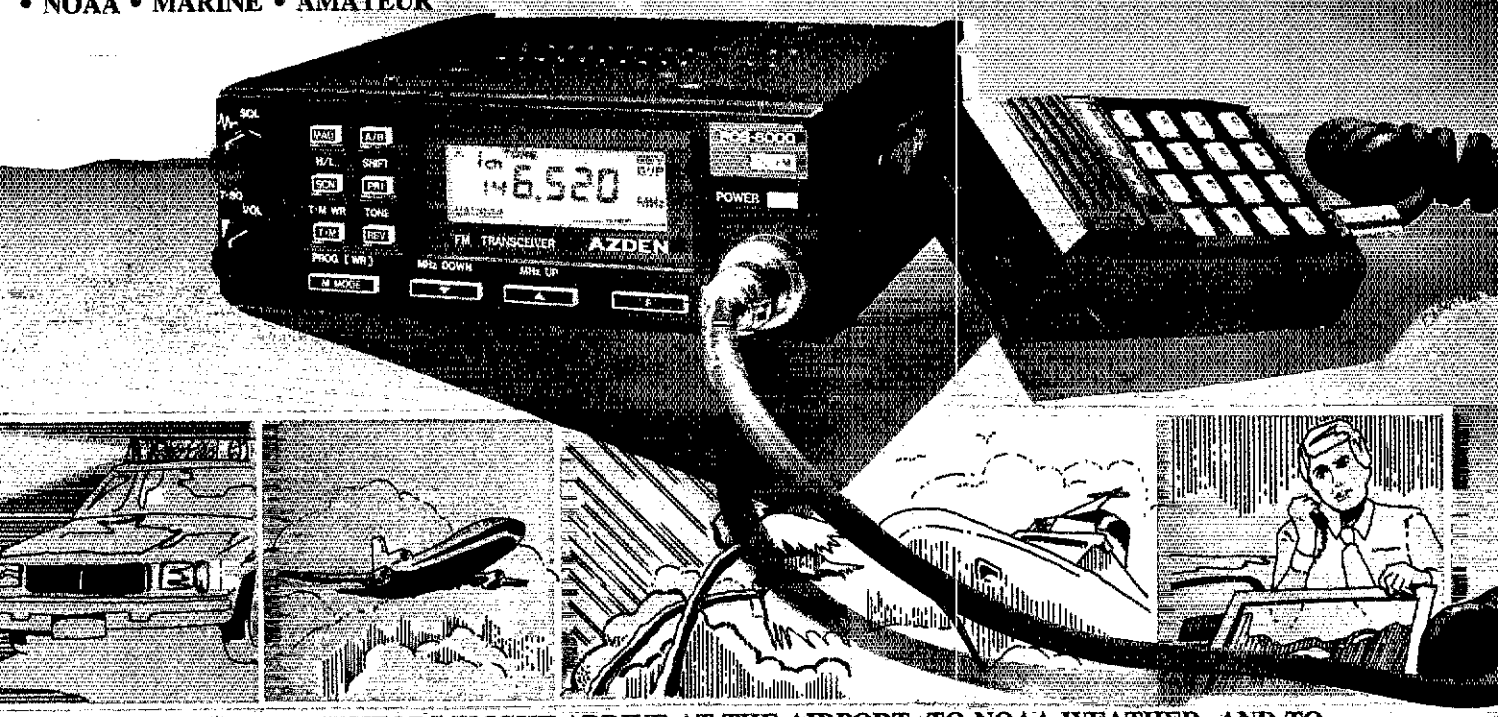

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UNPRECEDENTED WIDE REQUENCY COVERAGE: The PCS-6000 receives 118.00 to 135.995 MHZ AM Aircraft/136-173.995 MHZ FM and transmits 140.100 to 150.000 MHZ. Modifiable to ALL MARS and CAP frequencies (proof of authorization/license required)

TINY SIZE: Only 2 inches high, 5½ inches wide and 7¼ inches deep!! Easily fits anywhere, even in the smallest car!

20 CHANNEL MEMORY IN TWO BANKS PLUS 1 TEMPORARY CHANNEL (TM): Two memory banks, A and B have 10 memory channels each. The memories store frequency, shift width, offset information, and PL tone frequency as programmed. *An extra memory channel (that we call TM-temporary memory) is provided to allow you to store any operating condition instantly again and again!!*

UP TO 21 NONSTANDARD SPLITS: Program any split in any channel.

VERSATILE SCANNING FUNCTIONS: Dual memory scan, programmable band scanning, hold scan and delay scan functions are provided, with selectable delay time. ALL memory channels are tunable independently.

PRIORITY CHANNEL MONITORING: Memory Channel B0(the first channel in memory bank B) is monitored every four seconds regardless of any operating condition. When a signal is received, a beep is heard.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PROGRAMMABLE FREQUENCY STEPS: In memory, frequency steps can be set at 5KHZ to 20KHZ in any increment.

BUILT-IN PROGRAMMABLE TONE ENCODER: 57 different tones are built in for instant programming of PL tones into memory channels and microcomputer. Tone frequency can be entered independently in RX and TX. A tone decoder is available as an option.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

FEATHER-TOUCH TUNING CONTROL KEYBOARD: The LED backlighted light touch keyboard performs all tuning operations simply by pushing the key(s) and key actuation is audibly verified.

LARGE LCD (LIQUID CRYSTAL DISPLAY): The LCD display shows the operating frequency, S/RF, memory channel in use and various other operating functions. The LCD is back-lighted by green LEDs, making it possible for you to read the display even in total darkness.

FULL 16 KEY TOUCHTONE PAD MICROPHONE: DTMF Microphone functions as auto-patch when transmitting.

DIGITAL S/RF METER: Shows incoming signal strength and relative transmitter power.

MICROPHONE CONTROLS: Up/Down memory and frequency control.

TRUE FM, NOT PHASE MODULATION: Unsurpassed intelligibility and audio fidelity. High/Low Power: 25W/45W or 5W/10W (6000/6000H). Output-Fully adjustable.

SUPERIOR RECEIVER: Sensitivity is better than 0.15 Microvolt for 20-DB quieting. Commercial-Grade design assures optimum dynamic range and noise suppression.

AUDIO OUTPUT: 2 Watts or more.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

OTHER FEATURES: Rugged dynamic touchtone DTMF microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.

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W9OYL 212, W5YQZ 198, K5MQX 147, W5BMP 142, KD5RC 134, KC5NG 61, N5KCL 53, N5NZH, WA5EZT 17. PSHR: KF5BL K5UPN K5MXQ W5YQZ N5KCL N5NZH/T. U OTs look out for N5NZH. He will pass u up. Total traffic: 2270. We need an ACC, SGL, many ATCs, OOs, ORS, PIAs, etc.

OKLAHOMA: SM, Joe Lynch, N6CL—Over thirty years ago, Jim Stults, K5RLM, and Johnny Fish, K5GBN, shared a vision to start a ham radio club that would serve northwestern Oklahoma. Out of that vision came Wheatstraw ARC, an excellent radio club that recently produced two of the youngest Extra Class hams in the state. This past March, Jim joined the Silent Key ARC. Amateur Radio will sorely miss someone who gave so much to the hobby. ARRL National Convention is this month in Dallas; see you there June 2-4. Field Day is the last weekend. Your SM will operate from KV5X, the Edmond ARS station and will be looking for your FD messages. A good time to transmit them will be on the OPEN Net at 9:00 AM Sunday, on 3900 kHz. A new emergency coordinating district has been created in the Central Tulsa area. WB5OSM is the new DEC. The counties covered by Central Tulsa are: Tulsa, Creek, Wagoner, Muskogee, and Okmulgee. Your SM had an excellent meeting with Shawnee ARES members. Tulsa Repeater Organization presented an excellent WX seminar. Tnx to WB5OSM for all the hard work. 73. Traffic: WA5OUV 137, N5IKN 124, K5GBN 121 KF5RD 73, WA5ZOO 34, W5VLW 28, W5VOR 28, K5CPZ 2.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR— STM: WD5GKG. SEC: K5DG. ACC: WB5YDD. OOC: K5SBU. TC: NZ5U. BM: WA5WCY. PIO: WA5UZB. SGL: K5KJN. ASM, all of above plus N5TC. Brazos Valley ARC upgrades: KC5CMP, KB5HHI, KB5ION to Technician; KB5IGL, N5MFJ, N5NVU, N5KWO to General; KB5HZS, WB5GGY, N5NPP, N5NWA to Advanced; 3 unlicensed applicants, 1 to Technician, 2 to Novice. PIA KG5HQ, Houston ECHO Society, rprts upgrades: N5NKB to Extra, N5KWO to Advanced, N5NXS, N5MNK and KB5HHI to General; 2 unlicensed to Tech; public-service phone patches averaging 840 calls per month with average of 16 per mo to law enforcement offices; newly elected officers - K5EJX, president; VP, KF5NU; recrdg secy, KA5RIZ; crspdnc secy, KG5HQ; treas, KB5EEG; parliamentarian, W5TXV. 7290 Traffic Net Secy NL5P rprts 346 msgs 50 March sessions; 3,443 ck-ins; NTS liaison 2 per session; NM W5YQZ. OBS W5KLV rprts 4 propagation forecasts, four bulletins given 21 readings on 7 nets in Mar. PIA KA5EEQ, Brenham ARC, rprts upgrades: N5NMY to Advanced; N5NMX, KB5HOE to General; Texas Independence Day Special Events Station went off well, despite adverse wx; BARC members working TIDSE were W5AUM, KA5BLB, KA5EEQ, WD5FGY, N5GCU, W5HTI, W5JBL, KA5KPT, KA5LEI, N5NMX, N5NMY, WB5FRQ, KF5SP. DRN5 NM WB5YDD rprts 643 msgs in 62 March sessions; STX represented 100% by KD5KQ, W5KLV, W5CTZ, WB5HZO, WA5ZJY, NZ5U, KE5ZV, WB5EPA, WB5FQU, WB5FII, WV5X and WB5YDD. Bay Area ARC newsletter, LaPorte, rprts successful VE session: KB5HFN, KB5HND went to Tech; several passed portions of upgrades. Clear Lake ARC Chronicles rprts upgrades: KQ5QB, Extra; KB5EWX, N5NXT, KB5HSR, KB5IEQ, KB5HSF, KB5IMO, KB5HST to Tech; Valentine Day traffic went big, with N5IMC, WR5O, KB5AWM, KA5GLX, KB5HEJ, KA5KTH carrying the load; the 117 originated messages would double or triple the count when relays are counted in. STARFEST 89 was huge success; attendance around 1000; ARRL Forum well attended; Asociacion de Radio Aficionados de la Rupublica Mexicana (ARARM), a large Amateur group from Mexico, also held their forum at STARFEST; that's why it is called STARFEST International; South Texas Amateur Repeater Society (STARS) planning a bigger and better of STARFEST 90. Brownsville Repeater Organization (BRO) merged with C.H.A.R.R.O., Brownsville, at a recent joint meeting; more attention can now be paid to the repeater operation. Traffic: WB5J 523, W5CTZ 251, WB5YDD 251, WD5GKH 82, WB5FQU 73, W5KLV 35, AC5Z 34, W5BGE 22, W5KR 17, NZ5J 15.

WEST TEXAS: SM, A. Milly Wise, W5OVH— We are pleased to report that the Prairie Dog ARC has been officially renewed as a Special Service Club. The Section Manager's Net of the West Texas Section now meets at 0100 Zulu on 3931 kHz and will be called on the 2nd and 4th Thursday of each month. Let us try to recruit new "young" radio amateur radio operators. Have you all noticed the greying of Amateur Radio? Let us all communicate to the young people the magic of Ham Radio. Key City ARC of Abilene Novice Class has six new Novices coming up. Thanks to N5JZH, N5ANO and KF5ZY for all their help. Abilene may lose its national weather service. If so, the amateurs will have to keep on their toes to report severe weather. Van O'White, the commo van of the San Angelo ARC is sporting a new Coleman refrigeraed air conditioner donated by two active members of the SARRC. Twenty four Novices have passed their exams and some have already upgraded to Tech from the 35 students who stuck with the classes at El Paso ARC. The instructors and students are to be congratulated for the success of one of the largest classes ever held at W5ES. The instructors were KB5QV and K5CU. Enjoyed the Littlefield hamfest and meeting the various members of the Pampa and Amarillo Club recently. Will try to visit more clubs in the near future. 73, Milly, W5OVH. 7290 Net report: 50 sess, 3443 QNI, 3346 QTC. Traffic: AE5I 166, W5ERT 35, K5KKO 27, KE5VH 5.

TECH TALK from ICOM

ICOM's New IC-725! A High Tech Fun Radio!

Although only recently introduced, ICOM's new IC-725 HF transceiver has created widespread excitement among new amateurs and old-timers alike. This versatile transceiver was designed to fill a noticeable vacancy between full-size units used in deluxe home setups and compact rigs for increasingly popular secondary interests. Favorably exceeding that requirement, the IC-725 is thus ideal for mobiling, portable operating, for newcomers with limited space or budgets and QRP enthusiasts. When combined with ICOM's optional PS-55 AC power supply, AT-150 or AH-3 automatic antenna tuner, SP-7 speaker, GC-5 world clock and SM-10 graphic equalized desk mic, a very impressive IC-725 based home setup is also created.

The go-anywhere IC-725 operates 160 through 10 meters, plus it includes full shortwave reception from 100kHz to 33Mhz. Receiver sensitivity can be increased or decreased via a front panel-selectable RF preamp or attenuator, thus tailoring strong and weak signal performance to fit your special needs. Transmitter output is fully adjustable from 100 watts maximum to approximately 10 watts via the RF PWR control. An easy internal readjustment of R-208 on the transceiver's main circuit board will extend the RF PWR control's minimum setting to five watts or less for serious QRP operation.

ICOM's incorporation of a Direct Digital Synthesizer system in the IC-725 is a significant step forward in modern amateur transceiver designs. DDS was originally used in only top-of-the-line equipment like ICOM's pacesetting IC-781. Thanks to innovative technology and corresponding cost reductions, however, the benefits of DDS can now be incorporated in even modest-priced transceivers like ICOM's new IC-725. A Direct Digital Synthesized local oscillator/mixer injection signal produces very low noise reception, wider dynamic range, high intermod immunity, and superior transmitted signal quality. DDS also assures exceptionally fast PLL lock-in time for top-rate CW, RTTY, AMTOR and PACKET operations.

The new IC-725 also features Band Stacking Registers like its big brothers, the IC-781 and IC-765. Their function is to retain your last-selected frequency and mode in VFO A and B for ultra-convenient band changes. You can thus switch between favored hot spots on 20 meter CW, 17 meters SSB, 15 or 10 meters CW, etc. with a single button for high-score contesting or DX'ing. Once accustomed to Band Stacking Registers, anything less will seem obsolete!

Since all the IC-725's 26 memories are fully tunable and reprogrammable without VFO A or B interaction, many operators use them for dynamic operating or contesting. Memory numbers are matched with personal preferences or bands and modes of interest like MEMO 10 and 11 for 10 meter SSB and CW, MEMO 12 and 13 for 12 meters SSB and CW, etc. The IC-725's Memory Write button is then used when operating MEMOrized bands to progressively store needed stations in their related memories. This technique multiplies your DX contacts-per-hour ratio and really outpaces the competition! The IC-725 may be small in size, but it is big in performance!

Three scan modes are featured in the IC-725: programmable band scanning, full memory scanning, or memory scanning according to your selected mode. You can use the IC-725's all-mode squelch for quiet scanning, or scan with the squelch open to overview a band's action. Listening for a special DX'pedition to fire up within a 10 or 40kHz range? Program those upper and lower ranges into memory 25 and 26. Then set the IC-725 scanning while you work in the shack or listen as you relax in an adjacent room. Your diligence will be rewarded by hearing their first on-the-air activities!

Several front panel controls on the IC-725 serve a dual purpose. Pressing the FUNCtion button, then pressing the kHz button, for example, selects tuning rates of 2, 4 or 10kHz per dial revolution. Likewise, pressing the FUNCtion and BAND button toggles the LCD frequency display's 10Hz readout on or off. The FUNCtion button can also be used with the RIT to add its receive offset to the transmitter. Additional secondary functions are labeled on the IC-725's front panel.

Special connectors on the IC-725's rear panel include sockets for an AFSK, RTTY or PACKET terminal, personal computer, and optional AH-3 or AT-150 automatic antenna tuner. ICOM's optional CT-17 is required for computer interfacing. It connects to your computer's RS-232C port, exchanges information in a PACKET format, and its selectable baud rates are 1200 (preset), 300 and 9600 bps. ICOM's AT-150 antenna tuner is designed for deluxe home-station use with coax-fed antennas like dipoles and beams. Many operators also praise its wide matching range for working with multiband antennas like the G5RV and Carolina Windom. ICOM's AH-3 is perfect for mobiling, portable setups and home operating with random-length wire antennas. The AH-3 tunes 80 through 10 meters with its mating AH-2b mobile whip system. It also works 160 through 10 meters with 40 foot or longer single wires. The AH-3 system's controller is factory installed in all IC-725's.

The IC-725's most impressive assets are not defined or limited to front panel controls. They are ICOM's long-term commitment to top quality engineering, pacesetting circuit designs and phenomenal reliability. The IC-725 is also backed with ICOM's legendary one year full warranty. Considering those outstanding assets, the IC-725 is one BIG little radio!

ICOM America, Inc., 2380 - 116th Ave. N.E., Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
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HOME IS WHERE YOUR IC-725 IS

Fixed, mobile or portable, ICOM's new IC-725 delivers band-commanding performance. The easy-to-operate IC-725 reflects ICOM's world-renown excellence in circuit designs, versatility and dependability. Your enjoyment is also guaranteed with ICOM's one full year warranty!

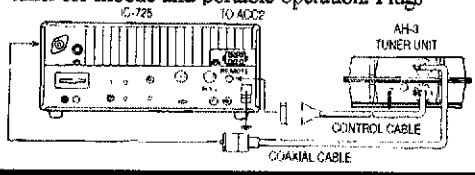
SMALL SIZE, BIG PERFORMANCE!

