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Amateur Radio

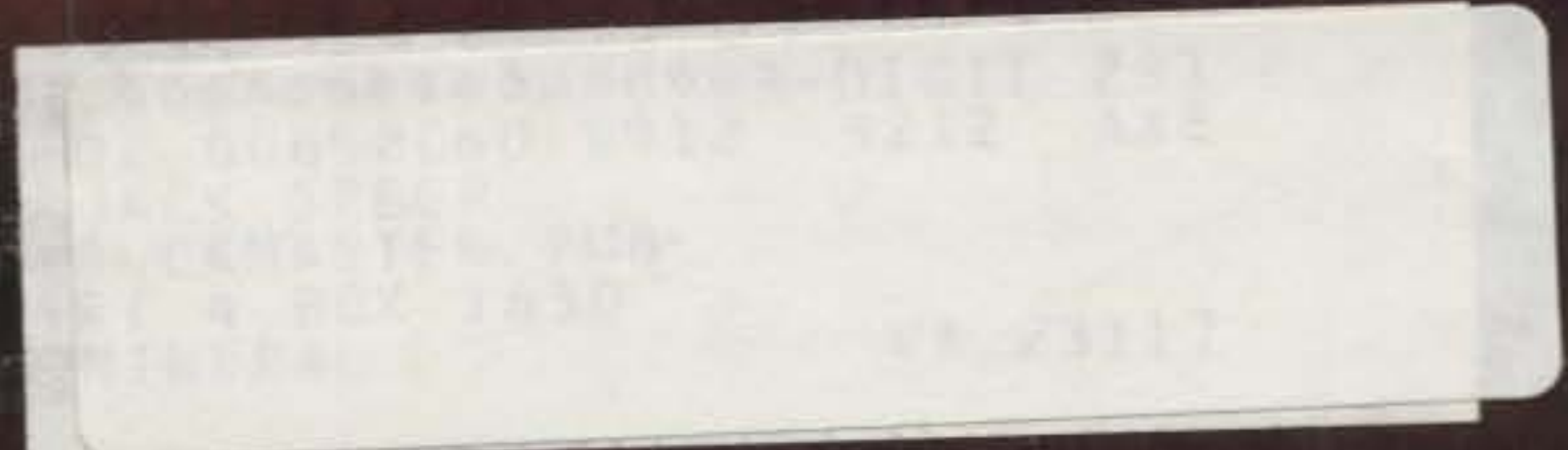
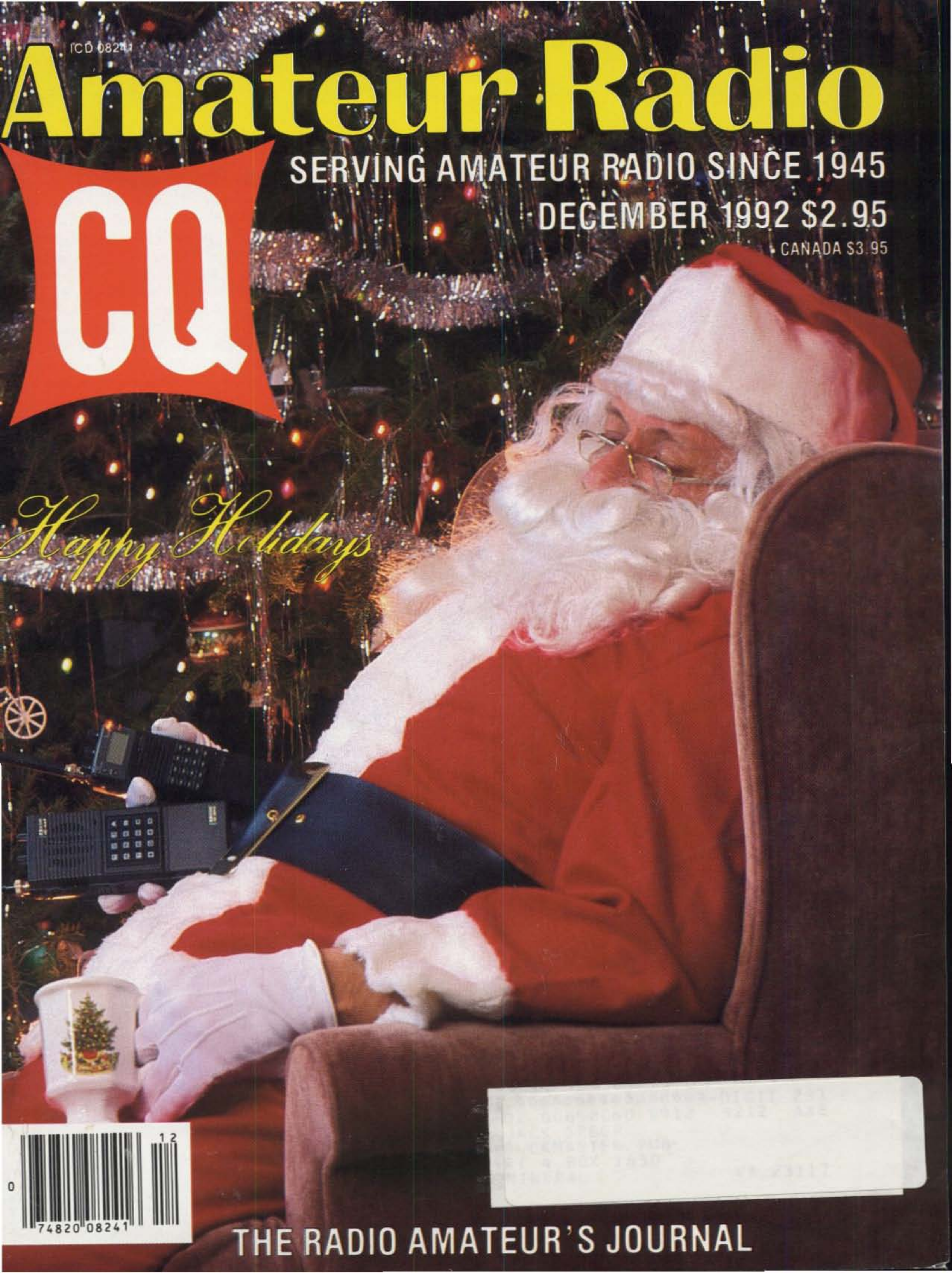
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The Radio Amateur's Journal



ON THE COVER: Exhausted after an all night aeronautical mobile operating session, Santa himself is caught snatching forty winks before heading North again. (Photo by Larry Mulvehill, WB2ZPI)

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ZERO BIAS

EDITORIAL

Ah... the sounds of the holidays. Somehow, when presents are involved everyone is still a kid at heart. We all like to rip wrapping and open boxes to discover some delight that's guaranteed to make our lives brighter and more fun. It's a marvelous time of year when people focus in on those who are close to them rather than on themselves. It's picking out that exact right gift for someone, hoping it will bring joy. Okay, you really can't count that weird flamingo tie with the LED eyes from Aunt Flo, but her heart was in the right place.

We as amateurs obviously would prefer some new piece of gear or a new antenna, or if wishes could come true, a huge tower. We want whatever is new to improve our station and give us an edge in some aspect of our hobby. Call-letter socks are just not the same thing. In thinking about it, though, it suddenly dawned on me that these two great religious holidays, Christmas and Hanukkah, with their celebrations and gift giving simply fall at the wrong time of the year for amateurs who are expecting that new super-zowie whatever.

Simply put, amateurs who have a reasonable (or even unreasonable) expectation of a new addition to the shack should try to push the gift giving part up to the end of August or the beginning of September. This gives you some time before the CQ WW DX Contest to get the gear up and running. This past October, for example, saw operations to Market Reef, Ethiopia, Eritrea, and the Laccadives. This obviously is well before you get a chance to open that natty and festively wrapped monobander you expect to find this year. November will find you using the same old CW gear for the CQ WW CW Contest instead of that brand new key and keyer that await you (maybe). About one third of the current "Big Gun" season will be over, therefore, before we can get our hands on the goodies. There's something wrong with this picture.

I know that the holidays have far more significance to people than simply exchanging gifts and wish lists, and perhaps I am making a bit light of tradition, but if I was skiing or mountain climbing, December would be a fine time to receive a scarf or heavy wool socks, and everything would be fine. Maybe we could just have the use of our anticipated gifts and have to wait until December to open our benefactor's greeting card to make it okay. Then we could sit smugly with the family, a few new countries under our belts, a respectable score in the contest, and best of all, Aunt Flo's tie would even look good at this

time. But tradition is tradition, and there's always next year.

Speaking of 1993, let's try to reduce our stress level by listening more and speaking less. It is amazing but true (take my word) that just about everyone can find out who the DX is, what their call is, where they're located, and the QSL route in reasonably short order simply by listening to the operator. If you don't hear the station, you really have no business adding to the din. I know that hope springs eternal, but get a grip on reality.

I'd like to see the new year bring an end to some of our confreres' choice of language and abusive personality traits. I have a feeling, though, that their everyday lives are just as screwed up as their amateur radio lives, and I can't see a way of legislating around it. We do tend to attract a lot of very interesting people, however, and it would also seem that there are a lot of angry people out there. As the vast majority of us already know, amateur radio is a fun hobby with many satisfactions and substantial reasons for taking personal pride in our activities. It's not a substitute for real life, and it certainly is not a place to strike out at someone for something else that happened to you during the day.

As we enjoy this holiday season and share the warmth of family and friends, let's try to extend some of these feelings to amateur radio and be nice to one another. Basically, it is just a hobby in which we're supposed to enjoy ourselves while we contribute to our fellow man's well being. It's really not that hard to do.

Let's make 1993 a good year whereby all of the amateur radio policemen hang up their Sam Browne belts and retire, where amateurs simply enjoy whatever aspect of the hobby they like, and where all the moral and ethical pundits look to their own houses first. Let's make it a year where sales of dummy loads soar along with their use. Let's all try to listen to the other fellow more; he might have something important to say. Most of all, enjoy yourself and have fun. It's okay.

1992 Hamfest Roundup

This has been one terrific year for hamfests. By and large they've all been well attended by enthusiastic amateurs and exhibitors. There was enough new stuff on display to make everyone want something to add to his or her shack. With any luck, some of these items will show up this month (try to act surprised). I know that to a lot of you the important item is food, but

if you took my advice and brought your own food, you could have saved enough money to buy yourself a new toy at the next hamfest you get to. Outside of the few hamfests where the committee people arranged for lunches to be brought to all the exhibitors, the standard A1M1 Greasedog was available from coast to coast. Best to avoid them and save your money as well as your digestive system.

I did manage to get a lot of great stuff at the various fleamarkets, and have deposited said goodies with the rest of my previous fleamarket finds in my basement. Someday I'll find the time and the use for some of it.

Our first show in the new year will be the Miami Hamfest, and if you have the chance to attend, do so. I look forward to seeing you there. Get out of the shack once in a while and meet your fellow amateurs face to face. You might also see a new side of amateur radio and find some new activities to challenge you. Bring a sandwich.

The WPX Award

The word *archives* implies some sort of imposing repository where voluminous records of almost everything are kept. One can almost conjure up the vision of a wizened curator shuffling down long dark aisles between floor to ceiling shelves packed solid with all sorts of documents and records. Well, word has it that Norm Koch, K6ZDL, our WPX Award Manager, has doffed his wizened curator garb in favor of western attire after his move to Clovis, New Mexico. Norm would like to cull out all of the original documentation from applicants who have not updated their files or submitted new data in five years. Obviously, the WPX Award is a very fluid program where new prefixes are added and used all the time and numerous prefixes are dropped from use regularly. The dilemma becomes whether we build Norm another storage building (fat chance) or he has to make room by getting rid of these inactive records.

Accordingly, we're going to give everyone a chance to update these older applications before they're eliminated from Norm's barn (archive). The time frame for the great purge is right after the Dayton Hamfest, or late April 1993. If you're still interested in the program, I suggest that you plan on updating before then. Remember, this is only for people who have not been heard from in five years or more.

73, Alan, K2EEK

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ANNOUNCEMENTS

• The following Special Events will take place during December:

W1FHP: The Hen House Gang ARC will operate W1FHP from Bethlehem, Connecticut during December to celebrate the Christmas season. Operation will be on 80-10 meters. For QSL send QSL and Stamp or SASE to R. O'Neil, W1FHP, Hard Hill Road, N. Bethlehem, CT 06751.

N4SXG: The Triangle East ARA will operate N4SXG from 1300Z December 23 to 2300Z December 24 to commemorate the 70th anniversary of the birth of the late Ava Gardner. CW 3.715 and 7.135; phone 14.260 and 28.335. For certificate or card send QSL and SASE to TEARA, 209 N. Third Street, Smithfield, NC 27577.

W5QX: The San Angelo ARC will operate from

Fort Concho in San Angelo, Tom Green County, Texas to celebrate the 125th anniversary and Christmas at Fort Concho. Operation will be from December 3-6 on 14.265, 7.235, and 28.360 MHz. For certificate send QSL and 9 x 12 SASE to W5QX, P.O. Box 4002, San Angelo, TX 76902.

KF6UF: The Relay Repeater Club will operate KF6UF December 30 through January 1 from the Wrigley Mansion, Pasadena, California to commemorate the 104th anniversary of the Tournament of Roses. Operation will be from 1600-0200Z each day, with primary frequency of 28.460 MHz and secondary frequencies 21.335 and 14.260 MHz. Amateurs in California/Nevada can contact the station on 2 meters through the 147.21 + repeater on the half hour or on 220 MHz via the Condor Connection on the hour. For certificate send QSL with contact number and 9 x 12 SASE (58 cents postage) to the Relay Repeater Club, P.O. Box 81, Arcadia, CA 91066-0081.

WL7CX: The North Pole Hamsters ARC will operate WL7CX from the home of Santa Claus, North Pole, Alaska from December 19-20 on 20 meters and Novice portion of 10 meters. QSL with SASE to North Pole Hamsters ARC, P.O. Box 56424, North Pole, AK 99705.

KA6RJF: The Toys for Tots Ham Radio Rally will operate KA6RJF from 1600-2200Z on November 28 to commemorate this second annual charity event. To participate in the charity event for children, bring a new, unwrapped toy valued at \$5.00 or more to Jun's Electronics (5563 Sepulveda Blvd., Culver City) from 19 AM to 4 PM on November 28. All toys will be collected for the US Marine Corps Reserves Toys for Tots program. The special event station will be on SSB 28.450 (plus or minus) MHz. For a certificate from the special event station, send QSL and \$1.00 to KA6RJF, 1302 Mar Vista, Pasadena, CA 91104. (Shortwave listeners welcome.)

• The following hamfests, etc., are slated for December:

Dec. 5, **Superstition ARC Hamfest**, Mesa Community College, Mesa, Arizona. Contact Bill Howes, KG7XB, 602-380-4839, or SARC, P.O. Box 1551, Apache Junction, AZ 85217.

