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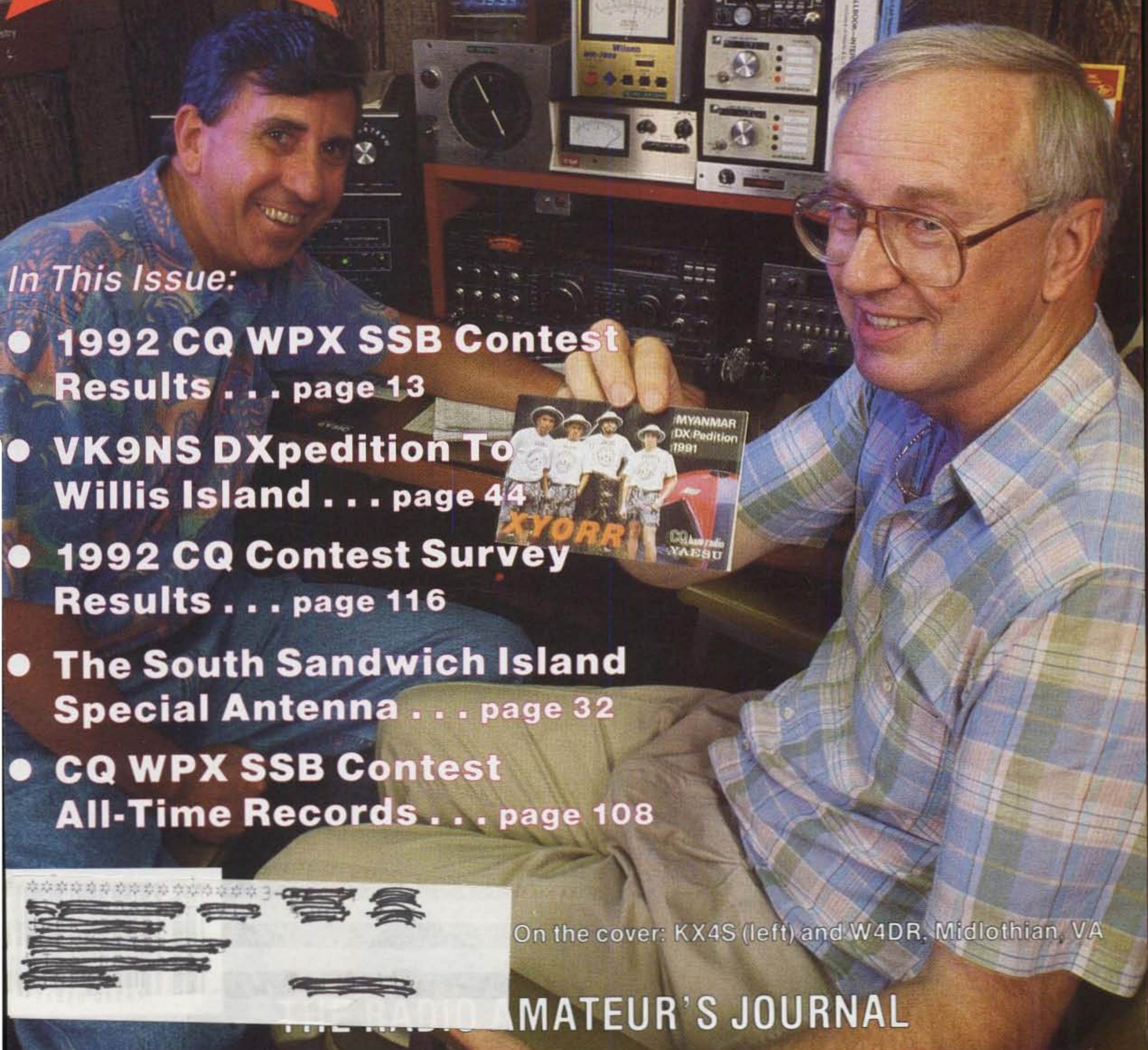
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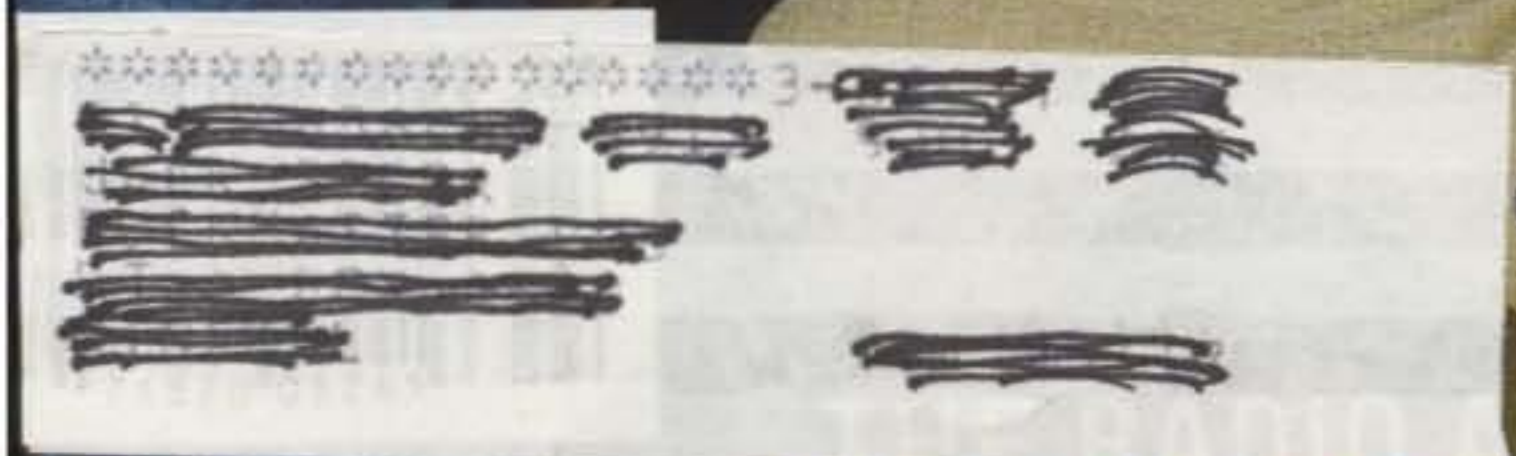
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# CQ



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On the cover: KX4S (left) and W4DR, Midlothian, VA

THE RADIO AMATEUR'S JOURNAL



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# The Radio Amateur's Journal



**ON THE COVER:** Yes, folks, all that radio equipment and all those antennas are intended to produce that little piece of cardboard! That's Bill Bunting, KX4S, at the operating desk as chief op Bob Eshleman, W4DR, proudly shows off his QSL from the Myanmar DXpedition, XYØRR. (Photo by Larry Mulvehill, WB2ZPI)

**MARCH 1993**

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# ZERO BIAS

## EDITORIAL

A few weeks ago I experienced an interesting phenomenon. I was listening to a large pile-up for a few minutes, trying to find out who it was and where they were listening. Tuning down slowly, I thought I finally had found the source for all of this excitement. Yes, it certainly was worth getting excited over, but there was one very loud and distinct signal overriding the DXer with just the last two letters of his call. Obviously, the DXer wasn't listening on his own frequency (the rest of us were trying to) and he did say where he was listening, but this one station kept right on giving his last two letters. Our valiant police force added to this by taking turns yelling "listen up" to no avail. Our friend and brother amateur persisted. At some finite point the DXer had had enough and said that he was going QRT. A few hopeful amateurs called once or twice, again trying to lure the DXer back. Then there was silence . . . except for our two-letter friend. He just kept on going an additional 6½ minutes with the last two letters before he tired out or finally stopped to listen. As I listened to him, I tried to figure out what he was thinking about or what he expected to finally happen that hadn't happened previously. He obviously thought something was going to happen.

Admittedly, the above was rather unique, but there is a more common phenomenon that also defies logic. Imagine, if you will, two amateurs engaged in a conversation on the air. Suddenly, a massive signal comes on the air at exactly the same frequency and proceeds to go through a ritualistic tune-up for two or three minutes. Satisfied that his rig is optimally tuned, an operator now asks if the frequency is occupied. Of course, the two original amateurs rant and rave that it is, whereby the phantom tuner moves on to do it again somewhere else. Sometimes the phantom tuner doesn't even wait for an answer before he simply starts calling CQ.

Maybe it's time to add an element on listening and comprehension to the amateur exam in each country. Simply put, an applicant would have to listen intently and then perform tasks or follow instructions based on what was heard. It's probably too much to ask for. Some of these problems will resolve themselves in the future when every rig is auto-tuned, but technology can't make up for either ignorance or impatience, nor can it instill simple common courtesy. Years ago people questioned, "Why can't Johnny read?" and now it's come down to "Why can't Johnny listen?" If a person can't *listen* and comprehend, then he or she certainly can't *read* and comprehend.

### OM and OK Are OK

In mid-January I received an announce-

ment from the League stating that for upcoming ARRL contests OM3 and OK stations would count for multipliers yet not count as countries. While this may be sort of logical to some amateurs, it's probably very confusing to the folks who live in the Czech and Slovak Republics. These folks only think they live in separate countries as of January 1, 1993, but we as amateurs, as with the people from Hebrew National Products, must answer to a higher authority.

This prescient announcement does imply that the vote on country status is in all probability a certainty, and this move will at least start the process. Going from one country to two multipliers followed by two multipliers and two countries seems a bit complicated and extravagant. Accordingly, we at CQ simply will skip a step and go right into two countries, OM and OK, as of January 1, 1993. The people of the new Czech and Slovak Republics seem very happy and content with their new status, and we should be too. It's really as simple as that.

### What's In A Name?

The next iron in the fire that people seem to be upset about is the entity called *Macedonia*. We have had demonstrations here in New York by both American and Canadian groups over the alleged usurpation of the name Macedonia. Greek people obviously feel that they have a historic right to the name Macedonia, as do the people who reside in the Balkan area. At the present time there are no incursions, nor is there any fighting, death, destruction, or any other visible signs of strife going on in this area. We have a lot of discussion over possible "copyright infringement" and a lot of strong feelings. The people who inhabit this area seem perfectly content to call this area Macedonia and to consider themselves Macedonians.

Being somewhat naive, I worked a 4N5 some time ago and mailed my QSL card to this place the operator called Macedonia. The U.S. Postal Service apparently had no trouble deciding where Macedonia was (or wasn't) and in short order delivered my card. Within a few weeks my card was answered by a card from the 4N5, and was even postmarked Macedonia. That sort of tells me that this place exists and that most folks seem to know exactly where it is.

While we as amateurs somehow don't recognize this area as a real country, we do recognize their neighbor, Bosnia, as a complete and sovereign nation. Now if you manage to work a 4N4 and send him your QSL card, the odds are that it will be returned to you postmarked undeliverable.

There is a war going on for control of the entity called *Bosnia-Herzegovina*. This entity, which is being slowly devastated day by day, cannot guarantee its inhabitants food and water, let alone mail. But this is an amateur radio country, albeit in flux. Somehow it doesn't seem to make too much sense. Everyone seems to know where it is, but no one can guarantee who owns what on any given day.

To confuse the previous matter even further, there is a prefix in use by the Serbian Occupation Forces fighting in Bosnia-Herzegovina. Other than a new prefix, how do you count them? I don't think they'll be doing much contesting, but if they do will it technically count as a separate multiplier?

### Throw Another Log On The Fire

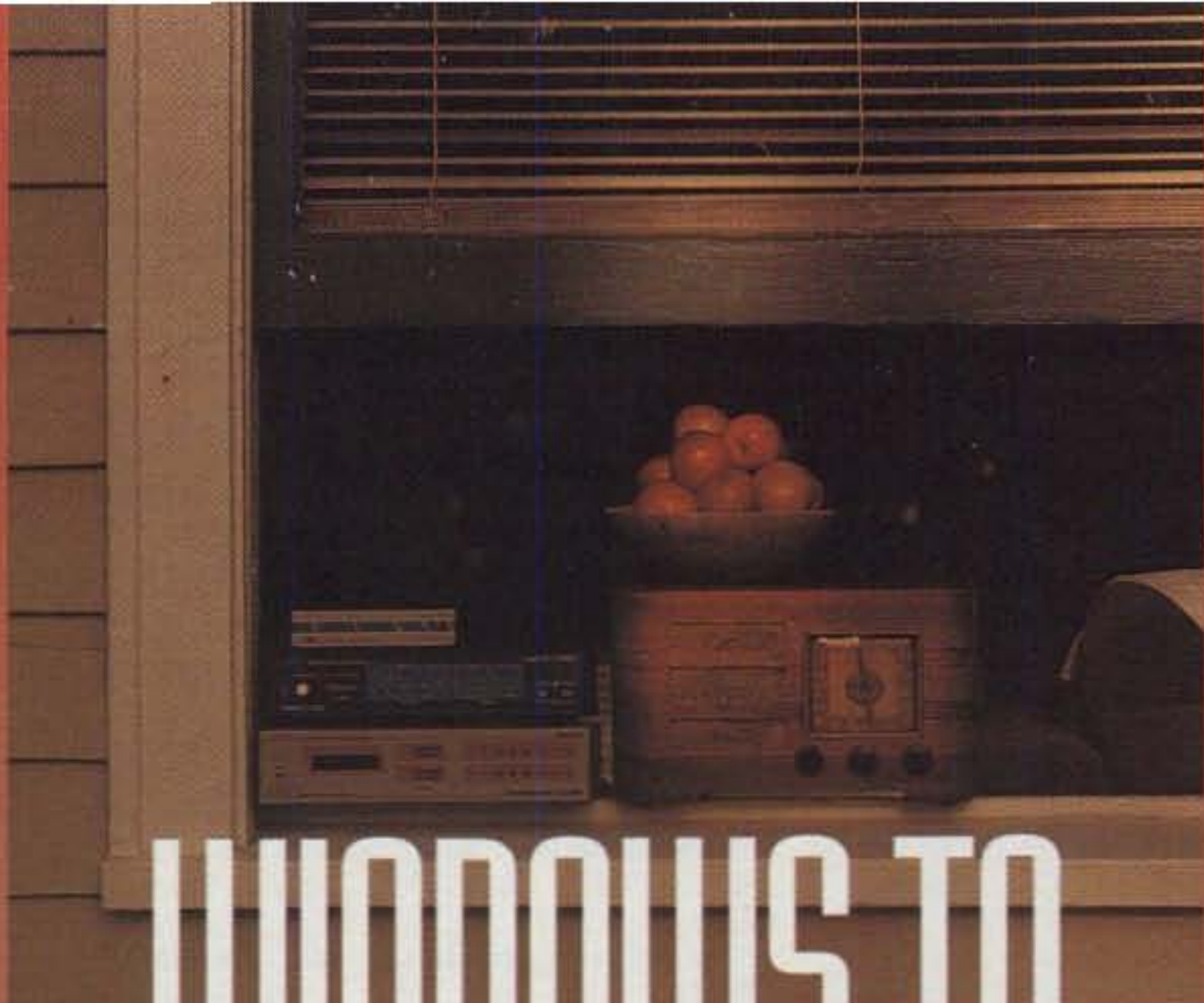
I think I finally am beginning to understand why CW contesters tend not to mark their log entries as to mode. Quite a number don't even mark their summary sheets either. I think that it's some sort of arrogant belief that since CW is the only mode a true amateur would use, there's no need to mark the envelope or summary sheet. We should know. The intrepid in-house CQ Contest Committee has as of the third week in January received, sorted, repacked, and shipped out 58 cartons of logs, for a total weight of 1482 pounds. I don't know what the final tally will be, but we'll keep you posted. Who knows? If someone asks how the logs came in and we answer "we got a ton of logs," it just might be accurate. One frightening thought keeps popping up here from time to time: What if everyone whose call appears as a participant decided to send in a log or even a check log? We'd be talking about several hundred thousand envelopes and packages probably weighing in at 10 to 15 tons. The thought of all those people having a good time is amazing, isn't it?

### It's Here At Last!

Speaking of having a good time, this is it, primo antenna weather. Get your L.L. Bean and Lands End catalogs out and place your orders. Get set for some really fine frost-filled antenna work. Topping the list should be a safety belt, a must item that you should use automatically. In fact, a safety belt should be a higher priority than warm clothes. You can always thaw out, but a splat can be forever. So while you're ordering your mukluks, check out our ads for dealers in safety belts.

73, Alan, K2EEK





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# ANNOUNCEMENTS

• **The following Special Events will take place during March:**

**K4BV**, from 52nd annual Motorcycle Week, Daytona Beach, Florida; Daytona Beach ARA; 1700Z March 6 to 2100Z March 7; phone in the lower portion of General 40, 20, 15 meter subbands, with CW in lower Novice 40 meter subband. For certificate send QSL and 9 x 12 SASE to DBARA, P.O. Box 9852, Daytona Beach, FL 32115.

**AC4QY**, from Spring Break, West Palm Beach, Florida; Palm Beach ARS; 1400-2400Z March 20; phone only 14.235 and 28.320. For certificate send SASE to PBARS, P.O. Box 5454, Lake Worth, FL 33466.

**W4BKM**, from 11th annual Macon Cherry Blossom Festival, Macon, Georgia; Macon ARC; 1300-2200Z March 27 and 28; CW 7.135, 14.035, 21.135, 28.335; phone 7.235, 13.235, 21.335, 28.335. For certificate send QSL and 9 x 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

**WA4TGF**, from 102nd anniversary of the *Norwegian Lady*, Virginia Beach, Virginia; Virginia Beach ARC; from 1400Z March 27 to 2000Z March 28; CW 10 kHz up from bottom of Novice subband, phone 3.880, 7.280, 14.280, 21.280, 28.363. For certificate send QSL and SASE to VBARC, P.O. Box 62003, Virginia Beach, VA 23462.

**KN4RY**, from Experimental Aircraft Assn. Fly-in to St. Lucie Airport, Fort Pierce, Florida; Fort Pierce ARC; 1600-2300Z March 6 and 7; on 20, 15, and Novice portion of 10 meters phone. For QSL or certificate send 9 x 12 or No. 10 SASE (2 units postage) to Fort Pierce ARC, P.O. Box 0004, Fort Pierce, FL 34954.

**5-land**, from 20th anniversary of the Plano Amateur Radio Klub, Plano, Texas; all of March for a certificate work three members of the Plano ARK evenings and weekends in the Novice and General portions of the HF bands. For QSL, send SASE and log information (callsign, QSO serial number, date, and time in UTC for each club member worked) by April 15 to Plano Amateur Radio Klub Special Event, P.O. Box 860435, Plano, TX 75986.

**W0CUO**, from Sandhill cranes annual return to the Platte River, Grand Island, Nebraska; Grand Island ARS; 6 PM CST March 19 to 6 PM March 21; on General phone and Novice frequencies. For a certificate send QSL and 9 x 12 SASE to P.O. Box 5074, Grand Island, NE 68802.

• **The following hamfests, etc., are slated for March:**

Mar. 6, **Annual North Jersey Hamfest**, Morris Avenue, Denville, New Jersey. Contact Bernie, WB2YOK, P.O. Box 251, Flanders, NJ 07836 (201-584-4423). (VE exams, 9 AM sign up.)

Mar. 6, **Four States ARC Hamfest**, YWCA Building, Texarkana, Texas. Contact Travis, K5AVH, FSARC Hamfest, 1260 Canadian, Texarkana, TX 75503 (903-792-2080). (VE exams 1 PM.)

Mar. 6, **Mike & Key Electronics Show & Fleamarket**, Western Washington Fairgrounds, Puyallup, Washington. Contact 637 Second Ave. S., Kent, WA 98032, or call 206-854-4031 (5-9 PM PST).

Mar. 6, **Shore Points ARC Springfest '93**, Holy Spirit High School, Absecon, New Jersey. Contact SPARC, P.O. Box 142, Absecon, NJ 08201.

Mar. 7, **Cuyahoga falls ARC 39th Annual Hamfest**, ST.V. Center, State Road, Cuyahoga Falls, Ohio. Contact Bill Sovinsky, K8JSL, 2305 24th St., Cuyahoga Falls, OH 44223 (216-923-3830). (Wheelchair accessible.)

Mar. 7, **Mt. Tom ARA Hamfest/Fleamarket**, Smith Vocational School, Northampton, Massachusetts. Contact Jim, K1MEA, 316 Main St., Easthampton, MA 01027 (413-527-3199 from 7-9 PM). (Handicapped accessible; VE exams 10 AM, preregistration 413-245-3228.)

Mar. 12, **Jefferson Barracks ARC 33rd Annual Auction**, (7:30 PM; doors open 5 PM), St. Louis, Missouri. Contact Vivian, WD0EMS, or Scotty, KA0FJA, at 4121 Fabian Dr., St. Louis, MO 63125, or call 314-631-4068.

Mar. 13, **Interstate Repeater Society Amateur Radio Fleamarket**, Lions Hall, Hudson, New Hampshire. Contact I.R.S., P.O. Box 693, Derry, NH 03038.

Mar. 13, **ARCA Spring Hamfest**, Scottsdale Community College, Scottsdale, Arizona. Contact Ron Avery, WB6PEB, 602-391-2388 (FAX 602-451-3876). (There will be a three-day—Mar. 12, 13, 14—No-Code Tech license class. More info call N6CIO, 714-979-2633. VE exams on Saturday, Mar. 13; registration begins at 11 AM, test at noon.)

Mar. 13, **Flemington Hamfest**, Hunterdon Central High School Field House, Flemington, New Jersey. Contact Keith Burt, KF5FK, P.O. Box 308, Quakertown,

(continued on p. 8)

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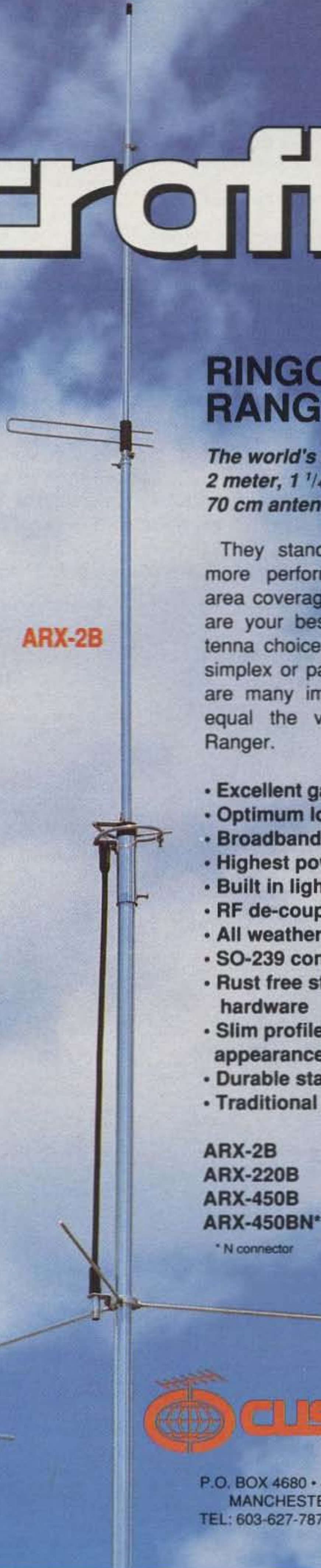
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ARX-450B



AR-270



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## Announcements (from p. 6)

NJ 08868-0308 (908-788-4080). (Handicapped facilities; VE exams.)

Mar. 13, **Radio Society of Norwich Ham Radio Auction**, Senior Citizens Center, Waterford Municipal Complex, Rt. 85, south of exit 77 of I-395, Connecticut. Contact KA1BB, 203-739-8016. (Bring equipment to be auctioned; wheelchair accessible.)

Mar. 13, **Red River Radio Amateurs Hamfest '93**, The Bowler, Fargo, North Dakota. Contact RRRRA, P.O. Box 3215, Fargo, ND 58108-3215 (218-233-2584 from 7-10 PM.)

Mar. 13-14, **St. Patrick's Day Swapfest**, Midland County Exhibit Building, Midland, Texas. Contact N5TQU or N5UNH at Midland ARC, P.O. Box 4401, Midland, TX 79704. (VE exams 12 noon Saturday.)

Mar. 13-14, **1993 Charlotte Hamfest & Computer Fair and 1993 ARRL Roanoke Division Convention**, Charlotte Merchandise Mart, Charlotte, North Caro-

lina. Contact Charlotte Hamfest, P.O. Box 221136, Charlotte, NC 28222-1136, or call 704-841-HAMS. (VE exams on Sunday.)

Mar. 14, **Conneaut ARC Hamfest & Computer Swap Meet**, Conneaut Human Resource Center, Conneaut, Ohio. Contact Conneaut Hamfest 1993, Clarence Baugher, W8FAS, 109 Daniels Ave., Conneaut, OH 44030 (216-593-3038). (Exams.)

Mar. 14, **6th Annual York Springfest**, York Fairgrounds, York, Pennsylvania. Contact York Springfest, P.O. Box 526, Red Lion, PA 17356 (717-843-7864). (VE exams.)

Mar. 14, **Indiana Hamfest**, Indiana State Fairgrounds Pavilion Building, Indianapolis, Indiana. Contact Aileen Scales, KC9YA, 3142 Market Place, Bloomington, IN 47403 (812-339-4446).

Mar. 20-21, **North Florida Ham/Swapfest**, Fairgrounds, Fort Walton Beach, Florida. Contact Jim Jajuga, KD4NHQ, 904-651-5362.

Mar. 21, **PENN-DEL Hamfest**, NUR Temple, New Castle, Delaware. Call 215-497-2124. (VE exams.)

Mar. 21, **Tri-County ARC Hamfest**, Jefferson County Fairgrounds, Jefferson, Wisconsin. Contact W9MQB, 213 Frederick St., Fort Atkinson, WI 53538 (414-563-6381 evenings).

Mar. 21, **HAMCOMP '93**, Mercer County Community College, West Windsor, New Jersey. Contact HAMCOMP '93, P.O. Box 7024, West Trenton, NJ 08628 (609-882-2240). (Handicapped accessible.)

Mar. 21, **Sterling-Rock Falls 33rd Annual Hamfest**, Sterling High School Field House, Sterling, Illinois. Contact Lloyd Sherman, KB9APW, Sterling-Rock Falls ARS, P.O. Box 521, Sterling, IL 61081 (815-336-2434). (VE exams; info Robert E. Welch, WY9G, 815-626-5619 after 6 PM; walk-ins between 8-10 AM only.)

Mar. 21, **1993 TMRA Hamfest/Computer Fair**, Lucas Recreation Center, Maumee, Ohio. Contact Bob Hanna, K8ADK, 2154 Circular Rd., Toledo, OH 43614.

Mar. 21, **Two Rivers ARC Hamfest/Computer Fair**, Pittsburgh Expomart, Monroeville, Pennsylvania. Contact Two Rivers ARC, P.O. Box 184, Greenock, PA 15047.

Mar. 27, **Michigan City, IN ARC Hamfest & Computer Fleamarket**, Rogers High School, Michigan City, Indiana. Contact Jack Lemley, N6SYJ, 219-325-0951. (VE exams; reservation appreciated.)

Mar. 27, **Lincoln Trail ARC Hamfest**, Pritchard Community Center, Elizabethtown, Kentucky. Contact Whitey, WD4GDA, P.O. Box 342, Vine Grove, KY (502-877-2234). (VE exams walk-in only starting at 9 AM.)

Mar. 28, **South Shore ARC Fleamarket**, Viking Club, Braintree, Massachusetts. Contact Dave, 617-337-5301 evenings until 11 PM.

Mar. 28, **Lake County Hamfest**, Madison High School, Madison, Ohio. Contact Roxanne, Lake County Hamfest, 5777 Fernwood Court, Mentor on the Lake, OH 44060 (SASE), or call 216-257-2036 weekdays 6-9 PM and weekends 10 AM to 4 PM; or 216-352-6756 weekdays 10 AM to 4 PM. (VE exams.)

Mar. 28, **Teays ARC Hamfest**, Pickaway County Fairgrounds, US Route 22, east of edge of Circleville, Ohio. Contact Dan Grant, W8UCF, 22150 Smith-Hulse Rd., Circleville, OH 43113 (614-477-3026).

Mar. 28, **LAMARSFEST 1993**, Lake County Fairgrounds, Grayslake, Illinois. Contact Frank Avellone, W9GLO, LAMARSFEST '93, P.O. Box 437, Lake Bluff, IL 60044 (708-234-4124 until 10 PM).

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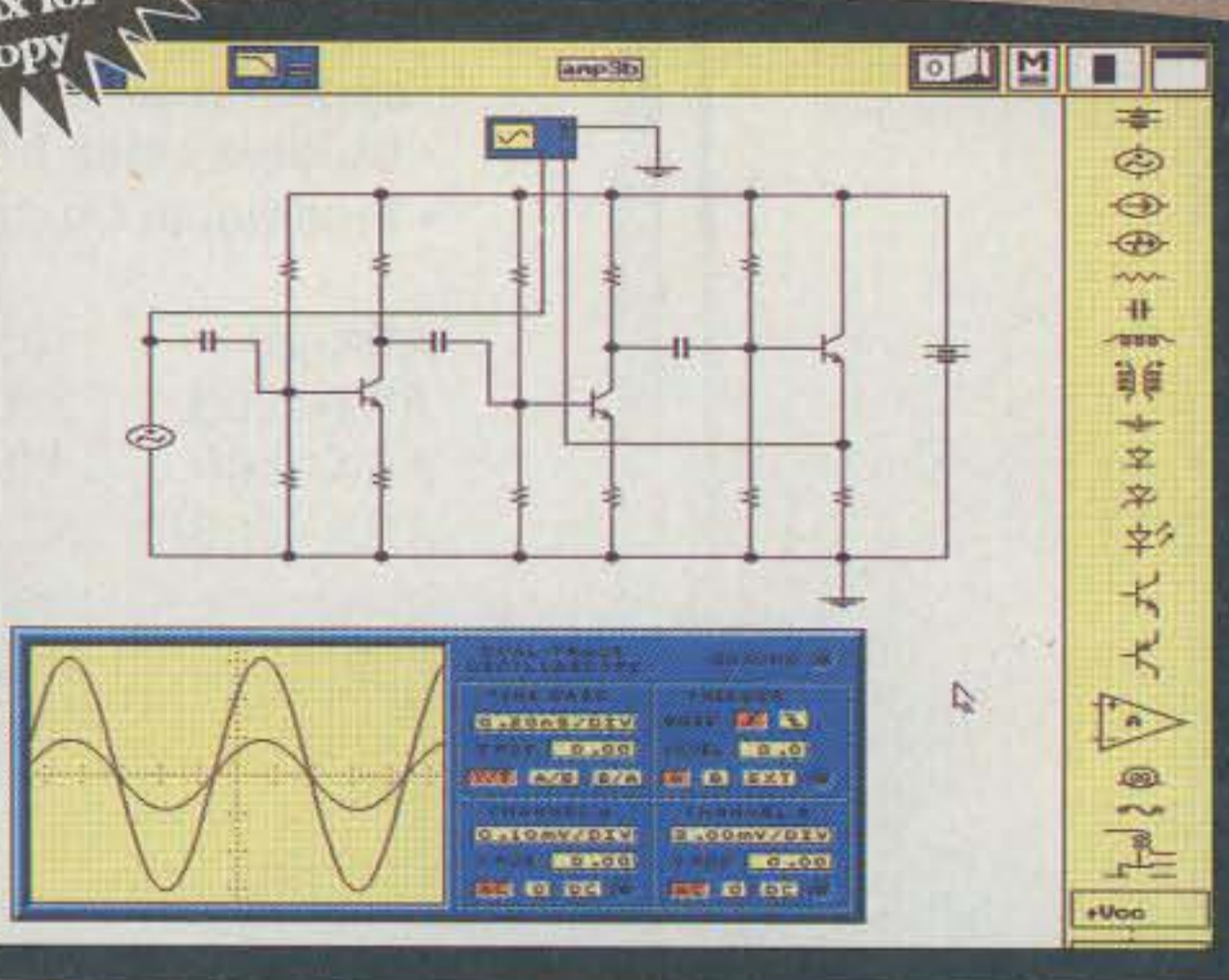
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## OUR READERS SAY

### Zero Bias Hits The Spot

Editor, CQ:

I keep thinking about your excellent editorial in the September '92 issue. I could never quite put my finger on what made contesting so great. But yes, it is a great celebration of life, the closest you're going to get to having every licensed amateur in the world on the same band at the same time, and yes, all these purposes and aims are fun!

I've made good use of your words. I've repeated them to several non-hams, and they really do make the explanation complete. Thanks so much! Thanks also for the other words of wisdom every month.

Fred Wirth, KL7FAP  
Fairbanks, AK

### The WW From Russia

Editor, CQ:

Before leaving for 3½ weeks in Russia for the WW Phone Contest, I phoned CQ to obtain copies of the magazine to carry to the Russian amateurs. The amateurs in Russia were very happy to receive the copies. Thank you for making them available. In fact, they want me to bring any and all radio magazines I can carry on another trip. The amateurs there are really poor, as are all of the Russians.

I had a great time with W4ETO operating RL0L. It was my very first Phone Contest—and it was done from Russia. How about that!

Paul Bittner, W0AIH  
Eua Claire, WI





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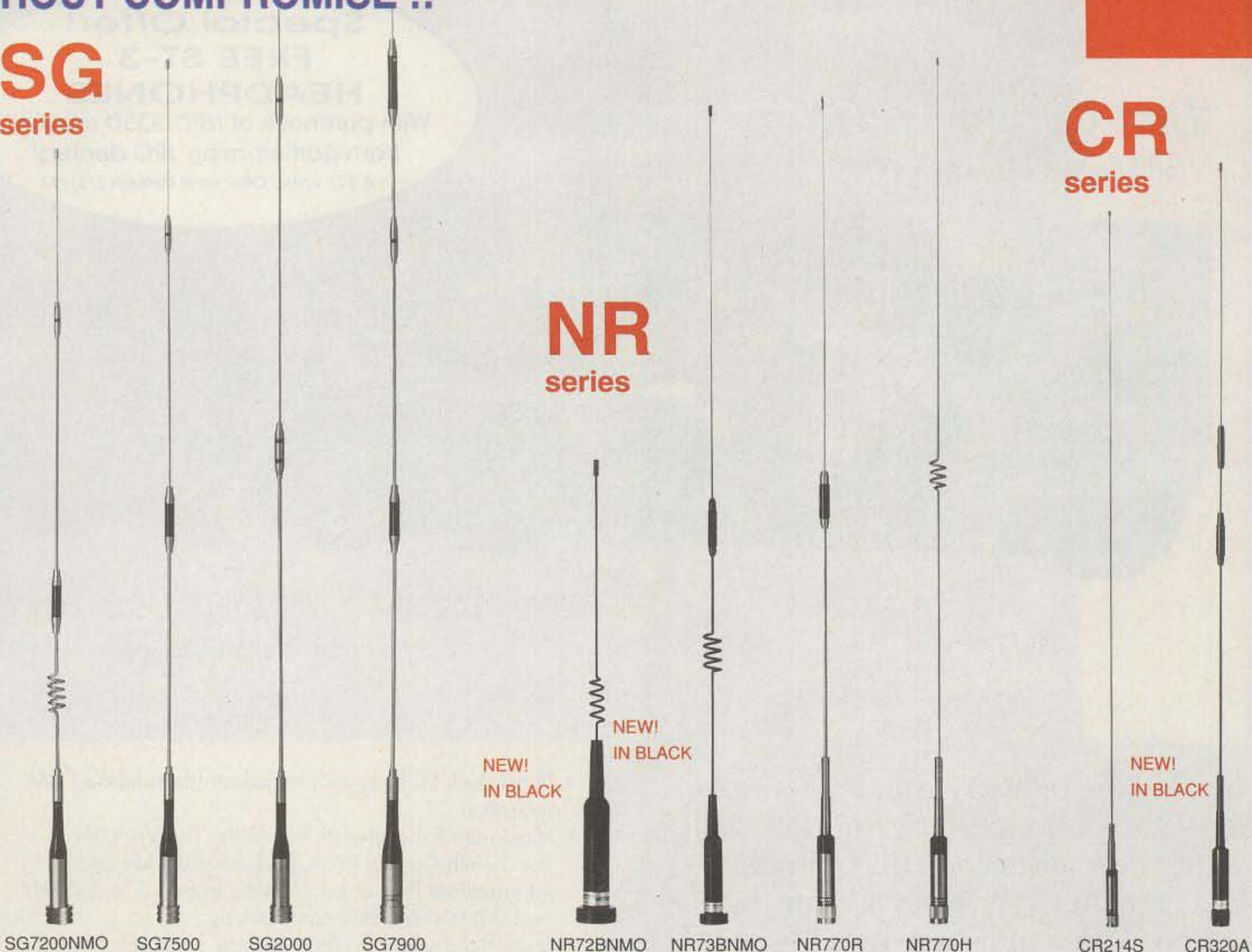
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NR-72BNMO	2m/70cm	2.15	100	NMO	13.8	1/4 λ, 1/2 λ
NR-73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2 λ, 2-5/8 λ
NR-770SA	2m/70cm	2.15/2.15	100	UHF	16.9	1/4 λ, 1/2 λ
NR-770HA	2m/70cm	3.0/5.5	200	UHF	40.2	1/2 λ, 2-5/8 λ
NR-770HNMO	2m/70cm	3.0/5.5	200	NMO	38.2	1/2 λ, 2-5/8 λ
NR-770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2 λ, 2-5/8 λ
NR-790A	2m/70cm	4.5/7.2	120	UHF	57.5	6/8 λ, 3-5/8 λ
SG-7000	2m/70cm	2.15/3.8	100	UHF	18.5	1/4 λ, 6/8 λ
SG-7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2 λ, 2-5/8 λ
SG-7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2 λ, 2-5/8 λ

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ, 3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ, 5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8 λ, 2-5/8 λ
CR-320A	2m/1-1/4m/70cm	2.15/3.8/5.5	200/200/100	UHF	37.4	1/4 λ, 1/2 λ, 2-5/8 λ
NR-2000NA	2m/70cm/23cm	3.15/6.3/9.7	100	N	39	1/2 λ, 2-5/8 λ, 5-5/8 λ

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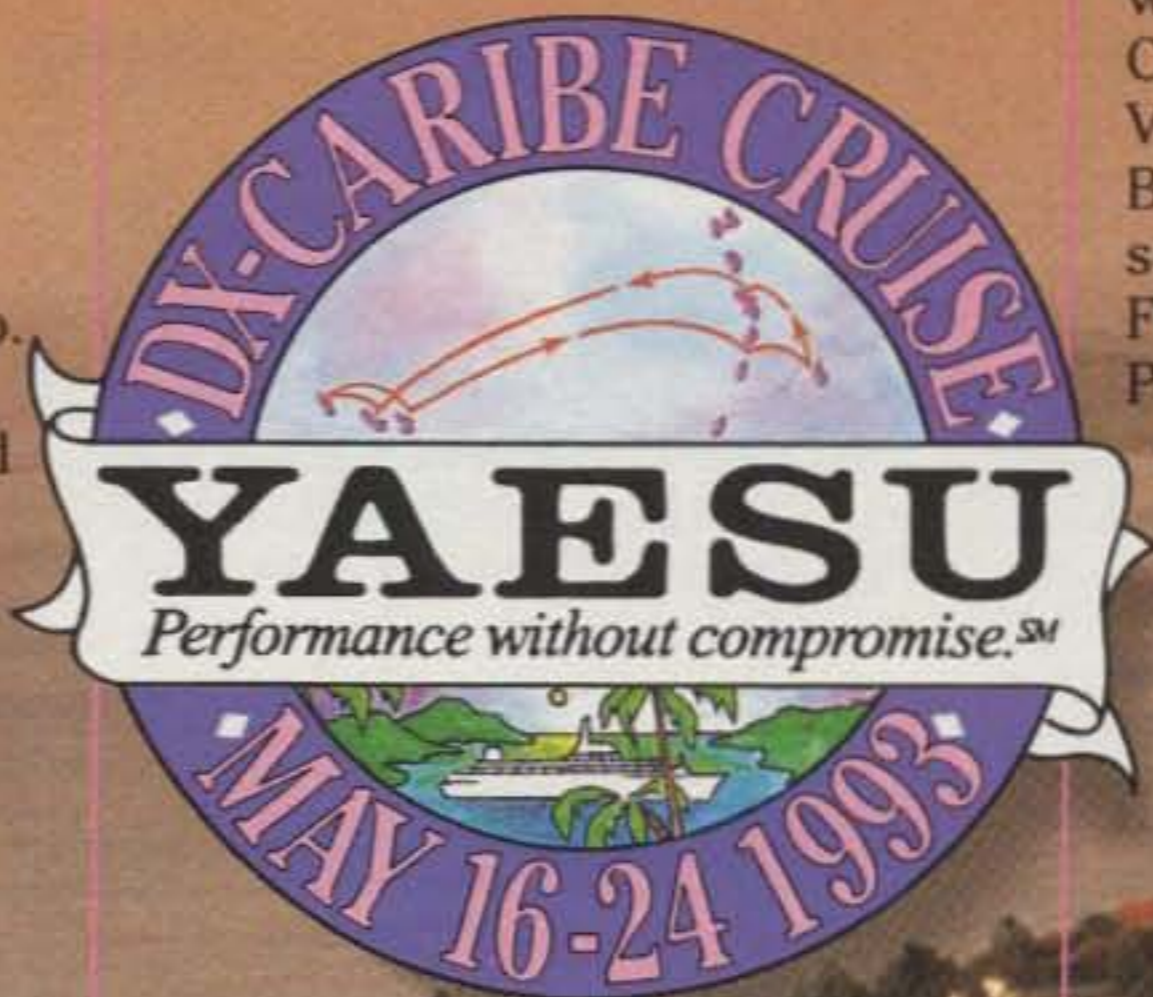
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# Results of the 1992 CQ World-Wide WPX SSB Contest

BY STEVE BOLIA\*, N8BJQ

Improved conditions, a new low-power category, 36 hours of operating time, and some excellent DX activity—all were responsible for a 5 percent increase in contest entries, as well as 2 world records, 6 US records, and 14 continental records. After an off year in 1991, the 1992 contest weekend provided excellent conditions world-wide. The addition of the low-power category was responsible for many additional participants, as well as some excellent scores.

## DX

Making a spectacular return to WPX contesting was N6KT, who shattered the world record from HC8A. Rich's 24.8 million points easily broke P40V's 1990 record. Rich averaged over 190 Q's/hr for the entire 36 hour period. Only the top three multi-multi stations and VP2EC worked more stations than Rich.

Number two was previous record holder AI6V at P49V with 18.5M points, followed by Pekka, OH1RY, at EA8AH with a new African record. Finishing fourth was OH6XY at PJ9Y, followed by K2XR at 7Z2AB with an Asiatic record 9.17M points. Number one in North America and number six in the world was John, VG3EJ, with 8.9M points. 5U7M (JH4NMT op.), WR6R/KH6, D44BC, and 5Z4BI rounded out the top 10. WR6R's KH6 operation netted AI the Oceania all-band record.

ZW5B with N5FA at the mic also set a world record with his 13 million point effort on 10 meters. ZY5Z (PY5NW op.), HD0T (HC10T op.), and CE6EZ provided lots of competition for Jim. P20A used the first 2 x 1 call ever issued from Papua New Guinea to establish a new Oceania 10 meter record. ZZ9A (PY5CC operating) and ZP0Y (ZP5JCY operating) were neck and neck for the top spot on 15 meters. Luis had a few more Q's, but Peter had the much needed advantage in multipliers. Third in the world, with a new Oceania record was Kenny, AH0K, followed by Asiatic record holder 7L1GVE. CT1BOH operated CT2A to world fifth high and a European record. Twenty meter honors belong to ZV5A (PY5EG operating), followed by LZ5W and GB8FX operated by G3FXB. EA9LZ was number one on 40 meters, with IZ3A second and US record holder KC7EM third. CT7N operated by CT4NH just edged K1ZM for the top spot on 80 meters. OZ3SK as a low-power entry was the top scorer on 160, with EI7M second.

In the new and very popular low-power category (100 watts output), some very competitive scores were turned in. KG4DD was the first low-power all-band champion with an outstanding 5,379,660 points. Second place went to CY2C



This is 9K2WR (KJ6TC), who took time out from his duties in Kuwait to give 7Z2AB a run for his money.

with EA8BWW, NH6T, and NP2I rounding out the top five. JG1EGG was the world 28 MHz low-power champ, with 8P9CW second and JE4VVM third. WP4CEL lead the world on 21 MHz, followed by JA7ZWD and TG9AJR. BY4BB was tops on 14 MHz, with CT1BWW and OK1ARI second and third. On the low bands OK1PFJ was tops on 40, VG3LRL tops on 80, and OZ3SK the "big gun" on 160.

Aki, JA5DQH, used his special HI500A call to capture the top spot among the QRP stations. Second place went to Doug, KR2Q, with a new USA record. KE2JO/4 topped the 10 meter QRP entries, with RW9AB topping the list of 15 meter entrants. K5IID headed up the 20 meter QRP category, with K7UR topping the 40 meter ops and YB2OK winning the 80 meter class.

## USA

Repeating as USA champion was Bob, KQ2M, at KM1H. Bob set a new US record on his way to the top spot. The contenders surprisingly came from all over the country. Second went to Dave, AA9AK/0, from the black hole, with Lew, N7AVK, third and Bob, KW8N, fourth. KO4QW was the 10 meter champ, with WU3V very close behind. In one of the closest finishes Trey, WN4KKN/6, edged K5MR and KA2AEV to repeat as 15 meter leader. KK9A reigns as 20 meter champion, with KC7EM setting a new 40 meter record in his battle with N5RZ. K1ZM set a new US 80 meter record with an excellent 1.2M point entry. Top-band honors went to WT3Q, with AA4MM only 3K behind.

In the low-power category, WB5NXH operated by WB5VZL turned in an excellent 2.4M point effort. N1HOQ and K2POF also turned in excellent scores. KE5FI topped the 10 meter section, with WZ8T tops on 15. K7DBV turned in the top US 20 meter low-power log, with WA6WPB, NR6E, and N2KMJ/AE the only low-power USA entrants on the low bands, thus earning certificates for number one on 40, 80, and 160 meters.



Expedition trophy winner OH6XY operated PJ9Y to number four in the world.

KR2Q is the new US record holder and QRP champion with 1,269,960 points. Doug bettered the previous record after 28.5 hours. Second went to KY5N with 845K. KE2JO/4 topped the 10 meter category, KS9U was number one on 15 meters, K5IID topped on 20, and K7UR topped on 40. KE2JO, K5IID, and K7UR also were number one in the world in their respective categories.

## Multis

The gang at CT3M fell a little short in their quest to break ED8ACH's 1991 world record, but still turned in a fine 41 million point log. European powerhouse HG73DX finished second, with OT2A third and CZ7Z fourth. Utilizing their fine location, VP2EC returned to the head of the multi-single class. Gordon, Ray, and Jim came up a little short in their attempt to better the world record, but did set the North American record with a fine 24.4M point outing. Second went to the Les Nouvelles DX Group expedition station TK5A, who just edged out UX1A for the top spot in Europe. UX1A was slightly ahead going into Sunday, but then conditions changed to favor southern Europe. TX4B, with the special call from Martinique, was fourth, followed by TM5C and GB6BT. WC4E, IR4T, TM2V, and JJ3YBB rounded out the top 10.

WC4E easily outdistanced the field to repeat as US multi-single champion. Colorado super station AA6TT/0 was second, followed by NE8T and AA8U. WZ6Z again topped the multi-multi field, with some serious competition from NX1H and WK4Y.

## Trophies, Special Prefixes, Etc.

Several new trophies were added effective with the 1992 contest. WC4E was the winner of the USA Multi-Single trophy sponsored by the Oklahoma Comm Center, KC7EM won the N7AVK

\*4121 Gardenview, Beavercreek, OH 45431





Juan, TG9AJR, turned in the third highest low-power 21 MHz score.

USA 7 MHz trophy, and AH0K was the recipient of the AH9B trophy for the top single-band entry in Oceania.

In addition, a Combined SSB/CW trophy also sponsored by the Oklahoma Comm Center is up for grabs in the US. A USA club trophy will also be awarded, thanks to the sponsorship of the Oklahoma DX Association.

For 1993 a Combined SSB/CW trophy in memory of Al Slater, G3FXB, has been added for the world high combined score. Al was one of the top contesters in Europe and a long-time participant in the WPX contests.

There are still many categories looking for trophy donors. If you or your club is interested in sponsoring a trophy, please get in touch with me. It's an excellent way to get some publicity for your club and make a deserving operator happy.

As usual, the WPX Contest would not be such a success without the support of those who come up with the special prefixes for each contest. New ones seem to appear each year. PR0R, HD0T, P20A, IR8A, IZ3A, CY2C, 4E0DBT, TX4B, XB9Z, RT1U, CU20T, ZS500A, 4J4JJ, RL2O, RL0P, CU0WPX, IG8R, 4D9RG, 8A2DX, 4T8DX, 5B5E, and XA5T were some of the more notable prefixes used in 1992. In addition, ZA1TAG, BY8AC, BY4BB, several V63 stations, 9K2WR, 7Z2AB, 8Q7PA, VP8CEH, BV2CR, BV2WA and

JP1RIW/BV, Z21BL, XT2BW, and TL8NG provided some DX excitement for those looking to up their CQDX and DXCC totals. Thanks to all, plus thanks to the more than 1400 stations who submitted entries.

In an attempt to get a better handle on logging accuracy, 260 logs were entered into the WPX database. This represented 49,500 unique calls and over 340,000 QSOs by participants from all areas of the world and in all categories. This is how I spent my summer vacation. I was recovering from back surgery and had lots of time to stand in front of the computer typing and putting computer files in the proper format. I have made no attempt to do any statistical analysis of this information, but I did see "unique rates" as low as 1.8 percent for some and as high as 20 percent for others. I would prefer to think that most operators are down at the low end of the scale, but that is not necessarily so. From what has been written by others, and from my personal observations, it is apparent that a large percentage of "unique" calls are errors.

At the moment, we are only using this information as one of the tools used for log checking. QSOs are not automatically removed just because they show up as "uniques." It is a very useful tool for finding typos and partial calls, though. For those who send in logs strictly on disk and don't check your typing, take heed. Typos and partial calls are removed. Many of you lost a couple of multipliers for things such as KL0, AL5, KL3, NP7, etc. For the contest these are not legal prefixes, as they do not reflect the DXCC country where the station was operating. Rule VII of the current WPX rules covers this situation.

The 1993 SSB contest (March 27 and 28) promises to be another exciting event. With any luck, 10 meters will be with us for another year, but it is best to be prepared and improve your low-band antennas to take advantage of the extra points available on 40, 80, and 160. With the changing world situation, look for more interesting prefixes from the former Yugoslavia and former Czechoslovakia.

For those of you who desire copies of the results, please send your requests to CQ with an

SASE with sufficient postage. Logs and summary sheets and contest rules can also be ordered from CQ. If you are looking for log sheets, please mark the envelope. This will ensure that your request gets into the right pile. Also, keep marking "WPX SSB (or CW) Contest" on the outside of your log. That will get it into the boxes coming in my direction. Inquiries about the contest can be sent to me via my Callbook address, the N8BJQ packet cluster, N8ACV BBS, via Prodigy (ID FXTD51A), or via FAX.

One change in the rules takes effect with the 1993 contest. Logs postmarked after the deadline may not be accepted. One 30 day extension can be granted for legitimate reasons. Logs have been coming in extremely late, which puts a real burden on us. As an example, I got a package today (December 26th) with a CW log for the contest which was held in May. Most of you are good at getting your logs in before the deadline, but some continue to send them way after. For clarification, see rule XV in the current WPX rules.

Many thanks to all who help to make the WPX Contest a success each year. Scott, N9AG, provides a big hand with the logs, and the folks at CQ keep the mail sorted and coming on time, plus put all of this in some semblance of order.

73, Steve, N8BJQ

## Random Comments

First time ever that we recall being able to work Europeans throughout a midnight shift on the 10 meter band. . . . CZ7Z. JJ3ZKD forever!!! . . . JJ3ZKD. OT2A was the contest call of club station ON7LR. QSL via ON7LR. . . . OT2A. New callsign for KD2SX! So Murphy visited. He began Friday by taking out SB 220, a hard drive, Alpha 77 and a computer monitor! . . . WZ1R. Our second multi we work better than first but propagation was at hollydays. . . . ED1WWE. First WPX for the Clipperton DX Club callsign and sure to see you in CW part. . . . FF0XX. I did better chasing VP8SSI on CW than I did in this contest. . . . GB0WOX.

Good contest, good weather, average con-



Here are the operators at the top European Multi-Single station TK5A. From left to right are F6BBJ, TK5NN, TK5EP, F6EPY, F6GOX, and TK4ML.



The "Big Guns of Kwajalein." Pictured are V73CT, V73DG (AH9B), and V73DH (N5MIH), number one multi-single in Oceania as V73DH.



## TROPHY WINNERS

### SINGLE OPERATOR, ALL BAND

**WORLD:** Stanley Cohen, WD8QDQ Trophy. Won by: **Station HC8A operated by Rich Smith, N6KT.**

**U.S.A.:** Atilano de Oms, PY5EG Trophy. Won by: **Station KM1H operated by Bob Shoheit, KQ2M.**

**CARIB/C.A.:** CQ Magazine Trophy. Won by: **Station ZF2NE/ZF8 operated by Joe Staples, W5ASP.**

**EUROPE:** Jim Hoffman, N5FA Trophy. Won by: **Steve Cole, GW4BLE.**

**\*JAPAN:** The DX Family Foundation Trophy. Won by: **Toshikazu Kawanishi, JA8RUZ.**

**SOUTH AMERICA:** Ron Moorefield, W8ILC Trophy. Won by: **Station P49V operated by Carl Cook, AI6V.**

**OCEANIA:** Phillip Fraizer, K6ZM Memorial Trophy. Won by: **Al Crespo, WR6R/KH6.**

**AFRICA:** Peter Sprengel, PY5CC Trophy. Won by: **Station EA8AH operated by Pekka Kolehmainen, OH1RY.**

**WORLD QRP/p:** Dayton Amateur Radio Association Trophy. Won by: **Station HI500A operated by Akito Nagi, JA5DQH.**

**U.S.A. QRP/p:** CQ Magazine Trophy. Won by: **Doug Zwiebel, KR2Q.**

### SINGLE OPERATOR, SINGLE BAND

**WORLD:** John N. Reichert, N4RV trophy. Won by: **Station ZW5B operated by Jim Hoffman, N5FA (28 MHz).**

**WORLD 7 MHz:** William D. Johnson, KV0Q Trophy. Won by: **Jorge Pareja, EA9LZ.**

**EUROPE:** Myron Crofoot, WB4VQO Trophy. Won by: **Station CT2A operated by Jose Nunes, CT1BOH (21 MHz).**

**OCEANIA:** D. Craig Boyer, AH9B Trophy. Won by: **Kenny M. Sakuraa, AH0K (21 MHz).**

**U.S.A. 3.7 MHz:** Lance Johnson Engineering Trophy. Won by: **Jeff Briggs, K1ZM.**

**U.S.A. 7 MHz:** Lewis Sayre, N7AVK Trophy. Won by: **Steven Kelly, KC7EM.**

**U.S.A. 21 MHz:** Bernie Welch, W8IMZ Memorial Trophy. Won by: **Trey Garlough, WN4KKN/6.**

**U.S.A. 28 MHz Novice/Tech:** Jon Engelhardt, KA0ZFX Trophy. Won by: **Joseph Gohndrone, KA2KRA/7.**

### MULTI-OPERATOR, SINGLE TRANSMITTER

**WORLD:** Mike Badolato, W5MYA Trophy. Won by: **Station VP2EC operated by K5RX, KC5EA, N5AU.**

**U.S.A.:** Oklahoma Comm Center Trophy. Won by: **Station WC4E operated by WC4E & K4XS.**

### MULTI-OPERATOR, MULTI-TRANSMITTER

**WORLD:** Prince Georges Zulu Radio Club Trophy. Won by: **Station CT3M operated by CT1AHU, CT1BOP, CT1DIZ, CT1DUV, CT3BX, CT3EE.**

**NORTH AMERICA:** Burt Curwen, KL7IRT Memorial Trophy (James Dixon, NL7HI donor). Won by: **Station CZ7Z operated by VE7ANS, VE7AV, VE7CV, VE7DBS, VE7DRS, VE7EME, VE7LKM, VE7RBL, VE7XYL, VE7SK, VE7SMS, VE7SSS.**

**U.S.A.:** Glenn Tracey, KC3EK Trophy. Won by: **Station WZ6Z operated by N3AHA, K3EST, W6QHS, KK6QM, W6RGG, N6RO, N6TV, WZ6Z, W0ZZ.**

### CONTEST EXPEDITION

**WORLD:** Kansas City DX Club Trophy. Won by: **Station PJ9Y operated by Carl Heinz Ikaheimo, OH6XY.**

ditions—no equipment failure!! . . . **GX0OBS.** Friday our 2.5 ton crankup tower was making our trailer sink farther and farther in the mud and it took an hour plus hard work to move it. . . . **GX5QK/P.** P20A had a BIG 10 meter long path signal Saturday morning! . . . **KJ4VH.** Wish I could have operated more, but had a blast at the end. I had a 100-plus hour from 2235Z to 2335Z! . . . **KY2T.** Not bad for a multi-single with the TH7DX bearing to the penguins in the Antarctica during half the contest . . . rotor failure! . . . **LU4AA.** First contest ever for N7PIP. . . **N7PIP.**

Finally broke 5 meg. Sorry this is the last year we will be able to compete for a while (med school starts next fall). . . **NM9H.** Again we enjoyed the contest. Had a major failure in our Yagi for 14 MHz. After all we were glad that we did put up the tribander after all. . . **PA6WPX.** **SM0MLZ, SM0THN, SM0CXM, SM0HEP, SM0SYP.** . . . **SK0HB.** All three of us were up the tower for 4 hrs the day of the contest; we lost

power once, the radio wouldn't key the amp, but we did okay. . . **VP2EC.** What a thrill to activate the UCLA radio club again after a 10 year absence! . . . **W6YRA.** Had to move the station before the contest started due to 20+ line noise. . . **WC8R.**

Quit 8 hours early due to neighbor problems (TVI and telephone). . . **XM5MH.** Special prefixes for QRPp are a BIG HANDICAP! Many would copy my call as 9Y4FO. Second most common was 5B4FO and others 6Y5FO. Since I was weak they would turn their beams to the Caribbean and lose me completely. Next time I will leave the special prefix. . . **5Y4FO.** Working P20A and VS6CM on 5 watts was great. QRP can break through the pileups with a little patience. . . **AL7MK.** First time in a QRP test. Most impressed by DX contacts on 40/80m! . . . **DL1YAW.** This is the last contest from Dominican Republic (**HI500A**). . . **HI500A.**

The stations from Japan were some of the



*KW8N and his unique shack. Bob overcame equipment problems to make it into the top five in the US.*

strongest on the band. I'm looking forward to CW portion where QRP might be more successful. . . . **K7EAU.** Not enough 40 meter JA's in test! . . . **K7UR.** QRP on 20 getting tougher as the higher bands have shorter openings. . . **K9OSH.** Surprising that many of the hard QSOs came easy and many they should have come easy were very difficult running QRP. Also don't waste your time trying to run while operating QRP. . . . **KE2JO/4.** Broke the old record after just 28.5 hours. Also worked 116 DXCC countries. High point: working XV7TH and having him offer me a deal: QSO #1 for a phone patch to NH! No phone patch, but I did get a QSO number. . . **KR2Q.**

First time in QRP class and it was great. Finally figured what QRP means—QSOs Require Patience. . . **N6YKL.** Worked first JT, V85, and VU. . . **PA2PDN.** I have a lot of long-distance QSOs with QRP! . . **UA9FJF.** The best contest for me (after 15 years of CQ WPX and WW)! . . . **WB6JMS.** I couldn't continue with the contest because my radio is out of service. . . **XE2HWB.** Sorry, break out AC power many times. . . **4J4JJ.** It was very poor condition for multiband. Are low bands necessary? . . **5U7M.** I had a great time except for a few minor problems. I had rig problems and had to pull my TS440S and replace with my backup rig. Finally I was working a massive pileup Sunday evening and a storm hit with lightning. It knocked the power off. . . **5Z4BI.**

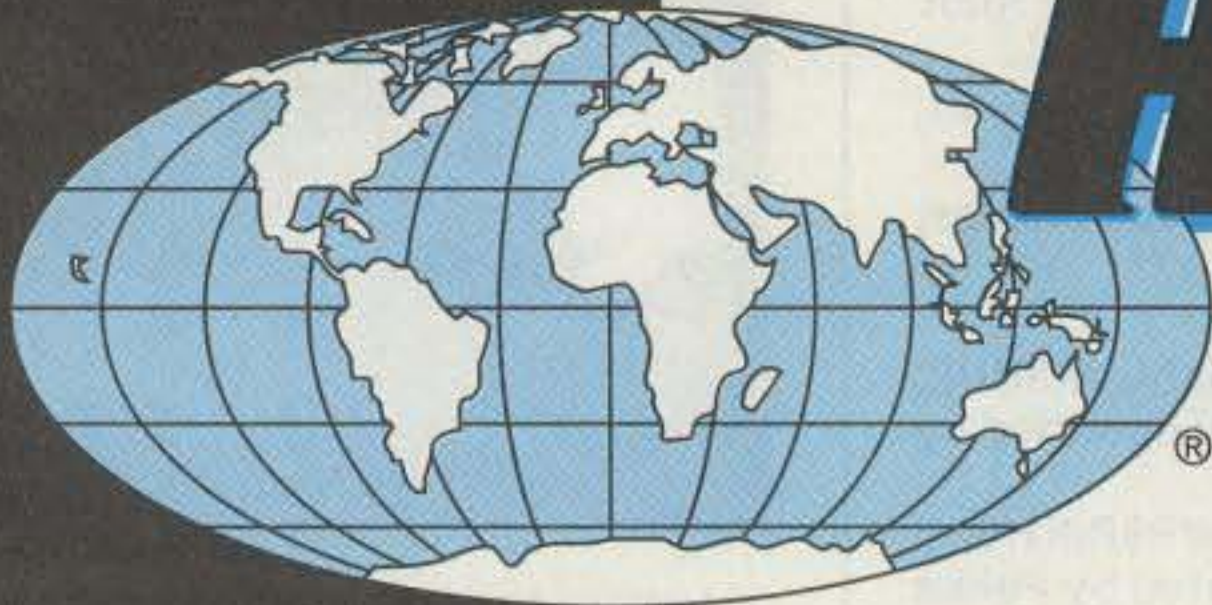
Not so bad result with 14 AVQ. . . **7K2HWI/3.** This is first entry. Very few stations of Africa. Band conditions are generally good. . . **7L1JHN.** 7M1 has not been one of popular prefix yet, I think. . . **7M1MCT.** New AA2 prefix was like be-



*Bill, K4XS, and Jeff, WC4E, the voices of US multi-single champion WC4E.*



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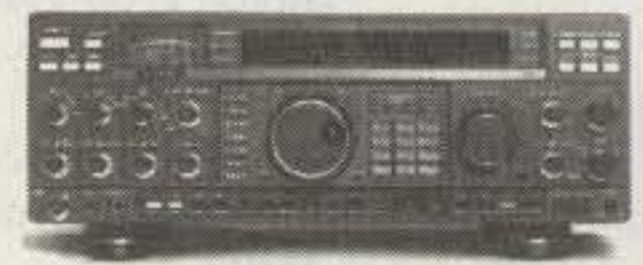
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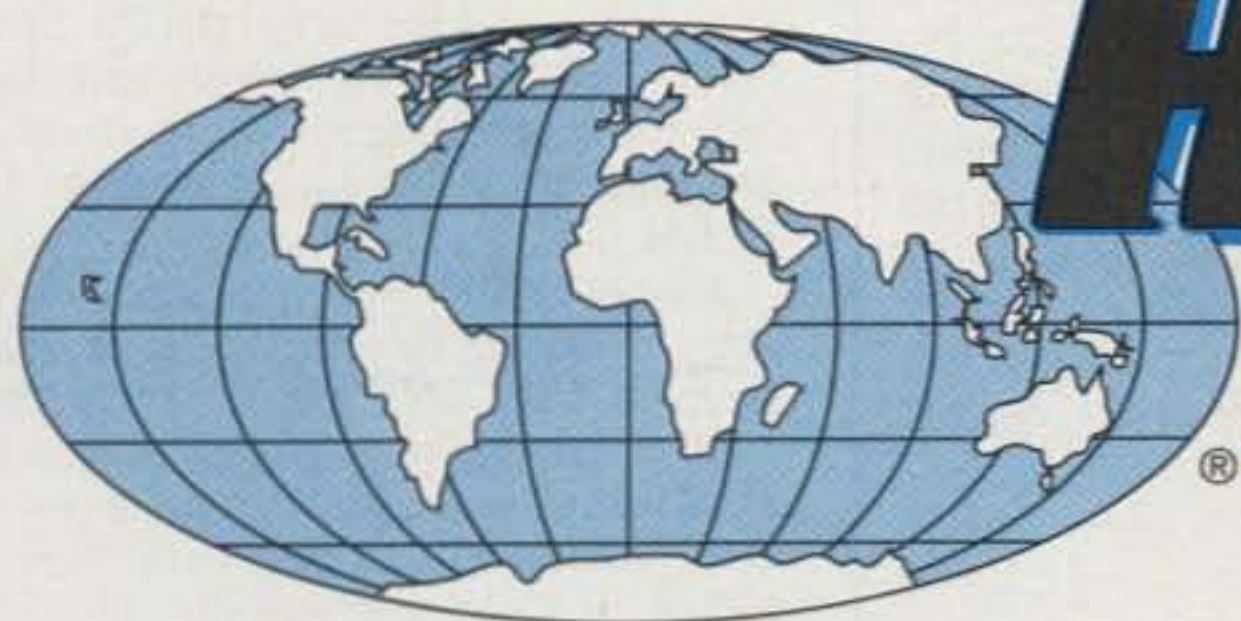
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<b>P49V</b> .....	<b>18,592,475</b>
<b>EA8AH</b> .....	<b>14,303,114</b>
<b>PJ9Y</b> .....	<b>13,618,143</b>
7Z2AB .....	9,177,296
VG3EJ .....	8,958,439
5U7M .....	8,643,635
<b>WR6R/KH6</b> .....	<b>8,394,030</b>
D44BC .....	8,287,158
5Z4BI .....	8,188,674
<b>KM1H</b> .....	<b>7,854,840</b>
KG6DX .....	7,737,496
PR0R .....	7,735,185
<b>GW4BLE</b> .....	<b>7,231,872</b>
BY8AC .....	7,167,517
OH5NQ .....	6,718,880
ZF2NE/ZF8 .....	6,538,824
XJ1XX .....	6,496,626
OM5R .....	6,438,872
9K2WR .....	6,393,089

### 28 MHz

<b>ZW5B</b> .....	<b>13,006,917</b>
ZY5Z .....	11,055,600
HD0T .....	8,866,890
CE6EZ .....	8,820,112
IU9A .....	5,383,770
P20A .....	5,184,625
ZS6WPX .....	4,959,465
J68AX .....	4,709,985
VG7NTT .....	4,105,570
Z21BL .....	3,905,370

### 21 MHz

ZZ9A .....	10,425,920
ZP0Y .....	10,172,646
<b>AH0K</b> .....	<b>7,206,850</b>
7L1GVE .....	6,848,136
<b>CT2A</b> .....	<b>6,029,559</b>
VG7SV .....	5,097,195
<b>WN4KKN/6</b> .....	<b>4,538,050</b>
YL1WW .....	4,507,448
K5MR .....	4,443,048
KA2AEV .....	4,278,888

### 14 MHz

ZV5A .....	7,325,685
LZ5W .....	5,671,509
GB8FX .....	4,984,488
IR8A .....	4,789,024
YT1BB .....	4,455,447
F2EE .....	4,418,812
4N2HDE .....	4,084,860
KK9A .....	3,389,568
DL8PC .....	3,089,130
LU2F .....	2,963,250

### 7 MHz

<b>EA9LZ</b> .....	<b>4,721,924</b>
IZ3A .....	2,093,624
<b>KC7EM</b> .....	<b>1,396,646</b>
IU9S .....	1,256,280
N5RZ .....	1,043,316
HA9BVK .....	870,480
SP5SSN .....	499,200
EA6GP .....	213,180
YO3JF .....	90,000
IV3NVN .....	66,992

### 3.5 MHz

CT7N .....	1,456,704
<b>K1ZM</b> .....	<b>1,266,844</b>
WW2Y .....	553,468
WE3C .....	536,514
OK3CBU .....	523,488
4N1A .....	444,544
IG8R .....	320,902
YU3IX .....	278,768
IK0DWN .....	258,544
DL3LAB .....	241,072

### 1.8 MHz

EI7M .....	48,168
WT3Q .....	17,280
AA4MM .....	14,364
WA7UGV .....	3,828

### LOW POWER ALL BAND

KG4DD .....	5,379,660
CY2C .....	4,812,740
EA8BWW .....	3,387,412
NH6T .....	3,117,650
NP2I .....	2,910,338
JF1SEK .....	2,779,975
WB5NXH .....	2,423,284
DX1L .....	2,369,180
YB2ARQ .....	2,155,766
8R1JV .....	2,109,970

### 28 MHz

JG1EGG .....	3,276,396
8P9CW .....	2,836,064
JE4VVM .....	2,427,858
YB3OSE .....	2,055,000
KE5FI .....	1,301,880
EA6VQ .....	1,168,903
JE7JZC .....	1,122,317
KS3F .....	871,145
JA7NVF .....	818,928
KA2KRA/7/N .....	647,629

### 21 MHz

WP4CEL .....	1,497,792
JA7ZWD .....	864,300
TG9AJR .....	848,043
XJ1SF .....	810,719
ED7FTR .....	642,360
ZF2QP .....	610,740
OK2TBC .....	431,940
WZ8T .....	402,052
JG4KCW .....	349,692
EC1CTH .....	323,730

### 14 MHz

BY4BB .....	792,939
CT1BWW .....	620,310
OK1ARI .....	470,592
HK4OTF .....	440,960
4M5KWS .....	276,060
DJ0AD .....	221,936
YU3PG .....	204,815
7M1GAG .....	189,318
OK3YK .....	165,540
EA6LB .....	159,993

### 7 MHz

OK1PFJ .....	89,095
DJ2YE .....	24,610
WA6WPG .....	20,502
JR7OMD/2 .....	9,108
EA7PN .....	1,650

### 3.5 MHz

VG3LRL .....	401,478
YU3KH .....	124,640
HJ6RXI .....	92,352
OK1JJB .....	89,600
YO8RTR .....	85,760

### 1.8 MHz

OZ3SK .....	55,968
G4PKP .....	36,080
RA3ZAP .....	10,540
UB5NBJ .....	8,820
UC2CEO .....	2,958

### QRP/p

<b>HI500A</b> .....	<b>A .. 2,651,944</b>
<b>KR2Q</b> .....	<b>A .. 1,269,960</b>
KY5N .....	A .. 845,598
DL1YAW .....	A .. 697,544
WB6JMS .....	A .. 438,426
KE2JO/4 .....	28 .. 249,275
JF3EIU .....	28 .. 173,817
KB9ABI/T .....	28 .. 93,670
RW9AB .....	21 .. 638,392
KS9U .....	21 .. 262,350
DU1CHD/6 .....	21 .. 189,224
K5IID .....	14 .. 214,118
UB4JHE .....	14 .. 116,560
OK3CPY .....	14 .. 65,156
K7UR .....	7 .. 36,740
YB2OK .....	3.7 .. 6,750

### MULTI-OPERATOR SINGLE TRANSMITTER

<b>VP2EC</b> .....	<b>24,409,580</b>
TK5A .....	13,981,000
UX1A .....	13,881,609
TX4B .....	12,949,233
TM5C .....	12,752,344
GB6BT .....	12,001,386
WC4E .....	11,611,929
IR4T .....	11,364,375
TM2V .....	10,616,373
JJ3YBB .....	10,554,900
FF0XX .....	10,494,536
VG7SZ .....	10,313,226
XB9Z .....	10,009,980
RT1U .....	9,659,146
V73DH .....	9,546,910
EA3KU .....	9,404,354
GB8LC .....	9,087,636
CU20T .....	8,345,826
FO8AA .....	8,236,470
OL1A .....	8,170,525

### MULTI-OPERATOR MULTI-TRANSMITTER

<b>CT3M</b> .....	<b>41,324,256</b>
HG73DX .....	24,692,108
OT2A .....	20,963,931
<b>CZ7Z</b> .....	<b>20,228,367</b>
<b>WZ6Z</b> .....	<b>15,616,238</b>
NX1H .....	13,173,594
EZ6L .....	12,446,213
JJ3ZKD .....	12,055,232
OG1T .....	11,442,700
WK4Y .....	11,226,946

ing rare DX. One guy even asked what country I was in! ... AA2GQ. Work mostly CW, but got started in this WPX SSB and just had fun! ... AA7FK. This contest is the only SSB contest that is truly fun! Love the 36 hour limit. ... AA9AK/0. Seen better conditions, but still the greatest contest. ... A12C. I set up the station at a top of a high mountain—3200 meters above sea! The propagation is the best I've ever seen. ... BY8AC.

My best WPX effort ever since 1983 when I established a world record. This time I more than doubled it, but not enough to break the current record. Maybe I'm getting too old for this. Best of all was meeting friends I have been working in the WPX test. ... CE6EZ. Great WPX Contest; lots of fun working stateside stations all night. My wife says this is the last CQ WPX, but I'll be back next year! ... CT1BWW. I am A.R.S. since 1937. My age is 78 years old. ... CT1QF. Found out that the special call sign policy is being changed and CU0WPX may be unavailable next year, so I operated even though I only had time for half the contest this year! Hope everyone who needed CU0 got it. ... CU0WPX.

Special call CY2C authorized for use at this station only for WPX contests in March and May 1992 by Communications Canada ... CY2C. Didn't actually plan to get in seriously because I had to help my son move to a new flat on Saturday, but the bug still bites after 25 years of contesting. Hi! ... DK1FW. Big storm first day and no possibility to use the computer. See you again in May. ... EA6GP. Had to leave early to airport, so missed a part of second day pileups. ... EA8AH. Thank you very much, to all the people calling, to me, in the contest I think that it is a beautiful contest. ... EA9LZ. If I consider that I had to work the weekend and that this is my first WPX, I'm more than happy with the result. ... EC3CIL.

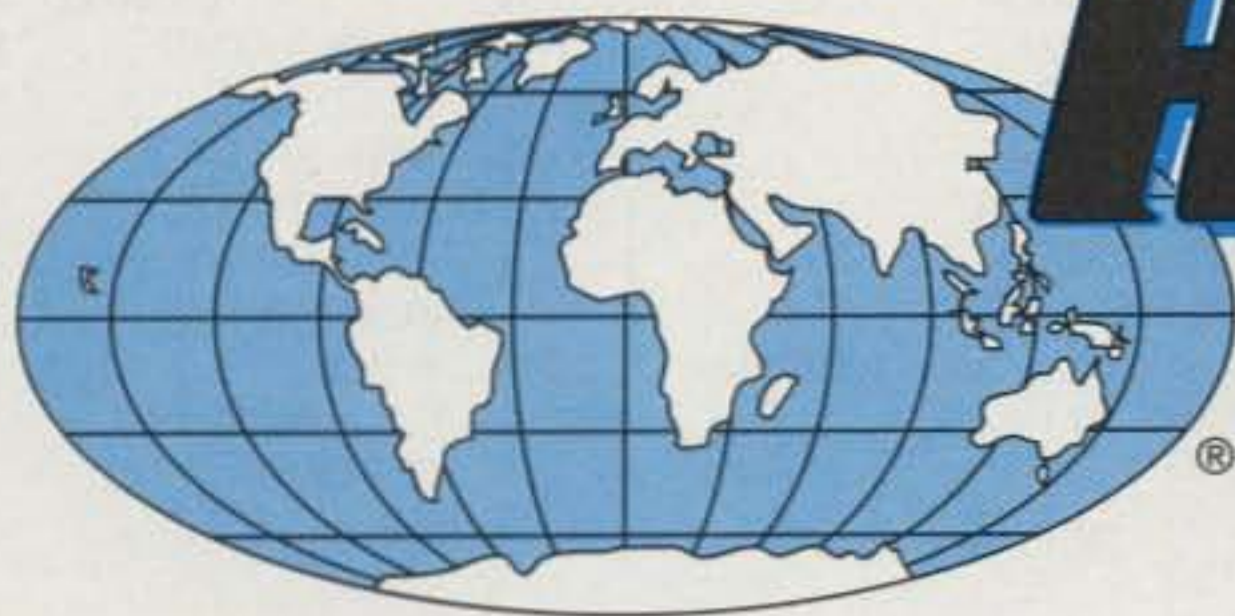
Contest helped to make holiday in Ireland even more enjoyable. ... EI/G3YOG. Always nice contest; a lot of beautiful call sign. ... F2EE. I just received my license 3 months ago—a lot of new prefixes for me—fantastic. ... FD1SHQ. A lot of new prefixes for my WPX award. Very good time with the contest. ... FE6FNA. What a lonely band 160 can be, especially with a G4 prefix! For once I could hear more than I could work. ... G4PKP. Very mixed conditions with no "W's" the first day. ... GM3CFS. Windy weather meant my tower was cranked partly down = some "sag" on the LF slopers! ... GW4BLE.

Elders call holder in Korea. ... HL5AP. According to license, only 2 hours for WPX Contest. UNICEF is a great ambassador to the peoples for radio amateurs to let us aid it. ... IIONU. It has been a very pleasant first experience in an international contest. I hope to repeat it next year. Going on with the score and been present to every band. ... IK8ODA. The happiness to break the one million points for the first time in my life, fantastic! ... IN3QBR. After the first day the computer crashed—and fun began. ... IR8A.

Enjoyed very much; very good propagation on Saturday, very bad on Sunday morning. Please look for me next year on 10 meters again, as the sunspots go down my antennas go up. I have a nice project to put four Yagis on my tower. ... IU9A. Satisfactory score for my first WPX on 40 meters. I hope in best antennas for next year's edition. ... IU9S. Four new ones on 40 meters: 9K2WR, 7Z2AB, VP2EC, PJ9Y. ... IV3NVN. Operated from Castries (J69J) ... J68AX. Enjoyed contest very much. I hope condx remains good in CW too! ... JA8RWU. I heard



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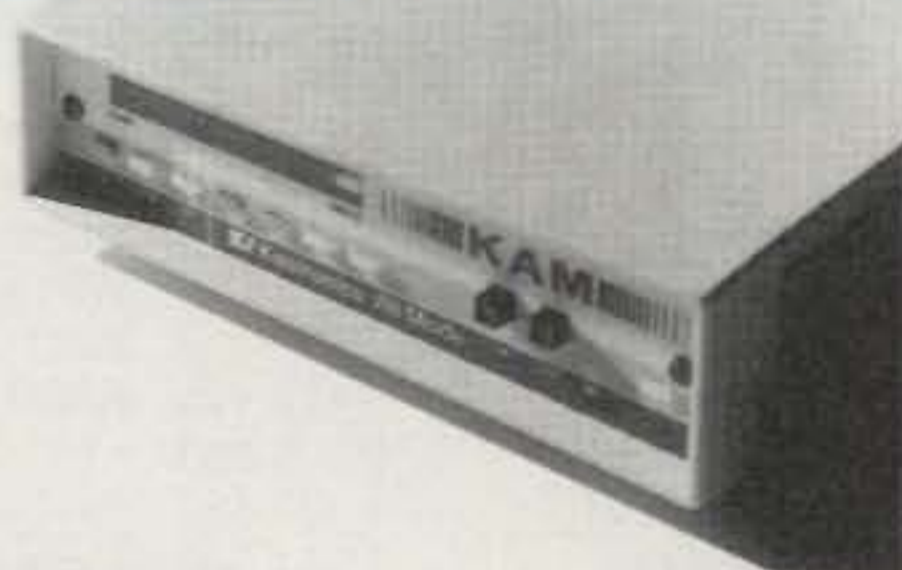
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## rfconcepts

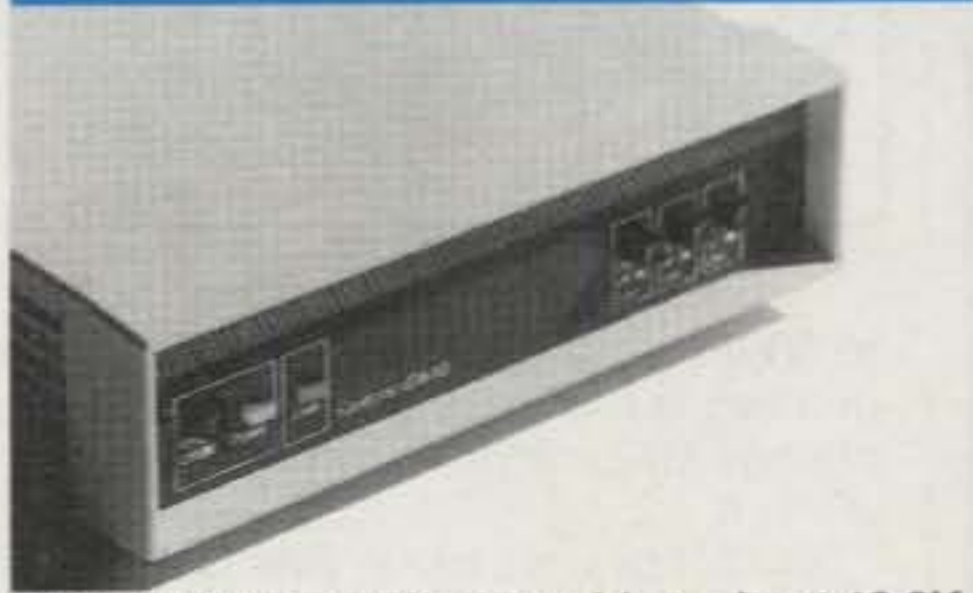
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BP-84 7.2 VDC, 1000 mA.H., Ni-Cad Batt. Pack .....	81.00
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N7AVK .....	4,910,290
NU6S .....	4,667,208
KW8N .....	4,652,883
AD1C .....	4,126,650
AA2GQ .....	3,882,750
K3ZO .....	3,591,040
N7TT .....	3,452,070
K6HNZ .....	3,115,420
WZ4F .....	3,073,726
NG8D .....	3,034,528
W5KFT .....	2,826,967
N6AR .....	2,560,950
K9ZO .....	2,552,004
N6EK .....	2,365,362
K4VUD .....	2,355,712
W0CG .....	2,316,624
K16CG .....	2,278,476
K2PS .....	2,075,520

**28 MHz**

KO4QW .....	2,828,120
WU3V .....	2,709,850
WB4KRH .....	1,382,832
K5TSQ .....	1,081,694
AG6D .....	631,350
KH6DW/KS6 .....	576,343
KC4TIR/T .....	529,452
WF5E .....	431,034
WA4QMQ .....	266,272
K6XO/7 .....	242,223
W7AYY .....	212,420

**21 MHz**

<b>WN4KKN/6</b> .....	<b>4,538,050</b>
K5MR .....	4,443,048
KA2AEV .....	4,278,888
K3ZJ/8 .....	3,063,720
N3GB .....	1,531,305
N4MO .....	1,291,290
W7FP .....	1,116,744
W6TKF .....	405,764
W0ACT .....	336,600
K9BLY .....	275,842

**14 MHz**

KK9A .....	3,389,568
AA1AA .....	1,492,344
AA5WQ .....	1,029,600
K1KJT .....	1,000,395
WY2E .....	240,024

**7 MHz**

<b>KC7EM</b> .....	<b>1,396,646</b>
N5RZ .....	1,043,316
ND1W .....	41,356
W4TMN .....	2,992
AA5IB .....	432

**3.7 MHz**

<b>K1ZM</b> .....	<b>1,266,844</b>
WW2Y .....	553,468
WE3C .....	536,514
K0CS .....	56,024
W6CN .....	16,560
K2ONP .....	14,774

**1.8 MHz**

WT3Q .....	17,280
AA4MM .....	14,364
WA7UQV .....	3,828

**LOW POWER  
ALL BAND**

WB5NXH .....	2,423,284
N1HOQ .....	1,195,110
K2POF .....	1,079,884
KF2O .....	967,978
KA8WEO .....	890,625
AC0W .....	795,586
N8FEH .....	758,536
WS1A .....	736,644
KJ4TI .....	615,750
KA8D .....	580,260

**28 MHz**

KE5FI .....	1,301,880
KS3F .....	871,145
<b>KA2KRA/7/N</b> .....	<b>647,629</b>
KF7LK .....	616,192
W6UQF .....	519,659
WB6CJE .....	401,103
N7LOX .....	345,420
KJ6HO .....	297,440
W6PYX .....	238,700
WB5RUS/T .....	227,154

**21 MHz**

WZ8T .....	402,052
WA9BOW .....	175,440
N5XGS .....	89,044
W9HE .....	46,980

**14 MHz**

K7DBV .....	77,760
W9HNI .....	25,056
KA3VYN .....	23,793
WS1O .....	22,440
KA1UJ/4 .....	18,281

**7 MHz**

WA6WPG .....	20,502
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**3.7 MHz**

NR6E .....	25,392
------------	--------

**1.8 MHz**

N2KMJ/AE .....	300
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**NOVICE/TECHNICIAN  
28 MHz**

<b>KA2KRA/7/N</b> .....	<b>647,629</b>
KC4TIR/T .....	529,452
WB5RUS/T .....	227,154
N0HJQ/T .....	208,175
KD4FNA/T .....	199,364
KC4GFW/T .....	116,645
WB2BZR/3/T .....	78,822
KB4BBC/T .....	47,600
N2LDU/T .....	43,632
KD6DAE/T .....	31,737

**QRP/p**

KR2Q .....	A ..	1,269,960
KY5N .....	A ..	845,598
WB6JMS .....	A ..	438,426
KE2JO/4 .....	28 ..	249,275
KB9ABI/T .....	28 ..	93,670
KS9U .....	21 ..	262,350
K9JS .....	21 ..	121,746
K5IID .....	14 ..	214,118
K9OSH .....	14 ..	38,503
K7UR .....	7 ..	36,740

**MULTI-OPERATOR  
SINGLE TRANSMITTER**

<b>WC4E</b> .....	<b>11,611,929</b>
AA6TT/0 .....	6,663,376
NE8T .....	6,333,020
AA8U .....	5,639,183
NS1M .....	5,384,320
WN9P .....	5,089,290
NM9H .....	5,055,336
NJ1V .....	5,047,800
WA6IET .....	4,149,769
KJ4VH .....	3,680,253
KD9ST .....	3,562,156
WT2F .....	3,522,534
WC5C .....	2,757,260
WS9V .....	2,702,500
N5NMX .....	2,532,425
KI5ER .....	2,205,404
NC0P .....	2,139,529
KC1F .....	1,742,400
KB4GID .....	1,595,568
W8BI .....	1,575,483

**MULTI-OPERATOR  
MULTI-TRANSMITTER**

<b>WZ6Z</b> .....	<b>15,616,238</b>
NX1H .....	13,173,594
WK4Y .....	11,226,946
WZ1R .....	5,368,464
NE9O .....	5,280,093

VP8SSI. It's a big pileup! ... *JE0BTL*. I got many prefixes in this contest so I would like to exchange QSL cards for my WPX award. ... *JF1SEK*.