Extraordinary Performance! Includes: 160 through 10 meter operation • 100 watts output • Shortwave reception from 100kHz to 33MHz • SSB, CW and AM modes (FM optional) • Sensitive 105db dynamic range receiver • Low noise DDS switching • Panel-selectable RF preamp and attenuator • Dual VFO's • Selectable AGC • Rugged full duty cycle finals.

GLOBE-SPANNING OPERATION!

Full Featured Operation! 26 tunable memories with Band Stacking Registers which enable you to store a frequency, switch bands, and return to the stored frequency • 10Hz digital frequency display • Three tuning rates • Three scan modes • Highly effective Noise Blanker • RIT • Semi-QSK CW • Optional narrow CW filter • Built-in AH-3 controller • IC-725 measures only 9.0 x 3.7 x 9.4 inches (H, W, D).

Optional AH-3 automatic and remote antenna tuner for mobile and portable operation. Plugs directly into the IC-725. Wide impedance matching range. Mating whip unit (AH2-B) bolts to auto's frame, works 80-10 meters.



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A HANDFUL OF OPTIONS

ICOM's incredibly rugged and reliable handhelds are designed to fit your lifestyle with a full array of interchangeable accessories. They size up/down in operating time and output power with optional battery packs, and their rapid desktop chargers keep you talking longer. ICOM speaker mics clip on to belts or lapels, and headsets with VOX deliver hands-free operation. Exercise your options with ICOM!

Field-Proven Dependability

ICOM handhelds have trekked the frozen arctic, traveled cross-country in bicycle races, been dropped from towers and run over by vehicles, yet continue operating with amazing dependability!

2-Meters

Enjoy incomparable performance with ICOM's seven watt IC-2GAT, professional quality IC-02AT, pocket-size IC-μ2AT and rugged IC-2AT. All units sport expanded frequency coverage for MARS and CAP operations and exceptionally selective receivers for high intermod immunity. The IC-2GAT and IC-μ2AT include reception from 139 to 163MHz and NOAA weather copy.

440MHz

ICOM's six watt IC-4GAT and ultra compact IC-μ4AT are front-line winners covering 440.0-449.9MHz with phenomenal quality and reliability. They represent 70cm operation at its best!

Dual Band Triumph

The amazing IC-32AT operates full duplex on 140-150MHz and 440-450MHz with five watts output on both hands. Also receives 139-174MHz and stores any Tx and subaudible tone offset in 20 memories. Truly an FM'ers dream rig!

1.2GHz

ICOM's unique IC-12GAT sets the pace with full featured operations from 1260.0 to 1299.0MHz in today's most revolutionary handheld.

Customize Your Handheld

with ICOM's full line of versatile accessories and options. Visit your dealer or request ICOM's ham catalog for the full picture.

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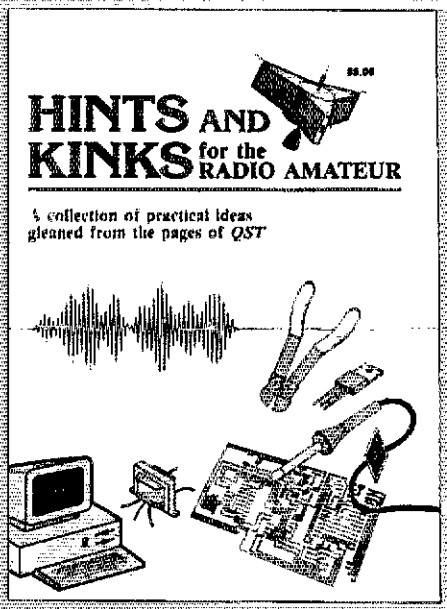
ARRL Publications



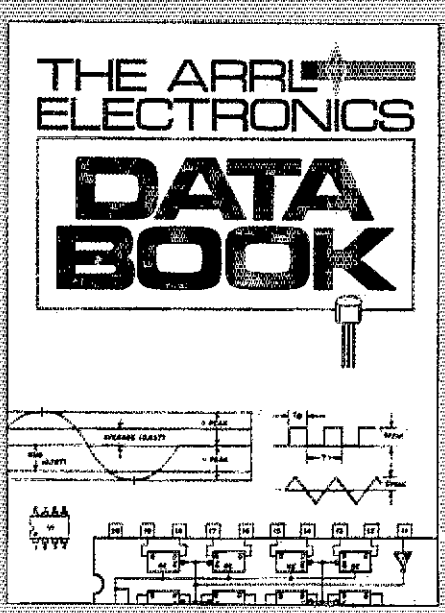
"A terrorist agent, representing an unknown foreign power or an internal subversive group, is bent on crippling or destroying America's space program by operating an illicit radio station from somewhere inside our Lost Padres National Forest wilderness area. A terrorist who has somehow gained access to our secret digital codes, launching schedules and classified radio frequencies required to cause our birds to self-destruct, during or after launch." And so begins a new adventure for Tommy Rockford, K6ATX.

Murder by QRM is packed with action. Join K6ATX on an ill-fated search using motorized hang-gliders and then as he backpacks through the wilderness in search of the hidden transmitter site. With the launch of the space shuttle *Conquistador* only hours away will Tommy be able to ferret out the culprits before the fatal destruct signal is sent?

This is the sixth and final ham radio adventure by Walker Tompkins (the real K6ATX) who became a silent key just before the book was published. 194 pages, $5.00*

*For postage and handling add $2.50 ($3.50 for insured parcel post or UPS—please specify)

The ARRL Data Book is back by popular demand! Doug DeMaw, W1FB has completely revised and expanded the material in this handy reference for the RF design engineer, technician, radio amateur, and experimenter. This one source has all of those regularly used tables, charts, and those hard-to-remember formulas. You'll also find hundreds of popular circuit diagrams of oscillators, mixers, amplifiers, other active devices and their operating parameters. This book can be used alone or to complement **The ARRL Handbook** and belongs in every technical library. Here's a brief summary and chapter lineup: **Symbols, Conversion Factors and Tables**; **Components and Materials** includes color codes, standard values, toroid selection charts; **Inductors and Transformers**; **Time and Frequency Measurement**; **Networks and Filters** covers attenuators and matching network design information; **Digital Basics** is 88 pages of logic, TTL Circuits, specific device descriptions, linear ICs, op-amp applications, and regulators; **Antennas and Transmission Lines**; **Catalog of Circuit Building Blocks** including audio amps, RF and IF small-signal amplifiers, mixers, FM detectors, oscillators, dc switches and amps, and frequency doublers; **Workshop and Lab Practices**. 234 pages, $12.00*



"Gimmicks and Gadgets, Tricks of the Trade." Since 1933, those words have been used describe **Hints and Kinks for the Radio Amateur**, but it has been almost seven years since the last edition appeared. Well, H&K fans, the long wait is over. The 12th in the series of the most popular *QST* "Hints and Kinks" contributions is now available, and hams like yourself share their innovations and wizardry. Like its predecessors, this edition has been said to be almost like having a radio club meeting on your bookshelf!

Here's just a sample: **In and Around the Station:** A Universal Equipment Stand, Safe Power Wiring Practices, Stop the Fire, Not Your Gear. **Transmitting and Receiving:** A Two-Transistor Transmitter for 30 Meters, Improvements for the HW-8, FT101ZD, TS830S, SB200, and SB220. **CW Hints:** Magnetic Switch for CW Tune Up, The Sneaky Knee Key for Mobile CW. **Computers and Digital Modes:** A Message-Waiting Indicator for TNCs, Tips for the VIC 20, TRS80 and Apple II. **Antennas and Feedlines:** Inexpensive 30 and 12-Meter Arrays, Retuning Traps for the WARC Bands, Baluns, Tower and Rotator tips. **Shop Secrets:** Tips on soldering and making PC Boards and more! **Tips on Testing:** Simple Logic Probe, plus 11 pages of test equipment and tips. **Portable and Mobile:** Power supplies, antennas, mobile installation tips. **VHF and UHF:** Antennas, amplifiers, CTCSS Tone Generator and more. **Power Supplies:** Power Supplies from Old Battery Chargers, High-Voltage Supply for Mobile Amplifiers. **Taming Interference:** Telephone RFI, TVI, CATVI cures. **Miscellanea:** COR and Timer Circuit, World-Time-Finder Slide Rule, AFSK System for FAX and more. 160 pages, $5.00*

ARRL, 225 MAIN STREET, NEWINGTON, CT 06111

CELEBRATE

the 75th anniversary of ARRL with a new Handbook!

1989 marks the 75th anniversary of the founding of the League. There's no better way of celebrating this momentous occasion, than with the new *1989 ARRL Handbook for the Radio Amateur*!

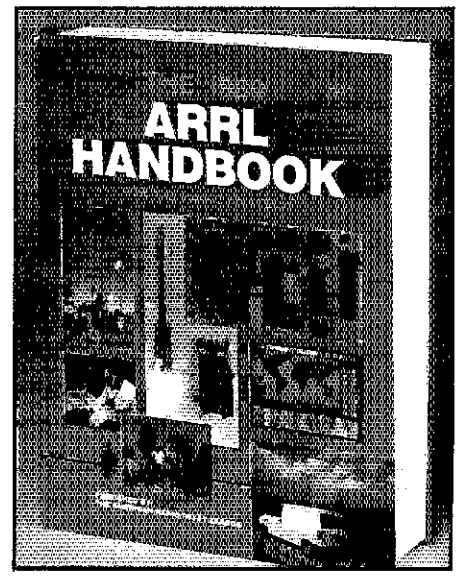
The 1200-page sixty-fifth edition contains over 2100 tables, figures and charts. The new *Handbook* is better than ever with revised information on phase noise measurement, direct frequency synthesis and spread spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects to this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a L/Q meter for measuring coil inductance.

But that's not all. You'll find many other popular construction projects that can be built in a weekend such as power supplies and VHF/UHF preamps. For the more ambitious builder there are projects like the 1.8 MHz QSK transverter (there are VHF/UHF transverter projects too) and there are many amplifier designs to suit your needs from HF through microwaves.

The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic incher" transmitter; not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accesories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

For $21, *The ARRL 1989 Handbook for the Radio Amateur,* remains an exceptional value for a hardcover technical publication. The price outside the US is $23. For postage and handling, add $2.50 (or $3.50 for insured mail or UPS—please specify)



Here is a description of what is covered in the Handbook:
The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primariliy to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

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ICOM Mobiles

YOU'RE LOST WITHOUT IT

Whether you're trying to find your way to an unfamiliar location or need assistance in an emergency, ICOM mobiles help you find your way. ICOM's dependable mobiles steer you to a friendly voice or a helping hand.

Most Popular Mobiles.

ICOM's popular mobiles include the 2-meter **IC-28A** and **IC-28H**, 220MHz **IC-38A**, 440MHz **IC-48A** and 2-meter/70cm dual band **IC-3200A**.

21 Memories.

Store frequency, offset and tone, with an offset check button on the front panel. The IC-3200A features 10 fully tunable memories.

Packet Perfect.

The IC-28/38/48 series includes a high speed microprocessor and switching circuit for superb packeting!

Top Features.

- Band and Memory Scanning
- Compact Size
- All Subaudible Tones Built-In
- Backlit LCD Readout with Dimmer
- DTMF Mic Included

"I feel any company willing to build radios as survivable as my IC-28A deserves my ham radio dollars. . ."

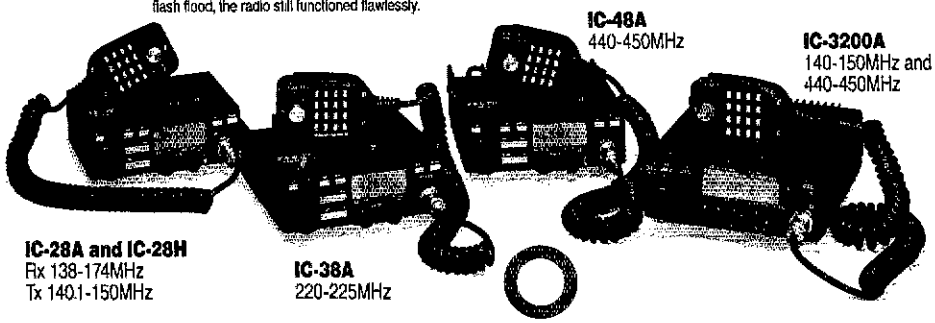
-Jonathan Starr AH6GJ
After his truck and IC-28A were washed away in a flash flood, the radio still functioned flawlessly.

Options.

Options include the UT-28 digital coded squelch, SP-10 speaker, HS-15/HS-15SB boom mic and PTT switchbox and PS-45 AC power supply.

ICOM Mobiles.

Don't be lost without them. Find them at your local ICOM dealer.



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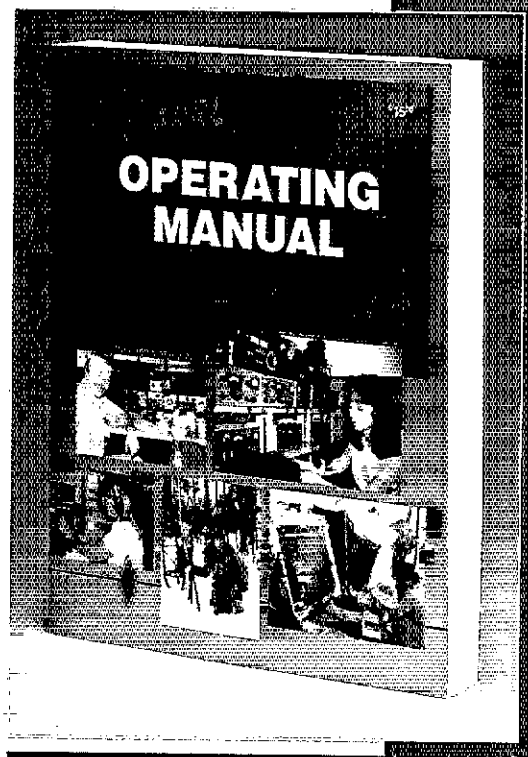
All stated specifications subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. Mobiles388.

OPERATING EXCELLENCE

No one has ever called Amateur Radio boring. There's so much to do in this multi-faceted hobby and it is all described in the big 688-page *ARRL Operating Manual*! The book proved so popular that we had to go back on press for a second printing in less than a year.

Why is this League publication a smash hit? We gathered together the efforts of talented writers who are experts in each of their Amateur Radio specialties: Basic Operating by Bill Jennings, K1WJ and Carol Smith, AJ2I; FM and Repeaters plus the chapter on Packet Radio by *QST* columnist Stan Horzepa, WA1LOU; DXing by Bob Locher, W9KNI, Overseas DXing/DXpeditions by Carl Henson, WB4ZNH; Traffic Handling by Maria Evans, KT5Y; Emergency Communications by Richard Regent, K9GDF; Image Communications by Bruce Brown, WA9GVK; VHF/UHF Operating by Michael Owen, W9IP; Satellites by Dick Jansson, WD4FAB and Contests by Clarke Greene, K1JX.



The chapters on Shortwave Listening, The Amateur Radio Spectrum, Antenna Orientation, and RTTY Communications were written by HQ staffers: AK7M, W4RI, K1TD and WA3VIL. Bob Halprin, K1XA was the editor of the *Operating Manual* and was responsible for the popular Operating Awards chapter where more than seven dozen awards are described and illustrated in full color.

If you really want to be "in" on what is happening in Amateur

by a host of world-class operators

Radio operating today, you need a copy of the third edition of the *ARRL Operating Manual.* Available at your dealer or directly from ARRL for $15. For postage and handling add $2.50 ($3.50 for insured mail or UPS—please specify.)

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SATURDAY
June 10, 1989
9am til 5pm

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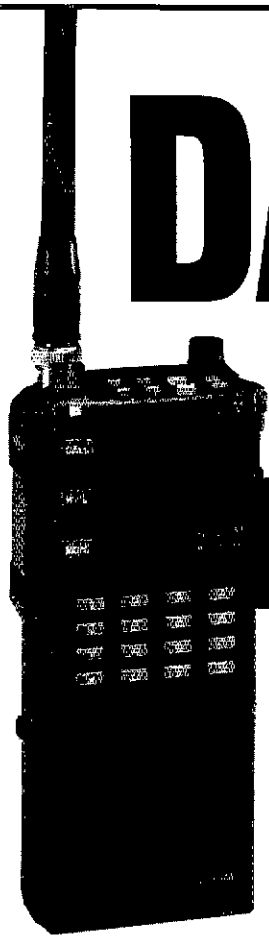

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Grand Prize
IC-2GAT 2M
7 WATT HANDHELD

Prize Drawings each hour.
Come and register to win.
(No purchase necessary to win.)