Dec. 5, **New Orleans Hamfest**, Alfred Bonabel High School, Metairie, Louisiana. Contact New Orleans Hamfest 1992, P.O. Box 73665, Metairie, LA 70033.

Dec. 5, **Courage Center Handi-Ham Winter Hamfest**, Eagles Club, Faribault, Minnesota. Contact Don Franz, W0FIT, 1114 Frank Ave., Albert Lea, MN 56007.

Dec. 6, **Prince George's County RACES/ARES Holidayfest 92**, Prince George's Community College Campus, Largo, Maryland. Contact Holidayfest 92, P.O. Box 1037, College Park, MD 20740 (301-572-2362). (VE exams)

Dec. 6, **Hazel Park ARC Swap and Shop**, Hazel Park High School, Hazel Park, Michigan. Contact HPARC, Box 368, Hazel Park, MI 48030.

Dec. 13, **Hancock ARC Hamfest**, Hancock County 4H Fairgrounds, Greenfield, Indiana. Contact Keith Dalrymple, N9GWK, P.O. Box 7033, Greenfield, IN 46140 (317-462-0023, or 317-328-4028).

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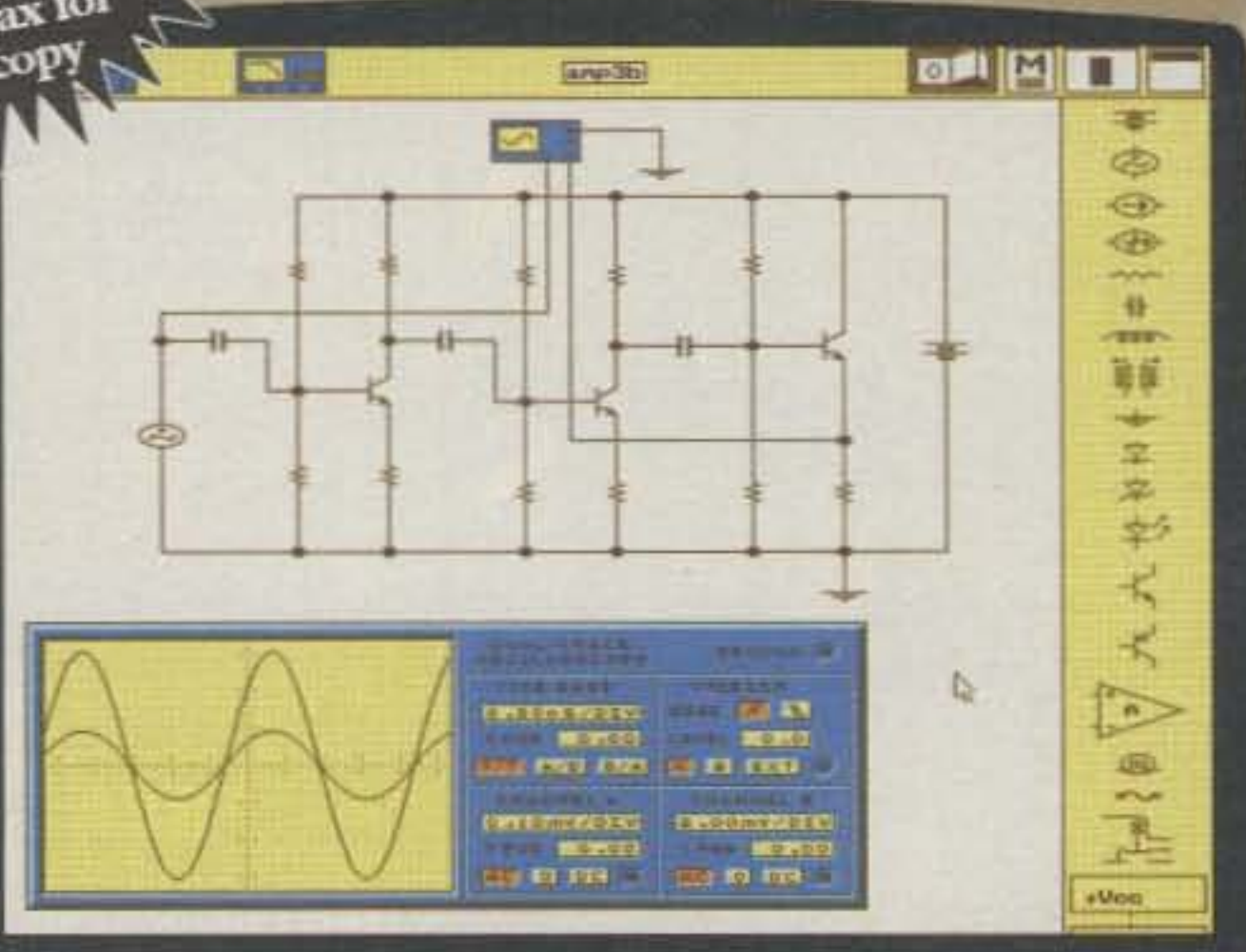
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220MHz

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2M/440MHz/1.2GHz

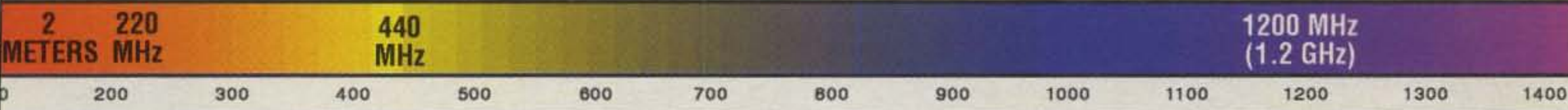
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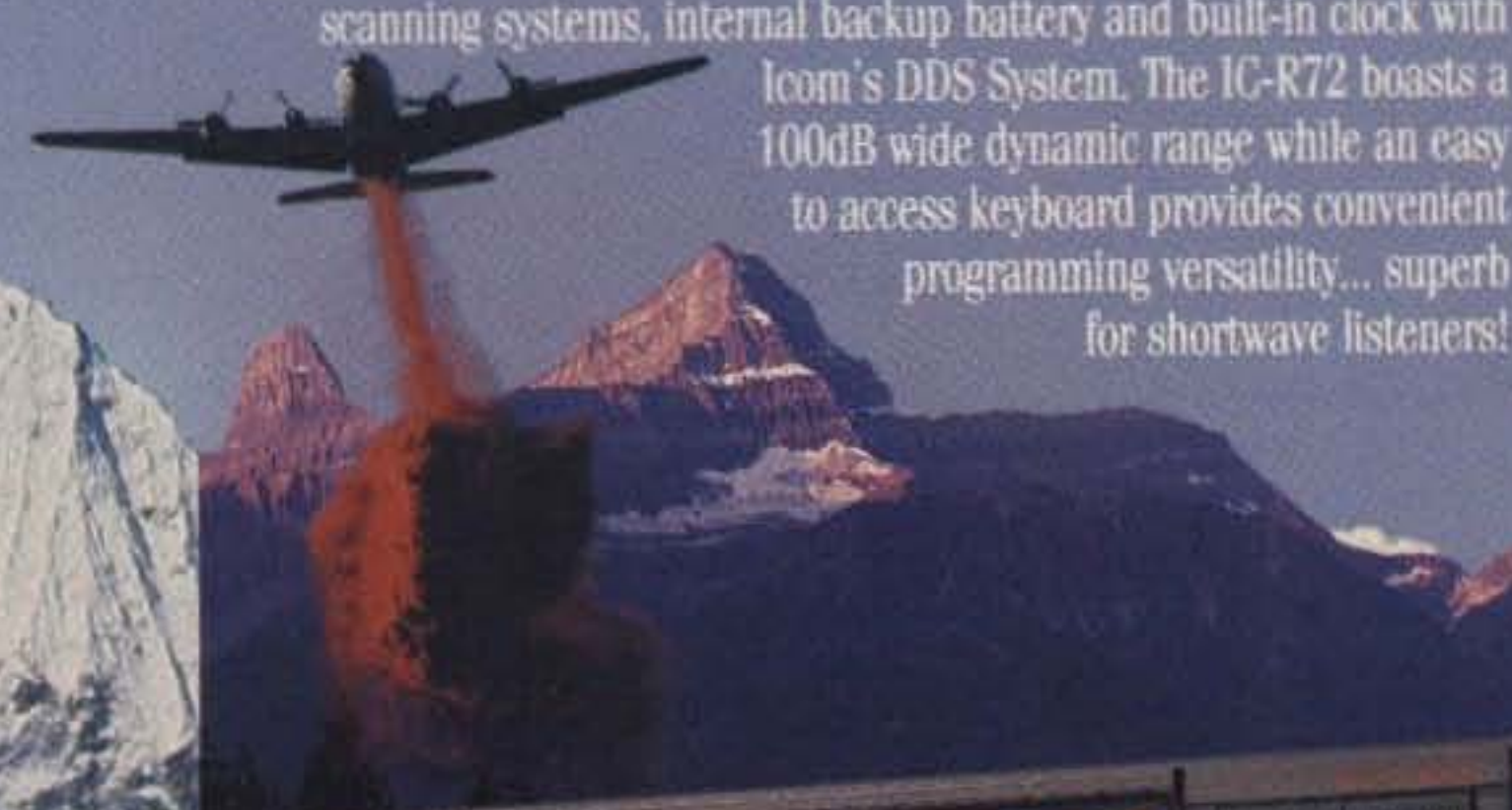
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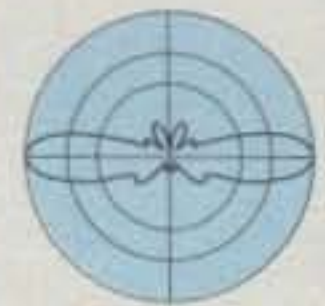
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X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	144/222	6.0/7.8	150	UHF	11.5	112
X-3200A	144/222/440	6.0/7.8/8.0	100/200	N	10.5	112
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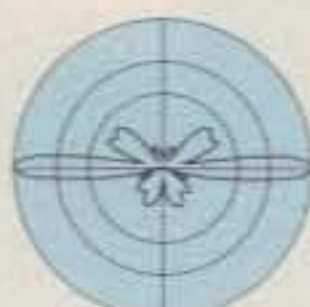
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MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CON N.	HT. Ft.	RATED WIND/ MPH
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F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	4.5/8.3/11.7	100	N	5.9	135
V-2000A	50/144/440	2.1/6.2/8.4	150	UHF	8.3	110

*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz



F-22



U-300A 440MHz



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How would you like to spend some time on a sparsely populated Caribbean island, stay in a quaint old building where every room has an open view, and work lots of DX? Sound good? NØTG tells us why Navassa might or might not be the place for you.

DXpedition To Navassa Island, KP1

BY RANDY ROWE*, NØTG

It is fully recognized that the DXpedition planned and executed as described herein is by comparison of small consequence when considering the more rare and difficult places such as South Sandwich, Spratly, Peter Island, Bouvet, etc. However, any DXpedition, and particularly a DXpedition to an uninhabited island such as Navassa, demands its own unique planning considerations in order for it to be a safe, enjoyable, and successful trip. Perhaps this article will provide a little insight as to considerations that otherwise might not be thought of by future DXpeditions to Navassa or like places.

For this DXpedition to happen there was a lot in front of us to be dealt with and planned. There were the motivation and purpose to be evaluated, the forming of a team of operators, and the planning of administrative details such as schedule, government permission, arrangement for boat transportation, financial matters, publicity, and operating plans. Additionally, the details for equipment required, antennas, living conditions on the island, and many logistic issues were to be dealt with.

Why Navassa?

For me personally, one of the most vivid and high points in my 35-plus years of amateur radio was going to Navassa in 1978. So when Murray, WA4DAN, and Bob, KW2P, contacted me to express their interest in going to Navassa, it got my blood flowing. They called to get information that I might be able to offer from my experience in 1978. As we continued to share information a friendship developed, and the three of us decided to form the nucleus team to plan a DXpedition to Navassa for January 1992. It had been about four years since

the last operation from Navassa, so it was felt that it was time again.

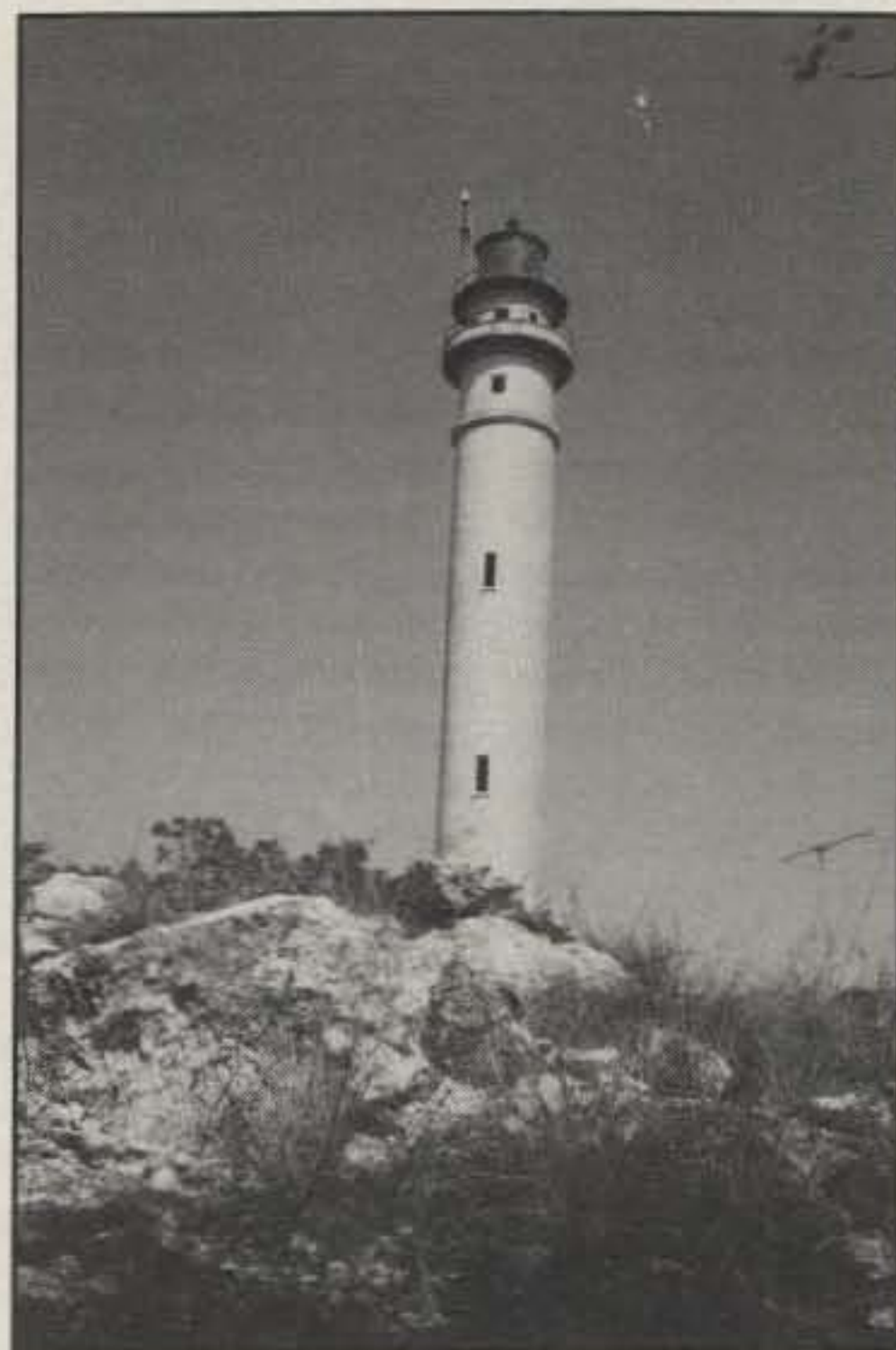
This was shown to be true by the results of the *DX Magazine* most-needed poll conducted by Chod Harris, VP2ML. Navassa ranked in the top 50 overall, number 10 most needed by the JAs and 23rd in Europe. From our research we knew that RTTY from KP1 was very rare and would be in great demand. Also, operations on the WARC bands would be very much appreciated by many.