The condx were better than last year on 10 meters. I enjoyed it! ... *JG1EGG*. I'm glad to get some new countries. ... *J11FYC*. Using FT757 and Spider mobile whip on balcony with no radials. Somehow the KP4 prefix doesn't attract as much attention as KP5, and my appetite for

contesting was lessened after N1DX and I returned from Desecheo with 6K Q's in three days. Besides, the pool ... *K0BJ/KP4*. The 80 meter static was 40 dB over on the dipole the first night and 40 dB over on the beverages the second night. ... *K0CS*. Thanks for creating this fun contest! Meeting an old friend (*JA7NVF*) on the air, during my first contest. ... *K7NPN*.

My first WPX contest and second all-time contest and lost linear half way into contest. You





Eugen Manaenko (age 12) made 272 contacts on 10 meters from UZ9YXI. Eugen is perhaps the youngest to participate in the WPX Contest and maybe one of its future winners.

don't have to be a big gun to have fun, but there's a lot to learn. My computer skills improved ten fold just getting ready. . . . K9BLY. Hard to compete with all the big stations with my portable antenna. . . . KA0CKN. Finally a WPX with no solar flares! My 1.4M new personal best. Glad to provide ND for all 5BWAS hopefuls. . . . KA0ZFX. Condo contesting from FL is no substitute for the home QTH in VT with a tower and delta loop. . . . KA1UJ/4. Thanks for the new low-power category. . . . KA7FEF. Had a lot of fun and hope to see you all next year, and hope to see you in WPX CW too. . . . KA8VPL.

Ten meters was the worst I think I have seen it in many years for the contest. After many years of 10 meter contesting, operating the lower bands was kind of strange (working Europe at midnight doesn't seem right). . . . KA8WEO. The competition was tough but I grinned and beared it. See ya next year. . . . KB8MKL. A lot of stations thought I was on Navassa Is. . . . KC4TIR/T. Heard/missed a lot of good ones. . . . KC5AC. I wish more European stations would listen for stateside. Tnx to all the JA's who worked me. The new antenna worked exceedingly well. . . . KC7EM. I enjoy this contest more every year! Thanks CQ! . . . KD2YP.

Really enjoy contesting, first 6 months as a ham. . . . KD4FNA/T. Is someone checking the power of the "Big Guns"?! . . . KE8NH. Interesting conditions with lots of unique prefixes. . . . KG6DX. This contest was eventful from being able to participate at all. Had expected to be out of town handling the kidnapping down south, but at the last minute the victims were fortunately released. Propagation was less than would have liked. . . . KG6UH/DU1. I love the way contests bring out the rare DX! Nine new countries, all continents in a weekend! . . . KI6VY. It's my first time contest in Guam Island. Ant is only dipole (3 - 10 feet high). . . . KK6WW/WH2.

I came within 160,000 points of breaking the 20 meter record. Too bad conditions were poor the second day. . . . KK9A. Now if only 10 meters could stay open to EU and JA for two days straight, might be able to crack a million in this contest (hi). Ten sure flattened on second day. . . . KS7T. Always my favorite contest. Wish I had time to operate it. Should put the old Oklahoma crew together (KK5I, N5CQ, WA0TKJ, K7CW, WA4PPX, and me—K5JZN). . . . KT7G. Sorry, but only a very few QSOs in this test. I went home from some weeks of military exercise just before the test started, so I gave my wife and some beer first priority. . . . LA9GY.

Biggest thrill other than getting a TK5 was the fact that I haven't been on HF for 10+ years.

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**HL-36U** All mode 30W amplifier for 70 cm. GaAs FET preamplifier built-in. LED power level indicator. Input power is 1 to 12W. Other models up to 230W output available.



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## CONTINENTAL LEADERS

### AFRICA

A	<b>EA8AH</b> . . . . .	<b>14,303,300</b>
28	ZS6WPX . . . . .	4,959,465
21	No Entrant	
14	EA8BGY . . . . .	1,001,900
7	<b>EA9LZ</b> . . . . .	<b>4,721,924</b>
3.5	EA8TH . . . . .	15,582
1.8	No Entrant	

### ASIA

A	7Z2AB . . . . .	9,177,296
28	*JG1EGG . . . . .	3,276,396
21	7L1GVE . . . . .	6,848,136
14	JJ1NNJ . . . . .	1,291,160
7	*JR7OMD/2 . . . . .	9,108
3.5	JH1HGC . . . . .	105,896
1.8	No Entrant	

### EUROPE

A	<b>GW4BLE</b> . . . . .	<b>7,231,872</b>
28	IU9A . . . . .	5,383,770
21	<b>CT2A</b> . . . . .	<b>6,029,559</b>
14	LZ5W . . . . .	5,671,509
7	IZ3A . . . . .	2,093,624
3.5	CT7N . . . . .	1,456,704
1.8	*OZ3SK . . . . .	55,968

### NORTH AMERICA

A	VG3EJ . . . . .	8,958,439
28	J68AX . . . . .	4,709,985
21	VG7SV . . . . .	5,097,195
14	KK9A . . . . .	3,389,568
7	<b>KC7EM</b> . . . . .	<b>1,396,646</b>
3.5	<b>K1ZM</b> . . . . .	<b>1,266,844</b>
1.8	WT3Q . . . . .	17,280

### OCEANIA

A	<b>WR6R/KH6</b> . . . . .	<b>8,394,030</b>
28	P20A . . . . .	5,184,625
21	<b>AH0K</b> . . . . .	<b>7,206,850</b>
14	KH6FKG . . . . .	2,218,050
7	No Entrant	
3.5	VK3DZM . . . . .	33,024
1.8	No Entrant	

### SOUTH AMERICA

A	<b>HC8A</b> . . . . .	<b>24,809,300</b>
28	<b>ZW5B</b> . . . . .	<b>13,006,917</b>
21	ZZ9A . . . . .	10,425,920
14	ZV5A . . . . .	7,325,685
7	PY2ELZ . . . . .	20,400
3.5	*HJ6RXI . . . . .	92,352
1.8	No Entrant	

### MULTI-SINGLE

AF	No Entrant	
AS	JJ3YBB . . . . .	10,554,900
EU	TK5A . . . . .	13,981,000
NA	<b>VP2EC</b> . . . . .	<b>24,409,580</b>
OC	V73DH . . . . .	9,546,910
SA	LU4AA . . . . .	4,795,011

### MULTI-MULTI

AF	<b>CT3M</b> . . . . .	<b>41,324,256</b>
AS	JJ3ZKD . . . . .	12,055,232
EU	HG73DX . . . . .	24,692,108
NA	<b>CZ7Z</b> . . . . .	<b>20,228,367</b>
OC	No Entrant	
SA	No Entrant	

Note: An asterisk (\*) indicates low power.



Jan, PA0IJM, was top scorer in The Netherlands.

... **N0BIW**. My first WPX. What a blast. New personal high contest score! What a rush trying to reach 1000 Q's by 2400Z! ... **N1HOQ**. First HF contest—love 160! ... **N2KMJ/AE**. The contest rules should state that the callsign MUST be given as part of the contest exchange. This would help us "search and pouncers," since we wouldn't have to wait for the "big guns" to go through five contacts before giving their callsigns. ... **N2LDU/T**. This is one contest where lil pistols have a shot. ... **N4MO**.

Just recovering from a heart attack so I had to take it easy. About 21 hours of operating was all I could handle. The rates on 10 meters were just incredible! ... **N6AR**. Great weekend. The XYL let me work more hours than usual and I got 8 new countries. ... **N6TPT/T**. I've had similar conditions in the dentist's chair. ... **N7AVK**. Biggest thrill was having people call me by name as soon as they heard my call. It happened three times. I was excited about the contest, but that really made it exciting for me. ... **N7LTM**. Lost driver in T-4XC. Stole TS-830 from K8DD. Did honey-do's all weekend. Loved it! ... **N8CQA**. Good conditions + nice turnout = good contest! ... **N8FEH**.

During the heat of the battle I was in a pileup for ZD8LII. He heard my call and said "Harry you're 59 001." I almost fell off the chair. I didn't know he knew my name. ... **NA2K**. Happy to have worked a couple of new countries. The prefix multipliers make for a fun contest. ... **N19C**. My first WPX SSB Contest. Thanks for the low-power category. All contests should have

it. Gives us folks with barefoot rigs a bit of recognition. Can't wait for CW weekend. ... **NP2I**. I improved my last year score by one million, but couldn't break 2000 Q's. I was so close. ... **OG6NIO**. First overseas operating experience for me (US call WQ2M). Hope to invest more time next year. ... **ON9CJM**.

Very poor conditions again this year. My last contest. ... **OY9JD**. With the help of the first-ever 2 x 1 call issued in Papua New Guinea, I had beaten the previous Oceania 28 MHz record by Sunday morning. Then Murphy struck me with a potentially fatal dose of malaria. As if that was not enough, I then blew the final. ... **P20A**. After being licensed since 1938, I still enjoy participating my way. ... **PA0YN**. First time in my 28 years of hamming I was so serious! Great time with good friends all over the world! Thank you. ... **PJ9Y**. My best mark on any contest: 1200 QSOs! ... **PW2A**. My best record on any test, even with high QRM from XYL and children! ... **PY2EYE**.

Very, very poor propagation; must have been a flare or something. ... **SM2EKM**. I just love contesting! ... **TG9AJR**. This is my first WPX test. Very nice contest. ... **UA1NDV**. My best monoband result in first time ever! PV4—great antenna! Thanks Mr. Lawson! ... **UB5LCV**. The band was wide open and crowded with American signals (229 prefixes from the USA are in my log, but only 67 prefixes from Japan) ... **UW9AG**. My first world contest! Next time I'll operate more and rest less! But finally worked VP8! Great fun, thanks much. ... **VE3BDB**. Con-

ditions were not the greatest on Sunday afternoon, but still had a good time in the contest. Thanks to all. ... **VE3VET**.

This year nothing broke down, quit, locked up, dumped, got loose, melted, iced up, or exploded. ... **VE3ZD**. Thirty-six hours is a step in the right direction for single operators. ... **VG3EJ**. Best contest of the season for me. A lot of good operators in WPX, especially JA's. ... **VG3EKF**. Wife thinks I'm nuts, but I had a ball! ... **VG3LRL**. P20A's effort made me wish I was in PNG again. Thanks CQ for a great contest with loads of participation from every direction. ... **VK2ARJ**. It's good to be back contesting. Just set target of 1000 Q's + 1M points. Points were easy, but antennas really not good enough—yet! ... **VK5GN**.

No propagation Sunday morning. Worked all stations heard—4 in 4 hours. ... **VP8CEH**. Problem: How to sleep all day and stay awake all night to work 40 meters. In the daytime I am 30 yrs old—at night I am 65! ... **W4TMN**. This is the first time I have tried it on low power. My amplifier was out. I never called CQ and worked all I heard. ... **W4WJJ**. My first score over 500,000! Twenty-five hours on air. Thirty-five hours later to tabulate and score! Too much work to score—especially that darn list of prefixes in alpha numeric order. ... **W4WKQ**. My goal in every test: to work WAC—accomplished on 75 meter from west coast! ... **W6CN**.

Had to tear down rigs and move on Sunday. XYL rented the house. ... **W7CB**. Sure had a great time in this year's SSB 'test! ... **W7FP**.





Mexican multi-single station XA5T provided many with a new prefix. Operating (left to right) are XE2ABN, XE2LV, XE2DRM, XE2JWM, and XE2KB.

Good contest—will give CW portion a go in May. . . . W7QN. My first WPX contest. Once I get the computer op (me) going faster, the score should go higher for the next contest! . . . WA1EHK. I work the WPX because I like it. . . . WA1VRD. Heard many Europeans, worked zip! . . . WA6WPG. Wow: 100W—what a blast! . . . WB5NXH. Band conditions were terrible. Signals fading out in middle of signing call. Very few Europeans. Lots of activity but only in some areas of world. . . . WB6NFO.

Ten meters was hot Saturday. What happened on Sunday? Still my best score ever. . . . WB8TLI. Worked a family of N7's—OM/YL and two kids. Great to have a beam up this year. This is my second and last as WH0AAP. Will be KH0AS next year. . . . WH0AAP. My callsign sure created a lot of interest. . . . WO1P. Neat to be somewhat in demand. . . . WR3G. My first time in contest and had a great time! . . . WY2E. Hunting and picking plus CT program equals no dupes! . . . XE1KHR. Lots of CQ's with no takers, but still the best contest! . . . XJ1SF. Ten meters was conspicuous by its absence (hi)! . . . XJ1XX. This was my 17th CQWW WPX SSB entry. . . . YU7SF. Conditions below average, especially poor to US. . . . YZ3AA. Unusual propagation. CU next time. . . . Z21BL.

### Station Operators Multi-Op Single Transmitter

**4D1P:** DU1EIB, DU1CLH, DU1MSD, DU1DDP, DU1KHZ, DU1ELB, DU1CEY, Ernie, Roger. **4N2CED:** Al, Zoran, Zoki, Chris. **4X4DM:** 4Z9FEB, 4Z9CCG, 4X4DM. **5B5E:** 5B4's ACY, YN, WN, XF, WS, XN, ADX, Marios, Chris, Matthew, Julio. **AA0A:** AA0A, N0KFE, N0PKX. **AA5NT:** AA5NT, N500N, WB2LMA. **AA6TT/B:** AA6TT, AA5B, OH6DO. **AA8U:** AA8U, K8MJZ, KC8EK, N8CC, KF8QE, KF8DF, WA8VHO, KB8INK. **AM1AX:** EA1NK, EA1AX, EA1DD, EA1ET, EA1MC. **CG2CA:** VY2AC, VY2GJ, VY2UA, VY2DM, VY2RB, VY2VN, VY2ZV. **CK7K:** VE7KD & VE7ETY. **CU2BT:** CU2AA, CU2AE, CU2AF, CU2AP, CU2CE, CU2CR, CU2DX. **D73DX:** HL5's BHH, BNK, BNY, BPF, PUV, BXG, JCC, JVF.

JFM, JTL, JRS, JVL, HL0BLA. **DA2UK:** DA2QX & DA2QJ. **DF00D:** DL1BJB, DL1BJL, DL1BJN, DL2BK. **DF7RX:** DF7RX, DK2OY, DL4RDJ. **DK0BF:** DL5IO, DK9UV, DF2IAQ, DF3IAB, DJ4XA, DL1IAI, DK7UY, DF1IC. **DK0UH:** DL9SCU & DF4SA. **EA3FQV:** EA3FQV & OE2MON. **EA3KU:** EA3AIR, EA3DU, EA3KU, EA3NY. **ED1SML:** EA1EVQ, EA1EVR, EA1EVS. **ED1WWE:** EA1EPB, EA1CJJ, EA1FCS, EA1FCR, EC1DDK, EA1EZV. **ED3HH:** EA3CAC, EA3GBW, EA3GEG, EA3GEJ, EA3GEM, EA3GEP, EA3GFA, EA3GGG, EC3CVD, EC3CZR, EC31843. **ED3QD:** EA3BOW, EA3BOX, EA3DGO, EA3EIO.

**ES5Q:** ES5MG, ES5RN, ES5MC, ES5RY. **EX9X:** UA3-142-1926, UA9-090-957, UA9XFY, UA9XLZ. **FF0XX:** F6BEE, F6FGZ, FD1NLY. **F08AA:** F05IW & F05LQ. **G0FDX:** G0IDE, G0LRE, G0KMU, G1AWM, G0GVA, G7FBR, G0NEI. **GB0WOX:** AA6MC & CDXC PacketCluster. **GB6BT:** G4BAH, G4BUO, G4VMM, G4PIQ. **GB8LC:** G3VHB, G3NLY, G3NAS. **GS0AEE/P:** GM4NNC, GM4TNJ, GM0EAS, GM0RJG, GM0PMW, GM7GVM, GM7LQR, Peter. **GX00BS:** G4WMH, G4JYE, G0IZM, G0JFX, G0KYM, G1MLK. **GX0PNW:** G0JSM, G4NXG, G4ZYN, G4YSN, G0JHC, G0MXU, G4ZYQ. **GX50K/P:** G4UOL, G0FPV, G1TYY, G0EFI. **HA5KEH:** HA1RJ, HA2PD, HA5EH, HA5AWP, HA5BVD.

**HA6KNG:** HA60B, HA6KNV, HA6YW, HA6YL, HA60I. **HA8KCK:** HA8EK, HA8DZ, HA8FW, HA8FT, HA8DT, HA8KH. **HG6V:** HA6VX, HA6VR, HA6ZV, HA6ZQ, HA6GK, HA6GM. **HZ1AB:** G4KIB, K1VBM, N4KT, DU1CSU, K3DTU. **I3QK0/3:** I3QK0, IK3DVX, IK3FXO, IK3PFO, IK3QAR, IW3FT, IW3GDS. **I2A:** I2UIY, I2VXJ, I1JQJ, IK1HSS. **I09JKY:** IT9JKY, IT9YXO, IT9MUO, IT9BBC. **IQ2ARI:** IK2's FEO, CFH, EKY, GAU, HNJ, ILH, IKT, MMF, MPV, OFR, OHG, OQB, RJK. **IR4T:** I4UFH, I4JMY, I4YSS, IK4IEE, IV3TAN, IK2BHX, IK2MRZ, IK2QEI. **IU2M:** IK2SGC, IK2SFZ, IK2SAI, IK2GWH, IK2RGT, IK2QIN, IK2AEQ, IK2HNA, IW2GSH. **IV3JVJ:** IV3JVJ, IV3NTA, IV3HIH.

**JA3ZKK:** JH4PUL, JR4VOW, JG3SXR, JM3ILK. **JA8YBY:** JO1DFG, JE8KLL, JF8TMI, JG8NFE, JG8NID, JH8PNE, JH8WBR, JR8WJS, JR8DHA, JE8CTG. **JE6ZIH:** JR6GKT, JF1DHS, JR1JNY, JF6DEA, JG6GMR, JI6BRB, Narumi, Ryoki, Maki, JG4KEZ. **JJ3YBB:** JA3CZY, JA3PJL, JA3FHL, JH3FQF, JH3UHG, JE3TXA, JI3ERV. **JT1KAI:** JT1BS, JT1BY, JT1BZ, JT1CE, JT1-203. **K2PF:** K2PF & Packet. **K4FPF:** K4FPF & Spotting net. **KA6ING/T:** KA6ING & Packet. **KA8WAS:** KA8WAS & PACKET. **KB2SE:** KB2SE & Packet. **KB4GID:** KB4GID, N4LDZ, KC4HOC, Packet. **KB8MRG:** KB8MRG & N8NPP. **KB9BIB:** KB9BIB & KB9FRX.

**KC1F:** KC1F & Packet. **KC1SS:** KC1SS & N2EBU. **KD9ST:** KD9ST & KA9SQS. **KI5ER:** KD5SP & KI5ER. **KJ4VH:** KJ4VH, KB4SRE, WB4OSS. **KJ6BK:** KJ6BK, KB60EN, KC6WRF. **KL7AF:** KL7AF, NL7YU, KL7JBV, AL7MP, NL7WA, AL7NZ, NL7YV. **KY2T:** KY2T & Net. **KZ1K:** K1PLX & KA1ZRO. **L8H:** LU4HKN, LU3HEO, LU9HIG, LU3HIP, LU4HMF, LU5HN.

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1/4 wave whip
- MM270B 2m/70cm: 19" tall  
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5/8 wave 70 cm



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**N5KXI:** N5KXI & N5LOX. **N5NMX:** N5NMX, N5LKC, N5NMY. **N6CCL:** N6CCL & Packet. **N7PIP:** N7PIP, WA6NKO, KB700X, N6HR. **NC0P:** NC0P, W00V, N0AMI, NU00. **NE8T:** NE8T, N8CXX, A8FE, N8BTU, K8CC. **NJ1V:** WV5S, WA1S, KB5B0B, AD1S, N5RJM. **NL7DU:** NL7DU & AL7KT. **NM9H:** NM9H, N09Z, N9HXG, Midwest Packet Cluster. **NN0M:** NN0M & N0ZA. **NS1M:** NS1M, NJ1F, KB1W. **OE3GBB:** OE3GBB & OE3GEA. **OG1EH:** OH1EH, OH1HS, OH1NOA, OH1NSJ. **OH4ZS:** OH4ZS, OH4JK, OH4MI, OH4NZI. **OH6LK:** OH6LK & OH6EI. **OK1KQJ:** OK1AYP, OK1DXS, OK1ICM, OK1IMR, OK1VKX, OK1BY.

**OK10KE:** OK1DUT & OK1VBA. **OK10PT:** Club Group. **OK2KDS:** Club Group. **OK2KMR:** OK2SAA, OK2BQZ, OK2PMD. **OK2KVI:** Club Group. **OK3KAG:** OK3WDX, OK3TWR, OK3TRU, OK3ZFM, OK3DX. **OK3KUN:** Club Group. **OK3KXR:** OK3YDP, OK3CGN, OK3CVB + 2 SWLs. **OL1A:** OK1DIX, OK1DWX, OK1FCW, OK1FIA, OK1FUA, OK2PZW, OK3EI, OK1BRA. **ON5LL:** ON4AKL, ON4AEK, ON4FK, ON5BR, ON7YP, ON6JZ, ON4BN, ON7WK, ON6NP. **ON6AH:** ON6AH, ON6MH, OH6QR, ON6VL, ON7PC, ON9CMB. **P29CG:** P29CG, P29DK, P29SC. **PA6WPX:** PA3BBP, PA3DMH, PA3ERC, PA3EWP, NL10373. **PB0ALB:** PA3BAG, PA3BSQ, PA3EPD, PB0AIU, PB0ALB.

**PI4SHB:** PA3FXU & PA3FCD. **R3K:** RA3DUT & UV3DTN. **R3R:** UA3-151-670, UA3-157-111, UA3RMK, RA3RFC, RA3RFH. **RL8DXX:** UL7-029-179, UL7-029-178, UL7-029-152. **RN7WPX:** RA1NA, RA1NF, UA1NAY, UA1NBO, UA1NCF, UA1NEX, UA1NCH, RT1U: UT4UZ, UT5UGR, UT3UA, UL7-179190. **RW9C:** RA9CU, RW9CZ, UC2AFE, UW9CK, UW9CZ. **RZ6AXD:** UA6-101-2900, UA6YN, RA6AX, UA6YHF, UV6AEW, UA6AHS. **SJ9WL:** SM0NSJ, SM30JR, SM3SGP. **SK0UX:** SM0JHF, SM0PYP, SM0TQX. **SK3LH:** SM3JLA & SM3PZG. **SP2ZFU:** SP6NVK & SP6OPE. **SP3KPN:** SP3OCR & SP3GXU. **SP6KFK:** Club Group. **SP9KDE:** Club Group.

**SP9KGG:** Club Group. **SP9LJD:** SP9LJD & SP9TCG. **TK5A:** F6BBJ, F6EPY, F6GOX, TK4ML, TK5EP, TK5NN. **TM2P:** F1JOT, F6FVY, F6BFH, F5JY, Dany, Maryse. **TM2V:** F6GLH, F6GLI, F6GYT, F10881. **TM5C:** F6CTT, F6HMQ, F9IE. **TX4B:** FM5CD, FE6ASS, FE6GW, FM5BH, FM5WD, FM5DN,

FM5HB. **UA9XC:** UA9XC, UA9XAC, UA9XKU, UA9XLN, UA9-090-7, UA9-090-8, UB4DWW: Yuri & Karl. **UB4FYC:** UB5FEI, UB5-070-165, UB5-070-123. **UC1CWB:** UC2-009-130, UC2CEO, UC2-009-126. **UC1WWR:** Novikov, Kazakevich, Badun. **UL8LWZ:** RL7LA, UL7LAA, UL7-026-751. **UX1A:** UW1AE, RV1AW, UA1BX, UV1AA, UA1AKC, UA1ARL, UA1ANA, UA1ABR, UA1AIU, KA1WPO, KA1WSS, UA1ALZ, UA1-169-946, UA1-169-3475.

**UX9C:** UV9CP, UA9CSS, UV9CCY, RV9CKV, RW9CW. **UZ0SWG:** UA0-124-001 & RA0SU. **UZ3AWR:** UA3-170-1169, UV3AEV, UA3-170-126, UV3AKW, UA3ABJ, UV3AKK. **UZ9CZO:** UV9CAZ, UA9-154-2007, RV9CDA. **UZ9JWJ:** UA9JAF, RW9J/UA9WO, RA9JAC, RA9JD. **UZ90WV:** UA9-145-587, UA9-145-585, UA9-145-586. **UZ9XWV:** Club Group. **V63FA:** Club Group. **V73DH:** N5MIH, AH9B, V73CT. **VE3AA:** VE3CRD, VE3GHM, VE3RMN, VE3SBG, VE3FSG, VE3BDR. **VE6AO:** VE6's NAO, AMR, JX, JJB, TZY, TFM, RJG, HJH, AJL, AFO, KZ, NOD, ROH, OBA, MFC, KC, UD, GLR, VQ, Jane. **VG7SZ:** VE7SZ, VE7ON, VE7CC, N7RO. **VK1DX:** VK1ST, VK2LVK, VK2XLK, VK1PJ.

**VK4WIE:** VK4CRO, VK4DMP, VK4KGS, VK4NEF, VK4XG, Kerry & Robert. **VK6ANC:** VK6's CR, ND, UE, ATA, APK, BDJ, BGG, FJA, JIP, TVA, ZDW. **VP2EC:** K5RX, KC5EA, N5AU. **VS6CM:** VS6CM & VS6WV. **W1BK:** W1BK & K1TXH. **W6YRA:** KH6WZ, KU6T, N6ZLH, KB6ZBI, N6RVZ, N6ZPZ. **W8BI:** KB4TLH, KF8HM, N8IBW, KF8EF, WD8EOL, N8PTL, KA8HQJ, WB8VUU. **WA4HIW:** WA4HIW & KC4QWF. **WA6AUE:** WA6AUE & Packet. **WA6IET:** W2KVA & WA6IET. **WB2YOF:** WB2YOF, WB2R, K2TD, W9FFC. **WC4E:** WC4E & K4XS. **WC5C:** WC5C, KF5FM, N5CG, KK5I, NW5H, WM4Z. **WC8R:** WC8R, N3JLL, KA3YRM, N3JYY, KD3BQ, KA3ZIQ. **WM2V:** WM2V & WA2SYN.

**WN9P:** WN9P, N0BSH, KA9FOX. **WR3E:** WR3E & Packet. **WS9V:** WS9V, KG9Z, KB9HJX. **WT2F:** WT2F, WA2EOV, K2SIG, N2IDY. **WV1C:** WV1C, WE1M, KA1PJO, KB1BU. **WX0V:** WX0V & Packet. **XA5T:** XE2KB, XE2DRM, XE2LV, XE2VY, XE2ABN, XE2AAL, XE2JWM. **XB9Z:** XE2CQ & XE2BEU. **XE1TD:** XE1EMN, XE1GRR, XE1HBU, XE1GZU. **XE2FU:** XE2FU, K5LZO, NT5D, N50AO, WB5N. **XM5MH:** VE5MH, VE5MQ, VE5MX, VE5FX. **Y38I:** Y23WI, Y31WI, Y44XI, Y54UI, DK9FE, DL5XU, DL7UCC. **Y45RJ:** Y45RJ & Y33UJ. **Y63ZH:** Club Group. **YE2C:** YB2BKJ, YC2LX, YC2ENE, YC2GAM. **ZW1Z:** PY1NEZ, PY1NEW, PY1MGM, PY1MN.

## Station Operators Multi-Op Multi-Transmitter

**4E0DBT:** DU1GCV, DU1JIG, DU1JGT, Rainier, Howard, Mike, Cesar, Erwin, Nicky, Bien, Jerome. **CT3M:** CT1AHU, CT1BOP, CT1DIZ, CT1DUV, CT3BX, CT3EE. **CZ7Z:** VE7's ANS, AV, CV, DBS, DRS, EME, LKM, RBL, XYL, SK, SMS, SSS. **EA5DCL:** EA5DCL & EA5EQL. **ED4UPM:** Gema, Patricia, Jesus, Manolo, EA4DAE, Julian, Alfonso, EA4RB, Marcelo, Juan Carlos, Luis, Pedro, Rafael, Benjamin, Pablo, EA4DYN, Luis Miguel. **EZ6L:** UA6LO, UA6LV, UV6LPL, UA6-150-1104, UA6-150-1403, UA6-150-264. **HG73DX:** HA1AH, HA1DAC, HA1DAE, HA1TD, HA1TJ, HA5AWH, HA5FM, HA5GF, HA5IW, HA5MK, HA5ML, HA5OM, HA5UA, HA6ND, HA6NF, HA6NY, HA6ON, HA6OQ, HA6PX, HA6WX, HA7RY, HA7VB, HA8IB, HA8IF, HA8LKE, HA8LLK, HG5CCC, HG5YY.

**IK6NGH:** IK6NGH, IK6QRG, IK6QRH, IK6JNH, IK6OHO. **JJ3ZKD:** Ken, Hey, Tan, You, Mako, Aki, Kome, Tsutsu, Sun, Hashi, Ted, Yoshi, Kaz, Jim, Yuu, Yuki. **JK17HH:** JA1LNA, JR1BTG, JK1SZX, JA7YSG, JE1HXZ. **LU4Fk:** LU2FID & LU7FW. **LY7A:** LY2NK, LY2BFN, LY2BKZ, LY2BMX, LY2BQO, LY2BUG, LY2BUH, LY3BN, LYR-346, LYR-1751, LYR-1853. **N8BJQ:** N8BJQ & Packet. **NE90:** N9AZD, NE90, WB9CEP, W9SU, WB9LTY, N9CAR, N9QE, AA9BH, W09I, WY9T. **NX1H:** NX1H, K1FWE, K1MNS, NW1U, K1KP, K1TWF, WN1V, WB1HBB. **OG1T:** OH1's SY, MIE, JD, NHU, MYA, XY, HD, KO, CO, OH6LI, OH6OS.

**OT2A:** ON1AEI, ON1AES, ON1ARZ, ON1AUZ, ON1AWB, ON1BTB, ON1GL, ON2AAC, ON2AIM, ON4ABW, ON4ADC, ON4AEF, ON4AJZ, ON4ALC, ON4ALC, ON4ALW, ON4AMI, ON4ANT, ON4ANV, ON4ASB, ON4AWU, ON4DB, ON4GG, ON4VT, ON4WW, ON5DH, ON5GQ, ON5OT, ON5UM, ON6BY, ON6EV, ON6MR, ON6VK, ON6WU, ON7BD, ON7SF, ON7TK, ON7UN. **PU4B:** PY4AEJ, PY4BA, PY4BHB, PY4JDS, PY4OY. **SN60:** SP6DVP, SP6GCU, SP6IHE, SP6OJK, SP6LUV, SP6SNT, SP6TTQ, SP230/OP. **W6EEN:** W6EEN, K6XC, K16CS. **WK4Y:** WK4Y, WA4PGM, W4DR, WB3D, KD4HEL, KC4URI, K04MF, W4RNP, WA4DAI, KN4XJ, W4MYA. **WZ1R:** WZ1R, KB1H, WM1K, KM3T, WA1HYN, N1AGU, AK1N, KA1IG, KB1KA, KD1GG. **WZ6Z:** N3AHA, K3EST, W6QHS, KK6QM, W6RGG, N6RO, N6TV, WZ6Z, W0ZZ.

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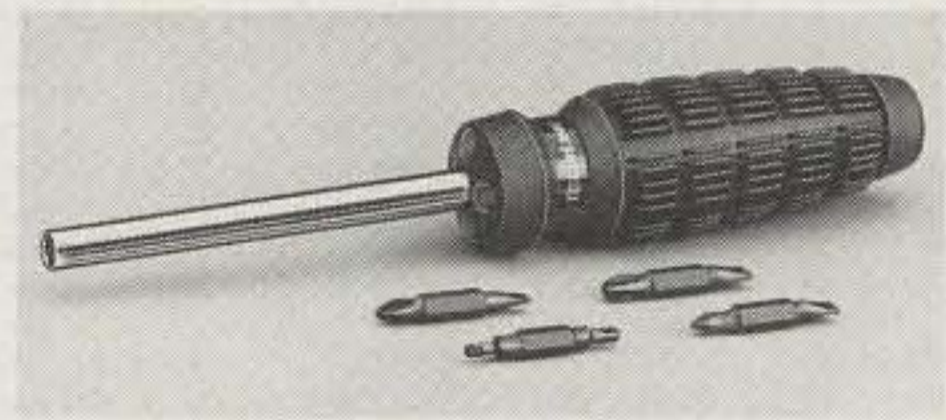
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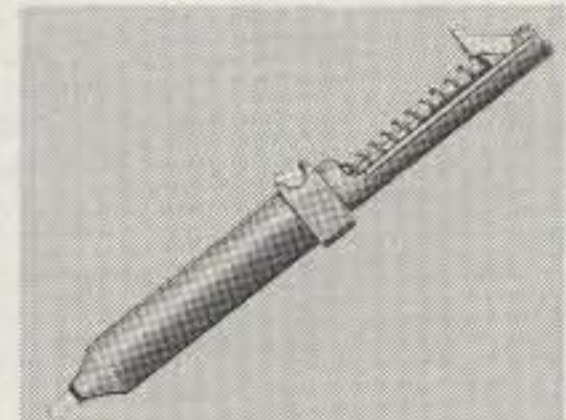
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### SSB RESULTS QRP/p SECTION WORLDWIDE

HIS00A	A	2,651,944	1955	584
KR2Q	A	1,269,960	926	557
KY5N	A	845,598	766	481
DL1YAW	A	697,544	677	446
WB6JMS	A	438,426	554	353
N6YKL	"	420,948	632	396
5Y4FO	A	407,056	456	304
WT3W	A	382,800	479	348
N1AFC	A	362,729	473	323
LZ2BE	A	350,436	541	318
HA7YS	A	335,016	575	324
WK6V	"	319,361	469	301
KB3TS	"	300,440	397	296
UW8ST	A	271,420	451	331
UB5VAP	A	269,312	518	263
IK1GKE	A	212,325	396	285
N7RWH	A	205,452	379	234
OH5NHI	A	157,617	242	211
I8BYG	"	138,532	370	236
UV3DCR	A	129,250	408	235
IO8KHP	A	102,752	252	208
PA2PDN	A	96,330	279	195
SP5UAF	A	93,181	282	197
YO4RDN	A	73,566	280	183
JE7DOT	A	68,376	187	148
P40Z	A	49,377	151	109
AL7MK	A	39,270	178	119
UA9FJF	A	24,444	98	84
G4MET	A	24,282	133	114
N8AXA	A	17,928	85	72
JH3AKD	"	17,100	85	76
OK2SBJ	A	8,024	73	68
YO4CBT	"	6,262	66	62
XE2HWB	A	3,440	29	28
KE2JO/4	28	249,275	389	295
JF3EIU	28	173,817	301	217
KB9ABI/T	28	93,670	225	190
WA6FGV	28	52,796	354	197
KJ6MW	"	46,410	195	170
SP4GFG	28	33,855	130	111
WB8IWG	28	32,639	142	127
JT1BY	28	29,458	143	103
VE7EKS	28	29,224	115	104
N2LSJ	28	24,552	102	93
KA1CZF	28	24,012	128	116
KD4EDP	"	21,432	101	94
K7EAU	28	3,944	64	58
UB5LXB	28	648	18	18
KB50NY	28	420	16	15
RW9AB	21	638,392	598	398
KS9U	21	262,350	385	318
DU1CHD/6	21	189,224	309	217
JJ2QXI	"	170,100	303	243
K9JS	"	121,746	252	206
RA3DQP	21	39,604	157	129
VE6SH	21	25,441	110	103
OH2MPO	21	24,840	123	108
SP2UUU	21	6,808	64	46
J14WHS	"	1,512	26	24
PA3CAL	21	1,500	26	25
JE8UHY	"	176	8	8
K5HD	14	214,118	360	302
UB4JHE	14	116,560	493	155
OK3CPY	14	65,156	231	174
LY2PP	14	52,839	217	171
K9OSH	14	38,503	150	139
SM8DZH	14	36,494	162	142
SP4SKW	14	12,670	158	70
EA3BCU	14	4,536	58	56
K7UR	7	36,740	126	110
W8QZA	7	900	26	25
JG7LBN	7	18	3	3
YB2OK	3.7	6,750	49	45

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KM1H	A	7,854,840	3259	945
AD1C	A	4,126,650	2190	825
N1HRA	"	609,598	771	458
W0IP	"	509,201	605	389
W1KRS	"	390,089	419	419
WA1EHK	"	208,172	353	284
W1XN	21	265,670	373	310
WK1P	"	6,498	61	57
AA1AA	14	1,492,344	1188	567
K1KJT	14	1,000,395	888	473
ND1W	7	41,356	108	98
*N1H00	A	1,195,110	1005	542
*WS1A	"	736,644	747	471
*WIENZ	"	71,050	196	175

*AE1D	"	2,050	57	50
*N1FUS	28	45,738	154	126
*KA10EO	"	34,408	165	136
*N1LOO	"	14,157	110	99
*WA1VRD	"	13,400	80	67
*KA1PRD	"	7,810	81	71
*KA1QVK	"	1,472	34	32
*WS10	14	22,440	110	102

AA2GQ	A	3,882,750	2020	775
K2PS	A	2,075,520	1290	640
KY2J	A	1,646,620	1156	580
KD2YP	"	764,175	685	443
KE2ZU	"	702,868	636	398
N2BJX	"	567,378	640	342
WB2UMF	"	419,121	520	361
KB2HUN	"	270,432	425	313
NA2M	"	225,776	339	274
KD2BW	"	69,156	185	153
WA2UDT	"	41,151	154	129
W2FXA	"	31,458	112	107
W2FGY	"	3,234	36	33
WA2FUZ	28	94,348	241	206
KA2AEV	21	4,278,888	2241	804
WY2E	14	240,024	388	292
K1ZM	3.7	1,266,844	1087	422
WW2Y	3.7	553,468	816	358
K2ONP	"	14,774	114	83
*K2PDF	A	1,079,884	906	494
*KF20	A	967,978	805	506
*N2WK	"	354,008	441	323
*NA2A	"	293,880	489	316
*NA2K	"	166,599	401	148
*NA2Q	"	146,464	266	199
*W2OMV	"	141,616	281	212
*KE2SU	"	122,901	249	213
*WV2B	"	93,660	275	210
*WA2LBT	"	89,199	221	159
*WM2U	"	80,608	243	176
*WB2MRX	"	78,050	213	175
*N2LET	"	58,800	147	140
*KF2GP	"	34,104	116	116
*N2KYP	"	934	34	33
*W2KZE	28	74,916	193	162
*N2LDU/T	28	43,632	175	144
*KA2AWE	"	21,888	135	114
*N2MBM	"	12,901	97	97
*WD2AJS/T	"	4,840	60	55
*N2KMJ/AE	1.8	300	25	25

K3Z0	A	3,591,040	1907	724
KA3DSW	A	604,920	666	426
WR3G	"	508,442	578	382
AA3B	"	111,494	270	214
KF5LD	"	47,034	136	117
W3FOE	"	33,696	113	108
K2DF/3	"	21,068	99	92
K3WW	"	5,166	45	41
WB2BZR/3/T	28	78,822	174	151
K3ND	"	64,680	177	154
N3GB	21	1,531,305	1126	597
W9XR	"	193,842	317	267
NK3U	"	115,856	230	208
WE3C	3.7	536,514	719	363
WT30	1.8	17,280	226	135
*WW3S	A	173,520	299	240
*KA3AVB	"	38,534	185	151
*KA3LCF	"	13,140	78	73
*KS3F	28	871,145	1264	517
*W3CPB	"	4,500	46	45
*N3KIP/AA	"	1,827	63	29
*KA3VYN	14	23,793	114	103

WZ4F	A	3,073,726	1866	694
N6AR	A	2,560,950	1624	630
K4VUD	A	2,355,712	1734	688
KA4RRU	"	1,964,996	1290	629
A12C	"	1,326,438	1024	531
AB4RU	"	1,316,486	1065	538
W4WKQ	"	822,173	837	451
N4BNO	"	402,039	484	341
W4OGG	"	37,605	150	115
W4VC	"	34,001	145	121
KD4CCV/AA	"	30,030	117	105
WK4F	"	11,718	65	62
KD4QW	28	2,828,120	1869	680
WB4KRH	28	1,382,832	1100	582
KC4TIR/T	28	529,452	569	396
WA4QMQ	"	266,272	363	314
N4MO	21	1,291,290	978	546
W4TMN	7	2,992	24	22
AA4MM	1.8	14,364	200	114
*KJ4TI	A	615,750	612	375
*WB4BVY	A	428,740	521	340
*AB4KL	"	209,056	368	277
*W4WJJ	"	168,920	285	205
*W4DEC	"	162,279	305	219
*KN4QV	"	74,800	203	170
*AC4HF	"	23,387	100	91
*WA8WAW/4	"	23,051	100	89
*KB4WNY	"	21,976	99	82
*W4UYC	"	9,858	76	53
*W4TWO	"	6,278	80	73
*KD4FNA/T	28	199,364	307	253
*KC4GFW/T	"	116,645	250	520
*KB4BBC/T	"	47,600	162	136
*KC4URW	"	26,620	100	95
*K4NNO	"	9,834	70	66

*W9HNI	14	25,056	116	108
*KA1UJ/4	"	18,281	115	101
W5KFT	A	2,826,967	1750	689
K5NW	A	1,267,362	1159	543
K5LP	"	579,582	607	351
WK1V	"	308,160	762	360
KF5DA	"	150,178	333	238
KC5AC	"	35,659	219	184
KD5GD	"	21,924	143	116
WU3V	28	2,709,850	2113	758
(Op. W5WUW)				
K5TSQ	28	1,081,694	1198	557
WF5E	"	431,034	752	398
K5MR	21	4,443,048	2362	828
AA5WQ	14	1,029,600	1087	585
N5RZ	7	1,043,316	947	397
AA5IB	"	432	9	9
*WB5NXH	A	2,423,284	1781	683
(Op. W5VZL)				
*KA5W	"	265,644	391	314
*W8VX	"	103,788	238	186
*WK5K	"	72,254	240	182
*KE5FI	28	1,301,880	1373	570
*W85RUS/T	28	227,154	428	289
*KG5EN	"	144,918	302	249
*NSXGS	21	89,044	261	226

NU6S	A	4,667,208	2507	728
K6HNZ	A	3,115,420	2133	748
N6EK	A	2,365,362	1716	558
K16CG	"	2,278,476	1643	657
KS6H	"	1,236,257	1478	601
AE6Y	"	1,053,522	1117	547
WA6UFY	"	660,436	706	412
W7CB	"	367,092	472	309
KK6XN	"	342,912	475	304
N6IP	"	341,553	511	257
K6NY	"	177,372	329	234
KD6QK	"	175,500	365	250
WA5VGI	"	170,183	338	247
W6HAL	"	118,080	263	192
AA6EE	"	40,552	157	137
NF6R	"	33,792	77	64
AD6E	"	32,450	123	110
NY6Y	"	27,354	106	94
KI6VY	"	10,890	72	66
K6LRN	"	120	10	9
AG6D	28	631,350	1081	450
KH6DW/KS6	"	576,343	1281	443
WB6NFO	"	86,436	246	196
WN4KKN/6	21	4,538,050	2370	814
W6TKF	"	405,764	536	361
N6WR	14	130,680	270	242
KU6T	"	21,056	100	94
K6KM	"	6,026	49	46
W6CN	3.7	16,560	103	92
*K6GAR	A	193,772	374	251
*K6ZCL	"	69,280	235	160
*N6FN	"	46,800	176	150
*WA6NOL	"	18,881	92	79
*W6UQF	28	519,659	986	427
*WB6CJE	"	401,103	687	369
*KJ6HO	"	297,440	468	352
*W6PYX	"	238,700	682	341
*N6EE	"			



ED8DM	A	2,337,561	1339	537	JH1HGC	3.7	105,896	183	124	RA0BR	"	384,910	603	305	*DL5APW	"	117,362	290	202	<b>ESTONIA</b>																																		
EA88GY	14	1,001,900	779	430	JA2DLM	"	2,806	25	23	RV0AR	28	1,435,632	1101	528	*DJ10J	"	107,666	225	202	ES1CN	28	9,584	72	64																														
EA8TH	3.7	15,582	50	49	JA9DOF	"	1,360	19	17	UA0SR	"	218,193	421	257	*DL2JAA	"	105,534	261	198	*ESRST	28	29,694	135	101																														
*EA8BWW	A	3,387,412	1817	622	*JF1SEK	A	2,779,975	1616	605	EZ9MA	A	3,798,406	2000	733	*DL6ZFG	"	92,232	230	189	<b>FRANCE</b>																																		
*EA8BXQ	"	49,623	137	119	*JL1MWI	A	718,016	689	416	UA9QA	"	1,829,940	1250	484	*DF2KD	"	89,012	256	187	F66AQJ	A	1,474,378	1178	526																														
<b>CUETA</b>																				*7K2HWI/3	A	593,816	607	374	UA9QA	28	641,985	823	381	*Y47VN	"	88,800	227	200	F6HLC	A	115,786	268	209															
<b>CENTRAL AFRICAN REPUBLIC</b>																				*JR4GPA	"	578,295	591	355	UA9QA	"	159,745	272	215	*Y38YE	"	62,266	210	163	F6FUN	"	113,490	225	194															
EA9LZ	7	4,721,924	1413	562	*JH1UUT	"	531,468	568	342	UZ9YXI	"	(Op. Eugen)	*Y42VN	"	49,700	185	142	FE1DMY	"	18,156	106	102																																
<b>BURKINA FASO</b>																				*JQ3PHB	"	513,546	564	341	UZ9YXI	"	(Op. Polyakov)	UW9AG	21	2,549,180	1462	647	*Y67UL	"	38,988	245	171	FB1MUX	28	713,780	728	401												
*XT2BW	A	1,617,000	1180	462	*JA0BMS/1	"	404,300	485	325	UZ9CWZ	"	806,500	709	424	*Y22NF	"	32,625	133	125	TM4C	21	343,674	537	313																														
<b>ZIMBABWE</b>																				*7L1JHN	"	315,360	422	270	UZ9FVW	14	1,120,381	871	479	(Op. UA9FOY)	*DL7DE	"	31,360	129	128	<b>SPAIN</b>																		
Z21BL	28	3,905,370	2151	630	*JA4DUD	"	266,181	369	249	*UA9YRN	28	1,386	22	21	*DL8EAQ	"	13,816	100	88	F9JS	"	84,730	204	185																														
<b>REPUBLIC OF SOUTH AFRICA</b>																				*7M1MCT	"	264,687	377	249	*UA9YRN	21	83,076	184	161	*Y35WF	"	13,680	87	80	F2EE	14	4,418,812	2334	862															
ZS500A	A	5,318,378	2334	767	*JA1BUI	"	214,760	319	260	*UA9XEN	"	76,356	151	134	*Y43WB	"	12,087	94	79	F1LBL	"	1,395,968	1188	608																														
ZS6AXF	A	1,517,274	1080	474	*JA20J	"	207,120	319	240	<b>GEORGIA</b>										*DL1RTL	"	8,250	60	55	F1NBX	3.7	205,422	355	219																									
ZS6WPX	28	4,959,465	2247	745	*JA1UWB	"	204,085	309	245	<b>ARMENIA</b>										*Y240N	"	1,184	35	16	F6BVB	"	102,304	277	184																									
<b>ASIA</b>																				*JH2WHS	"	182,736	335	216	<b>UZBEKISTAN</b>										*DL3HWW	"	5,445	48	45	*F8WE	A	792,048	969	464										
<b>ISRAEL</b>																				*JA3JOT	"	163,835	274	217	<b>KAZAKHSTAN</b>										*DL6UBZ	"	3,168	37	36	*FD1RAY	A	670,136	701	422										
4X4VF	28	9,570	110	87	*7K2MPA/1	"	153,296	222	208	<b>EUROPE</b>										*DL3BRA	21	29,639	120	107	*F2AR	"	442,309	602	353																									
*4X/AA4KD	A	90,592	208	149	*JL2HUJ	"	135,014	274	187	<b>PORTUGAL</b>										*DJ0AD	14	221,936	447	286	*FD1RDS	"	174,798	372	249																									
<b>MALDIVES</b>																				*JA5EO	"	74,550	193	142	<b>GERMANY</b>										*DJ0MW	"	108,052	260	227	*F1JDG	"	136,840	299	220										
*807PA	A	661,050	698	339	*JR1MRG	"	65,659	200	127	<b>GERMANY</b>										*Y31NB	"	12,420	99	90	*FD1PYI	"	22,179	101	96																									
<b>KUWAIT</b>																				*JA9GHC	"	62,411	163	139	<b>GERMANY</b>										*DJ2YE	7	24,610	115	107	*F1SHQ	"	19,306	105	98										
9K2WR	A	6,393,089	2979	739	*JG3NKP	"	34,344	115	108	<b>GERMANY</b>										<b>ENGLAND</b>										*FE10GG	"	9,016	65	56																				
<b>TAIWAN</b>																				*JA1AB	"	27,600	110	92	<b>GERMANY</b>										<b>ENGLAND</b>										*FE1JND	"	8,103	77	73					
BV2CR	A	1,038,978	880	394	*JA1IT	"	20,303	91	79	<b>GERMANY</b>										<b>ENGLAND</b>										*FD1SDA	28	26,220	115	92																				
BV2WA	A	856,863	961	441	*JA1BNW	"	15,264	78	72	<b>GERMANY</b>										<b>ENGLAND</b>										*FE6FNA	14	105,792	308	228																				
*JP1RIW	21	137,995	562	193	*7L1FPU	"	14,427	95	63	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
/BV	21	137,995	562	193	*JF5OVU	"	13,650	80	70	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>CHINA</b>																				*JH1VES	"	13,130	68	65	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
8Y8AC	A	7,167,517	2965	1057	*JH1POS	"	12,375	87	75	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*BY4BB	14	792,939	786	427	*JA1VLA	"	10,647	66	63	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>KOREA</b>																				*JE3UHV	"	5,528	46	42	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
HL0B	A	369,050	579	305	*JR3XUW	"	3,811	40	37	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*HL9RW	A	904,608	900	432	*JA2GHP	"	3,465	37	35	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*HL5AP	28	129,908	246	188	*JG1BPS	"	3,296	37	32	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>SAUDI ARABIA</b>																				*JE6GIQ	"	2,366	27	26	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
7Z2AB	A	9,177,296	3828	809	*7M1MCY	"	2,132	30	26	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>JAPAN</b>																				*JA0GZ	"	1,917	27	27	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
JA8RUZ	A	4,728,464	2304	716	*JA3TBT	"	1,508	51	25	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JA8RWU	A	4,641,119	2232	731	*7N1IUH	"	1,475	26	25	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JH4UHW	A	3,986,571	2155	669	*J17WV	"	448	15	14	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JH2UVL	"	3,664,563	1921	679	*JA1STY	"	341	11	11	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JH1AEP	"	3,009,207	1742	501	*JG1EGG	28	3,276,396	1865	621	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JR3NZC	"	2,569,280	1541	592	*JE4VVM	28	2,427,858	1544	558	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
JA9YAV	"	1,358,280	1000	495	*JE7JZC	28	1,122,317	861	469	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>WALES</b>																				*JF3PLF	"	133,920	295	160	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
HA7TM	"	698,625	621	375	*JA6EFT	"	121,600	230	190	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
HA5MY	21	490,400	610	400	*JE2IFM/1	"	65,376	162	144	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
HA4FF	14	192,960	443	288	*JA6ODU	"	58,590	158	135	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
HA9BVK	7	870,480	768	390	*JR7LVK	"	55,900	160	130	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>ITALY</b>																				*JG1TVK	"	37,510	132	110	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
IK4QIB	A	280,875	571	321	*JG1RDV	"	31,800	109	100	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK7NYU	A	211,888	490	323	*JE0BTL	"	27,170	103	95	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK30YU	"	187,380	322	270	*JA1VJL	"	24,440	95	94	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK0SMM	"	45,144	161	152	*JA4NQD	"	22,654	104	94	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK7QHS	"	29,127	136	133	*JA7HNJ	"	21,465	93	81	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
I2FUM	"	2,508	40	38	*JA1AAT	"	20,680	111	94	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IIONU	"	312	12	12	*JR4CAU	"	18,150	165	110	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IO4AUM	28	1,303,500	1089	500	*7N1HFK	"	8,162	58	53	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IN3QBR	28	1,266,783	970	537	*JA1XPU	"	5,461	49	43	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IV3BMV	"	241,230	366	255	*JH1PXY	"	1,848	27	24	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK1LBL	21	1,168,886	957	527	*JE00QQ	"	1,820	28	26	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK5ACO	"	879,186	831	462	*JH1NXU	"	435	15	15	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK0JMS	"	180,880	330	272	*JA7ZWD	21	864,300	748	430	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK0KV	"	156,894	293	237	(Op. JA7HOK)	"	349,692	466	322	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IR8A	14	4,789,024	2583	872	*JM6VWR	"	28,576	126	94	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>BALEARIC IS.</b>																				*JK2HDC	"	22,695	97	89	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
IV3GKE	14	1,602,912	1189	566	*JF2PXB	"	19,035	100	81	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IK6CNM	"	1,100,520	1097	540	*JF1FYC	"	16,796	85	76	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
I23A	7	2,093,624	1212	533	*JA4DHN	"	15,466	79	74	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IV3NVN	"	66,992	177	158	*JA2ONH	"	14,336	131	112	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
IG8R	3.7	320,902	520	312	*JF2MQX	"	10,899	75	63	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
<b>IRELAND</b>																				*J01LDY	"	9,396	67	58	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>									
IK0DOWN	"	258,544	430	286	*JR3KAH	"	6,600	59	50	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IB8YQV	A	813,312	639	384	*JE0DUA	"	6,533	57	47	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK8NSR	A	217,872	388	272	*JA2PEI	"	4,982	57	47	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK00QDB	"	146,370	310	238	*JG1TVC	"	4,536	47	42	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK80DA	"	67,712	232	184	*JE8UZG	"	4,257	45	43	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK8IFW	"	44,250	193	150	*JA3FZI	"	3,818	62	23	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK5RUR	"	43,397	177	153	*JA1JLP	"	3,072	32	32	<b>GERMANY</b>										<b>ENGLAND</b>										<b>SCOTLAND</b>																								
*IK3SCB	"	7,482	63	42	*J01MCC	"	2,880	35	32	<b>GERMANY</b>										<b></b>																																		



<b>SARDINIA</b>			<b>CZECHOSLOVAKIA</b>			<b>BYELORUSSIA</b>			<b>FED. REP. OF MICRONESIA</b>					
*ISBLDT	A	2,212 62 53	OM5R	A	6,438,872 2867 836 (Op. OK1ALW)	SP8TQ	A	272,720 472 280	*UC2WDX	21	53,582 174 146	V630M	21	144,144 342 143
<b>SICILY</b>			OK1KZ	A	504,992 687 367	SP9AGS	..	195,500 436 250	*UC2AAQ	14	4,176 49 48	V63YM	..	1,575 25 21
IU9A	28	5,383,770 2844 827 (Op. IT9GSF)	OK1ALQ	A	150,336 310 232	SP7MGO	..	107,604 300 196	*UC2CEO	1.8	2,958 61 51	<b>AUSTRALIA</b>		
IU9S	7	1,256,280 985 435 (Op. IT98LB)	OK1DLA	28	163,200 284 240	SP7VW	..	23,560 112 95	<b>KARELIA</b>			VK3TZ	A	2,234,804 1356 572
<b>NORWAY</b>			OK1TW	..	68,856 175 152	SP4AVG	..	16,254 104 86	<b>LATVIA</b>			VK5GN	A	1,382,745 1001 455
LA9WD	A	1,312,578 845 446	OK3YEB	..	51,600 149 129	SP3JYA	..	11,418 73 66	<b>YU1WW</b>			VK3HZ	..	223,776 345 224
LA4RJ	A	656,580 499 310	OK3CSQ	..	36,580 124 118	SP9DGO/a	..	1,827 28 21	<b>Y04A</b>			VK2ARJ	28	1,444,285 1137 437
LA6BBA	..	307,744 632 326	OK2BHM	..	34,320 126 110	SP5IVC	28	751,530 747 410	<b>Y09FLD</b>			VK5PMC	28	136,170 267 170
LA4KGA	..	156,816 382 242	OK3C8U	3.7	523,488 620 328	SP6ECA	..	400,788 497 324	<b>Y03JF</b>			VK3SM	14	103,964 200 188
LA8DY	..	129,150 323 225	*OK2HI	A	187,680 478 230	SP4PBI	..	12,710 80 62	<b>Y07LCX</b>			VK3DZM	3.7	33,024 86 64
LA7SI	..	28,815 125 113	*OK2BPO	A	123,579 257 199	SP4SHD	..	7,579 60 53	<b>Y08BFB</b>			*VK2AYK	A	481,824 493 336
LA2IJ	..	5,978 50 49	*OK3IA	..	94,622 248 187	SP2EIV	..	3,762 41 38	<b>Y04BEX</b>			*VK7ST	..	102,375 210 175
LA1PHA	28	13,398 86 77	*OK3YCA	..	47,328 163 136 (Op. Alexander)	SP7HKK	..	103,389 307 143	<b>Y09AGI</b>			<b>HONG KONG</b>		
LA2IR	14	215,784 458 296	*OK1FKV	..	25,850 144 110	SP8FHK	..	119,966 259 209	<b>Y04BEX</b>			VS6BG	21	775,935 1106 401 (Op. KB7G)
LA2WIA	..	7,560 66 63	*OK2BDI	..	7,000 52 50	SP4AS	..	103,944 251 183	<b>Y08RTR</b>			<b>INDONESIA</b>		
*LA9CQ	A	160,024 356 241	*OK2SWD	..	4,312 51 44	SP7VCO	..	103,389 307 143	<b>Y08RTR</b>			8A2DX	28	3,613,030 2025 610 (Op. YB2FRR)
*LA2AD	..	46,565 175 139	*OK3CAP	28	149,688 284 216	SP3DIK	..	29,304 155 88	<b>Y08RTR</b>			YC1TPF	21	188,640 364 240
*LA1KQ	..	27,192 216 88	*OK3TEG	..	69,384 189 147	SP9KGG	..	17,056 152 52	<b>Y08RTR</b>			YB0ASC	..	62,660 180 130
*LA20DA	..	15,150 79 75	*OK1AJN	..	22,420 101 95	SP8HXN	14	13,650 100 91	<b>Y08RTR</b>			YB1DYB	..	23,504 160 52
*LA3WEA	..	13,040 101 80	*OK2TBC	21	431,940 553 345	SP5SSN	7	499,200 621 323	<b>Y08RTR</b>			*YB2ARQ	28	2,155,766 1399 538
*LA6LHA	..	7,050 50 47	*OK2PCL	..	46,632 138 116	SP5ALP	3.7	90,528 259 164	<b>Y08RTR</b>			*YB30SE	28	2,055,000 1270 548
*LA9HFA	21	36,720 167 135	*OK2TH	..	24,983 145 83	*SP3SLA	A	566,832 729 392	<b>Y08RTR</b>			*YB8VM	..	566,145 562 345
*LA9GY	14	1,008 26 24	*OK1ARI	14	470,592 656 387	*SP7PRO	A	340,964 531 316	<b>Y08RTR</b>			*YC1BGI	..	33,046 140 82
<b>LUXEMBOURG</b>			*OK3YK	..	165,540 356 267	*SP7LZD	..	298,602 452 318	<b>Y08RTR</b>			*YC7BVY	21	246,431 324 263
LX1GQ	A	2,176,380 1099 535	*OK1JDU	..	78,516 283 193	*SP1E0I	..	231,288 362 276	<b>Y08RTR</b>			*YC2PSJ	..	9,790 72 55
LX1RQ	14	238,854 332 242	*OK1JJB	3.7	89,095 217 173	*SP7FQI	..	210,547 371 311	<b>Y08RTR</b>			<b>NEW ZEALAND</b>		
<b>LITHUANIA</b>			ON4UN	A	4,305,780 1921 684	*SP6DWB	..	76,050 276 169	<b>Y08RTR</b>			ZL4NF	A	998,477 814 419
LY3BU	A	1,185,543 1000 513	ON9CJM	..	108,069 203 163 (Op. WQ2M)	*SP8FJH	..	65,689 230 163	<b>Y08RTR</b>			ZL2ACP	28	3,235,440 1767 624
LY2BNC	A	648,405 797 405	ON4AGA	28	248,500 404 284	*SP7RFF	..	58,764 205 166	<b>Y08RTR</b>			*ZL1IM	..	191,490 351 195
LY2OM	..	272,688 422 276	*ON5EU	A	20,604 111 101	*SP6DAY	..	39,690 182 135	<b>Y08RTR</b>			*ZL2AH	A	48,645 142 115
LY3BS	..	157,131 285 221	*ON5SV	28	2,494 34 29	*SP5CHJ	..	38,955 204 105	<b>Y08RTR</b>			<b>SOUTH AMERICA</b>		
LY3BA	..	31,780 171 140	*ON4XG	21	94,478 226 194	*SP3COP	..	33,702 133 123	<b>Y08RTR</b>			<b>GUYANA</b>		
LY1KAT	..	19,046 100 89	*ON7CC	..	22,058 126 82	*SP5AZQ	..	29,376 121 102	<b>Y08RTR</b>			<b>CHILE</b>		
LY2WW	21	2,426,872 1522 604 (Op. LY2BIJ)	OY9JD	A	2,370,116 1744 658	*SP9LDP	..	17,172 93 81	<b>Y08RTR</b>			<b>BOLIVIA</b>		
LY2BJB	..	617,839 668 359	<b>DENMARK</b>			*SP7LHZ	..	2,638 82 55	<b>Y08RTR</b>			<b>*CP1AA</b>		
LY2BOC	..	33,805 131 105	OZ5EV	A	1,367,520 960 592	*SP7LHX	..	2,016 52 24	<b>Y08RTR</b>			<b>(Op. CP1BA)</b>		
LY1VV	..	16,517 98 83	OZ1KQP	..	127,440 302 216	*SP1RKM	..	221 13 13	<b>Y08RTR</b>			<b>ECUADOR</b>		
LY4W	14	1,486,874 1225 601 (Op. LY2BMW)	OZ1INN	21	279,770 424 277	*SP8CEJ	..	0 173 0	<b>Y08RTR</b>			<b>HD8T</b>		
LY2BN	..	527,922 815 417	OZ2ZZZ	..	161,674 316 229	*SP6AGD	28	38,678 139 111	<b>Y08RTR</b>			<b>(Op. HC10T)</b>		
LY1CJ	..	167,301 354 261	OZ1HXQ	..	149,574 258 194	*SP9KZ	..	20,726 99 86	<b>Y08RTR</b>			<b>GALAPAGOS IS.</b>		
*LY1DR	A	236,022 508 283	OZ1IZB	..	2,590 40 35	*SP5YQ	21	75,735 198 165	<b>Y08RTR</b>			<b>HC8A</b>		
*LY1DC	14	60 6 6	*OZ5ABD	A	171,900 246 191	*SP6FXF	..	34,960 145 115	<b>Y08RTR</b>			<b>(Op. N6KT)</b>		
<b>BULGARIA</b>			*OZ1ACB	..	144,995 309 235	*SP9EWM	..	30,591 136 103	<b>Y08RTR</b>			<b>COLOMBIA</b>		
LZ3YY	A	1,038,768 1325 456	*OZ1ASP	..	24,786 120 102	*SP9RED	..	24,070 128 83	<b>Y08RTR</b>			<b>*HK7MQC</b>		
LZ2KRU	21	2,395,396 1526 674 (Op. LZ2PP)	*OZ5EDR	..	1,600 26 25	*SP3GRQ	..	22,088 100 88	<b>Y08RTR</b>			<b>A 191,744 274 224</b>		
LZ1BJ	..	901,380 888 498	*OZ4IA	28	1,034 25 22	*SP3SLB	..	13,650 113 50	<b>Y08RTR</b>			<b>14 440,960 486 320</b>		
LZ5W	14	5,671,509 2635 883 (Op. LZ3ZZ)	*OZ1LTB	21	291,601 426 289	*SP4LXE	..	13,064 87 71	<b>Y08RTR</b>			<b>3.7 92,352 141 111</b>		
LZ1RN	3.7	36,400 152 104	*OZ8KV	..	10,074 92 69	*SP2AHD	14	73,000 254 200	<b>Y08RTR</b>			<b>ARGENTINA</b>		
*LZ2GS	28	33,220 121 110	*OZ4NA	14	4,914 55 54	*SP2FOV	..	72,443 413 131	<b>Y08RTR</b>			<b>L2Q</b>		
*LZ3YW	14	19,516 136 119	*OZ6ZH	..	1,560 25 24	*SP5NHQ	..	31,524 170 142	<b>Y08RTR</b>			<b>28 2,250,848 1531 496 (Op. LU2QC)</b>		
<b>AUSTRIA</b>			*OZ7GF	..	1,071 21 17	*SP6DHH	..	19,380 148 114	<b>Y08RTR</b>			<b>LU5MA</b>		
OE1RGG	A	553,800 508 325	*OZ3SK	1.8	55,968 208 132	*SP8UFB	..	14,100 97 75	<b>Y08RTR</b>			<b>.. 6,432 48 48</b>		
OE5SPW	..	108,480 226 192	<b>THE NETHERLANDS</b>			*SP9IKN	..	4,454 77 34	<b>Y08RTR</b>			<b>LU1MFK</b>		
OE1WWL	..	5,684 50 49	PAB1JM	A	2,650,025 1830 665	*SP9MDY	7	242 11 11	<b>Y08RTR</b>			<b>14 2,963,250 1527 675 (Op. LU9FDG)</b>		
OE6ND	14	79,560 265 204	PABKDM	A	103,935 265 195	<b>GREECE</b>			<b>Y08RTR</b>			<b>LU1DF</b>		
*OE6CLD	A	622,215 716 419	PA2GER	..	96,831 342 203	<b>RUSSIA</b>			<b>Y08RTR</b>			<b>*LU5ER</b>		
*OE1WEU	14	754 29 26	PA2KHS	..	34,650 135 110	<b>ALBANIA</b>			<b>Y08RTR</b>			<b>A 2,091,672 1281 556</b>		
<b>FINLAND</b>			PA8DOM	..	27,664 117 104	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>*LU2NI</b>		
OH5NQ	A	6,718,880 2976 857 (Op. OH1WZ)	PI4TUE	28	798,648 800 428 (Op. PA3EZL)	<b>THE PHILIPPINES</b>			<b>Y08RTR</b>			<b>A 1,595,744 1031 532</b>		
OG6YF	A	3,804,368 2178 752	PABYN	..	5,590 50 43	<b>ALBANIA</b>			<b>Y08RTR</b>			<b>*LU7MAO</b>		
OG8LQ	A	3,331,632 2273 744	PA3FNE	21	309,852 432 302	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>.. 23,622 105 93</b>		
OG30J	..	1,663,760 1524 560	*PA2SWL	A	146,060 322 218	<b>THE PHILIPPINES</b>			<b>Y08RTR</b>			<b>*LU1NFF</b>		
OH7MQF	..	396,033 540 363	*PA3ELD	..	27,126 111 99	<b>ALBANIA</b>			<b>Y08RTR</b>			<b>28 388,375 490 325</b>		
OH3BY/2	..	3 1 1	*PBBALN	28	4,671 63 29	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>PERU</b>		
OH6RM	28	1,450,790 1205 545	*PA2ALF	14	13,034 117 98	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>OA4ZV</b>		
OH400	..	58,855 188 149	*PA3BNH	..	5,762 78 67	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>28 1,797,160 1232 502 (Op. OA4ANR)</b>		
OG7NRW	..	58,520 204 154	<b>SWEDEN</b>			<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>*4T8DX</b>		
OG6NIO	21	3,567,148 1965 724	SM7A0I	A	610,416 527 324	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>A 1,108,480 1227 433 (Op. OA8DX)</b>		
OG8VJ	21	3,136,005 1840 681	SM7DXQ	A	215,055 300 243	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>ARUBA</b>		
OH5LLR	3.7	73,790 234 157	SM7AIL	..	65,010 200 165	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>P49V</b>		
*OH6SU	A	199,983 348 267	SM5AAY	..	33,840 136 120	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>A 18,592,475 5923 1025 (Op. A16V)</b>		
*OG7NW	..	80,660 245 185	SM6BJ	28	840,802 796 478	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>NETHERLANDS ANTILLES</b>		
*OH7WV	..	68,880 209 164	SM4BTF	..	23,862 110 97	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>PJ9Y</b>		
*OH6OP	..	50,127 200 147	SM0HBV	..	2,028 26 26	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>A 13,618,143 4677 903 (Op. OH6XY)</b>		
*OG2BRH	..	1,972 37 34	SM7HSP	21	6,273 55 51	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>BRAZIL</b>		
*OH6MPJ	28	17,391 115 93	SM2EKM	14	876,150 1040 495	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>PRBR</b>		
*OH6MUE	..	11,856 92 76	SM5ARL	..	296,425 442 355	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>.. 34,048 120 112</b>		
*OH2MDC	..	4,797 42 39	SM6AHU	..	38,442 175 149	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>			<b>ZW5B</b>		
*OH2BUU	21	199,430 344 259	SM5ARR	7	1,950 25 25	<b>WESTERN SAMOA</b>			<b>Y08RTR</b>					





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 FL-52A 500 Hz CW filter (2nd IF)..... 124.00 114<sup>95</sup>  
 FL-53A 250 Hz CW filter (2nd IF)..... 124.00 114<sup>95</sup>  
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 UT-30 tone encoder..... 21.00



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 AH-3 Automatic antenna tuner..... 523.00 449<sup>95</sup>



IC-728 HF xcvr/SW rcvr/mic..... 1119.00 939<sup>95</sup>  
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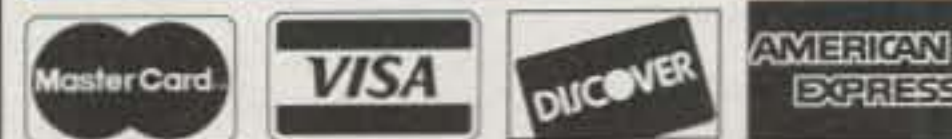
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# SAGANT ANTENNA

## Zepp Type Wire Antennas

### ZA-21K (15M)

Easy to Install  
No Tuner Required  
No Radials  
Low Angle Pattern for DX  
1000W PEP

Zepp type antennas are easy to install, have excellent performance, and all use stranded copper wire that is coated with clear vinyl. Shape of the antenna may be horizontal, sloping, or bent. ZA series come complete with matching transformer, pre-measured wire, insulators, and rope. Just connect your 50 ohm coax cable to the antenna and you're ready to operate.

Model	ZA-3.5FK	ZA-7K	ZA-14K	ZA-21K	ZA-50K
Band	3.5MHz	7MHz	14MHz	21MHz	50MHz
Length	131'	65'	32'	21'	9'

(Power Rating 1KW PEP)

### ZA-721

7/21 MHz Dual Band Zepp

This popular antenna is only 39 feet long. Highly flexible stranded copper wire is coated with clear vinyl for excellent corrosion resistance. Power is 600W PEP.

## Inverted V Wire Antennas

### MT-240XK (5 Bands)

3.5-7-14-21-28 MHz  
Efficient Loading Coils  
Overall Length 72 Feet  
1000W PEP

Inverted V wire antennas include our unique offset matching balun support which prevents interaction with the mounting mast. All V's use loading coils which are more efficient and last longer than traps. Wire is 7 stranded, annealed copper, coated with clear vinyl for flexibility and durability.

Model	Bands	Length
MT-240XK	3.5-7-14-21-28	72'
EL-40XK	3.5-7	85'
EL-140XK	7-21	42'

(Power rating 1KW PEP)

### AW-3.5 Antenna Wire

7 Strand Annealed Copper Wire  
Coated with Clear Vinyl  
Excellent Corrosion Resistance  
Flexible  
Rugged Enough for Marine Use  
30 Meter Rolls (98')



## FAMOUS Arrow Line Antenna SERIES

### AL-207F

Base  
2M/70CM  
Slim Design  
Easy to Install  
Low Radiation Angle  
Power 250W FM  
Glass Fiber Mast  
Lightweight .77 lbs.  
Length 51.1"

### AL-144F

Base  
2M  
Compact  
Easy to Install  
Low Radiation Angle  
Power 250W FM  
Glass Fiber Mast  
Weight .66 lbs.  
Length 43.3"

### AL-207FM

Mobile  
2M/70CM  
High Performance  
Low Radiation Angle  
Power 250W FM  
PL-259 Base  
Lightweight 1.2 lbs.  
Length 53.1"

### AL-144FL

Mobile  
2M  
Great Performance  
Collapsible  
Low Radiation Angle  
Power 250W FM  
PL-259 Base  
Lightweight 1.1 lbs.  
Length 55.9"

## HUMAN POWER STATIONS

Revolutionary hand operated generator. Rotation of the hand crank produces up to 15 watts of power. Never worry about dead batteries with the compact Human Power Stations. Great for portable, emergency, charging, and numerous other applications.



HPS-55

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Sagant U.S.A. P.O. Box 14000 Pinedale, CA 93650  
Tel. 209-261-1400 Fax. 209-261-0662

ZZ9A	21	10,425,920	3527	992
			(Op. PY5CC)	
ZV5A	14	7,325,685	2901	865
			(Op. PY5EG)	
PY4AQA	"	174,752	299	254
ZY1LI	"	100,050	208	174
			(Op. PY1LI)	
PY2ELZ	7	20,400	63	60
PY30C	3.7	1,804	23	22
*PW2A	A	1,805,248	1180	536
			(Op. PY2NY)	
*PY2BPY	"	237,666	387	286
*PY2EYE	28	284,700	376	260
*PY2HF	21	57,392	160	136

## FALKLANDS

*VP8CEH	A	449,500	548	290
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## VENEZUELA

4M5Y	21	2,212,770	1301	574
			(Op. YV5LAS)	
YW5N	14	2,411,520	1299	628
			(Op. YV5DTA)	
*YV1ZC	A	15,194	80	71
*4M5KWS	14	276,060	368	258
			(Op. YV5KWS)	

## PARAGUAY

ZP8Y	21	10,172,646	3715	913
			(Op. ZP5JCY)	

## MULTI-OPERATOR SINGLE TRANSMITTER UNITED STATES

WC4E	11,611,929	4645	1113
AA6TT/Ø	6,663,376	3153	874
NE8T	6,333,020	2951	895
AABU	5,639,183	2781	853
NS1M	5,384,320	2563	895
WN9P	5,089,290	2591	867
NM9H	5,055,336	2713	858
NJ1V	5,047,800	3526	895
WA6IET	4,149,769	2365	793
KJ4VH	3,680,253	2069	773
KD9ST	3,562,156	2171	793
WT2F	3,522,534	2021	753
WC5C	2,757,260	2105	755
WS9V	2,702,500	1788	734
N5NMX	2,532,425	1976	725
K15ER	2,205,404	1798	692
NC8P	2,139,529	1594	679
KC1F	1,742,400	1222	576
KB4GID	1,595,568	1329	624
W8BI	1,575,483	1339	609
NNØM	1,354,457	1124	559
W6YRA	1,073,754	1003	522
KZ1K	1,018,810	854	461
WM2V	890,930	967	530
KB9BIB	838,127	859	487
N7PIP	813,408	915	458
WB2YOF	774,574	774	482
WC8R	714,870	825	470
WV1C	708,068	746	458
N6CCL	628,256	957	464
AABA	600,710	768	430
KB8MRG	547,668	620	396
WXØV	538,892	627	398
N4YKD	515,424	569	364
WA6AUE	488,400	563	400
WA4HIW	467,342	562	362
AA5NT	378,246	611	363
KY2T	297,176	445	307
KJ6BK	295,164	524	324
KA8WAS	193,949	360	269
WR3E	174,317	335	253
K4FPF	139,650	277	210
W1BK	103,797	221	171
KC1SS	59,860	203	164
KA6ING/T	57,629	187	169
K2PF	56,742	178	147
KB2SE	52,374	149	129
N5KXI	10,030	64	59
N4XR	4,950	45	45

## NORTH AMERICA

VP2EC	24,409,580	6984	1115
TX4B	12,949,233	4788	979
VG7SZ	10,313,226	4179	882
XB9Z	10,009,980	4205	810
XA5T	7,394,504	3683	776
XE2FU	7,165,850	3892	794
KL7AF	4,095,190	1944	631
CK7K	3,776,876	2338	673
XM5MH	3,746,613	2376	663
XE1TD	2,450,980	2205	490
CG2CA	973,589	906	459
NL7DU	795,450	772	420
VE3AA	572,760	574	344
VE6AO	534,609	673	311

## ASIA

JJ3YBB	10,554,900	3976	932
JABYBY	7,634,544	3174	848
UX9C	7,335,120	3015	780
JE6ZIH	6,683,688	2917	792
HZ1AB	6,072,742	2749	722
JT1KAI	5,064,150	2422	975
UL8LWZ	4,215,787	2201	729
JA3ZKK	3,888,633	2044	679
5B5E	3,694,490	3053	646
RW9C	3,595,504	1941	659
UZ9CZO	2,939,375	1522	625
EX9X	2,625,450	1581	575
UZ9JWJ	2,260,544	1375	572
D73DX	1,602,138	1313	514
RL8DXX	1,542,000	1222	514
JM1NKT	631,400	606	385
UZ8SWG	184,194	300	243
UZ90WV	88,998	261	163
UA9XC	33,075	128	105
UZ9XWV	33,075	128	105
4X4DM	28,396	146	124

## EUROPE

TK5A	13,981,000	5282	1100
UX1A	13,881,609	5068	1197
TM5C	12,752,344	4574	1052
GB6BT	12,001,386	4337	1086
IR4T	11,364,375	4161	1045
TM2V	10,616,373	4095	999
FFØXX	10,494,536	3928	988
RT1U	9,659,146	4202	1073
EA3KU	9,404,354	3961	941
GB8LC	9,087,636	3858	916
CU2ØT	8,345,826	3764	874
DL1A	8,170,525	3356	925
PA6WPX	7,210,448	3032	952
PI4COM	7,202,874	3032	951
OK3KAG	6,986,252	2986	884
TM2P	6,451,998	3055	894
GXØØBS	5,971,680	2781	870
ØH6LK	5,966,680	2891	860
ØG1EH	5,835,830	3052	847
HA6KNG	5,681,664	2700	822
SJ9WL	5,530,504	2349	854
I12A	5,463,038	2668	854
ØNGAH	5,379,877	2649	841
ED3HH	5,153,448	2812	867
GXØPNW	4,955,720	2467	770
DF7RX	4,920,600	2411	834
LA2AB	4,853,888	2525	832
R3R	4,642,755	2723	821
Y3BI	4,496,918	2190	785
EA3FQV	4,164,370	1907	680
SKØUX	4,088,971	2276	779
IU2M	3,989,764	2374	782
DKØBF	3,812,436	2036	773
ØH4ZS	3,664,170	2167	738
ØK1KQJ	3,586,410	2039	718
SK3LH	3,284,715	2156	735
ED3ØD	3,284,294	2024	767
RZ6AXO	2,842,624	2075	694
IQ2ARI	2,664,792	1828	702
AM1AX	2,663,550	2241	675
SKØHB	2,623,152	1342	592
DKØUH	2,523,150	1683	675
ES5Ø	2,391,810	1857	610
HABKCK	2,125,344	1524	624
GØFDX	1,808,313	1567	597
HG6V	1,787,520	1610	608
ØE3G8B	1,781,318	1359	602
RN7WPX	1,619,370	1615	570
SP9LJD	1,581,832	1341	601
GX5ØK/P	1,547,440	1453	580
DFØØD	1,476,660	1270	560
UC1CW	1,412,959	1504	529
IØ9JKY	1,365,031	1461	569
R3K	1,309,987	1151	536
ØN5LL	1,185,366	1000	501
LY1BZR	1,174,425	1027	525
ED1WWE	1,109,160	1259	529
Y45RJ	1,051,155	1079	497
PØØALB	1,039,447	1045	491
LY1BZB	991,672	1044	472
UZ3AWR	957,420	1012	486
GBØWØX	859,876	814	454
Y63ZH	741,744	665	432
ØK3KXR	734,751	877	423
I3ØKØ/3	679,704	762	446
DA2UK	646,905	796	427
SP6KFK	600,837	815	381
ØK2KMR	588,392	669	392
HA5KEH	585,314	805	422
4N2CED	583,300	583	475
ED1SML	565,041	766	437
UC1WWR	472,329	674	367
GSØAEE/P	396,664	551	358
IV3JVJ	394,448	495	356
ØK1ØKE	370,470	374	265
UB4FYC	182,160	471	276
PI4SHB	168,664	311	232
IK2PZC	164,318	300	242
SP2ZFU	152,750	346	235
UB4DWW	139,590	47	





FT-747

# YAESU



FT-890



FT-5200



FT-1000 D



FRG-8800 Receiver



FT-415



FT-23R



FT-530



FT-2400



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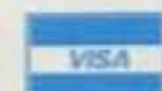
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**During the DXpedition to South Sandwich Island not all the anxiety and frantic operating took place on Thule Island. Some of it took place right here in Raleigh, North Carolina. ND1W explains how craft and wife helped him through this period.**

## The ND1W South Sandwich Island Special Antenna

BY BOB HAISTY\*, ND1W

**A**ll I was hearing when I got on the air at the new QTH was "Sandwich Island." I wanted to be ready!

The first thing to know is this: My new QTH is a settlement of buried power lines and utilities. That has two important consequences:

1. A community that buries its power, telephone, and cable TV lines is not about to allow anybody to install an outside TV antenna, much less a ham radio tower.