- Special pricing
- ICOM personnel to demonstrate new equipment
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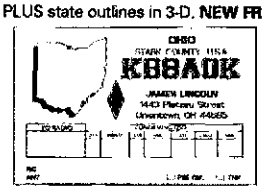

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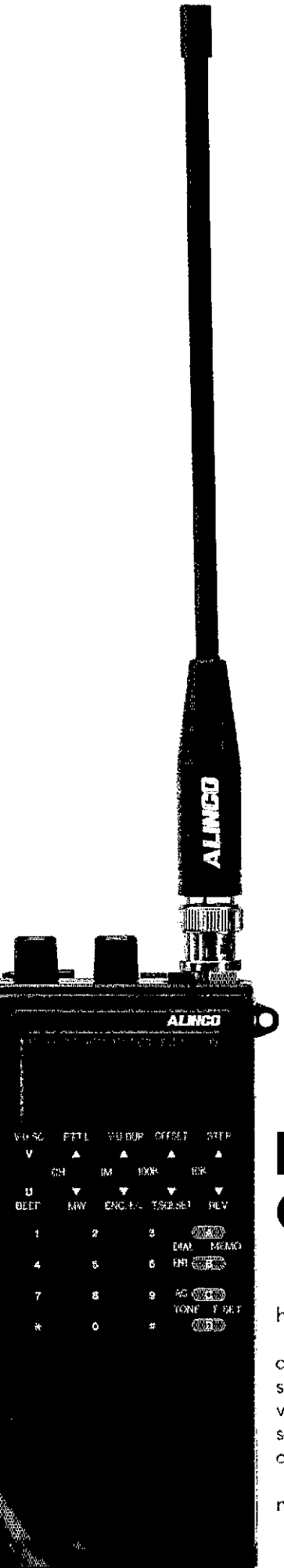

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THE ARRL ANTENNA BOOK Written by members of the ARRL Technical Department staff and sixteen well-known outside authors, all of whom have done much to contribute to the state-of-the-art in antenna and transmission line theory and practice. The recently published 15th Edition presents the best and most highly regarded information on antenna fundamentals, propagation, transmission lines, Yagis and quads, as well as all of the popular wire antenna designs. You'll find antennas for limited space, portable, mobile, VHF, UHF, microwave and space communications. Contains over 700 pages and 987 figures. **Chapter lineup:** Safety First, Antenna Fundamentals, The Effects of Earth, Selecting Your Antenna System, Loop Antennas, Multielement Arrays, Broadband Antennas, Log Periodic Arrays, Yagi Arrays, Quad Arrays, Long Wire and Traveling Wave Antennas, Direction Finding Antennas, Portable Antennas, Mobile and Maritime Antennas, Repeater Antennas Systems, VHF and UHF Antenna Systems, Antennas for Space Communications, Spacecraft Antennas, Antenna Materials and Accessories, Antenna Supports, Radio Wave Propagation, Transmission Lines, Coupling the Transmitter to the Line, Antenna and Transmission Line Measurements, Smith Chart Calculations, Topical Bibliography on Antennas, Glossary and Abbreviations. Edited by Gerald L. Hall, K1TD, *QST* Associate Technical Editor. Copyright 1988, #2065 $18*.

*For postage and handling add $2.50 ($3.50 for insured parcel post or UPS, please specify)

YAGI ANTENNA DESIGN is based on the series in *Ham Radio* Magazine by the late Dr. James L. Lawson, W2PV. Jim designed and built a highly competitive and successful Amateur Radio contest station. 210 pages cover the following subjects: Performance Calculations, Simple Yagis, Performance Optimization, Loop Antennas, Ground Effects, Stacking, Practical Designs, Designs for 7 through 28 MHz. Hardcover. Copyright 1986. #0410 $15*.

NOVICE ANTENNA NOTEBOOK At last, an antenna book written for the beginner! Don't let the lack of an antenna keep you from getting on the air. With this book you can choose which wire, vertical or beam antenna suits your needs, and you'll be ready for all of the fun of seeing that the antenna you put up really works! Contains pictorial drawings that show dimensions for Novice and Technician band use. Written by W1FB in his usual plain language style that makes him so popular as a *QST* author. Copyright 1988, #2073 $8*.

ANTENNA COMPENDIUM We don't have room for all of the good antenna articles that are submitted to *QST*, so we have packed this volume with new material on verticals, quads, loops, Yagis, reduced-size antennas, baluns, Smith Charts, antenna polarization and other interesting subjects. 176 pages. Copyright 1985. #0194 $8*.

LOW BAND DXING John Devoldere, ON4UN completely explores the 160, 80, and 40-meter bands. A large portion of this book is devoted to propagation characteristics and design and building of efficient antennas for these bands. 210 pages. Copyright 1987. #047X $10*.

HF ANTENNAS FOR ALL LOCATIONS was written by L.A. Moxon, G6XN for the RSGB. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, but you'll find descriptions of some aluminum antennas as well. Copyright 1982, #R576 $15*.

TRANSMISSION LINE TRANSFORMERS At last there is a source of practical design data covering the use of these devices for both commercial and amateur applications. Written by Dr. Jerry Sevick, W2FMI, this book covers types of windings, core materials, fractional-ratio windings, efficiencies, multiwinding and series transformers, baluns, limitations at high impedance levels and test equipment. Hardcover, 128 pages, Copyright 1987. #0471 $10*.

W1FB'S ANTENNA NOTEBOOK Not everyone has a great deal of real estate to put up a forest of aluminum. Doug DeMaw tells how to get the best performance out of unobtrusive wire antennas and verticals and how to build tuners and SWR bridges. 122 pages, Copyright 1987, #0488 $8* For shipping and handling add $2.50 ($3.50 for insured parcel post or UPS)—please specify.

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DX-ing, contests, pile-ups, traffic handling. When you need to command attention, you will with the SB-1000 Linear Amplifier from Heath. And you'll do it for a cost that no one else can match.

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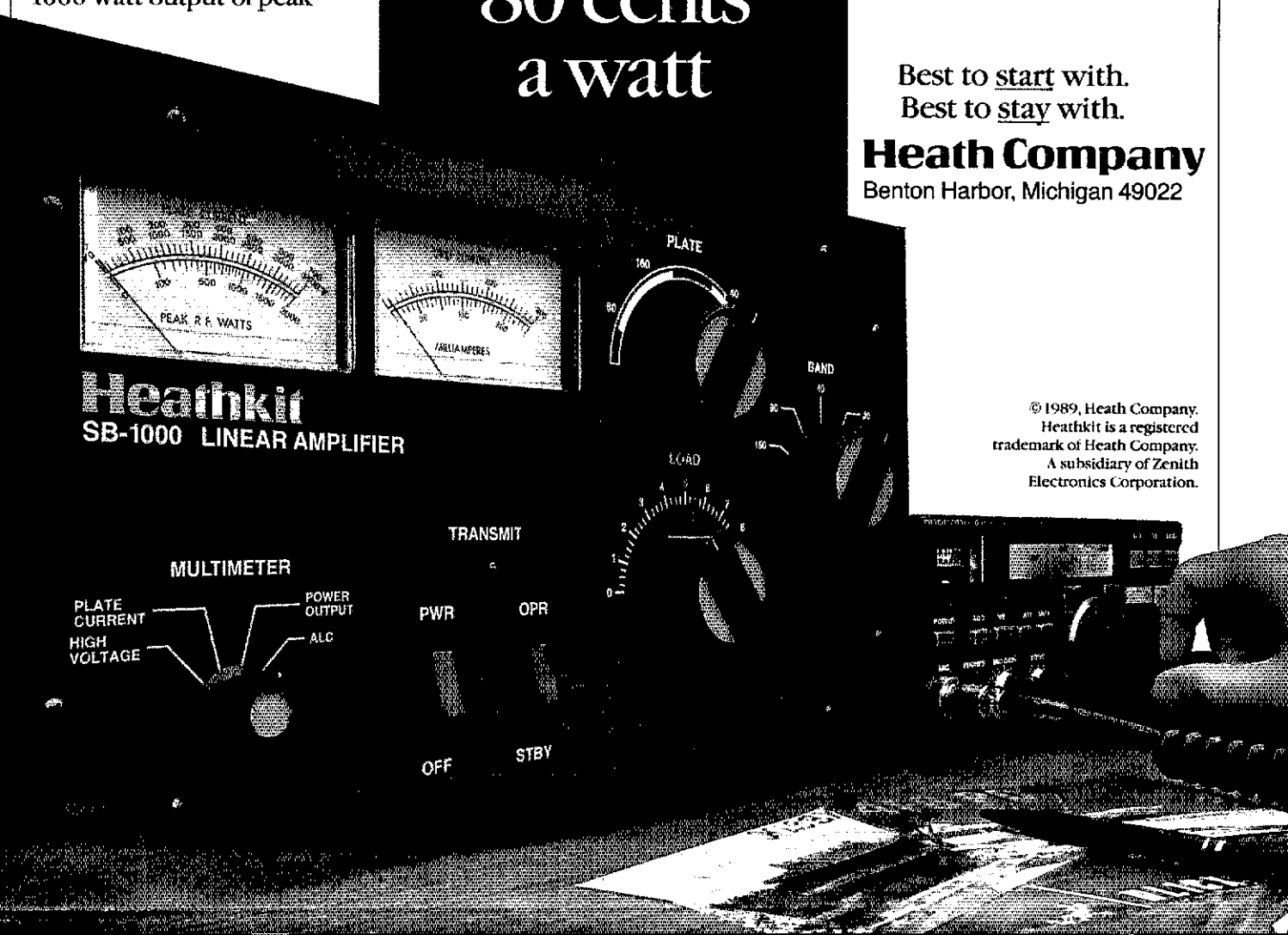

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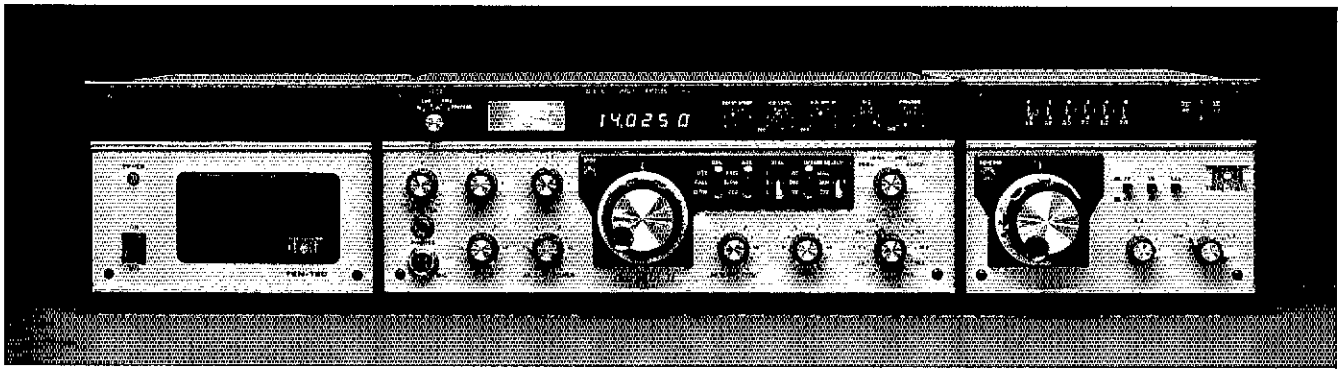
All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50 + dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

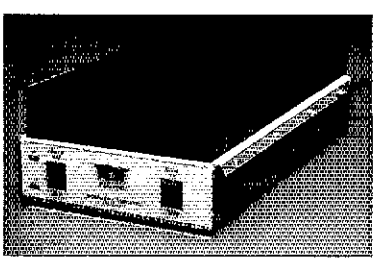
If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

Add Satellite Communications To Your HF Station

Model 2510 B

The Model 2510 B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410

TITAN: A Gallon And A Half Out! (5.68 Liters)

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

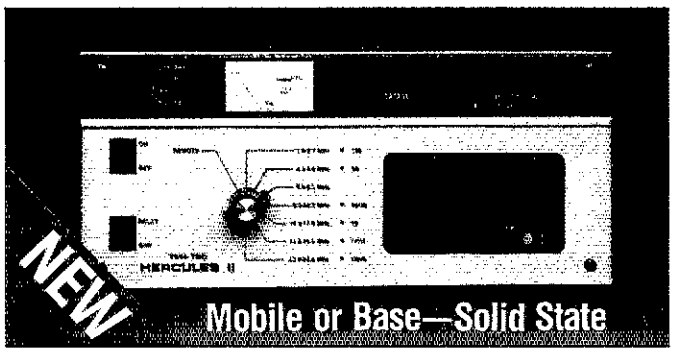
The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

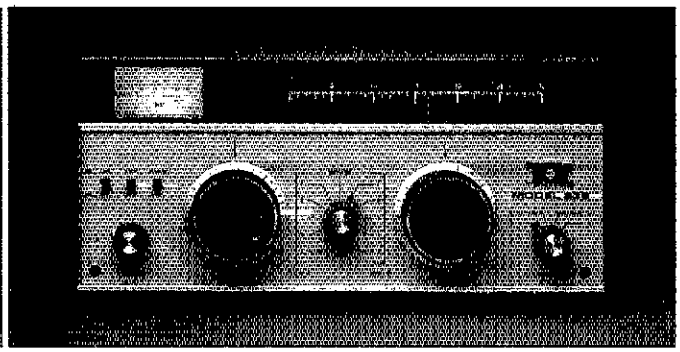
Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.





Hercules II No Tune 550 Watt HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

Two KW Antenna Tuner

The latest version of the highly regarded Ten-Tec antenna tuner is now the Model 238. The 238 has been re-styled to match our transceivers and looks great in your shack, whether your layout is "look alike" or "mix and match." This tuner adds a great deal of versatility. It will load virtually any unbalanced (coax fed or long wire) antenna. The high power balun is built in as standard which allows the use of balanced feeders also. Full coverage from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without false load problems. The lighted slide rule dial and calibrated tuning knob skirts make it possible to log settings and quickly QSY to the same frequency and antenna, without going through the tuning process again. Lighted multi-meter reads power in two ranges, plus SWR. A great way to operate all bands, including WARC and MARS, with something less than a world-class antenna farm.

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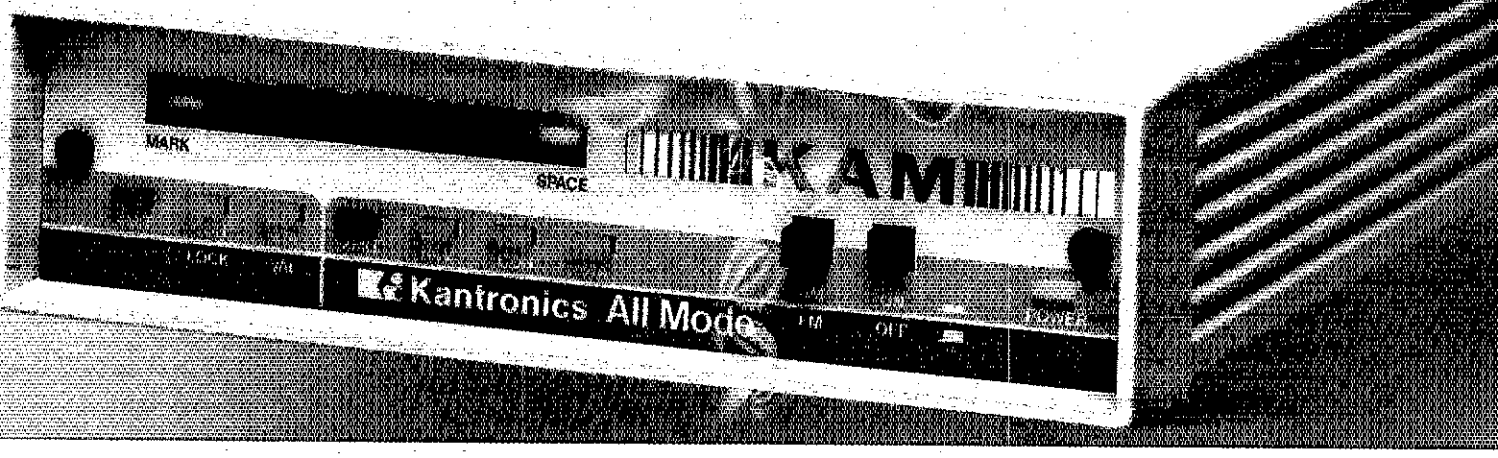

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In 26 countries around the world, tens of thousands of amateurs know that Kantronics is the leader in bringing tomorrow's technology to their stations today. They also know they will always be among the first to incorporate just-introduced features and modes with Kantronics software and firmware updates.

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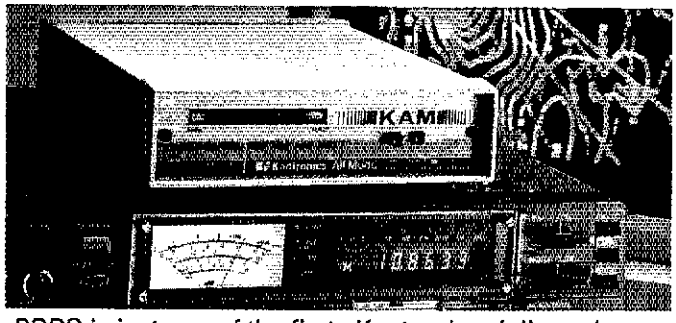

PBBS is just one of the firsts Kantronics delivered.

you will know you have mail in your **Personal Packet Mailbox**™ when your KAM "STA" LED is blinking. New firmware level 2.85 has also added a handy automatic mailbox user-connect. So save your computer and monitor life by turning them off when you are away, and never miss a beat on the airwaves.

Version 2.85 KAMs have increased Packet Cluster™ compatibility, **KA-NODE**™ path preservation, KA-NODE recognition of the "NET" nodes and HF baud rates from 50 through 300! And there are three new mailbox commands: *List Mine, Read Mine* and *Kill Mine.*

and Tomorrow...

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Kantronics **All-Mode**™ (KAM) has Packet, WEFAX, ARQ, FEC, RTTY and CW reception. But we have five models to suit your particular taste. **Ask your dealer for the best choice today...and tomorrow.**

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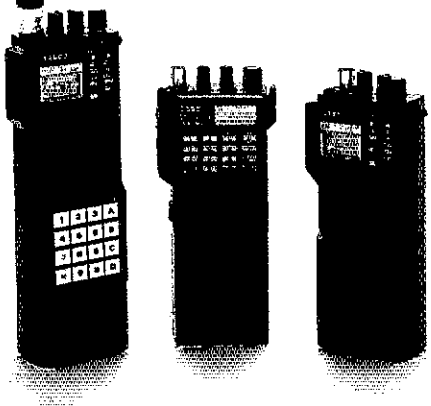
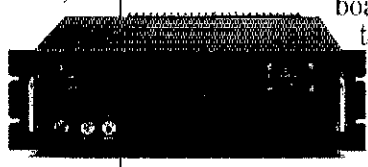


1 Maximum singleband HT performance. Yaesu's compact, 2-meter FT-411 gives "sophisticated HT operation" a whole new meaning. With 49 memories. Dual VFOs. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer (10 memories, 15 digits each). Built-in PL encode/decode. Extended receive. "Do-re-mi" audible command verification. Backlit display and keypad. Battery saver. Automatic power-off feature. Rotary channel selector. 2.5-watt battery pack (optional 5-watt pack available). Much more.