So with a nucleus team together, direct past experience available, the need per *DX Magazine* poll for Navassa to be activated, we completed the team by adding Ron, AA4VK, and Will, AA4NC, and launched the planning one year in advance for Navassa 1992.

The Team

The team consisted of five experienced Extra Class operators—NØTG, WA4DAN, KW2P, AA4VK, AA4NC. Each operator had experience in contesting and DXpeditions to IOTA or Caribbean Islands. Ron, AA4VK, had experience with a joint U.S./Russia effort as well as some other spots. Most importantly, however, each operator had a cooperative can-do enthusiastic team spirit. There was a continual sharing of ideas and approaches to planning. While on the island there was consideration and respect of other team members in all matters. This kind of cooperative attitude, respect, and sharing with one another was discussed up front as the approach this team would have. Thus, we had a genuine team approach and were united. This assured a fun and enjoyable trip for all and that was an important priority for us.

The team determined early on to make every attempt to be fair, courteous, patient during operating, and to understand that not everyone working us would be experi-



A familiar view to many DXers is the famous lighthouse on Navassa Island. The 150 foot lighthouse has its base at 250 feet above sea level. It makes a great anchor for long-wire antennas.

enced in working DXpeditions. We tried to assure that all parts of the world were given fair opportunity to work us. I know there is always room for improvement, and that is part of the learning process. I suppose there is no way to satisfy everyone, but we tried; we were rather amused how one EA7 station inaccurately observed our operation and with flawed data and statistical approach concluded and published how we failed to work a sufficient number of Europeans compared to North America. In fact, 34% of our contacts were with European stations—11,326 to be exact.

*2120 Reverchon Dr., Arlington, TX 76017

Permission To Land

First and foremost for the plan to become a reality to activate KP1 we had to obtain permission to land on the island from the U.S. Coast Guard. Having been to Navassa previously, I still had blank Waiver of Liability forms which the Coast Guard requires to be signed by everyone going to Navassa. I assumed that there would be no difficulty in gaining permission to land. Obtaining permission took several letters and phone calls. I suppose that granting permission for someone to go to Navassa had not been processed for some time, and due to office turnover, it was necessary to follow our request rather closely. Permission is acquired from the Coast Guard out of Miami, Florida. It was required that we fully describe our plan. We explained about amateur radio, that we were going there by boat out of Kingston, Jamaica, and that the boat would remain offshore of Navassa during our stay.

The Island of Navassa

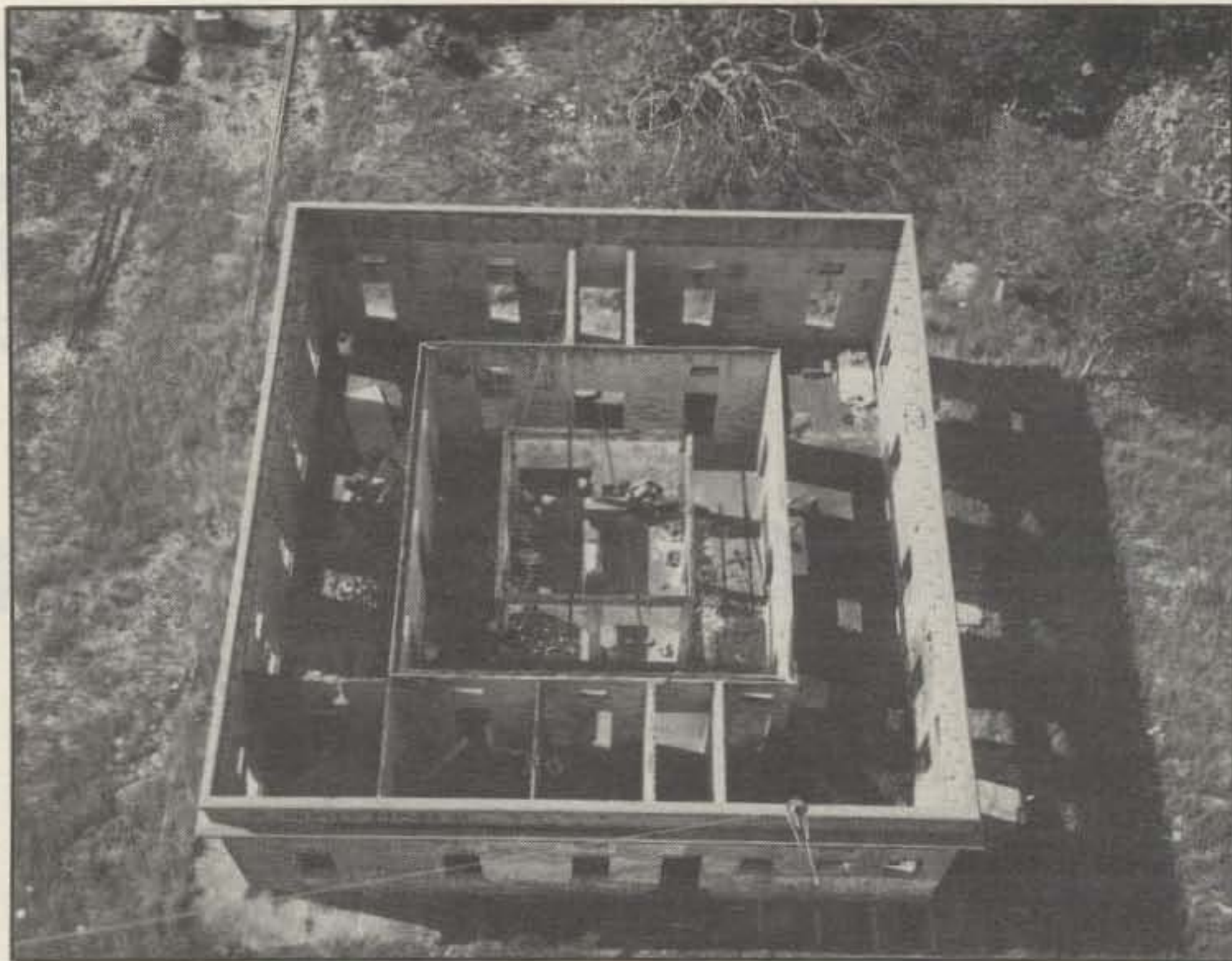
Navassa, the first U.S. Possession in the Caribbean, is not a friendly environment. The island is uninhabited except for a half dozen or so Haitians who have taken refuge there recently. Navassa Island lies 90 miles south of Cuba, 100 miles northeast of Jamaica, and 30 miles west of Haiti. It is a volcanic-type rock that jets out of the ocean with 50-100 foot cliffs. There is no beach; it is a very non-Caribbean type island. The 1.5 square mile island terrain is extremely rough—very jagged razor sharp rock, cactus, brush, ravines, and trees.

Access to the island is possible only by climbing a stainless-steel rope ladder that dangles 40 feet to the ocean from a cantilevered catwalk that extends out over the water a few feet from the rock cliff. The bottom rung of the ladder is broken so it is almost a jump from the small boat under the ladder to the first available rung. Not only is it a bit tricky, it is a potentially dangerous process that must be considered very carefully, especially if the sea is rough.

The only installation on the island is an automatic, unattended navigational light operated and maintained by the U.S. Coast Guard. The lighthouse and associated lighthouse keeper's quarters were built in the early 1900s. The quarters are now ruins without a roof, but most of the walls and concrete floors are still in place. These old quarters became the operating location for the DXpedition. The lighthouse base is 250 feet above sea level. The height of the lighthouse is 150 feet.

DXpedition Cost and Assistance

A primary concern and difficulty to overcome is the financial burden of putting on a DXpedition. All of our team members

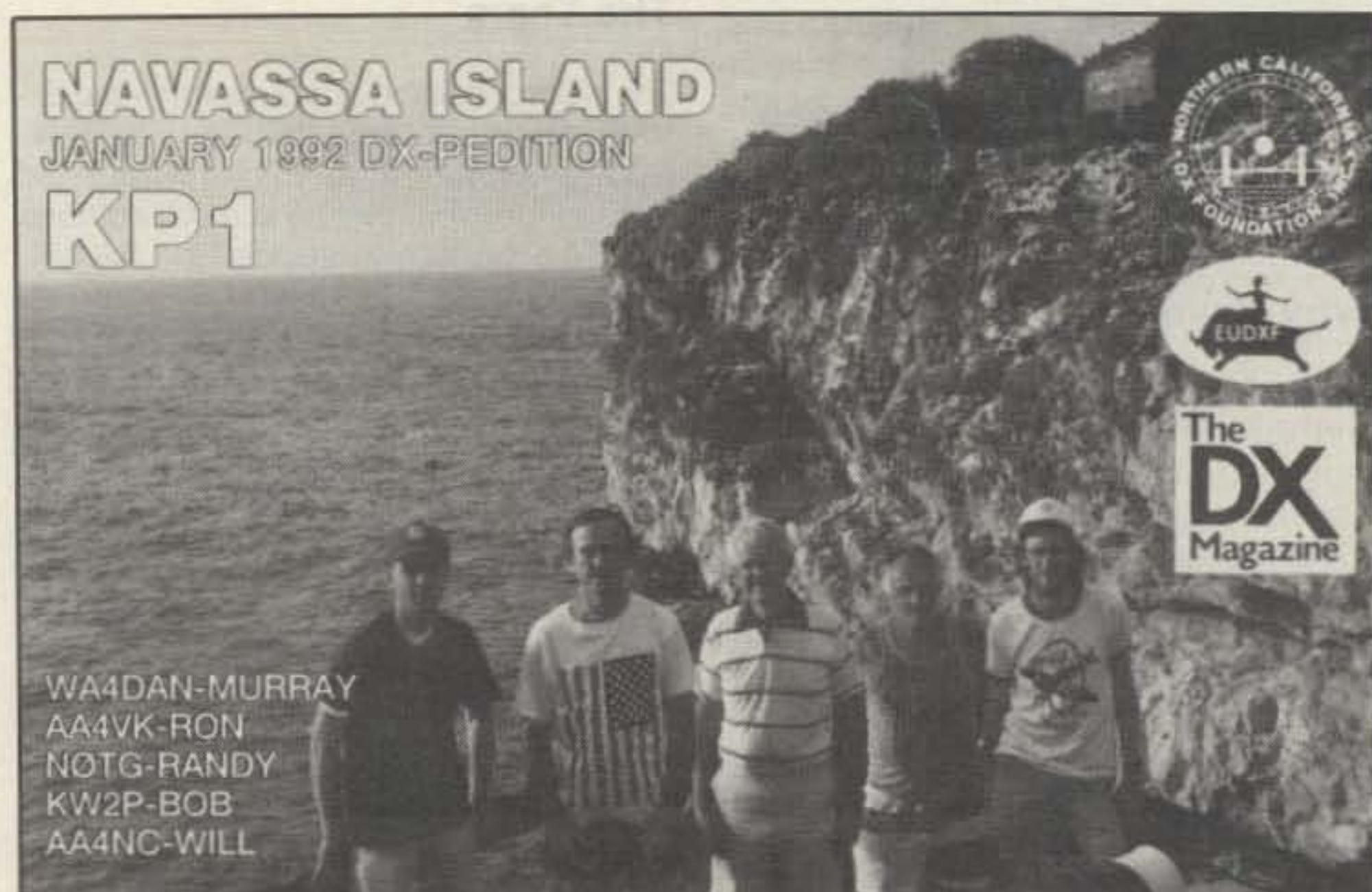


Looking down from the lighthouse you can see the old lighthouse keeper's quarters. As you can see, every room and operating position has an unencumbered view.

have family responsibilities and are ordinary working individuals. The cost of this DXpedition was going to run \$13,000. We considered that a lot of money. A major expense was the chartered 60 foot fishing boat out of Jamaica. While we all realized that it would cost us something individually, there was a point which would be beyond what we could afford.

We received primary financial assistance from the Northern California DX

Foundation, The European DX Foundation, and *DX Magazine*, and the antennas were furnished by Radio Works. In addition, there were a number of clubs and many individuals who donated funds to make KP1 a reality. I wish there was room to list all contributors. Then, with the QSL requests, a couple of thousand people kindly included a "green stamp" to help offset our cost. We appreciate so very much all of those who were able to assist financially. It lifted



The QSL card that made a lot of amateurs happy shows all of the team operators plus the sheer rise of the island from the sea.

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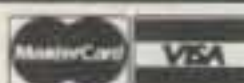
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Material and men had to be ferried back and forth from the commercial fishing vessel, The Gabriella. The famous Navassa ladder can be seen in the lower right.

a big burden from the team and allowed us to enjoy the DXpedition to the fullest. It really helped us. And yes, it still cost each of us, but now it was a more affordable project than when we first came up with the plan. Again, thanks to everyone for financial support, but also thanks for the many kind comments and remarks. We appreciate the interest you showed by working us and allowing us to have a fun time as well as provide a new country for many.

Getting to the Island

The DXpedition team convened in Port Royal, Jamaica on Wednesday, January 15, 1992. We planned to depart on the boat Thursday evening, January 16. Upon arrival in Jamaica, Lloyd Alberga, 6Y5LA, and Frank Vieira, our boat contact person, met us at the airport. What delightful and energetic gentlemen. We would never have made it to Navassa without their assistance. The Jamaican customs agents and cargo agents were very difficult to work with as we attempted to get the generators and other items claimed and loaded onto our boat. Enough thanks cannot be expressed to Frank and Lloyd for their assistance.