2. There must be something about buried power lines that makes the line noise on 40 meters worse; at least it's never been so strong at any other QTH that I can remember. I think it comes up through the ground and gets into my radials, and I say this only partially in jest.

\*6309 Dresden Lane, Raleigh, NC 27612

I don't know what possessed me to buy this property in the first place, except that I didn't realize the line noise was going to be so high. Maybe it was a gut feeling that the little brook running through the backyard would somehow help the low-angle propagation, or that the bevy of 85 foot pine trees scattered around the yard would come in handy, or that when the time came, I would be able to make my tower invisible. In a way, I have.

Photo A is a photograph of my main antenna. It carries the caption so familiar to city dwellers: "Where is the antenna in this picture?" That's my 40 meter vertical, a thin wire which you and the neighbors can't see running up the side of the pine tree. The top insulator, by some remarkable foresight on the part of Radio Shack, looks exactly like a pine cone.

From time to time I go out and add some

radials, stapling them to the lawn with 10 inch gutter spikes. For your use in similar situations, I offer several choices of explanations to curious neighbors who stop by to watch:

1. "It's for the lawn. It has been found that adding trace amounts of copper to the soil benefits the grass and helps keep out chiggers." I always drive out the riding lawn mower and park it nearby, with a shovel or two leaned up against it. This has turned out to be the most acceptable explanation. Several of the neighbors are putting radials in their yards.

2. "I am installing a covert shortwave aerial to get reports on the Tokyo stock market during the night and determine what our markets are going to do, so as to make money." This has found a very sympathetic ear among the bankers and stock brokers in the neighborhood, who have

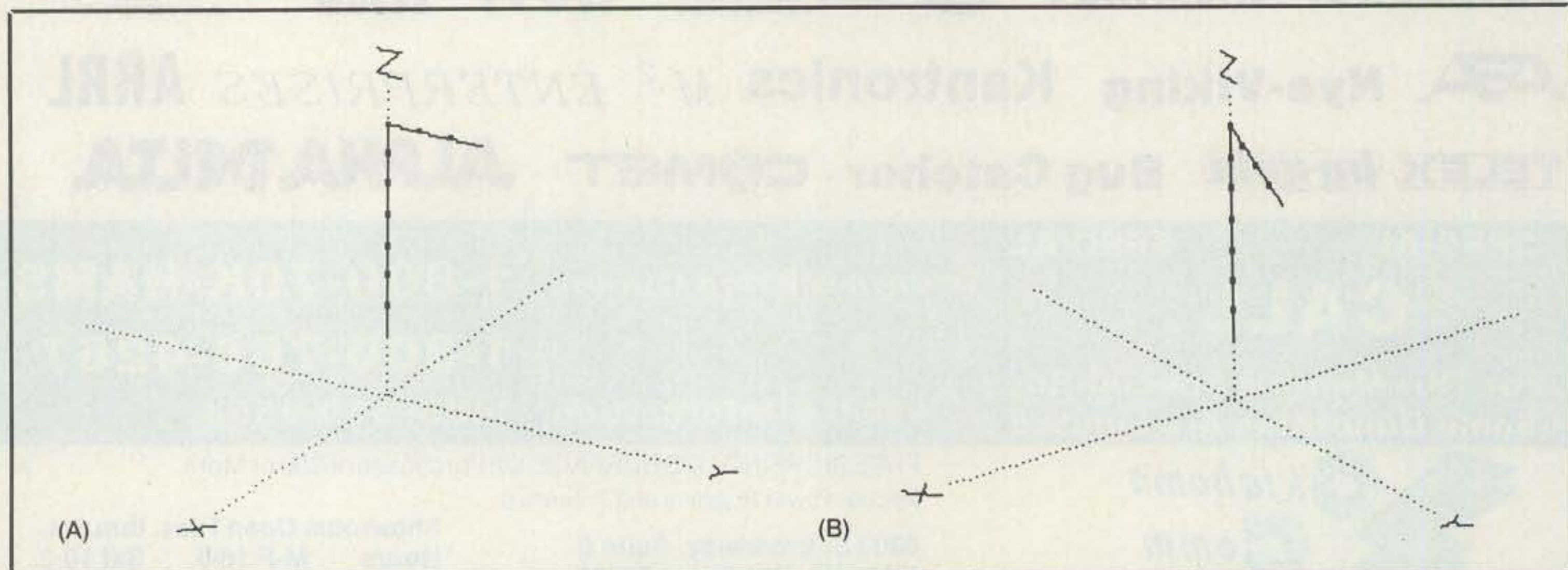
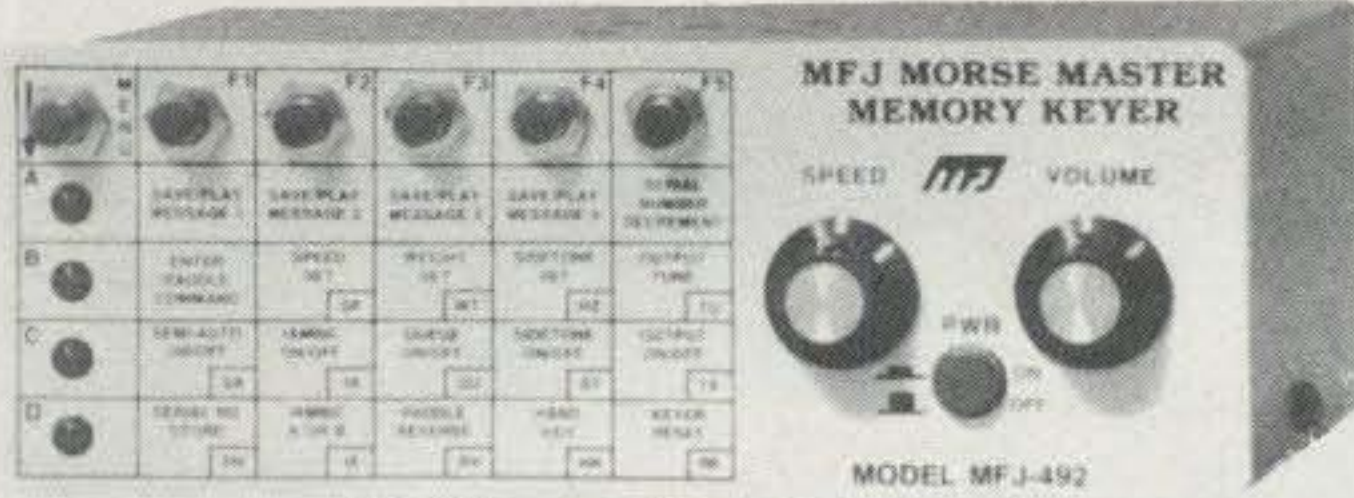


Fig. 1—(A) The basic plan for a "bent vertical." It is similar to the old Marconi or inverted L, but fed at the bend. (B) Final version, with the top bent down at a 30-degree angle to lower the radiation resistance.



# MFJ Menu Driven Memory Keyer™



**MFJ-492** MFJ's new *Menu Driven* Memory Keyer™ lets you immediately enjoy your MFJ-492 without reading an instruction manual -- there's no keypad, no complex sequences, nothing to remember.

You simply select a menu by pressing a button. An LED lights to show you which menu is active. You select a feature by pressing a feature button. It's as easy as using a computer touch screen! Each menu is clearly printed on the front panel -- there's no confusion.

From the menu you can save and play messages . . . decrement serial numbers . . . set speed, weight, sidetone . . . enter iambic, semi-auto, handkey, message queue, paddle command modes . . . turn on/off sidetone, transmitter tune, keying output on/off . . . select iambic A or B, reverse paddle, Morse trainer and store starting serial number.

You can bypass the menu by keying in simple two letter commands.

When you select a feature the keyer tells you its status in CW.

## Memory expandable to over 8000 characters

You can expand the MFJ-492 standard 192 characters in four soft sectored message memories to over 8000 characters in eight message memories by simply plugging in the MFJ-80, \$14.95, Memory Expansion Kit. Memories backed-up by lithium battery.

## Smooth Speed Control

Matching your CW speed to a QSO is best done by ear. The MFJ-492 lets you match speed by turning a knob or by using MFJ's Analog Set™. In this mode, pressing the dot or dash paddle smoothly increases or decreases speed from 5 to 100 WPM. You can also customize the range of the speed knob for precise control.

## MFJ Super Menu Driven Memory Keyer™/Keyboard



**MFJ-493** You get all the features of the MFJ-492 plus these . . .  
★ You get 32,000 characters of memory.

★ Plug-in a standard IBM compatible 01 AT type keyboard and you have an extremely powerful full featured standalone keyboard keyer. All commands, functions and memories can be done through the keyboard. Plus you get additional message memories and features.

★ Built-in serial port lets you combine the power of your computer with the MFJ-493. Use your computer to compose, build and store a complete library of often used messages, generate custom code practice sessions and exams and download to MFJ-493, control your keyer, automatically set up keyer for different operators during contest, display, edit and save message memories and keyer settings.

## Powerful Morse Code Trainer

A powerful Morse code trainer lets you practice or teach code in Farnsworth or normal mode.

You can select letters, numbers, punctuation marks or prosigns or any combination for practice. You can use standard 5 character groups, more realistic random 1 to 8 character groups or select specific six character sets to work on.

You can instant-replay a random session to check your copy.

You can store custom code practice sessions in memory for later replay.

## Here's what you can do with Message Memories . . .

**Message Repeat™** lets you repeat messages continuously. You can also insert pauses within a message. This lets you call

## Menu Driven Memory Keyer/Bencher Paddle Combo

**MFJ-490**  
**\$164.95**



The best of all CW worlds -- nearly all the features of the MFJ-492 *Menu Driven* Memory Keyer in a compact configuration that fits right on the Bencher iambic paddle! You can buy the combination or just the keyer for your Bencher.

You get message memories, Morse trainer, sidetone, automatic serial numbering -- plus more. 5x3x5½ in. Uses 9 volt battery, 12 VDC or 110 VAC with MFJ-1312B, \$12.95. **MFJ-490**, \$164.95, Keyer/Bencher Combo. **MFJ-490X**, \$109.95, Keyer only. Memory expansion kit not available.

CQ, listen for an answer and then resume calling CQ by pressing a single button. Each pause can be up to an hour -- it makes a perfect Automatic Beacon.

**Message Call™** calls other messages and **Message Queue** plays messages in sequence. You can store QTH, rig, weather and other information in separate message memories and play these in any sequence you want!

**Message Edit™** lets you correct mistakes while recording a message -- you don't have to start all over if you make a mistake.

While you're playing a memory message you can break-in at any time and insert comments from your paddle and then resume playing your message.

You can insert commands within a stored message. As you play it back, these commands will execute. For example, you can insert automatically incrementing serial numbers, replay messages continuously, call and play other messages, insert pauses or combine all these in one message!

When you play your messages back, automatic word and character spacing make your CW sound like perfect code. Or you can adjust the spacing for a more distinctive individual sound that DX stations will notice.

## Plus more . . .

You get contest serial numbering (0-9999) with auto-increment. You can send an N for 9 and a T for 0 to save time.

MFJ's **Analog Set™** lets you adjust speed, weight and sidetone just as smoothly as a knob -- dot/dash paddles are used as an up/down control.

You get built-in sidetone, speaker, front panel volume control knob and adjustable 300-3000 Hz tone.

You can use automatic, semi-automatic bug or handkey modes, reverse dot/dash paddles, select iambic A or B or non-iambic modes.

You can adjust weight from 5 to 95% and compensate for transmitter distortion with a special transmitter compensation feature.

A tune feature lets you key your transmitter for tuning.

You can turn off the keying output so you can practice without keying your transmitter or unplugging your keyer.

You get direct and grid block keying. Keys solid state and tube rigs.

Special MARS characters are recognized and can be used in messages.

Uses 9 volt battery, 12 VDC or 110 VAC with MFJ-1312B, \$12.95. 6½x2½x6¾ in.

**MFJ-80**, \$14.95, Memory Expansion Kit. Expands your MFJ-492 to 8000 characters and adds four additional message.

**MFJ-492X**, \$114.95. MFJ-492 with MFJ-80 Memory Expansion Kit installed.

**MFJ-78**, \$19.95. Full function Remote Control puts message memories and menu control at your finger tips for real convenience.

## Dedicated CW Keyboard



**MFJ-451**  
**\$89.95**

**Dedicated** CW Keyboard has 200 character type ahead buffer and two 100 character message memories with buffer and memory full indicators. Select features with **One Touch™** function keys. Use **Analog Set™** or type-in Speed (5-100 WPM), Weight (5-95%) and Sidetone (300-3300 Hz). Has speaker. 3½x1¼x3½ inches. Use 12 VDC or 110 VAC with MFJ-1312B, \$12.95. Keyboard supplied may vary from the one shown here.

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Compact 7½x2½x6¾ inches. Use 12 VDC or 110 VAC with MFJ-1312B, \$12.95. **MFJ-79**, \$19.95, full function Remote Control.





Photo A— Can you spot it? The 40 meter vertical is a #16 wire running up the left side of the tree in the foreground.



Photo B— Gardening equipment always on display for the benefit of the neighbors during antenna work.

hinted broadly they would be grateful for any information I can pass along to them.

3. For those apprehensive neighbors who are neither gardeners nor bankers—this includes a good many doctors and lawyers—I reveal that I am installing an elaborate system for lightning protection. It

is also my fervent hope that this is true. To that end, I have installed numerous ground rods and coax lightning protectors.

4. The above explanations have been sufficient so far, but if all else should fail, I figured I would explain that installing the radials will somehow help my golf game,

sliding over the fact that I don't play golf. I leave the details to your creativity.

My friend Bob in Florida was bragging the other night about how he had just put up a 40 meter vertical for only \$50 using sections of chain-link fence railing. I asked him why he wanted to spend so much. My wire vertical cost under \$10 using the Radio Shack kit for the top insulator and a little piece of toothbrush handle with holes bored in it at the bottom. He came back and said yes, but he would have to eat \$50 worth of bananas before he could climb that tree, whereas with his method all he had to do was carry his pole across the yard, Lancelot style, and mount it with guy

## W2FMI BALUNS AND UNUNS

How to put MORE power into your antenna and get better and higher signal strength ???

— Use the all new **MOST OUTSTANDING, HIGHEST EFFICIENCY (97% TO 99%), and the BEST BROADBAND UNUN (unbalanced to unbalanced) and BALUN (balanced to unbalanced) TRANSFORMERS** exclusively designed and optimized by **DR. JERRY SEVICK (W2FMI)**. Amidon Associates, Inc. now offers the widest selection of the W2FMI Baluns and Ununs to meet all your requirements for better and more consistent communication. Also available in do-it-yourself kits.

Use UNUN transformers for matching 50-ohm cable to:

- (1) Vertical antennas, inverted L's and ground fed slopers (all over good ground systems),
- (2) 75-OHM cable,
- (3) A junction of two 50-OHM cables,
- (4) Shunt-Fed towers performing as vertical antennas, and
- (5) The output of a transceiver or class B linear amplifier when an unfavorable VSWR condition exists.

Use BALUN transformers for matching:

- (1) Half-wave dipoles and inverted V's
- (2) Quad antennas
- (3) Folded dipoles
- (4) Rhombic and V antennas
- (5) Yagi beams



All designs, when used according to instructions, are **GUARANTEED** to give outstanding performances. Comparisons with other matching transformers are invited.

POWER RATING: at least 2KW continuous from 1MHz to 40 MHz.

W2FMI HIGH POWER UNUNS	IMPEDANCE MATCH	COMPLETE UNIT PRICE
2.25:1-HU50	50:22.22-OHMS	\$45.00
2:1-HU50	50:25-OHMS	\$45.00
2:1-HDU50	50:22.22-OHMS	\$50.00
	50:25-OHMS	
2.25:1-HU112.5	112.5:50-OHMS	\$45.00
2:1-HU100	100:50-OHMS	\$45.00
2:1-HDU100	112.5:50-OHMS	\$50.00
	100:50-OHMS	
1.78:1-HU50	50:28-OHMS	\$45.00
1.5:1-HU50	50:32-OHMS	\$45.00
1.5:1-HU75	75:50-OHMS	\$45.00
4:1-HRU50	50:12.5-OHMS	\$50.00
4:1-HCU50	50:12.5-OHMS	\$50.00
9:1-HRU50	50:5.56-OHMS	\$50.00
9:1-HUH50	50:5.56-OHMS	\$45.00
1.78:1-HDU50	50:28-OHMS	\$50.00
	50:12.5-OHMS	
1.56:1-HDU50	50:32-OHMS	\$50.00
	50:18-OHMS	
HMMU50(5 diff. ratios)	MULTIMATCH UNUN	\$80.00
1.78:1-HMMU50	MULTIMATCH UNUN	\$90.00
(8 different ratios)		

Unconditional money back guarantee for 1 year on completed unit.

**KIT PRICE FROM \$28.00! CALL TODAY!**

W2FMI HIGH POWER BALUNS	IMPEDANCE MATCH	COMPLETE UNIT PRICE
1:1-HBL50	50:50-OHMS	\$55.00
4:1-HBM200	200:50-OHMS	\$55.00
6:1-HB300	300:50-OHMS	\$120.00
9:1-HB450	450:50-OHMS	\$150.00
2.25:1-HB112.5	112.5:50-OHMS	\$120.00
4:1-HB50	50:12.5-OHMS	\$55.00

NOTE: OTHER BALUN & UNUN TRANSFORMERS AVAILABLE. PLEASE CALL OR WRITE FOR ADDITIONAL DETAIL.

BOOKS: 1) "Transmission Line Transformers Design Handbook", by Jerry Sevick, W2FMI, Amidon Associates, Inc., 1991, \$8.00 ea.

2) "Transmission Line Transformers", by Jerry Sevick, W2FMI/APRIL, 1990, \$20.00 ea.

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Photo C— ND1W "planting out some radials." The tuning capacitor for the vertical is in the water-tight box, which is normally covered by pine needles.



# MFJ 5/8 Wave Ground Plane

For an incredible \$19.95, you get a 300 watt 5/8 wave ground plane 2 Meter base antenna. Other 5/8 wave ground planes can't work any better — no matter how much they cost . . .



MFJ-1750  
**\$19<sup>95</sup>**

For an incredibly low \$19.95, you get a complete 2 Meter 300 watt PEP 5/8 wave ground plane home station antenna. It gives you the maximum possible theoretical gain of any single element antenna.

Competitive 5/8 wave ground planes can't work any better — no matter how much they cost.

You get . . . shunt fed matching that bleeds off unwanted static and gives you lowest

possible SWR . . . strong lightweight aluminum construction that's protected by MFJ's Permanent Molecular Bonding Technology™ . . . low loss ceramic antenna insulator for maximum radiated power . . . MFJ's Fast Tune Radiator™ for quick accurate tuning . . . super easy installation to any 1" to 1 1/2" inch mast with single U-bolt (included) . . . and it's Made in USA.

Also available for 220 MHz, MFJ-1752, \$19.95.

## MFJ Pocket Roll-Up™

2 Meter Halfwave J antenna

MFJ-1730  
**\$14<sup>95</sup>**

Roll up this half-wave 2 Meter J-antenna and stick it in your pocket!

This new MFJ Pocket Roll-Up™ is the perfect gain antenna for traveling.

Get home station performance on the go. Just hang your Pocket Roll-Up in the clear, plug the handy BNC connector into your handheld and enjoy some great QSOs.

It's omni-directional and has significant gain over a 1/4 wave. It doesn't need a cumbersome ground plane so it's convenient for indoors and works great with handhelds.

## 1/4 Wave Ground Plane

MFJ-1740  
**\$12<sup>95</sup>**

The MFJ-1740 is the most inexpensive way to put out a potent FM signal on 2 Meters. It'll bring up repeaters as well or better than any 1/4 wave ground plane — even if it cost twice as much.

The improved MFJ-1740 1/4 wave ground plane minimizes feedline radiation for more useful radiated power, reduced TVI and noise pickup by the coax shield.

It's made of strong lightweight aluminum parts protected from corrosion by MFJ's Permanent Molecular Bonding Technology™.

You get MFJ's Rapid-Tune-radiator™ for easy tuning and low loss ceramic antenna insulator for maximum radiated power. Single included U-bolt mounting for 1 to 1 1/2 inch mast. Cutting chart included for 220/440 MHz. Made in USA.

## "Shorty" Duck for HTs

MFJ-1718  
**\$12<sup>95</sup>**

Add this strong, flexible "Shorty" 1/4 inch rubber duck to your 2 Meter handheld and enjoy an outstanding signal! Its super efficient, high-Q helical wound radiator is especially impedance matched to handhelds for maximum gain.

## No Matter What Guarantee

Your MFJ antenna comes with MFJ's famous No Matter What™ One Year Unconditional Guarantee. That means we will repair or replace your MFJ antenna (at our option) no matter what for a full year.

## MFJ Permanent Molecular Bonding Technology™

MFJ's exclusive Permanent Molecular Bonding Technology™ protects aluminum. This super durable finish actually bonds itself to aluminum molecules — it won't come off unless metal comes off!

## 5/8 Wave 2 Meter Mobile Antenna

MFJ-1728 For maximum range while mobile, use MFJ's Maximum Gain™ 5/8 Wave 2 Meter Mobile Antenna. You'll get the maximum possible theoretical gain of any single element mobile antenna!

Competitive 5/8 wave mobile antennas can't work any better — no matter how much more they cost.

You get low SWR so your rig can safely deliver maximum power into your antenna. It's rated at 300 watts PEP so you can use any mobile rig plus a mobile amplifier.

You get a heavy-duty magnet mount that holds your antenna tight at highway speed and a chrome plated magnet base that keeps it looking good for years.

You get has a stainless steel radiator that'll endure years of harsh mobile use and 12 feet of coax cable with connector.

You get MFJ's famous one full year No Matter What™ Unconditional Guarantee.

The MFJ-1728 Maximum Gain™ 5/8 Wave Mobile Antenna gives you maximum mobile range and the most for your money. Get yours today.

## MFJ Dual 5/8 Wave Super Gain™

2-Meter Antenna . . . direct feed gives you irrefutable real gain.

MFJ-1764 This new MFJ Super Gain™ 2-Meter antenna directly feeds two full size 5/8 wave radiators and makes both elements strongly radiate. You get irrefutable real gain.

Plus, you get additional gain for FM and Packet because your mast doubles as a reflector. There's plenty of antenna gain to work stations off the sides and back, it's just stronger in the direction the MFJ-1764 faces.

The result? You get more range to reach distant repeaters and much better local coverage on direct channels and Packet.

You get an extremely wide 10 MHz 2:1 SWR bandwidth . . . excellent ferrite choke balun feedline decoupling to eliminate wasted power due to field pattern distortion . . . shunt choke for bleeding off unwanted static . . . strong lightweight aluminum construction protected by MFJ's Permanent Molecular Bonding Technology™. . . Made in USA.

It's fully assembled — simply attach radiators — no tuning required. Mounts vertically for FM and Packet or horizontally for SSB. Easy-to-install with single U-bolt (supplied) on any 1 to 1 1/2 inch mast or tower leg. Weighs 1 1/2 pounds, two 47 inch radiators, 23 inch boom. Also works as excellent 6 Meter full halfwave centerfed antenna. Has low SWR across entire band.

### Double your Gain with direct feed!

You can double the gain of one MFJ-1764 5/8 Wave Super Gain™ 2-Meter Antenna by mounting two MFJ-1764s one above the other on the same mast and directly feeding both. Order MFJ-1766, \$89.95, includes 2 MFJ-1764 Super Gain™ 2-Meter Antennas and a Direct Feed Power Splitter/Cable Harness. Also double gain on 6 meters.

If you already have two MFJ-1764s, order MFJ-1765, \$29.95, Direct Feed Power Splitter/Cable Harness to feed your two MFJ-1764s.

## Portable 3 element Yagi for 2 M

MFJ-1763 You can set up or take down MFJ's new portable 3 element 2 Meter Yagi in seconds! Elements simply screw into the boom.

You can take it with you wherever you go and have the "oomph" and directivity of a beam.

It's easy to store and sturdy enough to use as your home station antenna.

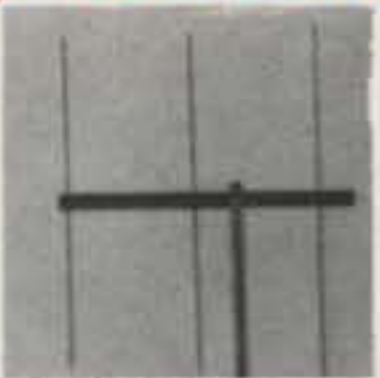
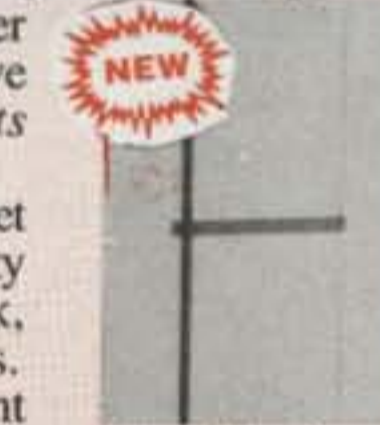
You can mount it vertically for FM or horizontally for SSB. You can easily center mount it on a mast or end mount it on a tower leg with a single U-bolt (included). It's great for packet and PacketCluster™.

Its compact 2 3/4 foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

Extra thick elements maintain high gain and directivity over virtually the whole 2 Meter band. A ferrite choke balun gives you excellent feedline decoupling. Coax coupling is further reduced by mounting the SO-239 connector behind the reflector.

Elements and boom are made from strong lightweight aluminum and protected by MFJ's Permanent Molecular Bonding Technology™.

Weighs just 2 pounds. Boom is 30 1/2 inches. Made in USA.



## Dual Band Mobile

Mobile Antenna for 144/440 MHz

MFJ-1724B  
**\$14<sup>95</sup>**

For \$14.95, you get an MFJ dual band magnet mount mobile antenna

for 2 Meters and 440 MHz! Plus, it's covered by MFJ's famous One Year unconditional No Matter What™ Guarantee.

The MFJ-1724B is a 1/4 wave on 2 Meters and a gain antenna on 440 MHz — it's perfect for dual band radios.

Low SWR across both bands lets your rig safely deliver full power into your antenna.

The stainless steel radiator will withstand the toughest mobile service. It's only 19 inches tall so you can park in your garage without knocking over your antenna.

The MFJ-1724B handles 300 watts PEP, has 15 feet of coax and has an extra powerful magnet to hold it steady — even at highway speeds.

## HT Range Extenders

Telescoping antennas for handhelds

### A. The Long Ranger™

2 Meter Halfwave. MFJ-1714, \$16.95.

For really long range this MFJ endfed halfwave is hard to beat. It outperforms a 5/8 wave on a

handheld because the A. B. C. 5/8 wave needs a ground plane. The MFJ halfwave doesn't. It's shorter, lighter, has more gain and places less stress on your antenna connector than a 5/8 wave antenna.

When collapsed, it performs like a rubber duck. 40" extended, 10 1/2" collapsed.

### B. The Dual Bander™ for 2

Meters and 440 MHz. MFJ-1712, \$14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a 1/4 wave for 2 Meters and a 5/8 wave with gain for 440 MHz.

7 1/4" collapsed, 19" extended.

### C. The Pocket Linear™

3/8 Wave, 2 Meters. MFJ-1710, \$9.95. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on The Pocket Linear™, extend it to 24 1/2" and carry on your QSO. Has pocket clip. 5 1/4" collapsed.

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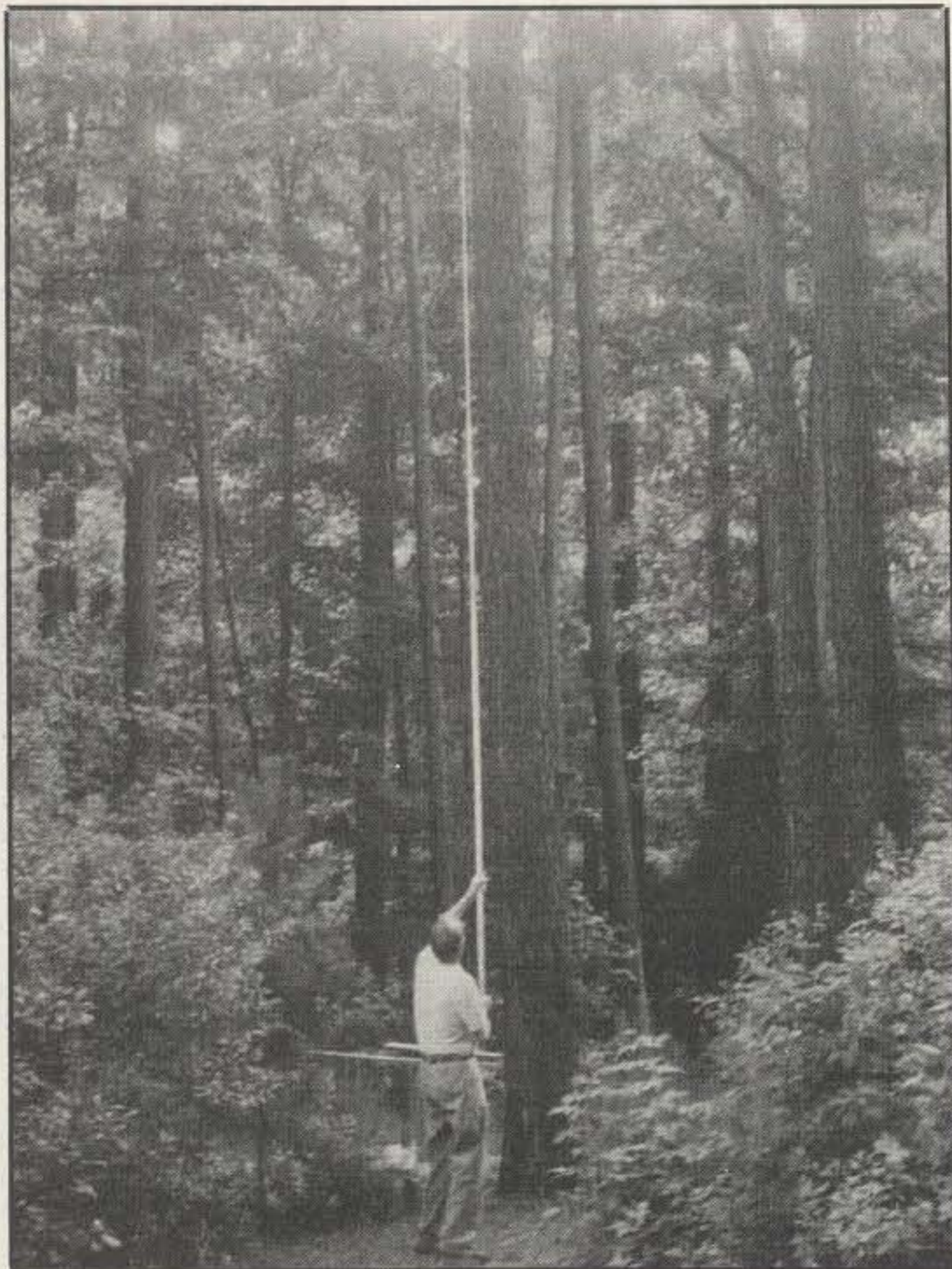


Photo D— Using a 20 foot aluminum mast, notched on one end, to loop a nylon string over the limb of a pine tree. The string is used to hold one end of the bent vertical.

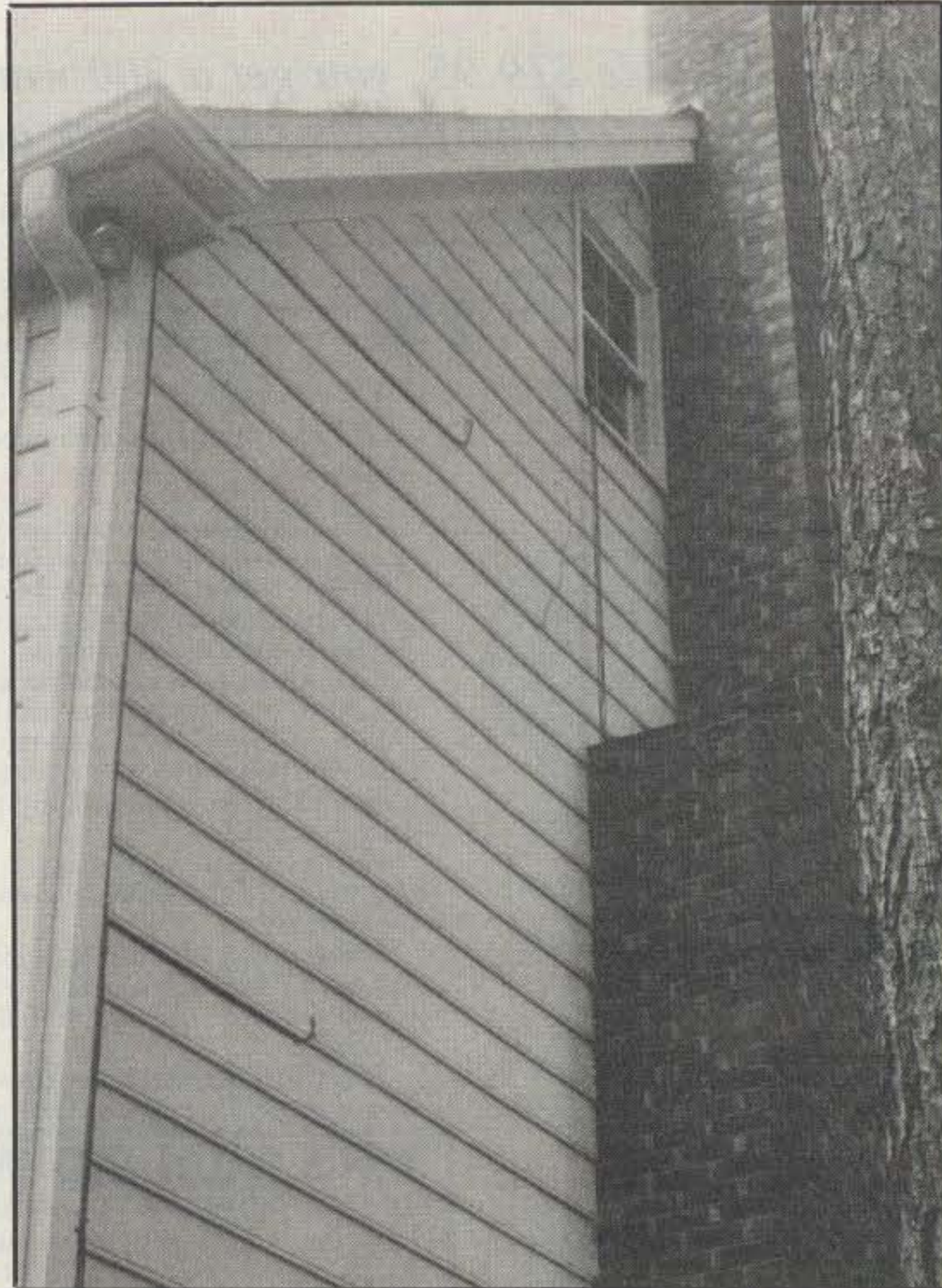


Photo E— The window from which the bent vertical hangs. The balun is the small cylinder, barely visible, attached to the eave.

wires. He had a point there, I admitted. I had to pay a chimney sweep \$40 to go up a ladder and attach the top of my wire to the tree.

I made the vertical longer than a quarter wave for a good reason, which I'm not sure is generally appreciated, even in these days of enlightenment. In fact, I believe we should think in terms of a " $\frac{3}{10}$ -wave antenna" rather than a " $\frac{1}{4}$ -wave." It raises the radiation resistance for a better match to coax, and gives a slightly better vertical angle. For a 41 foot vertical, for example, the angle calculates to 20 degrees with 73 ohm resistance, versus 28 degrees and 36 ohms for a traditional 33.5 foot quarter wave. Using a computer analysis program, I calculated that 37 feet would give me a radiation resistance of 50 ohms. Of course, I tune out the inductive reactance with a variable capacitor at the base. My SWR is below 1.1 at the 7.18 MHz design point, and I get outstanding signal reports—just lots of noise on receive.

### My Vertical Worked Fine But South Sandwich Island Didn't Cooperate!

I was all set for South Sandwich Island, and the neighbors were none the wiser. Only

it didn't turn out the way I had hoped. For many days South Sandwich Island didn't show up on 40 meter sideband much, and when they did, I couldn't hear them for the noise. I spent the days and evenings listening to them booming in on 10, 15, and 20 meters while I frantically calculated possible antennas for one of these bands. I tried an attic Yagi, dipoles out the window, loading my 40 meter vertical on 20, and various and sundry other wire configurations. (Ah, you say, load the 40 meter vertical on 15. Well, I have worked a few stations that way, but at  $\frac{3}{4}$  wave the vertical angle is too large for long DX—at least I couldn't get through the pile-ups with it.)

As for the other approaches, two things were against me:

1. In the heat of battle nothing works.
2. I was very limited by the building restriction code in what I could try.

Finally, I got a center-fed 10 meter vertical dipole out the window with the SWR low enough to test it on the air. But when I called an EA8, who was hitting 20 dB over S9 here, it took about 12 tries for me to get through, and even when I did, he had trouble copying my call. In contrast, with my 40 meter vertical I can rub two wires together and spit on them and the EA's can hear me. "No," I said, "this is not working. Back to the computer—it's got to be done

on 20 meters."

And with that was born an interesting, albeit not earth-shakingly new, concept for an antenna to hang out the window of a tall house.

### The South Sandwich Special A Top-Bent Vertical

My resources were a 32 foot drop out the window to the ground; an ancient 1:1 balun which could be attached with a single screw to the eave above the window; a large assortment of pine trees at various angles and distances from the window, toward which the top part of the antenna could be directed and tied off with nylon string; and the realization that the wire didn't have to be fed in the center, and that, in fact, the lowest vertical angle would be achieved by making the longest segment vertical and the top, horizontal, part much shorter.

The computer program confirmed this notion. In fact, starting from the basic arrangement shown in fig. 1(A), the vertical angle would peak at 28 degrees. But I wanted to get the 16-degree vertical angle of a half-wave vertical dipole. I also wanted to feed the antenna near the top end, and match a 50 ohm line. Would this be possible? The computer would tell.



# New MFJ CW Transceivers

... throw this *tiny* CW rig in a corner of your briefcase and enjoy DXing and ragchewing wherever you go ... you get a high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 watts output, semi/full-break-in ...

MFJ-9040, MFJ-9030, MFJ-9020,  
MFJ-9017, MFJ-9015

**\$179<sup>95</sup>** each

- **NEW! 5 Bands . . . Models for 40, 30, 20, 17, 15 Meters**
- **Write for Free manual**

Throw a tiny MFJ CW Transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go.

You'll turn lonely nights into exciting adventures as you contact fellow amateurs around the world.

With 5 watts you'll have plenty of power to work the world even with a makeshift antenna.

At home with a good dipole, vertical or beam, you'll be able to work almost anyone you hear — can you imagine earning DXCC with 5 watts?

**Big gun DX'ers:** Try a new DX challenge for the price of a simple station accessory.

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**Tiny 6x6½x2½ inches.** Weighs 1-3/4 lb. Uses 12-15 VDC. Optional matching antenna tuner, power pack, antenna, plug-in Curtis chip keyer and plug-in narrow audio filter.

## Now 5 Bands . . .

**MFJ-9040** covers 40 Meters: 7.000-7.150 MHz. **MFJ-9030** covers 30 Meters: 10.100-10.150 MHz. **MFJ-9020** covers 20 Meters: 14.000-14.075 MHz. **MFJ-9017** covers 17 Meters: 18.068-18.110 MHz. **MFJ-9015** covers 15 Meters: 21.000-21.200 MHz. \$179.95 each. **40 and 15 Meter Models include Novice and Technician Band.** Your perfect first radio.

## High Performance Superhet Receiver

You get a high performance superhet receiver with a selective double tuned front end and double-balance mixer. It's sensitive enough to copy weak DX signals down to the noise floor yet resist overload when a strong local comes on.

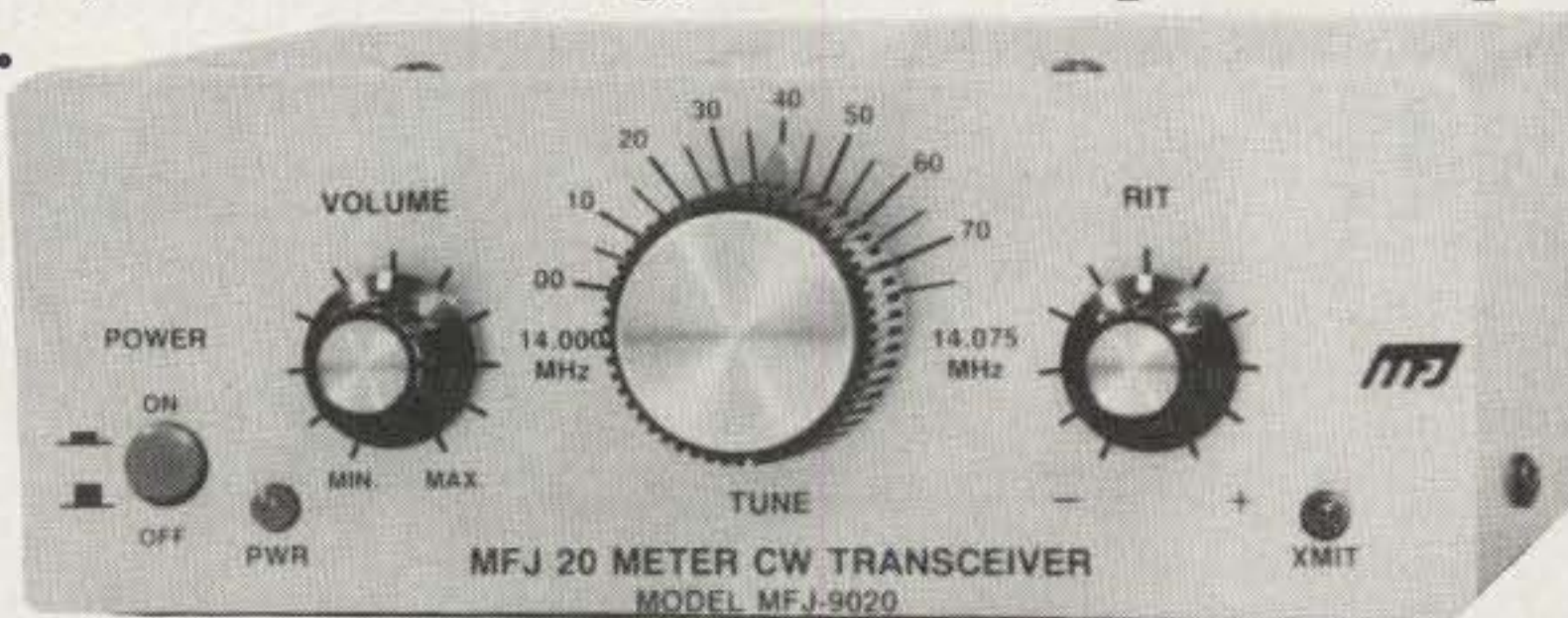
What you hear is what you get — images and birdies are eliminated with this single conversion design and a high IF.

A ball bearing reduction drive and linear frequency readout gives you smooth precise tuning.

Half watt of audio gives you plenty of volume from headphones and built-in speaker.

## Razor Sharp Selectivity

You'll slice through QRM and pull weak ones out of the mud with an 8-pole crystal filter that gives you razor sharp selectivity with steep sided skirts.



attractive matte-black aluminum enclosure with a deluxe brushed-aluminum front panel and matched knob set. Machine screws and pressed-in PEM nuts are used — not sheet metal screws.

Has power-on LED, transmit LED and SO-239 coax connector for antenna.

**Designed by Rick Littlefield, K1BQT**

## Instant Recovery AGC™

Weak DX signals are just as loud as strong local ones because a graceful Automatic Gain Control (AGC) keeps your audio level constant.

You get smooth break-in operation because MFJ's exclusive *Instant Recovery AGC™* gives you instantaneous transmit recovery.

## True Receiver Incremental Tuning (RIT)

True Receiver Incremental Tuning (RIT) lets you dodge QRM and compensate for other's drift without moving your transmit frequency.

## MFJ Integrated CW Station

Transceiver, tuner, power pack fastens together to form tiny 6x6½x8½ inch integrated CW station.

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**\$329<sup>80</sup>**

Save \$45! \$329<sup>80</sup> buys complete MFJ CW Station. Includes MFJ CW Transceiver, MFJ-971 tuner, MFJ-4114 power pack, portable antenna . . . order MFJ-9140B, 40M; MFJ-9130B, 30M; MFJ-9120B, 20M; MFJ-9117B, 17M; MFJ-9115B, 15M. \$374.80 each if purchased separately (keyer and filter not included.) MFJ-27, \$4.95, Handle for CW Station. Add \$3.00 s/h if order separately.



## Enough Power to Work the World

With 5 watts you'll have plenty of power to work the world even with a makeshift antenna.

You can use any antenna with an SWR up to 3:1. These MFJ CW Transceivers are rugged enough to withstand momentary antenna opens or shorts without damage.

If you're really into QRP you can reduce your power down to milliwatts.

A pleasing sinewave sidetone lets you monitor your sending.

You also get adjustable semi and full QSK break-in plus adjustable automatic transmit offset.

You'll get hours of battery operation — draws only 50 ma. receive, 1 amp transmit.

## Looks Great!

Each MFJ CW Transceiver is housed in an

The MFJ CW Transceivers were designed by Rick Littlefield, K1BQT. He's known worldwide for his reliable high-performance transceiver designs and countless articles.

K1BQT has given careful attention to board layout, heatsinking, mechanical rigidity, voltage regulation and component selection to ensure stable operation and long-term reliability.

It meets or exceeds all FCC requirements.

**Comes fully assembled, tested and guaranteed to work**

Your factory built MFJ CW Transceiver is ready to work DX right out of the box. It's not a kit of parts you have to put together and hope you can get to work.

## Free MFJ CW Transceiver Manual

Manual includes operating instructions, setting up your station, DX techniques, antenna suggestions, trouble shooting guide, theory of operation, alignment procedures, parts placement, schematic, parts list and more.

For a free manual write or call MFJ.

## Plug-in Keyer and Narrow Filter (Optional)

MFJ-412 Curtis chip iambic keyer, \$39.95. MFJ-726 narrow audio filter, \$29.95. Has In/Out switch.

Each plugs into an MFJ CW Transceiver. Controls on rear panel. No soldering or modifications needed.

## No Matter What™ Guarantee

You get MFJ's famous one year *No Matter What™* unconditional guarantee. That means we will repair or replace your MFJ CW Transceiver (at our option) *no matter what* for a full year.

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MFJ Customer Service Technicians will help you keep your MFJ CW Transceiver performing flawlessly — no matter how long you own it. Just call our toll-free help line 800-647-TECH(8324) — an MFJ exclusive.

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MFJ CW Transceivers are made in the USA. Help our fellow Americans by keeping our money here — buy Made in USA.

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Enjoy DXing and ragchewing wherever you go. Call your favorite dealer today and get your MFJ CW Transceivers. Don't leave home without it!

## MFJ Portable Operating Accessories

### MFJ Portable Antenna Tuner



MFJ-971 **Tunes** coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle SWR/Wattmeter has two switchable ranges: 30, 300 or user selectable 6 watt ranges. Tiny 6x6½x2½ inches matches MFJ CW Transceivers. Fastens to MFJ CW Transceivers and/or MFJ-4114 Power Pack to form single unit.

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### MFJ Portable Power Pack



MFJ-4114 **Matching portable** Battery/AC Power Pack for MFJ CW Transceivers or other low power rig. Provides power from Ni-cad D cells, regular or alkaline D cells or 110 VAC. Has charging circuit for Ni-cads D cells. 6x6½x3½ inches. Fastens to MFJ CW Transceivers and/or MFJ-971. Batteries not included.

### MFJ Portable Antennas

**\$34<sup>95</sup>** each Efficient low SWR folded dipole. Lightweight, easy to carry, easy to put up. Perfect for MFJ CW Transceivers. Order MFJ-1774, 40 Meters; MFJ-1773, 30 Meters; MFJ-1772, 20 Meters; MFJ-1771, 17 Meters; MFJ-1770, 15 Meters.

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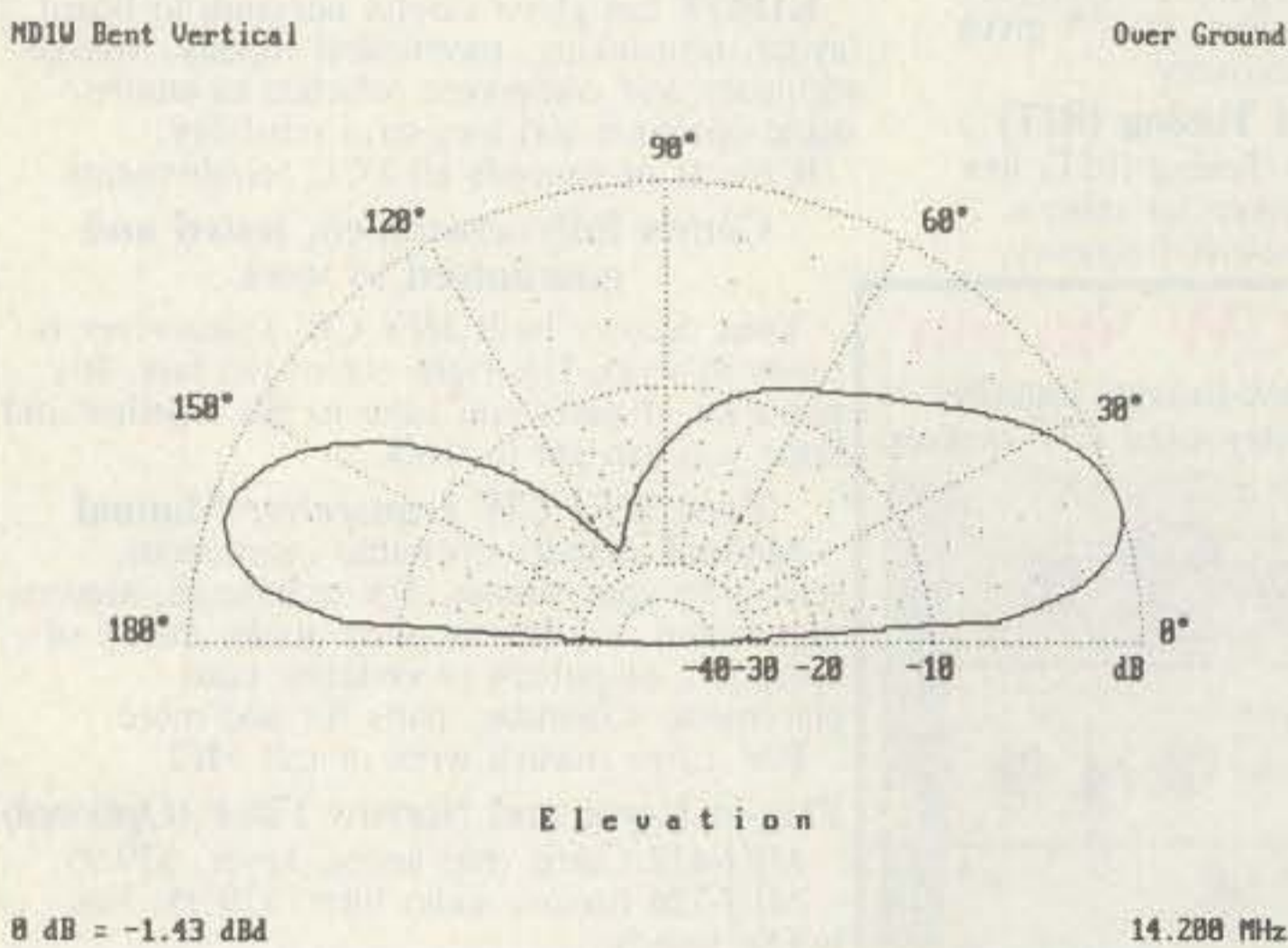
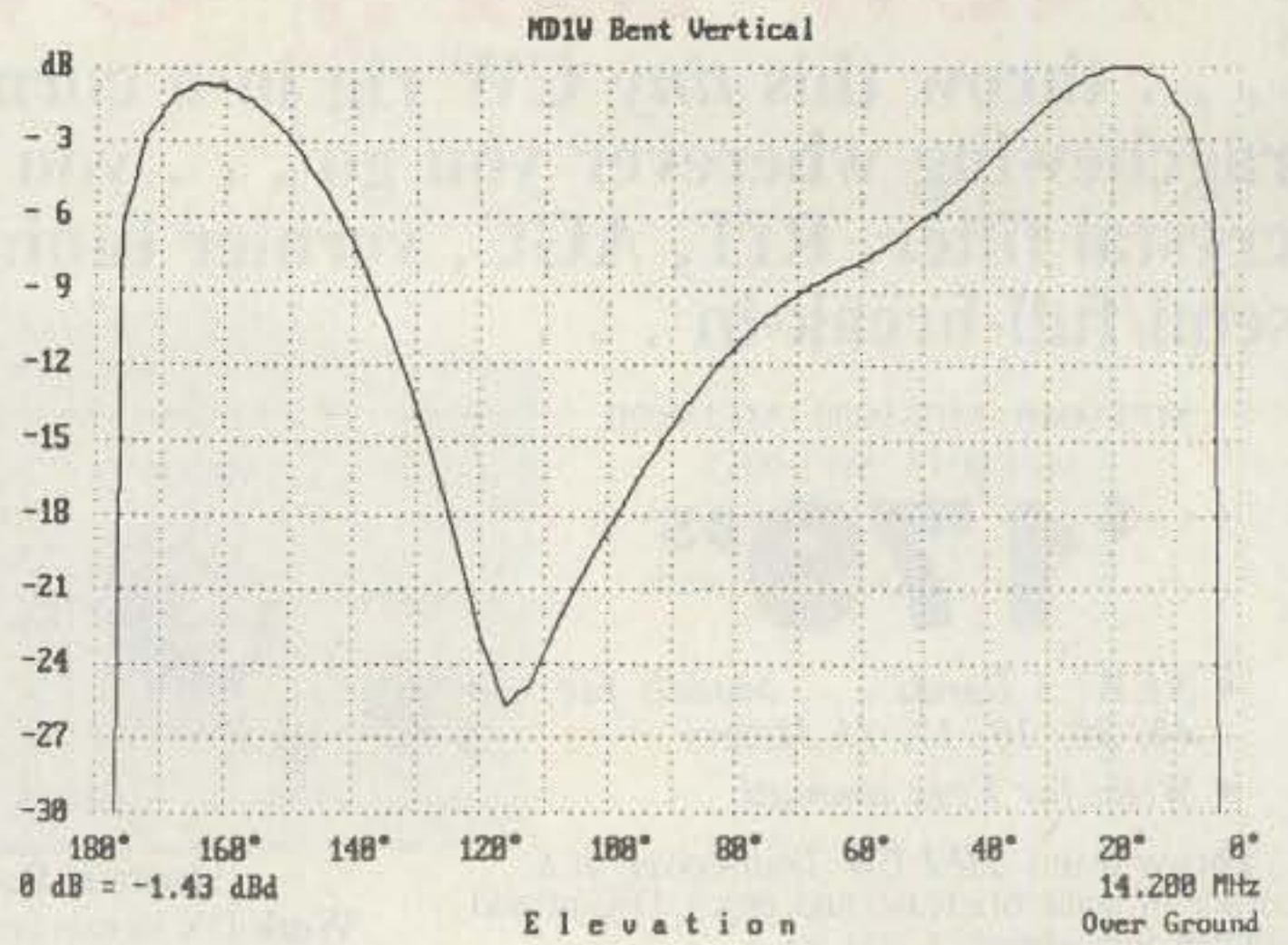
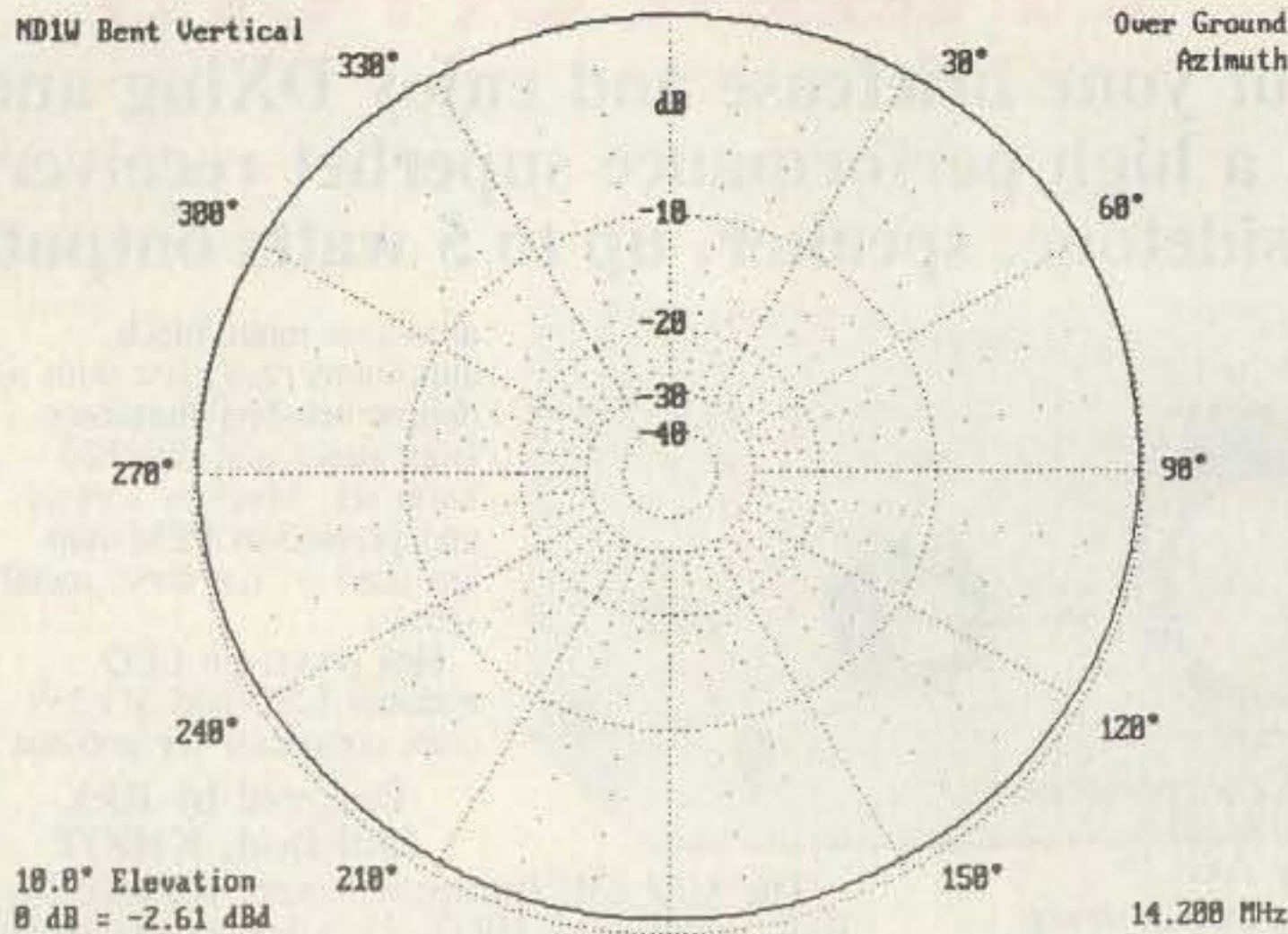


Fig. 2—Calculated pattern for the antenna shown in fig. 1, showing the low vertical angle. Note that the bent portion provides a slight directionality.

I wanted the bottom end to stop at least 8 feet above the ground so no one would accidentally get an RF burn by touching it. Limited only by that, I made the vertical part as long as possible, which was 24 feet. Feeding the antenna at this point, with the flat top portion cut 10 feet 9 inches to make the antenna resonant at 14.2 MHz, produced a calculated impedance of 90.2 ohms and a vertical angle of 16 degrees. This would be a good antenna, but it still had a higher impedance than I wanted for feeding with 50 ohm coax.

One way to lower the radiation resistance is to bend the flat top back toward the vertical. The trick is to make the angle small enough to achieve the desired lower impedance without raising the vertical radiation angle appreciably. This required a little juggling of the two lengths on the computer model. The final configuration, calculated for 14.2 MHz, is shown in fig. 1(B). The top of the vertical portion is 32 feet high, and the bottom end is 7 feet above the ground. The "flat top" is 12 feet, 9 inches, sloping down to a height of 21 feet, making an angle of 30 degrees with the vertical. The calculated impedance is 53.3

ohms, and the vertical radiation angle is 16 degrees, as shown in fig. 2. As expected, the measured SWR is about 1.1.

But the real question is, how well does the antenna work?

Well, there is good news, bad news, and more good news. The first of the good news is, the antenna works well! My first contact was with an LZ1 in Bulgaria, out of a fair-sized pile-up on my third call. My report was S9. The next station worked

was an OD5, Tripoli, out of an even bigger pile-up, on my first call. I was satisfied.

The bad news is, after I finished the antenna, I never heard South Sandwich Island again on 20 meters. I think their antenna had blown down, or frozen.

The second good news, though, is that in the last hour of the last night they were there. Those super guys came on 40 meter sideband for a little while and I was able to work them with my "hidden vertical."








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# CQ REVIEWS:

## The JPS Communications NF-60 Notch Filter

BY LEW McCOY\*, W1ICP

I have had the good fortune to live through and experience the many advances in the communications field. My father operated a spark transmitter, and my very earliest recollection was the sound of that rotary gap being keyed. In those early days of radio there were not many operators, so interference from one operator to another was relatively rare. As radio progressed, more people became licensed, and today our popular low-frequency bands often are absolutely jammed with stations trying to find space. The results can be overwhelming as far as interference is concerned. Receiver design has improved over the years with selectivity—a receiver having the ability to separate stations on a crowded band—the ultimate goal.

We have probably reached the ultimate in selectivity with modern receivers. To obtain intelligence in a single-sideband phone signal, the limit in bandwidth of a receiver is on the order of 2000 cycles (two kilocycles). (I am presently testing the Ten-Tec Omni VI, which has very steep skirt filters

at 2.1 and 1.8 kHz.) But even with this great selectivity, we still have the annoying problem of heterodyne tones resulting from nearby *undesired* signals.

This leads us to this product review of the NF-60, DSP Notch Filter.

Basically, the JPS Communications NF-60 notch filter is designed to process the audio quality of received voice transmissions by removing annoying heterodynes and tones from the received signal. For example, the notch filter creates cancellation of tones from tune-ups, heterodynes, CW, RTTY, or similar signals without interfering with voice signals.

The "DSP" stands for digital signal processing and the NF-60 does just that. The audio output from your receiver is fed into the unit. Audio is converted from analog to digital, where the signals are then processed in a special chip, a TMS320P15 DSP, which performs all the DSP functions. The main task of this chip is to operate on and manipulate the signals, removing the undesired signals. The processed signal is then converted back to analog and fed out of the unit. Does the filter do a good job of removing unwanted heterodynes? Frankly, I found it amazing.

The unit has an "in-out" switch, so it doesn't take much testing in a crowded

band to see that it really performs. Don't misunderstand. I may have made the circuit sound simple, but all you need to do is look at the accompanying photo of the inside of the unit to see all the circuitry involved. I had expected maybe some change in the desired signal when I switched it in and out, but I could not detect any changes.

The manual is well detailed and easy to follow. In addition, a troubleshooting guide is included. Also, a circuit is included detailing some of the signal conversion details.

As to the actual stats, the NF-60 in the rejection mode will provide greater than 50 decibels of heterodyne rejection and will handle from one to four tones. (I never encountered *four* heterodynes, but I set up and introduced *three* which it eliminated with no problem.) The headphone output will handle 8 ohms and higher, while speaker output is 2 watts into a 3.2 ohm speaker.

The size of the unit is 1.7"H × 6"W × 4.3"D. Power requirement is 11 to 15 volts DC at 500 ma (supply available from manufacturer). Factory introductory price of the complete unit is \$149.95. The NF-60 is manufactured by JPS Communications, Box 97757, Raleigh, NC 27624-7757 (telephone 919-790-1011).

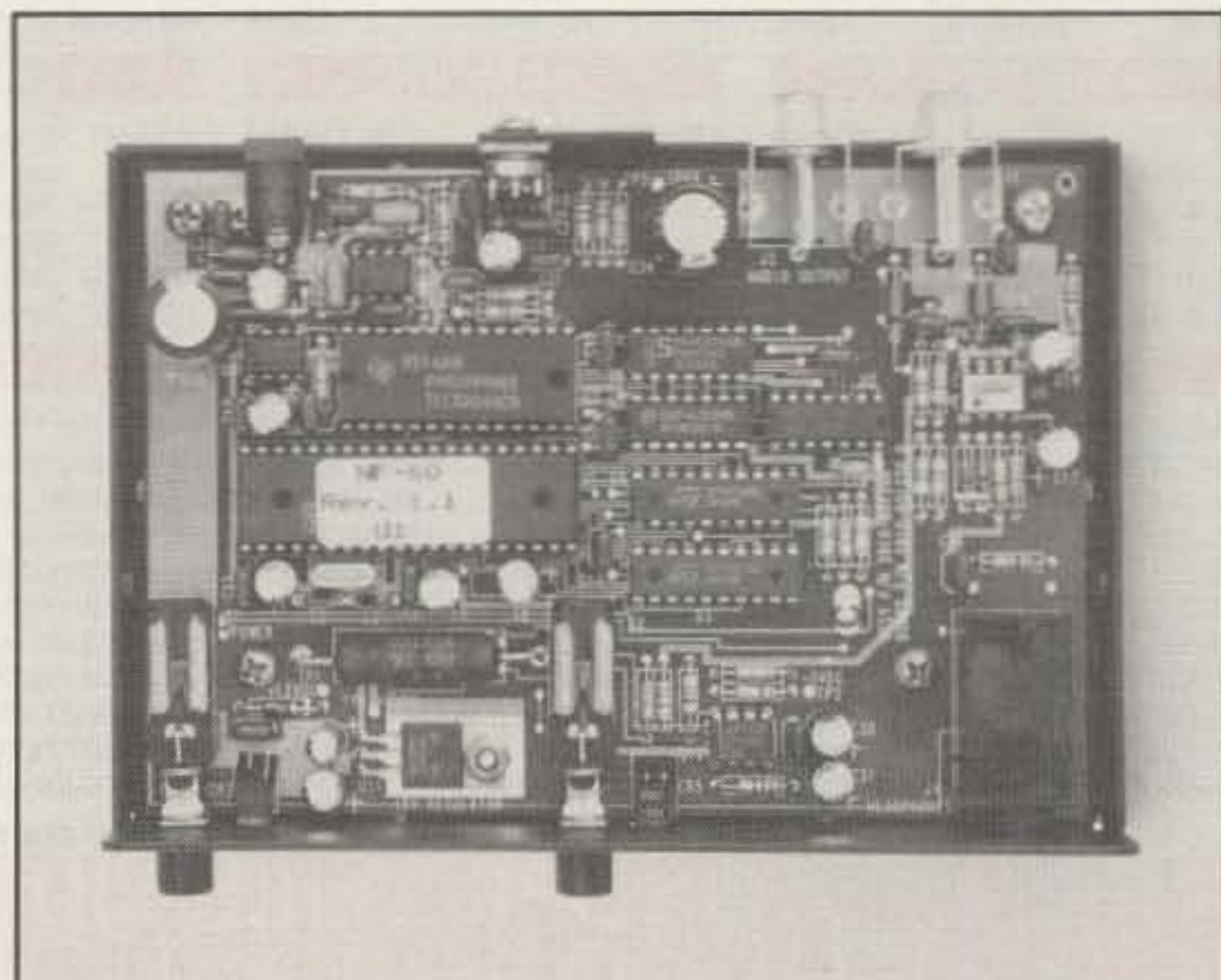


\*Technical Editor, CQ, 1500 West Idaho St., Silver City, NM 88061



Here is the NF-60 DSP Notch Filter. There is an LED power indicator on the left to indicate the unit is on. Also, there is a center switch and indicator for putting the filter in or out.

The interior of the NF-60. As you can see, no simple circuitry here—plenty of chips.





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**The Heard Island DX Association (HIDXA) made a lot of us happy this past October by putting Willis Island back on the amateur radio map. Jim Smith, VK9NS, fills us in on how it was done.**

## On A Wing and A Prayer DXpedition To Willis Island 1992

BY JIM SMITH\*, VK9NS

**T**he DXpedition to Willis Island in October 1992 almost did not happen. Originally, the HIDXA plans were for a DXpedition to Mellish Reef using a chartered vessel as a means of transport. It was then intended to call in at Willis Island for a couple of days, subject to permission being given. As things turned out, a decision was made to try for Willis Island alone, and a start was made on this project.

Willis Island is a tiny spot of Australia lying off the coast of Queensland. It has a basic role of being a weather station under the jurisdiction of the Bureau of Meteorology. The island is manned continually, on a rotating six-month stint, by a small team. The station gathers weather information on a daily basis, thus supplying valuable information to the mainland. It surprised me when I discovered that Willis Island has a long history in meteorology stretching back to the early 1920s. In those days the island was often manned by just a couple of people—a lonely sort of existence.

The Queensland Regional Office of the Bureau of Meteorology was kind enough to give our small party of three permission to visit the island for a period of seven days. Our small group was to almost double the population of the island overnight.

With this important permission in place, a move could be made to firm up our plans. When HIDXA first started on the Mellish/Willis Island trail, Bill, VK4CRR, did a lot of leg work. At one time he had received some input about the possibility of flying to Mellish Reef, but this fell through. The flying distance there and back was too great. It was this idea which I later followed up as a possibility for Willis Island, since it is much nearer. However, the idea almost stalled. Due to the total flying distance over open water, the necessary CAA



The VK9NL/W QSL.

dispensation could not be given for a single-engine float plane. This might be a good time to let you, the reader, know that Willis Island is just 12 acres of real estate and a few meters above sea level, having neither air strip nor runway.

Our contact point in Queensland also did some leg work. He came up with the possibility of a freelance pilot and a twin-engine Grumman "Super Widgeon" amphibious float-plane. (Yes, I realize that is going back a bit.) What sealed the idea was that the pilot was available for a charter and CAA clearance could be given for the flight. The Grumman "Super Widgeon" is a relic of the late 1940s, and I use the word *relic* in the kindest possible way. *Coral Wings*, registration VH-WET, proved to be ideal for our plans.

With DOTC Licensing as VK9WW in place, and agreement on the charter costs for the plane and the final clearance from the Bureau of Meteorology, things really

began to move. There was a false start due to a change in the date the pilot would be available, but this soon firmed up to the 12th of October. The actual departure was, of course, subject to weather conditions, but things looked good. The three members of the group were Atsu, VK2BEX; Kirsti, VK9NL; and myself. Our total weight was 463 lbs.

Weight became an all-important part of our plans. The plane could not refuel at Willis Island, and as a result we had a severe weight restriction. Atsu and I had many telephone discussions and FAX exchanges over equipment, relative weight, and so on. We came up with three complete stations: one barefoot IC-751, one IC-750AS (JA IC-751) and ICOM 500 watt linear, one 6 meter rig with a 60 watt linear. Antennas were to be two multiband verticals, a Cushcraft R5 and Butternut HF6V, plus a 5-element beam for 6 meters. RTTY operation was to be by means of a lap-top

\*P.O. Box 90, Norfolk Island, Australia 2899





*Coral Wings, VH-WET, Grumman "Super Widgeon," our stalwart transportation.*

computer and terminal unit. In addition, microphones, keys, many meters of coaxial cable, wire, and so on slowly ate into our weight limitation. I know Atsu and I weighed and re-weighed rigs, etc., on several occasions. Great care was taken to avoid any unnecessary items. Atsu went on a diet, losing over 11 lbs. in a couple of weeks, so we were able to take log books along.

We arranged to meet in Cairns, our departure point, on Sunday the 11th of October. It did not give us a lot of time, but we felt that it would be long enough. For our shopping requirements, most of the shops were open on Sunday. Atsu brought all his equipment into our hotel room and a further check was made. Initially things looked very tight in the weight department. I then called the pilot on the telephone and we discussed our plan of action prior to leaving. As a result of our discussion, it was suggested that we could load the plane right away. This now meant that we could shed a lot of weight and certainly make a much easier start in the morning, prior to our departure.

John, the pilot/owner, came over with a highly accurate weighing device known as a "bathroom scale," and a start was made toward finalizing our total weight. With the easy loading of the plane, it was apparent that much saving could be made in shedding outer wrappings such as suitcases and so on. For example, each suitcase weighed almost 2 lbs.

So it was that items were unpacked from suitcases, etc., to become single-wrapped items—e.g., an ICOM 751 wrapped in a towel. As we checked the weight of the equipment items (once again), they formed a heap to one side. John kept a running tally on these weights, finally adding the weight of the three passengers to arrive at the total. Suddenly we were home-free in the weight department. I believe that we shed over 85 lbs. of surplus weight. A drive to the airport with all our items, and an hour or so later everything was on board *Coral Wings* ready for the next morning. We heaved a sigh of relief. We could now relax.

The three of us returned to the hotel room, which looked as though a bomb had hit it. However, we soon tidied up, and the hotel was kind enough to store our suit-



*Loading Coral Wings. Will we get all the gear in?*



*Arrival overhead; Willis Island seems awfully small.*

cases and unwanted packaging ready for our return.

We met up with Harry, VK2BJL, now VK2RQ, and his wife, Mary. Harry and I are old friends, as we had been to Tokelau on a DXpedition in 1982. They took good care of us in Cairns, and we shared a pleasant evening in a local club. Harry arranged to pick us up early the next morning and take us to the airport. Of course, we still had a lot of shopping to do.

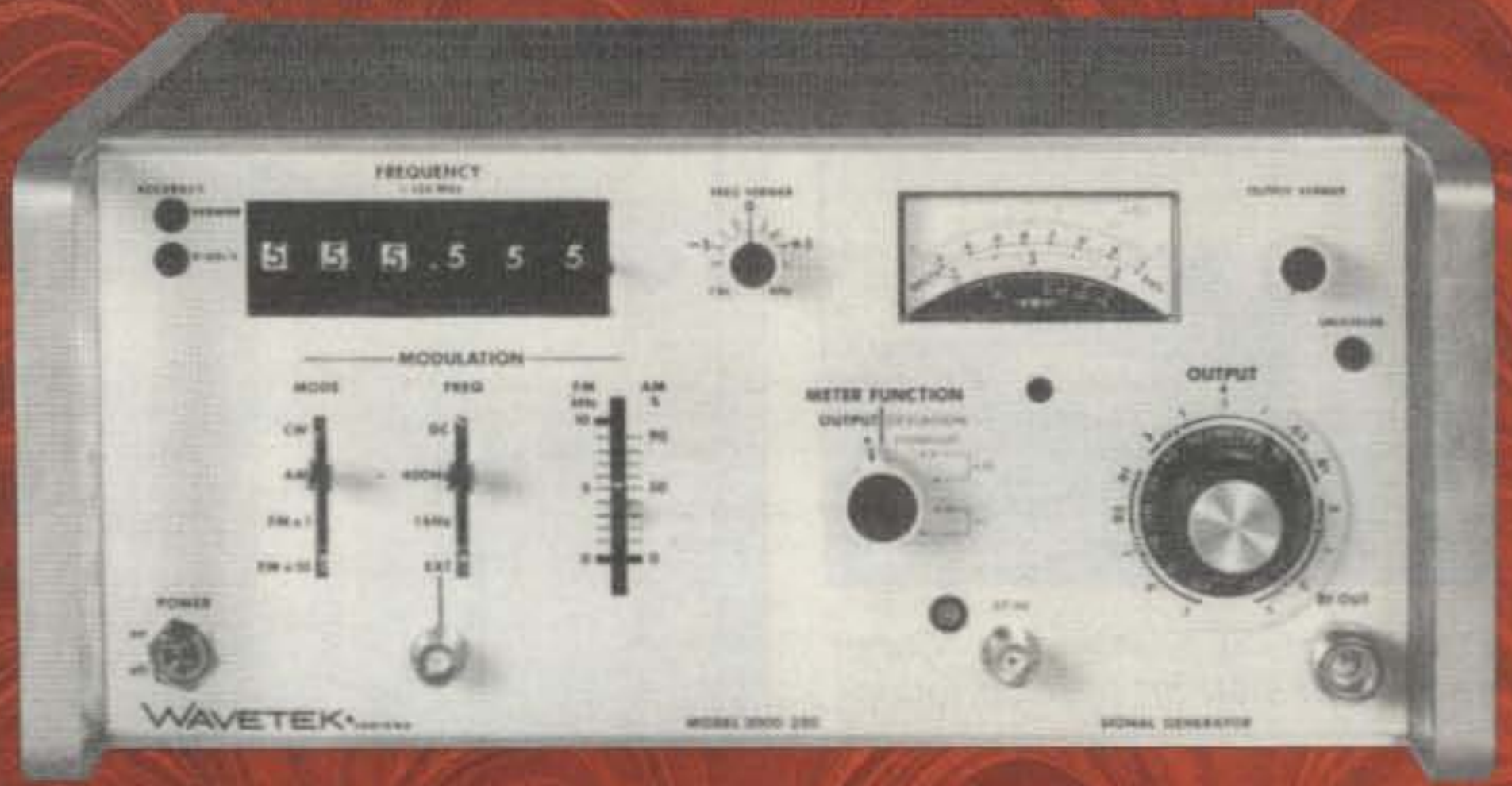
Sure enough, Harry was at the hotel bright and early next morning, and we headed for the airport via the supermarket. Every item purchased was weighed by the checkout girl. However, with the weight saved from the efforts of Sunday, our shopping became very straightforward. With a couple of minor exceptions, we managed to get everything required. We did make a couple of sacrifices at the checkout

counter—13 lbs. of bananas instead of 26 lbs., and so on. Since the plane would fly empty to pick us up, we had made arrangements to have the pilot bring several things to Willis Island on that leg.

Our departure point was the international terminal at Cairns, since there was a requirement that we clear Australian customs. This clearance was very straightforward, and of course we were carrying almost 135 lbs. of items, including those things purchased at the supermarket. *Coral Wings* looked tiny and was parked just a few meters away from a Qantas jumbo jet. We soon finished our final loading, and we were all aboard. The Grumman "Super Widgeon," being amphibious, is fitted with an undercarriage, and soon we were taxiing ready for take-off. It was about 10:30 in the morning and we were running about one hour later than planned. Not bad!



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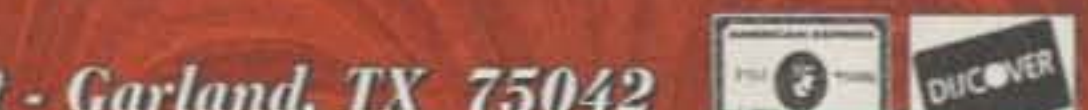


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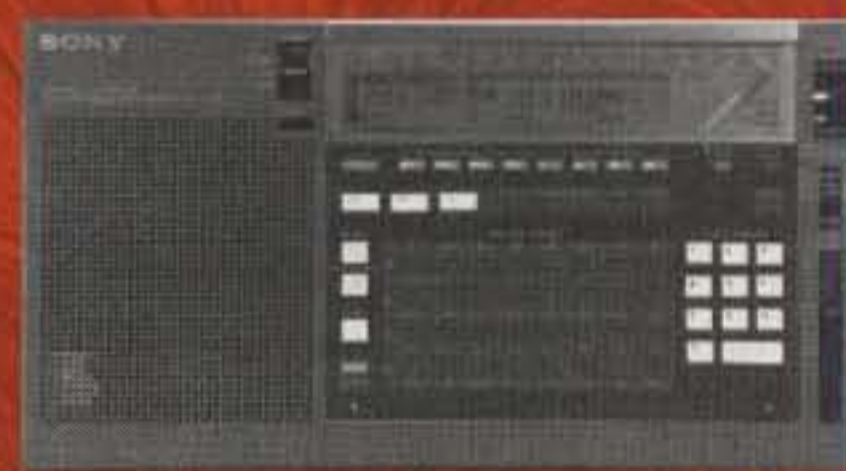
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Unloading Coral Wings after its arrival.

Flying over Cairns only took a few minutes and then we were heading out to sea, climbing steadily, on course for Willis Island some two hours flying time away. We

soon reached our cruising height of just over 6,000 feet and flying jump seat reminded me of Papua New Guinea—in those days I had flown thousands of miles



Kirsti operating VK9NLW.



Atsu operating RTTY.

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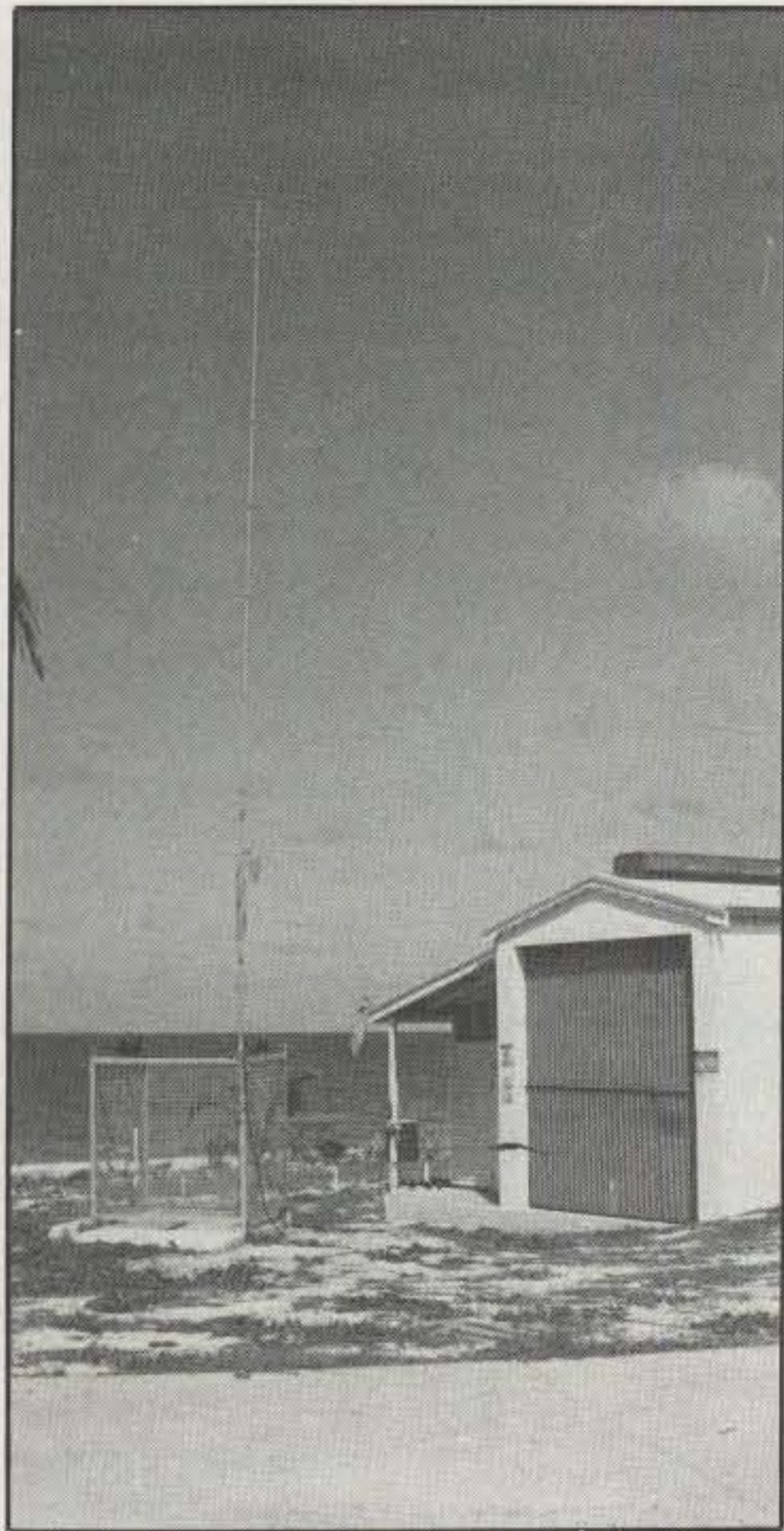
in small aircraft. None of us have any doubt that we "flew" to Willis Island and back again. Our intimate contact with this plane for every inch of the way remains with us; we flew by the seat of our pants. Flying many miles over open water in any small plane is a sobering experience, not like those jumbo flights at all.