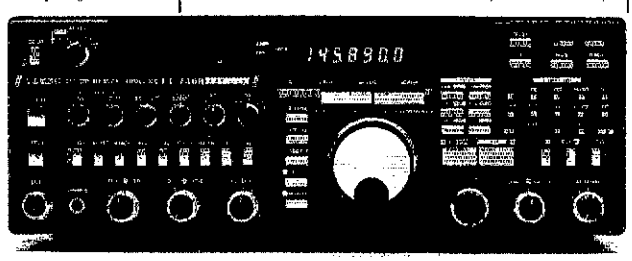
2 Mini HT packs big performance. Choose Yaesu's miniature FT-23R Series for serious pocket-size performance. 2-meter, 220-MHz, and 440-MHz models. Includes 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Lots of PL features. Auto battery saver. Aluminum-alloy case. Water-resistant seals. Variety of battery packs available, from 2 to 5 watts. More.

3 Interchangeable HT options. To help save you a bundle of money, many HT options are interchangeable throughout Yaesu's HT line. Choose the FNB-12 12-volt, 500-mAh battery pack. The miniature FNB-9 7.2-volt, 200-mAh battery pack. FBA-9 battery case for 6 AAA-size cells. FBA-10 battery case for 6 AA-size cells. DC car adapter/charger. Mobile hanger bracket. External speaker/microphone. Battery chargers. More.

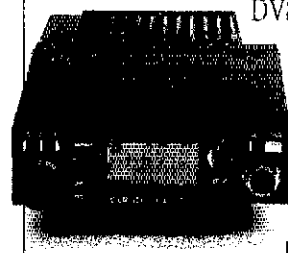
4 FM Repeaters. Looking for a repeater? Look no further. Our 2-meter and 440-MHz models feature 10 watts output. Glass-epoxy circuit boards. Plus they're FCC type accepted and ready for 19" rack mounting. Yaesu repeaters are the perfect building block for a complete repeater station.



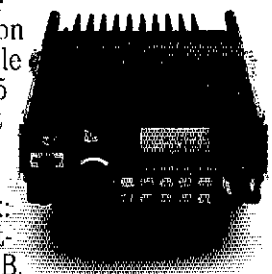
5 Space Station. Work satellites, moonbounce, troposphere, aurora, and meteor scatter with our FT-736R VHF/UHF base station. SSB, CW, and FM on 2 meters and 70 cm (430-450 MHz!) standard. Slots for optional 50-MHz, 220-MHz, or 1.2 GHz modules. Crossband full duplex capability. Satellite frequency tracking function. 25 watts on 2 meters, 220 MHz, and 70 cm (10 watts on 6 meters and 1.2 GHz). 100 memories. RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Much more.



6 Mobiles that double as answering machines. Our FT-212R Series mobiles take messages just like an answering machine (with DVS-1 option)! 2-meter and 440-MHz models. 45 watts output (35 on 440-MHz). Auto-dialer DTMF mic with 10 memories (22-digit memory each). 18 memories. Multiple scanning routines. "Do-re-mi" audible command verification. High/low power switch. Oversize amber display. Much more.



7 Mobiles you can take on foot. Our FT-290R Mark II Series (2-meter, 430-450 MHz, and 6-meter models) come standard as mobiles. But remove the heat sink and snap-on the optional battery pack, and you're ready to take your operation on foot! Mobile operation: 25 watts output (10 watts, 6 meters). Battery pack: 2.5 watts output. With SSB, CW and FM. 10 memories. Dual VFOs. LCD display. Offset tuning. Relative power-output/S meter. More.



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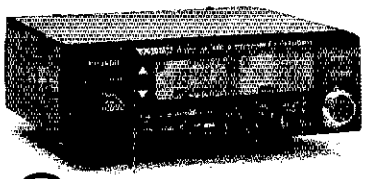
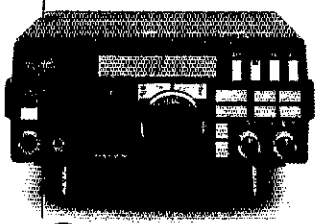
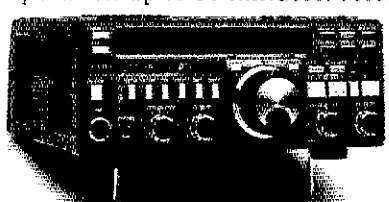


8 **Dual-band mobile with remote control head.** The FT-4700RH mounts almost anywhere—the "brains" on your dash, visor, or door, the "muscle" under your seat. 50 watts output on 2 meters, 40 watts on 70 cm. Full crossband duplex. Simultaneous monitoring of each band. Volume balance control for dual receive operation. 9 memories (each band). Extended receive coverage. Reverse repeater shift. Bright dual-band display. 10 memory autodialer mic (option). More.

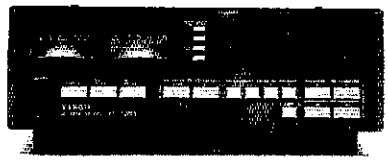


9 **HF price/performer.** Don't let the FT-747GX's affordable price fool you. This rig really works the DX! 100 watts RF output on 160 to 10 meters. Continuous receive from 100 kHz to 30 MHz. LSB, USB, CW, and AM. Slot for optional FM unit. 20 memories. Split-frequency operation. CW and AM filters. Plus one-touch noise blanker. All-mode squelch. RIT. 20-dB attenuator. Great receiver with superb overload protection. More.

10 **HF field-day favorite.** Contesters appreciate the portability and performance of Yaesu's FT-757GX Mark II. 100-watt output. 10 memories. Dual VFOs. Slow/fast tuning selection. IF notch filter. Iambic keyer. 600-Hz CW filter. AF speech processor. 500 kHz to 30 MHz receive. 10 to 160 meters transmit, including WARC bands. All-mode coverage. QSK operation. Continuous RTTY operation up to 30 minutes. More.

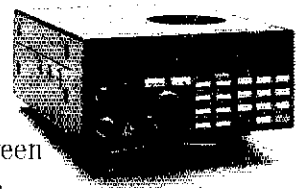


11 **Flex your *RF* muscle.** Cut through pile-ups with our FL-7000 power amplifier. 160 to 15 meter coverage. Built-in power supply. Automatic tuner. Fast turnaround for break-in (QSK) CW, HF packet, and AMTOR. 70 watts excitation for full output, 1200 watts PEP input. More.



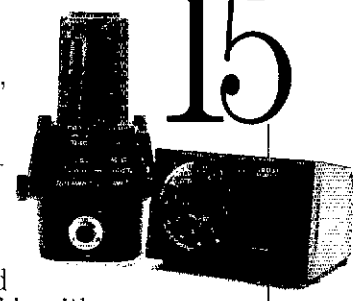
12 **World's first HF/VHF/UHF base station.** Talk about complete. The FT-767GX gives you 160 to 10-meter transmit standard. Optional plug-in modules for 6-meter, 2-meter and 70-cm operation. 100 kHz to 30 MHz receive. AM, FM, SSB, CW, AFSK modes built in. 10 memories for frequency, mode, and CTCSS info. Dual VFOs. VFO tracking. Digital display in 10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital RF power/SWR meter. Built-in RF preamplifier. And these are just a few highlights!

13 **Serious VHF/UHF Receiver.** Our FRG-9600 is a smart way to monitor. 60 to 905 MHz coverage. USB, LSB, CW, AM, FM wide and narrow. Optional NTSC video module. Scanning steps of 5, 10, 12½, 25 and 100 KHz. 99 memories store frequency and mode. Memory scan (also scans between memories). Keyboard frequency entry. 24 hour clock. Multiplexed output. Fluorescent readout. Signal strength graph. AC power adapter. Much, much more.

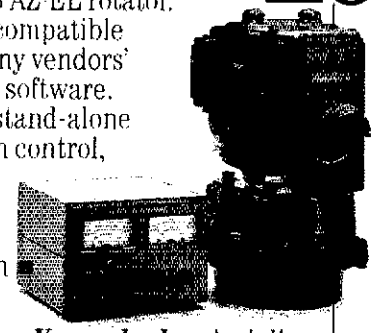


14 **World-class HF receiver.** The FRG-8800's perfect for keeping up with the world. Continuous coverage from 150 KHz to 30 MHz. Expanded coverage with optional 118-174 MHz VHF converter. USB, LSB, CW wide/narrow, AM wide/narrow, FM. 12 memories. Also programmable scanning routines. Keyboard frequency entry. LCD display. SINPO signal graph. Computer interface capability. Two 24-hour clocks. Recording functions. Much more.

15 **Antenna rotators for your application.** Our G-1000DX, G-800SDX/G-800S, and G-400RC models feature 360° "radio compass" control heads, and are compatible with most tower-plate configurations. Plus G-1000SDX and G-800SDX models feature 450° rotation and presets.



16 **AZ-EL rotators for space applications.** Into OSCAR or moonbounce? Choose our G-5400B or heavy-duty G-5600B AZ-EL rotator. Each is compatible with many vendors' tracking software. And for stand-alone elevation control, choose our G-500A elevation rotator.



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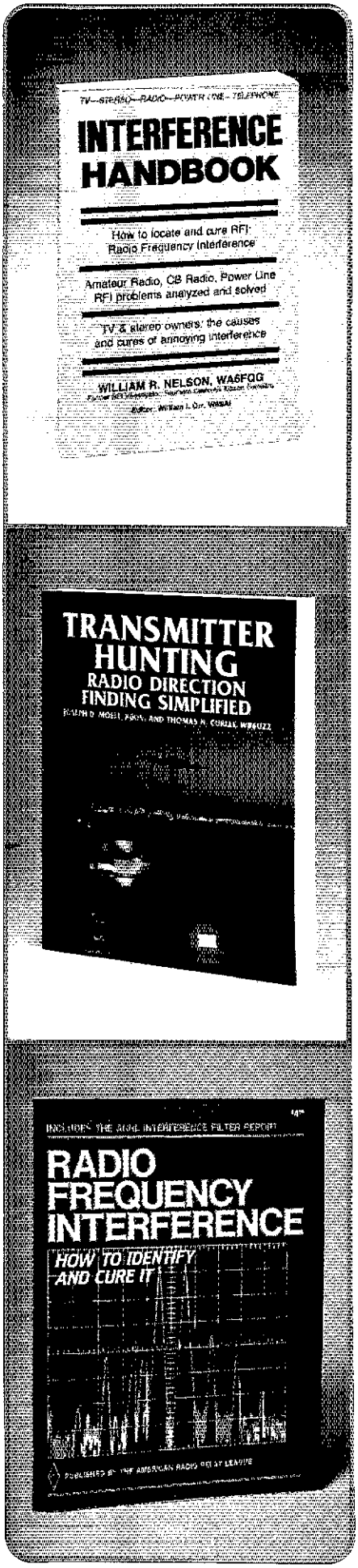

3 STRIKES AGAINST INTERFERENCE

INTERFERENCE HANDBOOK by William R. Nelson, WA6FQG, Edited by Bill Orr, W6SAI. WA6FQG is a former RFI investigator for Southern California Edison Company. This 250-page book is written from an RFI sleuth's perspective and is a diary of his experiences in solving interference problems. His experiences run the gamut from the common (arcing thermostats) to the bizarre (loose metal sheathing in a temporary building next to a 250kV transmission line and a certain brand of 25-watt light bulb) Besides all sorts of power line interference causes and solutions this book covers electrostatic discharge (rain or snow static,) grounds and grounding, vehicle noise suppression, RFI from nonlinear devices, how the power company locates RFI, how to RFI proof your transmitter, how some receivers suffer from self-inflicted RFI and solutions to RFI in various electronic devices. Radio Publications, Second Edition, 1988, $12 plus postage and handling*.

TRANSMITTER HUNTING by Joseph D. Moell, KØOV and Thomas N. Curlee, WB6UZZ. You'll find out how direction finding (DFing) can be both fun and practical. Combine the techiques taught in this 323-page book with those used by search and rescue teams and you can lean how DFing can even save lives! Explore the challenge of hidden transmitter hunts (fox hunting) and locating causes of both accidental and malicious interference to Amateur Radio communications. Find out about the history of RDF, how to get started, directional antennas, doppler DF units, all about S-Meters, commercial and military direction finding systems, direction finding from fixed sites, VHF mobile hunting techniques, T-hunting from orbit, hunting below 50MHz, how to be the "Fox" and triangulation using two BASIC programs. Copyright 1987 by Tab Books. $18 plus postage and handling*.

RADIO FREQUENCY INTERFERENCE What causes RFI? What are your responsibilities under FCC regulations to solve RFI problems? Are all RFI problems difficult, expensive and time consuming to cure? You'll find the answers to these commonly asked questions about RFI in this 82-page ARRL publication. Tells you how to understand why RFI occurs and to learn how to eliminate it. Chapters include: RFI: Problem of Opportunity, Survival in an RF-filled World, Interference from Transmitters, Interference from Electrical Devices and Power Lines, Cable Television: Friend or Foe?, How to Identify and Resolve Radio-TV Interference Problems, Consumer Products RFI Assistance List, Interference Filter Test Report. Copyright 1987. $4.00 plus postage and handling*.

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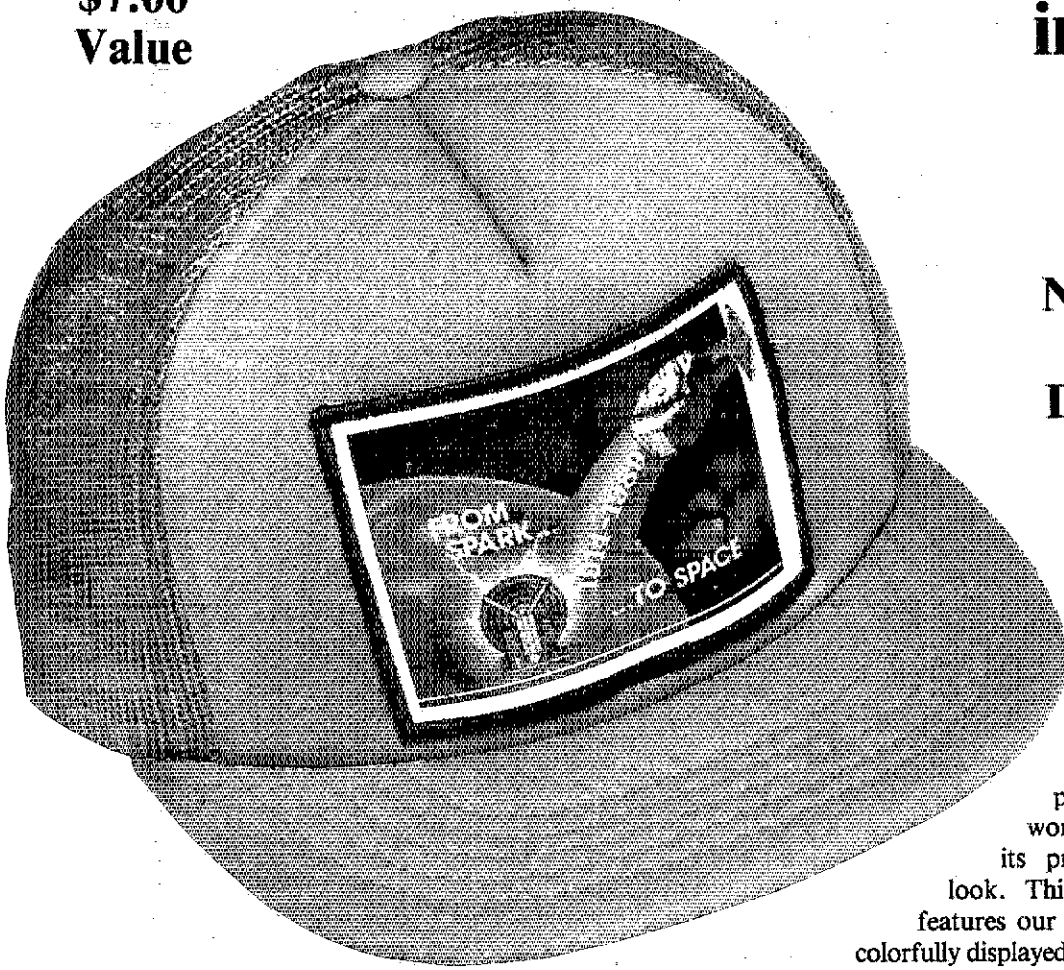

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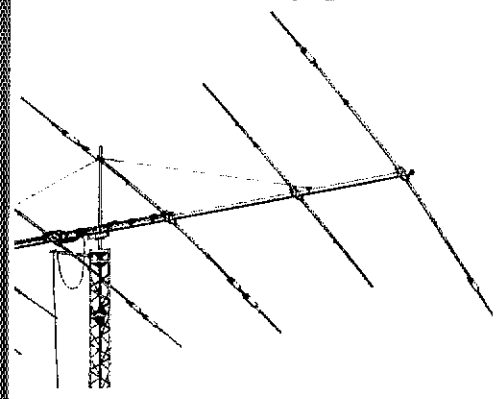

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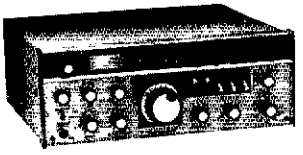

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MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

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QUEENS NY—Sunday June 4, 1989 The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot-Flushing Meadow Park, 47-01-111 Street, Queens, New York. Doors open at 9:00 AM. Set up after 7:30 AM. Amateur Radio exhibit station, tune up clinic, films. Donation-Buyers $3, Sellers $5 per space. Talk in 144.300 simplex link 223.600 repeat and 445.225 repeat. For further information call at night Steve Greenbaum, WB2KDG, 718-898-5599 or Arnie Schiffman, WB2YXB, 718-343-0172.

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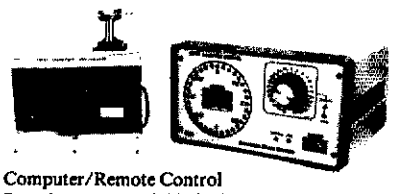

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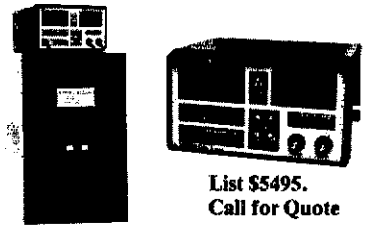

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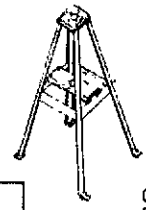

CR-18

CR-30

CR-45

ALINCO ROOF TOWERS

Model No Specifications	ETS-210
Spacing Between Legs At Roof	2'10"
Actual Height	6'6"
Max. Vertical Load	350 Lbs
Max. Rotational Torque	135 Foot Lb.
Max. Mast Length from Rotor Plate	5'6"
Roof Mounting Pads	Adjustable For Roof Pitch
Weight	26 Lbs

$140.00

roof towers require guy wires for safety.