Our boat, *The Gabriella*, was a 60 foot commercial fishing boat. Frank Vieira did an excellent job recruiting. The all-Jamaican crew consisted of Captain "Shorty" and four crew members. These fellows worked very hard and took good care of us. We loaded the boat at the hotel dock at Morgan's Harbor resort at Port Royal, which is near the airport and directly across the bay from the city of Kingston. So after a year of planning, we were ready to depart for Navassa at 2330 UTC (sunset)



Will, AA4NC, enjoying a bit of cross-ventilation and giving out a new one.

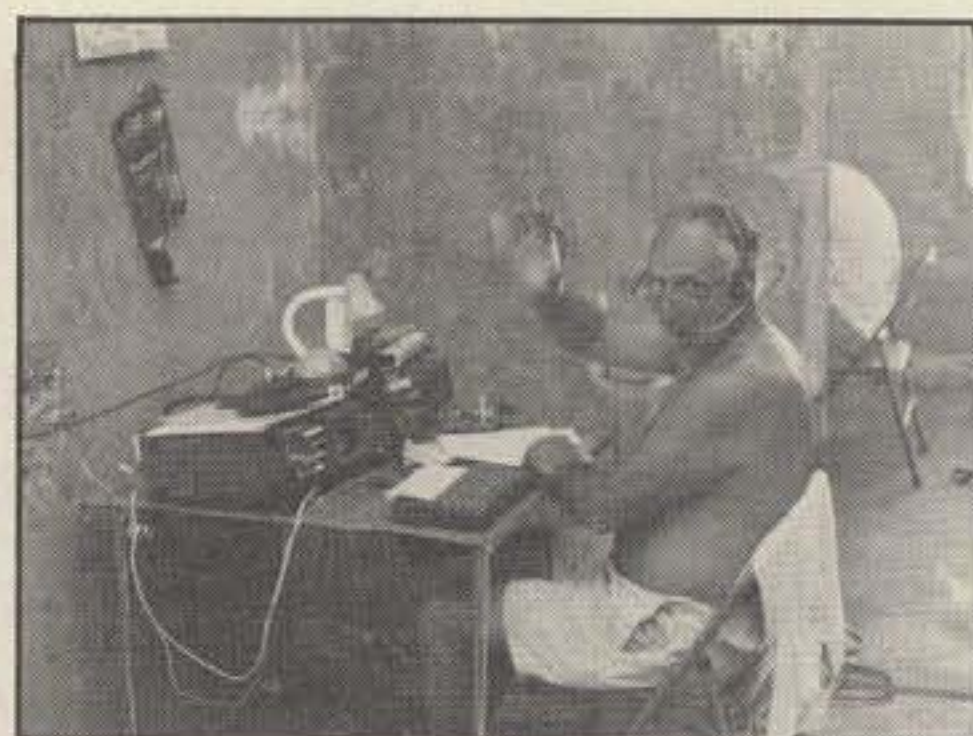
on Thursday evening January 16, 1992.

We placed the medicated patches behind our ears to hopefully avoid sea sickness. Well, it worked until midnight. The seas were very rough all night long. Everyone got sick. All night long back and forth to the rail of the boat was standard procedure. It was a very long night—no sleep. The trip took 22 hours, which was considerably longer than estimated. This meant that operations did not begin until dark rather than at mid-day. We were 8 to 10 hours behind our projected schedule.

As we arrived we were drained physically. All of us had been very sick and no one had gotten any sleep, food, or drink. The excitement of seeing Navassa on the horizon, however, overcame all of the physical feelings. We had made it and now eagerly climbed that 40 foot ladder that hangs out over the ocean and set foot on Navassa.

Living on Navassa

Some of us considered this the ultimate camping trip. Living conditions were not



With gear furnished by the RTTY DX Association, Bob, KW2P, worked nearly 600 stations on RTTY.



Murray, WA4DAN, looks up while completing another page in the log.



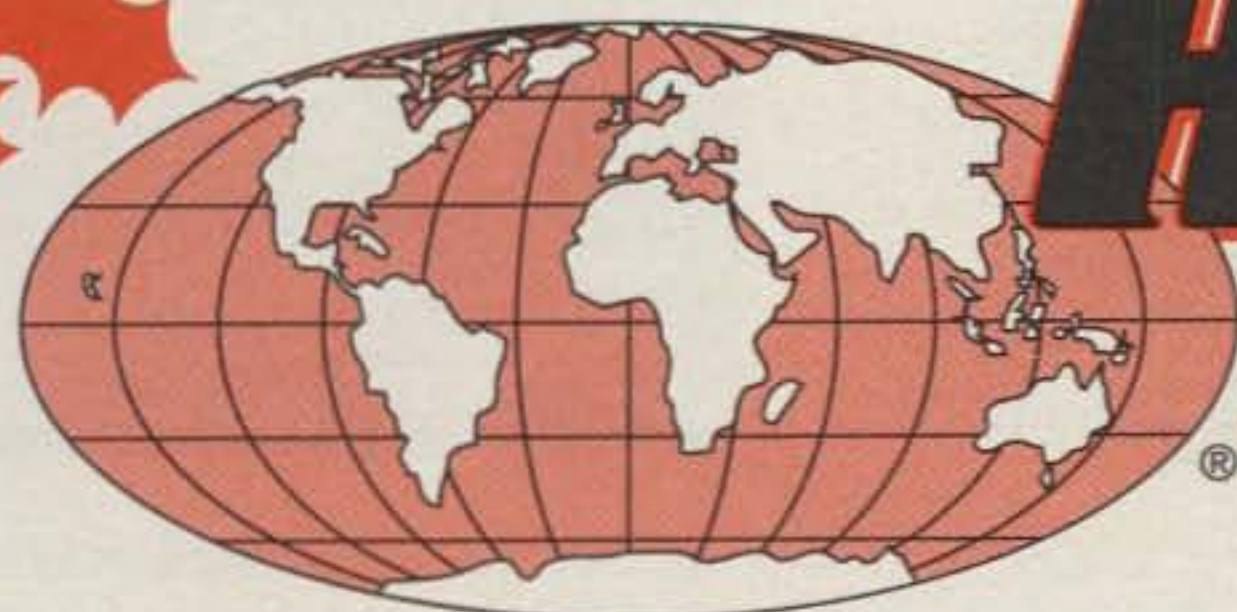
The author, N0TG, helping to increase that total contact count to almost 34,000.

too uncomfortable. We each had a tent, plenty of food, and the boat crew came ashore daily to supply us with fresh water and ice for our soda. For food we took prepared dried meals that require a cup of boiling water be added. They were very tasty and satisfying. Additionally, in Jamaica we purchased some fruit and snack-type items.

The weather was breezy and in the mid 80s F. It showered on us once for a very short time.

There were several Haitians who appeared to permanently live on the island. They were invaluable to us in assisting with carrying the heavy generators and other equipment from the landing site up the long steep hill to the site of the lighthouse. I amazingly observed one Haitian as he

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picked up the 128 pound generator crate, put it on top of his head, and proceeded barefooted to the top of the hill—a 15 minute climb. We expressed our gratitude with gifts of food and clothing.

Home for us on the island was the old ruins of a building used many years ago by lighthouse keepers. The building has no roof now, but the walls are in fairly good condition structurally. We each selected a room as an operating station to be set up.

A large room in the center of the building was used as a common area for supplies, etc. The ruins had been named "The Navassa Hilton" by previous DXpeditioners.

"This is Navassa Island— KP1—QRZ"

From the first QRZ until the last 73 five and one-half days later the pile-ups were con-



Ron, AA4VK, looks happy amidst the tropical splendor, as he gives out yet another KP1 contact.

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stant. They never slowed down. Nearly 34,000 contacts were made. Europe was open on at least one band or another around the clock. Over 11,000 Europeans were worked. Japan openings were good each day from about 2300Z to 0400Z. Each day the JAs would first begin to come in on 10 meters and close out on 20 meters. Over 2400 JAs were worked. The WARC bands were very popular, and we took note that many of the top-ranking DXers worked us there. At one point one of our operators attained a contact rate of over 300 per hour. We were able to have five stations on the air at the same time, all on different bands, with relatively little inter-mod or interference with each other.

We used 100 watt transceivers and worked split most of the time. No amplifiers were used. Antennas were primarily Carolina Windoms furnished by The Radio works company. The generator was a 2200 watt Honda. RTTY equipment was furnished by the RTTY DX Association. Bob, KW2P/KP1, worked nearly 600 stations on RTTY.

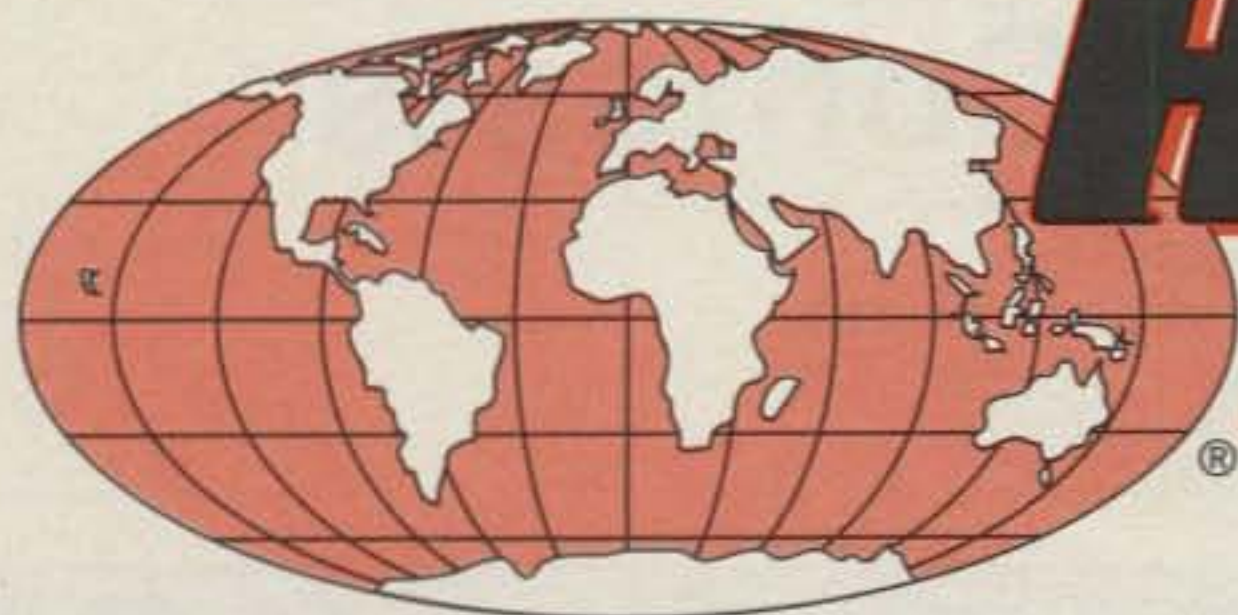
And the Mails Came

Unless you have experienced it, I cannot begin to describe the enormous amount of mail that arrived daily—day after day after day. It seemed everyone wanted a QSL. The confirmation process and filling out the cards has been a very labor intensive effort, but it has been a most enjoyable feeling to fill out a card and send it to the requester. Again, I must thank the other Navassa team members and many of their friends who assisted in this task. Although enjoyable, I would like to appeal to DXers to be more careful and accurate in log keeping with regard to correct dates and accurate times. We had hundreds and hundreds of problems along this line. Fortunately, we were able to find most of them with much searching through the log, page by page.

All the guys want to do it again... maybe so.



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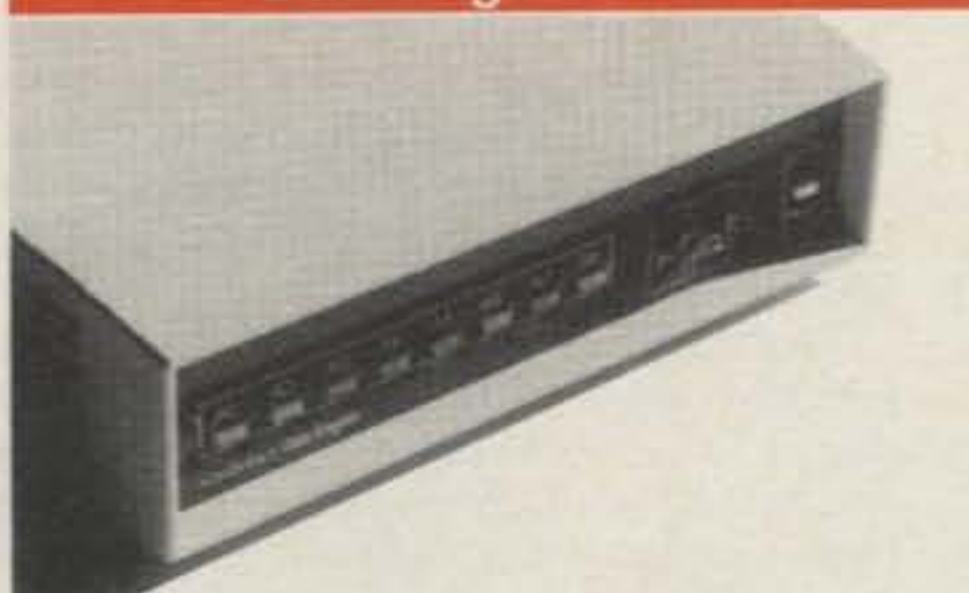
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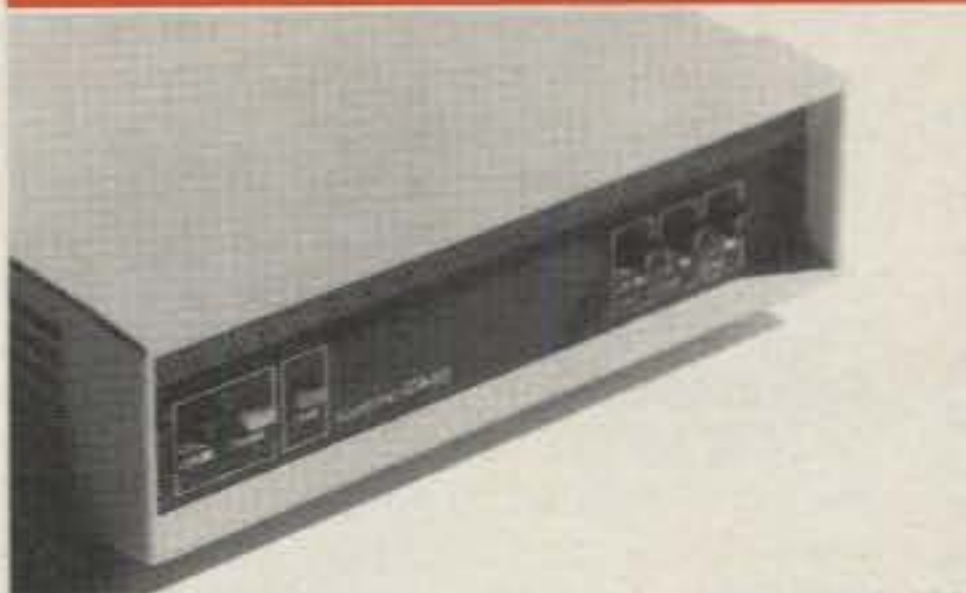
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Results of the 1992 CQ 160 Meter DX Contests

BY DAVID L. THOMPSON*, K4JRB

We will miss him (N4IN).... The 1993 CQ 160 Meter DX Contest will be dedicated to Don, N4IN, who passed away doing what he liked to do most—checking CQ 160 Meter Contest logs. Don made the CQ 160 Meter Contests the premier 160 meter operating event and lifted the contests to major status, right behind the CQ WW, CQ WPX, and ARRL DX events. This was no easy feat for a band considered to separate the men from the boys!