With a satellite navigator on board (a recent purchase by the owner/pilot) Willis Island would be easy to find. However, the pilot later made an interesting comment saying that the island was about two miles "off course" on the current charts. If correct this is an interesting discrepancy, especially if arriving by sea.

Just as we started our descent for Willis Island the sea began to roughen up. Until this point it had been very smooth and calm. Soon Willis Island was ahead looking very tiny, and first impressions are lasting. We were now on approach for landing and the sea swell looked quite heavy. The landing was very bumpy, but after three hefty bounces, lots of water on the windscreen and presumably elsewhere, we were taxiing towards shore. (Kirsti reckons that on landing she did not have time to scream!)

The welcoming party of the current four island residents was on the beach to meet us. They gradually became life size as we taxied through the opening in the reef. Incidentally, we taxied with the undercarriage down—better to hit a reef with the wheels than the hull. "Good idea," I thought. John





The HF6V all ready to go.

was able to put *Coral Wings* right up onto the beach. He wanted a fast turn-around before the weather got any rougher. There was a mad scramble to get everything off the plane and heaped on the white beach. As we unloaded we all made a hurried introduction to each other. John, the pilot, topped off his tanks from the jerry cans he carried, and before long he was ready to be on his way.

After take-off *Coral Wings* circled the island and set course for Cairns. It had all taken just a few minutes, and standing on the beach we all looked at one another. Willis Island, we have arrived! By the time we had moved everything up off the beach to the base area, it was getting quite windy. In fact, a couple of hours later a landing would have been impossible, and this gusty weather was around for several days.

The OIC (Officer In Charge) suggested that we set up our stations in the workshop area, and this suggestion was welcomed by the three of us. In due course the two HF rigs were set up, and the two verticals assembled and connected. So it was that within a couple of hours of arrival VK9WW and Kirsti, VK9NI/portable Willis were up and running. There were still things to do—6 meters antenna, wire antennas, and so on still to be completed—but we were active. The amateur radio grapevine would soon spread the word: "Willis Island is on the air."

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Jim and Kirsti just before leaving Willis.

Like all DXpeditions, once they are up and running things become hazy. It becomes a battle of one's own stamina against the endless pile-ups, and things move along with another antenna organized and other bands worked. In the first day we had an early opening on 6 meters, which was followed by a couple of days of complete silence. On a suspicion that things were not okay, the antenna was brought down. This brand new antenna had a faulty connection in the gamma match. This was fixed, and at least there was confidence that if the 6 meter band opened again, at least we would know. Atsu chipped away at the pile-ups, and then



Our hosts—the meteorological team on Willis Island.

VK9WW also became available on RTTY. Meanwhile, Kirsti and I shared the other station, each operating as long as we could, then changing over. It became days

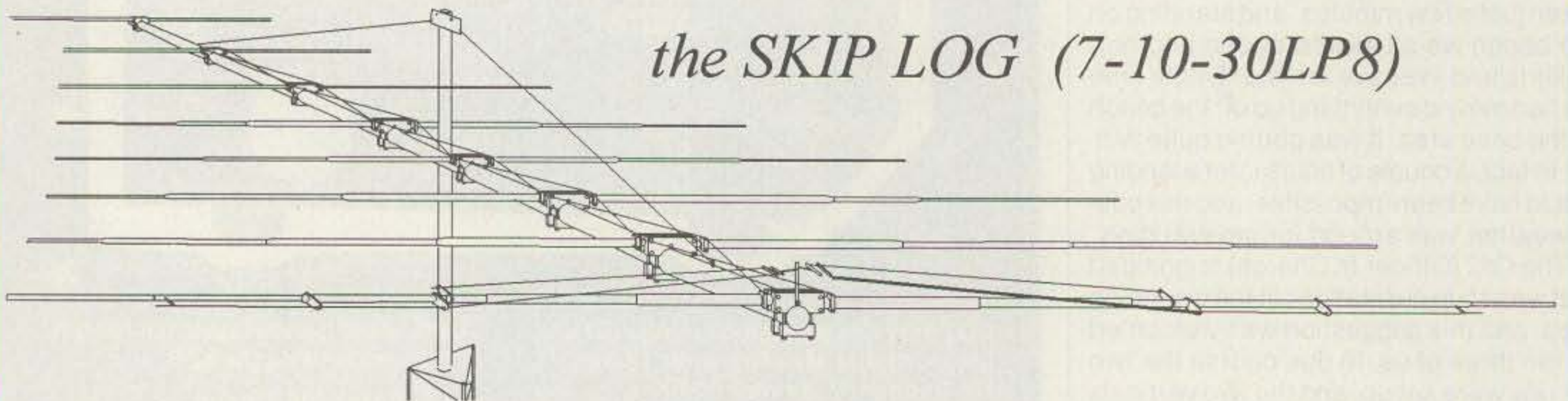
of operating, catching a few hours sleep, and another swop of operators. It worked out very well.

The workshop operating area was quite

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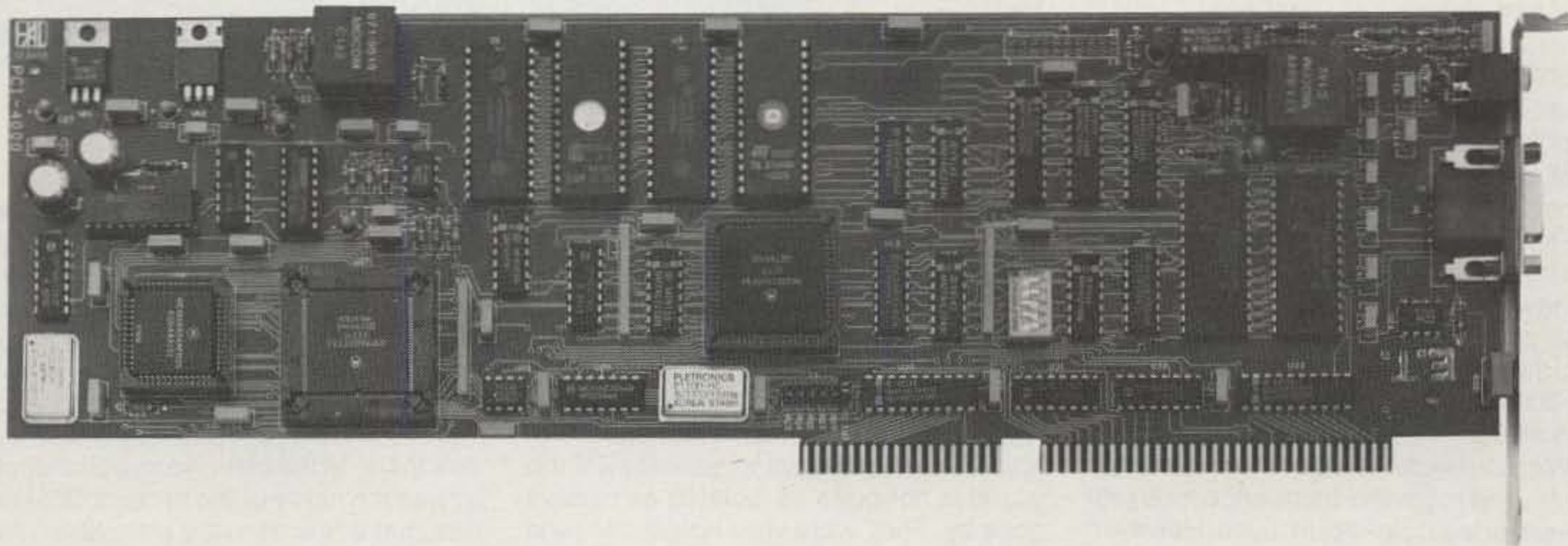




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noisy, but since it was air-conditioned it was a real bonus for us, allowing us to operate with little real fatigue. As the QSO totals crept up, after a few days we knew that the DXpedition was beginning to look okay. Still, you know what they say: "Never count one's chickens," "Don't get overconfident," etc., and sure enough the ICOM 750AS quit—no transmit on any band nor any mode. It took me some time to get to the problem, but finally we were back on the air again. Murphy had been defeated once again.

Of course, the daily life and work of the island went on. To avoid any possible interference problems we shut down during the daily morning weather observations, which started with the launching of the weather balloon. As it headed for the atmosphere it was then tracked by radar until it burst. Shortly after, we got the okay, and it was back to the pile-up. As time and band conditions permitted, each of us in turn toured the small island, looking at the countless sea birds which call Willis Island home. We all have our share of close-up bird photographs of boobies, frigate birds, etc. We also saw signs on the beach of turtles having come ashore, and on one occasion one was swimming a few meters off shore.

We also began to learn more about our hosts, and in joining them once a day for a meal, at least we kept in touch. However, as things turned out, propagation was not



Coral Wings arrives for the pick up.

too bad, and there was almost always a band open. Our operation became more or less around the clock, closing when the bands finally closed. There were good openings to most areas during our stay.

The small meteorology group on Willis Island has very good facilities for living and recreation time, a well-stocked library, etc. Also, with these days of satellite TV the island is not quite as isolated as in days gone by. They were very hospitable, and I suppose our arrival brought some mea-

sure of change to the normal daily routines. During one of the morning sessions a VK station called me and mentioned that he had been on Willis Island many years ago. In asking his name, I asked him to hang on. I quickly checked the Roll Board, which carries the year and names of all previous staff members. Sure enough, his name was there. In the same year, coincidentally, was the name of the present OIC! So it was that a few minutes were taken from the pile-up while they caught up with life

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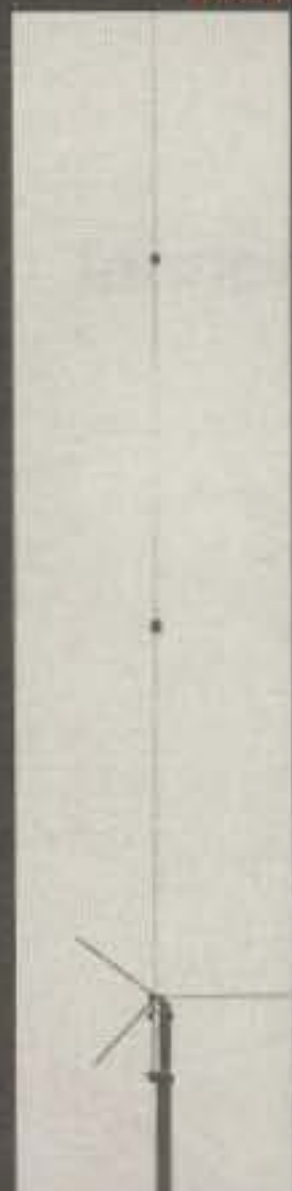
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Gain & Wave:  
146MHz 6.5dB  
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Length: 10' 2"  
Connector:  
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**FL-62S**  
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146MHz 3.5dB  
1/2 wave  
446MHz 6.0dB  
5/8 wave x 2  
Max Power: 150 watts  
Length: 3' 5"  
Connector:  
UHF (PL-259)



**FL-67S**  
Gain & Wave:  
146MHz 4.5dB  
5/8 wave  
446MHz 7.2dB  
5/8 wave x 3  
Max Power: 150 watts  
Length: 4' 11"  
Connector:  
UHF (PL-259)



**CX-224**  
Gain & Wave:  
146MHz 2.15dB  
1/2 wave  
222MHz 3.6dB  
5/8 wave  
446MHz 6.0dB  
5/8 wave x 2  
Max Power: 100 watts  
Length: 3'  
Connector:  
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since they had last worked together on Willis Island.


Finally it was time to get ready to go. We were due to be picked up at about 0900 on the Monday morning. We would have spent 7 days, less a couple of hours, on Willis Island. With some 18,000 QSOs in our collective logs things had gone very well. Starting quite early in the morning we gradually prepared for pick up, taking down antennas, rolling up coaxial cable, and so on. About one hour prior to our projected departure we closed down, and VK9WW and VK9NL/W went silent. As we tidied up the workshop, after our packing was more or less finished, we were left with those moments after all DXpeditions—the beginning of the switch off, a return to normality, the relaxation which comes about in the knowledge that things have gone well and one can begin to wind down.

Soon all our gear, nicely gift-wrapped again, was on the beach. Had it really been a week since we arrived? It seemed more like a couple of hours! Shortly after, we heard *Coral Wings* approaching, and within a few minutes John was taxiing on the beach once again. This time, free of weight restrictions, John had brought a few goodies for the group, courtesy of HIDXA. The plane was unloaded quickly, and John completed his tank topping off exercise.

We soon had all our gear on board, and with a final cheerio to our hosts we boarded the plane. We were on our way. This time the weather was fine and the take-off easy. Once again we were in the air looking down at Willis Island. This time we knew every bit of the island, and as we got a little higher we saw the other islands of the Willis Group in the distance. They are not visible from Willis Island, as they lie just over their horizon.

The two hour trip back to Cairns was uneventful, and soon we were on the approach to Cairns airport, ready for landing. Shortly after John got customs clearance for us, and we could then proceed directly to the "small aircraft" terminal. This meant very easy unloading, and I was soon telephoning for a taxi. After saying goodbye to John, we headed back to the hotel and checked in. The Willis Island DXpedition had finished. Like all true DXpeditioners, a couple of hours later Atsu was already starting to enter his part of the VK9WW log into the computer log. This was dedication!

Our Willis Island QSL card carries acknowledgment and sincere thanks to the many who helped make this operation successful. Atsu proved himself to be a real asset to our small team. He carried a large share of the operating during our DXpedition. Thanks also to Kirsti for her dedication to the exercise and her activity of giving many a new YL a country.

To our four friends on Willis Island, a big thanks, and we trust that we as radio amateurs brought some cheer to your lonely spell on this tiny island. Many thanks. 

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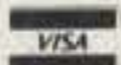
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**In this installment W2FMI takes up the topic of dual-ratio ununs. As we will learn, multi-match designs start to become more complicated, but they do yield very broad bandwidths.**

## Dual-Ratio Ununs

BY JERRY SEVICK\*, W2FMI

The first three articles in this series on ununs (unbalanced-to-unbalanced transformers) basically covered single-ratio transformers. Broadband ratios of 1.33:1, 1.5:1, 2:1, and 4:1 were the design objectives. The 1.33:1 ratio was obtained by tapping a 1.5:1 (actually 1.56:1) quintufilar-wound unun. The 2:1 ratio was obtained by tapping a 2.25:1 trifilar-wound unun. Although these transformers can be considered to have two broadband ratios (1.33:1 and 1.56:1 or 2:1 and 2.25:1), their two ratios were not different enough for many practical applications. This is especially true with antennas where the input impedance varies with frequency.

This article presents two ununs which have two broadband ratios that differ by a factor of two! One has a 1.5:1 and a 3:1 ratio (actually 1.56:1 and 2.78:1). The other has a 2:1 (actually 1.78:1) and a 4:1 ratio. Also, this article introduces the novel technique of connecting these two transformers in parallel on their 50 ohm sides, resulting in four very broadband ratios!

Earlier work by the author<sup>1</sup>, and a recent one by Dick Genaille<sup>2</sup>, have shown that a host of ratios (less than 4:1) can be obtained by tapping the bifilar winding of a Ruthroff 4:1 unun.<sup>3</sup> But the bandwidths obtained by this technique are quite limited with each ratio and are highly dependent upon the impedance level. This is particularly true when a rod core is used, since it requires more turns (resulting in longer transmission lines) in order to obtain the necessary choking reactance which isolates the input from the output. Furthermore, ratios around 2:1 exhibit more loss because autotransformer action also enters into the matching process.<sup>1</sup>

By using quadrifilar and quintufilar windings on small 1.5 inch OD cores and connecting them such that the characteristic impedances of the windings are near op-

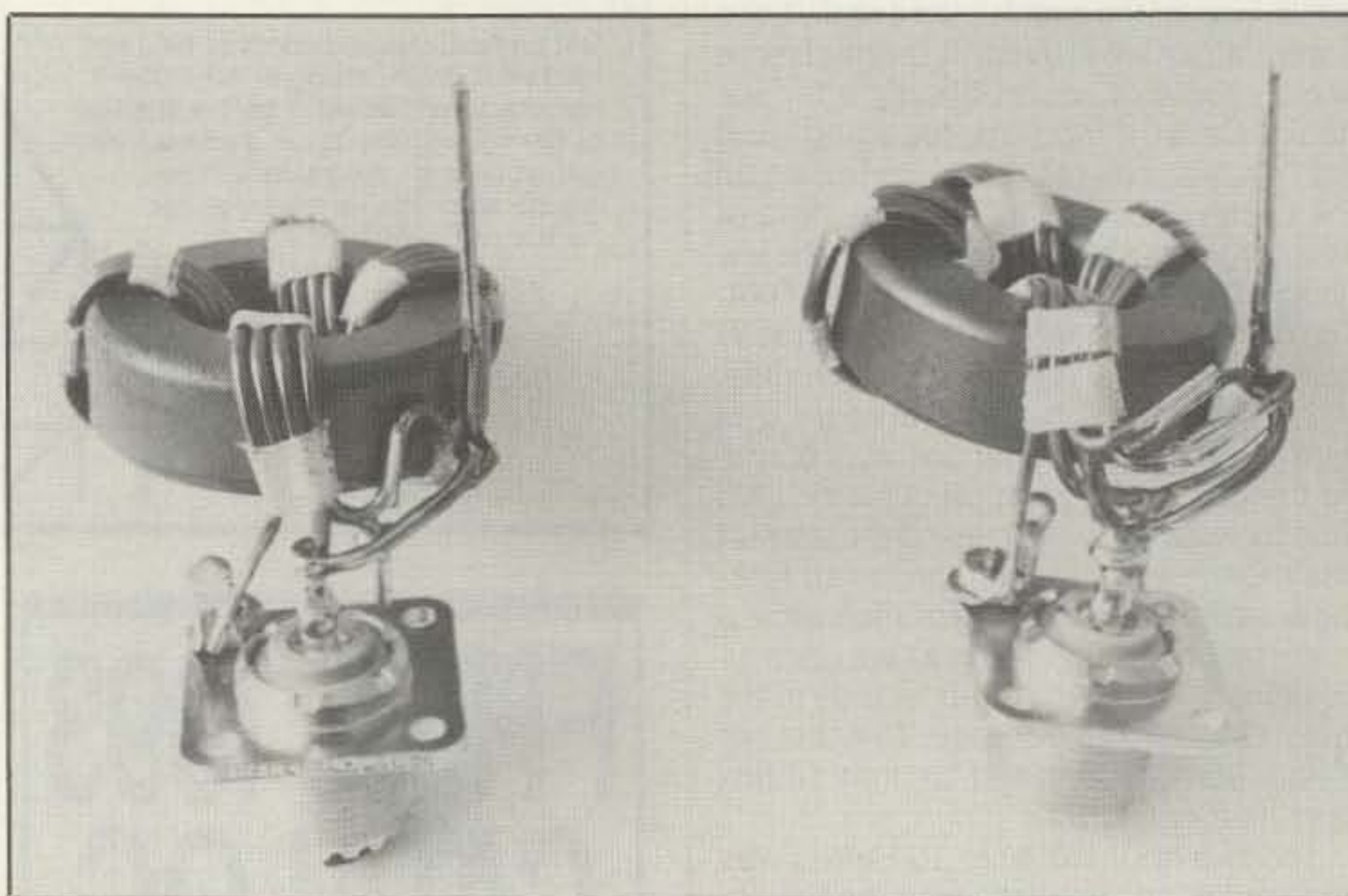


Photo A— On the left, a quadrifilar unun with ratios of 1.78:1 and 4:1; on the right, a quintufilar unun with ratios of 1.56:1 and 2.78:1.

imum, two very different and broadband ratios matching 50 ohms to lower impedances are obtained. Furthermore, since the transmission lines in these transformers are so very short (8 to 9 inches in length), these transformers do quite well in matching 50 ohms to higher impedances (as step-up transformers).

And finally, this paper presents some views on power ratings and failure mechanisms. Since this phase of the transmission line transformer is probably the most controversial and least understood, this section could very well be the most interesting of any in this series. I have entitled it *Reflections on Power Ratings*.

### 2:1 and 4:1 Ratios

Fig. 1(A) shows the schematic diagram of the quadrifilar unun yielding ratios of 2:1

(actually 1.78:1) and 4:1. Fig. 2(A) shows a pictorial of its windings. On the left in photo A is the bottom view of an unun. The cable connector is on the 28 ohm (1.78:1) side. This unun has four quadrifilar turns of No. 14 H Thermaleze wire on a 1.5 inch OD toroid with a permeability of 250.

In matching 50 ohms to 28 ohms (connection C-A), the response is flat to within 1 percent from 1 MHz to 30 MHz. From 1 MHz to 50 MHz it is flat to within 2 percent. In matching 50 ohms to 12.5 ohms (connection C-B), the response is flat to within 3 percent from 1 MHz to 30 MHz.

Since very short transmission lines are used, this transformer performs quite well as a step-up transformer. In matching 50 ohms to 200 ohms (connection B-C), the response is flat to within 3 percent from 1.5 MHz to 10 MHz. In matching 50 ohms to 89 ohms (connection A-C), the response

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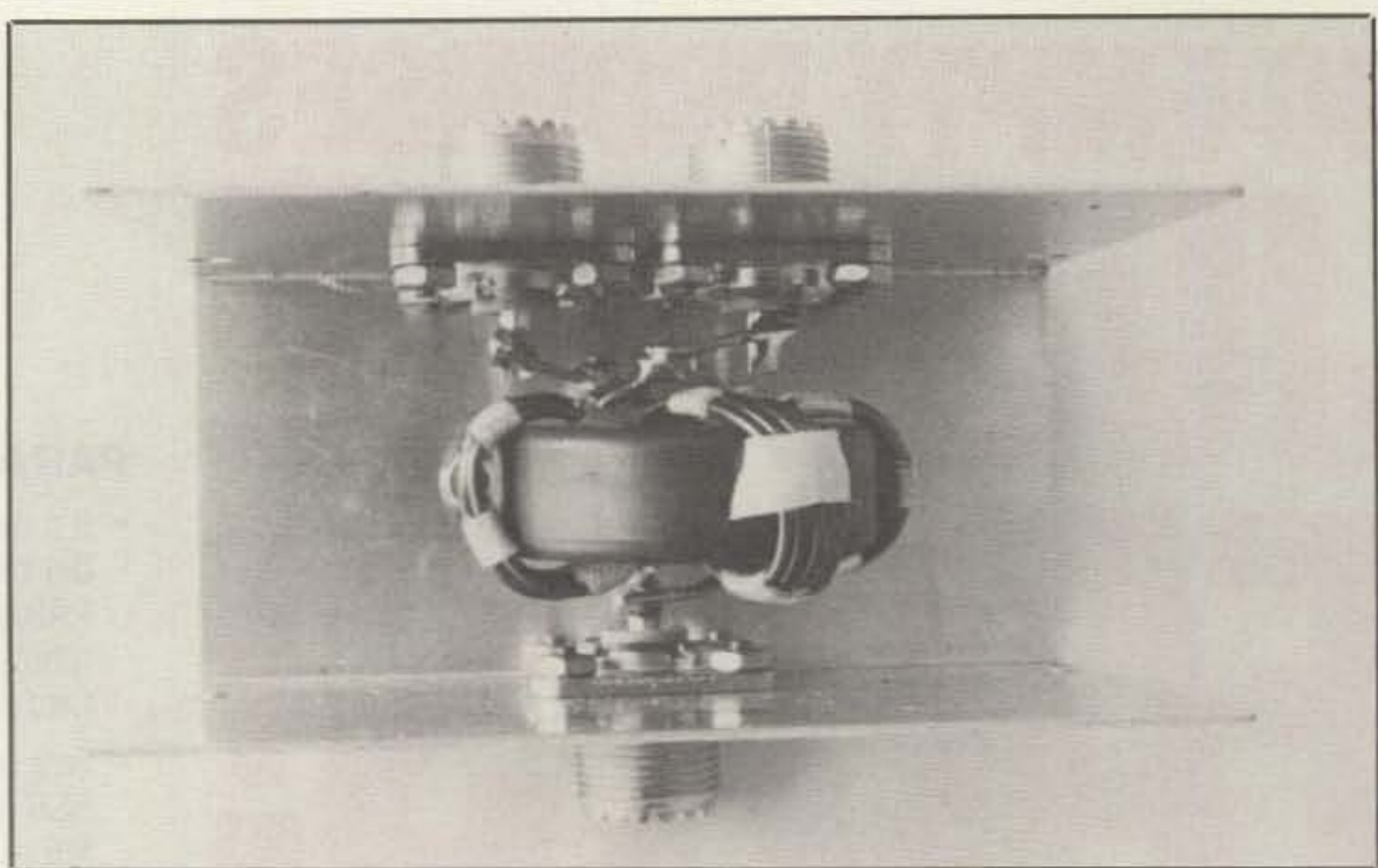


Photo B- The dual-ratio quintufilar unun mounted in a 4"L x 2"W x 2.75"H minibox.

is flat to within 5 percent from 1.5 MHz to 30 MHz!

### Construction Tips

Start with about 14 inches of straightened wire. Then form the wires into a ribbon with clamps of Scotch No. 27 glass tape every 1/2 inch. I found that strips 3/16 inch wide and about 1 1/2 inches long do a good job. The clamps should be long enough to go around the wires twice. After winding, connect terminals 2 and 7. Then connect terminals 3 and 8. And finally, connect terminals 4 and 5. Since work-hardening takes place quickly, a pair of pliers and a strong thumb (and arms) are necessary tools. Also, winding these exceptional performing transformers is not easy. As in all endeavors, practice really pays off.

### 1.5:1 and 3:1 Ratios

Fig. 1(B) shows the schematic diagram of the quintufilar unun yielding ratios of 1.5:1

and 3:1 (actually 1.56:1 and 2.78:1). Fig. 2(B) shows a pictorial of its windings. On the right in photo A is a bottom view of an unun. The cable connector is on the 32 ohm (1.56:1) side. This unun has four quintufilar turns on a 1.5 inch OD toroid with a permeability of 250. Windings 3-4 and 7-8 are No. 14 H Thermaleze wire. The other three are No. 16 H Thermaleze wire. Winding 7-8 also has two layers of Scotch No. 92 polyimide tape which optimizes the 1.56:1 ratio.

In matching 50 ohms to 32 ohms (connection C-A), the response is essentially flat (less than 1 percent variation) from 1 MHz to over 40 MHz. Without the two layers of Scotch No. 92 tape, the response varies by 4 percent from 1 MHz to 30 MHz. When used as a step-up transformer matching 50 ohms to 78 ohms (connection A-C) and with the two layers of Scotch No. 92 tape on winding 7-8, the response is flat to within 5 percent from 1 MHz to 15 MHz. Without the extra insulation on winding 7-8, the response is flat to within 5 percent from 1 MHz to 7.5 MHz.

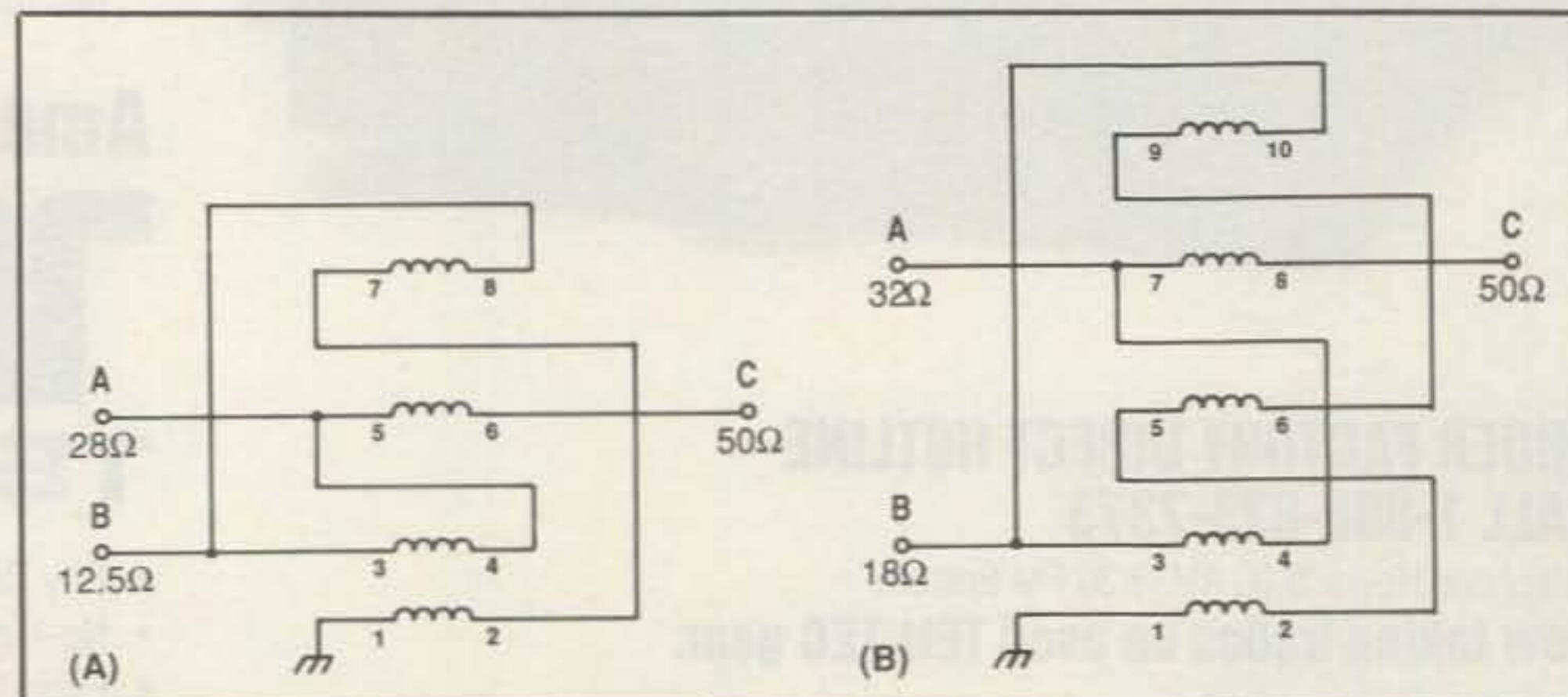


Fig. 1- Schematic diagrams of dual-ratio ununs: (A) 1.78:1 connection C-A, 4:1 connection C-B; (B) 1.56:1 connection C-A, 2.78:1 connection C-B.



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In matching 50 ohms to 18 ohms (connection C-B), the variation in response is less than 3 percent from 1 MHz to 40 MHz. The response is the same whether winding 7-8 is covered with the extra insulation or not. As a step-up transformer matching 50 ohms to 139 ohms (connection B-C), the response is flat to within 3 percent from 1 MHz to 10 MHz (with or without the extra insulation on winding 7-8). Photo B shows this unun mounted in a 4"L x 2"W x 2.75"H minibox. The two cable connectors on the low-impedance side could be replaced with feed-through insulators for antenna use.

## Construction Tips

Prepare the ribbon as was described for the quadrifilar unun. If you choose to use the two extra layers of Scotch No. 92 tape on winding 7-8, then make sure this winding is on the outside position of the ribbon. Refer to the pictorial in fig. 2(B). I found the best order in connecting the wires to be: first connect terminal 2 to 5; second connect terminal 6 to 9; third connect terminal 3 to 10; and finally, connect terminal 4 to 7. As was mentioned before, since a small toroid is used in order to achieve the best response (due to shorter transmission lines), this transformer also requires considerable strength and patience in the winding process.

## Parallel Transformers

One of the most pleasant surprises with these efficient and broadband transformers was to find that they can be connected in parallel on their 50 ohm sides and still possess their same performances. Since the loading effect of one transformer on the other is minimal (like a short length of transmission line), the transformer that is properly terminated takes the power while the other one is transparent. This allows you to obtain four very wideband ratios with the two dual-ratio ununs described in this article. Obviously, this technique eliminates one transmission line. Furthermore, baluns can also be connected this way for feeding, with a single coaxial cable, beams, and dipoles with different resonant impedances.

Photo C shows an example of two transformers connected in parallel on their 50 ohms sides using the two dual-ratio ununs described in this article. As was mentioned, it now yields four wideband ratios very close to 1.5:1, 2:1, 3:1, and 4:1. I have used this matching network to feed a host of ground-fed antennas (over a good ground system). In one case I had a 10, 15, and 20 meter trap vertical, slopers for 40 and 160 meters, a 12 meter vertical, and an inverted L for 80 meters all matched to a single coaxial cable at the same time. It was a simple matter of connecting each

antenna to the output terminal that presented the best match (lowest VSWR). This technique is actually an extension of connecting dipoles, for different bands, in parallel. The antenna that presents the right impedance takes the power, and the others are essentially transparent. In many cases I found that only one transformer with two broadband ratios performed adequately.

## Reflections on Power Ratings

One of the most controversial and least understood specifications for the transmission line transformer is the power rating. As of today, no professional group has yet set the standard for this specification (as well as any other one) for this popular class of matching transformers. In fact, manufacturers of ferrites, which are mainly the materials used with these devices, only specify them for their use as conventional transformers and inductors or microwave devices.

It is well known that power ratings for practically all conventional devices are based upon catastrophic failures (usually exceeding a voltage limit) and failures over a relatively short period of time because of an excessive rise in temperature.

With transmission line transformers there are really two catastrophic-type failures. One is voltage-breakdown. If the de-



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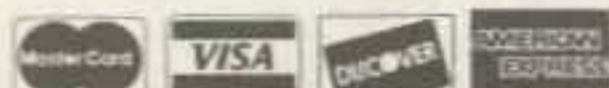
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vice is mismatched with a high impedance (especially an open-circuit), a breakdown of the insulation can occur. This is especially true of the 1:1 balun (50:50 ohms) that is terminated with the very high impedance of a full-wave dipole or inverted V. Using heavy-coated wires (but still maintaining a characteristic impedance close to 50 ohms) or high-breakdown coaxial cable can help under these conditions.

The second catastrophic failure occurs at the low-frequency end of the transformer's passband when the energy is not completely transmitted to the output circuit by a transmission line mode. This takes place when the reactance of the coiled or beaded transmission lines is not sufficient to prevent conventional transformer currents or shunting currents to ground. Under these conditions, harmful flux can take place in the core or beads. Also, nonlinearities can occur if the flux becomes appreciable. The objective in design at the low-frequency end is to have a margin of safety such that with a termination of about three times (hence VSWR of 3:1) that of a matched condition<sup>1</sup>, no flux will appear in the core or beads.

The failure due to an excessive rise in temperature is the least understood of all because it involves the failure mechanism in transmission line transformers when only transmission line currents are allowed to flow. Unlike the conventional transform-

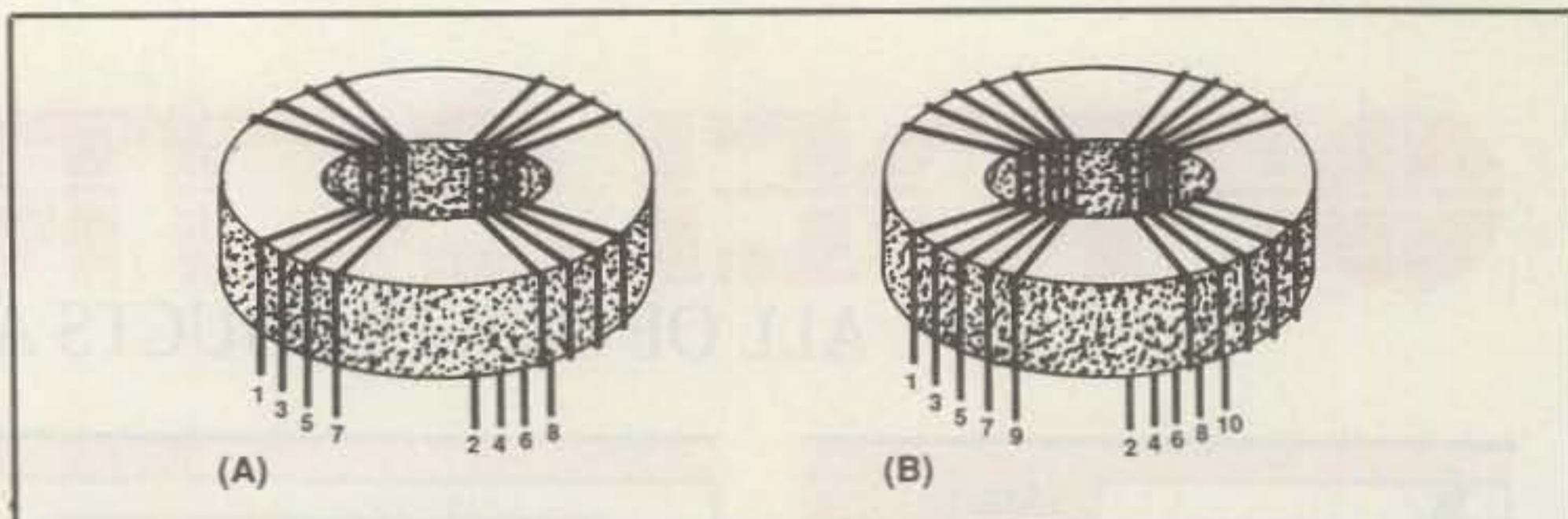


Fig. 2- Pictorials of higher-order windings: (A) quadrifilar, (B) quintifilar.

er the losses of which are current dependent (wire, eddy current, and hysteresis losses), the transmission line transformer's losses are voltage dependent (a dielectric-type). That is, the greater the voltage drop along the length of the transmission lines, the greater the loss. Furthermore, it can be shown that only low-permeability ferrites (less than 300) yield the extremely high efficiencies of which these transformers are capable.<sup>1</sup>

Since all transmission line transformers have voltage drops along their transmission lines, you have to look at their high-frequency models to determine the magnitude of them and hence the temperature rise that can be expected. Here are some examples:

If  $V_1$  is the voltage that appears on the 50 ohm side of the transformer, then:

1. For a quintifilar-wound unun, the longitudinal voltage-drop is  $V_1/5$  in matching to lower impedances (such as 32 or 18 ohms) and  $V_1/4$  in matching to higher impedances (such as 78 or 139 ohms).

2. For a quadrifilar-wound unun, the longitudinal voltage-drop is  $V_1/4$  in matching to lower impedances (such as 12.5 or 28 ohms) and  $V_1/3$  in matching to higher impedances (such as 89 or 200 ohms).

3. For a trifilar-wound unun, the longitudinal voltage drop is  $V_1/3$  in matching to lower impedances (such as 22.22 or 25 ohms) and  $V_1/2$  in matching to higher impedances (such as 100 or 112.5 ohms).

4. For a bifilar-wound unun, the longitudinal voltage drop is  $V_1/2$  in matching to a lower impedance of 12.5 ohms and  $V_1$  in matching to a higher impedance of 200 ohms.

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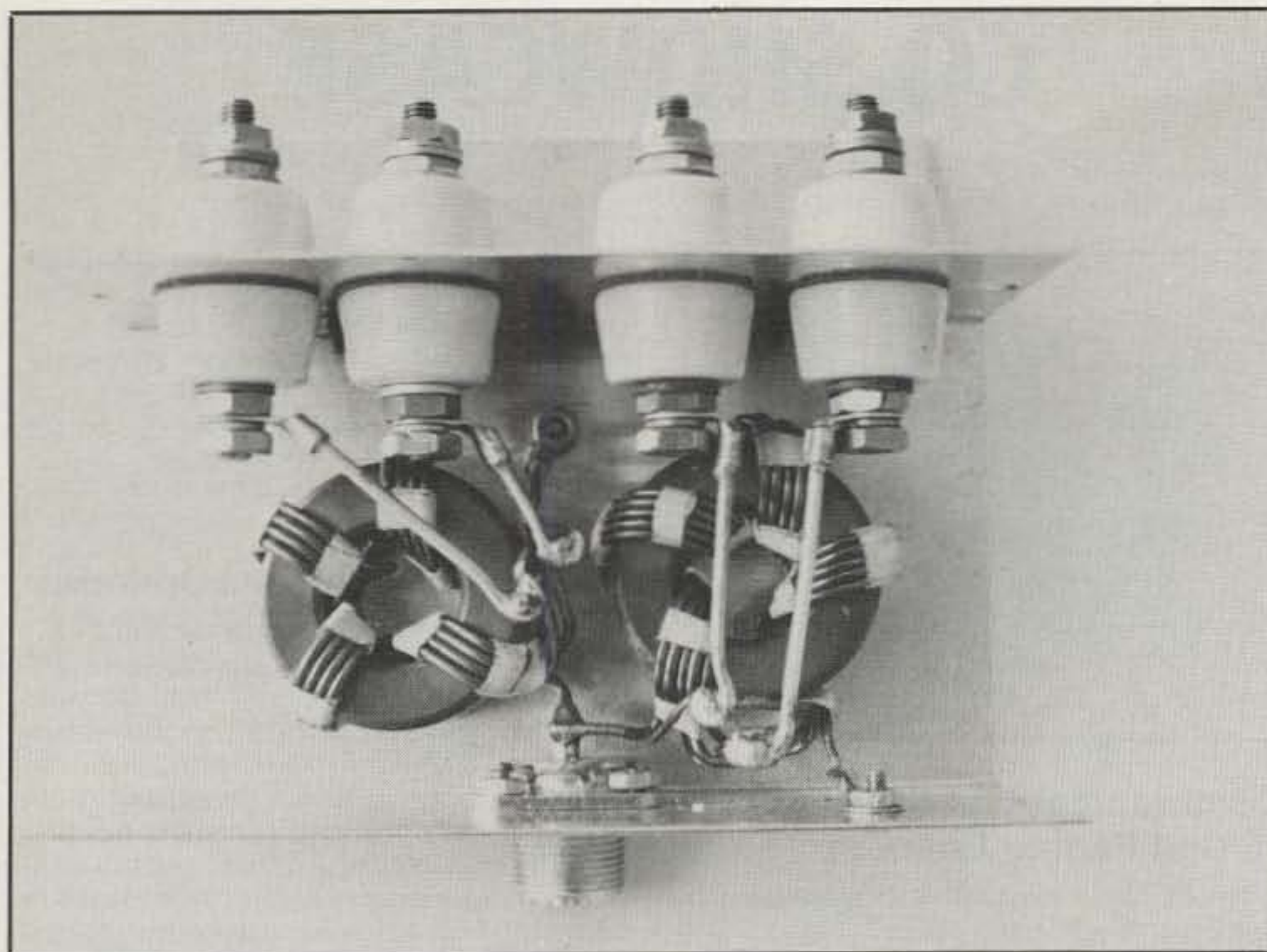


Photo C- The two dual-ratio ununs connected in parallel on their 50 ohm sides giving four broadband ratios close to 1.5:1, 2:1, 3:1, and 4:1. The quadrifilar unit is on the left and the quintufilar unit is on the right. The enclosure is a 5"L x 3"W x 2"H minibox.

Since the quintufilar-wound unun has the lowest voltage drop, it is expected to have the highest efficiency. Furthermore, it can be seen that the highest efficiencies occur in matching to lower impedances. Very accurate measurements<sup>1</sup> have shown that 4:1 ununs, using ferrite cores with permeabilities of 125, have exhibited losses of only 0.02 dB to 0.04 dB in matching 50 ohms to 12.5 ohms from 1 MHz to over 30 MHz. Even though the ununs in this series have mostly used permeabilities of 250 and should have slightly greater losses, they use higher-order windings (trifilar, quadrifilar, and quintufilar) and hence have lower longitudinal voltage drops. Therefore, they should have losses of only 0.02 dB to 0.04 dB as well.

When matching at the 1 kw level, the figures above mean that only 5 to 10 watts would be dissipated in the unun. As a heat-sink, these small transformers should be able to handle this loss easily. In fact, they should be able to handle several times this level of continuous power. Also, because they use heavy-coated wires, their peak-power ratings should be greater by more than a factor of two!

Another important consideration in the power rating is to determine what happens when the transformers are mismatched. Since the losses now considered are dielectric-types and hence voltage dependent, the harmful terminations are greater than that for which the transformers were designed. For example, if the termination is three times greater (a VSWR of 3:1), the voltages along the transmission lines

would increase by a factor of 1.73. This means the losses would practically double. The ununs described in this series,\* when matching to impedances lower than 50 ohms, should easily handle this mismatch. Obviously, mismatches in the range of 10:1 would result in much lower efficiencies and should be avoided.

The analysis of the losses in baluns follows the same pattern. The voltages, under matched conditions for a 1:1 balun (50:50 ohms) is  $V_1/2$ , for a 4:1 balun (50:200 ohms) it is  $V_1$ , for a 9:1 balun (50:450 ohms) it is  $1.5V_1$ , and for higher impedance baluns it could be  $2V_1$ . The higher voltage drops, together with high VSWRs, mean that high-impedance baluns (and ununs) have more loss and require larger structures to dissipate the heat. It should also be pointed out that there is a trade-off in efficiency for low-frequency response with baluns (and ununs) when matching 50 ohms to higher impedances such as 200 ohms, 300 ohms, 450 ohms, and higher. This is done by using permeabilities of 125 and lower.

And finally, I thought it might be useful to give some general guidelines as to what efficiencies you might expect with baluns and ununs when using ferrite cores or beads with a permeability of 250. Here are some expected efficiencies when matching 50 ohms to various loads under matched conditions:

Loads	Efficiency
50 ohms or less	98 to 99.5%
50 to 100 ohms	97 to 98%
100 to 200 ohms	96 to 97%
200 ohms and above	93 to 96%

As was mentioned earlier, these efficiencies would be reduced by a percent or two with a VSWR of 3:1, which increases the loss by a factor of about two. Also, the efficiencies can be increased by a percent or two with high-impedance loads (greater than 100 ohms) by resorting to lower permeability ferrites which trade off efficiency for low-frequency response. In closing, I would like to say that high-permeability manganese-zinc ferrites should be avoided because of their much higher losses. Furthermore, their losses are highly frequency-dependent, while low-permeability nickel-zinc ferrites are not.

## References

1. Sevick, J., *Transmission Line Transformers*, 2nd ed., Newington, CT: ARRL, 1990.
2. Genaille, R. A., "How to Build a Multi-Tap Unun," *CQ*, May 1992, pp. 28-32.
3. Ruthroff, C. L., "Some Broad-Band Transformers," *Proceedings of the IRE*, Vol. 47, August 1959, pp. 1337-1342.

## Footnote

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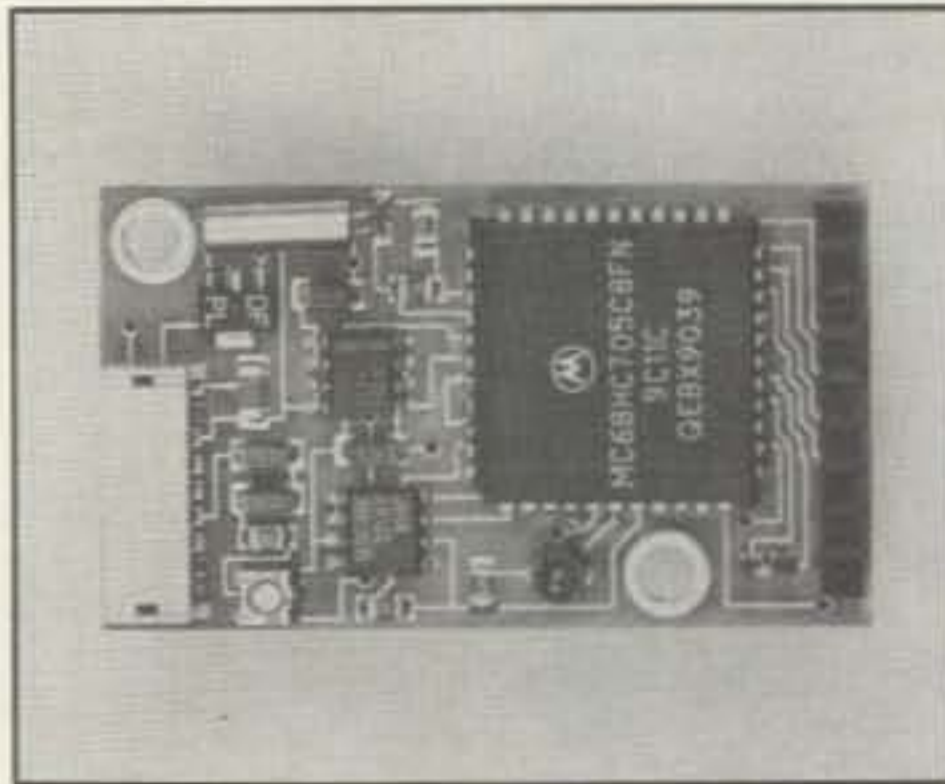
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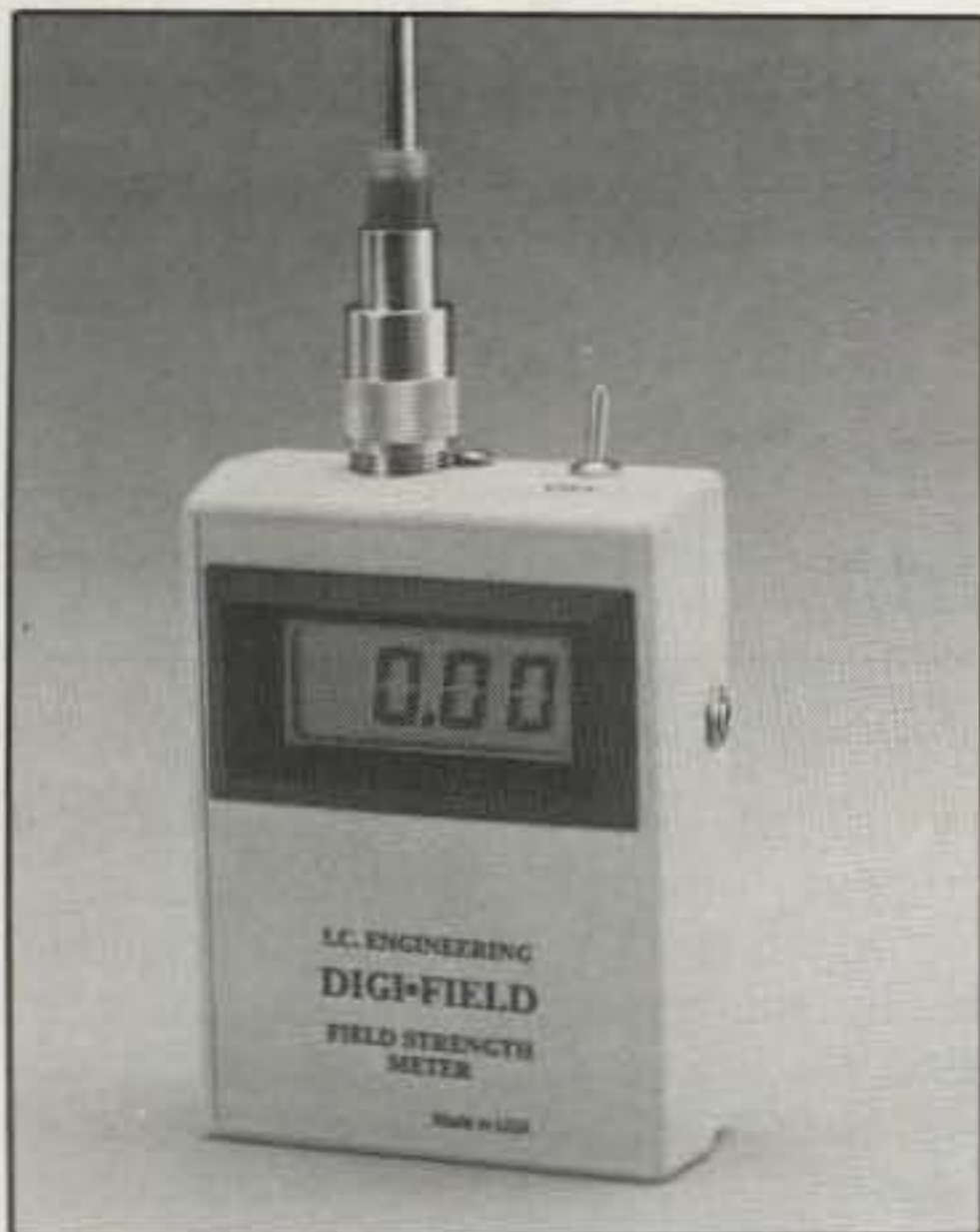
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## Controlled Feeder Radiation

**F**eeding a balanced antenna with an unbalanced coax line will, as every schoolboy knows, result in a certain amount of feeder radiation. That is, RF current flows on the outer braid of the coax because it divides between one leg of the antenna and the coax (fig. 1). There is nothing to prevent it from doing this. The outer braid current radiates, and the coax thus becomes part of the antenna instead of merely being a conduit to the antenna for radio energy.

Outer braid current can also be induced in the coax if the line is out of the plane of the antenna—that is, not perpendicular to the antenna (fig. 2). Few amateurs can bring their coax directly down from the feedpoint because of location of the shack, trees, or other obstructions. As a result, braid current is created by the field coupling between coax and antenna.

What are the effects of braid current? First, it confuses SWR measurements. SWR readings will vary from normal depending upon coax placement and the length of the line. That's the reason why some amateurs think that changing line length "tunes" the antenna. It doesn't, but trimming the coax gives a warm, fuzzy feeling to some operators who have a fetish for low SWR readings.

Second, braid current upsets the radiation pattern and may change feedpoint resistance of the antenna. A Yagi beam, for example, might show very poor front-to-back or front-to-side ratio due to coax line radiation which "fills in" the otherwise excellent beam pattern. Many amateurs diddle with element length to improve front-to-back ratio when coax radiation and/or signal pickup are the real cause of the problem. Odd-ball input impedance values may be caused by an unknown amount of braid current. The operator can compensate for this with the antenna matching system (gamma match, hairpin match, etc.), but the problem isn't solved. It is merely obscured.

Finally, including the coax line as part of the antenna system can bring about interference pickup of a perplexing kind. The use of a computer in the home station has in some instances brought about a serious

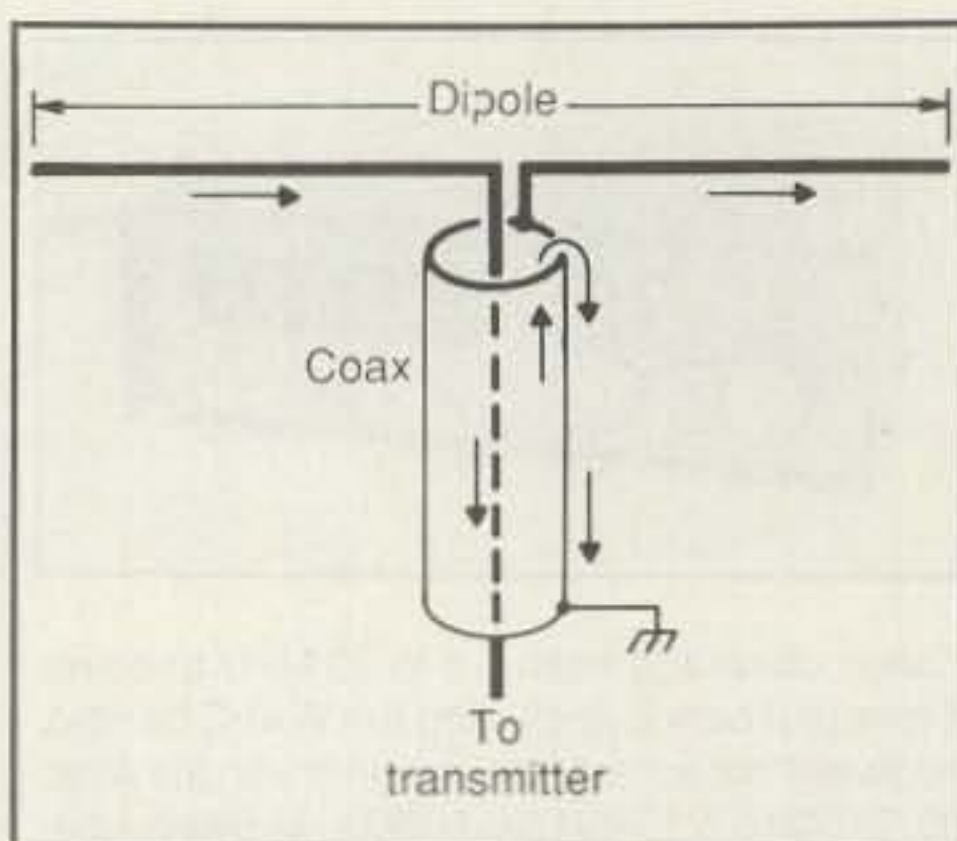


Fig. 1—Current flowing on inner braid of coax divides between one leg of antenna and outer braid of coax.

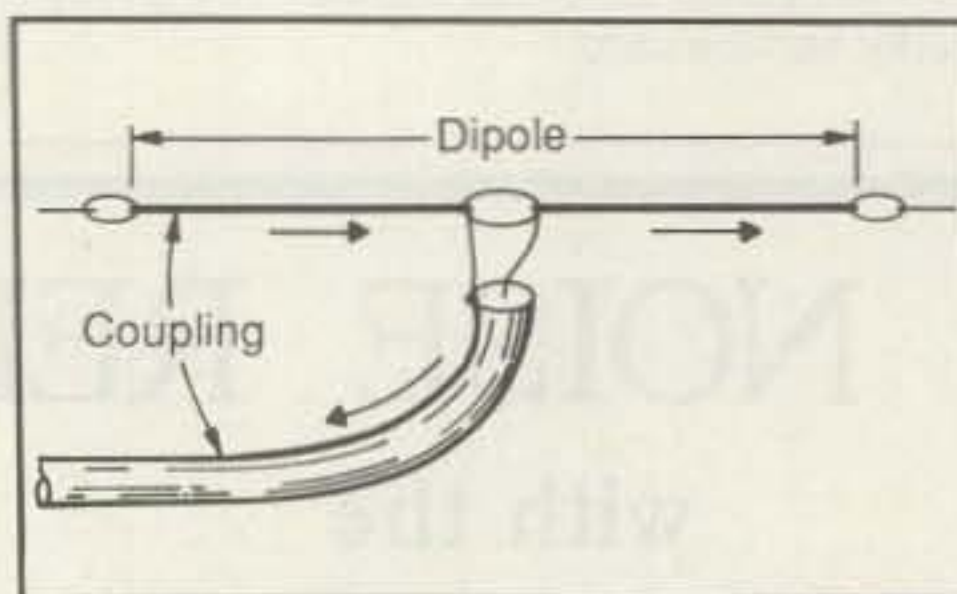


Fig. 2—Outer braid current can also be induced in coax if line does not come away at right angles to axis of antenna.

rise in receiver background noise. Coax pickup is a common cause of this problem. Automobile ignition noise is another source of QRM that is frequently enhanced by coax pickup.

All of these problems can be avoided by placing a current-type line isolator at the antenna feedpoint to choke off directly coupled current, and by bringing the coax line down vertically to ground level in the plane of the antenna to lessen induced current.

### Controlled Feeder Radiation

After this dissertation about the evils of coax shield current, why am I discussing the benefit of controlled feeder radiation? Can the nuisance of coax radiation be turned into a virtue? Some amateurs think

so. A few years ago B. Sykes, G2HCG, suggested using feeder radiation to manipulate the radiation pattern of a dipole to fit his operating needs.<sup>1,2</sup> His dipole was fed with a balun and coax line and provided the classic figure-8 pattern. He couldn't move his dipole, yet he wanted to contact stations off the end of it. To accomplish this he turned the nuisance into a virtue by allowing a quarter-wave section of the feedline to deliberately radiate (fig. 3). This was accomplished by placing a ferrite line isolator down the coax from the feedpoint, permitting a section of the coax to simulate a top-fed quarter-wave vertical antenna having an omnidirectional radiation pattern.

At the time of his experiment G2HCG was living in southern France and wished to communicate back to the UK on 7 MHz. An omnidirectional pattern, created by controlled feeder radiation, proved to be very effective over this path. Two days of deliberate operation without the coax radiator resulted in many comments of reduced signal strength in the UK.

Other amateurs, principally in Europe, have tried the idea with success. At least one US manufacturer features wire antennas with controlled feeder radiation<sup>3</sup> and interest in this novel idea is growing.

It is instructive to examine controlled feeder radiation with an antenna analysis program. I used the K6STI MN4.5 version<sup>4</sup> to see what, if anything, feeder radiation contributes to a dipole antenna pattern. A dipole cut to 14.2 MHz, 40 feet above ground, was chosen as the guinea pig, and the data was input to the antenna program.

With no feeder radiation, the dipole exhibited the classic figure-8 pattern, with maximum radiation at right angles to the wire. Radiation off the end of the antenna was absent.

A vertical radiator about a quarter-wave long was added to the dipole in the manner shown in fig. 3. The length of the vertical section was varied to see what the results would be.

If the vertical section was very short (an eighth-wave, for example) it accomplished little. As the length was increased, vertical radiation increased and the nulls of the figure-8 pattern started to fill in. When the vertical section was about a quarter-wave

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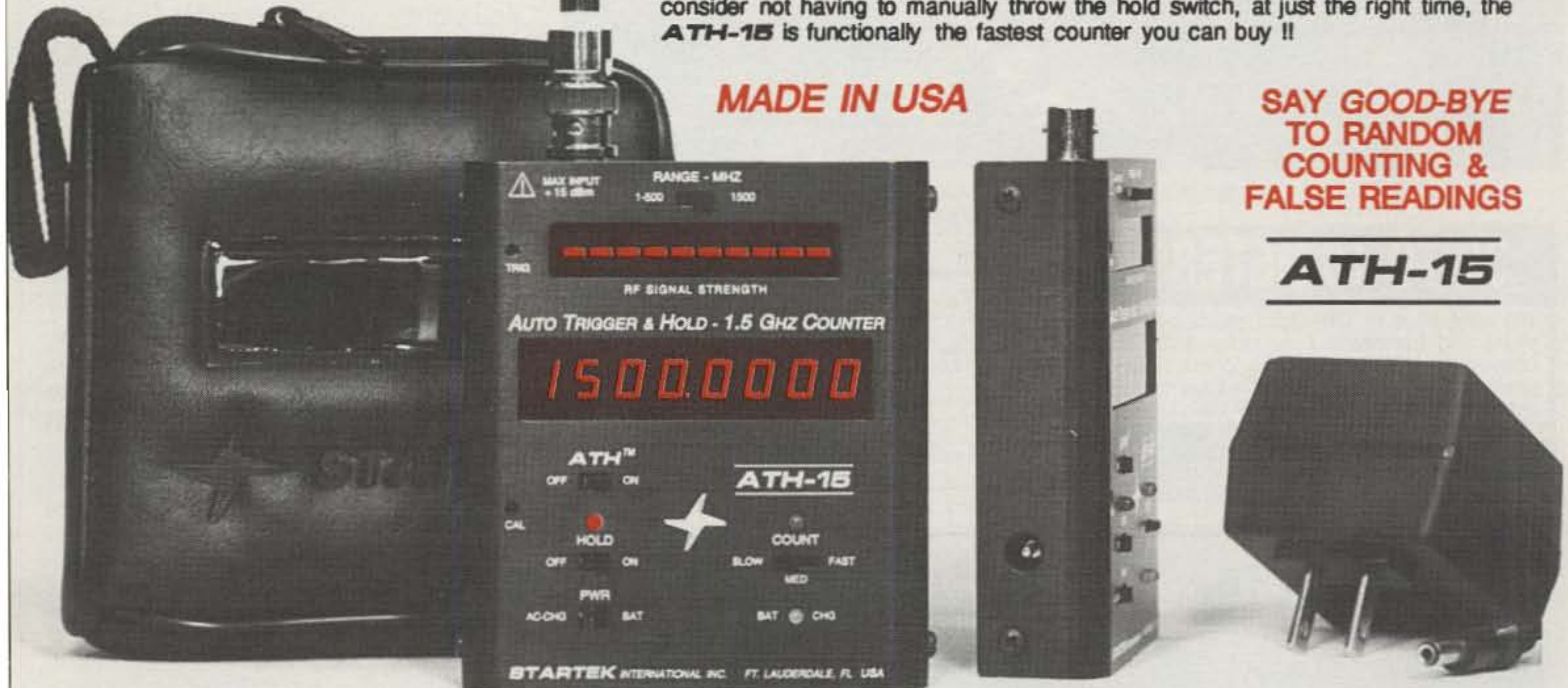
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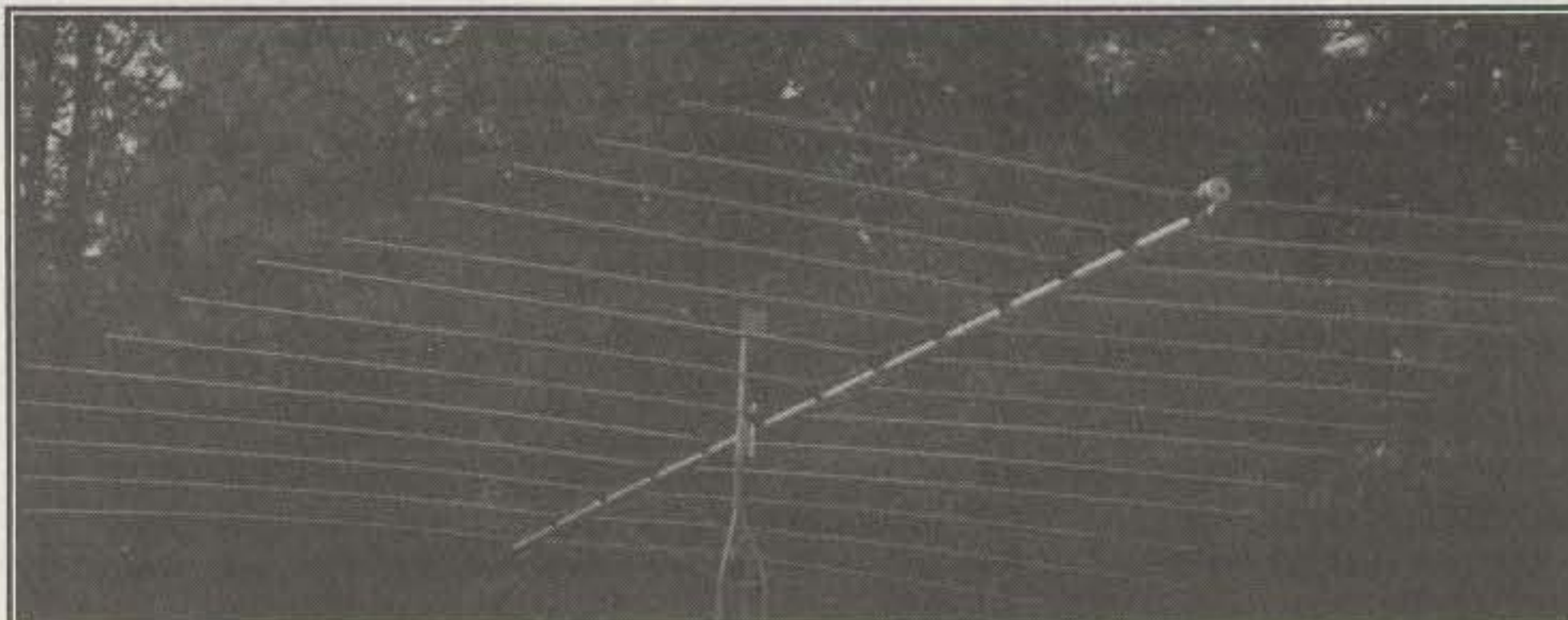
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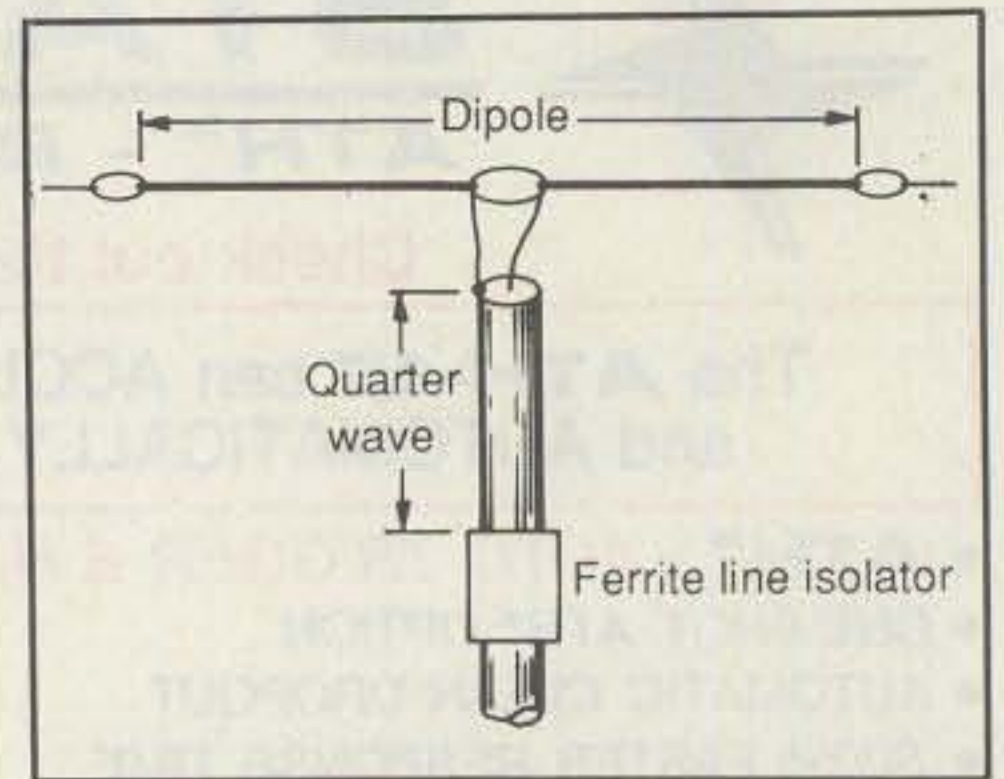


Fig. 3- Quarter-wave section of coax is allowed to radiate by placement of line isolator as shown.

long, the combined radiation pattern was nearly omnidirectional (fig. 4). And, when the vertical section was longer than a quarter-wave, the pattern started to revert back to the figure-8 dipole plot.

I noted that as the vertical section was increased in length, the feedpoint impedance of the antenna and the resonant frequency changed. When a nice, nearly circular pattern was obtained, antenna length was slightly longer than normal. The length of the radiating section of coax was very close to a quarter wavelength. Dimensions for the 20 meter band are shown in fig. 5.

## The Line Isolator

The key to controlled feeder radiation is the line isolator, which provides a very high impedance to outer shield current, effectively choking it off from the rest of the feedline. Choice of the isolator is critical. G2HCG used 10 turns of coax wound on a ferrite core. He states that the choke operates at high impedance and relatively low flux in the core, which allows high-permeability materials to be used without fear of core saturation.

He used British URM-76 coax (.195" OD), which, I assume, is equivalent to RG-58C/U. His core is 1 5/8 inch outside diameter (fig. 6). A relative permeability of at least 50 at the lowest operating frequency is suggested.

While I have not tried out this concept, I would suggest that winding RG-58 size coax on such a small diameter core is a dicey proposition. Bending the coax on such a small radius is not a good idea. I think a 2 1/2" outside diameter core is a better approach. The Amidon FT-240-43 (43 material with a mu of 850) would be my core choice.

It should be noted that the RF on the outside of the coax at the choke point can be quite high, as the end impedance of this section of the antenna can be several thousand ohms. The RF voltage drop across the choke is therefore high. Operation of the antenna in the proper manner depends



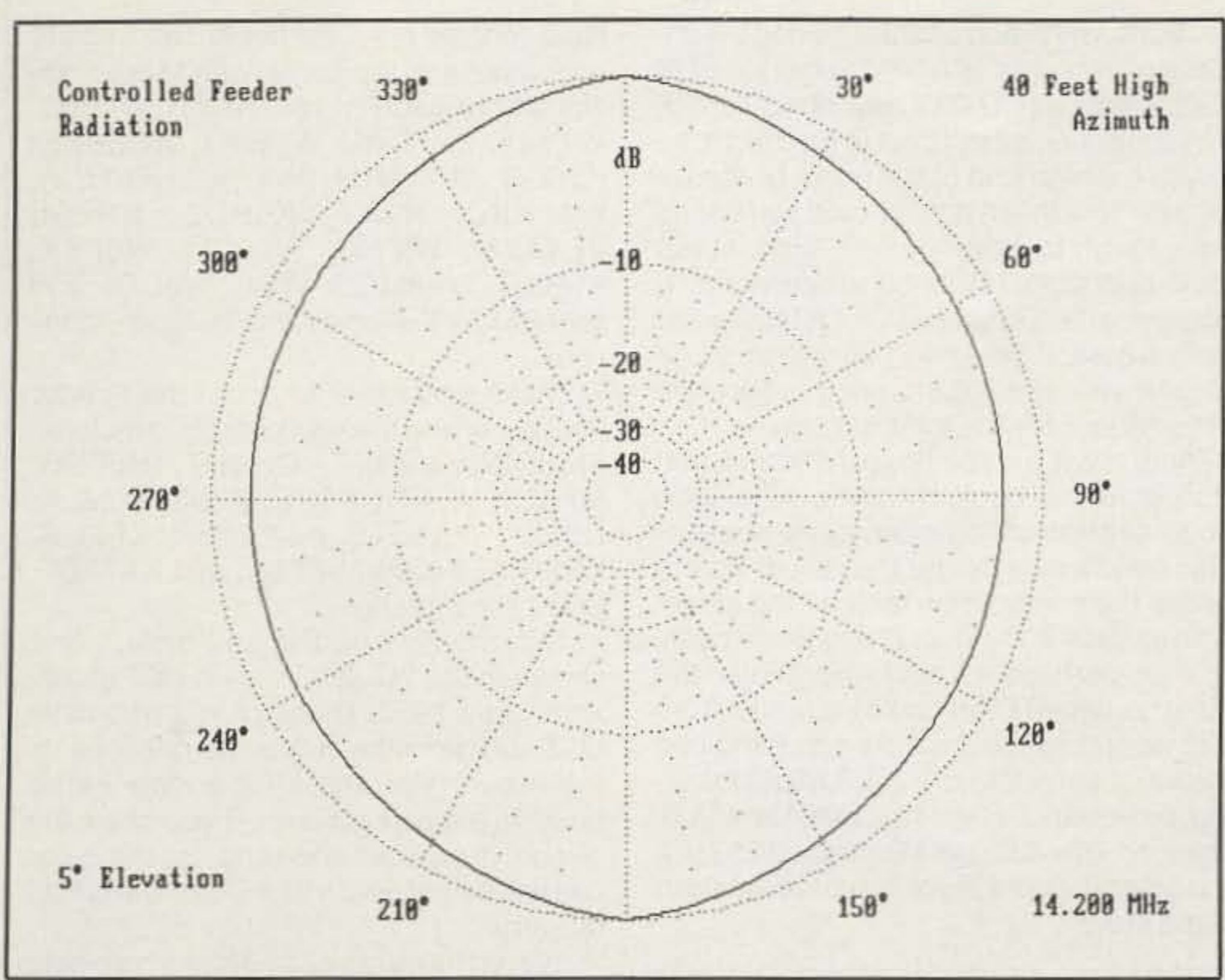


Fig. 4- Nearly omnidirectional pattern of dipole with controlled feeder radiation.

upon the isolation provided by this choke. One candidate for the job might be the Radioworks<sup>5</sup> type 4K-LI isolator. From the illustration in the catalog this device looks like a ferrite rod assembly, as the length of the case is about five times the diameter. In any event, the choice of isolator will undoubtedly influence the length of the vertical section. I would be pleased to hear from experimenters who try this simple antenna. Let me know your operating results.

**Shop Talk**

Ever try to cut RG-8 size coax with wire cutters? The result is usually a messy cable end that has to be trimmed before you can

begin to put a coax plug on it. A better and neater way to cut coax is with a hedge shear sold in most hardware stores and garden shops. The shear has a notch in the blade for cutting small tree branches. It cuts coax cleanly with a single snap of the blade. Try it! You'll like it. In reply to several queries, NEVER use bathtub calk or other everyday household sealant to seal coax plugs or antenna hardware. As it dries it exudes nitric acid that will quickly corrode the metal surface of the plug or coax. A nonacid sealant such as Dow Corning 3145 RTV Adhesive Sealant will do the job without causing this problem. In addition to using the sealant, I fill my PL-259 plugs with Dow Corning Vacuum

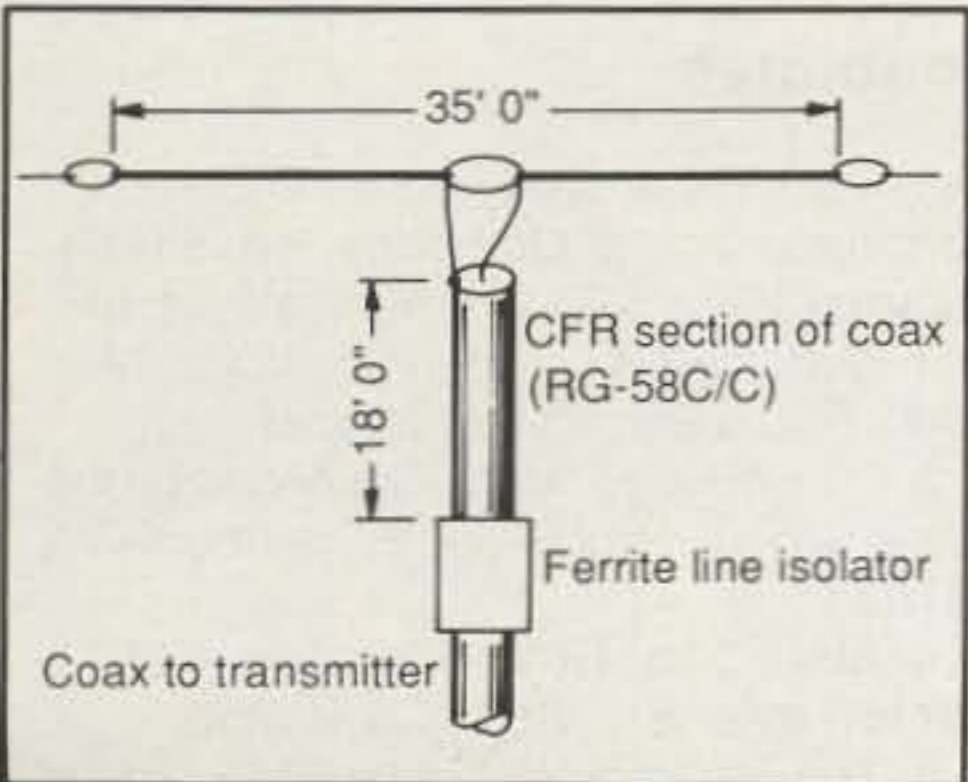


Fig. 5- Dimensions for CFR dipole. Height above ground is 40 feet. Feedpoint impedance is about 40 ohms.

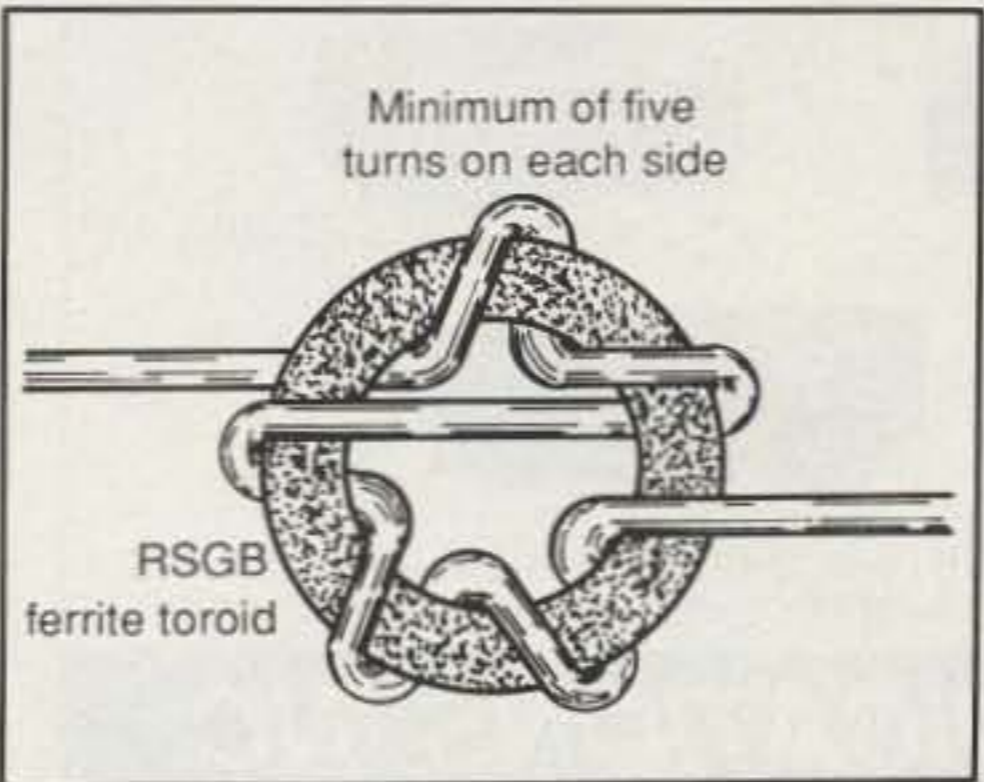


Fig. 6- The G2HCG isolator uses 10 turns of coax on toroid core for 14 MHz dipole. (See text for details.)

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### CQ Book Review

Hello, DXers out there! Many of you enjoy the robust sport of contesting. This high-tech sport is a hotly-fought free-for-all and shows up almost every month, in one form or another, on the principal DX bands.

To the beginner, contesting is a bewildering world of numbers, multipliers, countries, and zones all conducted in a "hot" environment. Confused? Not to worry. Bob Halprin, K1XA, helps you take the plunge into one of amateur radio's most exciting, intense, and challenging experiences.

*Ham Radio Contesting*, by K1XA, is a how-to-do-it book that guides you through typical contests. Pre-contest preparation is covered, along with matters such as operating procedures, goals, timing, and the exotic art of predicting band openings.