CREATE ROOF TOWERS CONSTRUCTED OF HIGH GRADE ALUMINUM WITH GALVANIZED STEEL BRACING FOR ADDED STABILITY AND STRENGTH WILL EASILY ACCOMMODATE YOUR ANTENNA REQUIREMENTS. THREE SIZES OF ROOF TOWERS WILL SUPPORT VHF ANTENNAS, HF TRI-BANDERS, AND OSCAR SYSTEMS. ROTATORS EASILY MOUNT INSIDE THE TOWER. AN OPTIONAL THRUST BEARING (CK46) IS RECOMMENDED. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.
*SUBJECT TO AVAILABILITY

MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-1/3"	440	28	$135.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	861	55	328.00
CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					52.00

"BUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

SPECIAL

CUSHCRAFT A3 — CALL!
CUSHCRAFT ARX2 — CALL!
ALLIANCE HD73 — CALL!

ROHN

20G	10' sect.	56.95
20AG	top sect. 9'	69.95
25G	10' sect.	69.95
25AG2	top sect. 9'	83.95
45G	10' sect.	166.95
45AG2	top sect. 9'	173.95
AS25G	access shelf	28.95
AS45G	access shelf	64.95
TB-3	thrust bearing	66.95
M200	10' mast	19.95
SB25G	short base	33.95
SB45G	short base	71.95
EP2545G	gin pole	395.95
	AND MORE!	

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RM75S/RM80S	75 or 80 super	37.95
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SSM-2	stainless ball mt	18.95
SSM-3	spring	16.95
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FX2	2mt. 5/8 mag. mt	24.95
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2M-22C	2mt satellite	
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435-40CX	70cm satellite	
432-30LBX	70cm satellite	
2M-13LBA	2 meter	
2M-16LBX	2 meter	

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RG 8X	Mini	22 cts
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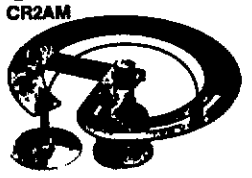

2½"

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TH3JRS	3 el. 750W pep	
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NORTHERN New Jersey—Sussex County ARC Hamfest, Sunday, July 16th. Sussex County Fairgrounds, Augusta, NJ. 8:00 AM. Indoor/outdoor space. Acres of parking. Refreshments. Talk-in 147.90/30 and 146.52. For information call Donald Stickle, K2OX, 201-663-0677.

AYN RAND admirers new 2nd Sunday every month 0045Z, 14270-14280 from RI discuss ideas in her novels Atlas Shrugged and The Fountainhead. K1UKQ.

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FREE Logbook with first order. QSL samples cost 3 stamps. Gazebo Press, 4148 Mimosa Lane, La Plata, MD 20646.

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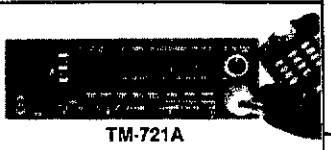

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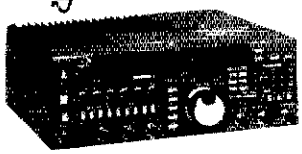

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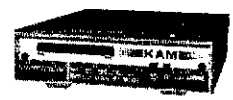

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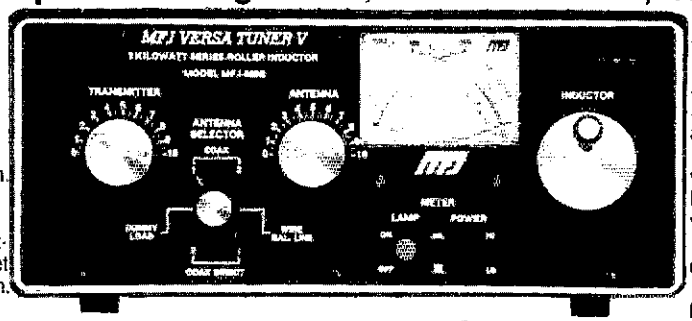
MFJ TUNERS

Here is the finest 3 KW PEP Tuner money can buy with roller inductor, dummy load, *new* peak reading meter, antenna switch, balun and more ...

The MFJ-989C is not for everyone. **However,** if you do make the investment you get the finest 3 KW PEP tuner money can buy - one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new **peak** reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With **three continuously** variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over SWR **and** the widest matching range possible from 1.8-30 MHz.



MFJ-989C **$349.95**

You get a **new** lighted **peak** and average reading Cross-Needle SWR/Wattmeter with a **new** more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra heavy switch contacts.

Its compact 10¾x4½x15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control. Add $10 s/h.

2-knob *Differential-T*™ Tuner

MFJ-986 **$269.95**

The **new** MFJ-986 Differential-T™ 3 KW PEP 2-knob Tuner has a differential capacitor to make tuning foolproof and easier than ever. It ends constant retuning with broadband coverage and gives you minimum SWR at only **one** best setting. Covers 1.8-30 MHz.

The roller inductor lets you tune your SWR down to absolute minimum. A 3-digits turns counter lets you quickly return to your favorite frequency.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp is front panel switched and requires MFJ-1312, $9.95.

A **new** current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add $10.00 s/h.

MFJ's *Fastest Selling* Tuner

MFJ-941D **$109.95**

The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It matches dipoles, vees, verticals, mobile whips, random wires, banlanced and coax lines.

SWR/Wattmeter reads foward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun, 1000 V capacitors. 10x3x7 inches.

MFJ's *Random Wire* Tuner

MFJ-16010 **$39.95**

You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Tunes 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.

MFJ's *Best 300 Watt* Tuner

MFJ-949C **$149.95**

The MFJ-949C gives you more precise matches than any tuner that uses two tapped inductors. Why? Because you get two **continuously** variable capacitors that give you infinitely more positions than the **limited** number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner? Covers 1.8-30 MHz.

You also get MFJ's lighted 2-color Cross-Needle SWR/Wattmeter, 6-position antenna switch, 50 ohm 300 watt dummy load and a built-in balun - all in a compact 10x3x7 inch cabinet that fits right into your station. Meter light requires MFJ-1312, $9.95.

With MFJ's **best** 300 watt PEP tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything - one that is highly perfected and has years of **proven** reliability.

MFJ's *Mobile* Tuner

MFJ-945C **$89.95**

Don't leave home without this **mobile** tuner! Have an uninterrupted trip as the MFJ-945C **extends your antenna bandwidth** and eliminates the need to stop, go out and adjust your mobile whip.

You can **operate anywhere in a band and get low SWR.** You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. **SWR/ Wattmeter and convenient placement of controls make tuning fast and easy while in motion.** 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, $3.00.

144/220 MHz VHF Tuners

MFJ-921 **$69.95**

MFJ's new VHF tuners cover both 2 Meters and the 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. SWR/Wattmeter. 8x2½x3 in. **MFJ-920, $49.95.** No meter. 4½x2½x3 inches.

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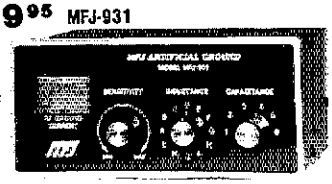
MFJ's *Artificial* RF Ground

$79.95 **MFJ-931**



You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically **place a far away RF ground directly at your rig** -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

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MFJ-962C **$229.95**

For a **few** extra dollars, the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. Covers 1.8-30 MHz.

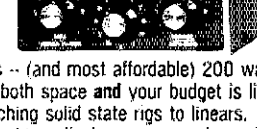
You get two husky **continuously** variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp is front panel switched and requires MFJ-1312, $9.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾x4½x14 7/8 inches. Add $10.00 s/h.

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**



The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner --when both space **and** your budget is limited. Good for matching solid state rigs to linears.

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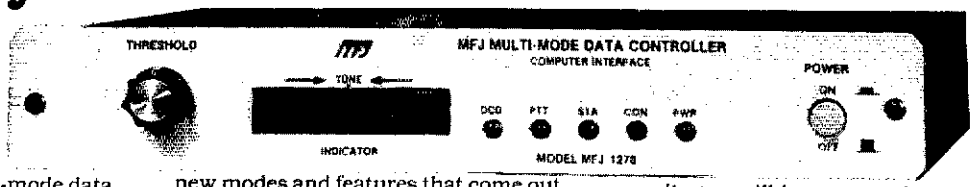
MFJ-1278
$249.95



Only the MFJ-1278 multi-mode data controller lets you operate all 9 digital modes using the latest up-to-date technology. *Plus* you get high performance VHF *and* HF modems that let you move from casual VHF ragchews to *hot* HF DX.

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Plus you get Easy Mail™, 20 LED Tuning Indicator, *exclusive* new packet collision prevention, one *free* eprom upgrade, 32K RAM, KISS, dual radio ports, *true* DCD, random code generator, parallel printer port, lithium battery backup, AC power supply, one year *unconditional* guarantee and more.

All you need to join the fun is an MFJ-1278, your rig and any computer with an RS-232 or TTL serial port and terminal program.

Use an MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and instructions ... everything you need.

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MFJ's new *Anti-Collision* technology virtually eliminates retrys due to collisions.

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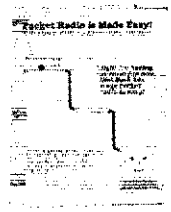
Packet Radio is Made Easy

New book by Buck Rogers, K4ABT



New book by **CQ Magazine** *Packet Radio Editor* Buck Rogers, K4ABT, gets you on Packet fast and easy.

Buck holds your hand from the time you take your new packet radio controller out of the box until you're on the air.

He tells you in his easy-to-understand style what packet is and how to get the most out of it.

Buck shows you how to successfully interconnect your transceiver, computer and packet radio controller.

He includes wiring diagrams for popular transceivers and computers and tells you how to properly configure your computer and packet radio controller.

By following Buck's *smooth* instructions your packet station will work the first time you turn it on.

He discusses packet commands, shows what they mean and how to use them.

In a short evening of relaxed, easy reading, you'll learn enough to impress the "experts" and get on-the-air fast.

Take home Buck's latest book and let him get you on packet today! **MFJ-32, $9.95.**

"Picture Perfect" Video Digitizer

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Create fascinating digitized snapshots of *anything* you can point your camcorder at!

The MFJ-1292 "Picture Perfect" Video Digitizer connects your video camera to your IBM or compatible computer. It lets you capture digitized video snapshots on a floppy or hard disk.

Your MFJ-1292 package includes a plug-in card for your computer, software and complete instructions for ... **$199.95.**

As an added bonus you get a handy Contrast and Brightness Control unit that you can conveniently place near your keyboard for fine tuning your pictures.

You'll quickly build an impressive collection of your very own digitized snapshots saved on disk.

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Use your MFJ-1278 to send pictures to your ham buddies

Here's how to use your MFJ-1278 to send pictures to your ham buddies:

Use your MFJ-1278 and packet binary file transfer feature in the MFJCOM program to transmit your picture files.

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The latest MFJ-1284 Starter Packet for IBM compatibles, $24.95, gives you both the MFJCOM program you need to transmit and receive binary picture files and the MFJVU program you need to view and print them.

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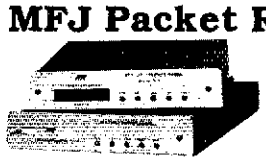

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WANTED: Columbia all band portable. KK4EI, 305-942-0490.

WANTED: McIntosh Tube Type Hi-Fi Gear, any condition for my collection! Ask your friends too! Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53220-0803, 414-545-5237.

WANTED: New Collector Wants Old Telegraph Keys And Bugs. Jerry, N9AW, 414-481-8831.

WANTED: Pre-WWII National NC-2-40 (no letter suffix) made for Pan American Airways. Uses external "dog house" power supply. Also AC/DC version of National NC-200 with marine band replacing 14-30 MHz. Nagle, 12330 Lawyers, Herndon, VA 22071.

WANTED: low freq. tuning unit TU61 and tank coil 1.5-2 MHz for a BC610-E. Call Jim collect 816-524-7343.

WANTED— Military radio communications. My special interest is WW2 German, Japanese, Italian equipment and parts. I enjoy restoring to operating condition! Also looking for following US sets and parts for myself or fellow collectors: ARQ#, ARR-16, AXR-1, BC-222, BC-322, BC-224/348-A thru suffix-C, BC-1209, BC-1306, DAG, DM-43, DM-65, FT-237, FT-250, FT-253, PE-157, PE-219, PE-237, PPN#, PRC-1, PRC-5, PRS-1, RAX, SSB converters MC-2 thru MCL-4, YRS-1, SST##, TBX, TBY. What do you have? Tnx! Hugh Miller, KA7LXY, 6400 Maltby Road, Woodinville, WA 98072-8375 or try 206-487-3047 mornings or weekends.

WANTED: reward for Harvey Radio FT-30 Transmitter. Looks like Collins 32B. Robert Enemark, W1EC, Box 1607, Duxbury, MA 02331, 617-934-5043.

GONSET 2M Linear (826's) $75. Heath: Apache $75, SB10 Sideband Adapter $75, WA-P2 Preamp $20. Sangean SG-789 Shortwave Radio $40. Reihl, 1715 Illinois, Northbrook, IL 60062.

JOHNSON 500 Transmitter $600, Ranger $145, Courier Linear $250, 75A4 $395, 75A3 $175, HQ180 w/Spkr. $150, Heath HO-10 Scope $85, 312B4 Wing $160. Jack Korona, WA2V, 1117 Dewitt Terrace, Linden, NJ 07036, 201-486-0039.

SELL: US Navy Receiver, Model RBL-3, dated 30 Oct. 1943, $150. Hallicrafter S-38, $75. Hallicrafter SX-111, $60. Details, KA2NWP, 607-547-9252.

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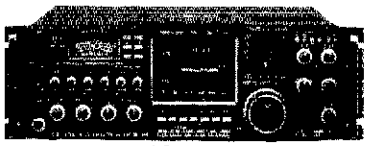

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Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
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IC-228A/H New 25/45w Mobiles	509./539.	Call $
IC-275A/H 50/100w All Mode Base	1299./1399.	Call $
IC-28A/H 25/45w, FM Mobiles	469./499.	Call $
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IC-48A FM Mobile 25w	509.00	Call $
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IC-04AT FM HT	449.00	Call $
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IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	469.00	Call $
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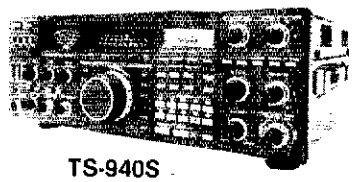

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TL-922A HF Amp	1749.95	Call $
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R-2000 150 kHz-30 MHz	799.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
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TS-711A All Mode Base 25w	1059.95	Call $
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TH-75A 2m/70cm HT	TBA	Call $
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TR-851A 25w SSB/FM	771.95	Call $
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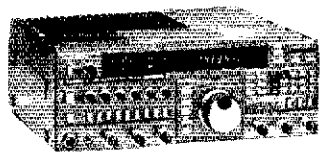
TM-321A Compact 25w Mobile	469.95	Call $
TH-315A Full Featured 2.5w HT	419.95	Call $



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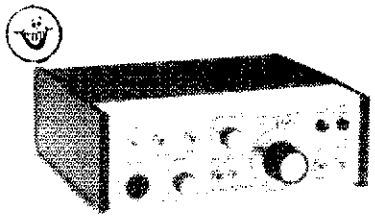

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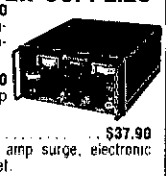

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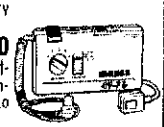

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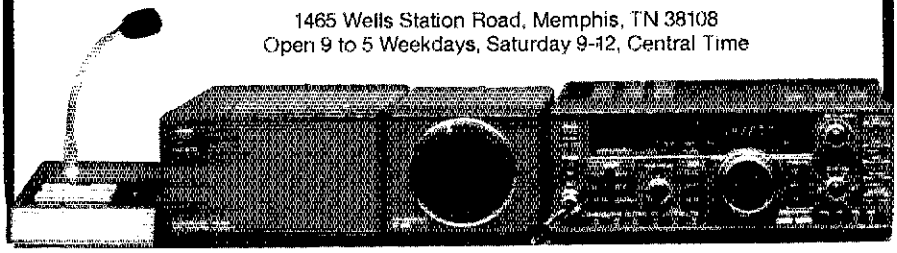

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1000 WATT Bugcatcher with whip, 42" stainless base. IC-2AT, IC-BP8, IC-BP4, IC-BP3 w/chargers, microphone/speaker, ducky antenna. 2 meter magnetic mount, 2 meter/440 magnetic mount. KF5SI, 306 Rhodes Circle, Crosby, TX 77532, 713-328-8118.

VHF/UHF GEAR. Tempo S1 Handheld, $100. 150 MHz. Motrac, $60. Regency HR-440, $100. Manuals. Mark, 206-387-1097.

GRID DIP Meter Boonton Mod 59, Spare Tubes, Manual, Phones, $49.50. Transformer 850-0-850 300ma $15. Realist Receiver SW60 $45. W6XM, 619-459-5527.

FOR SALE: Alpha 77 factory reconditioned with new tube and manual. 160 thru 10 meters, $2250. Leader model LDC-823S 250 MHz digital counter with manual, $100. Larry Weaver, KB9V, P.O. Box 1415, Citrus Springs, FL 32630, 904-489-6465.

FLORIDA Paradise DX Location For Sale. 110 foot tower, 60 foot tiltover tower, ham shack with fireplace, 3 BR, 2 bath, LR, DR, 2 car garage on 3 acres east of Sarasota, FL. $165,000. Send SASE for pictures. Steve Gross, N4PZ, 7376 Castle Drive, Sarasota, FL 34240, 813-377-8321.