We have a quantity of blank certificates that were signed by Don. As a memorial to his efforts, every 1993 contest winner will receive one of these certificates, and then the rest will be destroyed. A tip of the hat to Don as he passes by St. Peter at the gate.

Better Times Are Coming

The year 1992 was not a good one for 160 meter conditions, although 104 countries appeared on CW and 93 on SSB. Better years are coming, and those who don't participate will miss wall-to-wall QRM and a chance to quickly make 160 WAS or add to a DXCC score. Another sign of a contest hitting the big time is the expeditions just to put on a country, rare state, or location for one of the weekends. Numerous expeditions were made in 1992, and even more are expected in 1993.

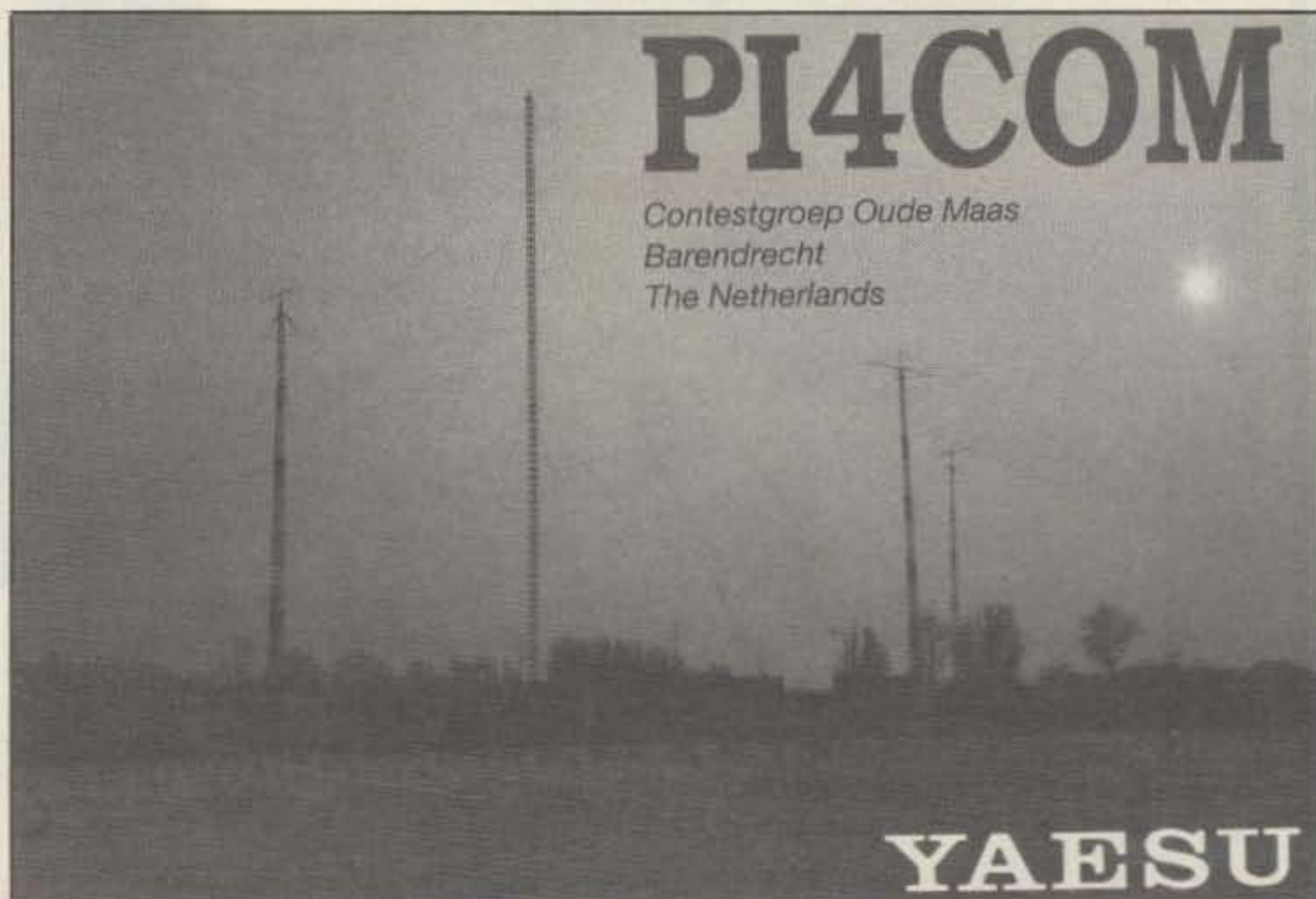
Statistically there were 3464 CW and 4013 SSB stations on the 1992 master list, or just slightly fewer than in 1991. However, there were 637 CW and 312 SSB logs submitted, which is a 6% increase over 1991. All states were logged on both modes, as were all provinces except VO2 on SSB. Rarest DX included D44, GU, GJ, HV, HZ, JD, KH3, PY0F, TA, TF, VQ9, UD6, 5U7, 7X, 4K2, and 9M2 on CW and D44, A92, A45, GU, HZ1, HV, PY0F, SV5, RF6, RI8, ZD8, 7X, UM8, UH8, and 4U1 on SSB.

Remember that just as in the CQ WW, we count the WAE countries as additions to DXCC. Many logged IT9, UN1, and even GM (Shetlands) and didn't know they had new multiplier points.

CW Contest January

The highlight of the CW competition was the photo finish between winner P40PI and KP2A. A scant 381 points separated Mike and Ken after the dust had cleared. Mike took advantage of virtually every contact counting 10 points to overcome the QSO and multiplier advantage Ken enjoyed at KP2A. Ken vows to return in 1993 and set the world record, and he is the person to do it! VE3EJ keyed his way to third place with

*4166 Mill Stone Court, Norcross, GA 30092



Typical weather for late January during the 160 Contest. This photo shows the extensive antenna farm at the PI4COM contest group.

442,552. Although he improved on his 1991 score by 10%, he fell one notch in 1992. K1ZM put in a solid effort as well, running up the USA high with 362,308. Jeff wins the iron-man award due to his second-place USA score on phone! Last year's top man, ON4UN, didn't have any jamming this year and finished fifth with nearly 351K. All the top five scores on CW this year were from single operators, and 24 stations scored over 200K, an increase of three over 1991.

The top ten single operator and multi-operator scores are highlighted in box scores, as are the top five VEs. Another box indicates all the plaque winners. Bill, W0ZV, added a Top JA CW plaque for 1992, and Richard, K5NA, is adding Top VE plaques for both CW and SSB to increase VE participation. Starting in 1993 the zone awards will be USA only! Please note that any score listed with * in this write up indicates a multi-operator.

QSO leaders were KN8Z* 1111, K1ZM 1109, W2GD* 1063, K5NA* 1063, WB9Z* 1054, K3LR* 1052, AB4RU* 1030, VE3EJ 989, KU4J 942, and W0ZV 927. Highest DX QSO totals were KP2A 821 and 6D2X* 741. No other DX broke the top 50 in QSOs. High country totals were just the reverse (all DX). They were ON4UN 62, DK8ZB 57, HG5A* 56, OK3KAP* 56, G3XTT 54, 4X4NJ 53, HA6PX 53, YU3EA 53, OK1KSO* and UZ2FWA* 52. Top USA/VE totals were K1ZM 48, K8PO 45, and W2GD* 44. They were the only USA/VE stations in the top 50 Countries list!

Most stations seemed to plod along with average rates. A few selected QSOs/hour rates stand out from the rest. The leaders were K5ZD 126; WX4G 105; W2GD* 103; K0PP/7 101; K8MFO and KN8Z* both with 88; and K3ZO, AA5BL*, and K1ZM with 87.

The only nasty tricks noted this year appeared in NE USA logs. Yes, Yukon was on, but only CZ1JA was any good. Only Fred, K3ZO, noted the rotten egg in his log. Sorry, gang, but many logs were cut one multiplier! The only other question mark was a TG that showed up in a few logs.

SSB Contest February

The lack of a window hurts the SSB gang more than the CW. To answer the cry, a volunteer DX window will be tried on both modes in 1993. Please make this work so we all can work more DX!

Propagation was the poorest in many years, with solar activity decimating the band for most competitors. K1ZM said conditions were so bad that he lost all chance at either USA or World High scores! W6GO wanted to know if New England had dropped off the map, and several Europeans wished for more propagation to the USA, Canada, and Pacific. Country totals were way down, but with patience good QSO counts kept things interesting east of W6 and W7. Most



Field day in February? The cold weather didn't stop VE3DC from making another fine showing.

contestants agreed by Sunday morning that the best plan was "wait 'til next year."

The biggest problem for many of us on phone was to find a clear frequency to "run" stations. Stations were lined up from just inside 1.8 MHz to over 1.93 MHz. Europeans reported similar conditions over their normally smaller allocations. Remember that outside USA and VE most stations can only work 1.83 to 1.85 MHz. This is the second basis of the need for a DX window!

VP9AD* turned in the world-high score with just over 402K. They were able to work all of the states plus get a fair quantity of Europeans in their climb to the top. The score represents an improvement of 10% over the 1991 high score.

VC3EJ (VE3EJ) dropped to second this year, but again lead the single operator scores at 337K. AB4RU* 208K, WB9Z 194K, and N2NU* at 166K finish out the top five. Seventeen stations finished over 100K, an increase of two from 1991.

AB4RU* had the world-high QSO count (either mode) with 1209 contacts. This is 98 more than CW leader KN8Z and nearly 200 more than the 1991 leader. If only the DX multipliers were there! WB9Z improved on his 1991 single operator total, logging 1128 stations. VC3EJ placed third with 1025 QSOs. Rounding out the top ten were N2NU* 961, K1ZM 946, VP9AD* 943, N5OLS* 863, K3ANS* 860, K7EG* 841, and K5NA* 822. The only other DX station to make the top 50 QSO list was RY7D with 505. Alex topped Europe in 1991 as RB5DX.

The country multiplier was again strictly a European affair, with IR4T* logging 48. The others in the top ten included IV3PRK 45,



Hiro, 7L1GVE, keyed this compact station to the high JA score.

IK5EPU 44, EA3ALD 41, I6FLD 41, OK3KAP* 41, OZ7YY 41, OK1DXS 40, OZ3SK 40, and a tie between EA3CCN and Y33VL with 39. The top USA/VE entries barely made the top 50. K1ZM lead with 22, followed by N2NU* 21, AB4RU 20, WB9Z 20, and AA4MM 19.

A sampling of the top QSO rates per hour showed the following: K5ZD 143, W9RE (as always) 125, VC3EJ 107, K4JRB 106 and 101, WB9Z 99, NQ4I 98, WX4G 97, AB4RU* 96, N5OLS* 93, and W3TS 88. No DX station had a rate over the low 60s again this year!

Seems most top scorers rarely made over 60 Qs in their best hour and just plodded along. Maybe the DX window and better conditions will change all that!

Club Competition

The Frankford Radio Club won a tight race with the Southeastern DX Club and the Yankee Clipper Contest Club for first place. All three clubs were over three million, and three more clubs made over one million and also deserve kudos. I held to Don's rule of at least two entries and 40,000 or three entries to make the list. Please show your club clearly on the summary sheet to assure proper credit. I know of at least one member each of Frankford and the Southeastern DX Clubs who did not indicate club affiliation and thus were not included! Good luck to all in 1993!

Helpers

Checking logs for this size contest, at a level consistent with Don's legacy, is not easy. Thankfully, computers do most of the work, but human judgment is still required to get rid of the garbage. Statistical sampling was used extensively to cross-check contacts and uniques. The top 50 on each mode got a second, more intensive audit.

Please thank K4PI, K4ODL, KI4XO, Helen (Don's XYL), and my XYL, Jean, for their assistance. Special thanks go to Bill, N4NX, for his help with the plaques.

Logging Notes

Please follow the rules in submitting your log. If you make over 200 QSOs, you must send in a dupe or check list. The summary page must be the first sheet or page, not the last or in the middle. Check your logs (especially if from a computer) for bad log entries such as W8W8WEJ or K4JR?. Next year I will remove the contact rather than correct the entry. Please make sure the points are correct, too. Wyoming does not count as a five pointer stateside, and VP9 is not a ten pointer from VE. I also noticed that DC came up as a multiplier in several logs (not so). Remember that this contest uses States, not ARRL sections.

I would prefer that every log be computerized with both a diskette and hardcopy. I accept hand-written logs (preferably on CQ official forms) and must have a hard copy in any case. Please give me totals for QSOs, multipliers, and points on each page (note to K8CC.NA users). Following the rules makes life easier for everyone.

I doled out numerous penalties for excessive dupes, not including a dupe list (over 200 Qs), and logging questionable multipliers. I must be less lenient from now on for my own sanity.

Kudos to OK1AYP for the best hand log and to ON4UN, WD8LLD, PI4COM, and TA4/DK7PE, among others, for submitting booklets based on computer logs.

Late Logs

Several logs were received too late to be included in the results, but were used as check logs. These were RB5ELM, UB7VA, and UB4MXR on CW, and RB5QRW on Phone.

Next Time

The 160 Meter CW Contest will be held the last full weekend in January 1993 (January 29, 30, and 31), and the SSB contest will be held the last full weekend in February (February 21, 22, 23). Please note that these are the last days of January for CW, but that six days remain in February after the SSB contest. Times in both contests are 2200Z on Friday to 1600Z on Sunday. Several operators in Europe still continue to work stations until 1800Z on Sunday. There is a double penalty if this continues in 1993.

Send a business-size SASE to CQ 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801 for log and summary sheets. Computer logs are preferred, and you don't need to send along one of the old official summary sheets if the first page of your log is a printed summary! If you want to make your own log, please log 40 contacts per page, use Z or GMT for all contacts, and fully fill out station, report sent and received (must include location such as state, province, or country prefix LU, OK etc.), and give me sub-totals on each page for QSOs, multipliers, and points. The summary should clearly show total claimed QSOs, points, multiplier broken down by total countries, and total W/VE. A dupe or check sheet is a requirement for all logs with over 200 Qs and would be nice with every entry. Multi-ops need to clearly list all operators and indicate the operator at all times.