The book is conveniently divided into

sections, with each chapter having a summary of contents. Is it best to call loud DX stations or call CQ DX? How do you crack a difficult pile-up? Is it best to tune from the low to the high end of the band, or the reverse? How much time should you spend on a tough-to-work station? How about multi-operators? Multi-band operation? If you get a QSO number of "ATN," what does it mean? Oh, boy! Your pulse starts to race while reading this book and you are "hyped up" for the next contest!

Actually, it's something of a shame that Bob wrote this book. He reveals the operating secrets of top scoring contesters. This makes it easier for the rest of us, but raises the competition for the "top guns" who already know everything in the book.

Well, perhaps not everything. Even the most hardened DXer could learn a lot from this work. I suggest before you jump into the next contest, read *Ham Radio Contesting*, by Robert J. Halprin, K1XA, Tiare Publications, Box 493, Lake Geneva, WI 53147. It is also available at your favorite amateur radio store.

### The "Dead Band" Quiz

First, thanks to the following readers who

have sent me personal notes. I appreciate your input and I'm sorry I can't reply individually to each of you: KN8B, W4RNL, W4YVY, KL7CMN, W3WPY, WD6BUK, KJ6GR, W9WHM, W1PXL, PY1LJA, WA KKC, K9AY, K5BDZ, KH6GI, VE4AKM, W2YYI, W5QJM, W6PYK, K9BXG, WA8MCQ, W8JI, W8UOF and W8ARM, W2FZ, and W8YFB. Again, thank you!

Those who knew all about the *Scarlet Pimpernel* and the voltmeter quiz include: SM5GW, W2DFZ, OH2DT, N2EBG, N7VZB, VE7IIT, K1RD, KI6IS, W3ZLK, N2EID, WA4DTE, ex-K2UKT, KF9HG, W4HYY, N4OFV, VE7BS, and KA1ADF. Good show, gang!

This month's quiz is an "oldie," first shown in the "Quist Quiz" in *QST* magazine, June 1957. Those of you who save *QST* and have the July issue can look up the answer. For others, the answer will be given in a future column. If you know the circuit, draw it out and send it to me. Your call will be entered in the Dead Band Hall of Fame.

"Given three lamps and four single-pole switches, wire the lamps and switches so that switch 1 turns on lamp 1, switch 2 turns on lamp 2, switch 3 turns on lamp 3, and switch 4 turns on all lamps, regardless of the position of switches 1, 2, and 3. Don't clutter up the circuit with relays, diodes, or other stuff. All you need are the relays, the switches, the lamps, some wire, and a voltage source."

In a future column I'll print the names of the successful circuit engineers who send their solution to me.

The January Quiz about the Decca recording of Clyde McCoy (1933) was an ode to a Murphy folding bed. No doubt the orchestra members slept on a lot of them during their one-night stands! The other side of the platter was the famous "Sugar Blues," used as a theme song for many months by Martin Block's "Make Believe Ballroom" on WNEW, Newark, New Jersey. Martin was a ham, by the way. I think his call was W2MHB, but that was before my time.

### Footnotes

1. Sykes, "Controlled Feeder Radiation," *Communications Quarterly*, pp. 51-54, Summer 1992. CQ Communications, Inc.

2. *Ibid.* *Radio Communications*, May 1990. Radio Society of Great Britain.

3. "Carolina Windom" antennas by the Radio Works, Box 6159, Portsmouth, VA 23703.

4. MN4.5 by Brian Beezley, K6STI, 507 1/2 Taylor St., Vista, CA 92084.

5. The Radio Works, Box 6159, Portsmouth, VA 23703.

73, Bill, W6SAI

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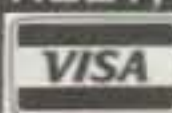
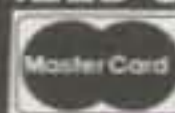
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### PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

### SL SERIES



### • LOW PROFILE POWER SUPPLY

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
SL-11A	•	•	7	11	2 5/8 x 7 5/8 x 9 3/4	12
SL-11R	•	•	7	11	2 5/8 x 7 x 9 3/4	12
SL-11S	•	•	7	11	2 5/8 x 7 5/8 x 9 3/4	12
SL-11R-RA		•	7	11	4 3/4 x 7 x 9 3/4	13

### RS-L SERIES



### • POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-4L	3	4	3 1/2 x 6 1/8 x 7 1/4	6
RS-5L	4	5	3 1/2 x 6 1/8 x 7 1/4	7

### RM SERIES



MODEL RM-35M

### • 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
RM-60A	50	55	7 x 19 x 12 1/2	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 1/4 x 19 x 8 1/4	16
RM-35M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50M	37	50	5 1/4 x 19 x 12 1/2	50
RM-60M	50	55	7 x 19 x 12 1/2	60

### RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-3A		•	2.5	3	3 x 4 3/4 x 5 3/4	4
RS-4A	•	•	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A		•	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	•	•	5	7	3 3/4 x 6 1/2 x 9	9
RS-7B	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10A	•	•	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	•	•	9	12	4 1/2 x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 1/2 x 10 3/4	13
RS-20A	•	•	16	20	5 x 9 x 10 1/2	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 3/4 x 11	46
RS-70A	•	•	57	70	6 x 13 3/4 x 12 1/2	48

### RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4 1/2 x 8 x 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46
RS-70M	57	70	6 x 13 3/4 x 12 1/2	48

### VS-M AND VRM-M SERIES



MODEL VS-35M

### • Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps)			ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 1/2 x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 1/2	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 3/4 x 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 1/4 x 19 x 12 1/2	38
VRM-50M	37	22	10	50	5 1/4 x 19 x 12 1/2	50

### RS-S SERIES



MODEL RS-12S

### • Built in speaker

MODEL	Colors		Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	•	•	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	•	•	9	12	4 1/2 x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 1/2	18
SL-11S	•	•	7	11	2 3/4 x 7 5/8 x 9 3/4	12



A LOOK AT THE WORLD AROUND US

## Mobiling From Mild To Wild!

**T**he season of outdoor fun, weekend jaunts to hamfests, and mobiling on the open road is finally returning, and I am sure you will agree warmer weather will not arrive a day too soon. Somehow, mounting a big HF rig in the car and tuning mobile whips tends to lose much of its glamor during bone-chilling temperatures and snow knee deep. A few days during the beginning of this month may still have a sharp bite in northern areas, true, but hang in there. The good times are straight ahead!

Spring is the perfect time to refurbish that mobile setup and antenna, especially if you have not performed any preventive maintenance in a couple of years. Corroded battery connections, exposed coax ends, and friction-fit ground straps deteriorate quite rapidly when exposed to dampness, cold temperatures, and long trips. A car's starter typically draws 70 amps when cranking; thus, a corroded battery connection with only .1 ohm resistance drops 7.0 volts. That leaves only 6 volts for the vehicle's electrical system, and produces the classic dead-battery syndrome. The correction is easy: Just use your pocket knife to scrape battery posts and the inside of each connector shiny-clean.

If the battery is approaching the end of its warranty period, incidentally, replacing it with one of the new 800 or 900 amp/hour types is a good move. I have found older batteries can supply only a portion of their original amp/hour rating, and their change in internal resistance also causes RFI problems with a car's on-board computer. Remember that tip the next time your car coughs and sputters when tuning up with 100 watts output.

Have you replaced your setup's coax during the last three or four years? In doing so, you may find it has been pinched beyond recognition by a seat cushion or back, or rain has turned it into a 20 foot long attenuator. Honest!

The easiest way I have found to clean whip and ground strap connections is by using fine sandpaper to remove the white-powdery corrosion that builds up every few months. I then add new ground straps (especially to the tailpipe), short the whip to its mount's ground lug with a clip lead, and then go inside the car and check for less



Photo 1- Neat bicycle mobile/QRP rig of WB9GIE. This go-anywhere setup has worked over 80 countries.

than .5 ohm resistance between the PL-259's center conductor and the car frame. This way the coax, mount, and ground straps are all checked simultaneously.

Finally, I double check the separate ground strap that connects from the car's frame to the rig's rear wing nut. This often overlooked strap makes a big difference in minimizing RFI in HF setups.

That's enough personal opinions for this time. Now let's look at some spiffy HF mobile setups, compliments of Elroy Shelley, Jr., WB9GIE; Don Johnson, W6AAQ; and other friends.

### Bicycle Mobile

Okay, creative-minded friends, how do you solve apartment antenna restrictions, kill automobile ignition noise, and eliminate vehicle computer entanglements in a single step? Simple: Take a lesson from Elroy Shelley, Jr., WB9GIE. He operates HF bicycle mobile/QRP, and has worked all states plus 80 countries on all continents while using the 4 watt setup shown in photos 1 and 2. The bicycle is a classic, black Hufly "Sportsman" Elroy received as a twelfth



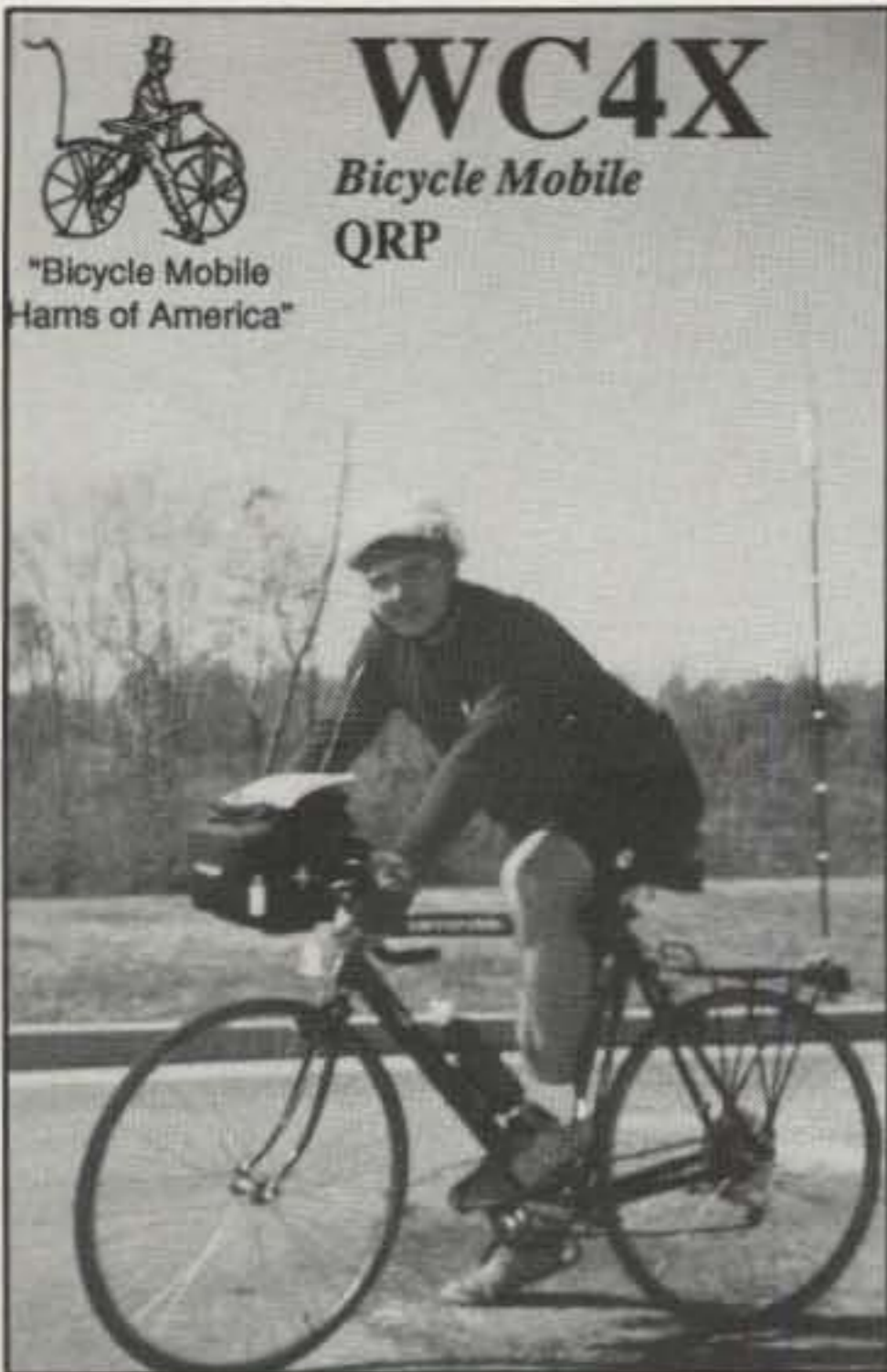
Photo 2- Close-up view of WB9GIE's setup. Note Argonaut transceiver, ICOM handheld, and Hustler antenna.

birthday present in 1964 and maintained in mint condition since that time. A rear carrier fitted with large touring bags holds the rig on one side (Argonaut 509, crystal calibrator, and CW filter), and a bank of D-cell batteries of approximately the same weight on the other side. A bracket bolted to the rear carrier supports a standard Hustler mobile antenna. The transceiver's speaker is mounted between the bicycle's front handlebars, and a homebrew paddle for CW is attached in front of one of the grips. Elroy also found room to squeeze in a small bag containing a portable tent, water bottle, and 2 meter handheld.

WB9GIE logs a significant number of miles on his bicycle each year traveling back and forth to work and camping during weekends. That is one nice aspect of this self-propelled mobile: it goes places too confined for cars. Some of Elroy's more interesting contacts include a CO2 in Cuba using only 500 mw, a G station in England worked on 10 meters at 10 PM in the evening, and the *USS Enterprise* (the aircraft carrier; not the starship). Since the *Enterprise* was using a 500 watt rig and 500 foot long-wire antenna, the contact represented the world's largest mobile

4941 Scenic View Drive, Birmingham, AL 35210





# WC4X

Bicycle Mobile  
QRP

"Bicycle Mobile  
Hams of America"

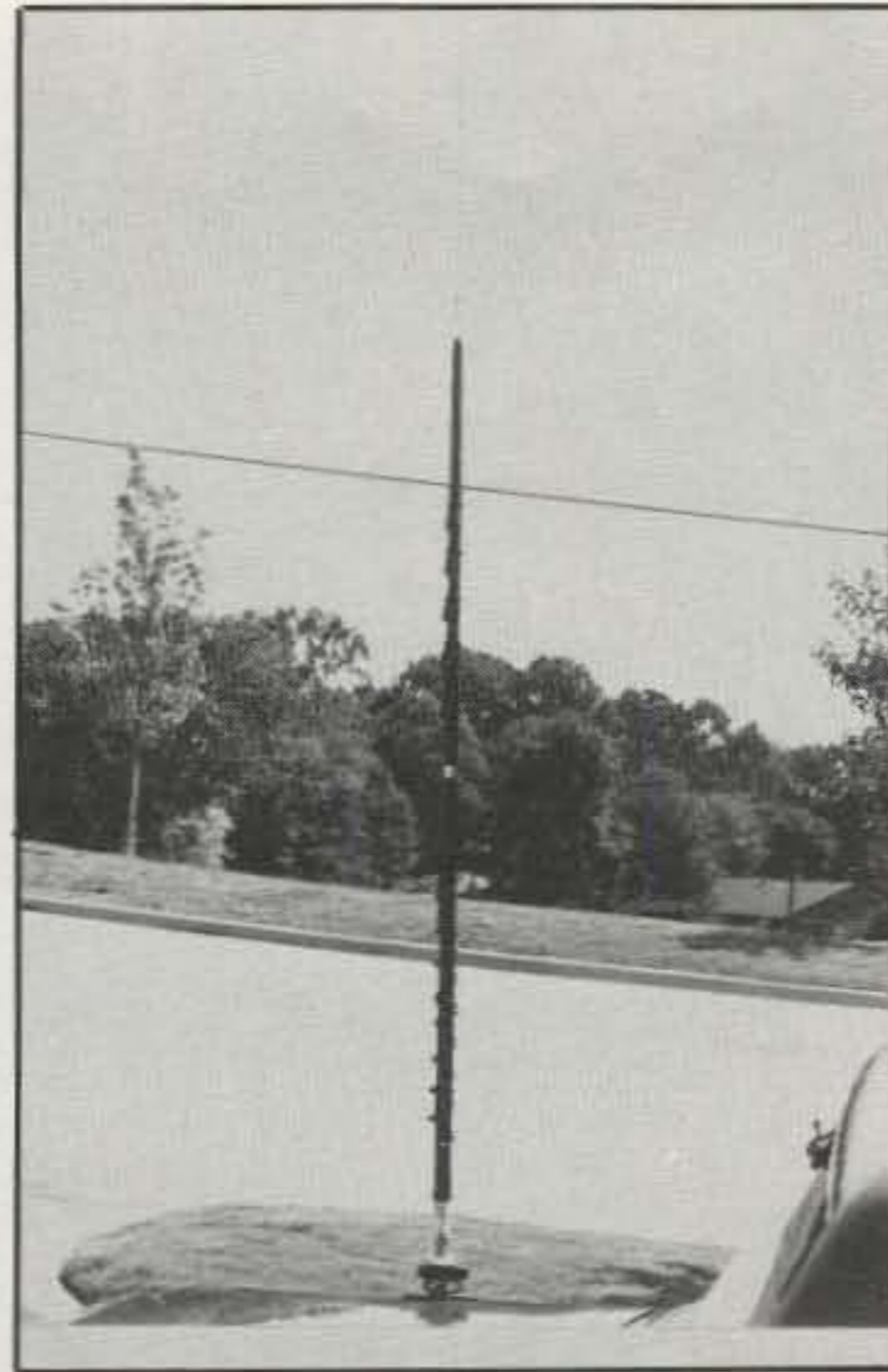


Photo 3- Ned, WC4X, mobile in motion on bicycle. Rig is mounted inside bag between handle bars.

Photo 4- The new Outbacker "Perth" all-band mobile antenna. This 7 foot whip is super sturdy and radiates a good signal.

I first met WB9GIE on 20 meters SSB one Sunday afternoon. He called after I concluded a QSO, and his signal was surprisingly good for only 4 watts. A couple of weeks later I joined WB9GIE and Ned Mountain, WC4X, on 20 meters when they established what is believed to be the first bicycle-to-bicycle QRP HF QSO. Ned was in Atlanta, Georgia and using a 3 watt Mitsuho 20 meter handheld with a Hamstick antenna. A picture of his setup is shown in photo 3. The rig is in the carrying case in front of the handlebars. The contact came off beautifully, and there was an obvious air of excitement on 14.253 MHz that afternoon (October 10, 1992).

## Bicycle Mobile Hams of America

The more you think about bicycle mobiling, the better it sounds. Gasoline consumption is zero, traffic on side road pigtrails is zilch, and your amateur radio rig on wheels is ready to roll any time you wish. Realizing those facts, a group of amateurs joined together and formed the Bicycle Mobile Hams of America. This group continues to grow in size and today BMHA has a membership of over 200 representing 33 states, plus a very impressive quarterly newsletter. BMHA holds a formal meeting every April during the Dayton Hamfest, and they also meet on 14.253 MHz at 2330 GMT dur-

contacting the world's smallest mobile. Elroy says his bicycle mobile setup creates excitement both on the air and on the road. In fact, on-frequency listeners often

call him after a QSO to confirm what they heard (bicycle mobile/QRP) is actually true, while local onlookers ask how he can talk across the country right from his bicycle.



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R7: 40-10 vertical  
AV3 & AV5 verticals  
D3W: 10, 12, & 17 meter dipole  
D4: 7, 14, 21, 28 MHz dipole  
40-2CD: 2-el 40M beam  
A50-6, A50-5, & A50-3 6M beams  
617-6B: 6 Mtr Boomer  
AR-6: Ringo for 6 meters  
ARX-2B: Ringo Ranger II  
ARX-220B: Ringo Ranger II  
ARX-450B: Ringo Ranger II  
AR270: 2M 440 MHz vertical  
A147-11: 11-el 146-148 MHz  
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VS-20M	VS-35M	VS-50M

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ing the first and third Sunday of each month.

Looking through the BMHA newsletter really inspires one to try bicycle mobiling. I am continuously amazed at the stories of amateurs traveling many miles via bicycle while working the world. There are also some good tips on antennas, mounts, and small rigs for both HF and VHF in the newsletter. BMHA Chairman Hartley Alley, N40A, reports the group will be happy to send a sample copy of BMHA's newsletter and other information about the club to amateurs sending a large, business-size SASE (with 2 stamps) to: BMHA, Box 4009-E, Boulder, CO 80306.

### Outbacker "Perth"

A couple of years ago in this column I described a new and upcoming antenna known as the "Outbacker" imported from Australia by Don Arnold, WD4FSY. I also explained how I replaced the standard short top stinger in my 4 foot Outbacker with a thin 42 inch whip and doubled its radiated signal strength. The concept worked fine for using the Outbacker's 10, 15, and 20 meter taps to work 17, 20, and 30 meters, respectively, but my home-brewed modification could not be applied to other bands.

Good news: Terlin Aerials, manufacturer of the Outbacker, has now redesigned



Photo 5- One-sixty meter mobile in style! Antenna is PRO•AM's PHF-160, and it works great. (Details in text.)

their all-band 4 foot antenna to use a 42 inch top whip, and it works like a champ.

A picture of the new Outbacker "Perth" is shown in photo 4. The tall whip is barely

visible protruding from the black bottom section. Also barely visible are the recessed taps for each band (80-10 meters, including WARC's). This mobile antenna is

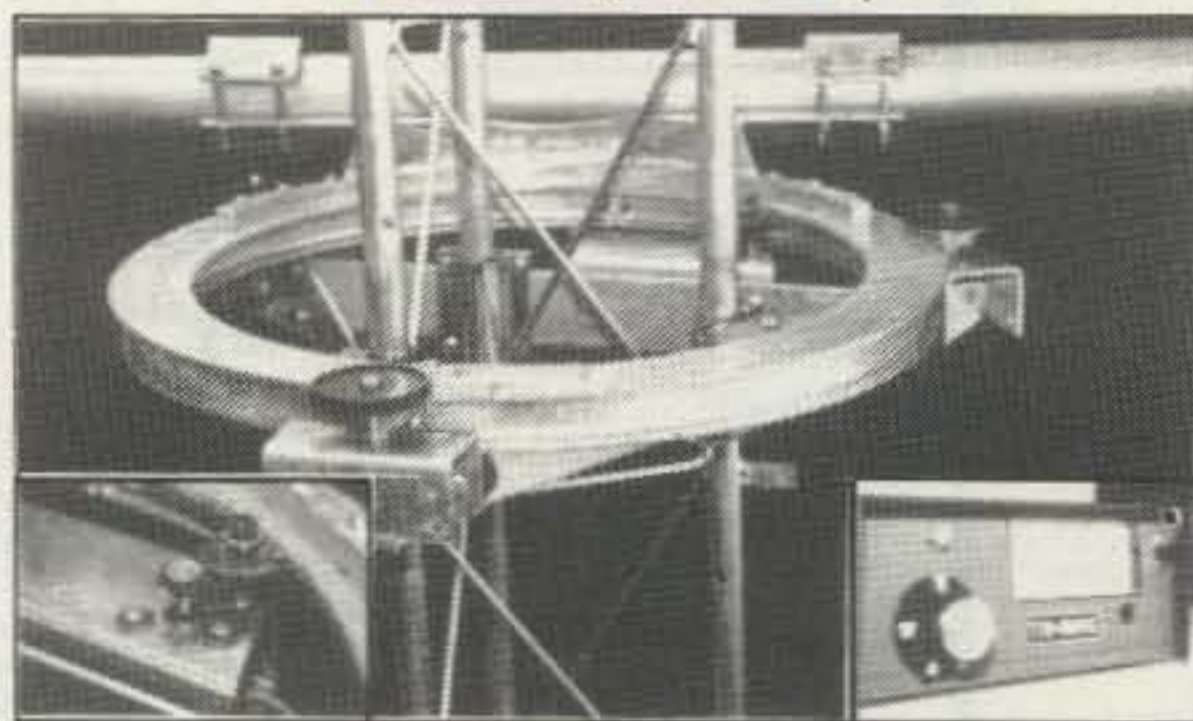


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**Frank Biba, MD, N5GH**  
Opelousas, Louisiana

January 20, 1993

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RE: TIC RING

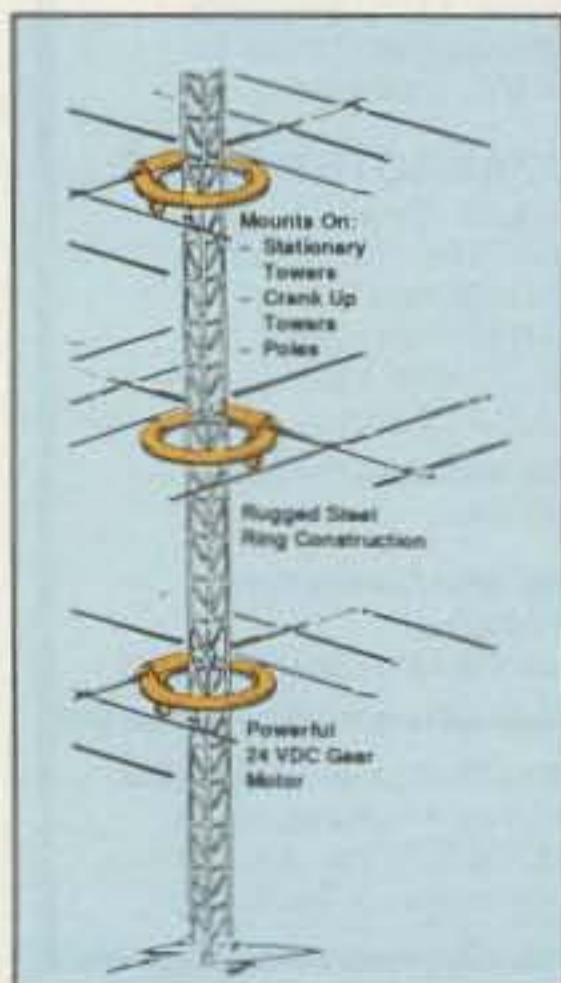
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Photo 6— Now this is the way to go HF mobile! KG6IG's van is fitted with big W6AAQ DK3 all-band and fully automatic antenna system. Check out that heavy-duty mount! Top whip, incidentally, is almost full-size CB antenna!



Photo 7— DK3 antenna mounted on rear of W6HMD (XYL of W6AAQ) car. Notice coil near photo top: It moves up and down in base unit to change bands automatically.

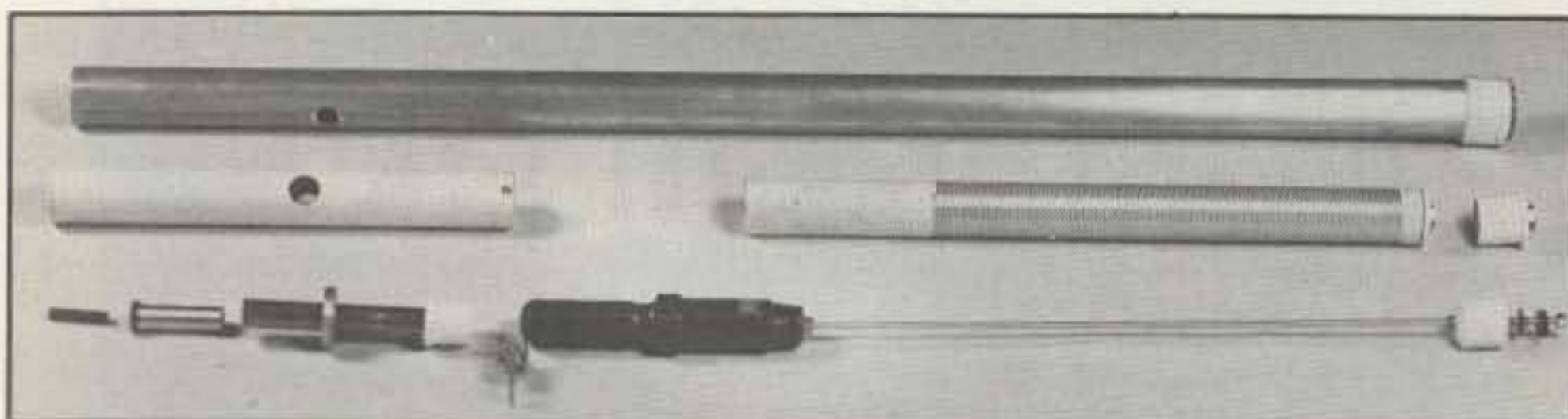


Photo 8— Main parts comprising a DK3 homebrewed antenna. (Discussion in text.)

becoming more popular by the day, and it is definitely built to last for years.

## Top Band Mobile

If you think bike-supported setups are somewhat scarce, try spotting even a regular mobile in operation on 160 meters. Now that is really unique and a genuine attention-grabber. Needless to say, a mobile antenna for 1.800 kHz is quite tall and uses a large(!) coil. I recently tried this gusto endeavor with a PRO•AM mobile PHF-160 antenna (photo 5), and it was a blast!

PRO•AM's "big stick" is approximately 8 feet tall and can be set to cover any section of the band by sliding its top whip in/out of the coil. Using an MFJ antenna bridge and frequency counter, I set the whip for CW operation and tapped a base tuning coil to match impedance (a 5 minute process). I then connected the transceiver to the antenna, checked the SWR (1.5:1), and made some good contacts. Response was amazing: The gang couldn't believe they were actually working a CW mobile on 160!

The antenna was supported by a light

trunk-lip mount, so I did not try "mobile in motion." No problem there, however, as 160 is a nighttime band, so it is perfect for operation while visiting relatives rather than traveling during the day. If you would like to add some new style fun to low band mobiling, try 160. You'll love it.

## Super Mobiles, or Rolling With the Big Wheels

I recently received a fascinating package from Don Johnson, W6AAQ. It contained pictures and information on his famous DK3 homebrew mobile antenna, and this is definitely a big-time item. As you can see in photos 6 and 7, vehicles sporting a DK3 antenna (or vice versa!) are serious mobiles indeed. The DK3 on KG6IG's van stands 13 feet tall. It is supported at the bottom by a steel plate bolted to the frame, while a brace attached to the previously used ball mount prevents side sway.

Look closely and you will see the antenna is coax-fed a couple of feet from the bottom (almost at door-handle level). Don says this elevated feedpoint works fine and impedance is the same as direct bottom

feeding. An automatic tuning unit is mounted directly inside the van, and although not visible, the center loading coil moves up and down within the large base section for automatic band changing. The coil is fully retracted in the photo of KG6IG's van. However, you can see it extended for lower band use in the photo of W6HMD's setup. Look closely and you can see the externally-mounted base tuning unit in photo 7.

W6AAQ emphasizes he is not in the antenna manufacturing business, but simply likes to help friends seriously interested in low-band mobiling build a no-compromise all-band/all-frequency mobile antenna. He points out that all parts to assemble a DK3 are available at most hardware stores and home-improvement centers, and a complete set of assembly instructions is available (from W6AAQ, Esprato, CA 95627-0595) for \$5.00 to cover the copying costs.

A disassembled version of the DK3 less mount and base tuning unit is shown in photo 8. A large-diameter 4 foot base section is on the left. The top end is fitted with finger stock that friction-fits to the center loading coil (middle item in picture), which moves up and down within the base tube for band/frequency selection. The loading coil, in turn, is driven by a regular reversible cordless screwdriver with base support and long extension tube (right items in picture). A  $\frac{3}{8}$ -24 threaded adapter atop the coil assembly accepts a top whip of 65 inches for 3.8 to 24 MHz (continuous) coverage. Bear in mind most of the antenna dimensions mentioned herein are approximate and can be varied according to your preference. This is because the user simply "rolls off" (or up?) a necessary amount of the center loading coil to achieve resonance and 1:1 SWR at any desired frequency.

W6AAQ and friends continue perfecting this design, and recent developments include voice-controlled actuation of the loading coil and base tuning unit for a complete hands-free antenna covering all frequencies from 3.5 to 30 MHz. Don says over 200 of these antennas have been built and are in use around the country, and owners love them. Some users have even mounted two DK3s horizontally in a dipole configuration, or inside PVC pipe supporting a flag for operation in restricted neighborhoods.

Our sincere thanks to W6AAQ for sharing views of this impressive antenna.

That winds down this month's column featuring HF mobiling, gang, and I trust we have rekindled your interest in outdoor hamming. Our discussion of mobiling goodies also overflowed available space, so there is only room left to say "Good HF mobiling to you." Watch for another blow-out double-feature "keys special" coming in the next two columns, and I look forward to chatting with you on 20 or 30 meters soon.

73, Dave, K4TWJ



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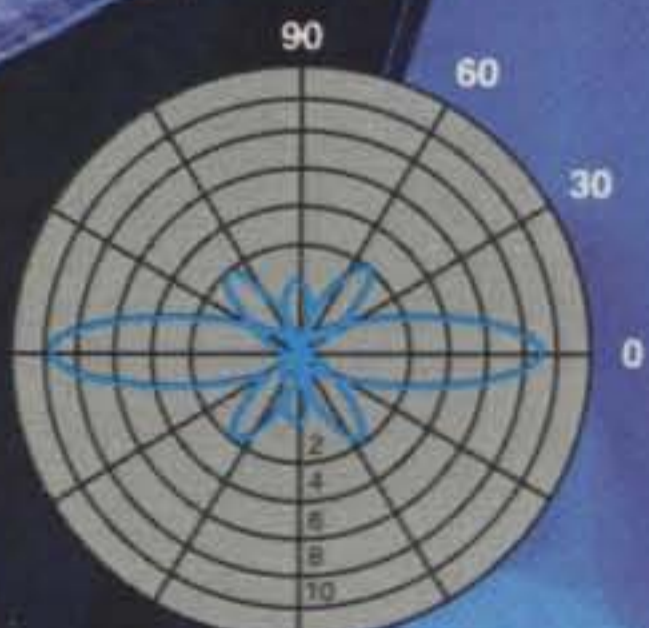
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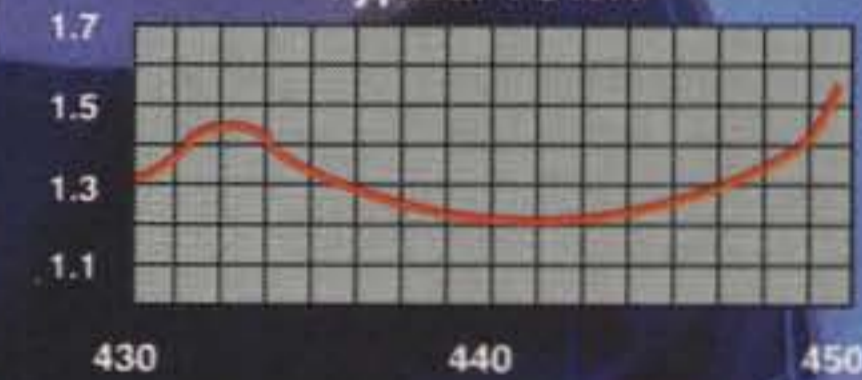
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# ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

## Antennas, Software, and More

**T**his month we will cover antennas and related items such as towers and rotators, software of interest to the radio amateur, and more, so let's dive right in.

### Antenna Topix

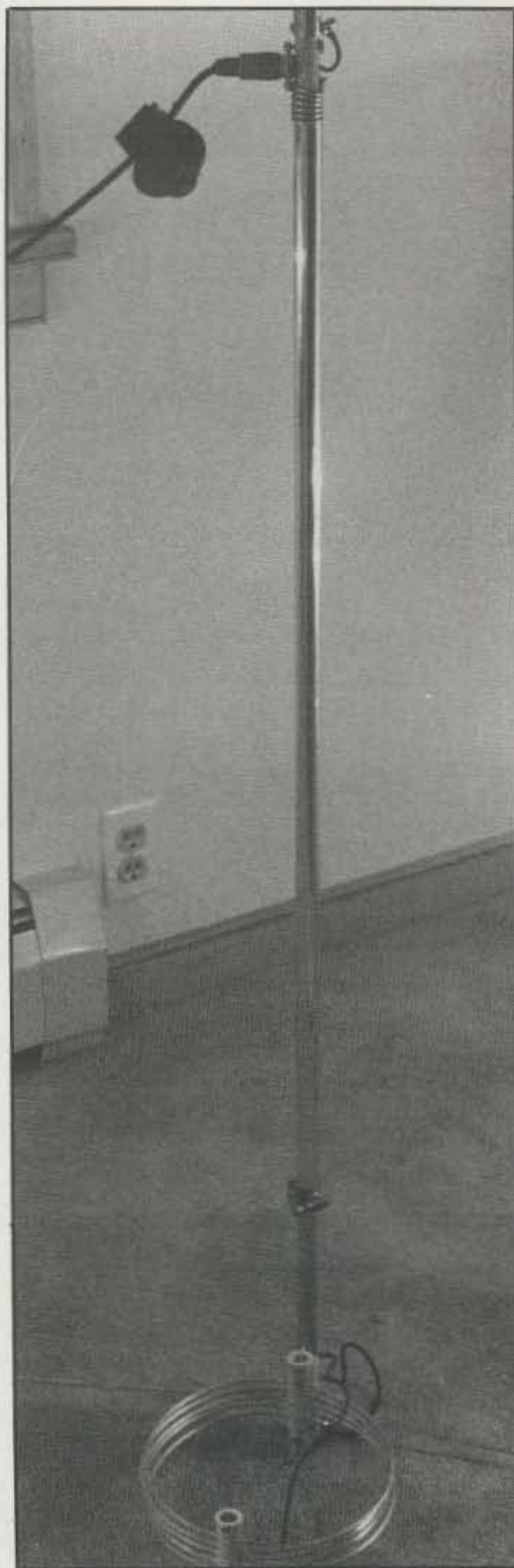
**Urban Indoor Antennas.** There's no getting around it. Operating on any band in a restrictive antenna environment, such as in an apartment complex or a condominium, can be a trying experience. Often, legal and contractual realities make it necessary to erect an antenna farm *indoors*, and this simple fact can greatly limit antenna performance.

Robert H. Johns, W3JIP, has developed an interesting line of indoor "floor to ceiling" style antennas. The W3JIP antennas are available in several versions to cover 40 through 2 meters. Somewhat resembling pole lamps, the antennas are vertical dipoles that clamp between the floor and ceiling or are windowsill-mounted; they do not require a ground connection.

The antennas were originally described by John in his construction article in last July's *73 Amateur Radio Today*. Additional details on homebrewing large, high-efficiency antenna coils are provided in his follow-up article in October 1992 *QST*. While the antennas can't be expected to give results comparable to full-size outdoor antennas, they can at least allow operation on bands that otherwise would be impossible to use.

The antennas connect directly to your transceiver or transmitter using coaxial cable, and they present a reasonably low SWR without using an antenna tuner. Vertically polarized with capacity hats on each end, and with the high-current portion of the antenna midway between floor and ceiling, they can be reasonably efficient radiators. For the lower bands the antennas are loaded with a large, high-efficiency coil (patent pending) to bring the electrical length to resonance. The antennas fit rooms up to 10 feet high, but if there are higher ceilings they can be set up between a chair or table and the ceiling.

Several different versions are available. The basic design is the ID 2-10, a "no-coil" indoor vertical dipole for 2, 6, and 10 meters; large-diameter, add-on coils allow operation on 40, 30, 20, 17, 15, and 12 meters, plus 11 meter CB. Both regular and travel versions are available; the latter version has telescoping elements that pack into a briefcase. Also available is a window mount assembly that lets you place the antenna outdoors, clamping it flagpole-style to a windowsill. In this case, the antenna elements are positioned at about 45 degrees by flagpole brackets; the entire assembly is held in place by a long carpenter's clamp.



Here's a closeup of the lower portion of one of the indoor antennas offered by W3JIP. They are available in several versions to cover 40 through 2 meters. The antennas are vertical dipoles that clamp between the floor and ceiling or are mounted to a window; they do not require a ground connection. The large-diameter loading coil is visible at bottom of the photo. See text for details. (Photo courtesy Urban Antennas, Inc.)

The ID 2-10 Indoor Dipole is \$44.50; the travel version is \$89. The accessory loading coils and window mount assembly are moderately priced. For more details, contact Urban Antennas, Inc., Box 662, Bryn Athyn, PA 19009.

**Philips ECG U-105 Antenna Rotator.** The U-105 is a durable, precision-built rotator originally designed to turn and accurately position large TV and FM antennas, so it's of interest to amateurs having modest-size VHF arrays. The high-torque rotor unit features a rugged, one-piece, cast-aluminum housing designed for high strength. Large bearing surfaces and reinforced mast support are provided for lateral loads. Precision-cut steel bars are hardened, and a ball bearing is provided for thrust (vertical) load. The rotator is designed to take high winds and harsh extremes of weather; a watertight seal is provided and the drive train is fully lubricated.

The rotator has a maximum vertical load capacity of 100 lbs. and a rotation torque of 8 ft.-lbs. Rotation time is 70 seconds. The optional TB-105 support bearing is available for extra-rigid installation and support to relieve wear and tear on the rotator imposed by wind loads; the optional support bearing can be guyed.

For additional information and pricing, contact Philips ECG, Westminster Drive, P.O. Box 3277, Williamsport, PA 17701.

**Orion Roof Towers.** Some time ago we profiled the Orion OR-2300 heavy-duty rotator, based on the "old reliable" worm-gear design. The OR-2300 has an antenna wind load area capacity of 35 sq. ft., a maximum vertical load of 1800 lbs., and a maximum horizontal load of 2400 lbs. As we noted then, the OR-2300 is designed to fit most popular towers, such as the Tri-Ex W series, U. S. Tower TX Series, and the Rohn 25.

I see that Orion also offers some complementary hardware in the form of two different roof towers. These are designed for medium-size HF beams, VHF/UHF arrays, OSCAR systems, and verticals. The towers are strong and lightweight, being designed for easy assembly and antenna mounting. The rotator and upper bearing plates and the feet are made of galvanized steel; the aluminum legs and bracing are  $\frac{1}{8}$  inch thick. There is a mast-bracket option for fixed-position antennas.

The ORT-4 is 47 inches high and has a base width of 23 inches; it is priced at \$119. The larger ORT-8 is 94 inches high and has a base width of 39 inches; it is \$239. Sleeve bearings, a fixed-mast bracket, and a thrust bearing are available.

For more details contact Orion Business International, Inc., 7560 N. Del Mar Ave., Fresno, CA 93711-6856.

**MFJ RF and Antenna Test Instruments.** In perusing the MFJ catalog, I was struck by the proliferation of RF and antenna test equipment. Several instruments are offered in addition to the three SWR Analyzers (MFJ-247, MFJ-207, and MFJ-208) that just about everyone knows

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The MFJ-206 Antenna Current Probe lets you monitor RF antenna currents without making direct connections. It monitors RF currents by sensing and measuring the magnetic field around conductors. Practical uses include determining antenna current distribution, RF radiation pattern, and antenna polarization. The unit also can pinpoint leakage from RF shielding as well as transmission line and ground lead radiation. The device doubles as a field-strength meter. (Photo courtesy MFJ Enterprises, Inc.)



The MFJ-202B RX Noise Bridge (also known as an antenna noise bridge, or ANB) is a \$59.95 device that measures antenna resonant frequency, feedpoint resistance, and reactance. The ANB can be used with any receiver; no external RF source is required. The unit boasts a hand-calibrated resistance scale and an expanded capacitance measurement range feature. (Photo courtesy MFJ Enterprises, Inc.)

The Voyagers are 13 or 18 inch triangular structures with angular side rails and Z-braces spaced every 15 inches, including across section joints where an inside bolted clip holds the joint solid. Sections come in three different lengths (7 ft. 6 in., 8 ft. 9 in., and 10 ft.). The M-13 is freestanding to 38 feet, while the M-18 is freestanding to 48 feet.

The firm also offers the T-1845 telescoping tower (43 ft.) on a trailer, a 9 ft. aluminum roof tower, and a plethora of tower accessories and hardware items. For a catalog, contact Glen Martin Engineering, Route 3, Box 322, Boonville, MO 65233.

## Soft Topix

**NX2P Terrain Analysis Packages.** Having trouble maintaining VHF/UHF communications over a certain path? Will the new repeater site really do the trick? NX2P Electronics offers a variety of programs to aid in sophisticated terrain analysis. The firm offers SoftWright's Terrain Analysis Package (TAP), a comprehensive and professional series of programs for retrieving and manipulating topographic elevation data and using that data in radio propagation studies and facilities design.

The TAP system is divided into numerous modules, each consisting of related programs, that you can acquire individually. The variety of TAP modules (about a dozen) for different types of propagation studies enables TAP users to design radio systems for a variety of applications. Topographic data files are available both on floppy disks and CD-ROMs.

Also, for the nonprofessional user, the firm offers a 3-D terrain and VHF/UHF propagation plotting service. Using TAP and a digitized terrain database, they'll prepare custom maps that you can use to evaluate possible repeater sites and links. The service also can help judge how changing antennas and/or height affects terrain clearance, identify major obstructions in the signal path, and determine where major signal losses occur.

For a flyer and pricing, contact NX2P Electronics, 321 East Shore Trail, Sparta, NJ 07871.

**More on YO and MN.** We've followed the evolution of Brian Beezley, K6STI's high-accuracy IBM PC antenna modeling software over the past several years. Recently he put everything

together into a small product update sheet summarizing his modeling wares, which includes some good representative graphics printouts that show his software's bottom-line capabilities. Two programs, MN Antenna Analysis Software and YO Yagi Optimizer, lie at the heart of his modeling packages. Both programs include coprocessor and noncoprocessor versions, and they comprise comprehensive antenna design libraries to get you started.

MN is up to at least Version 4.5 at this writing and is \$50. Based on the Navy's MININEC program, it provides fast and accurate analysis of wire antennas using an enhanced MININEC algorithm. MN features 3-D antenna geometry and wire-current displays, polar and rectangular plots with overlays, automatic wire segmentation, automatic frequency sweep, skin-effect modeling, polarization analysis, near-field analysis for RF hazards and TVI, current sources for phased arrays, and considerably more (see fig. 1).

The companion YO Yagi Optimizer 5.0 is a highly intuitive and graphical program that automatically optimizes Yagi-Uda beam designs for maximum forward gain, best pattern, and minimum SWR. YO models stacked Yagis, dual driven and tapered elements, matching networks, skin effect, and ground effects from HF to microwave. While YO runs much faster than MININEC, it's calibrated to NEC for accuracy and has been extensively validated against real-world antennas. Price is \$75 (see fig. 2).

Brian's product update sheets include some new additions. One is NEC/Yagis 1.0. It provides highest-accuracy analysis of Yagi designs with the professional-standard Numerical Electromagnetics Code. It requires a coprocessor and 640K RAM; price is \$50. Several high-speed and "huge model" options for MN and YO also are available. Upgrades to all versions are reasonably priced.

Another fairly recent offering is the GUY Guy-Wire Modeler. The GUY utility helps you to investigate the often devastating effects of tower guys on antenna systems, especially on optimized arrays. The program also simulates antenna rotation so you can examine worst-case guy-wire interaction. It's \$25 and requires MN to operate. Brian also offers the GUY utility as part of MN-Professional 4.5, a deluxe (\$300) "all options" version of MN 4.5 that also includes a commercial license.

For spec sheets and some sample program printouts, contact Brian Beezley, K6STI, 507 1/2 Taylor St., Vista, CA 92084.

As this issue went to press, Brian introduced the AO 5.0 Antenna Optimizer. The new program features the fast MININEC algorithm from MNC 4.5 and upgraded optimizing techniques drawn from YO Yagi Optimizer in a single, \$100 program that includes a three-dimensional radiation-pattern display that lets you see the entire radiation pattern at once. Also new is AO-Professional 5.0, which includes AO 5.0, the MN-Professional 4.5 Antenna Analysis package, and a commercial-use license; price is \$500.

**Amsoft CD-ROM.** If you have a CD-ROM drive on your PC, you know that a good way to build up your amateur radio software collection is by obtaining one or more CD-ROM discs of shareware and public-domain programs. Amsoft has collected about 275 MB of amateur radio, SWL, and scanner oriented shareware and public-domain (PD) software, placing it on its "World of Ham Radio Shareware" CD-ROM, Vol II.

Assembled by Pete DeVolpi, KC3TL, the disc's contents are staggering. It contains over



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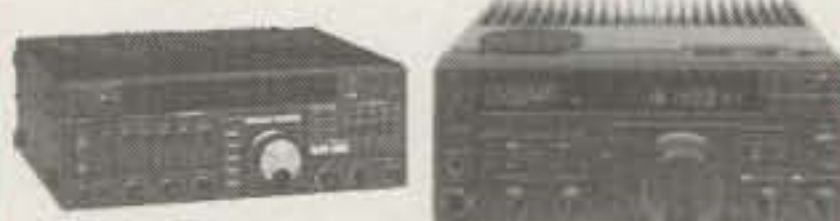
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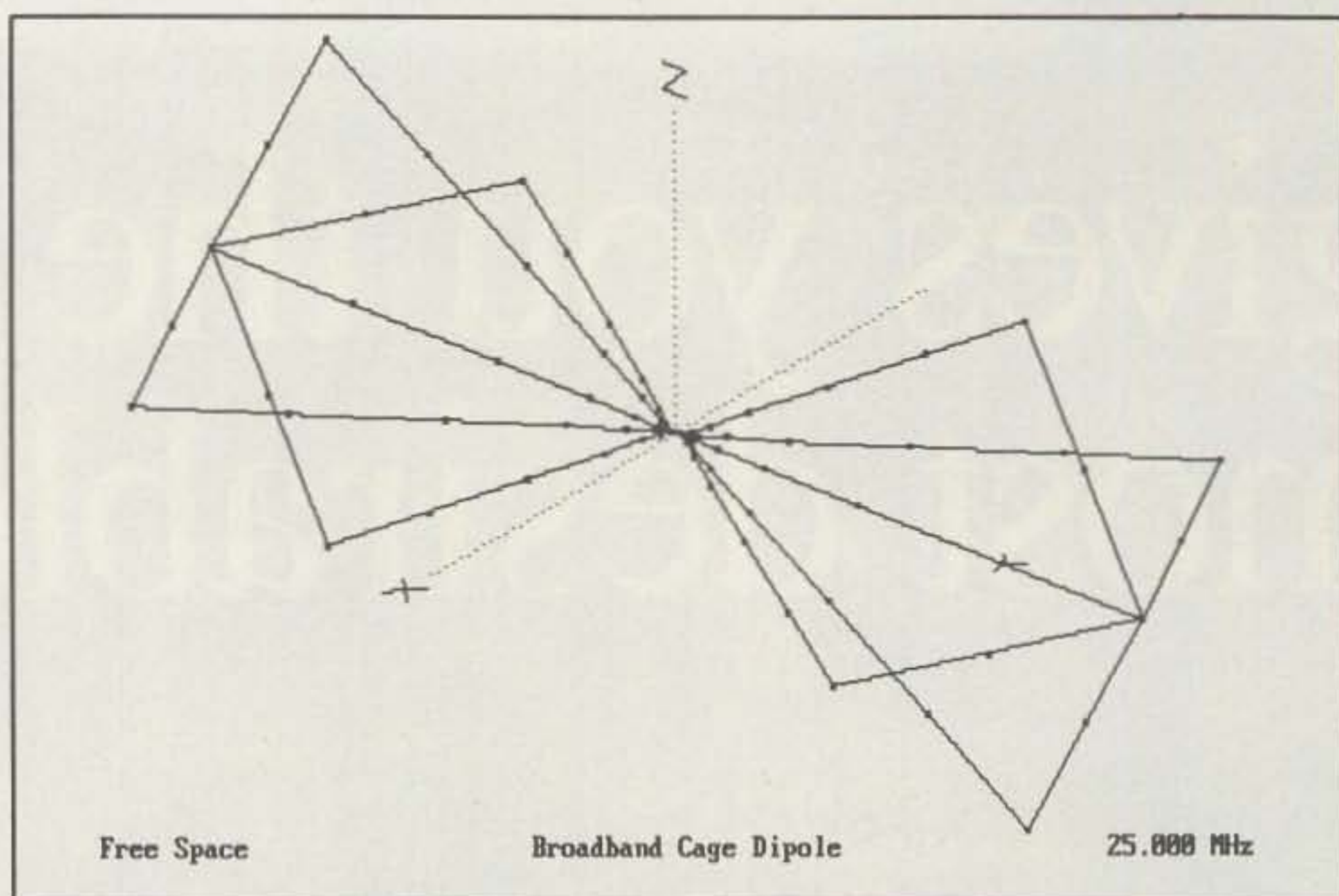


Fig. 1—Representative MN program output. Brian Beezley's MN Antenna Analysis Software provides fast and accurate analysis of wire antennas using an enhanced MININEC algorithm. A particularly nice feature of MN is its 3-D antenna geometry. Shown here is the program's graphical representation of a broadband cage dipole.

8000 files, including hundreds of executable programs, arranged in logically organized subdirectories in which similar programs are grouped, or which correlate to the floppy-based shareware disk library the author offers. Also included on the disc is a large collection of public-domain clip art, mostly in PCX format; the collection includes much amateur radio artwork.

Many of the programs can be run directly from the CD-ROM, while others are in compressed (ZIP) format; you have to uncompress the ZIPped files. It's \$79.95 from Amsoft, P.O. Box 666, New Cumberland, PA 17070. A sepa-

rate clip-art CD-ROM disc is forthcoming, and Pete also offers floppy-based amateur radio PD and shareware software.

**Prefix Search.** In recent months we've discussed several programs designed to aid amateurs working towards the WPX award. Dave Klaiber, WB4KSQ, has placed his hat in the "prefix derby" with Prefix Search for the IBM PC. As is the case with much shareware software, the author originally designed the program for his own and close friends' use. Dave developed the program at the suggestion of a friend who wanted a simple way to check to see if he had con-

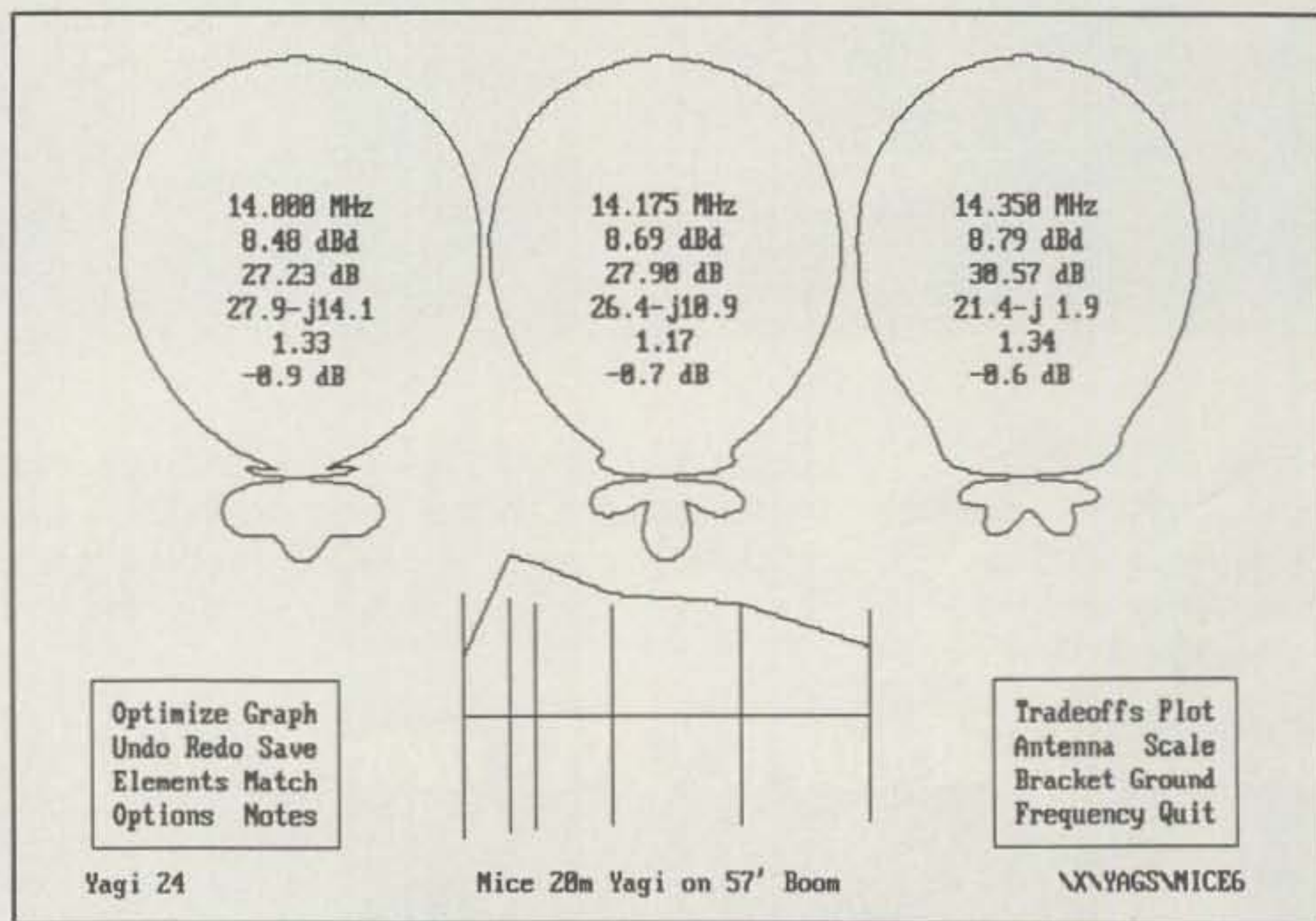


Fig. 2—Representative YO program output. Here's one of the many screen outputs available from Brian Beezley, K6STI's YO Yagi Optimizer. YO automatically optimizes Yagi designs for maximum forward gain, best pattern, and minimum SWR. Shown here are pattern representations of a 20 meter Yagi on a 57 foot boom at three different frequencies.



firmed a prefix while on the air. Since Dave is a "prefix hunter" himself and saw the need, he developed his program as a simple means of accomplishing this objective.

The program is divided into several modules: entry, delete, update, print, search, and help. At present, the full version has one limitation that Dave is addressing: there is no provision for multiple band or mode tracking other than by using an additional copy of the program for each band and/or mode you desire to track. Dave also says he's developing specialized contest logging and other hamshack software programs.

The full version is \$20 postpaid. There's also a less-enhanced shareware version that has a prefix limit of 300 entries; it's \$5 postpaid. Contact Dave Klaiber, WB4KSQ, 773 Teak Drive, Melbourne, FL 32935.

**FCC RULES.** The FCC's rules and regulations are in the public domain, and you don't need a computer program to read them. However, George A. Thomas, Jr., has come up with a handy shareware program, the FCC Part 97 Rules and Regulations DataBase Program for Amateur Radio Operators, that makes it simple (and almost fun) to "bring up" the rules online.

Billed as "the online FCC rulebook," the program offers a very fast and easy way to view and search the entire rules database by topic to locate rules of interest, especially helpful to newcomers. The user-friendly program features mouse and keyboard support for fast navigation. The menu line at the bottom of the screen serves as a reminder of the keys that are available for use; mouse users may click on the commands on this line for fast operation. A vertical scroll bar on the right side of the screen shows your current location within the rules. The entire database may be printed out.

The shareware version of FCC RULES is available in the HamNet forum of the CompuServe online utility. Registration is \$14.95 and includes a copy of the latest version of the FCC rules available that quarter. Contact Thomas Software, 1375 Beasley Rd., Jackson, MS 39206.

**Two from Symantec.** We've mentioned antivirus programs before: in the August 1992 column we highlighted The Norton AntiVirus™ 2.0, a very comprehensive program to protect users from computer viruses. Norton recently updated the program to V2.1 and kindly sent me a copy.

The Norton AntiVirus 2.1 for DOS and Windows includes complete DOS and Windows applications in a single package. It's designed to work automatically, transparently, and continuously in the background, looking for any of over 1400 computer viruses and strains without interfering with your routine work (up from 1000 in the previous version). The program protects against virus infection and repairs files that are already damaged. It scans for viruses whenever a program is run or launched, and every time a file is copied or removed. If a virus is detected, the program can stop its further spread.

Some new features include increased network functionality and friendliness, detection of 100 percent of viruses contained in the National Computer Security Association (NCSA) library, Windows background scanning while doing other work, a Windows scheduler for attended or unattended virus scans, and much higher scanning speed than in previous versions. The new version also boasts detection of the supposedly "undetectable" polymorphic viruses, those which change each time they infect a system, including the particularly virulent Mutation Engine virus. V2.1 is \$129, and upgrades are \$19

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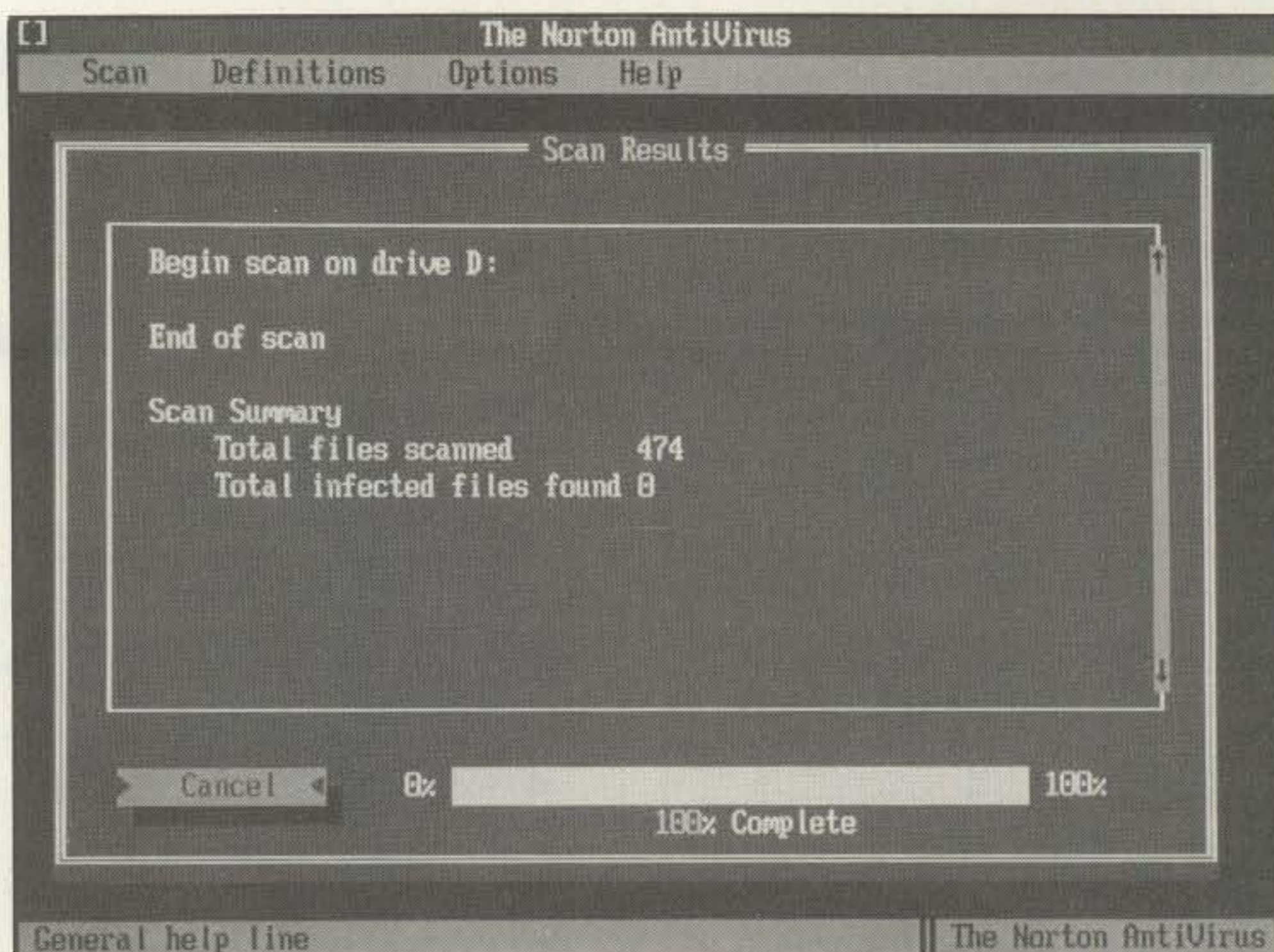
from Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063.

Also, Symantec has taken a grassroots approach to eradicating the virus problem by issuing a freeware, DOS-only version, which it calls The Norton Virus Scan. They've distributed it to more than 250 bulletin board systems (BBSes); look for it as a ZIPped file, NAV-SCAN.ZIP. The program detects over 1100 known viruses, allows removal of virus-infected files, and scans local and network drives. The program is free; technical support is in the form of recorded questions and answers on their "24-Hour Virus Newline" at 310-828-2906, or by calling 900-INFO-NAV (\$1.00 per minute is charged).

Symantec also offers a virus FAXline service and the Symantec AntiVirus Update Service, appropriately nicknamed the "SAV-U" program, which keeps users up to date through quarterly virus definition updates. It's \$69 for a one-year subscription. For more information, contact Symantec Corporation at the above-mentioned address.

**Protecting Yourself from Viruses.** Speaking of computer viruses... To my knowledge, I've never encountered a real, live computer virus, and I hope never to see one. Maybe that's because I'm careful what I feed my PC, or maybe I'm just lucky so far, because the virus problem seems to be getting worse, not better.

In any case, computer viruses are out there, and the NCSA says that about three new virus types emerge on a given day. A recent issue of Symantec's "The Norton Report," a corporate data security newsletter, offered an interesting observation on the origins of many viruses. According to Bryan Brandenburg of Symantec, the



The Norton AntiVirus 2.1 for DOS and Windows includes both DOS and Windows applications in a single package. It is designed to work automatically, transparently, and continuously in the background, looking for any of over 1400 computer viruses and strains without interfering with your use of the computer. (This photo actually depicts an earlier version of The Norton AntiVirus, but the V2.1 scan summary is similar.) (Photo courtesy Symantec Corporation)

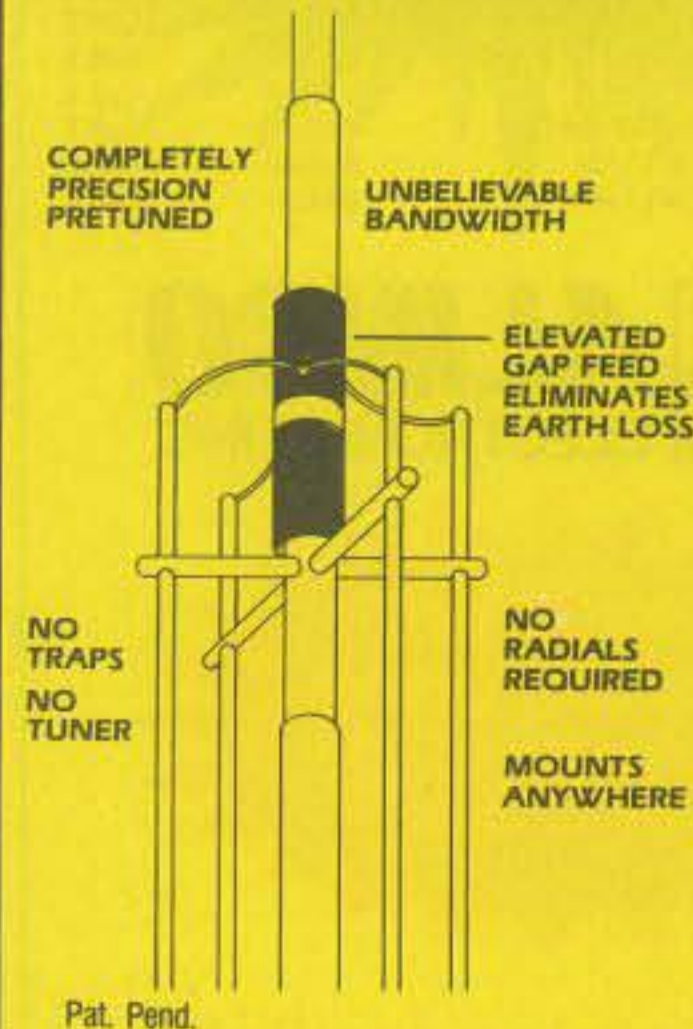
great majority of computer viruses come from the former Communist countries in Eastern Europe and from the Far East, as a medium of

speaking out against the government. Unlike Western virus authors who typically are teenagers, Eastern virus creators tend to be profes-

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sional computer programmers who are at once creative and intelligent but also underpaid and frustrated. As many as 90 percent of the computers in such countries may be infected, as opposed to under 5 percent in the U.S.

The same newsletter issue presented a number of common-sense suggestions to help prevent virus infection. It's well worthwhile to extract and adapt some key guidelines from the newsletter.

- Only download software from BBSes where you know the SYSOP scans all software before posting it for downloading.

- Use only original, shrink-wrapped commercial software and make sure the shrink-wrap hasn't been altered. (Beware: some software dealers rewrap and resell returned software—more on this later).

- Don't let other people run their programs on your PC. Their disks may well be infected.

- Spot-check your existing programs regularly, noting any changes in executable file size.

- Check for viruses on new computers before using them.

- Regularly backup up your data and programs—preferably the whole disk for safety's sake, not just changed data.

- Have a bootable floppy disk at hand should your PC need to be rescued from a system crash.

- Use an anti-virus product frequently and keep it updated to catch new and nasty viruses.

- Scan all software before placing it on your hard drive, being especially careful in transferring software from diskette to your PC's hard disk.

- Don't leave a floppy disk in the disk drive when you want to reboot from the hard disk.

Having said all this, what about shareware? Isn't it dangerous to use software that doesn't flow through regular retail distribution channels? Not necessarily so. According to the Association of Shareware Professionals (ASP), shareware actually has received a "bum rap" on computer viruses in the popular press. ASP claims that—surprise!—the biggest vehicle for the spread of computer viruses is commercial (retail) software. Why? Because many retail stores accept returns on opened software packages; they re-shrinkwrap the software and restock it on their shelves, thereby exposing the next purchaser's PC to infection. On the other hand, most BBS SYSOPS and disk vendors (the two main distribution channels for shareware) take considerable precautions against viruses, reducing the chances of a virus getting loose via their software.

**K-Quest.** There's plenty of amateur radio software available on local and national BBS systems. BBSes are great for those who are modem-equipped, although the connect charges can be high, and the download process can be time-consuming. So, from time to time we look for good sources of public-domain and shareware software.

One we've found is K-Quest, operated by Mike Kreuser, WS4Q, which offers dozens of carefully selected amateur radio programs in all major categories of hamshack software. Only the most recent program versions are offered, and each program is tested for proper operation. K-Quest only stocks fully operational programs—no text files or demos. They offer a "Bargain Dozen Pak" of 12 top amateur shareware packages for \$19.95.

The K-Quest catalog displays typical screen

photos of most of the programs offered so you can get some idea of their look and feel. A free catalog is available from K-Quest, P.O. Box 92877, Southlake, TX 76092.

**Public Brand Software.** A recent 100-page catalog shows about a dozen amateur radio disks among several hundred shareware and PD disks. Each program in the catalog is described briefly. One very useful feature of this catalog is its subjective ratings for each disk and/or program, ranging from "trophy" (tremendous) and four stars (invaluable), down to one star (merely interesting). This rating system, while not perfect, helps you separate the wheat from the chaff. Catalogs are \$2.00 from Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251.

## Short Bursts

**HamNet.** The HamNet Special Interest Group (SIG) is a forum open to all CompuServe users, not only licensed amateurs. HamNet is dedicated to amateur radio and related topics, including shortwave listening, scanning, and satellite TV. Membership is free, and the net welcomes users interested in learning more about these topics. The SIG is a vast resource of computer software, amateur radio newsletters, information on technical developments, FCC regulatory information, and more. Since most of the software you'll find on HamNet is PD or shareware, the only up-front costs are CompuServe's regular online charges.

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available on HamNet, there's an online swap shop, and several amateur radio vendor firms offer online support. The HamNet main SYSOP is Scott Loftesness, W3VS (CompuServe ID 76703,407). If you're a Mac user, you'll also find some amateur radio software in the various Mac-oriented CompuServe sections and libraries. You can access the CompuServe HamNet Forum by typing "GO HAMNET" at any "!" prompt.

Of course, there's no completely free lunch. You must be a CompuServe member to access

these online goodies. For more information on CompuServe membership, contact them at P.O. Box 20212, Columbus, OH 43220-0212 (1-800-848-8199 or 8990).

**Notes to Shareware Authors.** If you're a writer of amateur radio shareware software and want me to take a look at your offering and mention it in the column, fine. Just bear in mind that it usually takes quite some time to work a review or even a brief mention into the column. Also, there's no need to update me on every minor software revision; wait until there is a *major* re-

write of the software. Above all, please include a *printed* copy of the documentation, complete instructions on how prospective users can obtain the software, and its price, including upgrades.

Also, if you can send along a sample of good, high-contrast, reproducible screen dumps of key program menus or other screens, please do so. These can be helpful in explaining and illustrating the program. And, if you have a logger or other type of database program, including a small sample database makes my job easier.

I'm no programmer, that's for sure. But if you're a budding shareware author, consider joining the Association of Shareware Professionals (ASP). The ASP is a professional organization that has as its purpose the strengthening of the shareware (user-supported) software channel as an alternative to commercial (retail) software. Its members subscribe to a code of ethics for shareware distribution and marketing. One of the ASP's goals is to foster a high degree of professionalism among shareware authors by setting programming, marketing, and support standards for members to follow.

These include standards on software support, registration payments, and the full functionality of software (no crippling of shareware versions is allowed). They've also set up the "ASP Ombudsman" to mediate disputes between ASP members and their customers. Membership includes shareware authors, programmers, and publishers; disk copying services (vendors); bulletin-board systems (BBSes); and others active in the field. ASP also publishes disk-based, 670-page master catalog of shareware products offered by ASP members.

Additional information on ASP, and a membership application, is available on the CompuServe ASP/Shareware Forum by typing "GO ASPFORUM" at any "!" prompt. Or contact the ASP Executive Director, 545 Grover Rd., Muskegon, MI 49442-9427.

**What's Your AC Line Voltage Supposed to Be?** In the August 1992 *Radio-Electronics* a reader wrote to the editor stressing an interesting point: most of us don't *really* know what our residential AC line voltage should be!

The letter-writer, Eric G. Lemmon, noted that it is incorrect to refer to AC receptacle voltages as, say, 110, 115, or 220 volts. In fact "110/220" voltage doesn't actually exist today in the United States. In the 1950s and 1960s "115/230" and "117/234" VAC electrical service did exist, but beginning in 1970 this evolved to the now-standard "120/240" VAC.

Today the American National Standards Institute specifies "120/240" VAC in three-wire systems usually found in residences, in ANSI C84.1. Most electric utilities strive to keep to that voltage within plus/minus 3 volts. The letter-writer also pointed out that some appliances may carry a nameplate showing a voltage rating of 115 or 230 volts, but these ratings allow for wiring voltage drop; the no-load voltage should be 120 or 240 VAC. Very interesting. Funny, I never knew any better!

## Wrapping It Up

That's all for this time. Next month, more Antennas and Accessories subjects of current topical interest. See you then.

*Overheard:* The only labor that's worth laboring at is one that's a labor of love.

73, Karl, W8FX

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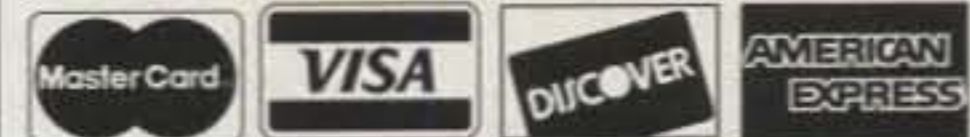
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## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Printed Items

**H**arry Helms, AA6FW, has written *All About Ham Radio*, a 291-page book which is useful to prospective and new amateurs. It covers what amateurs do. Activities, benefits, costs, and interests are explained in simple terms. Operating privileges are detailed for each class of amateur license, including the code-free Technician license.

*All About Ham Radio* is published by HighText Publications, Inc., 7128 Miramar Road, Suite 15, San Diego, CA 92121 (telephone 619-693-5900, FAX 619-693-3225). The price per book is \$22.95, which includes shipping charges to domestic (U.S.A.) addresses. A sales tax applies to Californians.

#### AntennasWest Catalog

The current AntennasWest catalog is titled "Radio Adventure," and the cover price is \$1.00. In addition to their excellent line of antennas, this publication contains feature articles plus information about hand portable operation, instant mobile operation, solar-power operation, homebrewing, and QSL cards. Their address is 1500 North 150th West, Provo, UT 84604.

#### The Radio Amateur's Digital Communications Handbook

This 224-page book is easily understood by amateurs who are new to various types of digital communications, yet it is detailed enough to be useful to experienced amateurs.

The main portion of the book covers AMTOR, ASCII radioteletype, Baudot radioteletype, digital communications basics, digital imaging, equipment/accessories, FAX (facsimile), FSTV/SSTV, the future of digital communications, the history of amateur digital communications, packet radio, radiotelegraphy/code, radioteletype, and setting up a digital communications station.

The appendices include an amateur radio introduction, AMTOR code chart, ASCII code chart, Baudot code chart, bibliography, glossary, index (4 pages), information sources, Morse Code chart, operating frequencies, and RS-232 C and D standards.

This handbook was written by Jonathan

45527 Third Street East, Lancaster, CA 93535-1802



*Here is Steve Allen, KA1ZVZ, of Moretown, Vermont. His station includes homebrew equipment and a Kenwood TS-120S transceiver, plus an extended lazy-H antenna. Steve particularly likes working DX (foreign) stations.*

L. Mayo, KR3T. It includes an assortment of 93 line drawings and photographs to supplement the text. This TAB book is available in many stores. The soft-cover version sells at about \$15, and the hard-cover version costs about \$23. Additional details can be requested by writing to TAB Books, Blue Ridge Summit, PA 17294-0850.

#### EEB Catalog

The 1993 EEB catalog contains 92 pages of items which may be of interest to many amateurs. In addition to amateur radio accessories and equipment, it advertises books, computer controls, scanners, shortwave receivers, and an impressive variety of interesting items. The cover price is \$4.95 and the address is the Electronic Equipment Bank, 323 Mill Street N.E., Vienna, VA 22180. Whether you are just getting started in radio, or you are an experienced old timer, you will find things of interest in this catalog.

#### Ham Radio Contesting Book

Robert J. Halprin, K1XA, has written a 73-page book about contesting. This 8½" x 11" book is assembled in a comb binder, which allows it to be left open without having to be held. It includes coverage of all aspects of amateur radio contest activity. The book price is \$14.95, and if your local store does not have it in stock, it can be

ordered from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. The domestic shipping and handling fee is \$2.00 per book.

#### Chicksands Book

The Shefford Press offers this 350-page book with printing on 8½" x 11" acid-free paper. It is indexed and complete with a bibliography and chapter notes. This book covers the history of the super secret RAF/USAF listening post at Chicksands in England. This book tells about the high-technology electronic eavesdropping accomplished at Chicksands. It was written by William C. Grayson, a retired USAF Signals Intelligence Officer with six years service at Chicksands and another nine years with the National Security Agency. The cost is \$21.95 per book, postpaid. The address is P.O. Box 4053, Crofton, MD 21114 (301-805-7279).

#### Kit Catalog

Townsend Electronics, Inc. offers a 28-page 5½" x 8½" catalog which presents the C.M. Howes line of high-frequency amateur radio equipment kits. The kit quality is excellent and the prices are reasonable. Complete single-band transceive combination kits sell at approximately \$165 to \$320. A typical combination transceive kit includes an audio frequency filter, case, hardware, receiver, S-meter, transmitter, and VFO. Their address is P.O. Box 415, 133 N. First Street, Pierceton, IN 46562 (toll-free 1-800-944-3661; others 1-219-594-3661; FAX 1-219-594-5580). Kit building greatly increases one's knowledge and confidence.

#### Stainless-Steel-Hardware Catalog

Ken Scheper, WA8JOC, had a terrible time locating stainless-steel hardware that he needed to complete one of his antenna projects. That frustrating experience motivated him to establish Shepter Stainless, Incorporated. He purchases stainless-steel hardware in bulk quantities, and he passes savings along to amateurs. His current 18-page catalog lists more than 800 of the items that are most commonly used



by amateurs. Ken also stocks a lot of hardware that is not listed in his catalog.

Allow at least a couple of weeks for an order to be filled. The minimum mix-and-match order is \$6.00, plus a \$4.00 shipping and handling charge. The \$1.00 catalog fee is applied towards the purchase price of one's initial order. Their address is P.O. Box 58126, Cincinnati, OH 45258-0126. To minimize errors, orders are not handled by telephone. Their 24-hour-per-day FAX number is 513-598-6887. If you need stainless-steel bolts, hose clamps, machine screws, nuts, tapping screws, or washers, Shepter probably can supply whatever is required.

## Universal Radio Catalog

The new Universal Radio catalog (92-08) has 101 pages filled with accessories, books, and equipment of interest to amateurs and shortwave listeners. The price shown on the catalog cover is \$2.00. If you are new to radio, this is one of the catalogs you should obtain and use. Their address is Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068.

## Vibroplex 100th Anniversary Book

Bill Holly, K1BH, is the author of this 91-page book, which should be a very welcome addition to the libraries of code enthusiasts. The book includes 116 illustrations, plus copies of original patents. The old advertisements are particularly interesting. The text covers the history of bugs dating back to 1902. Each unsigned copy sells at \$19.95, whereas the signed ones cost \$24.95 apiece. The mailing address is 98 Elm Street, Portland, ME 04101 (1-800-262-8387; FAX 207-775-7710).

## Satellite and Aerial Photographs

World Image sells an impressive variety of maps. Their product line includes aerial photographs taken at low and high altitudes, plus orthophotoquads used by cartographers to make maps. Their space and satellite photographs provide breathtaking views of Earth from space. The maps they have for sale include Defense Mapping Agency, foreign travel, geologic, old, road, topographic, and wall maps. The selling prices of these maps are very reasonable. Their mailing address is 6348 West 95th Street, Suite 104, Oak Lawn, IL 60453 (708-233-0208).

## Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been re-

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The screenshot displays the Ham Companion software interface. At the top, there are menu options: Locations, Maps, Graph, Info, Quick Reference, Utilities, and Exit. Below the menu, there are several windows. One window shows a list of locations with columns for Country, Seat & St. Capital, Denver, Colorado, and United States of America. Another window shows a propagation graph with Frequency (MHz) on the y-axis (ranging from 2.88 to 29.88) and Universal Time on the x-axis (ranging from 00 to 24). A third window shows a world map with various options like Country Names, Country & State Borders, Grayline, Great Circle, and Lat/Long Lines. At the bottom left, there are logos for VISA, MasterCard, American Express, and Discover. To the right of the logos is a shipping/handling section with rates for USA (\$5 Ground, \$15 Overnight) and Foreign (\$10 Ship, \$25 Air), plus TX & OK Res. and Add 8% Tax.

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printed for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#), self-addressed and stamped envelope to my California address. Licensing course instructors are welcome to revise and/or duplicate these items to suit their requirements.

### DX Envelopes

Two sizes of envelopes are available from Bill Plum. Mailer size (outgoing) envelopes are 4 3/4" x 6 1/2". Return-size envelopes are 4 1/2" x 6 1/4". These envelopes are made in America. They are tinted inside to provide confidentiality. They have a red and blue airmail border outside. The smaller envelopes sell at \$8 per 100, whereas the larger ones are sold at \$9 per 100. Larger quantities can be purchased at discount prices. Your name and address can be printed on these envelopes when they are purchased in lots of 500 or more. Bill offers a nice line of DX QSL supplies. His address is 12 Glenn Road, Flemington, NJ 08822 (908-788-1020, FAX 908-782-2612).