WANTED: RF Impedance Bridge such as GR916, GR1606 or HP250X, working or not. Sell: ARRA 0-60dB continuously variable attenuator, good for 1296 MHz $50. Millen SP6T RF Switch, good for 2 KW Linear $30. Ralph, N6YC, 1-504-863-2008.

HAMTRONICS Receiving Converter 435-437 in, 28-30 output $40. Hamtronics XV4-5 Transmitting Converter 28-30 SSB input, 435-437 SSB output $60. A real easy way to get to work the Oscar's. 450 Cushcraft 5/8 vertical mag mount $25. Joe, WE5V, 318-855-9202.

ELECTRONIC Course, Heath ET-3100 w/Lab $80. VHF Mobile Repeater w/Manual $75, Want: Cushman CE-3 Plug-Ins. K6KZT, 805-528-3181.

FOR SALE—Kenwood TS-520SE/CW Filter, MC-35S Mic. and Manual. Will ship in original carton. Herb Smith, W4PHD, 813-634-1859.

ANTENNA Rotor CDE Type CD-44 with control unit, never used, $85. W2FYY, 201-334-0986.

KEY-Want McElroy or Similar. N3JT, Box 19346, Washington, DC 20036.

SIGNAL One Milspec-1030, mint condition, serial no. 2125, update mods by factory 1984, best offer over $5,000. Fred Slater, K2ZGC, 1 Fawn Drive, Livingston, NJ 07039.

WANTED: Ext. Speaker Model 8120, for the Uniden Tempo 2020 (1976). Only in perfect condition. Contact: Donald R. Roland, N1FYX, 28 Faulkner Street, Malden, MA 02148.

KENWOOD TS-430S, MC-42S, Filter, FM-430, AT-250, mint. Will ship, $1000. Call John Trager, 516-473-7337, 516-933-3108.

YAESU FTV 901R Transverter Wanted. KA7WTI, 503-538-7149.

KW Mapi Antenna Tuners as mfg. by RF Power Components. Mint condition $125. K0GLS, 2804 Lakeview Drive, Fergus Falls, MN 56537, phone 218-736-6624.

THIS may be the last Heath SB-610 Monitor Scope that has all the options and manual, $150. Contact WA7GVT, 406-365-2261.

WANTED: Schematic and Manual for Clegg FM-DX. K7FM, 29830 NE Mountain Top Road, Newberg, OR 97132.

TUBES, 1575 types. For listing send SASE to W2SRQ, Ellicott Electronics, R2, Calhan, CO 80808.

FOB SELL: Signal One Milspec 1030, extra filters, mike, high power option, mint, special manual, $4800; Collins KW Proto type, needs minor work, $1000; Swan 600R, 600T, near mint, $375; Swan Speaker Patch, mint, $100; Globe Chief, $60; Globe VFO, $35; Viking II, $85; Viking VFO, $35; NC-98, $75; Eimac 450-TH, $50; JW Miller AT 2500 Tuner, needs comparator transistor, $600; 100 foot pneumatic mast on trailer, $2000; Swan 500CX, 117XC, near mint, $350; Want to buy Telrex Masts, Rotors, Rotor Cable. K8CCV, 216-427-2303, 6-9 PM EST weeknights.

6 METERS: ICOM 551D with PS20, all accessories, mint condition, make offer. W6AOX, 714-599-2618.

YAESU FT-101ZD 160-10M $450. SP-901P Speaker/Patch $50. New Realistic DX-440 General Coverage Rcvr. $150. Call Al, AL7KT, 907-456-1888.

SELL: Tempo One (grey), Palomar Meter, Shure 444 Mic, new Finals, $275. Pete, P.O. Box 463, Austin, MN 55912, 507-437-8125.

WORLD Timer, displays temperature in F° or C°. Small Solar Panels Chargers from $10. Send SASE: B.E.A.M. Solar & Electronics, N2ZY, 6205 11th Avenue, Brooklyn, NY 11219.

CUSHCRAFT 214FB 2M Jr. Boomer Stacked Pair w/Wiring Harness. Pickup only. W1KZQ, 203-822-6450 between 1-7 PM.

VACUUM Relays RJ1A, HC-1, RB1J $50, RB-2A $95, RJ2C $165. Kenwood TS-711A, like-new $750. KLM 2M-16LBX, new $135. Dentron Clipperton-L Amplifier, 4x572B, 2KW-PEP, 160M-10M, mint $495. Alpha 76PA Amplifier, 3x8874, mint $1695. A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

SIGNAL-ONE CX7A/B, $1200. 75S3B, 32S3, 516F2, 312B4, (R/E), $1800. James Craig, 32 Birchwood, Rye, NH 03870, 603-964-6658.

SUPERFAST Morse Code Supereasy. Subliminal cassette. $10. Learn Morse Code In 1 Hour. Amazing new supereasy technique. $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, 2535-G6, Marietta, Palmbay, FL 32905.

WANTED: Sparks Journal, Volume 1, Nr. 4, by Society of Wireless Pioneers. Clapp-Eastman Telegraph Key as was used with Spark Transmitters. Dave Johnson, 15514 Ensenada, Houston, TX 77083, 713-498-8945.

BEST OFFER: National HRO Dial PW2S, National HRO Dial NPW-0, Corning Standard Inductor Kit, Antique Jewell Tube Tester dated 1924, Assorted RCA Ham Tips, GE Ham News, General Radio Experimenter, MRL Handbooks. W9RDJ, 1214 S. Alvord, Evansville, IN 47714, 812-476-7601.

FOR SALE: Fluke Model 8060A Digital Multimeter $75. Ten-Tec Model 243 VFO $50. Brown Bros. Machine Co. Iambic Key $25. Drake 2B Receiver $60. Ballantine Model 1010A Dual Trace Triggered Scope DC to 10 MHz $400. All equipment in excellent operating and physical condition. Manuals included. Prices firm. FOB shipping. Before May 25th, 1056 King Street, Greenwich, CT 06831, 203-531-7685. After May 25th, Maquoit Drive, Box 89AA, Freeport, ME 04032, 207-865-0563. G.W. Mason, W1KRF.

KENWOOD TS830S, CW Filter, MC30, mint $750. TS530S, CW Filter, MC30 $500. Butternut HF5B Beam, $125. D104, $35. WA1IWD, 203-848-1376.

C64, 1541, Gemini 10X- + G Interface, Modem, C21V, Amber Monitor, $300. Wanted: Recent HF, Solid State Transceiver. W7HOO, 2187 Angle, Klamath Falls, OR 97601.

COMPLETE Packet System For Sale. Contact: San Benito ARC, P.O.B. 1382, San Benito, TX 78586 for details. SASE please.

SILICON Valley Gold. Over 20 lbs. of surplus electronic goodies. Everything from Amplifiers to Zeners: Parts, Sub-Assemblies, IC's, Caps, Heatsinks and more. Every assortment is different. You will be pleased. Shipped via UPS. Send $29.95 check to Alltronics, 2300 Zanker Road, San Jose, CA 95131.

HEATH DX60B CW Xmtr. $50, HG-10B VFO $50, HW-16 CW Xcvr. $100, all with manuals. HW-8 QRP CW Xcvr. w/Supply $50 no manual. Call or write: Bob, W5SUR, 220 Stonewall Jackson Drive, Conroe, TX 77302, 409-273-1902 evenings.

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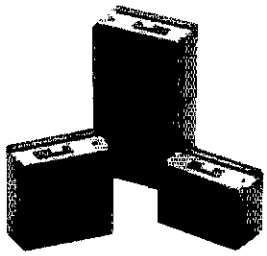

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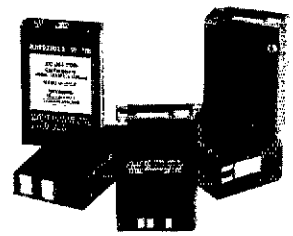

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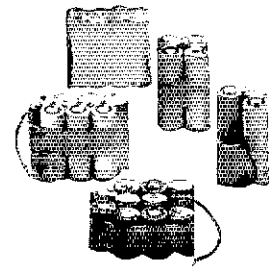

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R-390A Receiver Parts: Info SASE. CPRC-26 Military Manpack Radio, 6 Meter FM, with antenna, crystal, handset: $22.50, $42.50/pair. radio-only $9.50. Military-Spec TS-352 Voltohm/Multimeter, leads, info: $12.50. Patrol Seismic Intrusion Device ("PSID") TRC-3: $42.50 apiece, $147.50/set of four. Add $4.50/piece shipping, $9 maximum. Baytronics, Box 591, Sandusky, OH 44870.

TOWER 40' Crank-Up Fold-Over. You remove. $150. WA2KPL, 159-15 46th Avenue, Flushing, NY 11358.

WANTED: Ham Equipment and Other Property. The Radio Club Of Junior High School 22 NYC Inc. is a nonprofit organization granted 501(c)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. Get an incredible QSL for working our special event-June 26, 1100 to 2100 UTC, 7.238/21.395 MHz. Call WB2JKJ and the crew celebrating first day of summer vacation. Please write us at: P.O. Box 1052, New York, NY 10002. Round the clock hotline: 516-674-4072. Thank you!

HEATH HW-8 w/PS. Manual, good condition, $90 plus shipping. K4JCX, 121 Maple, Oak Ridge, TN 37830, 615-483-1427.

"CLEANING OUT SHACK" Kenwood R-5000 Rcv'r w/CW Filter, excellent, $660. AEA DX Handy 10 Meter SSB/CW Portable, mint $215. MFJ Artificial Ground Unit, like new $49. Mirage B-108 2M Amplifier 10 in 80 out, mint never run mobile $140. Call KD4AJ after 7 PM 404-396-0276.

SELL—HW-8, PS, mint $75, you ship. KB6GQ, 201 Plover Place, Reno, NV 89502, 702-826-0140.

ANTENNA Tuner MFJ949C N.I.B. never used "just had to go linear". $110 postage paid. Bob, WA3OCZ, 412-824-4208.

AMIGA, MacIntosh, Atari XL/XE/ST Amateur Radio public domain software for $4 disk. SASE for catalog. Specify computer! Kinetic Designs Hamsoft, Box 1646, Orange Park, FL 32067-1646.

WANT: small Transceiver like IC730. W9AUO, 309-829-1972 collect.

COLLINS: Complete S-Line Station. 32S-3A round emplem, 75S-3C, 312B-4 and 516F-2 Rockwell/Collins emblems. This station has less than 200 hours use and in excellent condition. No mods. All gear was purchased direct from Collins approximately 1980. Original manuals. Tim, NR8T, 356 Bradley Road, Bay Village, OH 44140, 216-871-3055.

WANTED: Portables, Zenith Trans-Oceanics, Grundig Satellites, NordMende Globetravelers, etc. Gary Stejskal, 1412 26th Street NW, Cedar Rapids, IA 52405.

FOR SALE: Ten-Tec #546 Omni-D w/Filters, #243 Remote VFO, #645 Keyer, Mike and #252 MO PS. SSB-221 w/10 Meters, Spare 3-500Z. Lad, W1CRL, CBA.

1989 CALLBOOKS: Until 6/15: North American, $21; International, $23. Any two or more, subtract $1/book. Any six or more, subtract $2/book. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1577, 714-687-5910.

HEATH HW-5400, Power Supply, Spkr., Desk Mike, HD-1986 Microlizer, excellent condition, factory aligned. $500 plus $25 shipping. Barken, WA2BLE, 781 Sylvan Way, Cortland, NY 13045.

FOR SALE—1 KLM/Mirage B-1016 2M Amp, 10W in, 160W out. Very little use, $150. Gordon, WB4JQZ, 904-269-1013.

HAM MUG beautifully hand-crafted pottery mug with your name and call imprinted into the clay. Earthtone colors and 16 oz. capacity will make it a welcome addition to your radio station. $14.95 plus $2 postage. Satisfaction guaranteed. JC Cramer, 650 Cascade, Shelton, WA 98584.

HEATH SB220. Mint condition. AG6K mods. Needs tubes. $450. Pickup only. W2LFJ, 315-673-4029.

WANTED: Clegg FM28 Transceiver. W2OBM, 4822 Cedarvale Road, Syracuse, NY 13215, 315-468-6118.

OSCAR Station Yaesu FT480R (no Xmit.) FT780R SC-1 Console, Mutek GasFet Amp, KLM 16C-18C Antennas. Package deal $475. HL-90U Amp $175. Want Code Reader. KG3U, Box 3470, RD #3, Hamburg, PA 19526, 215-562-2973.

STAINLESS Steel U-Bolts, Turnbuckles, Eye Bolts, Screw Eyes, Bolts, Screws. Small Quantities, Free Catalog. Elwick, Dept. 735, 230 Woods Lane, Somerdale, NJ 08083.

NICAD Battery Packs. Gordon West Tapes. Florida Nicad Specialties, 1-800-666-4223.

COMMUNICATIONS Batteries: Clone-Packs! Ready-for-use. ICOM: BP-3S Double BP3 "Wall Chargeable" $43.95, BP5 $43.95, Yaesu: FNB2 $21.95, Santec 142/442/1200 (3 pin) $23.95. "Rebuilding-send-ur-pack" ICOM BP3 $20, BP5 $28, BP7/8 $34, Yaesu FNB4/4A $38, Kenwood PB21 $18, PB25/H/26 $28, T-T 2991 $29. "U-do-it Repair Inserts" ICOM: BP2 $18.95, BP3 $16.95, BP5 $23.95, BP7/BP8 $28.95, Kenwood: PB21 $12.95, PB24 $19.95, Azden 300 $19.95, Yaesu: FNB4/4A $32.95, Tempo: S1, 2, 4, 5, 15/450 $22.95, "Antennas" 2 Mtr. 5/8-Tel/BNC $18.95. "Much more" SASE-Catalog. PA + 6% $3 Shipping/order. Visa-M/C + $2. Cunard Associates, Dept. A, RD 6, Box 104, Bedford, PA 15522, 814-623-7000.

WANTED: Manual/Diagrams for Wireless Set Nr. 19, and looking for Aerial Variometer Unit for 19 set. British Morse Key G.P.O. Type 56. NF5B, 15514 Ensenada, Houston, TX 77083, 713-498-8945.

WRITTEN Exams Supereasy. Memory aids from psychologist/engineer cut studytime 50%. Novice, Tech, Gen: $7 each. Advanced, Extra: $12 each. Moneyback guarantee. Bahr, 2535-G6 Marietta, Palmbay, FL 32905.

ROSS' $$$$ New June Specials: Kenwood TH-215A $309.90, TH-25AT $277.70, TM-721A $609.90, TS-440S/WAT $1229.90, TS-711A $895.90, Nye-Viking MB-V-A $554.90, RFM-003 $213.90, ICOM IC-228H $459.90, IC-37A $348.50, IC-32AT $539.90, IC-725 $809.90, MFJ 949C $134.90, 986 $239.90, 12/8 $224.90, Yaesu FT-727R $409.90, FT-747GX $669.90, FT109RH $276.99, FT209RH $276.99, FT-73RTT $289.90, FT-33RTT $299.90, FT-736R $1499.90, FTV-707DM $242.90, SC-1 $189.90. All LTD (limited time offer). Looking for something not listed?? Call or write. Over 8780 ham-related items in stock for immediate shipment. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, ID 83263, 208-852-0830, FAX 208-852-0833.

COLLINS KWM-380 user group share *hints, kinks, mods*, spare parts and newsletter possible. SASE for reply. Hank, WD5JFR, 4161 Oak Road, Tulsa, OK 74105.

DRAKE TR7 Service Kit #7037 Wanted. Name your price. Bill Hamlin, K6UO, 408-354-8712.

YAESU FRG9600 Turbo Scan Program for Commodore, IBM. For information write Don Rasmussen, 2316-214 Paseo De Laura, Oceanside, CA 92056.

SELL—Drake Twins, R4-A, T4-X with MS-4, nice shape, $200. WIØO, 905 5th Street, Sheldon, IA 51201, 712-324-2690 evenings.

WANTED: Hammarlund SP-600JX in cabinet in good condition. N2EG, 31 Forest Drive, Flemington, NJ 08822, 201-782-2762.

KENWOOD TS820S, VFO 820, CW Filter, MC60 Mic, $700; MFJ941D Tuner, $75; MFJ 401B Keyer w/Bencher, $75. NØNT, 314-642-8780.

FOR SALE: 4-1000A guaranteed $75, Johnson Matchboxes 1 KW with Remote SWR Sensor $175, 250 Watt $100, Yaesu 301 Phone Patch $25. W5BWA, 5812 Hiawatha Drive, Alexandria, LA 71301, 318-448-3197.

QUAD ANTENNAS, 10-12-15 Meter $139.95. 10-15-20 Meter $199.95. Lightweight fiberglass construction. Lightning Bolt Antennas, RD #2, Volant, PA 16156, 412-530-7396.

FOR SALE: Heath HD-4040 TNC & HDA-4040-1, $150; Tandy Model 100 Computer with SuperRom, Cassette Player, Programs, Portable Printer, $550; HP-67 Calculator and Accessories, $100. Paul White, WB6BDN, 1-800-832-6637 days, 213-475-3780 nights.

ROSS' $$$$ Used June Specials: Kenwood TH-205AT $229.90, ST-2 $69.90, TR-2400 $169.90, TS-930S W/AT $1399.90, Collins KWM2 $499.90, KWM-380W/FL, NB $1995.90, 32-S1 $249.90, ICOM U2AT $239.90, 701PS $109.90, R-7000 $849.90, Yaesu FT-901DM/W XF8.9HS, XF8.9HCM $599.90, FT-101E $499.90, FT-780R $399.90, FTV-250 $169.90. Looking for something not listed?? Call or write. We have over 235 used items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, ID 83263, 208-852-0830, FAX 208-852-0833.