CW mailing deadline is February 28, 1993 and the SSB deadline is March 31, 1992. Send logs to 160 Meter Contest Director David Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092 USA. Logs may also be sent to CQ, but these will be forwarded to K4JRB. Please indicate CW or Phone on the envelope. Please put on enough postage to properly mail the entry. We welcome photos (no deadline on photos!).

See you in 1993. GL!

73, Dave, K4JRB

Soapbox CW W/VE

Trying to learn a new program during a contest is a bummer! . . . KK4UJ. My first CQ 160 Contest. Although my operating was limited by equipment and previous commitments, the ops in this contest appeared to be more courteous and more helpful than in other contests. Enjoyed it! . . . N8FEH. It's amazing what you can do with nearly nothing, operating strictly "hunt and pounce" . . . WK5K. HELLO ALASKA! The east coast is looking for you! . . . K3EI. Obviously a "just for fun" effort. Not much time for the test, but still loads of fun . . . NX9T. Hard disk crashed second night; time to replace computer . . . KN1M.

Thanks to N4IN and his helpers for making this contest go! . . . KB5UL. 7W to 25 foot high 40 meter dipole—very weak sigs and very good

TOP 10 SCORES SINGLE OPERATOR

USA CW		USA SSB	
K1ZM	362,308	WB9Z	193,809
K8PO	307,867	K1ZM	163,836
K1KI	276,752	WY2X	113,360
W3LPL	251,560	NQ4I	105,740
W0ZV	199,430	K4JRB	105,740
AA1K	188,584	KD9SV	100,863
WA2SRQ	178,925	W3BGN	100,165
K2KIR	176,616	N8ATR	93,062
K3ZO	168,320	AA4MM	92,750
W3UM	164,948	NX3A	91,896

VE CW (TOP 5)		VE SSB	
VE3EJ	442,552	VC3EJ	336,804
VO1NA	279,531	VE3PN	100,439
VE3DO	201,075	VE3MSN	72,574
VE3PN	195,179	VY2SS	22,400
VE3KP	181,755	VE3CUI	20,490

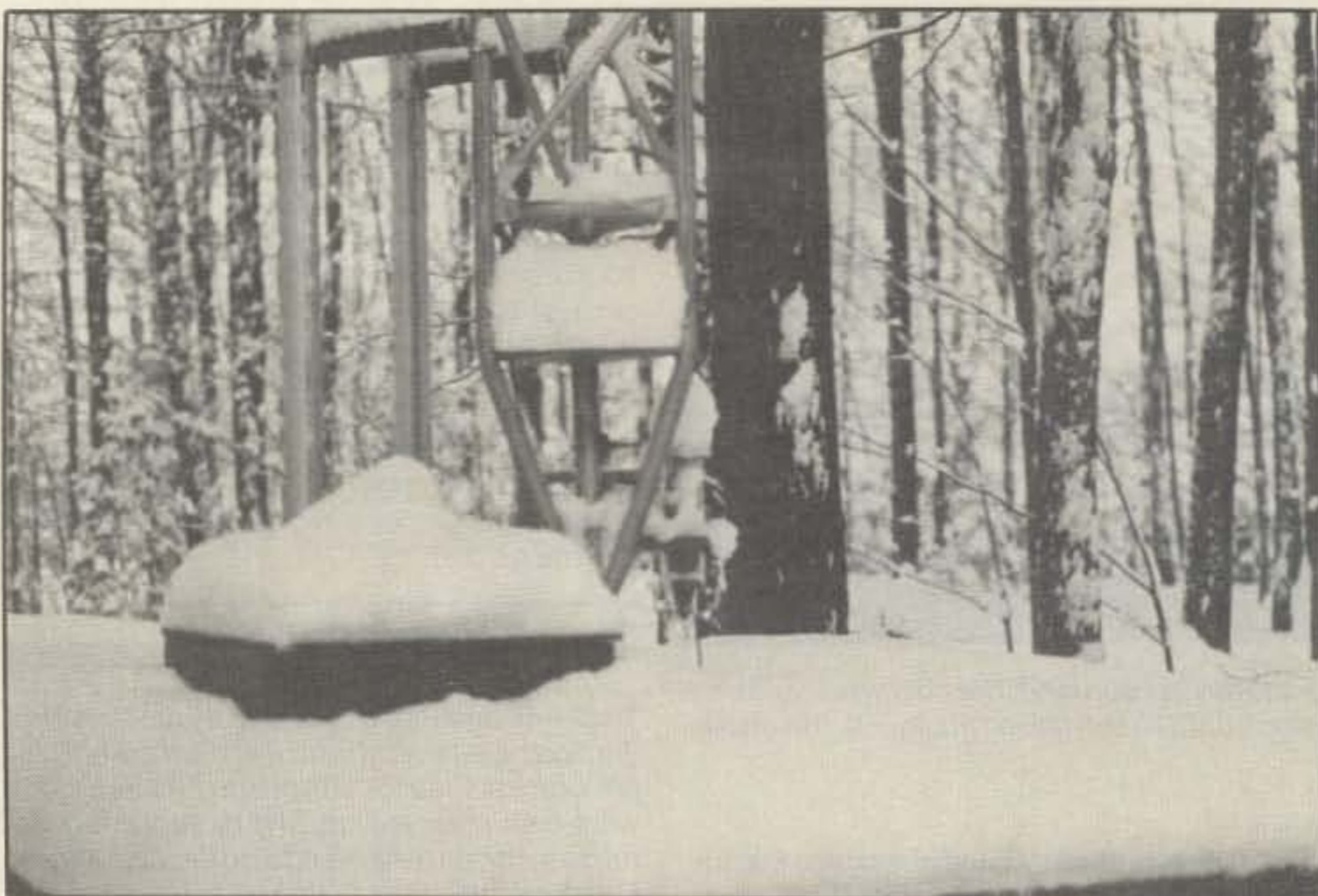
DX CW		DX SSB	
P40PI	487,791	IV3PRK	78,832
KP2A	487,410	OK1DXS	65,800
ON4UN	350,660	CT3M	57,860
TA4/DK7PE	285,376	HB9CXZ	57,434
KH6CC	243,432	RY7D	53,696
4X4NJ	232,896	OZ7YY	53,550
HA6PX	213,640	IK5EPU	51,435
DK8ZB	197,500	I3QJZ	44,572
YU3EA	178,920	EA3ALD	40,291
GM3YOR	170,448	A92BE	36,762

MULTI-OPERATOR

CW		SSB	
K5NA	315,726	VP9AD	402,240
W2GD	309,162	AB4RU	207,860
KN8Z	287,264	N2NU	166,075
6D2X	277,894	N5OLS	132,790
AB4RU	270,528	K5NA	121,290
NX1G	267,995	K7EG	118,976
WB9Z	238,609	K3ANS	114,420
HG5A	237,495	IR4T	110,067
K3LR	208,662	K0LW	95,460
K7EG	200,796	OK3KAP	85,422

ears for those I worked... *W6MVW*. Low noise, but very poor EU both nights... *N4IN*. Larry, UC2AAA, visited for an hour of the contest. He was impressed with the station and computer logging set up... *K4PB*. Judging by the participation (growing all the time) 160 meters is fast leaving the "Fringe Band" category. Friday night amplifier problems fixed by "corrective surgery" that ensured smooth sailing for the balance of the weekend... *VE3CUI*. Quiet band, good conditions. It is amazing to hear and work 8, 9, and 0 call area from VT in broad daylight. I can't even hear 50 KW broadcast stations then!... *WA1GUV*.

Got in almost as much homebrewing as operating. Friday night I blew a capacitor in the ant tuner and repaired it; then early Saturday AM blew out the electronic bias switch in my homebrew amp and then repaired it after the band closed down Saturday after sunrise. (A test of my true ham ability to stay "on the air")... *W3TS*. Couldn't hear two DX stations who asked me to get on, but enjoyed making some USA contacts... *VC4SK*. Nice shakedown cruise in the 160 contest from new QTH (moved July 30), but lots of antenna work ahead. Inverted Vee (which I raised from 60 to 80 feet at tip of mast



VE3DO's base insulator was completely buried in snow. However, Ivan still keyed his way to 200K plus on CW.

on Friday morning) worked OK, but just doesn't have the "reach" into Europe of the shunt-fed vertical at my old location. Tower will "grow" by several sections this summer and that should help... *AA1K*.

Big thrill hearing shoulder-to-shoulder sigs after listening to practically empty band for weeks!... *VE3XI*. Best hour 126 QSOs (0128-0227). High-band condx were too good for 160 meters to be great... *K5ZD*. I enjoyed the contest again, as I always do. Very well disciplined contestants. I was fortunate being able to meet old friends again. After a slow start the band opened up quite nicely for DX... *W1PL*. It's always a thrill to work all states in this contest. Our multiplier total was hurt by the lack of a beverage antenna this time... *N2BA*. Ten minutes before starting, yanked out 17 log sheets at random; just what I ended up needing! Exceeded last year's total the first night... *K1IK*.

Just as the JA window opens up Saturday morning, out go the lights, ouch!... *N7NW*. No free meal this year. *K3CP* whooped me!... *KU3X*. I think the computer actually acted as a "carrot and stick." As I watched the little window with my score show a higher and higher score, I felt compelled to keep at it and really do the best I could. I was able to stay awake all night both nights, which I have never been able to do for any contest—ever!... *K4TO*. First logging program ever. Additional contest improvements in the works. Looking forward to some serious contest work... *K9BLY*. Wow—49 states in 14 hours of operating! Great quiet band condx. If only *K7HIR* was still in Alaska... *KG7Z*.

Soapbox CW DX

Enjoyed this non-serious effort; did not envy the non-stop CQing of serious entrants! Barely any DX propagation to the east, but some good W/VE signals... *G3SXW*. Quite an experience to contest split frequency; me at 1800-1825 and Japan at 1907.5-1912.5. All the 173 JAs worked were in that 5 kHz segment!... *HL9HH*. In Madeira,

we can only operate 1830 to 1850 kHz. This area was all QRM from WCQ Machines... *CT3CU*. Much of the DX didn't hear me due to the 15 watt limit in Norway... *LA4LN*. Started building the antenna in darkness three hours before the contest. Tremendous summer static and local QRM... *ZS6EZ* (ex-*ZS6BCR*).

Used only a 10, 15, 20 butterfly beam so only a low score... *I2FUM*. No Europe heard. However, several stateside signals could not hear me. Next year bigger transmit antenna... *LU4FM* (op. *AE6E/LU*). My CW has greatly improved and *K1EA* program a big help... *ON4UN*. Only a Saturday morning opening to USA East Coast this time... *PA0LOU*. Anyone see my vertical and balloon?... *PA3DFT*. Difficult to make contacts with 10 watts... *YL2TW*. My first CW contest after 20 years of phone contesting... *IV3PRK*. I expected better conditions on Sunday, but it did not happen... *YU3EA*.

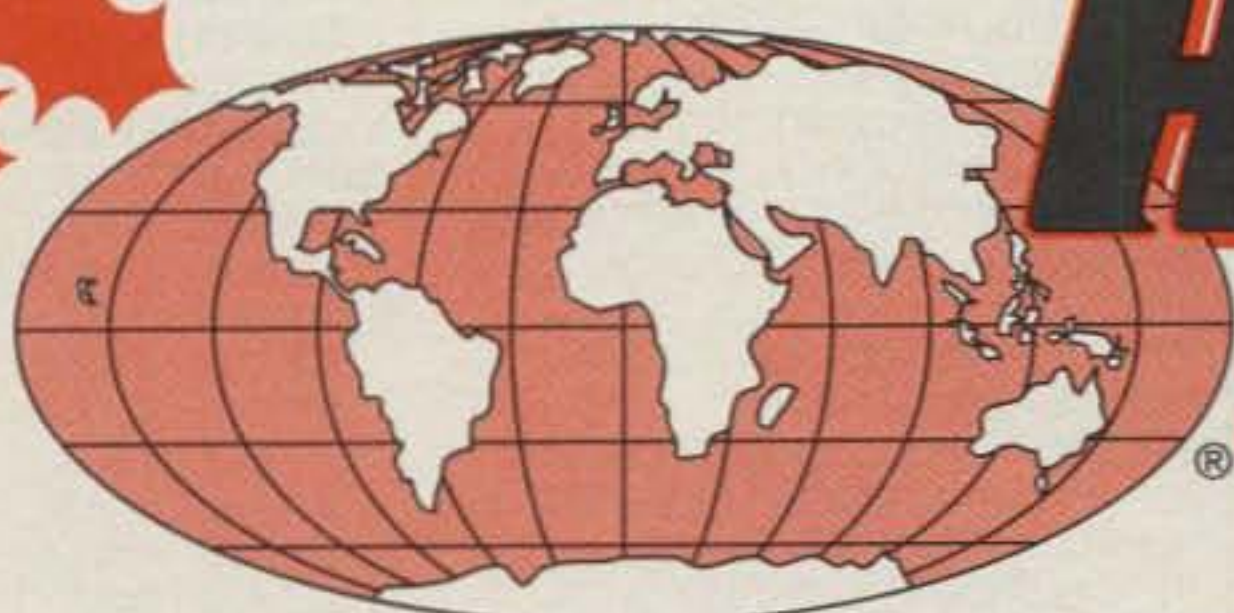
Had trouble with computer and could not print log... *EI4HM*. 1500% improvement over 1991... *TF3DX*. Terrible QRM from 1.7 MHz broadcast station... *4N7A*. My dipole was only 10 meters high... *5U7M*. Heard many stateside signals, but no chance to work them with my long wire... *DJ6TK*. New call, new rig, new band... *DL8WCM*. Will be QRV as *JA5DQH* in 1993... *HI160M*. QRM from N.T.T. Telephone service... *JE1SPY*.

It was a nice contest until we ran out of luck! We at *OK1KCR* were using a balloon antenna that was 41 meters vertical with 6 radials in a field at our second QTH. After two good hours we were looking forward to a pile-up of USA stations. However, the balloon was too big and its vertical force gigantic. The vertical wire snapped and the balloon disappeared into the sky. All we could do was look forward to next year!... *OK1FRG*.

Soapbox SSB W/VE

My first 160 Meter contest. Thanks to all who had the patience to work me... *KA1ILG*. First time entry... *KA1FP*. Wish I had more time for the

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TROPHY WINNERS

SINGLE OPERATOR CW

World by K5AAD (N5JJ Memorial): Winner Mike Greenway, P40PI.
USA by K4TEA: Winner Jeffery Briggs, K1ZM.
Zone 3 by KM4NG: Winner Paul Gordon, N6LL (WA6CDR Op.).
Zone 4 by K5NA: Winner John Sluymmer, VE3EJ.
Zone 5 by WA4CUG: Winner Paul Obert, K8PO.
Africa by K4SB: Winner Yoshiyuki Matsuda (JH4NMT), 5U7M.
Asia by NE4S: Winner Rudolf Klos (DK7PE), TA4/DK7PE.
Europe by K4UEE: Winner John Devoldere, ON4UN.
Oceania by K4TKM/6: Winner Jack Wheeler, KH6CC.
South America by K4JAG: Winner John Thompson, PJ9JT.
Japan by W0ZV: Winner Hiro Shiozawa, 7L1GVE.