### Display QSL

Mike Kravitz, K2MK, is one of the QSL printers listed in my *PSE QSL!* book. He offers an excellent selection of custom QSL cards and business cards at reasonable prices. If you want samples and data, send your request to K2MK QSLs, 551 Norwood Road, Mount Laurel, NJ 08054. Enclose one green stamp (dollar bill) with your request for samples and data. A \$1.00 discount coupon will be sent with the sample cards. Mike uses a low-cost solid-ink process which enables him to offer 100 single-sided full-color cards at about \$16. This low-quantity low-cost offer should be of great interest to new amateurs who are not ready to buy a large quantity of cards.

Mike offers a unique service which should be of interest to many amateurs. He can produce an enlarged reproduction of a QSL card which is suitable for framing and display. The available enlargement sizes are 8" x 10", 8 1/2" x 11" (standard), 9" x 12", and 11" x 14". Mike also offers black wood frames for these QSL enlargements.

### QSL Cards For Those Who Just Need A Few of Them

New amateurs seldom purchase QSL



Phil Harrison, KA0NAU, was on the air from Kauai following the island being devastated by Hurricane Iniki. Bruce King, N7BIW, handled a lot of phone-patch traffic for Phil. Phil advises that an antenna is available at Kinipopo Village on Kauai Island for use by visiting amateurs. If you are interested in using this antenna, send your request to FAX 913-842-1777.

cards because they intend to get a supply of cards when they upgrade and change their callsigns. However, most of these amateurs need a few cards before they upgrade to confirm important contacts. One way to get around this problem is to use standard postcards (or photographs); simply attach to them a peel-and-stick report form, your callsign, and your address. One source of such self-adhering labels is K-K Labels, P.O. Box 412, Troy, NY 12181-0412. To give you some idea of price, a set of 100 callsign strips, 100 address strips, and 100 report forms sells at \$26, including shipping and handling.

### Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB



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## ALL ABOUT THE WORLD ABOVE HF

### New World DX Record on 47 GHz

**O**n 15 September 1992 at 1920 UTC Erich Zimmermann, HB9MIN, and Ferdi Staempfli, HB9MIO, operating portable from JN47 and JN37, respectively, made a 47 GHz QSO over a distance of 166 km. This distance eclipses the previous record of 105.44 km held by Tom Hill, WA3RMX/7, and the Tektronix Employees' ARC. (That record was set over the weekend of 6-7 August 1988 during the ARRL UHF Contest.) On each end they used narrow band "constant amplitude SSB." They ran 8 mw into 2 meter dishes. Erich had previously held the record when he worked HB9AMG/P on 13 January 1985, for a distance of 55 km. More information on constant amplitude SSB and their feat will be found in a future column.

### EME Conditions and Reports

Once again this month will contain excellent EME conditions. The date to watch for is 8 March. Perigee and the full moon are both on 8 March. Days before and after this date should be very good, as well. While not confirmed at the time of the writing of this column, the Algonquin 150 foot dish may be operational on 432 MHz the second sked weekend of this month. Check with the EME nets for further updates.

**Chris Patterson, WA3HMK.** Operating as VP5/WA3HMK, Chris made contacts with 15 stations on 2 meters via the moon. Among the lucky ones were SM7BAE, W5UN, K5GW, KB8RQ, VE7BQH, N1BUG, SM2CEW, DL5MAE, SM5FRH, WB5LBT, LA8YB, DL8DAT, WA6MGZ, WA7LYI, and his own home station,

P.O. Box 73, Oklahoma City, OK 73101

A fish-eye view of Paul Chominski, SM0PYP, and his 7.6 meter dish. Look for him on your favorite EME band. (Photo courtesy SM0JHF)

Paul Chominski, SM0PYP, examines the 432 MHz feed horn for his 7.6 meter dish. Paul is one of the most active EME operators on the air and frequently shows up in the logs of EME operators from 144 MHz to 2.3 GHz. All of his equipment is home made. (Photo courtesy SM0JHF)



### VHF+ CALENDAR

March 1	First quarter moon.
March 6-7	First weekend of REF contest. Possible operation of the 7000 meter <sup>2</sup> Nancay, France telescope. (See text for details.)
March 8	Perigee and full moon. Excellent EME conditions.
March 13-14	Charlotte Hamfest and Computer Fair. (See text for details.)
March 14	Poor EME conditions.
March 15	Noisy EME conditions. Sagittarius A. Last quarter moon.
March 21	Moderate EME conditions.
March 22	New moon. Moderate EME conditions.
March 28	Moderate EME conditions. Possible operation of VE3ONT at Algonquin. (See text for details.)
March 29	First quarter moon.

WA3HMK, operated by KI3W. Additionally, Chris completed seven meteor scatter contacts. Among them were WB4JEM, WB4DBB, W3ZZ (the longest meteor contact), KC4YO, KM4ID, WA4VCC, and KB4CSE. (Ted said that Chris was unexpectedly loud for their contact on the morning after the "predicted peak.") Chris also made several tropo contacts into Florida, including W4FF and NI4Z. Chris used 700 watts into two 17-element M2 antennas with elevation to 70 degrees. He reports that all his contacts were made without a pre-amp. QSLs go to his home call.

**FR5DN.** This station was quite active during the sked weekend of 12-13 December. He is now using 300 watts into four 17-element antennas on 2 meters and 4 Yagis with 200 watts on 70 cm. Skeds can be arranged on the EME nets.

**S57TW.** Formerly YU3TS, this station now

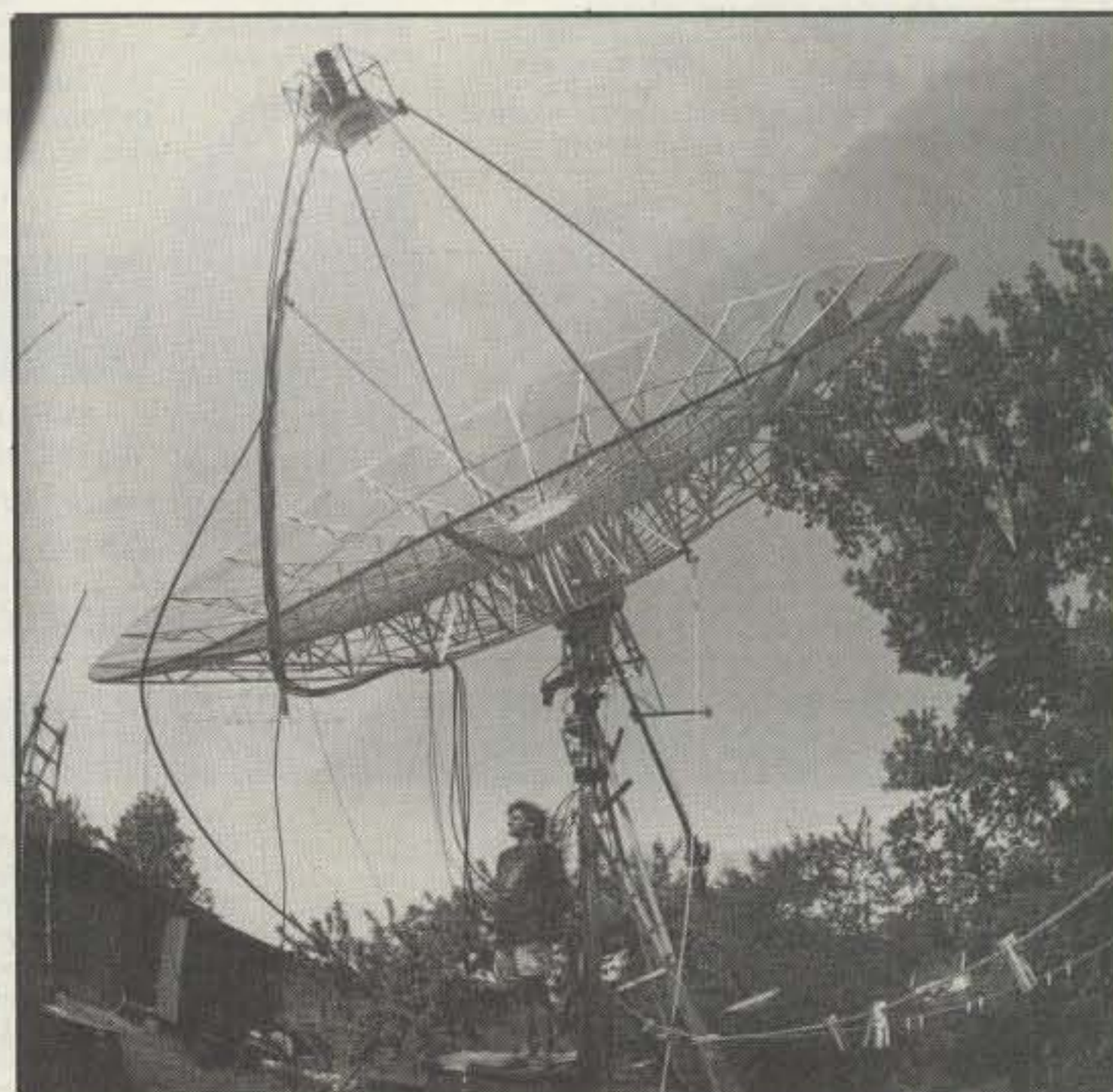
counts as Slovenia (for contacts after 26 May 1991). He is using one kw into eight 17-element antennas.

**Croatia.** 9A1EZA and 9A1CCY are active from this new (26 May 1991) country. Both stations use four Yagis.

**Gibraltar.** ZB0T is now on 432 MHz with four 17-element Yagis and 280 watts.

**Martinique.** FM5CS is back on the air and looking for skeds. You can contact him via phone (596-52-01-16) or via his *Callbook* address.

**Rhode Island.** On 2 meters, by the time you read this, Jack Szelka, AI1K, will be running 1.2 kw into four 17-element Yagis. On 70 cm Dale Clement, AF1T, made a one-day foray into Rhode Island, setting up at Edward Shekleton, WA1HYN's QTH. Dale made 432 EME contacts with SM4IVE, KU4F, PA3CSG, N4GJV, W5RCI, KD4LT, K0RZ, AA4TJ, W0KJY, KB3PD, and Don







How is this for coincidences? Dr. Rick Dorsch, NE8Z, then operating as HC8VHF, worked John Webster, 8P6JW, on 15 November 1981. During the course of the QSO they discovered that it was both of their 30th birthdays and that they were born only 45 minutes apart—John at 1445 UTC on Barbados and Rick at 1530 UTC in Detroit. On 15 November 1992 Rick traveled to Barbados to celebrate their joint birthdays. While there, he had this photo of John, Elsa, 8P6LL (John's wife), and himself taken. He reports that John is busy finishing construction of their mountaintop home. Once completed, they will construct an antenna farm that will once again put 8P6 "Johnny Walker" and 8P6 "Lovely Lady" all over the HF/VHF bands. (Photo courtesy NE8Z/HC1MD/8P9DR)

Roberts, W7FN. Incidentally, this was Don's 50th state. Don had worked Clark Stewart, W8TN, in West Virginia during the contest for state number 49.

**Nancay, France Telescope.** The 7000 meter<sup>2</sup> Nancay, France (grid locator JN17) telescope is scheduled to be activated on 23 cm during the weekend of 6-7 March for the REF contest. The callsign to be used will be FF1EME. Because the telescope is a meridian instrument, it has the moon for only around an hour each day. Therefore, only random contacts will be attempted. Times to look for them are  $\pm 30$  minutes of 2228 UTC on 6 March and 2330 UTC on 7 March. SSB contacts are welcome from big stations and a station running 1 or 2 meter dishes with at least 100 watts should be able to work them on CW. Polarization will be linear. For more up-to-date information on this station, monitor the EME nets.

**Manuel Castelo, CX9BT.** Look for Manuel on 70 cm very soon, as he is making excellent progress on a 6 meter dish. He will also eventually be on 23 cm using an IMU horn. Additionally, he has ordered an N6CA amp from NA6E. Check the EME net for scheduling with Manuel.

**Shep Shepard, W7HAH.** Shep writes that he worked K6QXY and W5FF during November on 6 meters EME. He points out that the contact with Fred was on 30 November, when the moon was at  $-12^\circ$  declination and 12 days past perigee. Nevertheless, he states that Fred's signals were loud. Shep feels that we have much to learn about using the moon on 6 meters. He also reports that during the December activity weekend he worked nine new stations, bringing his initial total to 512. Unique stations include 557TW, LA0BY, and UZ2FWA. Shep states that he received several get-well cards from around the world following his hip injury last summer. He is walking now with the aid of a cane and a walker and hopes to solo soon.

**2304 MHz EME.** Charlie Justinak, W7GBI, has recently gotten his klystron fired up on 2304

MHz. He now has 500 watts on this band. His first contact was with Paul Wilson on 10 December. The signals were so good that they completed both CW and SSB contacts. Speaking of Paul, he now has made 23 contacts on this band and is actively looking for more. He states that he advocates other 13 cm stations to use the Saturday preceding the sked weekends for testing and random operation around 2304.025 MHz or 2320.025 MHz for G and DL stations.

**Pete Heins, K1FJM.** Pete reports that he is on 2 meters EME as a "sub marginal" station thanks to the "pump up" at the CSVHF conference last year. To date he has worked KB8RQ, W5UN, and AF9Y. He is using an AM 6155 surplus amp putting out 300 watts to 60 feet of Heliac feeding a 16-element F9FT antenna. He is also using a WD5AGO pre-amp. He will be looking for you during upcoming activity weekends.

## Other On-The-Air Reports

**24 GHz.** A group of California hams, including Bruce Erickson, KK6TG, Len Rhymes, WB7ABP, and Bill Kaiser, N6OLD, are making an assault on the 24 GHz world record of 207 miles currently held by a group of Italians. Last year they set a North American record of 159.1 miles. On 12 September at 2300 UTC Len, operating from Bully Chooop (elevation 6500 feet, grid square CN80on) worked Bruce, operating from Pine Hill (elevation approximately 2500 feet, grid square CM98mr). Len was using a 10 mw transmitter, with a 10 dB noise figure, feeding a 24 inch dish. Bruce was using a 5 mw transmitter, also with a 10 dB noise figure, feeding a 16 inch dish. The temperature was  $76^\circ$  with a relative humidity of 32 percent. (They have found that they seem not to make contacts with a humidity above 40 percent.) Bruce reported that they were "playing around" on the contest weekend and, almost as a lark, set up to make the contact. Thinking that the distance was around 120 miles, they almost did not attempt the contact. After the QSO Bruce calculated the distance and found that they had worked much farther than originally perceived. Bruce reports that they are looking for possible sites for the record breaker and that these sites are hard to find. (In order to make a shot of 250 miles, one must be at 10,000 feet in order to clear the surface of the earth.) Look for some serious attempts, possibly in Arizona, from this group this summer. Also look for their beacons on 10.36802 GHz and 24.19205 GHz, operating 15 dBm into omni-directional antennas from grid square CM88qq, using the callsign KK6TG/B.

**The Geminids.** A number of stations reported an average of a 60 percent completion rates during this meteor shower. Among the check-ins to the 75 meter VHF Group net were the following reports: W3ZZ, with Chris, VP5/WA3HMK; WB4DBB, also with Chris and two others; K0BI, one of four, but with EN72, a new grid; KM4ID, one of three, that one being with Chris; N0LL, two of seven; K0IFL, one of two; KE8FD, four of seven; VE3BDR, nine of twenty; WZ1V, five of seven; AB4CR, eleven of twenty-five; KG5UN, three of ten; N2WK, eight of thirteen, with one on 222 MHz; N4TWX, ten of sixteen; NI4Z, three of four; W9/G4FDX, twelve of sixteen; KF5IU, five new grids, plus two more on tropo; NC7K, four new grids; W7HAH, one for two (K7QXA in CN91), and W2CRS, seven completions.

**East Coast VHF/UHF Opening.** On the evening of 15 December VHF+ operators on the East Coast experienced an opening that many

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had not seen in years. The opening extended from the Florida Keys to the Maritime provinces. I will share logs from two ends of the opening to give you some idea of the extent of the opening. From the Keys, Rene Shaw, WB4MJE (EL94), started experiencing the opening around 2230 UTC, 15 December. Between then and 1300 UTC he made the following mostly 2 meter contacts: 2239, N4OOT, EM84; 2248, KD4NUE, EM91; 2315, K3KEL, FN11; 2354, K4KAE, FM02; 2355, WB3CZG, FN21; 0006, WA2NSD FN20; 0011, W3EP, FN31; 0023, K3BFA, FN10; 0031, W3ZZ, FN19; 0044, W4DR, FN17; 0104, N1FGJ, FN41; 0105, W2IV, FN?; 0132, N4AVV, FM04; 0133, AA2Z, FN31; 0137, K1NG, FN42; 0139, WB1FKF, FN42; 0141, K1GBU, FN41; 0152, W2MCF, FN41; 0153, KM1X, FN41; 0202, WA4VCC, EM95; 0235, KM1H, FN42; 0251, KO4VD; EM84; 0439, KA4CGI, EM84; 0441, N1KFT; 0445, KC4SGO, EL98; 0454, KM1H, FN42 (on 432 MHz, for a distance of 1373 miles); 1222, WB4DBB, FM07; 1235, WB4DBB, FM07 (on 432 MHz); 1240, K4CAW, FM06; and 1304, W4DR, FM17. Additionally, Rene reports that he maintained on and off contact with his friend Dave Collins, K2LME, from between 2337 and 0300. Rene said that this opening reminded him of the 15 December 1989 sporadic-E opening when he worked 53 stations in 10 states and 29 grids.

On the opposite end of the opening Carl Huebner, KM1H (FN42), reported the following from his log: On 2 meters, at 0223, VE1EJA, FN63; 0227, KB3NR, EL89; 0231, KD4EEB, FM17; 0232, NI4Z, EL98; 0232, W3ZR, EL86; 0233, K4HJF, FM18; 0234, WB4MJE, EL94; 0235, W3ZZ, FN19; 0236, AB4SF, FM17; 0236, WA2OGY; 0237, KD4JRX, FM04; 0238, KA4VXT; 0239, WJ9B, FM06; 0240, KC4RDP,

EL88; 0241, K4KAE, FM02; 0242, WA3JPY, FM15; 0243, WA3JPY, FM15; 0243, WB4IYG, EL98; 0244, N4AVV, FM04; 0244, KD4JRR, FM16; 0244, KA3AQS, FM19; 0245, WA4OFS, EL98; 0246, KM4ID, EM93; 0247, WD4AFY, EM92; 0248, KC4WNT, FM16; 0249, K2QWQ, FM29; 0250, K4SC, EL98; 0251, WC4G, EM92; 0253, N4HB, FM17; 0256, W4FF, EL96; 0302, WA2GSY, FN20; 0303, N4WI, FM14; 0305, WD4IXD, EL98; 0306, KC4SUS, EL95; 0308, WB4YJG, EL95; 0310, WA4GHK, EL97; 0312, WA1GUD, EL87; 0314, WD4AHZ, EL87; 0316, K4HJE, EM96; 0317, KB4LEA, FM18; 0405, N4TWX, EL89; KC4WQC, FM18; 0422, KE0YG, FM16; 0426, WA2HGP, EL88; 0427, KN4SM, FM16; 0432, N3KVA; 0433, K4AGV, EM96; 0434, WB4YJG (who was using only a 19 inch whip in his garage!), EL95; 0441, WA4ZEF, EL87; 0444, N4XQU, EL87; 0445, VE1CCD (who was using a vertical), FN74, 0506, WB4VQW; 0509, KD4NUE, EM91; 0527, WA4CHA, EL88; 0557 N4JJR, EL98; 0601, W4AMJ, EL86; and 0606, NE4C, FM06. On 70 cm, at 0448, W3ZR (who was running only 5 watts), EL86; 0451, WB4MJE (who was running only 20 watts), EL94; 0513, WA4GHK, EL97; 0513, KB3NR, EL89; 0530, WA4CHA, EL88; 0531; WA4TNV, FM05; 0549, WA4ZEF, EL87; and finally, 0551, WA4CHA (again; this time with 59+ signals both ways), EL88.

All of Carl's contacts on 70 cm were made with only 35 watts. He reports a total of twelve new grids on 2 meters and seven on 70 cm. He has now completed contacts with 113 grids on 2 meters since August and 46 grids on 70 cm since the September contest. Carl states that he only needs Alaska 6 meters for WAS. He is looking for 2 meter meteor skeds with Mississippi (try WB5KYK), Texas, Kansas (try N0LL), Ok-

lahoma (there are several of us), Nebraska, North Dakota (try K0ALL), and South Dakota (try K1LL when Art's antennas thaw out). You can reach Carl at P.O. Box 973, Pelham, NH 03076, or call 603-635-3048.

Mark Wilson, AA2Z, also got in on the fun. He reported that he became aware that something was up when he was hearing distant signals on his commercial FM radio. He turned on the packet to see a spot by K2LME indicating that Florida was being worked in Connecticut on 2 meters. Mark got on 2 meters and also made several contacts in Florida, including W4FF, W3ZR, KB3NR and WB4MJE.

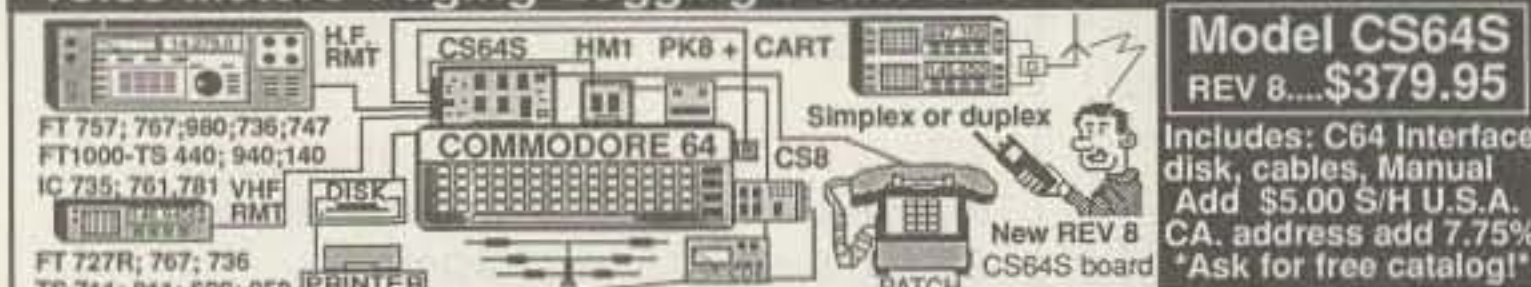
Emil Pocock, W3EP, also got in on the fun. However, he made an observation worth noting. He heard VE1 stations trying unsuccessfully to work through the pile-up. Unfortunately, he observed that many stations seem to pile onto the calling frequency. We have discussed this problem before in this column. Spreading out off the calling frequency, especially when the band is so wide open, will invariably help more stations make even more contacts. People can be worked off the calling frequency. For example, Carl was able to make those nearly 50 contacts 20 kHz away from the calling frequency.

The opening even extended to 1296 MHz, with W1RIL making a contact into Florida. Not many other reports from this band, however. I guess everyone was having too much fun on 2 meters and 70 cm.

From "Cheese Bits," Dave Hackford, N3CX, makes the following report: "On 12 December at 1900 (local?) I went to the shack to check out some antenna systems after the bad winds and rain we had the past few days. I was testing on 2 meters when W4AVV called me from FM04. We went up through the bands to 432 MHz.

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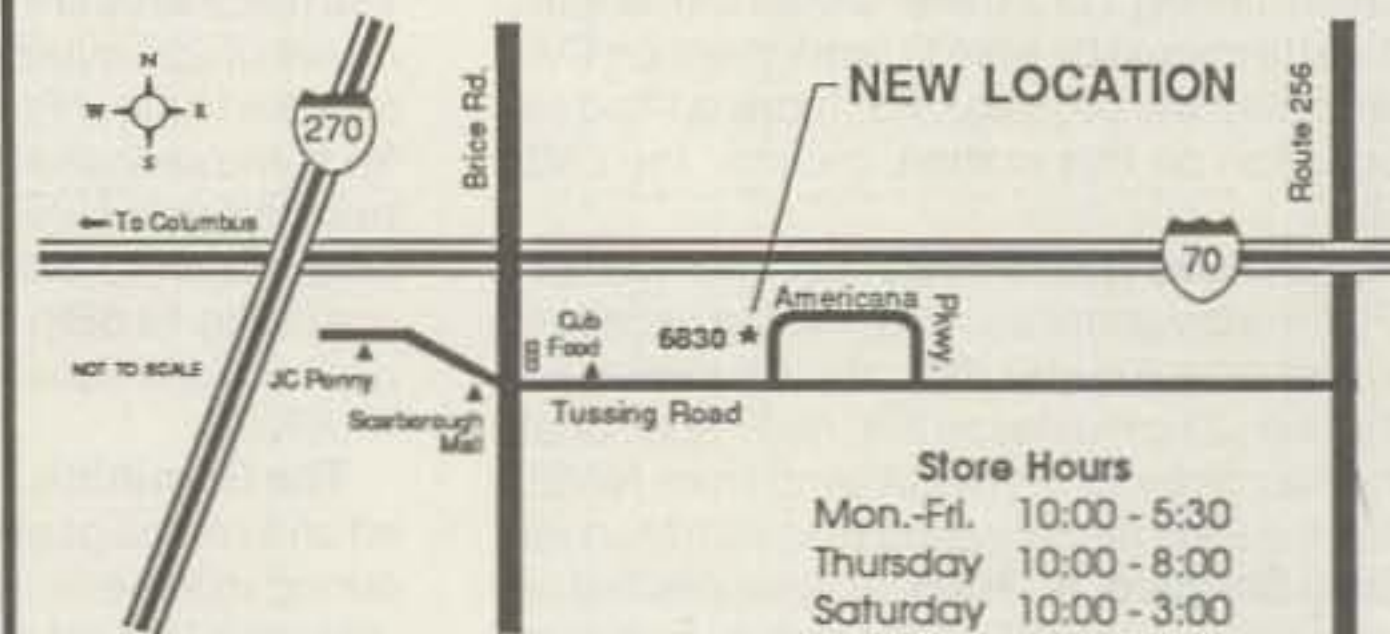
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Three generations of amateur radio operators representing 72 years of licensing are pictured here. From left to right, Les Bostedor, WB8KYP, who now resides in Florida; Dave Bostedor, K8WKZ, who was the very first recipient of VUCC on 6 meters and the eighth recipient of DXCC on that band; and Dave, Jr., N8NQS. You can expect to find Dave, Jr. and his wife, Pat (not yet licensed), on yet another grid safari this summer. (Photo courtesy Pat Bostedor)

When I signed with him on 432 MHz I couldn't believe the station in Florida calling me. First WA4CHA/EL88, then WD4IXD/EL89, then KC4RPD/EL88 and NI4Z, near Orlando. The east coast was having a big opening and it was exciting. There was KM4ID/EM93, K4KAE/FM02, W4KSV/FM07, WJ9B/FM06, K4AGV/EM96, and good old Bill, AA4TJ/FM08. About 1945 the duct started to move and the New England boys started to knock them out. Boy, were they excited up there. Our old friends W1RIL and WA1MBA had a blast. I even heard WA1YHO in there. I never thought I'd work Florida on 432 MHz. From my QTH I couldn't work anyone on the microwave band. The conditions here didn't favor it."

**6 Meters.** On 11 December Ray King, WB8YFE/9 (EN71), participated in a 6 meter sporadic-E opening to the east coast starting around 1350 UTC. He worked stations in Vermont, New Hampshire, Maine, Massachusetts, Nova Scotia, New York, and New Jersey, until around 1630 UTC. Then on 19-20 December 6 meters really started to perform. Stations from around the country reported some sporadic-E. Several double-hop openings were reported. Among them was Randy Galloway, KN4QS, who made his first ever California contact. Perhaps the most exciting day in December was Saturday, the 19th. The band was open to some part of the country during some part of the day. Here in Oklahoma the band was open for at least 12 hours. Among the stations heard or worked on that day were: WB8TRY, KM4ID, WA4TNV, AE2L, N4AVV, W3OTC, WB4WXE, N2LIV, KA1A, WB4NFS, WA8QNR, N8TLZ, KC4TIQ, WJ9B, XE3EB, YN1CC, WZ8D (who worked Jose, YN1CC, for a new country), WB8YFE/9 (who also worked Jose for a new one at 2155, for his 79th country), WA4VCC, WA1T, K2QE, KF0KP, NP4NP, VE1MQ, KA7VLH, KB3WL, VE1SLM, CO2KK, N0UET (on FM), K0GUV, N9MFE, N0TNV, KB5QKS, VE2NRN, W0KAV, K1GPJ, N4KWX, KB4FQ, KC4ZZE, KC4ZTL, WB4HIE, W5NZS, KU8Y, KA8TBW, AA2DR, K9SYA, KE9HO, K8WKZ, KA2DRH, KF5IU, WA4AUX, N1EFM, WD5G, KA5WRG, and W3EP.

The band opened again on 21 December. Mark Hoffman, KA2RDO, reports on a rather spectacular opening on that date. He turned on the radio when he go home at 0400 UTC and he

found the 6 meter band to be wide open. The following is extracted from his log: 0419, WB5IRI, EL29; 0422, W5FF, DM62; 0433, N0HJZ, EN34; 0450, N0QDS, EN34; 0453, W5NZS, EM15; 0455, WA5JCI, EM21; 0508, N0HWY, EN35; 0510, N7JJS/5, EM32; 0511, WA5PUP, EM11; 0513, KG5UN, EM02; 0515, N5TIP, EM13; 0517, K5SW, EM25; 0519, K5ZXE, EM14; 0526, WS0H, EN34; 0528, N8AXA, EM79 (on back scatter); 0529, N0MWE, EN33; 0532, VE3HQW, FNO3; 0535, N0DBG, EN35; 0536, KA9WBX, EN53 (back scatter); 0539, W6XP, DM06; 0541, VE3EEI, EN58; 0544, WA8FTA/9, EN52 (back scatter); 0547 W0RRY, EM26; 0550, W6JKV, DM08; 0532, K6KLY, CM87; 0553, KB0JKQ, EN34; 0555, NT0V, EN17; 0603, N0SPE, EN33; 0606, AJ6T, CM87; 0608, KB5QKS, EM44; 0609, WD5K, EM13; 0629, N0EDV, EN46; 0652, WA3DJG, FN00 (back scatter); and 0705, K3QMX, FM09.

Mark makes a note in his log that things start

getting weird at this point. Again, from the log: 0709, KE9OL, EN52; 0714, WB8WZG, EN81 (on 2 meters); 0746, WD8CYB, EN66; 0756, N0STO, EN26; 0757, NT0V, EN17 (this time on 2 meters!); 0811 NT0V, EN17 (again on 2 meters!); 0816, NT0V, EN17 (now back on 6 meters); 0829, VE3SXE, FN25 (back scatter); 0833, WD8CYB, EN66; 0842 NT0V EN17 (again on 2 meters!); and, finally, 0902, NL7OW, BP41 (Alaska in four hops! He remains in here until 0911).

Mark comments on the opening: "It was weird. Guys from Minnesota, Wisconsin, and even Michigan were 59 + 60 dB for hours on end. I have never seen sporadic E with such intensity. The K0GUV/B and VE2TWO beacons were in from when I got on until I went to bed at 0930, with 599 + 60 dB signals. They never exhibited QSB or flutter. Tom, NL7OW, was as surprised as I was. It appears the multi-hop sporadic-E took place as follows: First hop to EN66, second hop to EN17, third hop to DO17

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(or so), and final hop to BO41. NT0V and I were the only two crazy enough to be playing at that hour, or so it seemed. (Well, not quite, Mark. Read VE1MQ's and K2LME's reports of 2 meter sporadic-E contacts.—ed.) If you would have told me before to expect 2 meter sporadic-E in December, I would have said, "Bah, Humbug!"

Ray King, WB8YFE, also got in on the fun, with openings to Florida, Colorado, and Texas, between 0100–0220 UTC. Then on 22 December Ray worked into Virginia at 0118 UTC. Also, on that date Carl Huether, KM1H, worked stations in Alabama, Mississippi, Louisiana, and east Texas. On 26 December Frank Moorhus, AA2DR, reported a sporadic-E opening. He worked (from his car) KD4NUE (EM91), KD4EO (EL99), KC4HW (EL98), C6AGN (FL16), and KC4XX (EL98). On 27 December at 1515 UTC, your editor (EM15) made a CW QSO via what appears to be meteor scatter, with Bruce Handy, WA8FTA, in EN52. On 28 December the band was alive with aurora. Frank, AA2DR, worked Mark Hoffman, KA2RDO, on aurora while Frank was mobile.

Mark also worked the following: 2115, VE1MQ, FN65; 2143, VE2TH, FN47; 2200, WB3LJK, FM19; 2210, W3EP/1, FN31; 2219, VE3USC, FN03; 2237, WB2UFF, FN21; 2240, K2MUB, FN20; 2244, N2OUD, FN30; 2248, WR1G, FN31; 2251, K1GPJ, FN44; 2252, WB4WXE, FM29; 2253, VE3URS, FN15; 2348, VE3GOG; 2349, WO8Q, EN81; 2350, N8PBY, EN82; 2356, VE3ECL, FN03; 0001, VE3SJV, EN93; 0009, N1KLW, FN33; 0012, VE1SLM, FN65; 0118, KA2LIM, FN12; 0122, KN8B, EN80; and 0127, WB8RUQ, EN02.

Ray, WB8YFE, reported hearing signals from W2, FN12, FN22, FN15, and FM08 (that being the most southerly grid heard). Also, Rolf Ange,

LA9ZB, reported hearing the VE2TWO beacon via aurora!

Mike Smith, VE1MQ, reported that his best DX was with W5FF, with 59 +60 dB signals. He states that he heard both XE1GE and XE3EB, but could not break the pile-ups. He also noticed a number of WVE stations in the 50.100–50.125 MHz DX window during his sporadic-E openings, which prevented him from hearing anything that might be coming through from the Caribbean or Central America on those frequencies. Let's make calling frequencies and the DX window work for their intended uses. There. The soap box is put away.

On 5 January (UTC) Larry Lambert, N0LL, and a number of other stations mainly on the west coast worked ZL1ANJ, ZL1AXB, and ZL4AAA. Larry's contacts appeared to have been sporadic-E assisted from Arizona. More details next month.

**2 Meters.** On 20 December (UTC) Mike Smith, VE1MQ, worked the following on sporadic-E: 0423, KA9LDS, EN51; 0426, KB8JI, EN64; and 0427, WZ9D, EN51. He also reported hearing N9QZD, but no two-way contact. He says that he suspects the band was open much farther north, as he heard the VE2TWO beacon 59 + +. On the evening of 21 December (UTC), while most everyone was having a good time on 6 meters, Dave Collins, K2LME, hearing a VE3 beacon decided to sneak off to 2 meters. When he got there, he made contacts with Rich Westberg, N0HJZ, and Gary Mohrlant, WA0BWE, both in EN34, during a very brief opening. On 22 December at 1327 UTC Mike Smith, VE1MQ, worked Larry Jones, WB5KYK, for a 1550 mile meteor contact. He stated that it took them awhile to complete. They found it best to work each other at 50 + wpm! Mike further states that

he is always looking for meteor skeds. You may reach him at 408 Canterbury Dr., Fredericton, NB, Canada E3B 4L9, or call him at 506-357-3035.

On 28 December Mark Hoffman, KA2RDO, reported the following auroral contacts: 2106, VE1MQ, FN65; 2116, K3BFA, FN10; 2138, N2LT, FN20; 2142, N3DRX, FM19; 2147, VE3ASO, FN25 (on 222 MHz); N3JNP, EN91 (on 222 MHz); 2326, K1PXE, (on 222 MHz); 0341, VE3DEW, FN04; 0347, W8IDT, EN83; 0350, WD8DTH, EN72; 0354, W1XR, FN42; 0402, K8BHZ, EN75; and 0405, WA9TKE, EN61.

**2 Meters TE.** Esteban Acosta, YV4AKK, reports that he once again made long-haul contacts on 2 meters. The latest occurred when he worked LW2DWA and LW2DBM on FM at 1845 local time for a period of 6 minutes on 146.010 MHz. Esteban is using a TM 241 transceiver with 45 watts out into a Cushcraft 26B2 antenna.

**ZS's "Fired Up" for Contest.** Vicki Fox, ZS5VF, reported in the "YL Harmonics" newsletter on her experience at the ZS5D portable location during their June contest. They chose a location nearly 7500 feet ASL and set up equipment for operation on 6 and 2 meters and 70 cm. While setting up their equipment in 40 knot winds, they spotted a fire some distance from them. However, an hour before start time the fire had drawn dangerously close to their location. They decided to abandon the location temporarily to see how the fire was going to travel. They were amazed at how the antennas that they hadn't taken down stood out against the backdrop of the smokey sky.

After waiting for two hours they decided to return to camp. They operated four hours before the wind shifted, thereby driving the fire back at them. Seeing that their only exit was threat-

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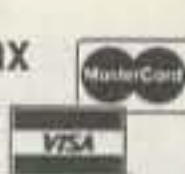
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N1EJF in a review about our XP 706 in 73 magazine, 4/1987

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ened by the fire, they called it quits. Vicki remarks that they had no idea how bad the fire was until watching reports on TV that night. She said that within the Dragensberg Mountains there were farms, livestock, and people all gone. She also stated that she would never forget that contest!

## Current DXpeditions

**Bill Wiseman, KM1E.** Bill is planning a return 6 meter operation from the Bahamas as C6AGN during this month. He has already been worked by a number of east coast and southeast stations during his first stay in December and January. The QSL route is via KA1DIG.

## More on 222 MHz NPRM

As reported last month, the FCC issued a Notice of Proposed Rule Making (PR Docket 92-289) that mostly pertains to the 222-225 MHz U.S. amateur band. The proposal would create a weak signal sub-band (from 222.000 to 222.150 MHz), allow Novice class licensees use of the entire band, and allow Novice class licensees the privilege of being control operators for repeaters on this band and on their sub-band on

1240 MHz. The deadline for comments is 23 February and the deadline for reply comments is 23 March.

Early indications of opinions show some opposition within the repeater community in southern California to the size of the weak-signal sub-band and some opposition to the provision allowing Novices control operator privileges.

## Coming Conventions And Contests

The Mecklenberg Amateur Radio Society will present the Charlotte Hamfest and Computerfair on 13-14 March in Charlotte, North Carolina. Among the programs will be a joint session moderated by Emil Pocock, W3EP, *QST's* VHF editor and myself. This will be an opportunity to meet both VHF editors at the same time. No, there will not be a dunking tank set up for your entertainment—sorry. Additional speakers include The following: also from CQ, John Dorr, K1AR, who will talk about single-op contesting; Ron Oates, AA4VC, and Murray "Dan" Adams, WA4DAN, who, fresh from Desecheo, will give the first hamfest report of this most recent DXpedition; Dennis Mitchell, K8UR, who will speak on

phased vertical array antenna construction; and Press Jones, N8UG, also known as "The Wireman," who will talk about antenna wire, baluns, transmission lines, and tuners. This is an ARRL sanctioned hamfest. Therefore, members of the League will be present. Included among the representatives will be one from the DXCC desk who will be able to verify up to 110 of your DXCC cards.

Hotel accommodations are with the Charlotte Best Western. If you are interested in staying in Charlotte, you had better call immediately, since the NCAA basketball tournament will also take place the same weekend. For reservations call 800-528-1234, and ask about the block of rooms reserved for the hamfest. For ticket information contact Charlotte Hamfest and Computerfair, P.O. Box 22136, Charlotte, NC 28222-1136, or call 704-536-7373. For booth information contact Robert Starling, N4GVF, 7921 Holly Hill Road, Charlotte, NC 28227, or call 704-568-7611.

The first weekend of the REF contest is 6-7 March. The bands include 2 meters and 23 cm. Rules for this contest can be obtained by writing REF or by checking with the EME nets.

## A Call for Papers

**CSVHF.** The Central States VHF Society, which will hold its conference 29 July to 1 August in Oklahoma City, has issued a call for papers for its *Proceedings*. If you are interested in making a presentation or submitting a paper, contact Tommy Henderson, WD5AGO, at 12476 E 13th, Tulsa, OK 74128. You can call him at 918-438-0099. The conference will be held at the Lincoln Plaza Hotel, where a block of rooms has been reserved for \$59.00 per night. For registration information, contact your editor (me), Joe Lynch, N6CL, P.O. Box 73, Oklahoma City, OK 73101. You may call me at 405-528-6625.

**Microwave Update.** The organizing committee for the 1993 Microwave Update conference has also issued a call for papers for their *Proceedings*. If you are interested in making a presentation or submitting a paper, contact Rick Campbell, KK7B, at Route 1 Box 195, Chassell, MI 49916. You may also call him at 906-482-7804. The conference is scheduled to be held 24-26 September at the Northwest Atlanta Hilton in Atlanta, Georgia. A block of rooms has been reserved for \$62.00 per night. Registration information for this conference will be forthcoming in a future column.

## Ham Photo Calendar

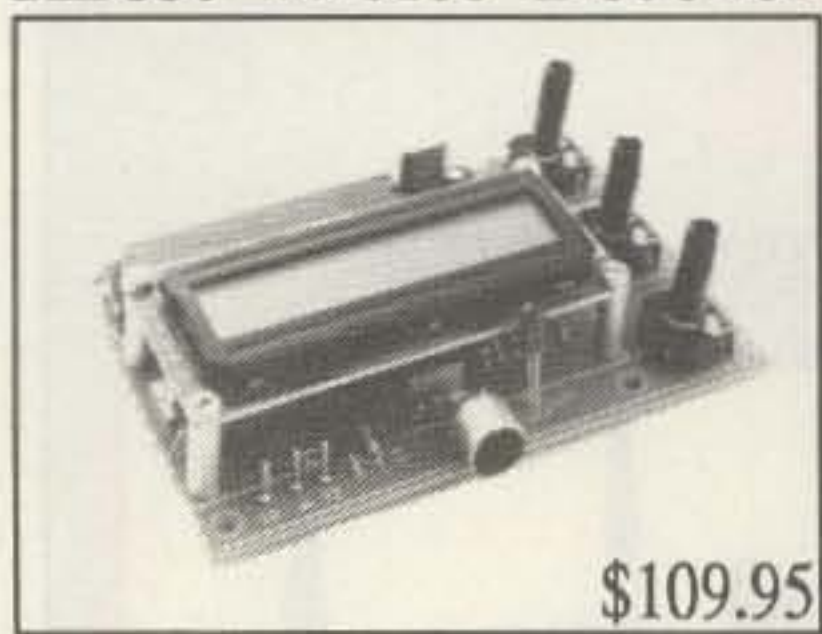
Do you want a way to keep track of the year's activities? Then the "Ham Photo Calendar" is for you. It lists all the contests (including all the VHF + contests), the good-excellent EME weekends, and so much more. It is new and larger than the previous editions, complete with full-color pictures of many well-known DXers and DXpeditions. For your copy, send \$12.95 plus \$2.50 shipping to: KB1T Radio Specialties, Box 1015-YCV, Amherst, NH 03031. You may also phone in your order by calling 603-673-4100.

## Silent Keys

Al Mehner, W7HP, a long-time EME operator, became a Silent Key on 27 November. Many an EME operator has entered his call for their Nevada contact for WAS. His presence will certainly be missed on the moon.

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Harold Crumley, WA4GBE, became a Silent Key on 4 January. Known as Mr. VHF, he was active on VHF and above for over 40 years. He was on first from W5 land, then later from the Raleigh and Winston-Salem, North Carolina areas, and finally from Chattanooga, Tennessee. His last QTH was in a ten-story apartment building. He had his antennas *and* bricks on top of the apartment building. He was always willing to help anyone who needed help on the VHF + frequencies. Harold was a member of the KC4YO contest group and will be sorely missed by them, as well as by all who knew and benefited from his generous helping hand.

## And Finally

My apologies go to Rusty Hack, NM1K, who I incorrectly identified as Rusty Shaw in the January issue. A person's name is golden, and when someone goofs it up it makes for unpleasant feelings. I am sorry, Rusty.

While I am making corrections, I might mention the following: In the October issue I identified the new Canadian beacon on 50.059 MHz as VE6UBL. It is VE3UBL and was heard at your editor's QTH a couple of times last summer.

Also, pertaining to the topic on grid squares in the December issue, Joe Reiser, W1JR, took issue with my statement that the old German system was a 1° by 1° square. He states that the Germans started right off with a 1° latitude by a 2° longitude "square" because, as he states it, "... that is the only way to have a relatively square grid at 45° N latitude." Indeed, the first paragraph on page 2 of *The ARRL World*

*Grid Locator Atlas* states "The system used 2 letters to indicate the largest unit, 'square,' that was 2 degrees (longitude) \* 1 degree (latitude)." Nevertheless, the CSVHF Society felt compelled to try to "square things up" by adopting a 1° by 1° square for their awards program. However, the League and IARU adopted the Maidenhead Locator system and thus, the universal size today is the 1° latitude by a 2° longitude "square." However, the term "square" continues to be misapplied to the system because, as Joe points out, the only place the locator approaches "square" is around the 45° latitude.

By the way, there are a few old timers who absolutely resent using "grid squares." When you work them, please respect their wishes and don't make a big thing about your grid square.

I am writing this column at the end of 1992 and the beginning of 1993. In a certain sense I am looking at what is currently happening on the VHF + frequencies as an ending of an old chapter and a beginning of a new chapter. For the most part, F2 propagation on 6 meters is over for this cycle. (Look at last March's column for a comparison of reports.) The optimists, the 6 meter die-hards, and those who need "just a few more" for DXCC on this band are thinking in terms of EME as the only way to complete their quests. (However, even the moon has its limitations, with about two to three years left of excellent conditions before its orbit shifts into a more noisy part of the sky for a few years.) Others are thinking about the effects of multiple-hop sporadic-E propagation and dreaming of mid-west openings to Europe (it can happen). Still others are thinking that there will be *new* ways discovered for completing long-distance contacts on this band.

Incredibly, this may be something to look for. Over the years receivers have been developed with previously inconceivable sensitivity. Have we reached the limit in technology or is there something beyond the horizon that will make receivers even more sensitive without an increase in internal noise figures? If so, will we be looking at ways of detecting whispers of propagation and exploiting them? Or, for that matter, is F2 propagation dead during the lull in the sunspot cycle?

While we are discussing advances in technology, what about all the developments on the microwave bands? Are we just a few years away from commercially available 5.7 GHz hand-held radios? The answers to these questions will come from you, the explorers of the VHF + frequencies.

Please let me hear from you as you make your discoveries on these frequencies above HF. Also, if you are planning a grid expedition for this summer's contests, please let me know by the end of this month. The more advance publicity of your trip, the more people know you are there and the more likelihood of your success. Whatever your activity, please drop me a note in the mail real soon. You know the address. The phone number is, as always, 405-528-6625.

My thanks go to Al Katz, K2UYH, and the "432 and Above EME News," Paul Kelly, N1BUG, Emil Pocock, W3EP (who graciously supplied me with most of the information on the 47 GHz record QSO), the EME BBS (704-284-4854), "YL Harmonics," "Cheese Bits," the "2 meter EME News," and all of you who regularly send me reports. I hope to meet many of you in Charlotte this month. However, until next month...

73, Joe, N6CL

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## NEWS OF CERTIFICATE AND AWARD COLLECTING

**T**he Story of the Month for March is:

**Dick Elkins, N6OKX**  
**USA-CA All Counties #765**  
**All SSB, 5-1-92**

"I was first licensed in 1955 with the call W7YKQ and lived in Las Vegas, Nevada at the time. Shortly after that a group of local amateurs formed an emergency back-up communication system for the Nevada Highway Patrol. At the urging of one of our group, a Patrol Sergeant, the state commissioned the group into the Nevada State Police as reservists, and we took on duties as part-time patrol officers on holidays and big weekends.

"From this beginning, together with my regular work which required traveling to California, Arkansas, and Utah, I became interested in mobile hamming and set up a 75 watt AM-CW unit in several vehicles I drove for the next couple of years. My big interest then was working DX from both the fixed 2 KW station and the mobile, on AM, SSB, and CW.

"In the early 1960s we sold our business in Nevada and returned to California, where my wife, Elaine, and I had previously lived. I received a WA6 call and operated from both my home and mobile for a couple of years. Several businesses, including a retail stamp and coin shop in Santa Ana, California, an outdoor advertising company in San Bernardino, Riverside, Inyo, and Mono counties, and an apartment house in Anaheim kept my attention, and eventually I sold all my equipment back to Henry Radio and shoved my license into a desk drawer, where it lay undiscovered for about two years, far past the automatic renewal period of the time.

"My second interest, which carried over from the late 1930s, was 'drag racing' an automobile. Unfortunately, rules would not allow me to race with the mobile equipment in the race car, so many weekends there was not much hamming due to race schedules. This has continued to the present, and I am now known around the racing circuit as a 'senile senior,' but I still beat the younger racers on a regular basis. In 1990 I was my home track champion and have managed to finish near the top each year since then.

"During the next year 10 meters got most of my attention with the 10-10 net and various contests and QSO parties. On Oc-



*Dick Elkins, N6OKX, USA-CA All Counties #765, with one of the several mobile stations he has assembled and operated.*

tober 6, 1987 a contact with Stu, W2PDM, who was running mobile in Louisiana on the CH net, was followed quickly by other contacts on the net. This got me interested in 'hunting,' and county hunting became my main interest from then on.

"Since that beginning, I have had mobile equipment in three vehicles, and have transmitted all counties from 12 states and many other counties from 17 additional states, while working toward my USA-CA All Counties number. In the final stages of my quest, Mary, KC5UO, helped greatly by letting me know when mobiles were heading for counties I needed. She arranged for Stu, WU4S, to go a good distance for my next-to-last county, and on the same day (April 5, 1992) while I was running counties in Idaho, Wayne, AA4HD, drove down to Talbot, Georgia to give me #3076!

"Numerous friends on the net whom I have met personally or hope to meet in the future have given me one or many counties along the way. To all of them, many thanks, and I hope to contact them again on my second time around.—Dick Elkins, USA-CA All Counties #765."

### Awards Issued

Ray E. Skrabut, WA2CNJ, put the finishing touches on his good record and received USA-CA All Counties #789, Mixed, dated 11-4-92.

Charles "Bart" Bartlett, N7LWX, round-

### USA-CA Special Honor Roll

Ray E. Skrabut, WA2CNJ  
 USA-CA All Counties #789  
 Mixed, 11-4-92

Charles "Bart" Bartlett, N7LWX  
 USA-CA All Counties #790  
 All Mobile 20M SSB, 11-20-92

### USA-CA Honor Roll

3000	500
N7LWX 815	KE2OI 2641
	W0DFK 2642
	CT4RH 2643
2500	KB4QCE 2644
OK1DKS 893	DK2BL 2645
KW0U 894	EA3CZM 2646

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For non-subscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801 USA for \$2.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated January 1, 1993. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Custodian, Star Rt. 40, Box 76, Pleasant Mount, PA 18453-0076 USA DX stations must include extra postage for airmail reply.

ed out his collection of county confirmations and claimed USA-CA All Counties #790 and USA-CA 3000 #815, All 20M SSB Mobile, dated 11-20-92.

Karel Sokel, OK1DKS, filed his good application for USA-CA 2500 #893, All SSB, dated 11-20-92.

Richard H. Weil, KW0U, took another good step in his quest, receiving USA-CA 2500 #894, All 20M SSB, dated 11-23-92.

USA-CA 500 certificates went to:

John C. Grove, KE2OI, USA-CA 500 #2641, Mixed, 10-31-92.

Robert R. Roth, W0DFK, USA-CA 500 #2642, Mixed, 11-6-92.

Antonio Queiros, CT4RH, USA-CA 500 #2643, All SSB, 11-7-92.

Paul M. Sweeney, KB4QCE, USA-CA 500 #2644, All SSB, 11-9-92.

Albert Sers, DK2BL, USA-CA 500 #2645, Mixed, 11-23-92.

Joaquim Font Arnal, EA2CZM, USA-CA 500 #2646, Mixed, 11-25-92.

### Awards Available

**Desert Storm DX Net Certificate.** The Desert Storm DX Net Certificate is available from Yousef Al-Shayji, 9K2YA, P.C.

333 South Lincoln Ave., Mundelein, IL 60060





Desert Storm DX Net Certificate available from Yousef Al-Shayji, 9K2YA, Kuwait.

Box 13210, 71953 Kaifan, Kuwait. The certificate is awarded for participation in the Desert Storm DX Net. The Desert Storm DX Net meets twice a week on Saturday, 1400-1600Z, and Tuesday, 1900-2100Z.

To qualify for the certificate, net participants must contact a minimum of five DX stations on the net and have checked into the net a minimum of five times. Applicants for the certificate must send a copy of their logs, certified by another licensed amateur, to 9K2YA.

Please check with Yousef regarding the cost of return postage for the certificate, net frequencies and modes, and any other questions.

**European World-Wide Award.** The European World-Wide Award is available to all licensed amateur radio stations and SWLs who fulfill the following conditions.

#### HF

**Mixed** (CW-Phone-RTTY)—200 confirmed contacts with 200 different countries from the official EWWA countries list. Contacts must have taken place from January 1, 1980 onwards.

**CW**—same as above in CW mode.

**Phone**—same as above in phone mode.

**RTTY**—same as above in RTTY mode.

**Monoband**—100 countries on 160, 80, 40, or 30 meters; 200 countries on 20, 17, 15, 12, or 10 meters.

**Five-Band EWWA**—The five-band EWWA certificate is available for working and confirming 100 countries from the EWWA countries list on each of the following bands: 80, 40, 20, 15, 10 meters. It is obtainable in Mixed, CW, Phone, and RTTY modes.

**Nine-Band EWWA**—same as the five-band EWWA, but on each of the following bands: 160, 80, 40, 30, 20, 17, 15, 13, 10 meters.

**Top List HF EWWA**—To qualify for the Top List EWWA, a total of 292 confirmed country contacts are necessary from January 1, 1980 in Mixed, CW, Phone, RTTY. Each Top List Award will include a special pennon.

#### VHF

Requires 100 confirmed contacts with 100 different countries from the EWWA countries list in the VHF bands from January 1, 1980. It is obtainable in FM, SSB, CW, or Mixed modes.

#### Special OSCAR Award

Requires 100 confirmed contacts with 100 different countries from the EWWA countries list via OSCAR satellites, from January 1, 1980.

QSL cards, or copies, and a log extract containing the callsign of each station worked, country, mode, frequency or band, date and time should be sent to the Award Manager, F6FQK, or your regional checkpoint (list follows), with the appropriate fee to cover costs: 7 ECU (10 US dollars) payable in USD, French francs, German marks, Italian lire, Spanish pesetas, or pounds sterling, plus sufficient funds or IRCs to return the QSL cards.

All QSOs must be made with licensed amateur radio stations working in authorized amateur bands. All stations worked must be land-based stations, and all stations must have been contacted from the same country as included in the EWWA countries list. Amateur radio operators portable in other countries must include a copy of their individual licenses and the official permission of the authorities for the portable operation, with specific mention of the callsign used in the portable operation. These copies must be sent to F6FQK, the award manager.

The EWWA Board of Directors requests comments and suggestions for improving the EWWA. For all correspondence, including petition for new country status, please write to Conseil de l'Europe, Regie des Moyens Audio-Visuels, Mr. Kremer Francis, F6FQK, BP 431 R6, 67006 Strasbourg Cedex, France. Applications for the EWWA will be considered from January 1, 1980.

#### Checkpoint List

**South America:** LU7HJM, Jose Maria de la Vega, P.O. Box 1401, 5000 Cordoba, Argentina. OA4ED, Augusto Morales Zevallos, Aurelio Fernandez Concha 590, Miraflores, Lima 18, Peru.

**Central America and USA:** OA4OS, Natan Sterental, 10820 S.W. 88 St. #S2, Miami, FL 33176, USA. **Cuba:** CO7KR, Dr. Juan Emilio Gonzales Balado, P.O. Box 5378, Camaguey, 70300, Cuba.

**US and Canada:** VE2PJ, Terrance Lowde, 910 Argyle, Sherbrooke, Quebec J1J 3J4, Canada.

**Caribbean:** FM5DN, Richer Leonce, 4km500 Rte de Balata, 97234 Fort De France, Martinique.

**Australia/Oceania/Asia:** YB2FRR, Sidik Tandjung Jalan Bromo, 32-A Semarang 50232, Central Java, Indonesia. **Japan:** JA1QKK, Tamotsu Ebina, 1461-206 Nagae Hayama, Miura-Gun Kanagawa 240-01, Japan.

**Africa:** 7X2RO, Afif Benlagha, 11 rue d'Alembert, 16000 Alger, Algeria. 6W6JX, Pipien Jean Louis, Salins du Sine Saloum, BP 200 Kaolack, Senegal.

**Europe:** F6FQK, Kremer Francis, 31 rue Louis Pasteur, 67490 Dettwiller, France. **Germany:** DL3MBE, Hans Scharfen, Oytalstrasse 22, D-8900 Augsburg, Germany. **Italy:** I2MQP, Mario Ambrosi, Via A. Stra-

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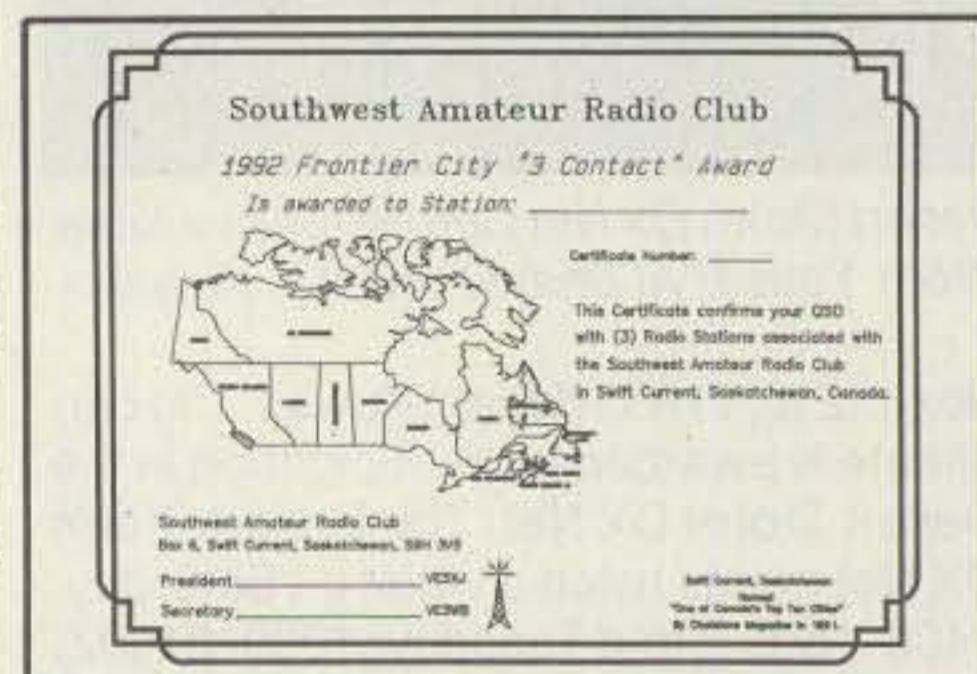
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*East Europe:* HA5WE, Peter Zudor, Pautay E. u. 13 l. em. 1., 1061 Budapest, Hungary. *Czechoslovakia:* OK2QX, Jiri Pecek, Riedlova 12, 75002 Prerov, Czechoslovakia. *C.I.S.:* UA4CX, Yuri Novikov, P.O. Box 374, 410026 Saratov, Russia. *Baltic Countries:* LY3BY, Morkunas Vilmantas, P.O. Box 34, 5410 Siauliai, 10 Lithuania.

**Worked All Swift Current Award.** The Worked All Swift Current Award is sponsored by the South West Amateur Radio Club, VE5SCR, of Swift Current, Saskatchewan, Canada. This award may be earned



Worked Swift Current Award sponsored by the Southwest Amateur Radio Club, Saskatchewan, Canada.

by an amateur radio operator who has made satisfactory two-way contacts with three amateur radio operators who are members of the SWARC. Contacts may be made on any frequency, any mode. QSLs are not required. Send a copy of your log, certified by another amateur, along with \$3.00 to cover costs of shipping and handling, to SWARC, P.O. Box 6, Swift Current, Saskatchewan, Canada S9H 3V5.

## Of Interest To County Hunters

Hardy Data Systems is offering an IBM-compatible Zip Code/County Software package for county hunters. The software does the following:

Enter Zip Code and the county, city, and state are displayed.

Enter county and all Zip Codes for that county are displayed.

Search routines for finding 60 cities of a given name.

The package requires hard drive for installation. Install program provided. It is available on 5 1/4 or 3 1/2 inch high-density diskettes.

For further details, get in touch with James D. Hardy, K4HAV, Hardy Data Systems, P.O. Box 7304, Tifton, GA 31793-7304.

Best wishes to you all. May all your County Hunting/Hamming be appropriately rewarding.

73, Dorothy, WB9RCY



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## WHAT'S NEW AND HOW TO USE IT

### Battery Usage

Last month we looked at ways to charge a battery. This month we will look at modern approaches for using that battery.

It has been said that battery technology has not progressed at the same rate of innovation as the rest of the electronics industry. Although there are many new types of batteries (alkaline, lithium, solar, etc.) the amount of "watts per pound" from one of the new types is not radically different from what it was in the vacuum-tube era. If this is indeed true, then it is imperative to get that last drop of power from whatever battery we do wind up using.

During the past few years a number of ICs have been designed to obtain as much useful power from a battery as possible. We will examine two such ICs this month. Both are from Maxim Integrated Circuits (120 San Gabriel Drive, Sunnyvale, California), and both are designed to convert battery power efficiently to 5 volts with enough "ommph" to power many portable devices.

The MAX738, shown in fig. 1, is a step-down regulator that will produce a regulated 5 volt output ( $\pm 5\%$ ) at up to 300 ma

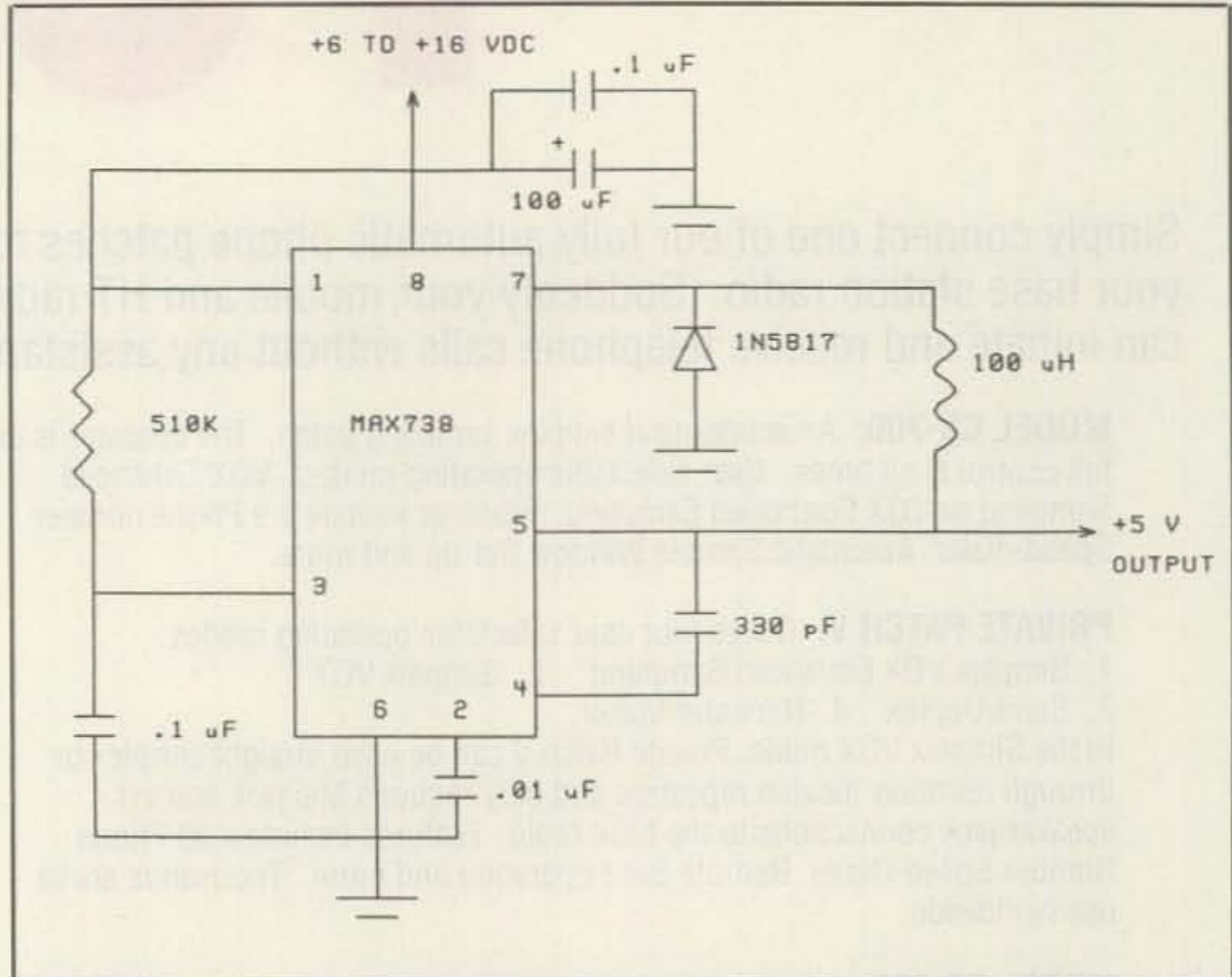


Fig. 1- Basic step-down regulator.

c/o CQ magazine

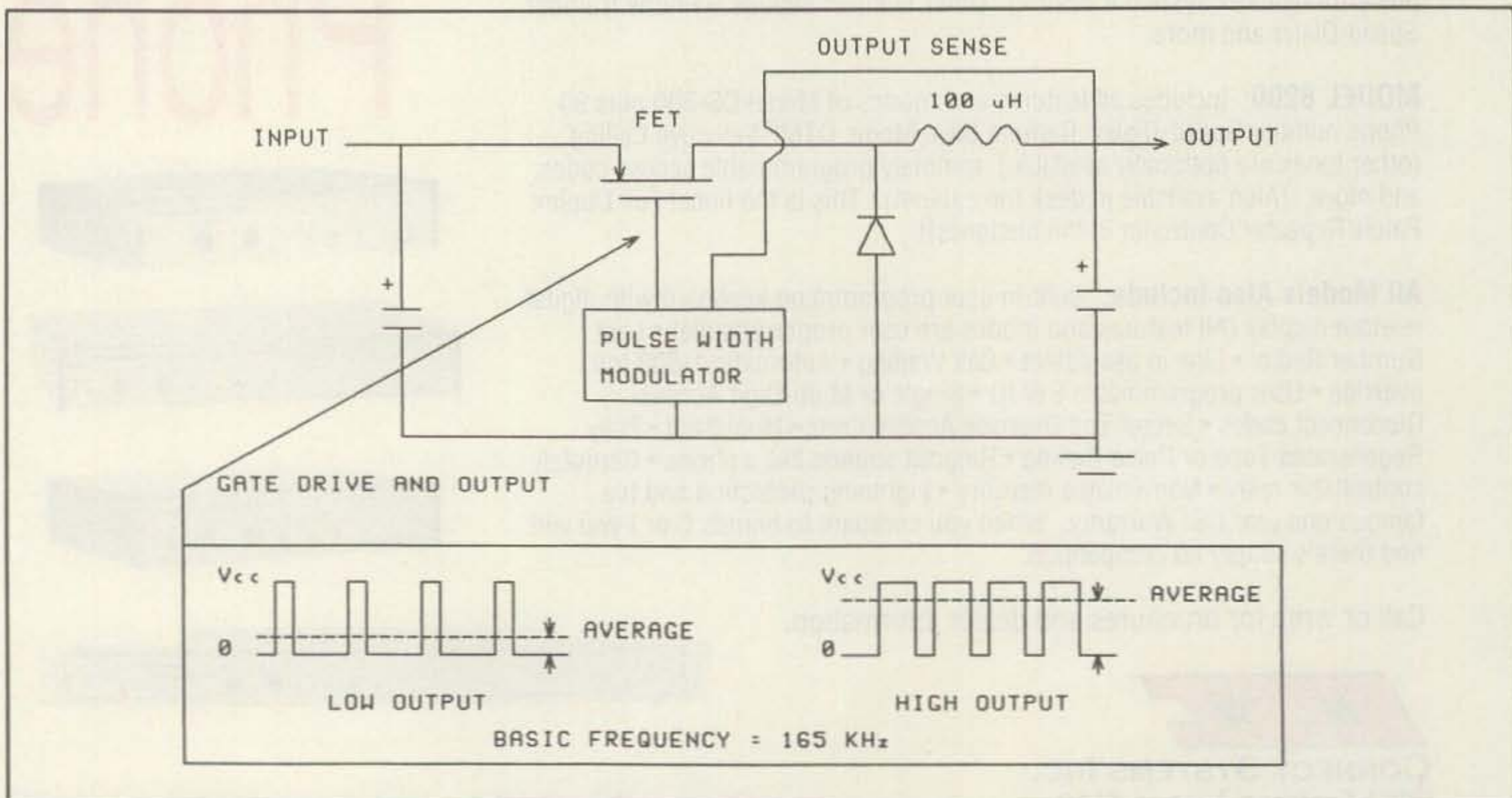


Fig. 2- Step-down regulator details.



# Answers! Answers! Answers!

## CQ's New 1993 Guide to Amateur Radio

New hams—Novices, Techs, Generals or whatever ticket you start with—have questions. What do I look for in an HT? How should I operate on the local repeaters? What's it like to get on HF? How do I set up a station? How do I use an SWR bridge? These questions and a hundred more. As important as these problems are, there's one other question that's more important: Where can I go to find the answers?



### CQ's 1993 Guide To Amateur Radio

will answer these questions and hundreds of others. This new guide is chock-full of articles written strictly for the newcomer by some of the best writers in Ham Radio. Bill Orr, W6SAI, shows you how to efficiently set up your first station. Lew McCoy, W1ICP, takes you on a tour of repeater operating practices and etiquette. McCoy also tells you what an SWR bridge is and how to use it, as well as recommending the best type of SWR indicator for newcomers. Ed Juge, W5TOO, gives you a concise guide to the common and not-so-common functions and capabilities found in today's handhelds. Famous ham educator Gordon West, WB6NOA, guides you through the licensing and upgrading maze. John Dorr, K1AR, shows you how to set up your first packet station and make that first connect. There's even an article that gives you the secrets of successfully installing PL-259s—no small task even for old timers. You'll find many, many more articles that you'll want to refer to often. Also, you'll find detailed information on many of the most popular rigs plus an explanation of what everything means—a mini buyer's guide of sorts. Plus, you'll find an up-to-date listing of all the Ham Radio manufacturers and dealers. You'll want to keep this book handy for day-in-day-out operation. It will pay for itself with every article you read.

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CIRCLE 38 ON READER SERVICE CARD

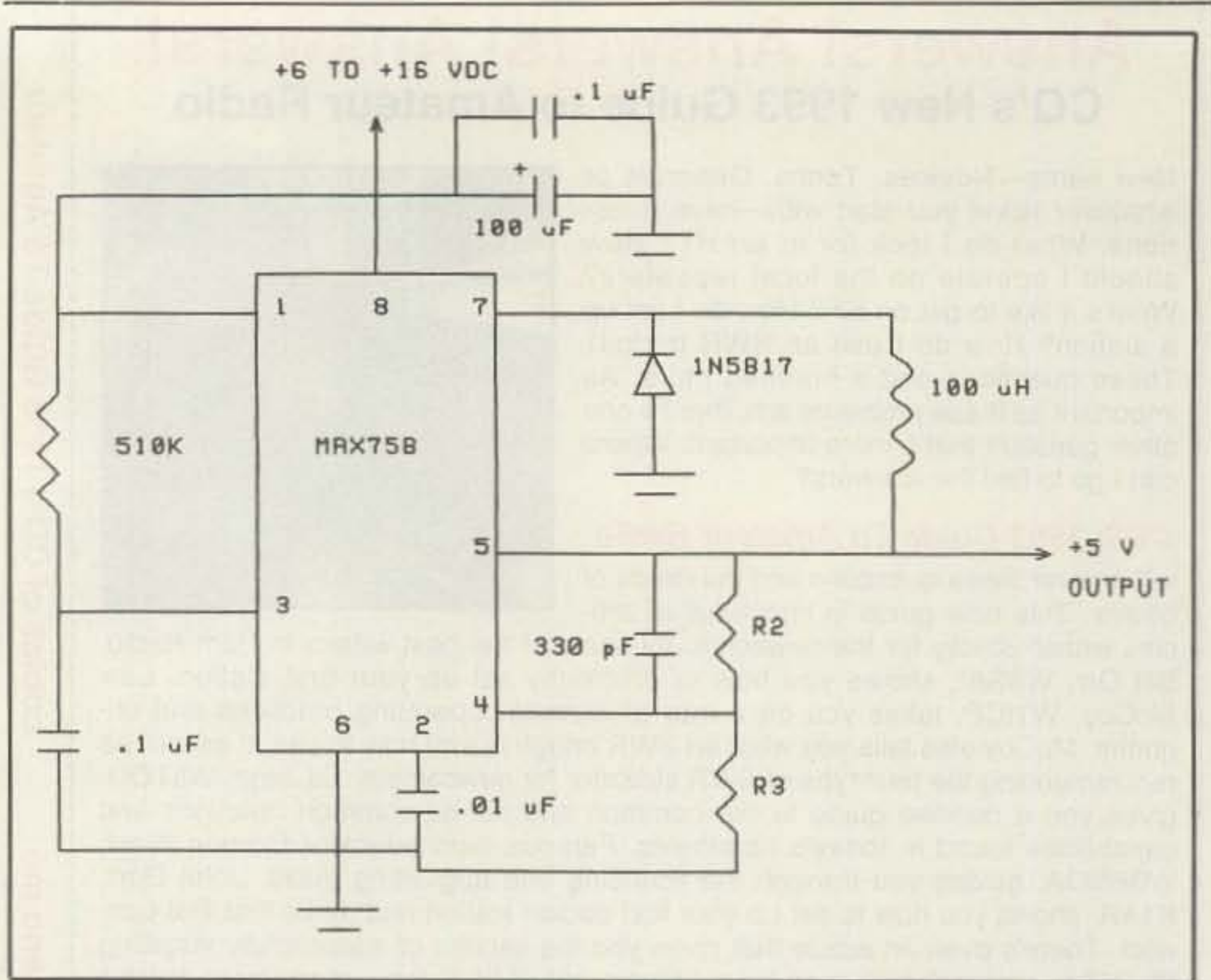


Fig. 3- Adjustable step-down regulator.

from any input between 6 and 16 volts (750 ma with inputs from 10.2 to 16 volts), thus making it the ideal choice for use with power sources ranging from lantern cells to car batteries. This 8-pin chip is a switching reg-

ulator and is very efficient, up to 90% in fact, so that just about all of the power from the battery goes into the load, not dissipated in a pass element, and the chip runs cool. The only special component is a low-

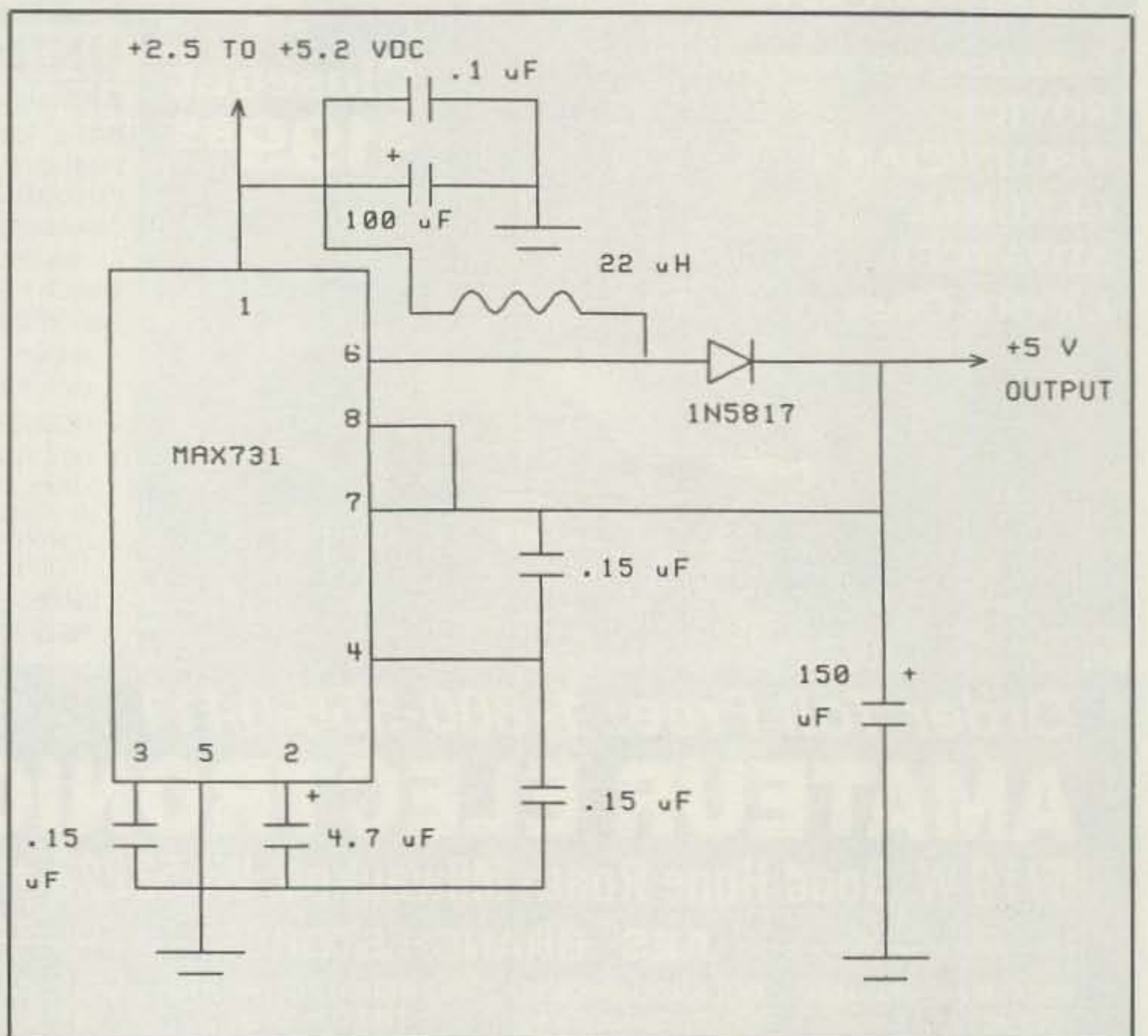


Fig. 4- Basic step-up regulator.



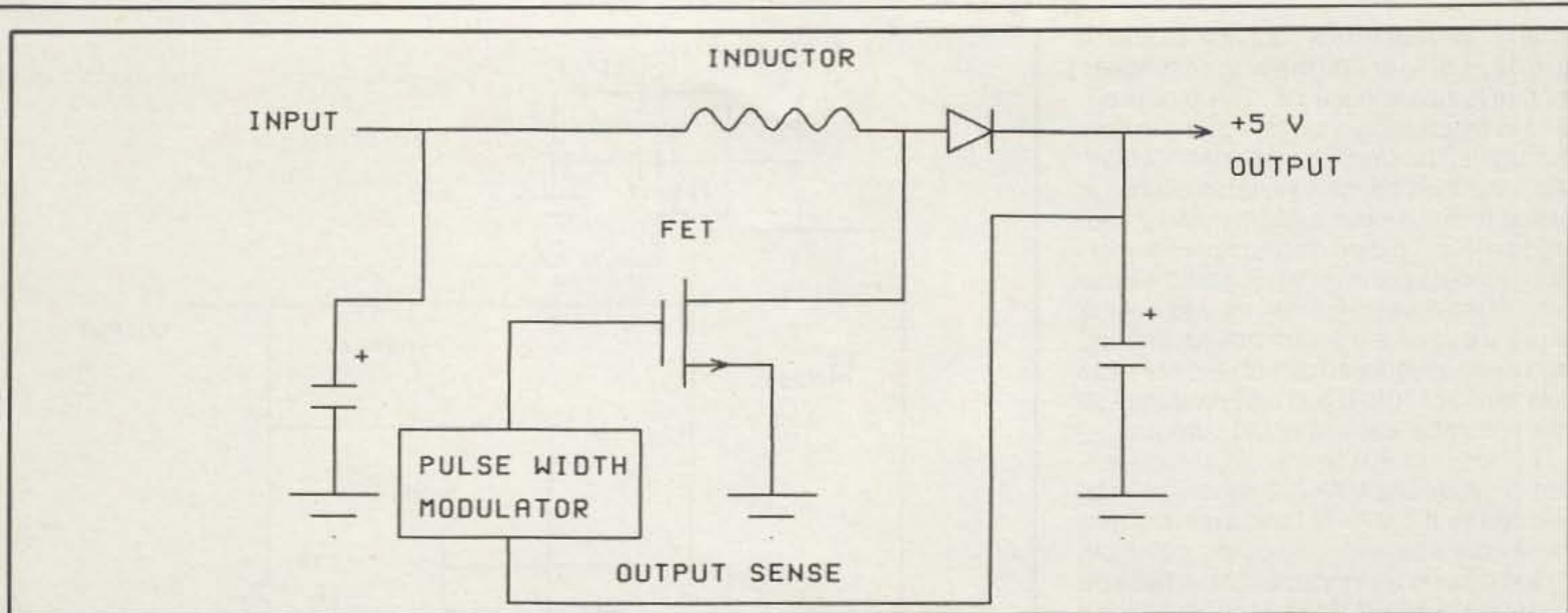


Fig. 5—Basic operation of step-up regulator. As the PW modulator turns the FET on and off, the voltage developed across the inductor is connected in series with the incoming voltage, thereby producing the higher output voltage.

cost 100 uH inductor, also available from MAXIM as part number MAXL001.

In operation, the circuit acts as a pulse width modulator, varying the width of a 165 kHz pulse to produce the required output voltage. How this is done is shown in simplified form in fig. 2. The FET pass transistor either saturates or conducts, depending on the width of the gate drive pulse. This width is controlled as a function of the out-

put voltage. If the voltage drops too low, the pulse width gets larger. If the voltage is too high, the pulse width narrows. The inductor then smooths out the pulses in conjunction with the output filter capacitor to produce DC with only 50 millivolts of ripple. For output voltages other than 5 volts, up to the input supply voltage, you must change the chip to a MAX758 (using all of the same components) and add a resistor

network between pin 4, the output, and ground as shown in fig. 3. The value for R2 is then found by the formula:

$$R2 = R3 \frac{(V_{out} - 1)}{1.23}$$

where R3 = 100K

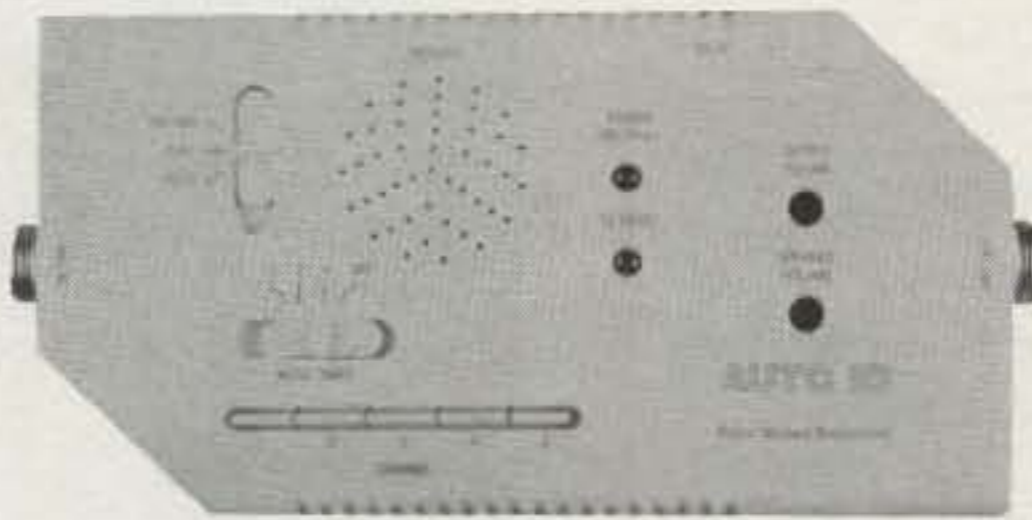
Now let's go the other way. Fig. 4 is a schematic of the MAX731. This chip is the heart of a step-up converter that will

## AUTO-ID AUTOMATIC MESSAGE BROADCASTER

The **AUTO-ID** is a solid state digital voice recorder that was developed especially for 2 way radios. It simply plugs in between the radio and its microphone. With the use of your radio microphone, you can record up to 5 separate messages that can be played on the air by pressing one of the 5 message buttons. The **AUTO-ID** also has a built-in timer that monitors your PTT (push to talk) activity. Record your station identification, and thereafter any time you are on the

air, the **AUTO-ID** will broadcast your ID message for you. The **AUTO-ID's** message #1 timer can be set for intervals of 3 or 9 minutes or it may be set to broadcast your message

every time you use your PTT. With the use of the **AUTO-ID's** built in speaker, you can monitor the message that the **AUTO-ID** is broadcasting, regardless of whether the selected message was broadcasted automatically or manually.