ANTENNA Parts Catalog, Lowest Prices: Dipole/Quad/Ground Radial Wire, Insulators, Center Feeds, Open Wire Feed Line Coax, Relays, etc., Catalog: $2. Dipole/Quad Wire: new Hybrid Product, 168 strand copper "Flex-Weave", #14, strong, flexible, non-stretch, won't rust/kink like copper weld. $34 first 275' (minimum), $.12/ft. thereafter, includes shipping. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

WANTED: NCL 2000 plate xfmr, BT1 LK 2000 working or not, crankup tower, 4CX5000A, 4CX10000D, SK 306. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

SELLING—Ham M-3 Rotator. Professionally rebuilt. Works like new and looks like it, $155. W4YHB, 407-732-1673.

KWM-1 with Mobile Mount and 12 VDC PS. W9MTU, 317-644-4084, 317-644-7854.

WANTED: Kenwood TS-930, K1CC, 203-875-0166.

WANTED: Military Surplus Radio Equipment. We need RF Harris RF-280 or RF-280A Transceivers, 1960-1000 Antenna Couplers, RF-280 Module Boards, also need ARC-164, ARC-150, ARC-159 Radios. Top dollar paid or trade for new amateur gear. Write or phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

WA2RZQ desires to purchase R390A, TR-7, Drake R7 or any other fine receiver with General Coverage. Allen W. Bart, 51 South Oxford Street, Brooklyn, NY 11217.

TS-820, good cdx, $300 OBO. N1IR, 617-367-3940.

PAKRATT-64 with HF modem. Mint, $150 firm. Henry, NJ1Z, 808-533-7101.

WANTED: Heath SB-301 Receiver, Heath SB-610 Monitor Scope. Mark Kohlbacher, 123 Martin Road, Jamestown, NY 14701, 716-484-1696.

WANTED: Service Manual or Schematic for a Tempo VHF/One Plus, Two Meter Transceiver. Ron Sauve, NX0H, 16270 W. 13th Avenue, Golden, CO 80401.

FOLD OVER Tower 60', good condition, $250, you remove. Bob, K2LGO, Box 158, Riverhead, NY 11901.

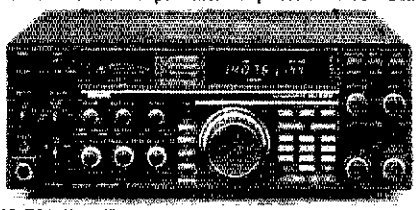
YAESU FT-101Z (ZD), ZD Digital installed, Cascade SSB Filters, CW Filter, FA-9 Fan, FV-101Z Remote VFO, SP-901 Speaker, YD-148 Microphone, Spare 6146's, Manuals, Service Manual, Cartons, 200 hours transmit, excellent to mint condition, original owner. Shipped UPS for first $500 check, all others returned. Ralph McClintock, W1ZK, RD 1, Box 185A, Jericho, VT 05465.

2 METER FM Amplifier; Heath HA-202A 50 Watts w/Manual $30. WA2IDZ, 407-269-2429.

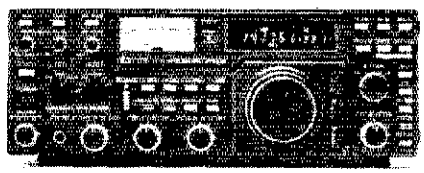
WANTED: Hallicrafter HT6, Howard 430. Complete or for parts. Ten Tec Signalizer. Yaesu FT7 Transceiver. Grebe CR18 or earlier models. Deforest Audion Receiver. Russ Olmsted, K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

GROUND Radial Wire For Verticals Or Slopers: Improves performance, new #16 bare solid copper. Lowest cost, 1000 foot spool, $38 includes shipping. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

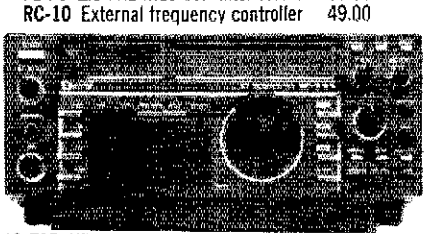
HF Equipment	Regular	SALE
IC-765 Xcvr/ps/keyer/auto tuner	3149.00	2789
IC-781 Xcvr/Rcvr/ps/tuner/scope ...	5995.00	Call



IC-761 Xcvr/Rcvr/ps/tuner	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter ..	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer.....	59.00	



IC-751A 9-band xcvr/1.30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-63A 250 Hz CW filter (1st IF).....	59.00	
FL-52A 500 Hz CW filter (2nd IF)...	115.00	109.95
FL-53A 250 Hz CW filter (2nd IF)...	115.00	109.95
FL-33 AM filter.....	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	



IC-735 HF transceiver/SW rcvr/mic	1099.00	989.95
PS-55 External power supply.....	219.00	199.95
AT-150 Automatic antenna tuner ...	445.00	369.95
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	
IC-725 Ultra compact HF xcvr/SW rcvr	949.00	849.95

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
EX-627 HF automatic antenna selector	315.00	279.95
PS-15 20A external power supply.....	175.00	159.95
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319.95
MB Mobile mount, 735/751A/761A...	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A....	79.00	
PP-1 Speaker/patch.....	179.00	164.95
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan.....	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. ant. tuner...	445.00	389.95
AT-500 500W 9-band auto. ant. tuner...	589.00	519.95
AH-2 8-band tuner w/mount & whip....	659.00	589.95
AH-2A Antenna tuner system, only.....	519.00	449.95
GC-5 World clock.....	91.95	79.95

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IC-275H 100W 2m FM/SSB/CW	1399.00	1199
IC-375A 25W 220 FM/SSB/CW *(Close.)*	1399.00	799.95
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1199
IC-475H 75W 440 FM/SSB/CW.....	1599.00	1369
IC-575A 25W 6/10m xcvr w/ps	1399.00	1129
IC-575H 100W 6/10m xcvr.....	1699.00	1499

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic *(Closeout)*	499.00	329.95
IC-47A 25w 440 FM/TTP mic *(Closeout)*	549.00	369.95
PS-45 Compact 8A power supply...	145.00	134.95
UT-16/EX-388 Voice synthesizer ...	34.99	
SP-10 Slim-line external speaker ...	35.99	
IC-28A 25W 2m FM, TTP mic *(Special)*	469.00	379.95
IC-28H 45W 2m FM, TTP mic.....	499.00	439.95
IC-38A 25W 220 FM, TTP mic	489.00	349.95
IC-48A 25W 440-450 FM, TTP mic....	509.00	449.95
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch.....	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP mic *(Special)*	509.00	429.95
IC-228H 45W 2m FM/TTP scan mic...	539.00	479.95
IC-448A 25W 440 FM/TTP mic	509.00	449.95
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller.....	639.00	569.95

★ Package Special . . .
IC-900A Transceiver controller with **UX-29H** 2m/45W and **UX-39A** 220/25W band units.
$969.95

UX-19A 10m 10W band unit	299.00	269.95
UX-29A 2m 25W band unit.....	299.00	269.95
UX-29H 2m 45W band unit.....	349.00	319.95
UX-39A 220MHz 25W band unit....	349.00	299.95
UX-49A 440MHz 25W band unit....	349.00	319.95
UX-59A 6m 10W unit	349.00	319.95
UX-129A 1.2GHz 10W band unit ...	549.00	499.95
IC-1200A 10W 1.2GHz FM Mobile.....	699.00	599.95
IC-1271A 10W 1.2GHz SSB/FM xcvr	1269.00	1099
IC-3200A 25W 2m/440 FM/TTP *(Close.)*	695.00	469.95
UT-23 Voice synthesizer.....	34.99	
IC-3210A 25w 2m/440 FM/TTP	739.00	649.95
AH-32 2m/440 Dual Band antenna ...	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount.....	20.00	
Larsen PO-TLM Trunk-lip mount....	22.00	
Larsen PO-MM Magnetic mount	22.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	1349
RP-2210 220MHz 25W repeater	1649.00	1399
RP-3010 440MHz 10W FM repeater...	1299.00	1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

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IC-2A 2-meters.....	289.00	259.95
IC-2AT with TTP.....	319.00	279.95
IC-02AT/High Power	409.00	349.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2AT for 2m w/TTP	329.00	279.95
IC-u4AT 440 MHz, TTP	369.00	289.95
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

FREE Battery! . . .
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Aircraft band handhelds	Regular	SALE
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	369.95
IC-12GAT 1W 1.2GHz HT/batt/cgr/TTP	529.00	469.95
A-2 5W PEP synth. aircraft HT.....	525.00	479.95
A-20 Synth. aircraft HT w/VOR.....	625.00	569.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35...	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8.....	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35....	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CA-5 5/8-wave telescoping 2m antenna	19.95
CP-1 Cig. lighter plug/cord for BP3 or Dlx....	13.65
CP-10 Battery separation cable w/clip.....	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs.....	25.99
LC-2AT Leather case for standard models.....	54.50
RB-1 Vinyl waterproof radio bag.....	35.95
HM-9 Speaker microphone.....	47.00
HS-10 Boom microphone/headset.....	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10.....	24.50
SS-32SMP Commspec 32-tone encoder	27.95

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver.....	$999.00	869.95
RC-11 Infrared remote controller....	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF).....	178.00	159.95
EX-257 FM unit.....	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker.....	65.00	
CK-70 (EX-299) 12V DC option.....	12.99	
MB-12 Mobile mount.....	25.99	
R-7000 25MHz to 2GHz scan rcvr	1199.00	1029
RC-12 Infrared remote controller....	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit.....	139.00	129.95
AH-7000 Radiating antenna	99.00	

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The second quarter-century of OSCAR satellites has begun! We've collected the best of the "Amateur Satellite News" column and articles out of 31 issues of **QST** to better document this new era. This handy volume can be used alone or as a supplement to the previously published *Satellite Experimenter's Handbook*. Available separately below.

You'll find the latest information on OSCARs 9 through 13 as well as the RS satellites. Operation on Phase 3 satellites (OSCAR 10 and OSCAR 13) is covered in detail. A heretofore unpublished article gives a profile of the UoSat-OSCAR 11 Satellite. The popular four-part series, "Adventures In Satellite DXing," and "Working OSCAR — the basics," are included. Timely information appears on the use of digital modes, tracking, antennas, RUDAK, microcomputer processing of telemetry and where to find additional OSCAR information. *The ARRL Satellite Anthology* belongs in every OSCAR enthusiast's library. The retail price is $5.00.

Satellite Experimenter's Handbook

This 208-page classic book on amateur satellites was written by Dr. Marvin Davidoff, K2UBC and published by ARRL in 1984. Under one cover is what the Amateur Radio Operator needs to know in order to communicate through the OSCAR satellites. Thousands of ham radio operators, scientists, educators, and satellite enthusiasts have used these "birds" for pleasure, education and experimentation. $10.00.

AMSAT Space Symposium

This conference was held in conjunction with the 1987 Amsat Annual Meeting in Southfield, MI, Nov. 6-8, 1987. 11 papers are presented with topics on: trends in spacecraft technology, and space science education. FO-12 mailbox, QRP EME, Phase III-C and Phase IV developments in orbital determination and attitude control. Over 100 pages $12.

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TRAP DIPOLES

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	$64.95
D-52	10/15/20/40/80	2	105'	69.95
D-56	10/15/20/40/80	6	82'	114.95
D-58	10/15/20/40/80/160	8	146'	149.95

TRAP VERTICALS-"SLOPERS":*

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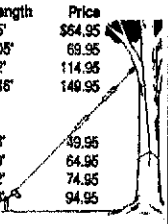
VS-52	10/15/20/40/80	2	49'	64.95
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95



*Can be used without radials
**Feedline can be buried if desired

***Permanent or Portable Use**

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga. Stranded CopperWeld ant. wire and End Insulators. Automatic Band Switching - Tuner usually never required - For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

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D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

LIMITED SPACE DIPOLES

- Reduces overall length over 40%!
- "Shorteners" are enclosed, sealed, weatherproof and lightweight.
- Complete with Deluxe Center Connector, 14 ga. CopperClad antenna wire, end insulators, and assembly instructions.
- Use as inverted "V", or flat-top.
- Excellent for all class amateurs.

Model	Band	Length	Price
LS-40K	40	36'	$44.95
LS-80K	80/75	66'	$49.95
LS-160K	160	100'	$49.95

●Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add $8.00 to antenna price.

COAX CABLE: (includes PL-259 connector on each end)

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RG-58	50'	$9.00	$11.95
RG-58	90'	13.00	16.95
RG-8	50'	21.50	25.95
RG-8	100'	30.00	39.95
RG-8X	50'	11.95	14.95
RG-8X	100'	16.95	20.95

"PRO-BALUN" PB-1 $17.95

- 1:1 For Dipoles, Beams & Slopers
- Handles Full legal power
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- Deluxe connectors require NO soldering
- NO jumper wires
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- Handles Full Power
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- Feedline can be shortened
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- Works ALL Bands 160 thru 10 Meters
- Perfect for ALL classes of Amateurs
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FOR SALE: Antenna Farm, 20 acres, located in noise/pollution free Siskiyou Forest of Northern California. Year round creek through property, excellent hunting and salmon/steelhead fishing. Tall pine, cedar and fir trees on property, many antennas already in place. Two bedroom cabin with sun room and spa. Well insulated. Beautiful location with privacy. $89,950 owner will finance. Call or write for photos/information. W6JFD, 916-496-3626, P.O. Box 686, Belad Valley, CA 96086.

ALBUQUERQUE New Mexico, ideal location in Southwest for working the world, and good climatic conditions, 3/4 bedrooms, 2000 square feet, 4 year home, complete with crank-up tower, HF/VHF antennas and ready made shack located on hill, altitude 5,400 feet. Call WB2EUS/5, 505-897-3646, owner/agent.

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FOR SALE: "Autotenna" 5 Band Automatic Resonate 10, 15, 20, 40, 80 after initial adjustment $65, B&W Inverted V Trap Antenna 160, 80, 40, 20 Meters. 137' Long $75. Collins Power Supply KWM Type 516F-2 $40. Collins VFO for R-390 Type 70 H-2 $35. K4VFA, 615-728-3856.

3 ACRES & 3/2 brick home (2 yrs. old) in Griffin, GA 35 miles south of Atlanta. Excellent antenna location on hill, no restrictions. Good place for retirees. Call KB4KWS, 404-229-9344 after 6:00 or on weekends.

KENWOOD Collection For Sale: TS 820 $425, R820 Receiver $575, TS 830S $675, TS 700SP $435, VFO 520S $155, VFO 820 $165, AT230 $185, DG-1 Digital Display Kit For TS 820 $135, R1000 $275, BS5 $50, 599D Twins $450, DG-5 $165, AT 200 $165, AT 130 $125, SP 230 $75, TS 130S $450, TS 930S/AT Serial #2 Mil. $950, PS 30 $135. Prices include shipping, equipment clean, with boxes and manuals. Jack Korona, WA2V, 1117 Dewitt Terrace, Linden, NJ 07036, 201-486-0039.

KENWOOD TS-520SE Transceiver, CW Filter, mint condition, $475. 10M converted CB, $120. K1CC, 203-875-0166.

KWM-2A with 136B-2 NB, 316F-2 PS, PM-2 portable PS, MM-1 Mike, CC-2 carrying case, 302C-3 directional wattmeter all for $1,100 packed in original boxes including all manuals and some tubes. All excellent condition. W9MTU, 317-644-4084, 317-644-7854.

WANTED: Singer SSB 50 Analyzer, Eimac 3-1000, 8170, 8171, SK306, Hypersil plate xfmr., crankup tower. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

TEN-TEC, new boxed latest 1989 production models, USA made, 561 Corsair II, 562 Omni V, 585 Paragon Transceivers, 425 Titan 1.5 KW and 420 Hercules II, 1 KW Linear Amplifiers, 238 Antenna Tuner 2 KW, 2510B Satellite Station, 2410, 100 Watt 430-450 Amplifier, Mobile HF Antennas, Keyers, and Accessories, take clean, working ham gear in trade. Visa/MC or check. For best deal, write or phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

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WANTED: Selector Switch S-7 for Swan 500CX. K3JA, 215-672-0750.

SELL: Kenwood TS-180S Transceiver with WARC Bands. Heath Model 2240 Digital LC Bridge. Make offer, you pick up or ship. Mike, W3SV, 215-286-9203.

WANTED: Collins 32V1, V2 or V3 Transmitter. Must be cosmetically good. Also need an 800 Hz Filter for a Collins 75A4 Receiver. For Sale: Yaesu FT DX 400, Kenwood VFO-820 and Hallicrafters SR-500. Bill, NØZX, 11608 Davenport Plz. #23, Omaha, NE 68154.

WANTED: Hallicrafters Speaker. K5TVC.

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L4B, L7, 30S1, TR7(A), RV75, MN2700 Wanted. E. Straeter, W1/DK9QS, Monument Road, Dublin, NH 03444, 603-563-8816.

YAESU 901DM Scanning VFO mint condition $125. Bencher Paddle $30. Shure 444 Microphone $25. N4HWH, 615-728-2681.

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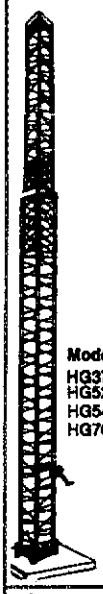

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HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

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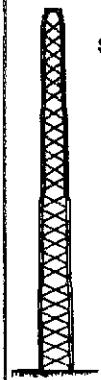

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Model	Height	Ant Lead*	Weight	Delivered Price*
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HBX48	48 ft	10 sq ft	303	$539
HBX56	56 ft	10 sq ft	385	$629
HDBX40	40 ft	18 sq ft	281	$519
HDBX48	48 ft	18 sq ft	363	$619

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Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
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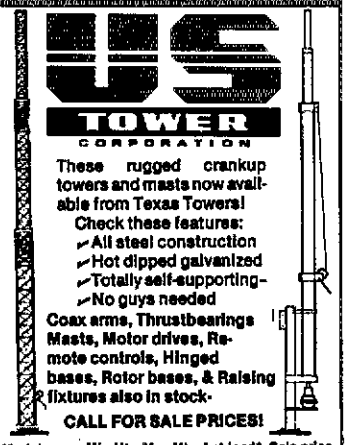
60'	849	1539	1989
70'	1029	1719	2199
80'	1099	2019	2559
90'	1169	2169	2759
100'	1399	2349	2969
110'	1469	2719	3159
120'	1559	2879	3399

US TOWER CORPORATION



These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	869
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

**Note-towers rated at 50 mph to EIA specifications*

RG-213U

$.36/ft $349/1000 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

$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.42/ft $409/1000 ft;

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket.....$.79/ft.
½" LDF4-50 Andrew Heliax®.....$1.99/ft.
⅞" LDF5-50 Andrew Heliax®.....$4.99/ft.
select connectors below
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics: (DB/100 ft)

Cable Type	Input.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
⅞" Heliax®	$29	$29	$29	$29
½" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259.....$1.50
UG21B N Male.....$3.50
9086/9913 N Male Connector.....$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.....$.10/ft.
¼ mile 18ga copper-clad steel wire.....$30
Dog bone end insulator.....$.79 ea.