SSB

World by K5AAD (N5JJ MEMORIAL): Winner John Sluymmer, VC3EJ.
USA by K4JRB: Winner Jerry Rosalius, WB9Z.
Zone 3 by N4ONI: Winner Paul Gordon, N6LL (WA6CDR Op.).
Zone 4 by KC4MJ & KM4IH: Winner Gary Nichols, KD9SV.
Zone 5 by K4ODL: Winner Jeffery Briggs, K1ZM.
Africa by WB4ZNH: Winner Hernani Correia (CT3BX), CT3M.
Asia by W4LVM: Winner S. K. (Don) Street, A92BE.
Europe by N4NX: Winner Pierluigi Mansutti, IV3PRK.
Oceania by K4DLI & KB4SSS: Winner Jack Wheeler, KH6CC.
South America by KL7JAR/W4: Winner Elsa Ponson, YV1DRK.

MULTI-OPERATOR CW

World by N4RJ: Winner Richard L. King, K5NA.
USA by WS9V: Winner John Crovelli, W2GD.

SSB

World by Southeastern DX Club: Winner Allan Davidson, VP9AD.
USA by WB9Z: Winner Ron Hooper, AB4RU.

Special

Director's Choice: Winner John Ackley, KP2A.
North America CW Single Operator/2nd World High Operator: Ken Byers, K4TEA.

AGGREGATE CW AND PHONE CLUB SCORES

Club Name	Score	CW	SSB
FRANKFORD RADIO CLUB	3,250,528	W2GD	VP9AD
SOUTHEASTERN DX CLUB	3,142,738	P40PI	AB4RU
YANKEE CLIPPER CONTEST CLUB	3,044,026	K1ZM	K1ZM
MAD RIVER RADIO CLUB	1,463,225	KN8Z	K7EG
NORTH COAST CONTESTERS	1,437,434	VE3EJ	VC3EJ
POTOMAC VALLEY RADIO CLUB	1,011,188	W3LPL	K4YT
SOCIETY OF MIDWEST CONTESTERS	798,656	WB9Z	WB9Z
RHEIN RUHR DX ASSOCIATION	575,998	ON4UN	—
ARI (ITALY)	412,656	I3VHO	IK5EPU
MILE HIGH DX ASSOCIATION	388,135	W0ZV	—
HOOSIER CONTESTERS	380,912	KD9SV	—
SO. CALIFORNIA CONTEST CLUB	377,656	N6DX	N6LL
LEFT COAST CONTESTERS CLUB	360,863	K7SS	W7AWA
KENTUCKY CONTEST GROUP	329,169	K4LTA	KC4DWT
NO. CALIFORNIA CONTEST CLUB	327,430	G0MFO	AJ6T
UPPER LAKE LIVINGSTON W.A.	316,950	AA5BL	N5OLS
NORTH ALABAMA DX CLUB	299,215	KU4J	—
NORTH TEXAS CONTEST CLUB	281,406	KY5N	K5WXZ
KANSAS CITY DX CLUB	252,908	NX0I	K0LW
CAROLINA DX ASSOCIATION	243,050	AA4V	AA4S
BAVARIAN CONTEST CLUB	218,075	DK2OY	PA3DWD
DIXIE DXERS	213,642	AB4LX	NQ4I
SALT CITY DX ASSOCIATION	189,162	K2KIR	NA2A
VERON (NETHERLANDS)	167,523	PA3DFT	—
ST. LOUIS ARC	164,013	K0LIR	K0LIR
MINNESOTA WIRELESS ASSOCIATION	151,130	W0AIH	—
CENTRAL FLORIDA DX ASSOCIATION	128,252	N6AR	—
CENTRAL COAST CONTEST PALS	128,050	N6RZ	N6RZ
NORTHERN OHIO ARS	119,177	WB8PHI	K8SVT
SNAKE RIVER RADIO CLUB	113,636	NK7U	NK7U
CANADIAN INT'L DX CLUB	86,290	VE6JY	VE6JY
VALLEY ARS	82,601	W4XD	W4XD
WESTERN NY DX ASSOCIATION	79,480	K2ZR	—
WESTERN WASHINGTON DX CLUB	71,750	W7BYR	—
SP DX CLUB	69,064	SP5INQ	—
H.I.C.K.S.	61,625	W9RE	W9RE
ALASKA DX ASSOCIATION	59,014	WL7E	—
PZK (POLAND)	57,797	SP9GDB	SP9GDB
TEXAS DX SOCIETY	55,854	AA5NK	KI3L
GRAND MESA CONTESTERS	50,185	KI0G	K0GAS
CENTRAL ARIZONA DX ASSOCIATION	46,388	KC7V	—
ARROWHEAD RAC	21,343	AA0AW	WB0SVA

contest . . . KQ1V. Couldn't hear Europe due to the stateside QRM . . . NY1V. Conditions poor. Caught the flu so KN1M and AD1G did the bulk of the operating . . . W100. Band jammed with stations . . . WO1P. Absorption from the flare killed NE USA the first night . . . K1ZM. Next year I'll try to have a better antenna . . . N2WK. Increased score by using 5/8-wave vertical wire supported by a helium balloon . . . W2CWW. Just a part-time effort as had to work the first night . . . AA1K.

No shortage of QRM . . . K5ZD. Band so noisy I had to put 20 dB of attenuation in—sort of like driving with the brakes on . . . KU3X. Tip of the hat to AA1AA for letting me work a weak station on his frequency . . . K3IXD. Thanks to everyone for the reports . . . AB4RU. Nice to hear old friends again this year . . . K4YT. Will miss N4IN in future tests . . . K4TEA. Florida is a terrible place for a 160 contest. It's hard to QSO the ocean . . . K4VUD. My first half-serious effort. Too bad conditions so poor . . . KE2JO. First contest ever. Was very nervous . . . N4XKU. Where did the West coast go? . . . N4XMX.

Always a fun contest . . . NX9T. Used our field day setup . . . W4DOC. Had laryngitis so bad so cut my operating time short . . . W4DMB. K1EA's CT program is fine, but I've got to learn to edit it . . . AA4MM. My first contest. Hope I didn't make too many mistakes . . . AC4EX. Biggest problem was finding a frequency for running Q's . . . K4JRB. Please re-establish the DX window . . . KF4HK. At nearly 83, I've slowed down some . . . W4HVU. Found out I could work nearly



Mike, K4PI, looks serious after making the world-high score from Aruba as P40PI. Mike edged out KP2A by about one contact for the top slot!

everyone I heard barefoot using my shunt-fed tower—sure saves on the light bill . . . W4UNP. Local thunderstorms sure messed up the first night . . . K5WXZ.

Must have been asleep at the mike to dupe KV4FZ . . . KA5T. First contest entered. Starting out looking for states. Will be back next year . . . KE5YD. Made successful trip to Arkansas . . . N3FTI/5. Conditions bad! . . . N5IA. Thunder shaking the building forced us to QRT early on Saturday morning . . . N5OLS. About same activity as last year . . . AA6EE. Second night OK, but still no DX . . . K6MO. Surprised to get my score over 1,000 points . . . K16PG. Sure would

be nice to work 160 from back east again . . . N4ARO/6. Finally worked Mississippi . . . N6JM. Wish I was in VP9AD's log . . . N6LL.

Terrible conditions . . . N6RZ. Did New England fall into the Atlantic? . . . W6GO. Second night FB! QSOs and no QRM . . . WA6AUE. Both amplifiers blew circuit breakers on Saturday so shut down after three contacts . . . WB6EGE. If the propagation had been a horse, I would have shot it . . . N7AVK. Antenna a full size "J" pole with top support up 400 feet on a commercial FM tower . . . N7BXX. We should all sign our call /N4IN as a tribute to Don in 1993 . . . NF7E. Almost as good a score as 1991 in one-half the time . . . WC7S. Conditions terrible . . . K7EG. Both operators 15 years old . . . KF8QE.

One op asked me if I was in Alaska. When I said no, he replied, "Oh, yeah, I wrote that down" . . . KL7FAP/W8. Lots of activity despite the bad conditions . . . W9RE. Heaviest activity yet . . . K9OSH. First 160 Meter effort. Know more of what to expect next time . . . KE0RO. Linear made my smoke alarm beep . . . KG5LD/0. 206-60-06! Somebody turned out the lights . . . KJ0B. Grandkids took most of my operating time . . . W0CEM. Tough to make contacts with 80 watts to a low sloper . . . WB0SVA. Where was Alaska? . . . WD5COV/0. Used abandoned AM broadcast site (two of three towers) as antenna . . . VC1FRT.

Kept hearing the same stations, over and over again . . . VE3CUI. Set up in a farmer's field, field-day style . . . VE3DC. No shortage of QRM . . . VE3DO. And I thought conditions couldn't get

worse. Silly me... VE6JY. Not much new activity the second night... KD9SV.

Soapbox SSB DX

Could copy USA 59 + *30, but they couldn't hear me... CT4RH. Sending in my log due to Ron, AB4RU... CU8AI. Signals from Europe swamped any WVE that made it through... DK0IW. No phone operation allowed in JA yet... HI8A/JA5DQH. Dario, IK4MED, made Russian QSOs in Russian... IR4T. Just discovered 160... ON4AEK. It's nice to work top band even if conditions were poor... SM6HRR. IS0 and SV5 new ones for me on 160... UA2EC. Weekend guests cut operating time... VP5JM. Poor antenna possibilities at hotel—only made three contacts... W2GD/8P9CV.

Heavy tropical QRN. Remember it's summer in Venezuela... YV1DRK. Needed more power. Could hear USA, but they couldn't hear me... PR0R. Strong aurora and an A index of 63 made for a green sky and a sick band... OY9JD. Selective fading on Europe. Very disappointing results... A92BE.

CW Multi-Op Station Crews

4N7A: YT7AC, YT7NW. **6D2X:** K5TSQ, W5VX. **A0AW & AA0BY:** AA1AA/2: AA1AA, packet. **AA4G & KC4KU,** KC9CS, WB4FNH, WW1N, KN4RI, N4UYO. **AA5BL & N5OLS.** **AB4RU & AA4GA,** KB4GID. **AD00 & N0ST.** **DJ1BZ/A:** DK1NO, DL1IAO. **DK0EE:** DK6WL, DL1MFL, DL3MFZ, DL4MCF, DL4MDO, DL4MEH. **DL0KF:** DF6LI, DJ7SW, DJ4FZ, DH1LAO, DF3LP. **DL5TV/P:** DL5TV, DL3SAU, DL3SAZ, DL4SAU, DL3SAS. **G0MFO:** AA6MC, packet. **HG5A:** HA5IW, HA5GF, HA6WX, helper Endre. **I2UIY & I2VXJ.** **JA0ZRY:** JP1QGO, JU0NCJ, JR0BOD. **JA3ZOH:** JG3KIV, JE3MAS.

K0LIR: N0KFE, AA0A, N0PKX, N0IS, W0YIJ, W0HBH, N0LIK, KB0KK, AA0CR, WA0IYY, WD0CHW, WD0FPY. **K1TWF:** packet. **K2TD:** packet. **K3LR & WR3G,** W3YQ. **K3ND:** packet. **K3UA & W3FSB,** packet. **K3WW:** packet. **K4AMC & WA6KUI.** **K4PB:** K4RKI, UC2AAA. **K5CM & N5KW,** WM4Z. **K5NA & WB2Q,** KU2Q. **K7EG:** KC8MK, NZ4K, KB8BOG, WD8IXE, KU8E, AA8EY. **K7SS & W7XR.** **K9BLY & K9BLY,** N5XR. **KB3MM & WB3FIZ,** WB3LFZ. **KC3CL & N8DZA.** **KD9SV & KA9A.** **KN1M:** net. **KN8Z & WA8YVR,** WX8T, WA8OSE. **N8JEC:** WU8A, NZ80. **K04HS:** packet. **KT7G & N0AX,** KR7G, K7LXC.

KU4J & W4BRE, KU0C, KB4HZ, WA4DPU, K4CEF, KC4ZV, KE4GY. **KY0A & KV0Q,** WB0HBS. **KY5N & KM5X.** **KZ3H:** packet. **N2BA & K8HVT.** **N2NT:** packet. **N2VW:** packet. **N4XM & AB4RX,** KD4U, NJ9C. **N4XMX:** packet. **N4ZZ & WY7I,** W9WI. **N6CDA:** packet. **N6CQ/3:** N6CQ, NY3G, WF3T. **N6DX & AD6C,** N6VR. **N7NW & WA7UVJ,** K7ND, KF7QF. **N8EA & K8LX,** K8GM, WA8ZDT. **NC1R & KN4GI.** **NF7E & AI7Z,** W7YS. **NK7U & NI7T.** **NS7K & K7OA.** **NX0I & K0LW,** KD0FW. **NX1G & K1XX,** NW1U. **NX1P:** packet. **OH0AM:** OH1JT, OH1NX, OH2BH, OH2MM. **OH2BCI & OH1XM.**

OK1KCR: OK1DQC, others. **OK1KSL:** OK1FAK, OL1BSP, OL1BXZ. **OK1KSO:** OK1AEZ, OK1CF, OK1JJB, OK1JKT. **OK1OKE:** ops. **OK1OPT:** OK1DOL, others. **OK2KBA:** OK2PMA, OK2BJL. **OK3KAP:** OK3TPV, OK3PA, OK3TMW, OK3TZW. **OK3KCM:** OK3NA, OK3CBU, OK3TOP, OK3TUC. **OK3KFF:** OK3CZA, OK3TGW, OK3TJW. **OK3RMB:** ops. **OK7MM:** OK3TKW, OK3WTI, OK3CTA, OK3YLA. **OM5JAK:** group. **PA3BAS & PA3AUC,** PA3DSB, PA3CLU, PA3BPL. **PI4ALK:** PA3DLA, PA3FPA, PA0XAW. **PI4COM:** PA3BWD, PA3AIU, PA3ERC. **RZ6AZZ:** RV6AGG, UA6BGL, UA6-101-355. **SK0UX:** SM0JHF. **SK6QW:** SM6BWQ, SM6LPF, SM6NJK, SM6RAS.