The **AUTO-ID** comes with plugs for an Alinco or Kenwood mobile amateur radio. There are accessories available to interface the **AUTO-ID** to most other types of radios.

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- 110VAC adapter (INCLUDED).
- Fully wired and tested, just plug it in.
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- Built in local speaker.
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- Adjustable microphone level.
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- Connects directly in line between radio and microphone.
- Pre-wired for Alinco and Kenwood Mobile radios.
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- TX ready LED indicator.
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- 32 seconds of total digital audio storage time.
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change the output of a couple of D cells to 5 volts ( $\pm 5\%$ ) at 200 ma with an efficiency that is also about 90%. This circuit operates by causing a current pulse to flow through a 22  $\mu$ H inductor (MAXIM RCH654-220) and then connecting this inductor in series with the input voltage, thereby adding to it. A simplified diagram of this operating mode is shown in fig. 5. As in the case of this step-down regulator, the width of the current pulses is also controlled, thereby achieving a regulated output. The MAX731 operates at 170 kHz and only produces 50 millivolts of ripple at the DC output.

In those cases where an adjustable output is desired, a MAX752 should be substituted for the MAX731 and a resistor network added between the output point, pin 4, and ground. The inductor should also be changed to 50  $\mu$ H (MAXIM RCH654-470) for most efficient operation. The formula for calculating the resistor network for this chip is:

$$R1 = R2 \frac{(V_{out} - 1)}{1.23}$$

where  $R2 = 22K$

Both of the above chips are representative of a family of devices that is currently available. Similar devices are also being introduced by various manufacturers on a regular basis with the intention of allowing "every last drop" of power available from a battery to be used. All efficiently convert battery voltages and currents to values

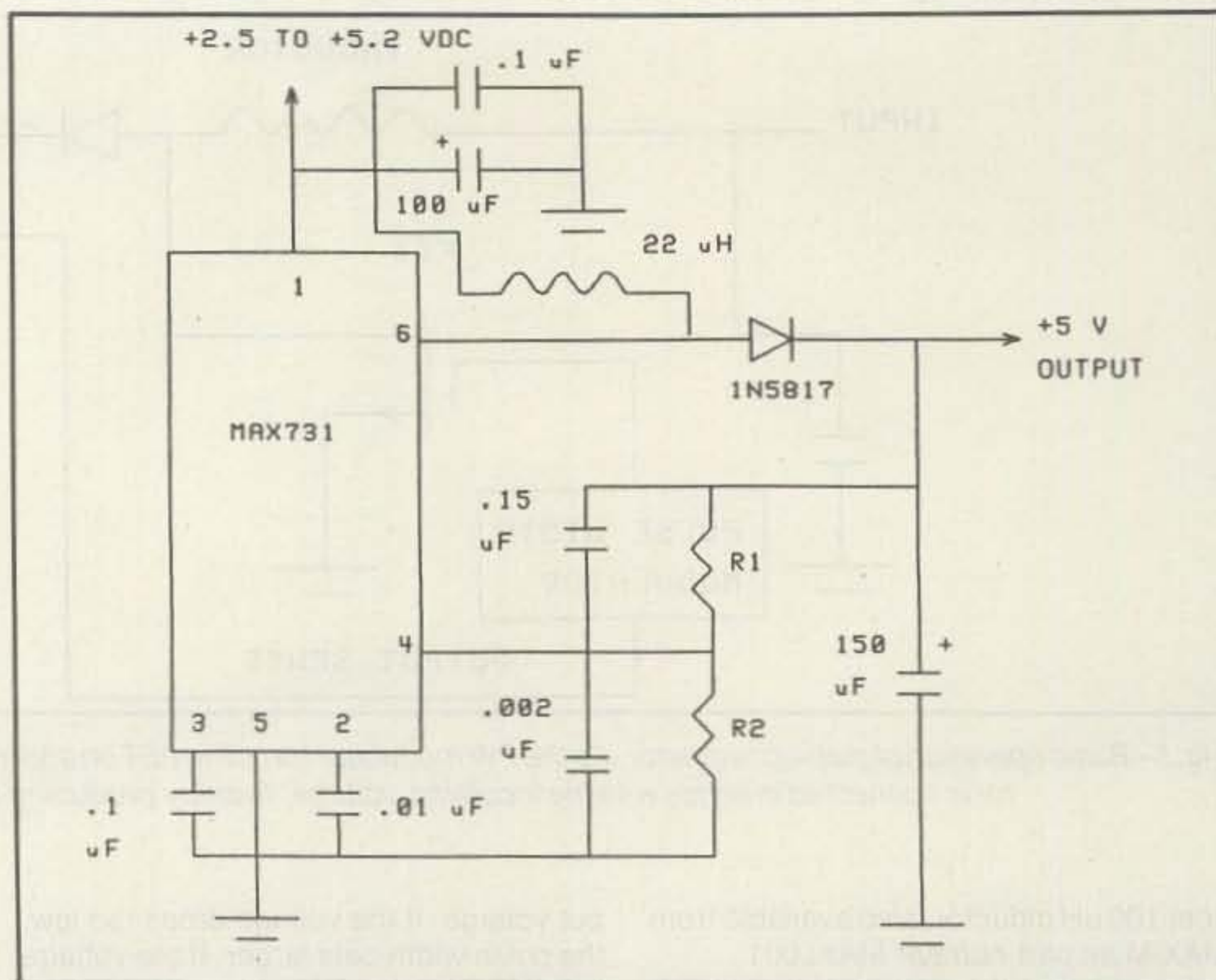


Fig. 6- Adjustable step-up regulator.

that are more in line with the values needed for electronic circuitry.

So even if the ideal, super-power, infinite-life battery is not yet available, at least

the ones we do have can be made to operate longer and more efficiently by modern IC technology.

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# DAYTON Hamvention® '93

April 23, 24 & 25, 1993

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Asst. General Chairman, Ken Allen, KB8KE

- \* **Giant 3 day Flea Market**      \* **Exhibits**      \* **Activities for the Non-Ham**

### Information

General Information: (513) 454-1456  
 FAX: (513) 890-5464 Attn: Hamvention,  
 or, write to  
 Hamvention, Box 964, Dayton, OH 45401-0964  
 Lodging Information: (513) 223-2612  
 (No Reservations by Phone)

Flea Market Information: (513) 454-1880 Daytime  
 (513) 767-1107 Evening

### Lodging

Please write to **Lodging, Dayton Hamvention,  
 Chamber Plaza, 5th & Main Streets,  
 Dayton, OH 45402-2400** or refer to our 1992  
 Hamvention program for a listing of hotel/motels in the  
 Dayton area.

### Special Awards

Nominations are requested for Amateur of the Year,  
 Special Achievement and Technical Excellence  
 awards. Refer to the Hamvention Program for  
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 Chairman, Box 964, Dayton, OH 45401-0964.

### 1993 Deadlines

Award Nominations: March 1  
 Advance Registration and Banquet:  
 USA - April 2 Canada - March 26  
 Flea Market Space: February 1

### Flea Market

Flea Market Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. A maximum of 3 spaces per person (non-transferable). Electricity is now available in a portion of the last Flea Market row for \$40 additional per space. Rental tables and chairs are not available in the Flea Market. Vendors **MUST** order an admission ticket when ordering Flea Market spaces. Please send a separate check for Flea Market space(s) and admission ticket(s). Spaces will be allocated by the Hamvention committee from all orders received by February 1. Please use 1st class mail *only*.

Notification of Flea Market space assignment will be mailed by March 15, 1993. Checks will not be deposited until after the selection process is complete.

**HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.**

### Dayton Hamvention 1993 Advance Registration

Reservation Deadline: USA -April 2, Canada-March 26  
 Flea Market Reservation Deadline: February 1

Enclose check or money order for amount indicated in  
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Admission (valid all 3 days)	_____ @ \$11.00*	\$ _____
Grand Banquet	_____ @ \$22.00**	\$ _____
Alt. Act. Luncheon (Saturday)	_____ @ \$8.00	\$ _____
(Sunday)	_____ @ \$8.00	\$ _____
Flea Market ‡ (Max.3 spaces)	_____ \$30/1 space _____ \$60/2 adjacent _____ \$150/3 adjacent	\$ _____
Electricity add	_____ \$40.00/space	\$ _____
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<b>Total</b>		<b>\$ _____</b>

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# CQ World-Wide WPX SSB Contest All-Time Records

BY STEVE BOLIA, N8BJQ, DIRECTOR, CQ WPX CONTEST

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls are year of operation, total score, and number of prefix multipliers.

## WORLD RECORD HOLDERS

### Single Operator

1.8	UL7ACI('91)	331,008	128
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	NP4A('86)	6,668,184	654
14	ZZ5EG('88)	8,219,627	871
21	ZP0Y('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060
QRP/p	VP2EXX('90)	6,727,444	779

### Multi-Operator Single Xmtr.

P40V('91)	26,987,142	1127
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### Multi-Operator Multi-Xmtr.

ED8ACH('91)	47,278,236	1319
-------------	------------	------

## U.S.A. RECORD HOLDERS

### Single Operator

1.8	K5UR('85)	122,664	228
3.5	K1ZM('92)	1,266,844	422
7.0	KM6B('87)	1,164,800	320
14	K2VV('87)	3,546,294	687
21	WN4KKN/6('92)	4,538,050	814
28	WM5G('89)	4,213,127	799
AB	KM1H('92)	7,854,840	945
QRPp	KR2Q('92)	1,269,960	557

### Multi-Operator Single Xmtr.

WC4E('92)	11,611,929	1113
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### Multi-Operator Multi-Xmtr.

WZ6Z('89)	18,737,170	1138
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## CLUB RECORD

Araucaria DX Group('90)	62,858,364
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## WPX (Prefix) RECORD

HG73DX('91)	1,337
-------------	-------

## QRPp RECORD

VP2EXX('90)	6,727,444
-------------	-----------

## CONTINENTAL RECORD HOLDERS

### AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	EA9LZ('92)	4,721,924	562
14	TU4BR('86)	3,483,480	637
21	TR1G('90)	6,788,925	825
28	FR5DX('91)	7,543,818	831
AB	EA9AH('92)	14,303,300	923

### ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UF6VZ('90)	835,584	256
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	JH1AJT('89)	4,848,480	740
AB	7Z2AB('92)	9,177,296	809

### EUROPE

1.8	LZ2BE('84)	261,504	144
3.5	CT7N('92)	1,456,704	423
7.0	IO4VEQ('90)	3,878,928	648
14	LZ5W('92)	5,671,509	883
21	CT2A('92)	6,029,559	919
28	9H1EL('89)	5,882,825	787
AB	YZ9A('91)	8,518,112	928

### Multi-Operator Single Xmtr.

AF	5H1HK('90)	13,980,480	960
AS	TA5/N0FYR('91)	16,474,965	1005
EU	LZ9A('89)	14,399,625	1075
NA	VP2EC('92)	24,409,580	1115
OC	AH0K('91)	11,552,112	726
SA	P40V('91)	26,987,142	1127

### NORTH AMERICA

1.8	CG3MFA('85)	319,140	162
3.5	VA3EJ('91)	1,950,592	448
7.0	NP4A('86)	6,668,184	654
14	TI2CC('87)	5,491,290	790
21	FG5R('89)	9,936,240	912
28	J68AX('92)	4,709,985	651
AB	KP2A('90)	15,056,886	1014

### OCEANIA

1.8	T32AF('83)	16,872	37
3.5	AH6AZ('88)	492,030	231
7.0	T32AF('90)	3,345,864	436
14	KG6DX('90)	4,558,527	733
21	AH0K('92)	7,206,850	698
28	P20A('92)	5,184,625	703
AB	WR6R/KH6('92)	8,394,030	774

### SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	YV3A('91)	1,664,476	362
7.0	YV5A('91)	3,460,900	530
14	ZZ5EG('88)	8,219,627	871
21	ZP0Y('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060

### Multi-Operator Multi-Xmtr.

AF	ED8ACH('91)	47,278,236	1319
AS	JA9YBA('89)	13,579,072	988
EU	HG73DX('91)	30,664,095	1337
NA	VP2EC('87)	37,446,109	1147
OC	FK0AW('89)	26,538,972	1002
SA	ZZ5EG('87)	38,096,250	1250



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## CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

### RS-232 and The Packet Radio User

**A**s defined by the Electronics Industries Association (EIA), RS-232 is a set of twenty signals, or signal circuits. Each signal has a label or name which defines its use or application. The combination of these signals is referred to as the "RS-232 Standard."

In our world of voice and data (digital) communications, there are many applications for this "standard" in use in every part of the world. Almost every device used with data communications (and in many voice applications) implements some part of the RS-232 standard.

Not long ago some of the smaller home computers, or "game machines," implemented a similar data support called Transistor to Transistor Logic (TTL). Today, computers—whether they are large host computers, office computers, or home personal computers—have adopted the RS-232 standard as the principal data communications support. This includes both the computers and the peripherals that are interconnected.

#### RS-232 Applied To Packet Radio

For the prospective packet radio user, we have just made our first point. The need now becomes real for us to look into our computer manual to determine if our computer does indeed implement the RS-232 standard. Many times we may have a computer that appears to have a connector that is associated with the RS-232 standard, yet it is of the TTL type communica-

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tions port. This is why I insist that it is wise to look at the manual to determine the communications port signal type.

If you find that you don't fully understand the protocol of the RS-232 comports, then don't feel ashamed. There are mountains of papers that have been written about this standard. Sometimes you may read an RS-232 document only to finish it and feel as if there is still something missing, or yet to be learned. This is not an uncommon feeling. However, it is my intention to try to simplify the use and application of the RS-232 standard as related to packet.

For openers let's look at the signals of the RS-232 standard, and at the same time we will apply them to the two most popular connectors that are used as comports on many of our personal computers.

In fig. 1, I have drawn the DB25 connector and applied the RS-232 signals to the connector as they are "normally" applied in most (early) personal computers. In fig. 2 I've illustrated the DB9(P) (late model) personal computer comport connector. In either case, the computer comport connector shown will support all the signals that are needed with our packet radio terminal node controllers (TNCs).

#### RS-232 is a Standard, Not A Connector

The following statement is one I've seen in many publications: "RS-232 is a standard that is applied to a connector that has 20 or more pins or connections." This statement simply is *not true*. The RS-232 signals may be applied to any type of connector that can support at least three con-

nections. The three signals that are applied to the connector are transmit data, receive data, and signal ground. For instance, the Radio Shack Color Computer(s) support an RS-232 comport connector that has just four pins (see fig. 3). Here we see that pin 4 is the transmit (TxD), pin 3 is the signal ground (SigGnd), and pin 2 is the receive (RxD) signals. Pin 1 is not used.

Another remark that I see in print is the inference which says, "standards are made to be broken." I do not subscribe to this notion. A standard is a set of tried and proven rules that should be followed, and each standard has a basic purpose. With the RS-232 standard we have a guide that gives us a definite direction for its use and application. To deviate from this applied signal structure would be as obscure and troublesome as the wiring of the microphone ports for many of our HF, VHF, and UHF transceivers.

The nonstandard microphone connector subject is in itself another topic of discussion. For now let's be happy that one facet of our hobby has some method to the madness, and enjoy the standards that apply to the many makes and models of the IBM and compatible personal computers.

#### No Complex—Only Full Duplex, Half Duplex, and Simplex

To define the subhead above, let's look the parts of it in reverse order. RS-232 is supportive of these three main data-flow mechanisms.

**Simplex** is thought of as one-way data flow which never changes direction. Most

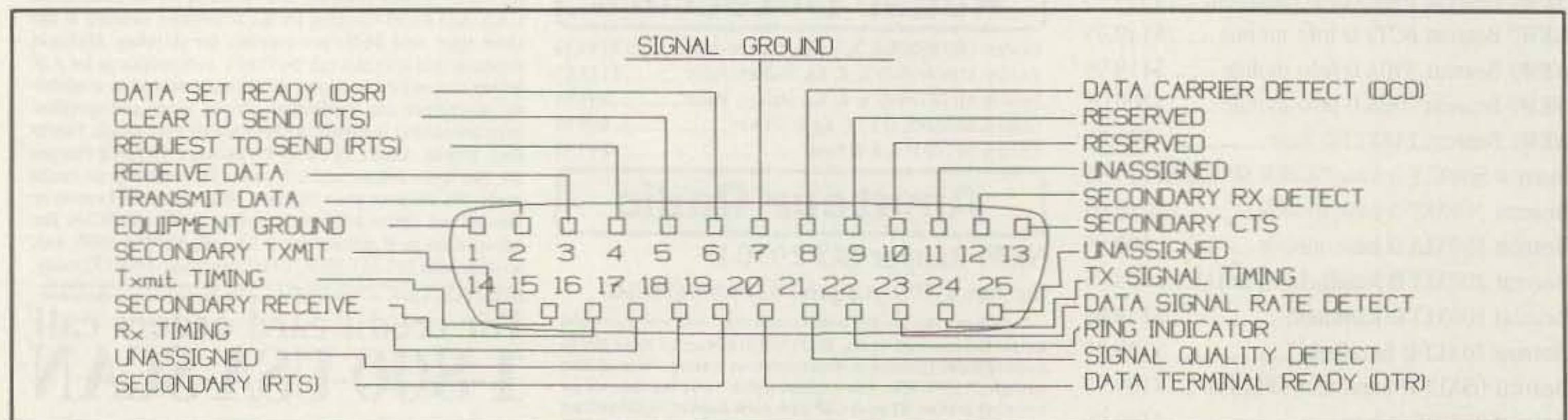


Fig. 1— This illustration lists the signal titles as applied to the EIA RS-232 standard. The type of connector has no relationship to the RS-232 standard signals.



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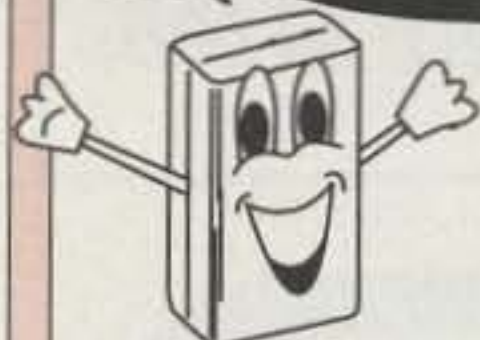
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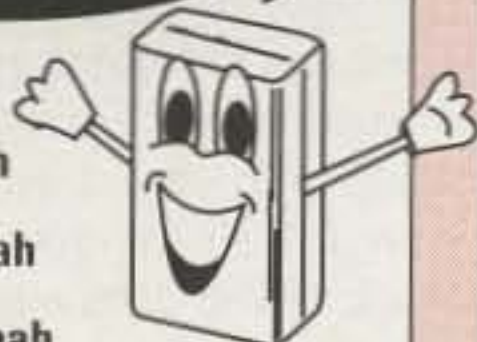
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+3 TO +25	SPACE	0	ON
-3 TO -25	MARK	1	OFF

Table 1- The label and signal levels that provide the logic (binary) symbol and the control status (see text).

with the DB25 connector. In almost all data terminal equipment (DTE), such as the computer or dumb terminal, the comport is the "male" (plug) connector, while the counterpart that is configured as data communications equipment (DCE), such as the TNC, modem, etc., is almost always equipped with the "female" (socket) connector.

**Flow Control**

In fig. 3 we are using only two of the signals from the RS-232 standard. In an application where only the Txd, Rxd, signals, and SigGnd are used, we can assume that the flow control is administered through "software control."

It is the control signals in the RS-232 standard that are used when we implement "hardware flow control." By applying these signals in a specific order to other signals of the RS-232 comport we can ration the signal flow in such a manner as to make the data follow in a serial, orderly flow without losing any data or information.

At this point I can assert that RS-232 is serial, as opposed to parallel, in data communications. Serial data communications can be fed with both asynchronous and synchronous serial encoded signals. The encoded (digital) signal is a switched DC voltage, as related to square waves.

In Table 1, I've defined the label and signal level(s) that provide the logic (binary) symbol and the control status. In effect, logic 0 (zero) is true, or ON, while logic 1 equates to OFF.

Now that we've established the "mood-swung" that enables us to use certain signals to control data flow, we can look at how this new-found knowledge can assist our packet radio endeavors.

As a Senior Systems Engineer for the Ericsson/GE corporation I'm often away from my full-size computers at home. When I'm away from home, I carry with me a Tandy 1110 HD Notebook Computer. When I have time during the day or at night in a motel room, I commit much of the day's work to the database in the portable/notebook computer. When I return to the office, I can upload the documentation from the portable computer to the office system. To perform the upload into the larger computer, I use a "null-modem" cable with only three wires connected. They are the same three signals defined earlier: TxData, RxData, and signal ground, except that the TxD, and RxD lines are rolled (switched) at one end of the cable.

If I use the wrong terminal program to

make the transition of the data into the larger computer, I may quickly find that I have a complete lock-up of the data flow. The reason is that I have not implemented "software flow control." The terminal program I use to make the transfer has a command that allows me to set it for either program (software) or machine (hardware) flow control. It only takes a moment to reset my terminal program to "software flow control."

The same command in a TNC will determine the manner of flow control that you are using. If you plan to use software flow control, you must remember to set the TNC XFLOW command to ON. This allows the software (terminal program) to execute the control "S" and control "Q" to enable the XON and XOFF control of the data flow.

With the later packet terminal programs we have found that it is easier to implement the control signals of the RS-232 standard. Thus, we have begun to use the request to send (RTS), and clear to send (CTS). On the DB25P connector of most PCs the RTS is at pin 4, while the CTS is at pin 5. If you are using a PC with the DB9P connector, the RTS control signal is at pin 7 and the CTS signal is at pin 8. The use of the RTS and CTS signals provide us with machine control, or what is widely known as "hardware handshaking." In fig. 4(A) and (B) I've drawn both types (DB25 and DB9) of hardware handshaking interface cables for the PC to TNC. I have included the DB9 to DB25 adapter in fig. 5 so that all PC and TNC comport can be covered. This enables the use of a DB25 connector to be adapted to a DB9 comport at either the PC or the TNC. Many TNCs are now implementing the DB9S connector.

**RS-232 Limitations**

This heading is of no real concern to the packeteer because we have all the means to circumvent the lack of direct RS-232 flow control by using two of the signals (RTS and CTS) to control the flow of data to and from the TNC. With the current level of computers (80486) and comport drivers we are able to achieve easily an "ABAUD" (terminal to TNC baud rate) of 19,200 bauds.

The only other limitation of the RS-232 standard that comes to mind is the distance limitation with regard to interface cable length. Fifty feet is nominal. However, there are cases where the RS-232 signal cables exceed 100 feet in length. The determining factor for cable length lies in the cable type itself. For our discussion,



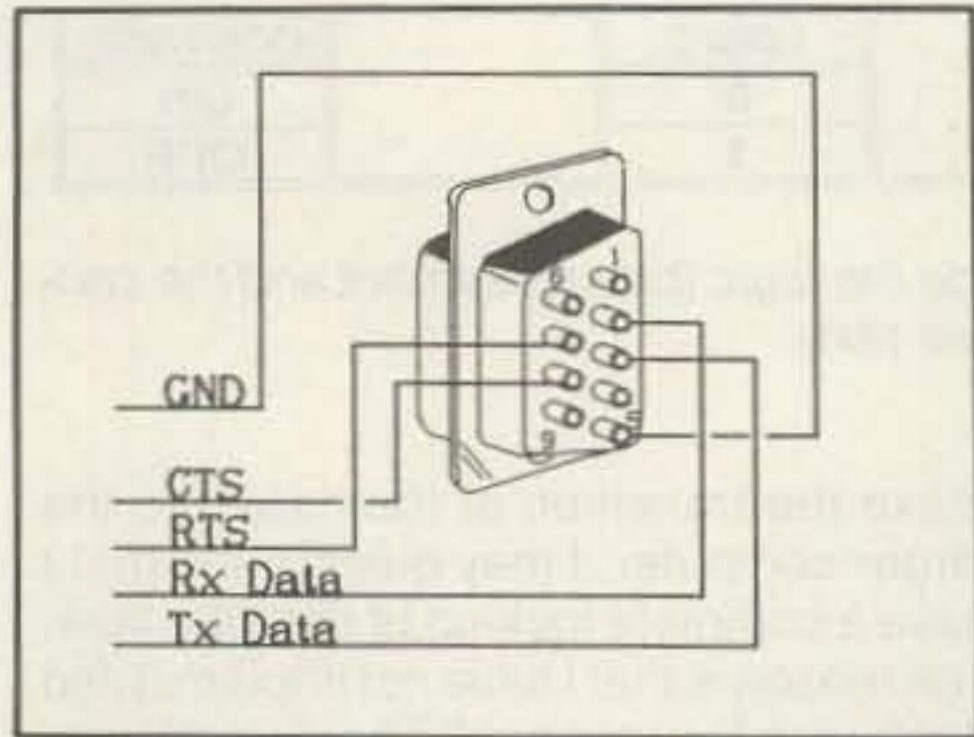


Fig. 2 - The five signals of the DB9P necessary for hardware handshaking.

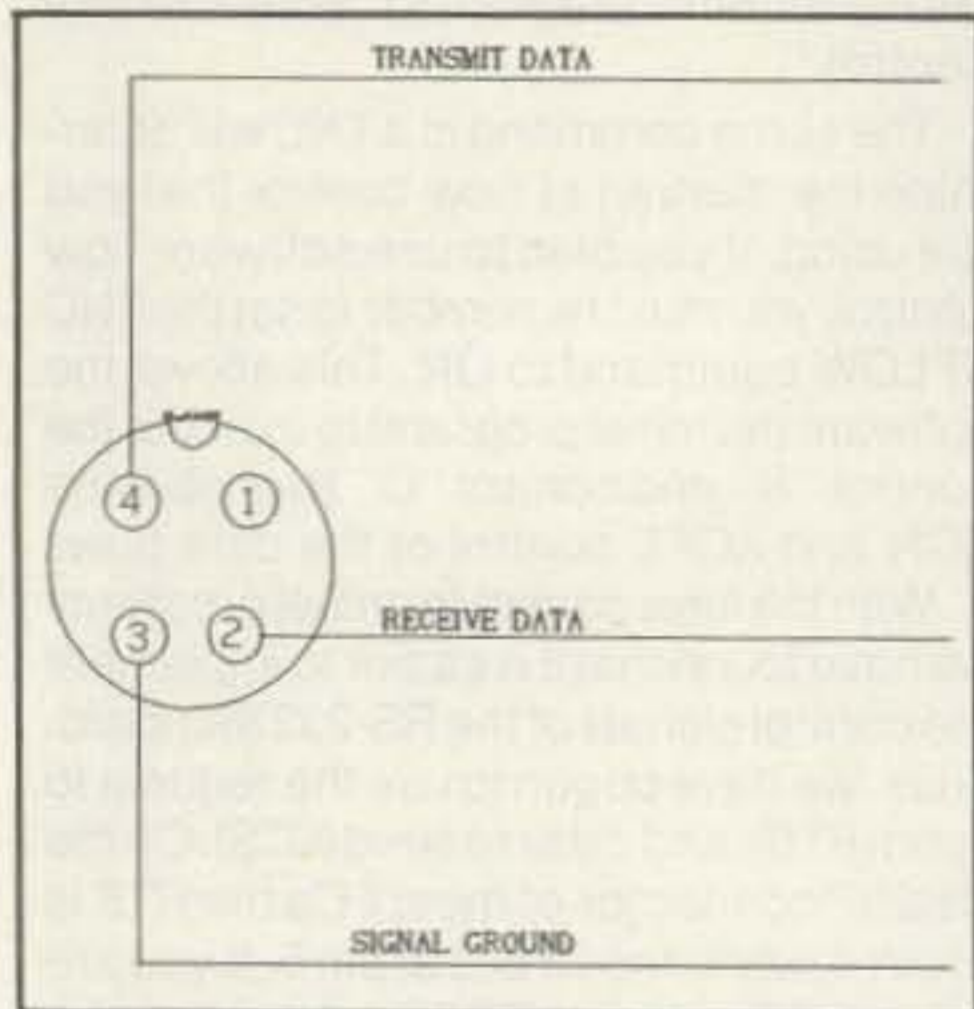


Fig. 3- Radio Shack Color Computer I, II, and III.

often the simplex mode is used with data collection from a telemetering device or source.

**Half Duplex** is when data flows in two directions, but in a rotating or alternating pattern. This is the configuration that is most often used in (AX.25) packet radio applications. The same applies to the data flow between the computer and the TNC (DTE to DCE).

**Full Duplex** is thought of in terms of data flow in two directions at the same time. In special trunks and backbone applications two frequencies are used to enable full-duplex packet operation.

### DTE and DCE

Very simply put, the RS-232 standard set of signals consists of data signals, control signals, timing signals, and signal grounds. There is a "frame," or "earth," ground associated with the RS-232 set, but for now we will confine our discussion to the "signal ground."

Another important point that we should understand is the connectivity that is related to a particular kind of connector, and the protocol that it supports. The signal to pin addresses shown in fig. 1 are illustrated in the recommended pin-out associated

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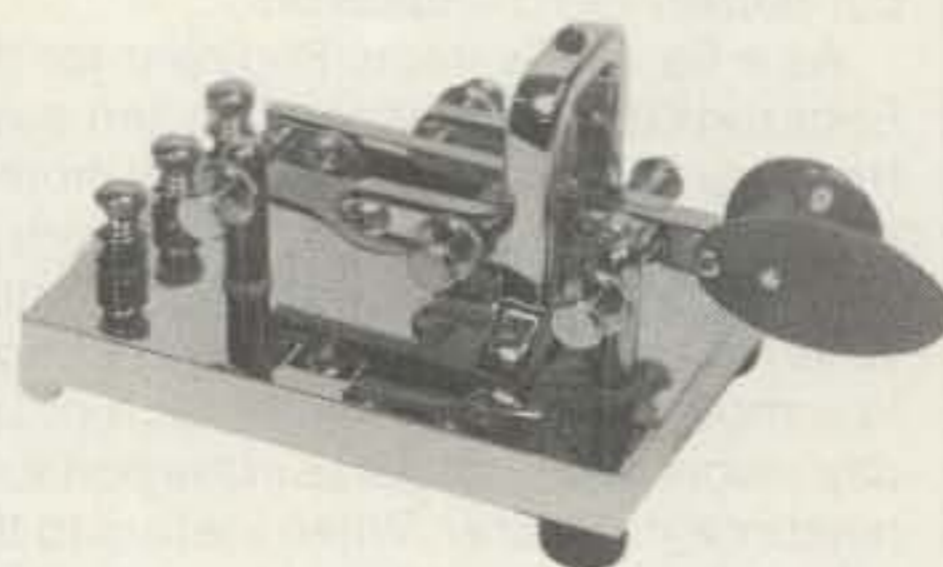
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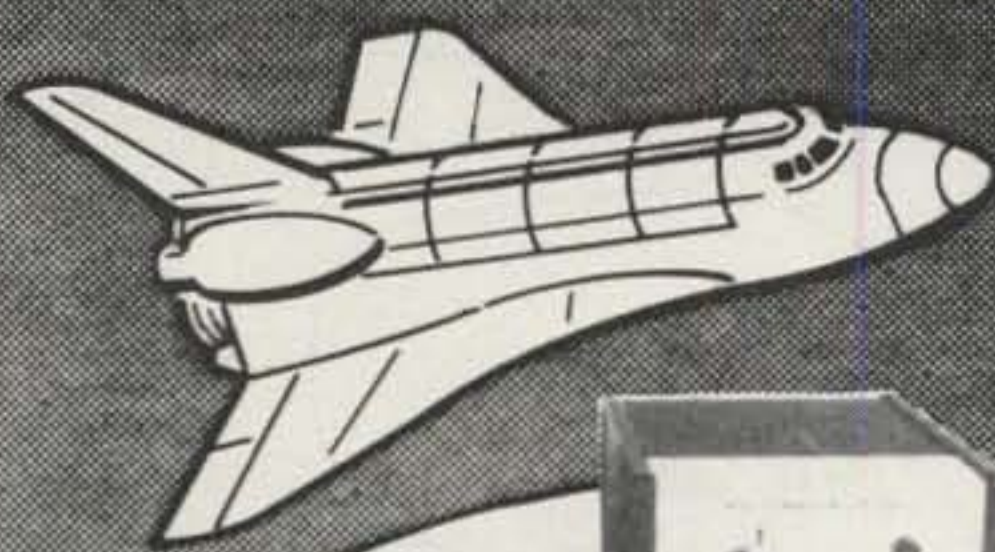
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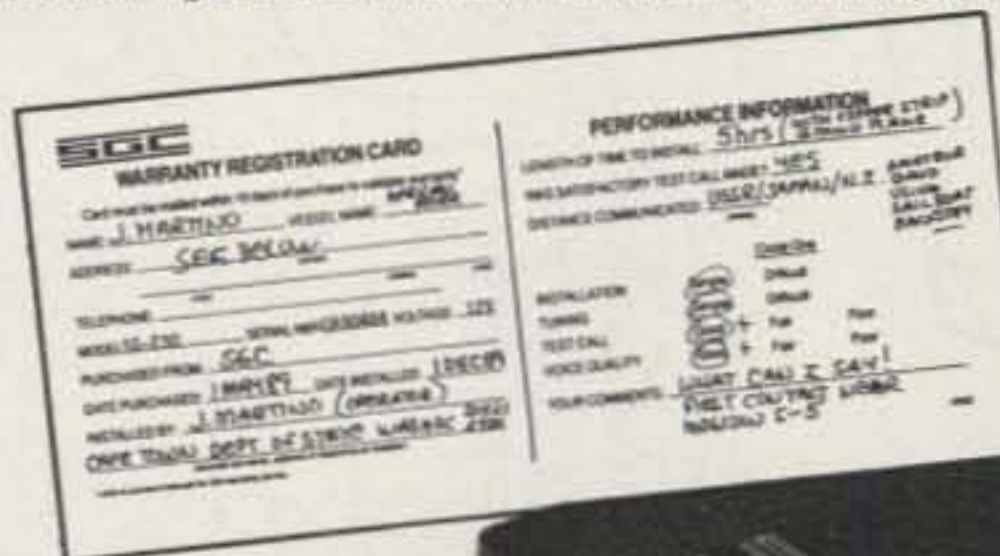
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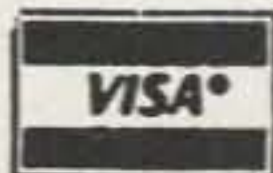


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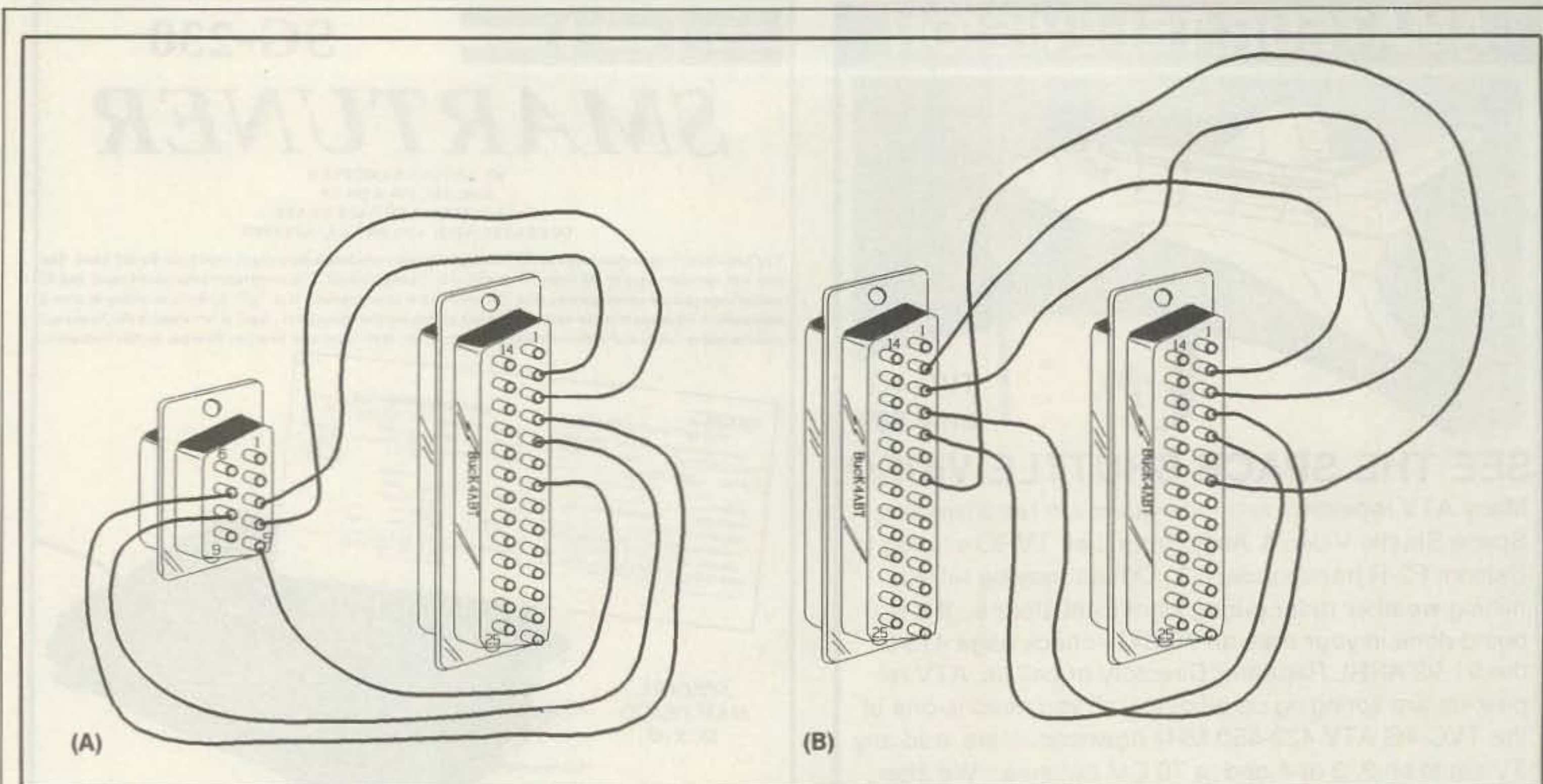


Fig. 4—(A) PC or compatible 9-pin comport to KPC-3. (B) PC or compatible 25-pin comport to KPC-3.

the cables in general use with RS-232 will display about 50 pF per foot. This cable capacitance is where we come to grips with the length restrictions, and thus the "50/50" rule.

The maximum capacitance (data rate to rise time) with regard to speed that can be withstood in the RS-232 cable is 2500 pF. With a capacitance of 50 pF per foot, we can easily calculate (divide 50 pF per foot into 2500 pF total tolerance) that our cable length is limited to about 50 feet ( $50 \times 50 = 2500$  "pF").

Now for the final "limitation": When building the RS-232 interface cable for our packet station, it is wise to use a quality cable that has a shield around the com-

plete wire bundle, which is then covered with the rubber or plastic jacket. The shield is then tied to the case of the connector, or the TNC or computer chassis.

As an additional noise deterrent I add a torroid clip-on, or snap-on, ferrite choke to the cable. Place the choke as near the entry comport of the PC as possible. Remember, the environment in which we are operating has the UARTS, data generator transmitters, and CPU signal voltages that are "marking and spacing" at frequencies

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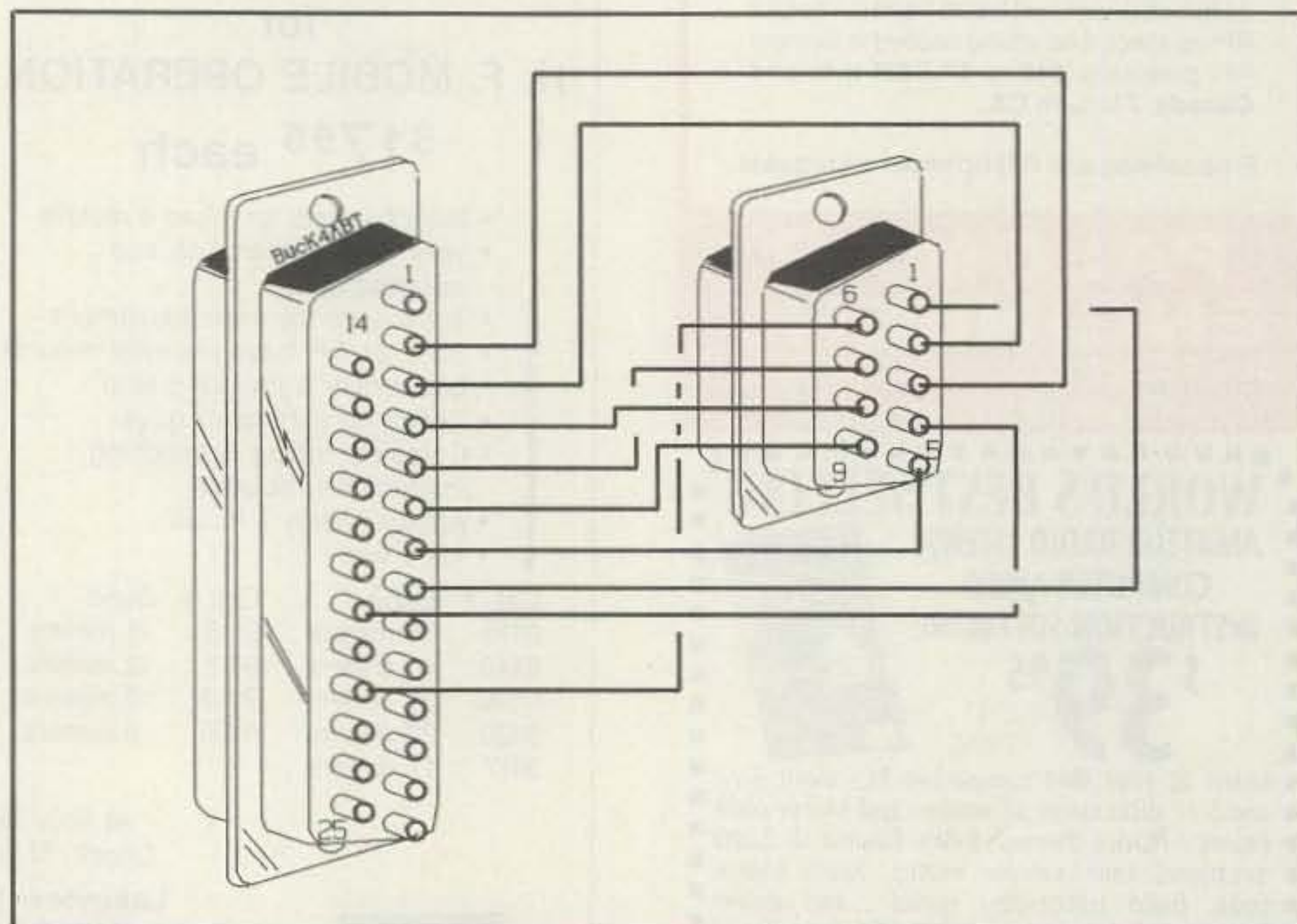


Fig. 5— This drawing illustrates how the late-model DB9 comports may be adapted to TNCs which require the DB25 connector.



at sub-multiples of our operating frequencies. For this reason alone we should be cautious and reduce as much spectral pollution as possible near our sensitive HF and VHF receivers.

I've also found that by adding low voltage (32 to 48 volt) MOVs (metal oxide varistors) from each of the two data lines (TxD and RxD) to the shield or ground, I not only reduced the spike ingress, I accidentally improved the noise egress along the cable.

A side benefit of the MOVs was similar to the use of an RF by-pass capacitor. There was a definite reduction of noise when I added the MOVs to the data lines.

There is no substitute for a good ground. Preserve the integrity of the ground wherever and whenever possible. The rule above the exception is to ground first, shield second, and by-pass third.

### Coming Soon: The "PROM"

I've covered many more computers and a larger variety of computers in a new book that is soon to be released by CQ Communications. If your computer is not included in this article, then by all means acquire the *Packet Radio Operator's Manual* ("PROM") from CQ. In this new manual there are over 200 interface drawings and illustrations that cover every kind of interface from the PC, TNC, and transceivers to the nodes, switches, backbones, trunks, and cluster applications.

### The "KNAT BYTES" Again

At the July 1992 board meeting of the ARRL directors it was decided to accept the Digital Committee's recommendation that unattended, automatic, HF packet forwarding should *not* be allowed. A select number of stations were operating under special temporary authorizations (STAs), automatically forwarding packet messages on the HF bands. The STA expired at the end of 1992 and essentially halted the HF packet forwarding network.

This network of stations has been operating for several years and has been successful in the transfer and forwarding of thousands of messages between packet operators and BBSs across the country and around the world. The League has recommended the use of semi-automatic forwarding. This spells doom to the BBS forwarding as we have known it in the past. In addition, what is left of the forwarding will slow the messages throughout the system to an all-time "sLOW."

In short, the League's decision means that only a station with a control operator present may initiate a contact with an unattended HF station.

### An Alternative Solution

Lyle Johnson, WA7GXD, has presented us (and them, the League) with a proposal that

can be put in place with the stroke of a pen and the tuning of some dials (and antennas). To follow up on this proposal contact TAPR and request the July 1992 issue of the TAPR "Packet Status Register." Lyle's solution would move unattended HF packet operations into small portions of the WARC 30, 17, and 24 meter bands.

Immediately we could reduce the crowding of the 20 and 40 meter amateur bands that were used for the forwarding. This offers a compromise, and possibly an alternative that can help to keep the HF for-

warding network active. **Please** contact the ARRL or your section manager and region directors. Give this proposal the strength that will provide the HF BBS forwards an option that can help it continue. **YOUR HELP IS NEEDED NOW!**

If you have a different proposal or suggestion, add that to the list of options. But whatever you do, sound off to the League before they destroy what is left of our HF packet network.

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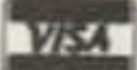

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## NEWS/VIEWS OF ON-THE-AIR COMPETITION

### CQ 1992 Contest Survey—The Final Results

#### March's Contest Tip

Avoid the temptation of diving directly into a pile-up after first hearing the frenzy. Take the time, especially when using a smaller station, to listen to the operating style of a needed multiplier before calling. Adding a planned delay of two or three QSOs to learn the DX STATION'S techniques will usually reduce the time needed to get him into YOUR log.

As with most contest seasons, this past year has been one loaded with issues and generally constructive debate. The 1992 contest survey was designed to capitalize on these topics as well as ask a question or two which you may always have wanted to ask. I hope you find the results to be as interesting as I did.

More so than in the past, you were exceedingly opinionated in these results. I received countless responses that included page after page of additional comments. Not only have these been invaluable in reporting the results, but they will also become the basis for future columns.

Some of the highlights of the survey are as follows. There is a feeling that winning contest operators are indeed a coterie or cliquish group; surprising to me, many did not necessarily find that to be a bad attribute. Perhaps it may come as an eye-opener to some of you, but an unexpected percentage in our ranks—the most enthusiastic supporters of contesting to be found—felt that there just may be too many contests. And as with DXers and hams in general, we too are dealing with the issues of RFI and antenna restrictions.

Even though this is my fourth survey, I continue to be amazed at the effort that many of you put into your responses. Lynn Shriner, W5FO, again submitted the longest response, although his dominance in this category is facing some serious competition. As with all the input you provide, I appreciate the effort you took to voice your views being summarized this month.

I am pleased to report that I received a total of 331 responses to my survey, up 42.7% from last year—an all-time high.

c/o CQ magazine

#### Calendar of Events

Feb.	26-28	CQ WW 160M SSB Contest
Feb.	27-28	RSGB 7 MHz CW Contest
Feb.	27-28	REF French SSB Contest
Feb.	27-28	UBA CW Contest
Feb.	27-28	YLRL YL-OM SSB Contest
Feb.	27-28	North Dakota QSO Party
Mar.	6-7	ARRL DX SSB Contest
Mar.	13-14	QCWA SSB QSO Party
Mar.	13-14	YL-ISSB SSB QSO Party
Mar.	14-15	Wisconsin QSO Party
Mar.	16-17	CLARA HF Contest
Mar.	20-21	Bermuda Contest
Mar.	20-22	BARTG Spring RTTY Contest
Mar.	20-22	Virginia QSO Party
Mar.	27-28	CQ WW WPX SSB Contest
Apr.	3-4	SP DX Contest
Apr.	10-11	JA Int'l CW Contest (High Bands)
Apr.	10-11	Holyland DX Contest
Apr.	14-15	DX-YL to NA-YL YLRL CW Contest
Apr.	28-29	DX-YL to NA-YL YLRL SSB Contest
May	15-17	Michigan QSO Party
May	29-30	CQ WW WPX CW Contest
June	12-13	ANARTS WW RTTY Contest
June	12-14	ARRL June VHF QSO Party
June	26-27	ARRL Field Day

This year the average level of contesting experience was 15.2 years (slightly down from the 17.8 average of last year), with responses from every state and 21 countries. Refer to Table I for a demographic view of the data.

And now on to the results!

#### 1992 Survey Results

**Question 1. If you were making a purchase today, what new radio would you select for your contest station?**

Transceiver	1st Choice	2nd Choice	Total
FT1000	80	51	131
TS950	51	31	82
IC765	22	31	53
TS850	31	19	50
IC781	24	24	48
Other	23	25	48
Omni VI	19	11	30
FT990	5	13	18
IC751A	5	9	14
TS450	4	7	11
TS940	6	2	8
TS930	2	4	6
TS830	3	2	5
Homebrew	2	0	2
Don't Know	8	9	17

I found the answers to this question to contain a few surprises. In addition to contesters reflecting their support for industry's leading products, there was significant representation of those preferring the older transceivers. Remember, I asked, "If you were making a purchase TODAY . . ." Surprisingly, nearly 10% of the respondents preferred older radios rather than today's popular transceivers. You will also note that there was a significant "other" component. This category of 48 choices represented 11 different models with no clear leader worthy of special mention. Finally, you should know that I blended together all versions of a model family in the summary. In other words, the FT1000 and FT1000D were placed in the same category for simplicity in reporting.

**Question 2. Do you feel it is "ethically acceptable" to tape record a contest and use the recording to prepare/edit your log after the contest?**

YES—148  
NO—175

Although the results of this question approached a 50/50 split, based on your comments it was clear that most respondents felt strongly about their position. This question was based on the current debate surrounding a technique used by some competitors to tape record their entire contest operation and remove (or even correct) bad QSOs after the event. Those who violently opposed this technique were also strong supporters of ideas such as 48-hour log deadlines (in the future) and general abhorrence to modifying a contest log by any means after the fact. On the other hand, supporters, although perhaps agreeing that this one example may be acceptable, did not necessarily agree that all forms of log modification were acceptable after the conclusion of a contest.

**Question 3. Are you in favor of the FCC implementing a fee-based (self-funded) system for amateurs to select their own callsigns?**

YES—251  
NO—62

Based on our results, among contesters there is a strong bias in favor of adopting a self-funded callsign administrative system for amateur radio. This is despite the



Question #	Yes	No	Total	% Yes Responses
1	N/A			
2	148	175	323	45.8
3	251	62	313	80.2
4	N/A			
5	228	80	308	74.0
6	N/A			
7	94	230	324	29.0
8	99	220	319	31.0
9	N/A			
10	N/A			
11	N/A			
12	145	175	320	45.3
13	N/A			

Table I— Summary analysis of survey results.

Call Area	# Responses	DX Country	# Responses
W1	32	G	3
W2	33	DL	4
W3	23	KL7	2
W4	34	KP4	1
W5	21	PY	1
W6	37	KH2	2
W7	38	V7	1
W8	24	ZC4	1
W9	19	OH	2
W0	16	ZD8	1
VE	5	VK	3
		DU	1
		KH6	3
		LU	1
		GM	2
		HL	1
		VS6	1
		XE	1
		YV	1
		ZS	1

Table II— Geographic response analysis. Of the 331 total responses, 315 indicated their call area or DX country.

strangling bureaucracy in Washington and Gettysburg. Naturally, contest operators (and DXers alike) are more cognizant of the benefits of a short and snappy callsign. Interestingly, however, supporters included a large number of respondents who would have no intention of changing their own callsign if such a system were put in place.

**Question 4. If you answered YES to Question #3, how much would you be willing to pay for a new callsign?**

Average = \$81.14

This adjunct to Question 3 was the more interesting part of our inquiry. We all know the folklore that exists about the frugality within our amateur radio fraternity. My question was an attempt to discover if this would carry into a more personal area of our hobby. While the average was fairly modest, there were some wide swings indeed. A few responses reflected the feeling that choosing a callsign is a right given to us as hams and should not be charged for. On the other hand, two or three people were willing to spend \$2500, including one interesting approach that calculated an expected 30 years of amortization for justification purposes!

After rereading the question, I was concerned that there would be wide interpretation of the intent regarding one-time fees versus annual renewal charges. Fortunately, most of you read my mind and interpreted the question to mean a one-time fee.

**Question 5. Do you feel there is a clique or significant elitist component within the contest community today?**

YES—228  
NO—80

This question certainly brought out your strongest opinions (and I thought it would

be "Are there too many contests?"). I have to admit that as a serious competitor myself, I was personally interested in reading your responses. In general there was little debate about the existence of an elitist component within our ranks; the results speak for themselves. On the positive side, about 50% of the "yes" votes did not view this to be negative or even germane to contesting, but rather saw it as a natural occurrence in most forms of competition. What was disturbing, however, was an important number of new contesters feel they have been left to the side in favor of the experienced group. Breaking into those "heavy" conversations at the hospitality suites in Dayton was mentioned over and over again. The message to the serious and/or consistent contest winner was simple: Take a breath, watch your hat size, and remember you were new and inexperienced once too!

**Question 6. If appropriate, which contest computer logging program do you use?**

K1EA CT—165  
K8CC NA—56  
Other—28  
Homebrew—11  
N6TR—6

The growth of contest logging is well known and largely due to the efforts of K1EA, K8CC, and many others. K1EA's CT was the clear leader in answers to this question, although many users indicated that they use K8CC's NA for domestic contests and Ken's program for DX only. Additionally, there are numerous homebrew products being used, as well as a surprising number of other hardware platforms, including the Macintosh. In total, the "other" category represented seven additional products.

**Question 7. Has the integration of technology into contesting gone too far?**

YES—94  
NO—230

This question seemed to be a natural follow-up to question 6. Not only has this been a debate spawned by computer logging programs, but it has grown with voice integration, realtime database access, and the potential for intelligent callsign recognition in the future. Have we gone too far?

The vast majority of respondents said no. The results do not necessarily endorse the potential that technology may provide in the future, but clearly advocate where we are today. In fact, many of the positive responses to the question were based on the respondent's inability to purchase a computer for his shack.

Despite our current view, this is an area that the contest community needs to carefully watch in the future.

**Question 8. Do you feel there are too many contests?**

YES—99  
NO—220

Some people may say that this was the "teaser" question to get the non-contester to respond to the survey. Judging by the callsigns of those who responded positively, there are a significant number of "hard-core" contesters who support the view that we simply have too many operating events. However, it is probably no shock to see that the overwhelming majority of respondents think the current number of contests is very appropriate. This is and has been a spirited topic of conversation for a number of years. While I personally lean towards the need to reduce the overall



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number of contests, we need to remember the minimal impact that most listed operating events actually present on any given band or mode. I believe that these responses do not show disregard for the overall impact of this operating mode on our hobby, but more realistically reflect the negligible impact of the vast majority of contests as they are currently structured.

### Question 9. If you answered YES to Question #8, what do you recommend as a solution?

This probably comes as no shock to you, but there was an amazing range of answers to this question, from "nothing can be done" to well-thought-out ideas. Although difficult to summarize, some of the more common ideas included:

- Limit frequency usage in contests, especially small ones.
- Combine minor contests into regional events (QSO parties, national contests, etc.).
- Sponsor smaller events on simultaneous weekends.
- Establish guidelines for contest participation. If activity falls below a certain level, eliminate the contest.
- Ignore the issue; the real problem is impact from major contests, of which there are relatively few.
- Offer most contests on a biannual basis except for the "majors." (*Who defines a "major contest?"*)
- Reduce operating time to 24 hours for most contests.

Needless to say, there were about as many ideas on this topic as responses. It is probably time to visit this subject again in a future contest column.

### Question 10. How would you rate the quality of log checking in the following contests (1 = Poor to 10 = Excellent):

CQ WW DX Contest:	8.03 average
CQ WW WPX Contest:	7.51 average
ARRL DX Contest:	7.81 average
ARRL SS Contest:	7.55 average

The answers to this question told me several things. For starters, they reflect the contest community's *perception*, whether that be right or wrong. The perception is that contest checking in general is fairly consistent from one event to the next. From the numbers, however, the general feeling is that while log checking is good, it is not great. In other words, these are passing scores on a high school exam, but they are not producing "straight A's."

Further research uncovered that much of the criticism expressed in the comments were not related to the checking process itself. Concern was expressed more often about reporting accuracy, and the "freshness" and "depth" of contest analysis. For example, one respondent pointed out that he is tired of reading paragraph after paragraph of summary about the scores of the first-, second-, and third-place winners. Rather, he would like to see more analysis

and insightful reporting that goes beyond what you can read yourself in the scores and tables.

### Question 11. Do you currently have neighborhood problems with TVI, antenna restrictions, etc.?

	None	Mild	Serious
TVI	165	112	24
Telephone	153	120	37
RFI	182	100	25
Antenna Restrictions	200	65	41

It appears that telephones are public enemy number ONE to the contest operator. However, as you can see by the results, the notion that TVI is a "thing of the past" is an error of today. And of course, all too many of us are familiar with the problems generated from a neighbor's new sound system. One response summarized the answer exceedingly well: If there are *any* problems identified by this question, the problem is serious!

The subject of antenna restrictions is another emotional topic for many amateurs, contesters and non-contesters alike. I remember when I uncovered the relative ease in obtaining a building permit for my tower in Windham, New Hampshire. Within a few years we had the likes of K1DG, N6BV, K1TR, and others living nearby (not a bad group, I might add). If you are one of the 200 respondents with no antenna restriction problems and are looking for more local hams, the answer is simple—tell someone!

### Question 12. Do you think there are any real operating secrets among winning contest operators?

YES—145  
NO—175

I was intrigued by the relative even split in responses to this question. When digging further into the comments, I found that many respondents viewed station hardware, location, and/or physical endurance as a secret to winning rather than operating technique or pre-contest preparation. The negative answers can best be characterized by the common belief that there are either no secrets at all or that operating talent is largely based on experience. Put another way, in their minds there is no meaningful differentiation in operating strategy among the winners.

Based on the comments I read, those who thought that secrets abound felt very strongly about their view. With few exceptions, they want the winners to start sharing their experience with others. I think that in most cases simply asking will be a beginning to learning (remember answer #5, serious contesters!).

## Final Comments

I am quickly running out of editorial space this month. By now, most of you have



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heard about the passing of a good friend, Al Slater, G3FXB. Much has been or will be written about Al in the ensuing months following his death. Next month, rather than writing another life story or operating chronology, I want to share with you some personal recollections about one of the finest radio operators our hobby has even seen.

**News Flash!** As this column went to press, CQ was informed by the ARRL contest branch that the newly created OK/OM republics will count as separate multipliers in the 1993 ARRL DX Contest.

As always, please remember that the deadline for the July issue is May 1st.  
73, John K1AR

### Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., March 14-15

This one is a shorty, only 7 hours, and it is again sponsored by the West Allis Radio Amateur Club.

The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

**Classes:** Single operator and multi-operator and transmitter, both fixed and mobile. And Novice/Tech, both single and multi-operator.

**Exchange:** QTH only. County for Wisc.; state or province for others.

**Scoring:** Phone QSOs count 1 point, 2 points if on CW.

Wisc. stations multiply total QSO points by (U.S. states + VE provinces + Wisc. counties) worked for their final score. DX contacts count for QSO points only.

Others use total Wisc. QSO points by the number of Wisc. counties worked (maximum of 72).

Wisc. mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 15 QSOs from each county).

**Frequencies:** CW—3550, 3705, 7050, 7125, 14050, 21150. SSB—3890, 7230, 14290, 28400. Other bands may be used.

**Awards:** To highest scoring single operator in each class in each state and province.

**Wisconsin:** To 10 top single operator scorers in each class. Highest multi-operator in each class. Highest aggregate club score. Plaque to the highest scoring single operator in the Party.

Logs with more than 100 QSOs must include a separate dupe sheet for each mode with their entry.

Complete rules and entry forms are available from address below. Include a large SASE.

Mailing deadline for logs is March 31st to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201.

### CLARA Contest

1700Z Tues. to 1700Z Wed., Mar. 16-17

This is the 26th anniversary of the CLARA Contest, and it is open to YLs and OMs around the world on phone and CW on all HF bands. Each station may be contacted twice per band mode.

**Classes:** Single operator, all bands.

**Exchange:** Name, RS(T), QTH (Canadian

Province/DXCC Country), and CLARA Membership status (Yes/No).

**Scoring:** CLARA-CLARA QSOs are worth 5 points; CLARA-YL QSOs are worth 3 points; CLARA-associate OM QSOs are worth 2 points; CLARA-OM QSOs are worth 1 point. CW contacts are worth double points. Fifty bonus points will be added to your score if you work the secret bonus station during the contest.

**Multipliers:** Canadian Provinces and DXCC Countries with YL operators.

**Final Score:** Multiply total QSO points times multiplier.

**Awards:** A variety of trophies and certificates will be awarded to high-scoring CLARA members, non-members, and OMs.

Send your entries no later than May 31st to: Janis Cameron, VE7AAP, 3528 11th Avenue, Port Alberni, B.C. V9Y 4Y7 Canada.

### Bermuda Contest

0001Z Sat. to 2400Z Sun., March 20-21

This is the 35th year for this popular contest open to amateurs in the United States, Canada, the United Kingdom, West Germany, and Bermuda.

Stations in the U.S. and Canada may work the U.K., Germany, and Bermuda. The U.K. and Germany may work the U.S., Canada, and Bermuda. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands. Cross-band or cross-mode contacts are not permitted.

You are limited to 36 hours out of the 48-hour contest period. Off times of no less than three consecutive hours must be clearly indicated on the log. Participation is for single operator stations only and must be from their own residence.

**Exchange:** RS(T) and QTH. Parish for VP9, state for the U.S., province for Canada, county for the U.K., and DOK number for Germany.

**Scoring:** Five points for each QSO. A station may be worked on SSB and CW if the QSOs are more than one hour apart. Multiply total by number of different VP9 stations worked on all bands. (Note: It's each VP9 station, not each parish.) Counted once per QSO (e.g., QSOs on 20M SSB and CW count as 2 multipliers). VP9 Novices count as double multipliers.

**Awards:** Certificates to top scoring stations in each U.S. state, VE province, U.K. county, and DL DOK (minimum of 100 QSOs). The overall winners in the US, Canada, UK and Germany will each receive a trophy. **Note: There is no longer a free trip to Bermuda for trophy winners.**

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be received no later than June 1st by the Radio Society of Bermuda, Box HM275, Hamilton HM AX, Bermuda. Enclose 4 IRCs for acknowledgments.

### BARTG Spring RTTY Contest

0200Z Sat. to 0200Z Mon., March 20-22

This contest is sponsored by the British Amateur Radio Teleprinter Group and is being administered by John Barber, G4SKA. The contest is open to all amateurs in four classes—single operator (all band and single band), multi-operator, and SWL.



Activity will be on all bands 3.5–28 MHz, but no WARC. Operation is limited to 30 hours out of the 48-hour contest period. The 18 hours off may be taken at any time, but not less than 3-hour periods.

**Exchange:** RST plus a three-figure contact number and time in GMT (full four figures).

**Points:** Contacts with other stations count one point. The same station may be worked on each band for QSO and multiplier credit.

**Multiplier:** Total number of countries worked on each band and number of continents worked (continents are counted once only). W/K, VEVO, and VK call areas will be counted as separate multipliers.

**Final Score:** Total QSO points × country multiplier × continents worked.

Shortwave listeners must show call of station being heard, report of message being sent, and call of station being worked.

**Awards:** Certificates to the top-scoring stations in each class and to the continental leaders. Also in each W/K, VEVO, and VK call area.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc. Log forms are available from G4SKA; include 6 IRCs to cover postage.

Logs must be received by May 29th and go to: John Barber, G4SKA, 32 Wellbrook St., Tiverton, Devon, EX16 5JW England.

## Virginia QSO Party

1800Z Sat. to 0200Z Mon., March 20–22

This is the 18th year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO and multiplier credit. And VA mobiles in each county change.

**Exchange:** QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

**Scoring:** One point for each SSB contact; two points for CW; three points for working a VA mobile.

VA stations multiply total QSO points by sum of US states, VE provinces, DX countries, and VA counties.

Others multiply total VA QSO points by the number of VA counties worked (maximum of 95).

Mobiles receive special 100 bonus points for each different VA county.

**Frequencies:** CW—50 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—1815, 3860, 7260, 14260, 21360, and 28360. Also Novice bands, and both modes on 160.

**Awards:** Certificates to top scorers in each state, province, DX country, and VA county. There are six plaques as follows: top VA multi-mode, CW only, club, VA mobile, Novice/Tech, and top out-of-state station.

**Logs:** Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 15th to: Virginia QSO Party, c/o William T. Free, W3FTG, 3627 Great Laurel Lane, Fairfax, VA 22033-1212.

## CQ World-Wide WPX Contest

SSB: March 27–28 CW: May 29–30  
Starts: 0000Z Sat. Ends: 2400Z Sun.

Complete rules were published in the Febru-

ary issue. Following are a few points to keep in mind.

You may now operate 36 hours out of the 48-hour contest period as a single operator station. Off times can be taken in up to five periods, but off periods must be a minimum of 60 minutes in length. Multi stations can operate the full 48 hours.

The definition of the prefix multiplier is spelled out in detail and is now also being used for the CQ WPX Award program.

A prefix is the letter/number combination which forms the first part of a call.

The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the multi-operator, single transmitter category only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same

time period is prohibited.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log. Note that contest logs may be submitted on disk (MS-DOS compatible) in standard ASCII or .bin, .res, .dfb, .wks formats. To reduce the administrative burden, please label your computer entries with a unique name (e.g., N8BJQ.BIN).

An updated trophy and plaque awards list now shows over 40 awards. Be sure to check the awards that are available.

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. **Be sure to indicate SSB or CW on the envelope.**

All logs go to: CQ Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenvue Dr., Beavercreek, OH 45431 U.S.A. or via packet to the following: N8BJQ @W8BI.OH.USA.NA.

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## NEWS OF COMMUNICATION AROUND THE WORLD

**Recommended DX Operating Practices**

Late last year The DX Advisory Committee (DXAC) sent a list of recommended DX operating practices to the ARRL Executive Committee. The decision to forward this document to the Executive Committee was a split one, with a bare majority of DXAC members in favor of the action. (Nine of the 16 members of the DXAC voted in favor of forwarding the document, five against, and two members abstained.) The deep division within the DXAC reflects the very controversial nature of this document.

To fully understand the controversy, we need to look back more than three years, to the very end of 1989, when the 3Y5X Bouvet DXpedition was on the air. This operation was marred by some of the worst jamming, catcalls, profanity, and general bedlam ever seen on the amateur bands. The situation was so bad that not only the non-DXers but even many hard-core DXers felt that something had to be done to prevent a recurrence of the interference.

Part of the problem concerned the timing of the Bouvet DXpedition, coming during serious preparations for the 1992 World Administrative Radio Conference (WARC 92) at which amateur band allocations would be considered. Amateurs involved in preparing for the WARC worried that administrations around the world who coveted amateur band allocations for their own purposes (mostly international short-wave broadcasters) would use tapes of the profanity and jamming to discredit the amateur service as a whole. This could undermine worldwide efforts to retain our extensive band allocations, not to mention eliminating any possibility of expanding amateur high-frequency (HF) allocations, as happened at the 1979 WARC.

Under considerable pressure to do something, the ARRL Executive Committee voted in March 1990 to direct the DXAC to study ways to prevent such widespread interference to DXpeditions. Specifically, the DXAC was requested to "research and recommend disqualification criteria for DXpeditions." If the Executive Committee thought that the 3Y5X situation was a mess, they received far worse when news of this motion spread through the DX community.

The mere thought that a major DXpedition, involving many thousands of contacts



*John Rouse, KA3DBN, is on the African DXpedition trail this month. He also operates regularly from this Anguilla shack under the callsign VP2EBN.*

and even more thousands of dollars, might not count for DXCC credit because of the uncontrollable antics of a small number of disgruntled amateurs was terrifying to DXpedition planners and DXers everywhere. The potential for abuse seemed endless. Fortunately, the DXAC quickly determined that "disqualification criteria" for DXpeditions was *not* the appropriate response to the problem of interference from non-DXpedition operators. The DXAC quietly asked the Executive Committee if they could stray from the strict wording of the original charge and consider DXpedition operating practices instead.

Over the next three years a sub-committee of the DXAC, under the leadership of Garth Hamilton, VE3HO, listened to comments from DXers and DXpeditioners around the world and argued over the best approach to the problem of massive interference. Even after the subcommittee completed its final report, discussion within the DXAC postponed the final vote on sending the report to the ARRL Board of Directors for months.

**The Recommendations**

The report begins by dismissing the original charge to recommend disqualification criteria: "The DXAC has . . . concluded that DXCC basic rule 12, titled 'Operating Ethics,' [sic] already provides a mechanism for applying sanctions to individuals or DXpedition groups who exhibit poor operating practices, and that new disqualification criteria for DXpeditions are not required or desirable at this time." DXCC Rule 12, which is actually titled 'Operations Ethics,'

states that "fair play and good sportsmanship in operating are required of all DXCC members. In the event of specific objections relative to continued poor operating ethics, an individual may be disqualified from DXCC by action of the ARRL Awards Committee."

The rest of the report is a set of recommendations that the DXAC believes will reduce malicious interference and improve DX operating practices. Much of the advice for both DXpeditioners and stations calling DXpeditions is sound and practical. For example, DXpeditions should use split-frequency operation, report complete call signs, confirm any corrections by sending the calling station's full callsign at the end of the QSO, identify not less than every 10 QSOs, and send QSL routes not less than every 30 QSOs. While these recommendations seem obvious to experienced DXers, there are still too many DX operators who violate one or more of these principles, which inevitably leads to unnecessary interference, such as the obnoxious, "What's your call?"

The report also warns against some common practices that can quickly lead to chaos on a DXpedition's frequency, such as working stations out of turn when going by call areas, or acknowledging another station before the previous contact is complete and confirmed by both sides. In either case, many calling stations will see this as a sign that they can call any time they please, and the situation deteriorates rapidly.

The report also encourages the stations calling the DXpedition to improve operating habits. The number one suggestion is to *listen*, excellent advice that far too many DXers appear to ignore in the heat of pile-up busting. Among the practices DXers should avoid are calling on top of a QSO in progress, calling on the DXpedition's transmitting frequency, calling blind in a pile-up, calling out of turn, and "policing" the DXpedition's frequency (such as saying, "He's listening up, you lid!"). The DXAC also states that "2 contacts per band and mode are more than enough." (Actually, there shouldn't be any need for an "insurance" contact on the same band and mode, if the DXpedition operator clearly acknowledges the complete callsign of the calling station.)

Two other recommendations are (1) that the ARRL work with amateur equipment manufacturers to design rigs that *cannot*



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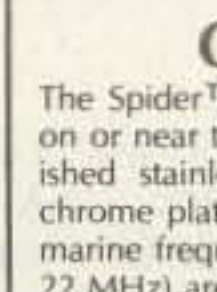
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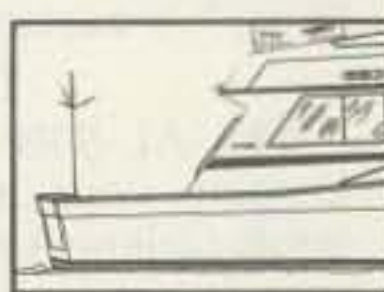
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## DXAC Recommended DXpedition Operating Band Plan

Band	DXpedition Transmit Frequency	DXpedition Listening Frequency
10 meters	28.393-397 SSB 28.493-497 SSB 28.593-597 SSB 28.023-027 CW	28.400-425 28.500-525 28.600-625 28.030-045
12 meters	24.933-937 SSB	24.950-960
15 meters	21.243-247 SSB 21.193-197 SSB 21.023-027 CW	21.250-265, 300-310, 350-360 21.250-265, 300-310, 350-360 21.030-045
17 meters	18.113-127 SSB 18.073-077 CW	18.130-140 18.080-090
20 meters	14.143-147 SSB 14.193-197 SSB 14.023-027 CW	14.200-215, 250-260 14.200-215, 250-260 14.030-045
30 meters	10.100-104 CW	10.110-120
40 meters	7.042-047 SSB 7.000-004 CW	7.050-060, 190-210 7.025-035
80 meters	3.790-795 SSB 3.500-504 CW	3.795-810 3.525-535
160 meters	1.825-829 CW & SSB 1.830-834 CW 1.840-844 SSB	1.835-840 CW, 1.845-850 SSB 1.835-840 1.845-850

Table 1- The DXAC recommended DXpedition operating band plan.

transmit on certain frequencies, to idiot-proof the gear, and (2) that there is developed an education program aimed at encouraging DXers to use ethical operating practices. This may include recognizing particularly good operators, perhaps through the A-1 Operators Club, and getting the ARRL FCC Auxiliary Corps involved in DXpedition monitoring.

All these suggestions are straightforward and likely to win the support of most DXers worldwide. However, two portions of the report are neither straightforward nor likely to gain much, if any, support from DXers. First, the report includes recommended DXpedition transmitting and receiving frequencies. As might be expected by experienced DXers, any recommended frequencies will step on someone's toes. For example, the report recommends transmitting near 14145 kHz, a frequency that is used in Latin America for a popular Spanish-language gathering. And some of the recommendations ignore such practical considerations as the only usable 75 meter frequencies in the CIS. One-sixty meter operators will probably take exception to the recommended frequencies on top band.

One good suggestion included in this extensive list of recommended frequencies is limited receive-frequency spreads. In too many cases DXpeditions attempt to spread calling stations out over an entire band, disrupting dozens of existing con-

tacts, public-service activities, and more. Few DXpedition operating practices are more likely to generate malicious interference than this one. However, the practice continues, even by operators who should know better. Romeo Stepanenko's P5RS7 North Korea operation earlier this year listened from 14025 to well above 14125 kHz on CW! Let's hope all DXpeditioners adhere to the suggested limited spreads of about 10 kHz on CW to as much as 25 kHz on the relatively uncrowded 10 meter SSB subband.

The DXAC's recommended band plans for DXpeditions will surely be the topic of much discussion worldwide. Before any such plans are widely accepted, DXers and other amateurs will have to carefully consider each segment. Perhaps a wide consensus will emerge supporting most, if not all, the recommendations. Meanwhile, the recommendations do provide a place to begin discussions and are a good place for an inexperienced DXpeditioner to seek advice on operating frequencies.

One recommendation in the DXAC's report, however, will probably generate more argument than all the others combined: a suggestion that DXpeditions work "portable" stations *only* under their "home" call area. This means that WB2CHO/6 would be able to call the DXpedition only under the 2s, and *not* under the 6s.

The reason for this recommendation is the abuse of the call-area means of con-





Andy, UA3DPX, reports that mail problems in Russia continue. Russian amateurs must now pay to receive QSLs via the notoriously unreliable Box 88, Moscow.

trolling the pile-up by a very small number of bad operators. A few unethical so-called DXers will call in every district, simply by adding a bogus "portable" designator to their call. Thus, W2NQ/7 will sign /6 when the DXpedition is working 6s, and /8 when it's the 8s turn. Because there is no longer any FCC (nor DOT in Canada) requirement to use such a "portable" designation when operating from other than one's "home" call area, this practice is not strictly illegal, but it *certainly* is unethical.

While the recommendation to ignore "portable" designators in pile-ups seems reasonable, it has the potential to prevent many hundreds of DXers from ever working a given DXpedition. A good example of the problem occurred during the 7O1AA Yemen of mid-1990. The inexperienced DXpeditioners, putting a New One on the air for the first time, made several grave operating errors, such as not including a CW operator and spending considerable time calling for YL stations only. (The subsequent chaos as hundreds of DXers dragged their wives to the microphone, or simply called in a high, squeaky voice, would have been hilarious, if it wasn't so pathetic.) The 7O1AA operators also attempted to cut down on abuse of the portable designators by flatly refusing to work any stations using such. In other words, they did what the DXAC has recommended as correct procedure. The practice was not popular, to say the least. Stations on the west coast who had retained call-signs from previous locations farther east found themselves effectively shut off from any chance to work this New One. If WB2CHO/6 has to call with the 2s who are 3000 miles closer to Yemen, he doesn't have a prayer of getting through.

As thousands of DXers change locations every year, often moving thousands of miles, while retaining their original call-signs, this problem of disenfranchising DXers from working DXpeditions will only increase.

That this recommendation will not be popular among DXers has already been determined by an informal survey via Pack-

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## The WPX Program

### Mixed

1591 JG2NXV 1592 K7KBN

### SSB

2349 WT3W 2353 WA6SLO  
2350 N4YKD 2354 N6RJY  
2351 KB2GLO 2355 N6GAH  
2352 YU1AB 2356 FR5ZN

### CW

2765 WT3H 2767 YU1AB  
2766 DL2MEG

### WPNX

275 KA3OHV

### Endorsements

Mixed: 450 JG2NXV, KB7KBN, 500 VO1SF, JG2NXV, K7KBN, 550 VO1SF, JG2NXV, 600 VO1SF, 650 VO1SF, JG2NXV, 700 VO1SF, JG2NXV, 750 VO1SF, JG2NXV, 850 N6IBP, 900 N6IBP, HP2CWB, 950 N6IBP, 1000 N6IBP, CT3CU, 1050 N6IBP, CT3CU, 1100 CT3CU, 1150 CT3CU, 1200 KS4S, 1250 KS4S, 1300 KS4S, 1350 KS4S, 1400 KS4S, 1450 KS4S, 1500 KS4S, 1550 KS4S, 1600 KS4S, 1650 KS4S, 1700 KS4S, 1950 WB2YQH, 2650 IT9TQH, 2700 IT9TQH, 2750 IT9TQH, 2800 IT9TQH.

SSB: 350 WT3W, N4YKD, KB2GLO, N6IBP, WA6SLO, N6GAH, FR5ZN, 400 KB2GLO, F11FFC, N6GAH, FR5ZN, 450 F11FFC, N6IBP, WA6SLO, FR5ZN, 500 F11FFC, N6IBP, WA6SLO, VE1RJ, 550 N6IBP, WA6SLO, FR5ZN, VE1RJ, 600 N6IBP, WA6SLO, FR5ZN, N3CYD, 650 N6IBP, WA6SLO, FR5ZN, N3CYD, 700 N6IBP, WA6SLO, FR5ZN, 750 N6IBP, WA6SLO, FR5ZN, 800 WA6SLO, FR5ZN, 850 WB4UBD, KW0U, WA6SLO, FR5ZN, 900 WB4UBD, KS4S, WA6SLO, FR5ZN, 950 KS4S, WA6SLO, FR5ZN, 1000 KS4S, WA6SLO, FR5ZN, 1050 KS4S, WA6SLO, 1100 KS4S, WA6SLO, 1150 KS4S, WA6SLO, 1200 KS4S, WA6SLO, 1250 KS4S, K2EEK, WA6SLO, 1300 WA6SLO, 1350 WA6SLO, 1400 AC3T, WA6SLO, 2300 F4VX, 2350 F2VX, 2400 F2VX, 2450 F2VX, 2500 IT9TQH, F2VX, 2550 IT9TQH, 2600 IT9TQH, 2650 IT9TQH, 2700 IT9TQH, 3550 ZL3NS.

CW: 450 N6IBP, 500 N6IBP, 550 N6IBP, 600 KS4S, N6IBP, 650 KS4S, N6IBP, 700 KS4S, N6IBP, 750 KS4S, N6IBP, 800 KS4S, N6IBP, 850 KS4S, 900 KS4S, 950 KS4S, 1000 KT2C, KS4S, 1050 KS4S, 1250 OK1DKR, 1400 VS6UW, 1700 W8IQ, PA0SNG, 1750 W8IQ, PA0SNG, 1800 W8IQ, 2450 IT9TQH, 2500 IT9TQH, 2550 IT9TQH, 2600 IT9TQH, 2650 IT9TQH, 2700 IT9TQH.

10 Meters: VO1SF, N1IR, KC7V, KB2GLO, N6RJY, LU1DOW

15 Meters: VO1SF, KC7V, LU1DOW  
20 Meters: VO1SF, KC7V, HP2CWB, LU1DOW  
40 Meters: KC7V, LU1DOW  
80 Meters: KC7V, LU1DOW  
160 Meters: KC7V, KS4S, LU1DOW

Asia: VO1SF, JG2NXV, KC7V, KS4S  
Africa: KC7V  
No. Amer.: VO1SF, JG2NXV, KC7V, KB2GLO  
So. Amer.: KC7V, KS4S  
Europe: VO1SF, JG2NXV, KC7V, WT3H, F11FFC  
Oceania: JG2NXV, KC7V

**Award of Excellence Plaque Holders:** 18YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4OX, W8BYTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BOY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VE3FXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCV, F1HWP, KC8PG, NE4F, VE3MS, K9LJN.

**Award of Excellence Plaque Holders with 160 Meter Endorsement:** FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BOY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, K9QRF, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to: "CQ WPX Awards," 880, CR13, Clovis, NM 88101-9511 USA.



Andy, YO3AC, one of the most active amateurs from Romania, now has a triband vertical for 30, 17, and 12. (DK7PE photo)

## Other DXAC Votes

On the same DXAC ballot with approval of the DX Operating Practices were three other items. As expected, the DXAC voted 16 to 0 *against* recommending that the Temburong District of Brunei V85 be added to the DXCC Countries list; it did not meet the 75 mile separation requirement.

The DXAC voted 10 to 6 to recommend *deleting* the Red Sea Islands (Abu Ail A15) from the DXCC countries list. Some DXAC members felt there was not enough evidence to justify the deletion. The Red Sea Islands were a separate entity on the DXCC Countries List because the navigation lights on them were under control of a multi-national group separate from nearby Yemen. Yemen has taken charge of operating and maintaining the lights, and the multi-national organization has disbanded. Next step is consideration by the ARRL Awards Committee at ARRL Headquarters.

They also voted 16 to 0 in *favor* of expanding the DXCC Field Checking program to include most new DXCC applications. The existing rules permit field checking only for an applicant's *initial* DXCC. This recommendation would expand the program to include subsequent *new* DXCC applications, such as for an additional mode or band. Neither endorsements nor 5BDXCC, VHF, nor satellite DXCCs would be field checked. This change will have to be approved by the ARRL Board of Directors, as it involves an actual change to the DXCC rules themselves. Given the current press of work at the DXCC desk, the large backlog of existing applications, and the unqualified success of the DXCC field-checking program to date, this is a sure thing.