Van Gordon

1:1 Balun.....$15 Center Insulator.....$8
Dipole Kits.....D80 $31.95/D40 $28.95
Short Dipole Kits.....SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line.....$29.95
G5RV all band antenna.....$49.95

ALPHA DELTA

DX-A 160-80-40 Sloper.....$49

CUSHCRAFT

CALL FOR SPECIAL PRICES!

A3 3-el Tribander.....
A4S 4-el Tribander Beam w/S.S. Hdwre.....
A743 & A744, 30/40 mtr KIT for the A3 & A4.
R4 20-10 mtr Vertical.....
AP8 80-10 mtr Vertical.....
AV5 80-10 mtr Vertical.....
D40 40 mtr Dipole.....
40-2CD 2-el 40 mtr Beam.....
A50-5 5-el 6 mtr Beam.....
215 WB NEW 15-el 2 mtr Beam.....
230 WB NEW 30-el 2 mtr Beam.....
4218 XL 18-el 2 mtr Beam.....
3219 19-el 2 mtr Beam.....
424B 24-el 432 MHz Beam.....
ARX2B 2 mtr Vertical.....

hy-gain

CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam.....
Discoverer 3-el Conversion Kit.....
EXPLORER-14 SUPER-SPECIAL.....
QK710 30/40 mtr. Add-On-Kit.....
V2S 2-mtr Base Vertical.....
V4S 440MHz Base Vertical.....
TH5MK2S Broad Band 5-el Triband Beam.
TH7DXS 7-el Triband Beam.....
TH3JRS 3-el Triband Beam.....
205BAS 5-el 20-mtr Beam.....
155BAS 5-el 15-mtr Beam.....
105BAS 5-el 10-mtr Beam.....
204BAS 4-el 20-mtr Beam.....
64BS 4-el 6-mtr Beam.....
12 AVQ 20-10 mtr vertical.....
14 AVQ 40-10 mtr vertical.....
18 AVT/WB 80-10mtr Vertical.....
18HTS 80-10 mtr Hy-Tower Vertical.....
23BS 3-el 2 mtr Beam.....
25BS 5-el 2 mtr Beam.....
28BS 8-el 2 mtr Beam.....
214BS 14-el 2-mtr Beam.....
2BDQ 80/40 mtr Trap Dipole.....
5BDQ 80-10 mtr Trap Dipole.....
BN86 80-10 mtr KW Balun W/Coax Seal...

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical $149 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

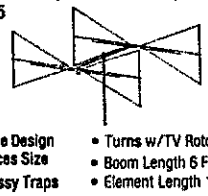
HF2V 80-40m Vertical $139 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:
RMK II Roof Mtg. Kit.....$55
STR II Stub-Tuned Radials.....$35
TBR160 160m Coil Kit.....$55
30m Add-on Kit.....$35
17/12m Add-on Kit.....$35

HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $229.95



- Unique Design Reduces Size
- Turns w/TV Rotor
- Boom Length 6 Feet
- No Lossy Traps
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam.....$399.95
KT34XA 6-el Broad Band Triband Beam.....$589.95

ROTORS

Alliance HD73 (10.7 sq ft rating).....$119.95
Alliance U110 (3 sq ft rating).....$49
Telex CD 45II (8.5 sq ft rating).....$Call
Telex HAM 4 (15 sq ft rating).....$Call
Telex Tailtwister (20 sq ft rating).....$Call
Telex HDR300 Heavy Duty (25 sq ft rating)...$Call

ROTOR CABLE

Standard 8 cond cables $.22/ft.
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.39/ft
(vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$49.50 45G.....$139.50
25G.....$59.50 55G.....$179.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Lead*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	
FK2568	68 ft.	11.7 sq. ft.	
FK4544	44 ft.	34.8 sq. ft.	
FK4554	54 ft.	29.1 sq. ft.	
FK4564	64 ft.	28.4 sq. ft.	

25G Double Guy Kit.....$279.
45G Double Guy Kit.....$299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating).....$.15/ft
1/4 EHS Guywire (6650 lb rating).....$.18/ft
5/16 EHS Guywire (11,200 lb rating).....$.29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating).....$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32".....$.45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle).....$9.95
1/2 x 9EJ (1/2 x 9" Eye & Jaw Turnbuckle).....$10.95
1/2 x 12EE (1/2"12" Eye & Eye Turnbuckle).....$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle).....$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
6" Diam - 4 ft Long Earth Screw Anchor.....$17.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.69
502 Guy Insulator (1/4" Cable).....$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG6700 Guy Cable (6700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
Socketfast Potting Compound (does 6-8 ends).....$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts ± In OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$49	$89	$129	$149
.25 in Wall	$69	$129	$189	$249

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Texas, Alaska & for information 1 (214) 422-7306

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(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

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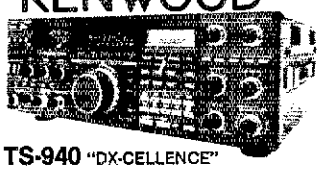

TS-940 "DX-CELLENCE"
- All Band, All Mode Transceiver
- Direct Keyboard Entry
- Engineered for the DX-Minded and Contesting Ham
- Its Got It All!

YAESU

FT-767GX HF/VHF/UHF BASE STATION
- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

ICOM NEW!

IC-765 NEW HF TRANSCEIVER
- Built-in Automatic Antenna Tuner and Power Supply
- 99 Memories • 100 W Output
- 160-10M/General Coverage Receiver
- Band Stacking Registers

uniden

SCANNERS

BC-100 XLT	$189.
BC-200 XLT	259.
BC-590 XLT	199.
BC-760 XLT	269.
BC-800 XLT	229.
HR-2600 (10 meters)	295.

KENWOOD

TS-140S AFFORDABLE DX-ing!
- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU

NEW!

FT-736R VHF-UHF BASE STATION
- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

ICOM IC-725

NEW ULTRA-COMPACT HF TRANSCEIVER

NEW!
- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160-10M Operation • 100 W Output
- Receive 30 kHz to 33 MHz
- 26 Memories with Band Stacking Registers

AEA CP-100

Complete Terminal Unit for Morse, Baudot, ASCII, AMTOR

NOW ½ PRICE CLOSEOUT SPECIAL
ONLY $169. DELIVERED
Software Available
Call Now—Don't Delay

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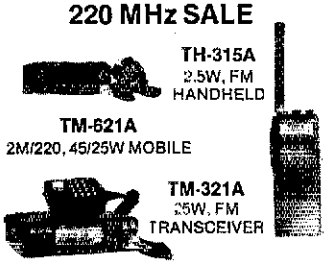
220 MHz SALE



TH-315A 2.5W, FM HANDHELD

TM-621A 2M/220, 45/25W MOBILE

TM-321A 25W, FM TRANSCEIVER

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FT-212 RH

THE "ANSWERING MACHINE" 2 METER MOBILE
- 45 Watts Output • Multiple Scanning
- 10 Memories Routines
- Hi/Lo Power Switch

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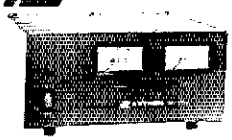
IC-2GAT
IC-4GAT
2 Meter & 440 Handhelds
- IC-2GAT RX 138-174 MHz TX 140-150 MHz 7 Watts
- IC-4GAT 440-450 MHz 6 Watts

ASTRON



• RS7A	$51	• RS35M	$167
• RS12A	$75	• VS35M	$179
• RS20A	$92	• RS50A	$209
• RS20M	$112	• RS 50M	$235
• VS20M	$129	• RM50M	$259
• RS35A	$149	• VS50M	$245

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NEW!
TH-75A
2M/70CM DUAL BAND HT

- Receive 141-163.995 & 438-449.995 MHz
- One Watt Power on Each Band
- Monitor Both Bands at Same Time
- CTCSS Encode/Decode Built-in

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NEW!
FT-470
COMPACT DUAL BAND FM HANDHELD (2M/70CM)

21 Memories for Each Band
Dual VFO's for Each Band
Up to 5 Watts Power
Built-in CTCSS
Built-in 10-Memory DTMF Autodialer

ICOM

IC-32AT
SUPER DUALBAND FM HANDHELD

- 5 Watt n Both Bands
- Receive 138-174 MHz 440-450 MHz
- Stores Standard and Odd Offsets

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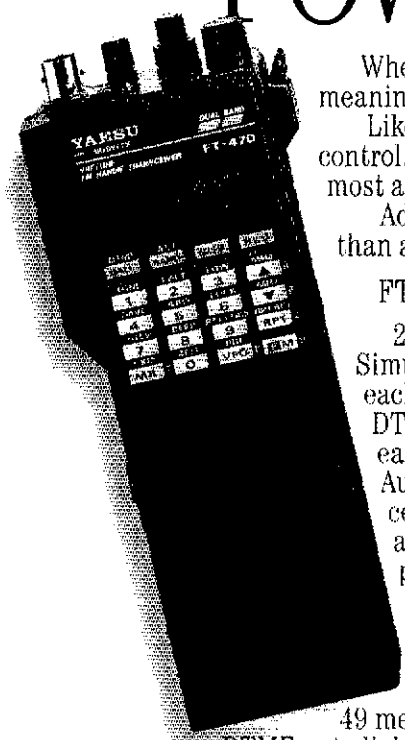
OUR COMPLETE LINE OF PORTABLE POWER TOOLS.



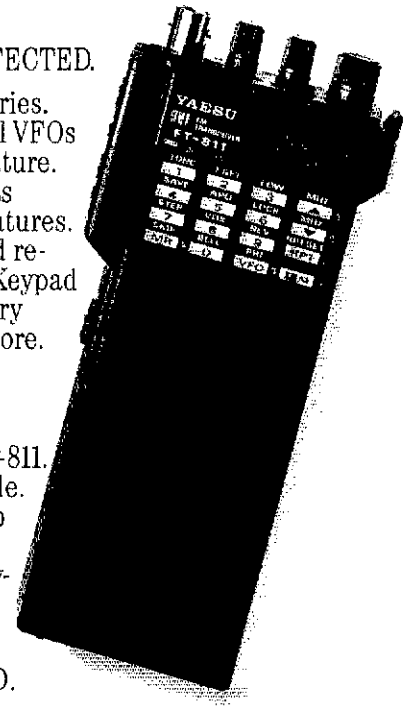
When you're talking Yaesu handhelds, power takes on many meanings.

Like maximum RF output. Sophisticated microprocessor control. Deceptively simple operation. Even cost savings—as most accessories are interchangeable throughout the line.

Added up, it's no wonder amateurs choose Yaesu HTs more than any others.

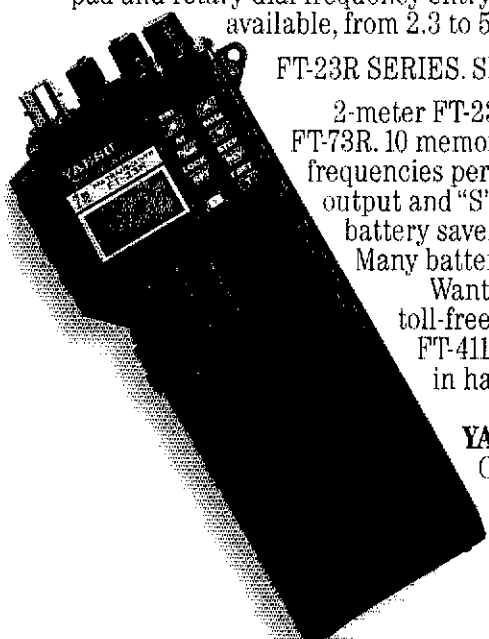
FT-470. DUAL-BAND OPERATION PERFECTED.

2 meter and 430-450 MHz. 42 memories. Simultaneous receive of both bands. Dual VFOs each band. PL encode/decode. Paging feature. DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Extended receive. Audible command verification. Keypad and rotary-dial frequency entry. Battery packs available from 2.3 to 5 watts. More.



FT-411 SERIES. MAXIMUM SINGLEBAND PERFORMANCE.

2-meter FT-411 and 440-MHz FT-811. 49 memories. Dual VFOs. PL encode/decode. DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Extended receive. Audible command verification. Keypad and rotary-dial frequency entry. Many battery packs available, from 2.3 to 5 watts. More.



FT-23R SERIES. SMALL, SMART, RUGGED.

2-meter FT-23R, 220-MHz FT-33R, and 440-MHz FT-73R. 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Many PL features. Auto-battery saver. Aluminum-alloy case. Water-resistant seals. Many battery packs available, from 2 to 5 watts. More.

Want more information? Call **(800) 999-2070** toll-free. Or ask your dealer about Yaesu's FT-470, FT-411 and FT-23R Series handhelds. The power in handheld performance.

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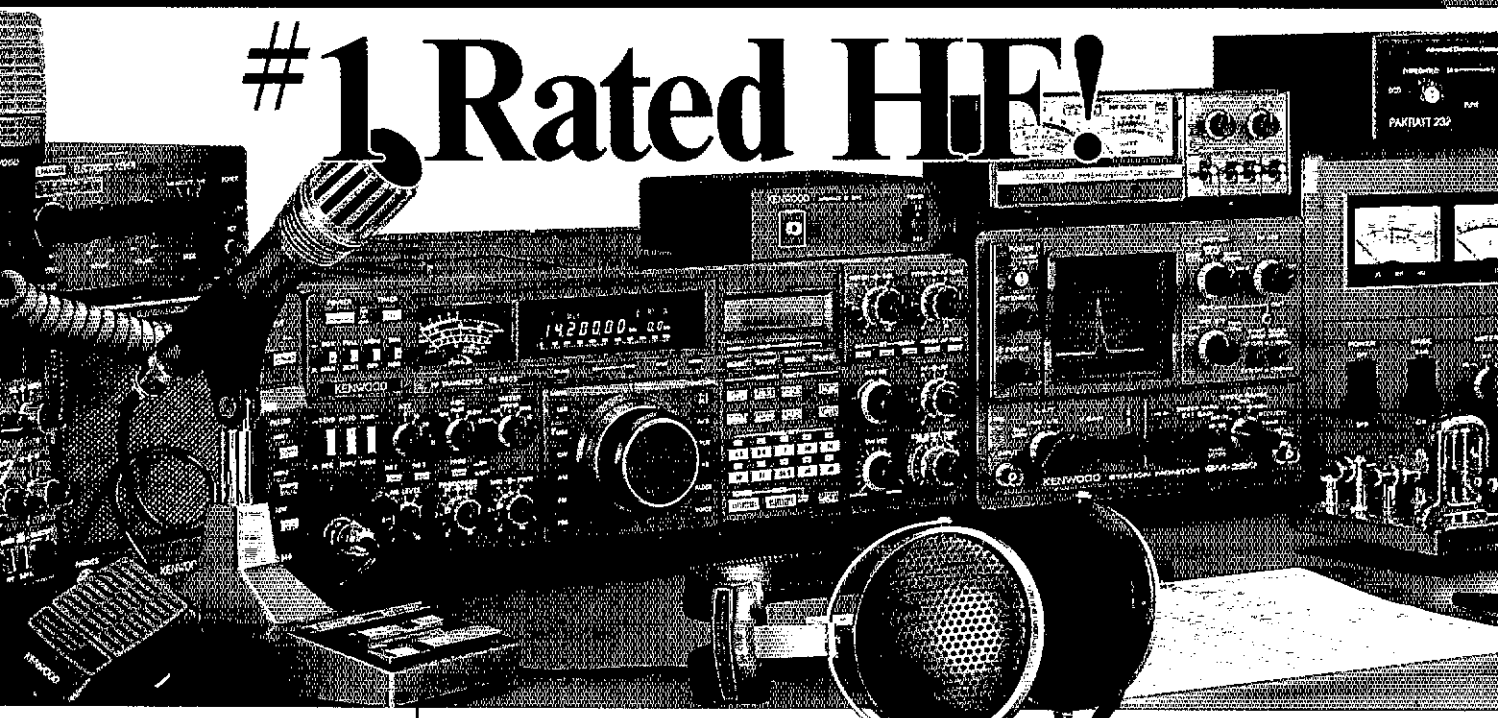
DX-cellence!

#1 Rated HF!

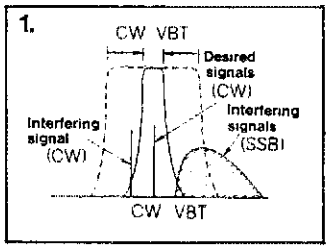


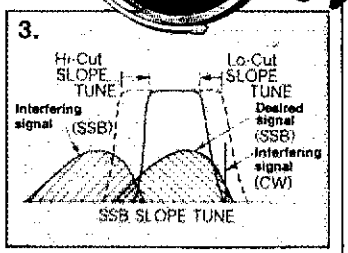
TS-940S

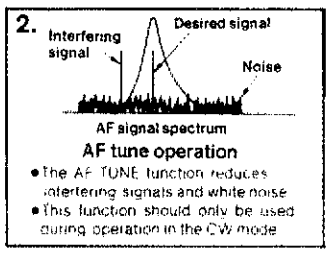
Competition class HF transceiver

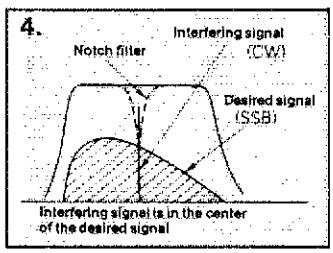
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) 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-43S 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 • IF-232C/IF-10B computer interface.

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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745