Another potential DXAC action will be changes in the former Czechoslovakia. As of the beginning of 1993, the country of Czechoslovakia ceased to exist. In its place are two new countries: the Czech Republic and Slovakia. Slovakian stations are using the **OM** prefix, and Czech stations continue to use OK and OL. QSL OM stations via the corresponding OK ad-

etCluster™ by one DXAC member. Without explaining the purpose of the question, the DXAC member asked DXers when a legitimate "portable" station should call: in the "home" call area, in the "portable" call area, or both. Only 10% of those responding agreed with the DXAC that the DXer should call only under the home district. More than half thought he should call under the "portable" district, and the rest felt he could call under both home and portable districts, the most common practice today.

This gives the "portable" DXer twice as many chances to work the DXpedition as other stations, perhaps a fair trade for the increased length of the callsign. However, it is exactly this doubling of the opportunity to call that results in the tiny, but serious, number of amateurs who abuse the practice.

There are other means available to reduce the abuse of the portable designator. The persons monitoring the pile-up can

quickly tell when an unethical operator is calling from more than one district. This operator can be notified that continued abuse of this nature will be a violation of DXCC rule 12, with subsequent disqualification from DXCC. The DXpedition operators can log the "portable" designators (most no longer do so). Then only cards for the physical location of the station would be accepted for a given DXCC (admittedly, an administrative nightmare for the over-burdened DXCC desk). Or stations should be encouraged to call under their portable district, and *not* both their home and portable areas.

DXers who disagree with this DXAC recommendation should make their feelings known to their ARRL Director, as the report now awaits Board approval or other action. Meanwhile, every DXer should review the suggestions for improving calling procedures, and every DXpeditioner should take to heart the non-controversial suggestions in the report.



## CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 323. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

### CW

W9DWQ 323	K1MEM 323	W0SR 320	WA4IUM 317	K8N8 314	K4CXY 310	I4EAT 302	KA7T 299	N3DQX 280
K2FL 323	K6JG 323	VK4LC 323	I4EAT 317	I5XIM 314	N4AH 309	XE1MDX 306	VE4AT 299	AB4UF 283
K2TQC 323	K2OWE 323	K9IW 320	WA4JTI 317	W1NG 314	WB4RUA 309	VE2GHZ 306	K5DUT 299	E16FR 283
ON4QX 323	K3UA 323	W9WAQ 320	G4BWP 317	PA0XPO 314	W6DN 308	VK3JF 306	I2ZGC 299	WA9BXB 282
K6LEB 323	W6PT 322	N6AV 319	IT9ZGY 317	KQ9W 314	IT9VDO 308	N4KE 305	N1CWA 299	WK3N 282
K9MM 323	K9QVB 322	SM3EVR 319	KD8V 317	I8WY 314	W8RY 307	K3LUE 305	NW5K 299	YB3CEV 282
YU1HA 323	K2ENT 322	DL3RK 319	K9TI 317	WD9IIC 313	K4CXY 307	NC9T 305	WB6GFJ 299	N5HSF 282
N4JF 323	W2FXA 322	W1WAI 319	KZ4V 317	IT9QDS 312	K1VHS 306	WA6DTG 305	KB2FC 298	VU2DVP 281
N6AR 323	DL1PM 322	W0HZ 319	EA2IA 317	WA2HZR 312	SM6CTQ 305	WF9K 305	4N7ZZ 298	TG9EP 281
K4CEB 323	W0IZ 322	N5FW 318	WA8DXA 316	W0JLC 312	I2QMU 305	YV5IVB 305	SV8CS 298	VE3NUP 281
N4KG 323	K9AB 322	N6CW 318	AA5NK 316	W4OEL 312	K2JF 303	NI5D 305	WA0TKJ 298	KA1LMR 281
SM6CST 323	W4BQY 321	K9BWQ 318	N7MC 316	N7RO 312	N8MC 303	W8URM 305	KF5DX 297	KD5ZD 281
AA4KT 323	K4XO 321	K8LJG 318	W7CNL 316	IT9TOH 311	WB5MTV 303	EA1QF 304	NP4CC 297	W8/DL2SCA 281
N4MM 323	OK1MP 321	W7ULC 318	KB8DB 315	DJ2PJ 311	K1HDO 303	KB1JU 304	VE3CKP 297	WA0QII 281
W2UE 323	N2KW 321	AA6AA 318	F3TH 315	W3BBL 310	KB9XG 303	ZL1BOQ 304	EA5RJ 296	YU1TR 280
						EA3EQT 304	HP1JC 296	N8HUR 280
						I8IYW 304	VE3XO 294	NX0I 280
						WA1DHM 304	EA3KW 294	K5AOL 279
						AC0A 303	W0IYR 294	WN5K 279
						KB9LN 303	W0IYR 294	WB8TLI 279
						KB0SY 303	W0IYR 294	VU2CVP 278
						KA9TNZ 303	W0IYR 294	W4AFA 277
						W4BQY 302	IT9VDO 293	K4BYK 277
						RA3YA 302	Ti2LTA 292	WA9BDX 277
						W2LZX 302	K9EC 292	WB0UFL 277
						ZS6A00 302	KE7UL 292	WN5MBS 277
						XE1KS 302	VE6PW 292	KG9N 277
						WB2JZK 302	SV1JG 291	I8WYD 277
						WA5HWB 302	CP5NU 290	CE7ZK 277
						WB4TGB 301	N5ORT 290	KA9I 277
						N5FG 301	4X4JO 290	CT1AHU 277
						VE6PW 301	I4UFH 289	W8/DL2SCA 276
						NO4J 301	W9TA 288	G4NXG/M 276
						W3SOH 301	YB2OK 288	WB4UHN 276
						YU2TW 300	Ti5RLI 287	KJ6HO 276
						N4CRU 300	OK1AWZ 287	VE7HAM 276
						WT4T 300	EA8TE 287	NX4Y 275
						WD0BNC 300	N8BJQ 285	WA4PGM 275
						W7KSK 300	FD1OZF 285	HP6AYV 275
						VE3FJE 300	IK8BMW 284	Ti2SD 275
						WB4NDX 300	NZ7D 284	KJ6GC 275
						K3NEE 300	KB5RF 284	KA5YCM 275
						OE7SEL 300	KB9AIT 283	KI4FW 275
						N6PTI 300	VE3IMO 283	WA4OPW 275
								AB4NS 275

### SSB

K2FL 323	K3UA 323	I4LCK 322	IT9TGO 320	IK1GPG 317	W7ULC 313	WA2MID 306	I8IGS 299	XE1LI 283
VE1YX 323	DL6KG 323	N2KW 323	K9QVB 320	I8LEL 316	W2FGY 312	XE1MDX 306	VE4AT 299	AB4UF 283
F9RM 323	K9BWO 323	W7OM 322	W6DN 320	KC8EU 316	K8CMO 312	VE2GHZ 306	K5DUT 299	E16FR 283
DJ9ZB 323	K5OVC 323	VK4LC 322	KB5FU 320	W6SN 316	Ti2KD 312	VK3JF 306	I2ZGC 299	WA9BXB 282
W9DWQ 323	K2ENT 323	WB1DOC 322	W3GG 320	AG9S 316	K8NWD 312	N4KE 305	N1CWA 299	WK3N 282
W0YDB 323	AA4KT 323	SV1ADG 322	I2QMU 320	K8ZJU 316	KC4MJ 312	K3LUE 305	NW5K 299	YB3CEV 282
W4DPS 323	OE3WWB 323	K2JF 322	AA4AH 320	DU1RG 316	K8YVI 312	NC9T 305	WB6GFJ 299	N5HSF 282
K2TQC 323	WA3HUP 323	ZS6LW 322	NJ2C 320	KV2S 316	ZS6BBY 312	WA6DTG 305	KB2FC 298	VU2DVP 281
W4EEE 323	W4NKI 323	OE2EGL 322	G4GED 320	N4WF 316	N6CGB 312	WF9K 305	4N7ZZ 298	TG9EP 281
W2SUA 323	WD8MGQ 323	WB3DNA 322	NJ0C 320	W5LLU 316	WA9IVU 312	YV5IVB 305	SV8CS 298	VE3NUP 281
K9MM 323	K9HDZ 323	I0AMU 322	WZ4I 320	YT7DX 316	KA5TQF 312	NI5D 305	WA0TKJ 298	KA1LMR 281
YU1HA 323	K0GT 323	K4CXY 322	W7FP 320	WA9RCQ 316	WD0DMN 312	W8URM 305	KF5DX 297	KD5ZD 281
W2FXA 323	K4MOG 323	KF7SH 322	K7EHI 320	WE2L 316	I2MQP 311	EA1QF 304	NP4CC 297	W8/DL2SCA 281
OZ3SK 323	KZ2P 323	I8AA 322	EA1QF 320	KB9OC 316	NN4Q 311	K4RIG 304	VE3CKP 297	WA0QII 281
DL9OH 323	IT9ZGY 323	K9AB 322	WB5TED 319	KF5AR 316	K0HQW 311	KB1JU 304	PY2DBU 297	YU1TR 280
VE3MR 323	4Z4DX 323	VE2WY 322	XE1CI 319	K4JLD 316	K4LR 311	ZL1BOQ 304	EA5RJ 296	N8HUR 280
EA2IA 323	OK1MP 323	K8NA 322	IT9TOH 319	N4KEL/M 316	N1ALR 311	I8IYW 304	HP1JC 296	VE3XO 294
K4MZU 323	W4UNP 323	KS2I 322	CX1TE 319	KI3L 315	XE1ZLW 311	WA1DHM 304	I4CSP 295	WN5K 279
KM2P 323	YV5CWO 323	W0SR 322	IK8GCS 319	KB2HK 315	KB2MY 311	AC0A 303	VE3XO 294	WB8TLI 279
VE3XN 323	K8LJG 323	KD8V 322	W9JT 319	W0LSD 315	KD5ZM 311	KB9LN 303	EA3KW 294	VU2CVP 278
K6WR 323	XE1AE 323	G4ADD 322	W6NLG 319	IK7DBB 315	KE5PO 311	KB0SY 303	W0IYR 294	W4AFA 277
N4JF 323	Y1GMV 323	W6BCQ 322	K9TI 319	KC2FC 315	KA5RNH 310	KA9TNZ 303	WD9IIC 293	K4BYK 277
VE3MRS 323	KS0Z 323	VE2PJ 322	WD8PUG 319	W0ULU 315	LU7HJM 310	W4BQY 302	IT9VDO 293	WA9BDX 277
K6YRA 323	I8ACB 323	PY4OY 322	K1UO 319	K2ARO 315	Ti2JJP 310	RA3YA 302	Ti2LTA 292	WB0UFL 277
YU1AB 323	N6AHU 323	LA7JO 322	WB6OKK 319	KE4HX 315	N6AHV 309	W2LZX 302	K9EC 292	WN5MBS 277
N6AR 323	K9IW 323	CT1FL 321	W2FGY 319	YV5DFI 314	I5EFO 309	ZS6A00 302	KE7UL 292	KG9N 277
K6JG 323	W0SFU 323	Ai8M 321	KA9ABC 318	W9RY 314	I1POR 309	XE1KS 302	VE6PW 292	I8WYD 277
YV1KZ 323	YV5AIP 323	Ai8S 321	KQ9W 318	KU9Z 314	G4GED 309	WB2JZK 302	SV1JG 291	CE7ZK 277
I0ZV 323	Ti2HP 323	K8CSG 321	WB6PSY 318	HR1KAS 314	KP4P 309	WA5HWB 302	CP5NU 290	KA9I 277
W4JVU 323	OZ5EV 323	VE4AT 321	WB3CQN 318	A92BE 314	XE1MD 309	WB4TGB 301	N5ORT 290	CT1AHU 277
N4MM 323	VE7WJ 323	KE4VU 321	OA4ED 318	XE1OX 314	WA8YTM 309	N5FG 301	4X4JO 290	W8/DL2SCA 276
WA4JTI 323	VE3GMT 323	IK8CNT 321	9H4G 318	OH5KL 314	WD9IIX 308	VE6PW 301	I4UFH 289	G4NXG/M 276
KB8DB 323	I8XTX 323	KC8EU 321	PA0XPO 318	K4SBH 314	YV2EJU 308	NO4J 301	W9TA 288	WB4UHN 276
EA4DO 323	WA6OET 323	ON5KL 321	I4ZSQ 318	KB1JU 314	N3ARK 308	W3SOH 301	YB2OK 288	KJ6HO 276
W9SS 323	K2JLA 323	IK8BQE 321	G4CHP 318	K1VHS 313	W4BQY 308	YU2TW 300	Ti5RLI 287	VE7HAM 276
WB4UBD 323	YV1AJ 323	KA3HXO 321	IK0IOL 318	I2EOW 313	IN3ANE 308	N4CRU 300	OK1AWZ 287	NX4Y 275
W9OKL 323	I4EAT 323	W2CC 321	K1HDO 318	WB4PUD 313	KB7VD 308	WT4T 300	EA8TE 287	WA4PGM 275
W6EUF 323	I8YRK 323	K9HQM 321	ZL1BIL 318	W1NG 313	KB8O 308	WD0BNC 300	N8BJQ 285	HP6AYV 275
OA4OS 323	WA4IUM 323	WA4DAN 321	N4CRU 317	KA6V 313	N6AV 307	W7KSK 300	FD1OZF 285	Ti2SD 275
W3AZD 323	KB4HU 323	AA6AA 321	XE1XM 317	AA6BB 313	WA2FKF 307	VE3FJE 300	IK8BMW 284	KJ6GC 275
ZL3NS 323	N5FW 323	KZ4V 321	KB3OQ 317	W1LQQ 313	WD5P 307	WB4NDX 300	NZ7D 284	KA5YCM 275
N7RO 323	Ti2CC 323	AA5NK 321	SM6CST 317	W4SSU 313	Ti2TEB 307	K3NEE 300	KB5RF 284	KI4FW 275
K4XO 323	VE7DX 323	K7LAY 321	KU9I 317	I8INW 313	VE3DLR 307	OE7SEL 300	KB9AIT 283	WA4OPW 275
ZL1AGO 323	K4POV 323	WA4ECA 320	WA4WTG 317	W5XQ 313	F6BFI 306	N6PTI 300	VE3IMO 283	AB4NS 275
N4KG 323	CX4HS 323	KR9O 320	YV1CLM 317					

dress. These two potential new DXCC countries are not yet on the DXAC agenda, but probably will be soon. The DXAC will most likely vote to delete the old Czechoslovakia, and add the two news ones, with an effective date of January 1, 1993.

### Visalia Convention

The International DX Convention in Visalia, California, is April 16-18, at the Holiday Inn. It's the Northern California DX Club's turn to host this event, the largest and most popular pure DX convention in the world. This year it is one week before the Dayton Hamvention, so many overseas DXers will

travel stateside for an intense dose of DX. Preregistration is still available for only \$45/person until March 15 (\$50 after March 15). This includes all the forums, the Saturday night banquet, and the Sunday morning brunch. Send your check made out to the International DX Convention to registrar Louese Bloom KA6ING, 2520 Heather Lane, San Bruno, CA 94066-2643. And don't miss the Friday evening cocktail party, co-hosted by this writer and the NCDXC. Stop by and say hello!

### March DXpeditions

On the heels of the Baker-Howland KH1

operation (using the very same boat) is a double DXpedition to Kingman Reef KH5K and Palmyra Island KH5. Pete Meyer, NAFW, leader of the 1992 Clipperton Island FO0CI operation, will gather a multinational crew in Honolulu in late February, with planned arrival at tiny Kingman on March 5. They'll set up a few stations there, and take the rest of the crew to nearby Palmyra for a concurrent operation. To reduce pirate operations, callsigns won't be announced until closer to the operation; see one of the weekly DX newsletters for up-to-date information just before the trip begins.

Another veteran DXpeditioner, Vance



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## The WAZ Program

### Single Band WAZ

#### 10 Meter SSB

445 ..... IV3JVJ 447 ..... DL3NCA  
446 ..... K9ZXG

#### 15 Meter SSB

434 ..... K9ZXG

#### 20 Meter SSB

906 ..... K9ZXG

#### 15 Meter CW

237 ..... K9ZXG 238 ..... K2LFL

#### 20 Meter CW

428 ..... K9ZXG

### All Band WAZ SSB

4014 ..... CE5BTS 4017 ..... WA6EZV  
4015 ..... I8JJB 4018 ..... DL1XE  
4016 ..... LA9MC

### CW/Phone

7297 ..... K7KBN 7300 ..... N7DBA  
7298 ..... JA1QVR 7301 ..... OZ1IWE  
7299 ..... WK9Z 7302 ..... OH6MHN (CW)

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

## 5 Band WAZ

As of November 30, 1992, 347 stations  
have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200  
zones confirmed:

None

The top contenders for 5 Band WAZ are:

N4WW, 199	IK8CNT, 199
SP9PT, 199	W1JR, 199
K6YRA, 199	W8SEY, 199
PY7ZZ, 199	N7RT, 199
DL9WW, 199	VE7AHA, 199
K0CS, 199	W1FZ, 199
KB0G, 199	IK2GNW, 199
AA4KT, 199	I8IGS, 198
K7UR, 199	SM6AHS, 198
K9EL, 199	K1ST, 198
NA0Y, 199	4X4DK, 198
VE7DX, 199	UA3AGW, 198
W0PGI, 199	KL7Y, 198
W2YY, 199	VO1FB, 198
W9WAQ, 199	S59VM, 198
K6EID, 199	

The following have qualified for the basic  
5 Band WAZ Award:

W9CH, 196 Zones

803 Stations have attained the 150 zone level as of  
November 30, 1992.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

LePierre, W5IJU, will lead a group to Navassa Island KP1 at the end of the month. They'll be active during the CQ WPX Contest March 27-28, as well as on CW, SSB, and RTTY outside the contest. QSL to W5IJU.

John Rouse, KA3DBN, returns to southern Africa the last two weeks of this month. He plans stops, and possible operation, in the Republic of South Africa ZS, a couple of the "homelands" in RSA, under H5 and S8 callsigns (which count for ZS in the DXCC program), and several other countries in the region, including Swaziland 3DA, Lesotho 7P8, Botswana A2, Zimbabwe Z2, and Malawi 7Q. QSL any operations via his home call.

Finally, Blaine Malmedal, WA0JTB, and son Greg, N0TKJ, will operate from Little Cayman Island ZF8 March 19-26 under the calls ZF2SQ and ZF2SP. They like 1835, 3520, 3795, 7020, 7290, 10113, 14040, 14145, 14224, 18140, 21285, and 28472 kHz. They'll be most active 2200-0800Z, but expect to be on the air much of the time that they are not diving and snorkeling in the crystal-clear Cayman waters. QSL home calls.

## QSL Notes

QSL 4U1UN and other callsigns used by the UN Headquarters station (such as 4U47UN) via Jim Tullis, W8CZN, 7226 Huntington Drive, Hudson, OH 44236. (Jim delivers the QSLs to Jerry Kurucz, WB8LFO, who, with help from members of the Northern Ohio DX Association, answers the cards.)

The YX0AI Aves Island QSLs finally arrived in Venezuela, and started going into the mail in November.

QSL the 4J1FM and 4J1FW M-V Island operations from October, 1992, to OH2LVG, Vanhaistentie 5 E 73, 00420 Helsinki, Finland.

QSL HC8U via WA6OTU, P.O. Box 4, Sierra Madre, CA 91025-0004. The former route via the Caltech Amateur Radio Club's W6UE station is no longer valid.

QSL VP5/N4CD and VP5/KB2PDC via Bob Voss, N4CD, 3133 Charring Cross, Plano, TX 75025.

QSL the CQWW SSB calls of 5K6CQ and 5K6C via HK6KCS, P.O. Box 3055, Pereira, Colombia.

QSL US50BS from October, 1992, via





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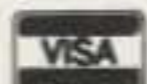
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### CQ DX Awards Program

#### SSB

1984 ..... K4SBH 1985 ..... KK4TR

#### CW

861 ..... IV3PVD 864 ..... NU4Y  
862 ..... 3A2LF 865 ..... OH3MUA  
863 ..... WA0QII 866 ..... AA3BH

#### SSB Endorsements

320	CX4HS/323	310	I2EOW/319
320	I4LCK/323	310	IK0IOL/318
320	K4POV/323	310	K1HDO/318
320	T12CC/323	310	YV1CLM/317
320	N2KW/323	310	IK1GPG/317
320	IK8BQE/323	310	N4KEL/M/316
320	VE7DX/323	310	KI3L/316
320	K9AB/322	310	TI2JJP/310
320	LA7JO/322	300	N5FG/302
320	W6BCQ/322	275	PY2DBU/297
320	VE2PJ/322	250	KK4TR/270
320	KZ4V/321	250	UA4CX/268
320	AA5NK/321	200	HP2CWB/204
320	K7EHI/320	28 MHz	UA4CX

#### CW Endorsements

320	K3UA/323	275	KA7T/299
320	W0IZ/322	275	N1HN/294
320	K9AB/322	275	KF5PE/277
320	N2KW/321	250	WB4UBD/253
310	IT9ZGY/317	200	WD0DMN/248
310	KZ4V/317	200	HL5AP/200
310	AA5NK/316	200	WA0QII/200
310	F3TH/315	150	AA3BH/182
310	W3BBL/310	150	3A2LF/180
300	VE7DX/301	150	IV3PVD/150

#### RTTY Endorsements

250 ..... WB4UBD/250

Total number of active countries is 323. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Bogdan L. Olejnik UB5BAZ, P.O. Box 22, Chortkov 283600, Ukraine.

QSL **PX0F** from Fernando de Noronha via operator Caludio Gimenez, PY2KP, P.O. Box 13535, Sao Paulo SP 03399-970, Brazil.

QSL **J69BB**'s satellite QSOs via NI7T, and other QSOs direct to Rosemand Clery, P.O. Box 1809, Castries, St. Lucia, Windward Islands.

**XE1KK** is ex-XE1XMT, Ramon Santoyo V., Ap. Postal 19-564, 03901 Mexico DF, Mexico. Don't use the out-dated *Callbook* address.

**HK0TCN** reports that he is having trouble receiving mail. He suggested using Recorded Delivery to reduce theft.

### QSL Help Provided

**RO200T** can be confirmed via R. J. Parsons, G3MTL, 22 Lower Leigh Road, Westhoughton, Bolton BL5 2EH, Lancaster, England. (Thanks, W2FXA.)

**JW0C**'s QSL address is Barentsburg Radioklubb, c/o Viktor Tsiba, N-9170 Longyearbyen, Norway. Other JW addresses include: **JW0F**, Polish Polar Station, N-9177



## QSL Information

3D2DM to AB4LX  
3X0HNU to F6FNU  
4J4GAT to DL1VJ  
4K1YAR to UA3YAR  
4K2MAL to UA4RC  
4K20KV to DL6ZFP  
4N5GB to YU5GBC  
4N5GX to YU5GBC  
4N5JA to YU5XTC  
4N5PK to YU5XVD  
4N5RB to YU5XTC  
4N5ZM to YU5ZM  
4N7ZZ to YU7FIJ  
4O4D to YU4FDE  
5N0HBK to SM5LLD  
5R8DG to F6FNU  
5R8GW to F6FNU  
6W6/K3IPK to K3IPK  
6W7/F6AUS to F6AUS  
7Q7RM to G0IAS  
7Q7XX to JH3RRA  
7Q7ZZ to JA1UMN  
8P9DF to OH3RB  
8P9DI to LA9GY  
8P9HT to K4BAI  
8R1RPN to OH0XX  
9A2PM to KA9WON  
9H3QT to G0CKP  
9J2AJ to YU2AJ  
9J2B0 to W6ORD  
9K2GS to WB6JMS  
9K2MU to 9K2AR  
9X5AB to DL6NA  
A22EX to N4CID  
A35ZY to SM0NZY

A45XD to DK1KK  
A61AC to ON7LX  
AA5K/AH8 to JA3JM  
C31LL to C31LBB  
C6AHJ to AA2Z  
C9RJJ to W8GIO  
C02VG to I0WDX  
CT3FN to HB9CRV  
CX0CW to LU8DPM  
D2/N6QHO to N6QHO  
D2EL to EA7EL  
D68GA to N6ZV  
EA6ZY to G6ZY  
EA9EA to OH2MM  
EU50 to DL1GWS  
FG4FR to FG5BG  
FG5FZ to F6FNU  
FK8GJ to F6CXJ  
F0/SM0NZY to SM0NZY  
FY/DH7XM to OH7XM  
FY5EW to F6BFH  
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H4410 to Y49RO  
H44X0 to Y49RO  
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TR8JH to W3HCW  
TU4SR to OH8SR  
TZ6NU to F6FNU  
U18ZAA to K9FD  
UJ8JI to IK3HHX  
UM8QDX to DL4DBR  
V31DX to KA6V  
V31RO to JH1ROJ  
V31RY to WN0B  
V73CT to OKDXA

V85BJ to VK2KFS  
VA1S to VE1AL  
VI158SYD to VK2WI  
VP2EST to KT8Y  
VP2V/KG6WI to N9DRU  
VP2VE to WA2NHA  
VP5P to WN5A  
VP8CKB to K1IED  
VP8GAV to GM0LVI  
VP8VN to G4LGZ  
VQ9AC to WN8O  
VR2/WX3N to AA0CR  
VY2SS to VE7ARS  
XR3A to CE3DNP  
XU7VK to HA0HW  
YP6F to YO6KAF  
Z21HQ to DF2RG  
ZC4GE to K7GE  
ZD8RM to AA5DK  
ZF2TG to WQ5W  
ZF2TN to OH6ZS  
ZK1AZY to SM0NZY  
ZK2XI to JA3JM  
ZK2XJ to JA3JM  
ZX4VG to PY4KL  
9A2AA to Tom, P.O. Box 225,  
Split, Croatia  
JY40GA to P.O. Box 7766 Am-  
man, Jordan  
S59KAB to Pista, Box 70, Soba-  
ta 69000, Republic of Slovenia  
SV98AI to P.O. Box 92, Chania  
73100, Crete, Greece  
TU4CI to Henri, P.O. Box 294,  
Katiola, Ivory Coast

Hornsund, Norway; **JW0E**, Pyramiden Ra-  
dioklubb, c/o Sergei Togilkin, N-9179 Py-  
ramiden, Norway. (LA6VDA)

**9G1KB** is now John Bergen, 525 West  
El Norte Parkway, Escondido, CA 92026.

## Not Managers

W3HNC is not the QSL manager for  
**D2ACA**, but can get a QSL card; please in-  
clude an SASE and US\$1.

KC7EY is not the QSL manager for  
ES1QD, as was incorrectly printed in the  
January issue.

W4XT is no longer QSL manager for  
**HC1XF**, who returned stateside in April.

And William Plum of DX stamps and en-  
velope fame is not the manager for **7Q7LA**.  
QSL via G0IAS.

## QSLing Romeo Stepanenko's Operations

**1S0XV**, **1S1RR** (1990 operation), **3W7A**,  
**3W100HCM**, **XV100HCM**, **XV0SU** via  
W4FRU, or LZ/3W3RR (P.O. Box 812, Sofia  
1000, Bulgaria).

**YA0RR** (Jan. 1991): LZ/3W3RR (Japan-  
ese contacts only may be confirmed via  
JH3DPB).

**YA0RR** (Dec. 1991) and **1S0RR** (Sept.  
1991): LZ/3W3RR (USA stations only may  
confirm via W8BLA).

**XY0RR**: LZ/3W3RR (Japanese only via  
JA2JPA).

**9D0RR**: P.O. Box 766, Brooklyn, NY  
11230 (or via NT2X's Callbook address).

(CIS stations only may confirm via  
LZ/3W3RR.)

**AH0M/W/VE**, etc., via the **W1** QSL  
bureau.

And **3W3RR**, **EK0RR/AM**, **EK0RR/MM**,  
etc., via LZ/3W3RR.

Note that Romeo's mail address in Rus-  
sia is Box 308, Moscow 103009, but his ad-  
dress cannot be used for QSLing, as much  
of the mail is opened before Romeo sees  
it. Use the Bulgarian mail drop for your  
QSLs.

Some routes that **won't** work: Box 1  
Simferpool, Ukraine (now closed); RB5IJ;  
UB1RR; Box 88 Moscow.

## QSL Bureaus

The **Aruba P4** QSL bureau is at the Aruba  
Amateur Radio Club, P.O. Box 2273, San  
Nicolas, Aruba.

The **Netherlands Antilles** QSL bureau  
accepts cards for **PJ2**, **PJ4**, **PJ5**, **PJ6**, and  
**PJ7** calls only. (PJ8 and PJ9 calls are for  
visitors, who are usually not members of  
VERONA, and do not make arrangements  
to receive bureau cards.)

The **Moldava** QSL bureau is at P.O. Box  
6637, Kishinev 277050, Moldava, accord-  
ing to UO5ODA.

**Croatia** contacts may be confirmed via  
QSL Bureau HRS, P.O. Box 564, 41000 Za-  
greb, Croatia.

**Slovenia's** QSL bureau is c/o QSL Bu-  
reau ZRS, Box 180, 61001 Ljubljana, Slo-  
venia.

73, Chod, VP2ML

# SGC

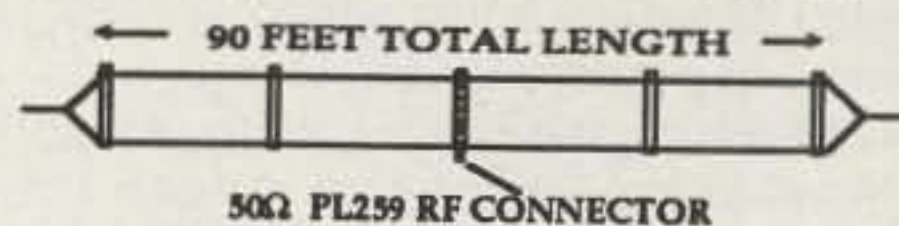
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## REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

### *Guide To Entry-Level Amateur Radio License Testing*

**T**his column covers what you need to know about amateur radio examinations:

- Where the test questions come from.
- How to locate a test site.
- How to prepare for the exams.
- Completing the Form 610 application.
- What to expect at a test session.
- Becoming a volunteer examiner.
- Conducting entry level examinations.

This month let's take the mystery out of entering the amateur radio hobby! This column is directed at two groups: those of you who have an interest in becoming a licensed amateur radio operator, and licensed amateurs who would like to participate in the volunteer examining program.

First of all, interest in the amateur radio hobby is expanding at never before experienced rates. Tens of thousands of everyday people like yourself have become licensed amateur operators since the FCC eliminated the telegraphy requirement for newcomers. Unlike CB, amateur radio is an internationally recognized radio service with many frequency band allocations. It was also the first radio service.

#### **Why Have Licensing?**

The early pioneers were all amateurs. It became quite apparent around the turn of the century that the radio amateur had to be regulated in some way to control interference to both other amateurs and to the emerging commercial radio services. The method chosen was licensing. Radio operators would be granted access to certain radio wave lengths if they were technically qualified and had an adequate knowledge of the radio rules.

The worldwide governing body over radio and wireline communications is the International Telecommunications Union headquartered in Switzerland. It was formed by 20 European states in 1865 to expedite delivery of wireline telegraph messages across international borders. Just about every country in the world is now a member. In 1927 the ITU began apportioning the radio spectrum to various uses and setting operating guidelines.

The ITU allocation plan divides the world

into three geographical regions. North and South America are in ITU Region 2. While national governments enact and enforce radio laws, this regulation is performed within the framework of international agreements, both regional and international in scope.

The amateur service is defined in the International Radio Regulations as "A radio-communication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs—that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest." Basically what that says is that amateur radio is simply a hobby.

Our FCC further states that the mission of the Amateur Service is to provide voluntary non-commercial communications (especially emergency communications), to encourage technology progress, improve radio operating ability, strengthen international harmony through communications, and increase the number of trained operators, technicians, and electronics experts.

Our licensing process has its roots in Article 32 of the International Radio Regulations which requires all nations to take whatever steps they feel necessary to ensure the operational and technical qualifications of anyone wishing to operate an amateur radio station. All radio amateurs are further required by international law to have manual telegraphy knowledge when operating below 30 MHz. No speed limit is specified, however, in the International Radio Regulations. It is our FCC that determines the telegraphy speeds required for the higher class licenses.

#### **The Licensing Process**

For 70 years the process of determining who was qualified to operate an amateur radio station fell to the government. Would-be radio amateurs had to appear at an FCC field office testing point to be examined in Morse code, both sending and receiving, electronics, and radio rules.

The system changed in the early 1980s when the FCC found that its amateur radio testing program was not only very expensive to the U.S. taxpayer, but often was an exercise in futility since many of its examinations were compromised. Furthermore, the FCC's operating budget constantly faced reductions. The responsibility for de-

veloping and administering amateur radio examinations was turned over to the amateur community in 1984. The system that developed was patterned after the FAA, whose examination questions and answers are all known.

#### **The VEC System**

Eighteen regional organizations (called Volunteer Examiner Coordinators) were established to supervise the program. The VECs approve and authorize Volunteer Examiners (VEs) to prepare and administer the various theory and Morse code examinations subject to the guidelines issued by the FCC.

There are actually three different levels of VE testing. Informal teams of two General Class VEs selected by the applicant may still examine the Novice operator requirements. The number of new Novice operators, however, is now declining as most beginners are choosing the No-Code Technician path into amateur radio. As a result, the Novice testing program is in the process of being folded into the VEC System. This should take place sometime within the next 60 to 90 days. When this happens, all amateur radio operator license testing will be conducted under the VEC System, which requires three accredited VEs.

General Class amateurs will still be able to conduct Novice examinations, but they will have to apply to a VEC for accreditation and testing instructions. Bringing Novice testing under the VEC System will improve communications between the Commission and the VE. Since all 18 VEC organizations are known, the FCC merely deals with these groups on testing matters. They, in turn, pass the word down to their VE teams.

It is even possible that the FCC may authorize General Class VEs to also administer the Technician requirements, since that class is the most popular and requires the most examiners. That will permit the VECs to have to handle only two levels of testing. General and Advanced VEs may test the Novice and Technician applicant. All other examinations must be administered by Amateur Extra Class VEs.

The VECs have two important internal committees—the VEC Instructions Committee and the VEC Question Pool Committee. They are a vital part of the amateur service testing program.

*National Volunteer Examiner Coordinator,  
P.O. Box 565101, Dallas, TX 75356-5101  
(817-461-6443)*



Element 2: Novice Question Topic	Questions in Current Pool	Questions in New Pool	Questions on Examination
1. FCC Rules	112	112	10
2. Operating Procedures	48	35	2
3. Radio Wave Propagation	18	12	1
4. Amateur Radio Practice	45	44	4
5. Electrical Principles	44	44	4
6. Circuit Components	21	23	2
7. Practical Circuits	20	24	2
8. Signals & Emissions	23	22	2
9. Antennas & Feedlines	39	33	3
<b>Total</b>	<b>370</b>	<b>349</b>	<b>30</b>

Element 3(A): Technician	Current	New	Exam
1. FCC Rules	63	55	5
2. Operating Procedures	30	41	3
3. Radio Wave Propagation	30	33	3
4. Amateur Radio Practice	44	53	4
5. Electrical Principles	34	22	2
6. Circuit Components	37	25	2
7. Practical Circuits	17	11	1
8. Signals & Emissions	28	22	2
9. Antennas & Feedlines	42	33	3
<b>Total</b>	<b>325</b>	<b>295</b>	<b>25</b>

Table II—Breakdown of Novice and Technician question pools.

The Instructions Committee is responsible for agreeing on and drafting detailed guidelines concerning all phases of the testing function. This includes accreditation of VEs, coordinating examination sessions, testing the handicapped, expense reimbursement handling, written and telegraphy testing procedures, and proper

handling of forms such as the Form 610 application and CSCE, Certificate of Successful Completion of Examination. (Every applicant is presented with a CSCE as evidence of passing an examination.)

The VEC Instructions are first approved by the FCC before release to the VECs. All VECs are required to comply with these di-

rections. No such set of instructions exists in the Novice testing program, which is a serious failing.

## The Question Pools

The VECs Question Pool Committee (QPC) is charged with updating all questions used in the various examinations, including the Novice Element 2 examination. Your author, Fred Maia, W5YI, is vice-chairman of this committee. The question pools contain all possible questions which might appear in an examination.

The Part 97 regulations require that all VECs cooperate in maintaining one question pool for each written examination element. Furthermore, each pool of questions must contain at least ten times as many questions as will be used on any one examination. There are nearly 2000 different questions in all of the written examinations. (A complete set of these pools—complete with multiple choices and answer identified—is available for \$9.95 postpaid from the W5YI Group, P.O. Box 565101, Dallas, TX 75356.)

The question pools are routinely revised on a four-year cycle, and one newly revised question pool goes into effect every July 1. The schedule calls for new Novice/Technician questions to be used beginning on July 1, 1993. Revised General questions go into effect on July 1, 1994; Advanced questions on July 1, 1995; and Amateur Extra



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Class on July 1, 1996. Then the cycle starts over again with new Novice and Technician questions being used in all examinations again on July 1, 1997.

The actual questions, multiple choices, and answers (without explanations) are released to the public about six months before the questions will be used in an examination. The new Novice (Element 2) and Technician (Element 3A) questions were released last December in both hard copy (booklet) and ASCII text (computer disk) format. Every one of the nearly 650 questions in Element 2 and 3(A) was replaced or changed in some way. The new Novice/Technician pools have approximately 10% less questions than the current version.

The revised questions and multiple choices were sent to every known amateur license preparation publisher. In addition, the new Novice and Technician question pools are available to anyone now—even though the questions will not start showing up in examinations until after June 30. It is anticipated that the publishing marketplace will have new No-code Technician study material with explanations on the shelves by May 1, 1993. This will allow a 60-day period between availability of study material and when the new questions will start showing up in examinations.

A new five-character question numbering system is being used beginning with this revision of the Novice and Technician question pools. It will eventually complete-

The **first character** indicates the class of the question pool: N = Novice, T = Technician, G = General, A = Advanced, and E = Extra.

The **second character** is the sub-element number, Number 1 through 9 as per Part 97.503(c) (see Table II).

The **third character** is always a letter of the alphabet and refers to the question topic as specified in the syllabus. There are always as many topics within a sub-element as there are required questions. If Part 97.503(c) requires an examination to have four questions from one sub-element, then there will be four syllabus topics within the subelement, and the letters A, B, C, and D will be used as the third character for those questions.

The **fourth and fifth characters** indicate the question number within the syllabus topic. Two characters are always used, even if the numbers are normally a single digit (a zero is used as the "tens" digit for the numbers 1 through 9.)

For example, question designated "N1B11" would indicate:

- N—Novice question pool
- 1—Subelement 1, *FCC Rules*
- B—Syllabus topic B, *Station Operator License*
- 11—Eleventh question within this topic

Table I—Explanation of new examination question numbering system.

ly replace the old numbering system as the Question Pool Committee revises the balance of the pools. Every question designator is five characters long. Hyphens between characters have not be used (see Table I).

The wording of the Novice and Technician questions were also greatly simplified so as to be on a junior-high and high school level. We tried to use grammar-checking computer software as an aid to writing clear questions, but found the program didn't help us much. Many of the electronic and technical words we had to use simply

weren't junior high (12 and 13 year old) level. Another new feature is that any needed formulas are now supplied rather than the applicant having to memorize them.

The two new pools have been incorporated into an Element 2 & 3(A) Question Pool booklet which contains the syllabus and all (644) Novice and Technician questions, multiple choices, and answers. (This booklet is available now from the W5YI Group, Inc., P.O. Box 565101, Dallas, TX 75356-5101 at a cost of \$2.50 plus \$1.00 shipping charge. The ASCII text computer disk of all new Novice and Technician

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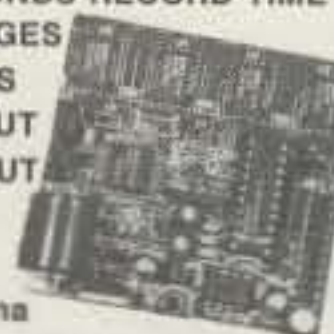
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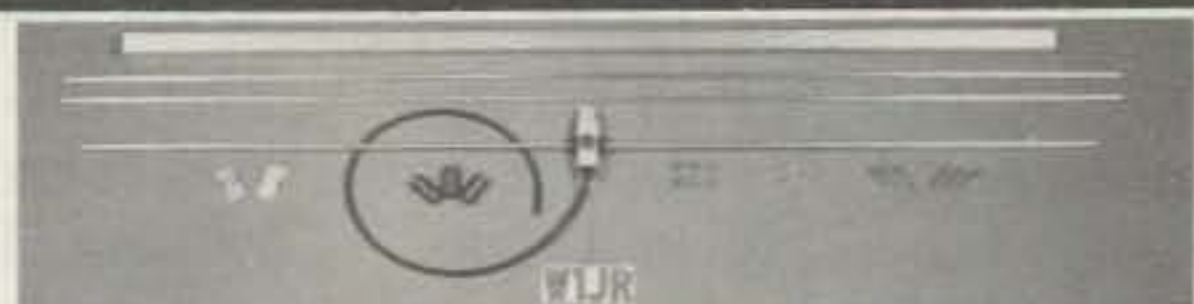
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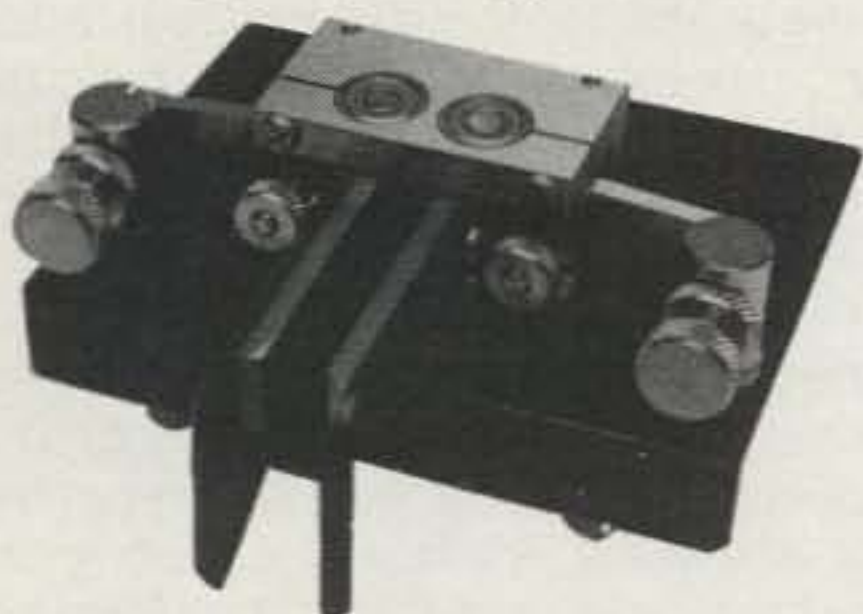
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questions is \$2.00 plus \$1.00 shipping charge. Both the new Novice/Technician Question Pool booklet and ASCII disk shipped together is \$5.00 postpaid.)

## Locating A Test Site

This part is easy! There are now amateur radio exam teams everywhere! In the old days applicants had to take a day off to journey great distances to the nearest FCC test site, and there were not many—probably less than 50 nationwide. All examinations were administered by government engineers during business hours. Today almost all examination sessions are conducted evenings or on weekends by volunteer examiners who hold senior amateur licenses. Saturday is by far the most frequent amateur radio testing day.

The best way to locate a test site is simply to ask a neighborhood amateur radio operator. If you don't know one, you can usually locate one by just looking for a large antenna array over a homes in your community. Just knock on the front door and ask where to take a test. Almost every ham knows who the local VEs are and will put you in contact. It has been estimated that there are now some 30,000 accredited VEs and 2000 testing teams in the United States. There is certain to be one nearby.

Your local Radio Shack store should also be able to tell you where to take a test. And you can pretty much bet that your nearest amateur radio club has a test team and schedules regular amateur radio license examinations.

Most of the amateur license examinations conducted in the United States are by VE teams approved by only two of the 18 VECs. The W5YI-VEC (our testing operation) and ARRL-VEC organizations account for about 85% of all amateur radio testing. If all else fails, you can telephone their headquarters and ask them where the nearest VE team is located. Each of these VEs has a master computer print-out of examination teams nationwide. The W5YI-VEC phone number is 817-461-6443; ARRL-VEC 203-666-1541.

## Preparing For The Exam

Most beginners enter the amateur radio hobby at the Codeless Technician level. To achieve this license you must pass two short, multiple-choice examinations. The Element 2 Novice exam contains 30 questions. The Element 3(A) Technician contains 25. The Novice passing mark is 22 questions correct; the Technician requires 19. You will be given a test credit certificate if you pass one and not the other. You have a year to pass the test you failed before the credit certificate expires.

The Novice exam consists of questions about elementary radio theory and regulations. The Technician has additional ques-

tions on rules and electronics questions with the emphasis on VHF/UHF operations. The questions are on nine different topics (see Table II). Remember that all of the questions that might appear on these two examinations are known and widely published. You simply study for the exam in much the same way you study to pass the written portion of an automobile driving test. You study the test manual and pass the test! There are no secret questions.

You certainly do not have to have an electronics or technical background to become a ham operator. Times have changed! While it is true that many amateur radio operators build their own equipment, most newcomers to the hobby today simply buy off-the-shelf radio equipment that is ready to go. Actually, all you need is a little knowledge about amateur rules and procedures. The information in study manuals will provide this information.

Since thousands of newcomers are joining the hobby monthly, license preparation material is widely available. Be sure that you purchase up-to-date study material, since the questions on at least one of the amateur classes changes every year. If you are unable to locate an amateur radio outlet or bookstore in your area that carries No-Code Technician study material, then you can purchase it by mail order from either the W5YI Group or the American Radio Relay League.

The W5YI Group has a toll-free number for purchase of study material by credit card; shipment is immediate (telephone 1-800-669-9594). The No-Code Technician study material is available in book form, or on audio cassettes, video tape, and IBM-compatible computer software disks. The computer program allows you to take actual sample tests right at your PC.

## Completing The Application

You will have to complete an FCC Form 610, Application for Amateur Radio Station/Operator License, before you are tested by a VE team. This form comes in three parts. Applicants complete Section I. The Administering VEs Report and Certification Section II is completed by the VEs. These forms are available without charge from the W5YI-VEC although we would appreciate an SASE. We routinely include this form with all orders for study material.

## Taking The Test

There is just nothing to it! Your VE team will first go over your Form 610 to be sure that it is completed correctly. There will be a test fee of \$5.60 charged to take the examination. All funds go to offset expense associated with the testing program. Some is sent to the VEC and used to pay their administrative costs.



They will be passed out the first of two multiple-choice examinations and a blank answer sheet. You merely check the correct answer—A, B, C, or D. You will be given a certificate if you pass one or both of the examinations. Your application will be returned to you if you only pass one examination, and the examination you passed will be indicated by the VE team. If you pass both, the application and test papers will be sent to the VEC for screening and subsequent forwarding to the FCC. The FCC will send you your first license in about 8 weeks with your very own station callsign! Once you have your callsign you can go on the air!

There are six different amateur radio license classes. Each yields progressively more frequency privileges. Most amateurs continue up the amateur radio ladder after achieving their first license. Once you have your first license in your possession, you need not wait for your next license to arrive before you begin using your new frequency privileges. The credit certificate issued by the VE team authorizes immediate use of your new privileges once you have a station callsign.

### Technician Privileges!

Make no mistake about it! The Technician Class amateur radio ticket yields excellent frequency privileges. No-code Technicians gain access to all frequencies at 6 meters and higher at full (1500 watt output) power. This includes the popular 2 meter band with its repeaters, packet networks, and satellite operations. Actually, most of the action in amateur radio today takes place at the VHF and higher frequency level.

The four bands that you will be most interested in are the 144–148 MHz (2 meter), the 222–225 MHz, 420–450 MHz, and 1240–1300 MHz bands. Although there is a ham band at 902–928 MHz, there is very little activity on that band.

The 6 meter band offers opportunities for long-distance communications when band conditions are right. And you can fly your radio-control model aircraft on the band and escape the congested frequencies used by other R/C enthusiasts.

### Becoming A Volunteer Examiner

Being a VE is amateur radio's highest calling. There are very few government requirements that must be satisfied. First, volunteer examiners must be at least 18 years of age and hold a General or higher class amateur operator license. They must not be engaged in the amateur radio license preparation or equipment business. And VEs must have a clean radio enforcement record. They must never have had their operator license suspended or revoked.

At present, General Class VEs need not be approved by a VEC. As mentioned above, however, Novice testing is in the process of being folded into the VEC System, and the W5YI-VEC is already accrediting General Class VEs in anticipation of this change. Only Novice Class examinations (that is, the written Element 2 and the 5 words-per-minute Morse code Element 1A) may be administered by a General Class VE.

The Advanced Class VE may administer both the Novice and Technician Class tests. Only the Extra Class accredited VE may administer all of the examinations. No VE of any class may administer an examination to a blood relative or relative by marriage.

General, Advanced, and Amateur Extra Class licensees who wish to become volunteer examiners must apply to a VEC. The ARRL-VEC requires that each of its VEs pass a simple open-book test prior to becoming a VE. Since the question pools already cover the requirements for being an examiner, the W5YI-VEC merely requires a signed statement by otherwise qualified licensees.

Please send the following statement to us if you wish to participate with another VE team, or head up a testing team of your own. We will return your VE credentials and laminated badge at once. There is no charge unless you wish a colorful VE certificate suitable for framing. (The cost of the certificate including mailing is only \$1.00.)

"I am a currently licensed General (or Advanced or Extra Class) amateur radio

operator and wish to be a volunteer examiner. I have never had my station or operator license revoked or suspended, nor have I ever been discredited by another VEC. I do not own a significant interest in nor am an employee of any company or entity engaged in the amateur radio equipment or license preparation business. My age is at least 18 years old."

Be sure to include your address, home telephone number, and a photocopy of your amateur operator license. You may FAX this statement and license copy to us at 817-548-9594 if you wish. Your free VE credentials will be sent to you at once. Let us know if you want to set up your own testing team so that we can forward the needed examination materials to you. Again, there is no charge for these materials.

These materials consist of a very detailed VE Instruction Manual, needed forms, and pre-made examinations. We also have examination software for VE teams to make up their own examinations. A special No-Code Technician test kit is available for those VEs who only wish to examine applicants for this entry level.

Let us know if you are interested in becoming a VE. You can call our VEC Division at 817-860-3800 during business hours if you have any questions. Volunteer examiners find that participating in the Amateur Service's testing program is a very rewarding experience indeed. It is sort of like paying the hobby back for all the enjoyment that it has given you over the years.

73, Fred, W5YI

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## THE SCIENCE OF PREDICTING RADIO CONDITIONS

### Forty-Second Year as Editor

**A**s this month's column is being written only a few short hours remain before that famous "ball" at Times Square will hit bottom and signify the start of a new year—1993. That is also a reminder to me that this March column signifies the beginning of another year for me as Propagation Editor of *CQ* magazine. Since my first column appeared in the March 1951 issue of *CQ*, this month marks the beginning of my 42nd year as editor of this column.

#### Solar Cycle Progress

Sunspot Cycle 22 is now in its 79th month, and it continues to decline steadily as expected. The Royal Observatory of Belgium reports a monthly mean sunspot level of 92 for November 1992. This results in a 12-month running smoothed sunspot number of 100 centered on May 1992. This is a decline of three numbers from the previous month's level. During November daily levels of solar activity varied between a high of 125 observed on November 25 and a low of 59 reported for the 13th.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 1992 was 143. This results in a 12-month running number of 157 centered on May 1992. The level of 10.7 cm flux is paralleling very closely the decline in the sunspot count.

A smoothed sunspot number on the order of 71 and a 10.7 cm solar flux level of approximately 129 are forecast for March 1993. These are approximately 30% below the levels observed last March. This reduction is expected to result in significant changes in HF propagation conditions compared to the same period last year. Generally, expect fewer daytime DX openings on the 10, 12, and 15 meter bands during the daylight hours, and fewer openings on the 20 and 30 meter bands during the hours of darkness. Improved conditions can be expected on the 40, 80, and 160 meter bands at night.

#### STD Bulletin Board

In my column for May 1992 I discussed the Solar Terrestrial Dispatch (STD) bulletin

11307 Clara Street, Silver Spring, MD 20902

#### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for March 1993

Propagation Index .....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 5, 15-16, 25	A	A	B	C
High Normal: 3-4, 10, 13-14, 17, 23-24, 30-31	A	B	C	C-D
Low Normal: 2, 6, 9, 11-12, 18, 21-22, 29	B	C	D	D-E
Below Normal: 1, 7, 26, 28	C	C-D	D-E	E
Disturbed: 8, 19-20, 27	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

- B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
- C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
- D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.
- E—No opening expected.  
3 dB per S-unit.

#### HOW TO USE THIS FORECAST

1. Find propagation index associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the propagation index, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a propagation index of 3 will be fair-to-poor (C-D) on March 1st, fair (C) on the 2nd, good (B) on the 3rd and 4th, excellent (A) on the 5th, fair (C) on the 6th, etc.

board, which provides on an almost real-time basis the most comprehensive source of radio propagation data that I am aware of. Much of this data is available free to call-ins, and a wealth of additional data is available for an annual administration fee of \$35. For more on-line information about the STD bulletin board, dial it up directly at (403) 756-3008.

The STD has recently announced the availability of an "Auroral Activity Prediction and Dynamic Oval Simulator" software package. The program, which has been under development for more than a year, should be of special interest to radio amateurs and other users of the HF and VHF bands. According to the STD the software can:

- Determine whether auroras might be observed at a particular location.
- Determine the potential magnitude of auroral activity.
- See whether HF radio signal paths cross into the auroral zone where significant signal degradation occurs.

- Superimpose any number of great circle paths on the maps the software produces to visually determine the proximity to the auroral oval for any date and time.

- Superimpose on any of the maps the sunrise/sunset grayline terminator.

- Determine azimuths and distances for radio transmission that avoid the instabilities of the auroral zone.

- Graphically draw prediction maps of northern and southern auroral zones.

- Determine where aurora can be seen overhead and simulate the visibility of auroral activity from any ground location on Earth, and for any date and any time.

- Plot the locations where auroras were sighted for any date since September 1991 to the present, including the major auroral storm period of late March 1991.

- And much more.

The software is based on scientific models of the aurora, and should be of considerable interest to science teachers, students, professional and amateur astronomers and radio communicators, and those interested in predicting, observing, or analyzing auroral activity. The program requires an IBM or compatible MSDOS computer system with at least 256K of memory and VGA graphics. A math coprocessor is highly recommended.

For additional information, availability, and pricing call the STD at (403) 756-2386. I understand that discounts are given to licensed radio amateurs, and an additional discount is given to members of the STD BBS.

#### March Propagation

March is a month of *equinoctial* propagation on the HF bands. This is typified by fewer east-west openings on 10 and 15 meters; more hours of daylight in which DX openings can occur on 15 and 20 meters; fewer hours for DX openings on 40, 80, and 160 meters; improved openings on all bands between the northern and southern hemispheres; and a seasonal increase in the static levels on all bands.

During much of March and continuing into early April, relatively similar HF propagation conditions exist in the temperate regions of both the northern hemisphere (where it is Spring) and the southern hemisphere (where it is Fall), as compared to the more extreme ionospheric conditions that exist when it is summer in one hemi-



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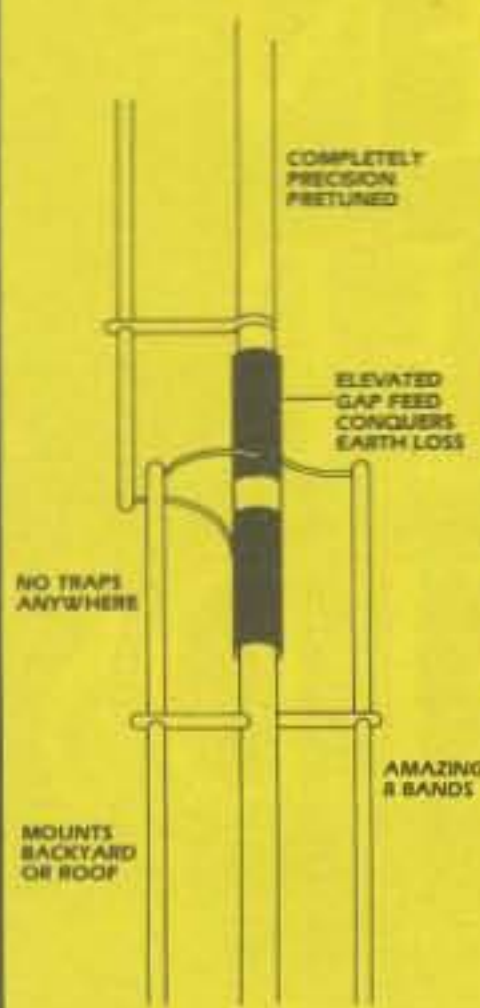
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### HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Charts the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the charts. For the Alaska and Hawaii charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An \* indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in parentheses ( ) after the time of each predicted opening. In the Short-Skip Charts where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the Last Minute Forecast at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight, 12 is noon, 01 is 1 AM, 13 is 1 PM, etc. In the Short-Skip Charts appropriate standard time is used at the path midpoint. For example, on a circuit between Maine and Florida the time shown would be EST; on a circuit between New York and Texas the time at the midpoint would be CST; etc. Times shown in the Hawaii chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone, 3 hours in the MST zone, 4 hours in the CST zone, and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14, or 2 PM, in Los Angeles; 17, or 5 PM, in Washington, DC; and 22 GMT. Time shown in the Alaska chart is given in GMT. To convert to standard time in other areas of the USA subtract 8 hours in the PST zone, 7 hours in the MST zone, 6 hours in the CST zone, and 5 hours in the EST zone. For example, at 20 GMT it is 15, or 3 PM, in New York City.

4. The Short-Skip Charts are based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband. The Alaska and Hawaii charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels the propagation index will increase by one level; for each 10 dB loss it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the US Dept. of Commerce, Boulder, Colorado 80302.

### CQ Short-Skip Propagation Chart March & April 1993 Band Openings Given In Local Standard Time At Path Mid-Point Using 24-Hour Time System

Band (Meters)	Distance From Transmitter (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	NIL	08-09 (0-1) 09-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-18 (0-1)	08-09 (1-0) 09-12 (2-1) 12-14 (3-2) 14-16 (2-3) 16-17 (1-2) 17-18 (1) 18-20 (0-1)
15	Nil	08-09 (1) 09-15 (0-2) 15-17 (0-1)	07-08 (0-1) 08-09 (1) 09-10 (2) 10-15 (2-4) 15-17 (1-3) 17-18 (0-2) 18-20 (0-1)	07-08 (1-0) 08-09 (1) 09-10 (2-3) 10-15 (4) 15-17 (3) 17-18 (2-3) 18-20 (1-2) 20-21 (0-1)
20	11-13 (0-1) 13-15 (0-2) 15-16 (0-1)	07-10 (0-1) 10-11 (0-2) 11-13 (1-3) 13-15 (2-4) 15-16 (1-3) 16-18 (0-3) 18-20 (0-2) 20-07 (0-1)	06-08 (1-2) 08-10 (1-3) 10-13 (3-4) 13-15 (4) 15-18 (3-4) 18-20 (2-3) 20-22 (1-2) 22-06 (1)	06-07 (2-1) 07-08 (2) 08-10 (3) 10-15 (4-3) 15-18 (4) 18-20 (3-4) 20-22 (2-3) 22-02 (1-2) 02-06 (1)
40	06-07 (1-2) 07-09 (2-3)	06-07 (2-3) 07-09 (3-4)	06-07 (3-2) 07-08 (4-2)	06-08 (2-1) 08-15 (1-0)

	09-18 (3-4) 18-19 (2-3) 19-21 (1-2) 21-00 (0-1)	09-11 (4-3) 11-13 (4-2) 13-15 (4-3) 15-18 (4) 18-19 (3-4) 19-20 (2-4) 20-21 (2-3) 21-00 (1-2) 00-06 (0-1)	08-09 (4-1) 09-11 (3-1) 11-13 (2-1) 13-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-20 (4) 20-21 (3-4) 21-00 (2-3) 00-02 (1-3) 02-06 (1-2)	15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (3) 02-05 (2-3) 05-06 (2)
80	07-08 (2-3) 08-11 (3-4) 11-18 (4-3) 18-20 (3-4) 20-22 (2-3) 22-02 (1-2) 02-05 (1) 05-07 (1-2)	07-08 (3-2) 08-11 (4-1) 11-16 (3-0) 16-18 (3-2) 18-20 (4-3) 20-22 (3-4) 22-02 (2-4) 02-05 (1-2) 05-07 (2)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-02 (4) 22-03 (2-3) 05-07 (2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-02 (4-3) 02-05 (3-2) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-2) 03-05 (3-2)	05-06 (1- ) 06-19 (0) 19-20 (1-0) 20-22 (2-1) 22-03 (2) 03-05 (2-1)

### ALASKA March & April 1993 Openings Given in GMT #

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	21-23 (1)	20-21 (1) 21-23 (2) 23-01 (1)	20-23 (1) 23-02 (2) 02-05 (1)	06-13 (1) 07-12 (1)*
Central USA	21-00 (1)	20-22 (1) 22-00 (2) 00-02 (1)	20-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-09 (1) 09-12 (2) 12-14 (1) 08-12 (1)*
Western USA	21-01 (1)	20-22 (1) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-07 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 09-10 (1)* 10-12 (2)* 12-13 (1)*

### HAWAII March & April 1993 Openings Given In Hawaiian Standard Time #

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	10-12 (1) 12-14 (2) 14-15 (1)	08-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-13 (1) 13-15 (2) 15-19 (3) 19-21 (2) 21-05 (1) 05-07 (2)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-01 (2)* 01-02 (1)*
Central USA	10-11 (1) 11-14 (2) 14-16 (1)	06-08 (1) 08-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-05 (1) 05-08 (2)	18-19 (1) 19-22 (2) 22-01 (3) 01-04 (2) 19-21 (3) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	09-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	15-18 (4) 18-20 (3) 20-00 (2) 00-04 (1) 04-06 (2) 06-09 (4) 09-11 (3) 11-13 (2) 13-15 (3)	17-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-06 (1)*

\*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.  
For 12 meter openings interpolate between 10 and 15 meter openings.  
For 17 meter openings interpolate between 15 and 20 meter openings.  
For 30 meter openings interpolate between 40 and 20 meter openings.

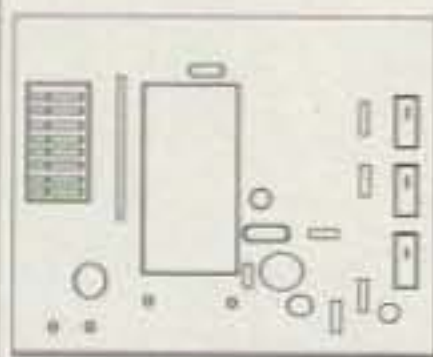
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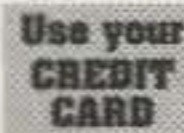
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sphere and winter in the other. As a result, DX openings between both continents are usually at their best during March and April and again during September and October. Good inter-hemispheric openings are forecast this month for all bands between 10 and 40 meters, with some openings possible on 80 and 160 meters as well. Typical of such openings are the paths from the U.S. to South America, to Australasia, and to central and southern regions of Africa, etc.

The best times to look for inter-hemispheric openings are shortly *before* local

sunrise and again shortly *after* local sunset on the 30, 40, 80, and 160 meter bands; and for an hour or two *after* sunrise and again from an hour or two *before* to about an hour or two *after* local sunset on 20 meters. For 10, 12, 15, and 17 meter inter-hemispheric openings check towards the southeast and south from a few hours *before* noon through the early afternoon hours. Check later in the afternoon for openings towards the south, southwest, and west.

On a worldwide basis it should be a toss-up between 15 and 20 meters for the best

DX band during the *daylight* hours of March. Some 10, 12, and 17 meter openings should also be possible during the daylight hours. From sundown to midnight, DX honors will likely be shared among 20, 30, and 40 meters, with 20 opening towards the south, southwest, and west, and 30 and 40 opening towards the east, north, and south. Some fairly good 80 meter DX should also be possible during this time period, with conditions much like 40 meters, but with weaker signals and high noise levels. From midnight to sunrise, best DX bands should be 40 and 80 meters, with some openings also possible on 160 meters. Openings during this time period should peak towards the south and west. For more detailed information, refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts centered on Alaska and Hawaii. The Short-Skip Charts contain band-opening information for predominantly one-hop paths, ranging in distances between approximately 50 and 2300 miles.

For day-to-day changes in HF propagation conditions expected during March, see the Last Minute Forecast, which appears at the beginning of this column.

### VHF Ionospheric Openings

Auroral activity tends to increase during equinoctial periods, improving chances for auroral-associated VHF ionospheric openings to occur. Check the Last Minute Forecast for those days which are expected to be Below Normal or Disturbed, since these are the days on which VHF auroral propagation is most likely to be possible during March.

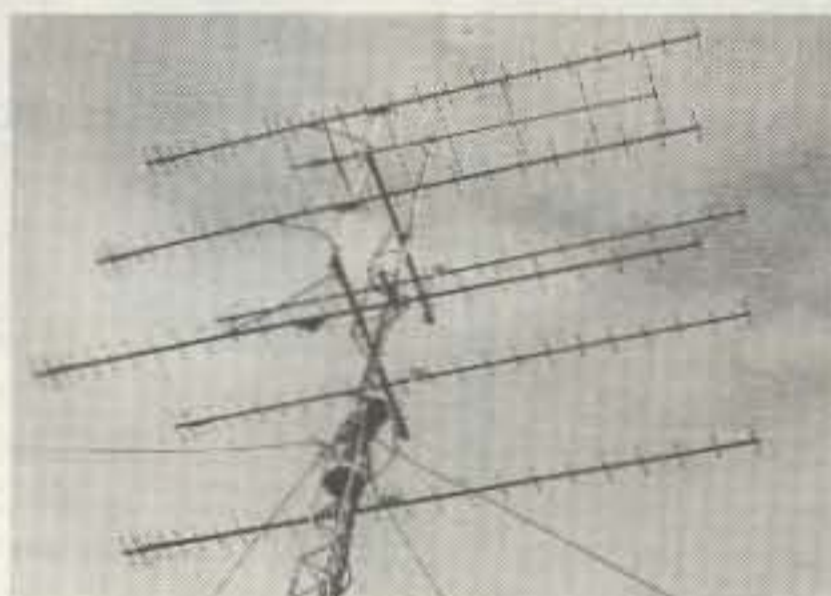
A seasonal increase in short-skip openings due to sporadic-E propagation usually occurs during March, and an occasional 6 meter opening may be possible during the month. Such openings are more likely to take place during the daylight hours over distances between approximately 1000 and 1300 miles.

Trans-equatorial scatter propagation conditions generally improve during equinoctial periods. Some 6 and possibly 2 meter openings may be possible via this mode during March. TE openings must cross the magnetic equator at or near a right angle, and the best time for such openings is between 8 and 11 PM local time. Conditions favor openings between the southern tier states and Caribbean islands into the southern countries of South America. At best, TE openings are very weak, with considerable flutter fading.

Not much meteor activity is expected during March, although some VHF meteor-reflection-type openings may be possible during minor showers expected March 11-15 and 22-26.

73, George, W3ASK

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FO15-144	144-145MHz	15el	25.1ft	13.8	DBd	192.50
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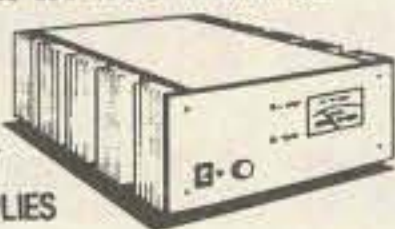
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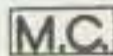
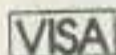
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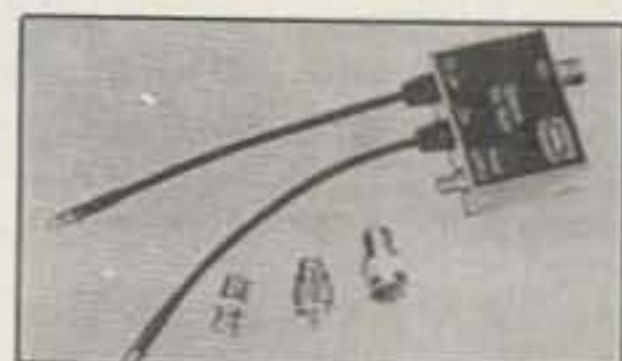
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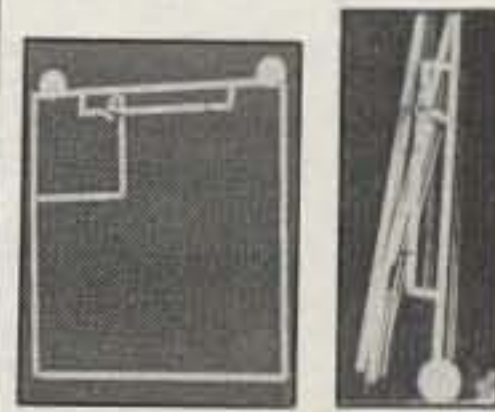
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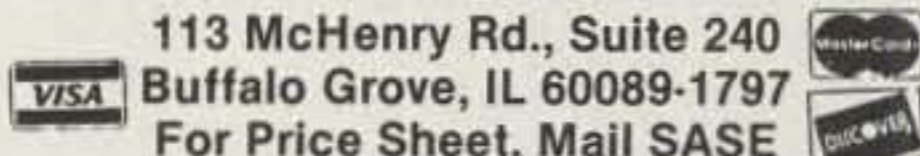
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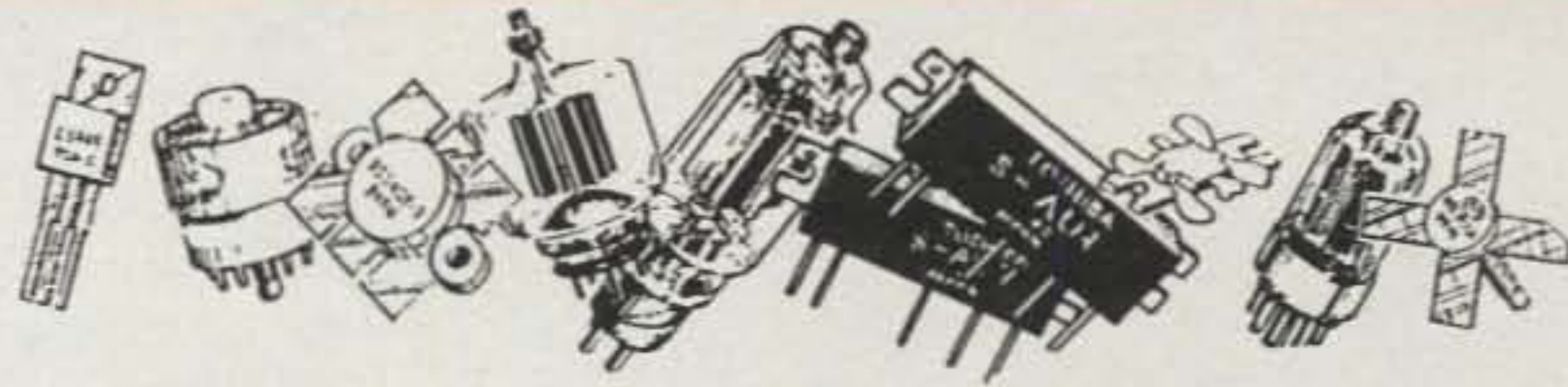
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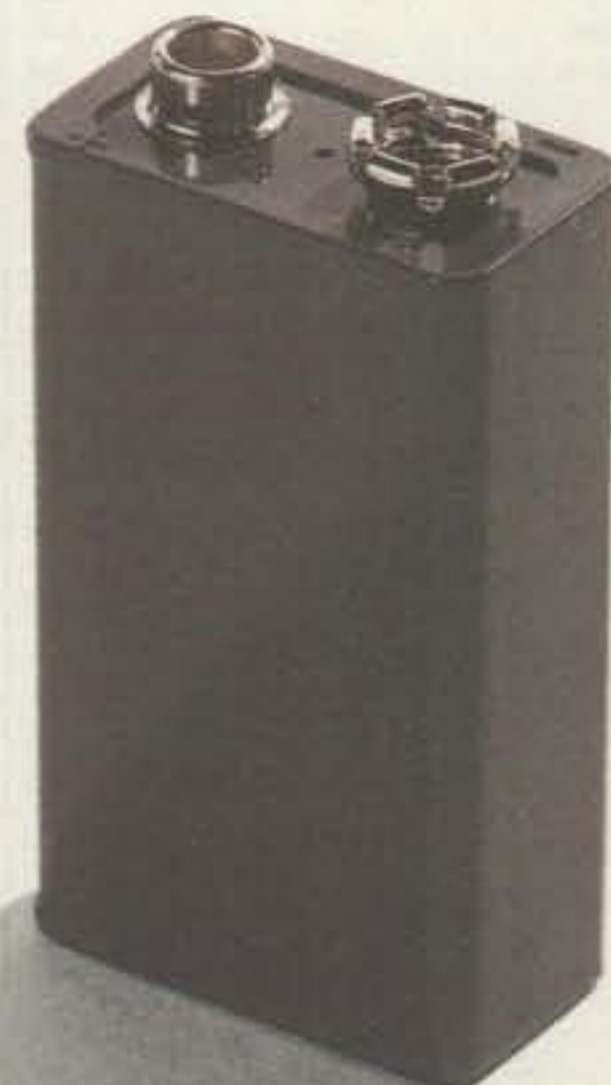
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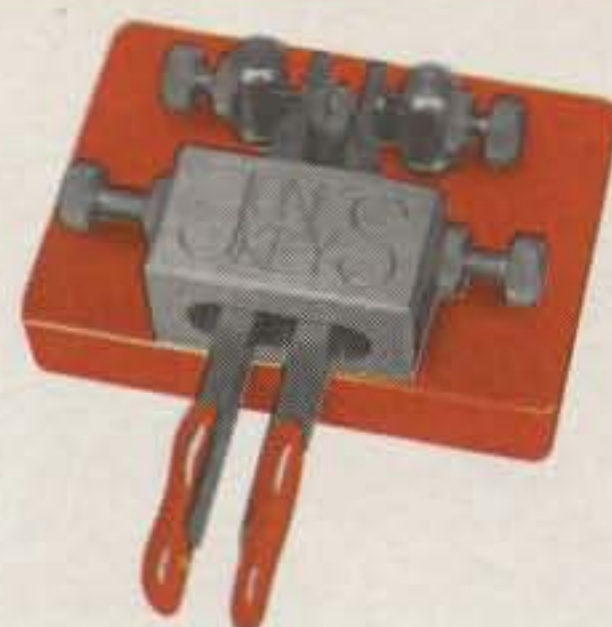
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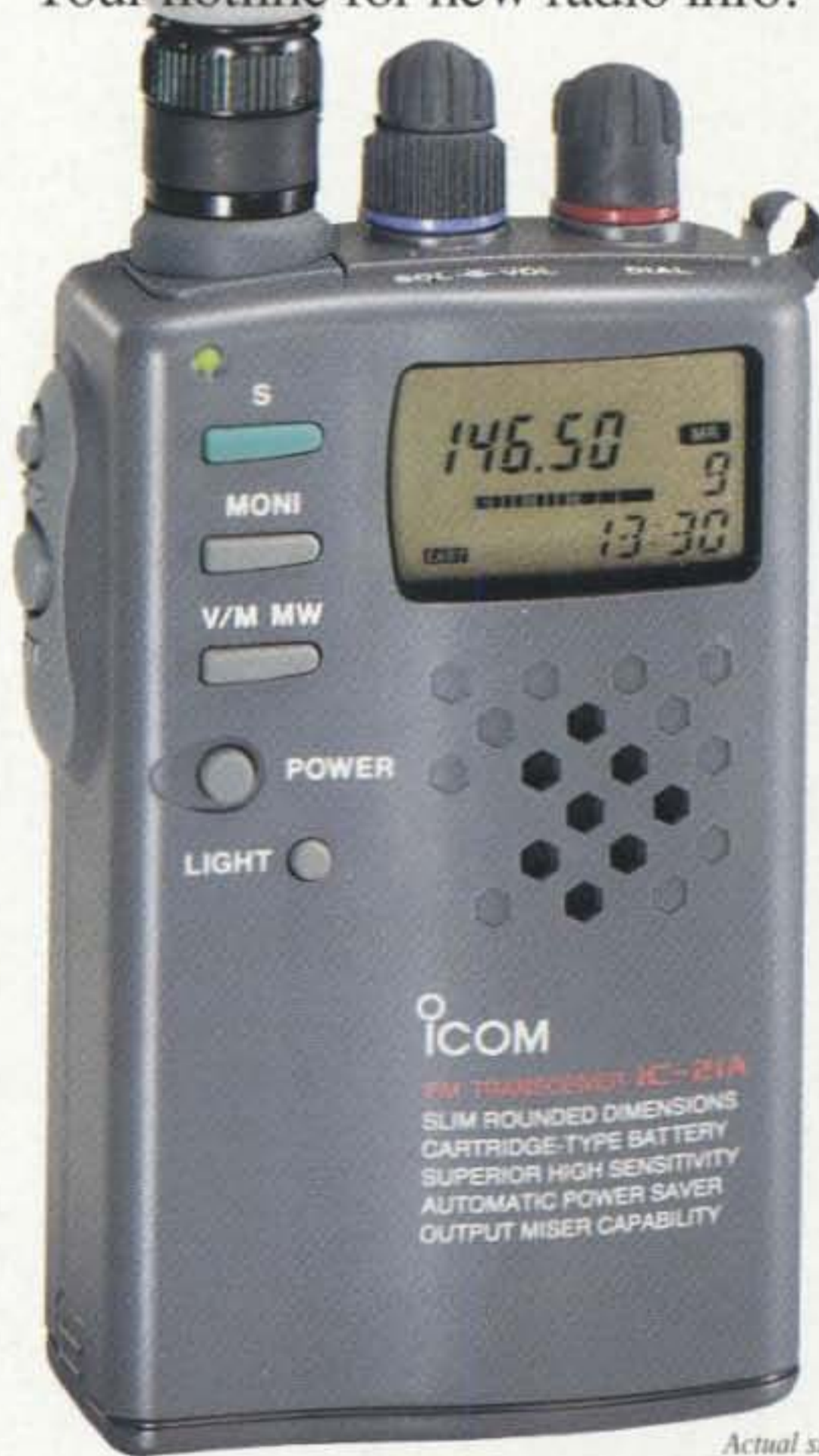
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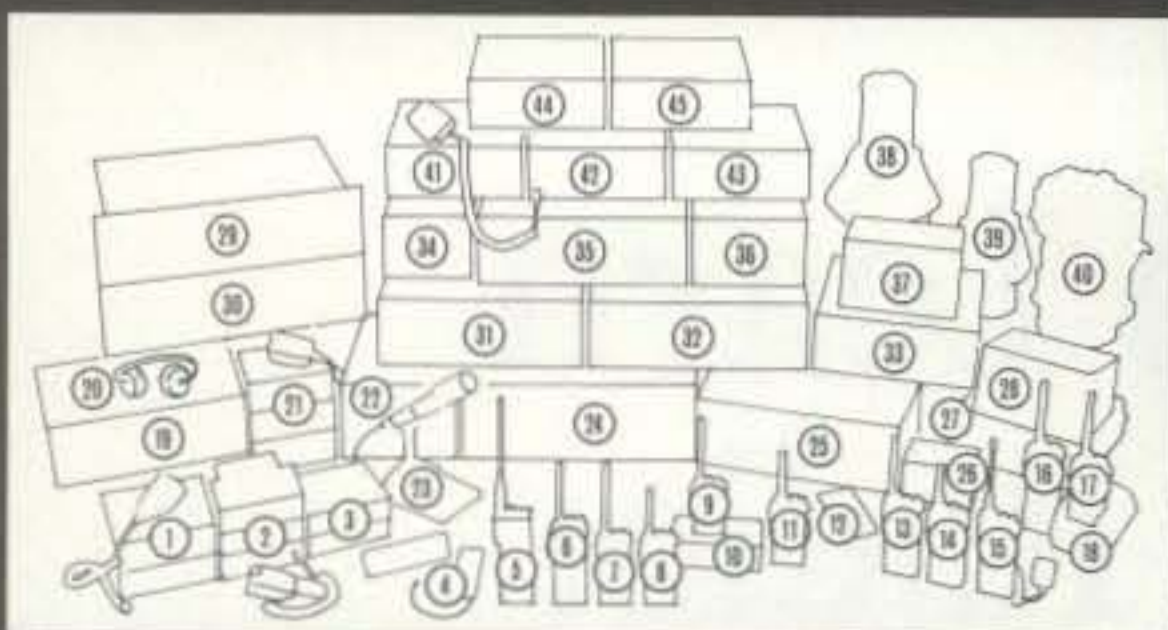
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| 2. <b>FT-212/712/912</b><br>2-Meters, 440 MHz<br>and 1.2 GHz Mobiles  | 9. <b>FT-26</b> 2-Meter HT                    | 20. <b>YH-77ST</b> Stereo<br>Headphones   |   |
| 3. <b>FT-5200 and FT-5100</b><br>2-Meter/440 MHz<br>Dual-Band Mobiles | 10. <b>NC-42</b> Rapid Charger                | 21. <b>FT-290/690/790R11</b><br>2-Meter, 6-Meter and<br>70 cm All Mode<br>Mobiles | 25. <b>FT-990</b> 100 Watt<br>HF Transceiver                      |
| 4. <b>MW-1</b> Wireless<br>Remote Control<br>Microphone               | 11. <b>FT-76</b> 440 MHz HT                   | 22. <b>SP-5</b> External<br>Speaker   | 26. <b>YS-60/YS-500</b><br>Power/SWR Meters                       |
| 5. <b>FT-470</b> Dual-Band HT   | 12. <b>DVS-2</b> HF Digital<br>Voice Recorder | 23. <b>MD-1C8</b> Desk<br>Microphone  | 27. <b>FC-800</b> External<br>Automatic Antenna<br>Tuner          |
| 6. <b>FT-530</b> New<br>Dual-Band HT                                  | 13. <b>FT-411E</b> 2-Meter HT                 | 24. <b>FT-1000</b> 200 Watt<br>HF Transceiver                                     | 28/39. <b>G-800</b> Rotator                                       |
| 7. <b>FT-415</b> 2-Meter HT   | 14. <b>FT-811</b> 440 MHz HT                  |   |   |
|   | 15. <b>FT-911</b> 1.2 GHz HT                  |   |   |
|   | 16. <b>FT-33R</b> 220 MHz HT                  |   |   |
|   | 17. <b>FT-23R</b> 2-Meter HT                  |   |   |
|   | 18. <b>NC-37</b> Rapid Charger                |   |   |





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31. **FT-767GX** 100 Watt HF Transceiver

32. **FL-7000** 500 Watt HF Linear Amp

33. **FT-650** 100 Watt 6/10/12 Meter Base Station

34/40. **G-5400B** AZ-EL Rotator

35. **FT-736** VHF/UHF 25 Watt All-Mode Transceiver

36. **SP-767** External Speaker

37/38. **G-2700SDX** Heavy-Duty Rotator

41. **FP-757HD** 20 Amp Heavy-Duty Power Supply

42. **FT-747GX** 100 Watt HF Transceiver

43. **FC-757AT** Desktop Automatic Antenna Tuner

44. **FP-800** 20 Amp Heavy-Duty Power Supply

45. **FT-890AT** 100 Watt HF Transceiver

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Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.





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