TA1KA/2: TA1E, TA2DS, TA2ZG, W2AV. **UZ10WZ:** UA10Z, UA10MS, UA1-113-244, UA1-113-630. **UZ2FWA:** UA2FF, UA2FJ, UA2FM. **UZ9JWV:** RA9JP, UA9TKM. **UZ90XJ:** UA9-145-670, UA9-145-669. **VC20J:** VE2FLD, VE3BDK, VE3KKU, VE3NJ. **VC7SV & VE7AGC.** **VE3DC:** VE3BZE, VE3LMS, VE30CY, VE30ZY, VE3TJB, VE3VFR, 2 SWLS. **VE6JY & VE6XH.** **VE7ZZZ:** VE7AV, VE7EME, VE7RBL. **WB0C & K8GG,** W8SEY, W8UVZ. **W0UN & K0RF.** **W10P & N1AKO,** W1GS. **W2GD & K2TW,** KU2C, W9NGA, packet. **W3FV:** packet. **W4DOC:** WA4CUG, K2UFT, N4REE. **W4LVM,** packet. **W8WEJ & AA4VV,** W8VVE, W9XR, packet. **WA0TKJ & K0WA,** N00Y. **WB2R:** packet.



Chances are if you worked Oklahoma you worked Myron, WM4Z, on SSB, or Myron teamed with K5CM on CW.



Antennas used by K5CM/WM4Z during the 160 Meter Contests in 1992. K5CM operator, N5KW, is at the 10 foot level of the big tower. Shouldn't he be at the 160 foot level?

WB6EGE: N6MQ, KA60PN, N6QC, WB6WPO. **WB9CIF:** packet. **WB9Z & K9ZO,** WS9V, AG9A. **WD9INF & W8IQ,** K8DD, N8COA. **WI8T & WX8G,** N8LVO.

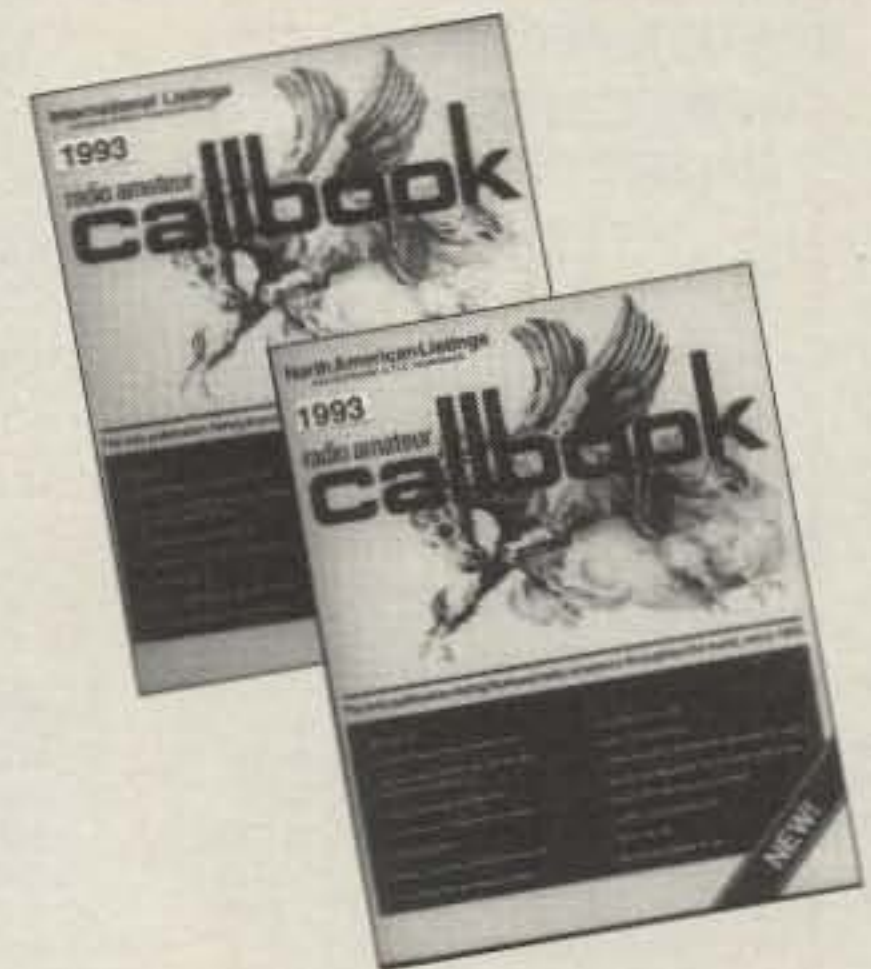
SSB Multi-Op Station Crews

AA1K: packet. **AB4RU & AA4GA,** KB4GID, K0DI. **AB4WY & KM4SO.** **DK0IW & DL5MFL,** DJ9MF, DJ9WH. **HB9TA:** HB9FAN, HB9FAE. **IR4T & I4YSS,** I4JMY, IK4IEE, IK4MED. **K0LIR:** AA0A, N0LIK, N0IS, N0PKX, NZ0V, KB0KK, N0KFE, KE0YO, WB0IUN. **K0LW & NX0I,** KD0FW, N0BIW. **K1TWF:** packet. **K3ANS & N3ADL,** WU3M, N2LAU. **K3TW:** spotting net. **K4PI:** packet. **K4TEA:** packet. **K5NA & KU2Q,** WB2Q, KY2J, N2GQS. **K7EG:** KC8MK, VE30ZB/W8, NZ4K. **KA3VEL & N3JRX,** KA3PVA. **KB1H & K1YRP.** **KE0RO & N0BSA,** KD0QL. **KF8QE & KF8DF.** **K04HS:** packet.

LY1BZB: LY2BDQ, LY2BSD, LY2BKF. **N2NU & KE2PF,** WW2Y, packet. **N2VW:** packet. **N4XKU:** packet. **N5OLS & N5NMX,** AA5BL, KI5LR. **N7BXX & N7DD,** WA7AHF, W0YOY, KF7NR. **NK7U & NI7T.** **NX1G & NW1U,** NX1P. **NX9T & N9JAS.** **NY1V & N1HRA.** **OK3KAP:** OK3PA, OK3TMW, OK3TZW, OK3TPV. **VC1FRT:** VE1BDI, VE1DXR, VE1JCI, VE1PBM, VE1STV. **VE2UMS:** VE2ATH, VE2GBY, VE2FAB, VE2HLS. **VE3DC:** VE3ANB, VE3ITS, VE3BZE, VE3LMS, VE30CY, 2 SWLS, VE30ZY, VE3TJB, VE3VFR. **VP9AD & N3RD.** **W100 & AD1G,** KN1M. **W2CWW:** KA2DMQ, NT2X, NA2V. **W3FV:** packet.

W4DOC: WA4CUG, K2UFT, N4REE, N4XDC, AA4LR, K14Y. **W4UNP:** packet. **W8UVZ:** packet. **W9AZ:** K9NR, WU9D, KE9MG, N9LCX, N9LCR. **WB0SVA:** AA0AW, KA0CDO, KB0JDX, KA0LAH, KB0JXS, AA0FY, AA0BY. **WB6EGE:** N6QC, WB6WPO. **WCT5 & Murpli.** **WM9M & WD8LLR.**

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**CW RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES
CONNECTICUT**

K1KI	276,752	901	59	39
K1TO	71,639	373	54	17
K1TN	22,272	195	41	7
W0MHK	17,625	157	42	5
K1VWL	16,728	180	38	3
AB1U	6,757	106	29	0
NY1V	6,567	69	33	0

MASSACHUSETTS

K8PO	307,867	903	58	45
WS1M	72,762	454	55	12
W1PL	67,024	287	49	22
W1FJ	60,970	314	49	16
W1BYH	53,630	374	54	8
KA1DWX	35,588	171	46	16
K5MA/1	23,760	177	48	6
W1AX	17,996	179	42	2
W1MK	9,888	131	31	1
AA1AA	2,310	45	21	1

MAINE

AD1G	113,652	362	55	29
N1CGP	15,211	159	39	2

NEW HAMPSHIRE

N1HFE	35,767	344	46	1
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RHODE ISLAND

WA1HYN	62,400	401	46	14
K2MN	14,445	137	43	2

VERMONT

K1IK	155,034	649	57	24
WA1GUV	11,649	160	33	0

NEW JERSEY

WA2SRQ	178,925	765	57	28
WA2VYA	55,205	390	53	8
K2SB	30,267	215	50	7
WU3A	22,352	229	42	2
W9NGA	15,794	119	47	6
W2HCA	11,880	148	36	0
KD2NT	5,709	77	32	1
K2JF	3,480	66	22	2
WA1YLP	1,548	40	18	0
WA0QOA	868	28	14	0

NEW YORK

K1ZM	362,308	1109	58	48
K2KIR	176,616	691	58	30
N2KW	133,896	622	58	26
WF2W	115,943	688	58	13
K2ONP	73,458	461	54	12
K2ZR	50,327	354	52	7
K2DB	42,625	343	52	3
KY2J	34,000	301	45	5
K2DW	29,480	337	40	0
KU2A	23,422	209	45	4
K2XA	17,934	158	45	4
W2FXA	17,328	150	42	6
W2JGQ	15,576	177	39	5
WB2ABD	11,825	114	38	5
WJ2Q	11,154	128	37	2
W2DMV	9,690	148	30	0
KB2NU	8,750	110	34	1
KR2V	8,316	108	33	0
W2GKZ	1,320	30	20	0

DELAWARE

AA1K	188,584	861	58	30
NW3Y	14,174	176	38	0
N8NA	2,260	52	20	0

MARYLAND

W3LPL	251,560	875	57	38
K3ZO	168,320	888	60	20
W3AZ	41,820	310	54	6
K3EI	33,288	255	51	6
WK3I	21,762	160	49	5
WD3P	20,378	198	43	3
KN5H	18,532	208	38	3
W3CPB	11,692	142	35	2

PENNSYLVANIA

W3UM	164,948	707	58	28
K5ZD	162,792	765	59	25
W3BGN	138,996	535	50	28
K3TUP	118,656	711	57	15

W3TS	113,245	644	57	14
W3OV	104,052	557	53	16
K3IPK	87,685	500	55	16
NN3Q	76,830	434	48	17
K3NW	57,096	400	53	8
WT3Q	51,150	300	50	16
KL7HIR/3	43,470	348	46	8
K3CP	41,040	341	50	4
WF3M	35,712	325	43	5
W3EHZ	22,797	210	46	5
KU3X	13,846	139	41	2
WI3U	13,533	173	38	1
K3II	13,448	137	38	3
NK3U	13,115	131	40	3
NE3F	12,285	140	38	1
K3MD	9,310	112	38	0
W3TDF	9,246	80	42	4
K3ANS	8,732	94	33	4
K3OX	5,100	75	29	1
K2DOX	4,239	71	26	1

ALABAMA

K4IQJ	38,849	330	47	6
WG4F	21,080	250	39	1
WA4AIA	1,300	28	20	0

FLORIDA

N6AR	116,449	533	56	27
N4IN	64,080	360	58	14
W4ROM	33,110	279	51	4
AA4MM	11,803	142	33	4
KK4UJ	7,038	89	30	4

GEORGIA

WX4G	138,429	709	57	24
N4RJ	118,080	529	56	24
AB4LX	81,874	534	55	12
K4SB	42,240	305	52	8
K4MJ	41,526	356	49	5
W4DMB	34,916	270	51	7
K3JT	33,385	257	45	10
KI4XO	32,370	194	55	10
N4NX	30,681	223	54	9
N4UZ	29,095	234	50	5
N8LM	25,872	236	44	5
K4UEE	19,796	164	39	10
K4ODL	17,101	133	42	7
KC4GR	13,872	110	45	6
W8BLA	5,508	84	24	3
KA4C	3,807	62	26	1
WB4FHF	3,753	61	25	2

KENTUCKY

K4TO	106,605	675	58	11
KA4IQD	51,861	398	53	6
KC4DWT	37,701	280	51	8
KM4FO	32,232	292	49	2

NORTH CAROLINA

KI6MS	65,736	405	52	14
N4UH	24,963	203	49	4
N4BNO	18,522	176	42	7
N4ROL	13,545	134	41	2
NX9T	13,459	129	39	4
WA4A	10,545	129	36	1
KS4S	9,940	133	33	2
KA2CDJ/4	6,400	64	37	3

SOUTH CAROLINA

AA4V	65,538	423	54	12
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TENNESSEE

K4LTA	136,620	888	56	13
AB4SW	37,642	275	52	7
K4XG	27,591	244	47	4

VIRGINIA

W4XD	70,028	521	56	5
KA4RRU	65,018	493	55	4
AB4RI	43,855	400	46	3
KX3Q	33,003	245	48	9
W4YE	31,784	236	51	7
K4BAM	23,226	204	45	4
WD4JHY	14,212	169	38	0
K4FPF	13,572	159	38	1
W4VC	11,268	136	33	3
W3FTG	4,004	71	26	0

LOUISIANA

K85GON	12,684	140	39	3
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NEW MEXICO

K85UL	70,749	487	55	8
K7UP/5	29,796	256	49	3
W5OLN	15,800	139	46	4
K4KIY	6,845	80	35	2

OKLAHOMA

W5EHY	13,912	142	43	4
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TEXAS

N5RZ	154,709	857	56	15
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N5TP	62,176	392	56	11
K5WXZ	49,010	310	56	9
W5FIX	47,082	367	50	7
K5LP	28,620	223	49	5
K5RX	26,565	201	51	4
KI3L	23,562	205	44	7
K5BJ	21,360	204	44	4
NA4M	18,200	161	48	2
WK5K	17,550	171	47	3
KA5T	16,269	133	46	5
W5MPX	8,120	94	38	2
W5IRP	24	4	3	0

CALIFORNIA

N6LL	106,470	560	54	11
N6RZ	59,148	349	54	8
K6MO	39,220	231	46	7
N6TV	36,975	288	45	6
W6PM	24,584	175	50	6
W6FSJ	24,200	214	45	5
AJ6T	24,158	206	42	5
WB6JMS	23,750	191	44	6
W6BIP	21,902	200	41	6
WA6FGV	21,206	203	42	4
WN4KKK	18,983	201	37	4
KI6CK	17,888	143	47	5
K6XK	17,556	119	34	4
N4ARO/6	16,412	159	40	4
N6NF	16,383	153	39	4
KK6C	14,400	123	41	4
KG6AO	10,537	104	38	3
K6XV	8,330	105	31	3
KH6DW/6	8,159	75	37	4
WB6ITM	8,050	97	30	5
W6JTI	6,528	82	29	3
WB6KUW	6,272	95	24	4
K0NW	4,872	68	26	3
AA6EE	3,850	70	23	2
W6HAL	3,750	60	24	1
WA6UFY	1,953	45	21	0
N6JM	1,856	46	14	2
W6MVW	994	30	13	1
KI6PG	902	38	10	1
N6AA	540	27	10	0
K6NA	528	17	9	2
W6PRI	304	16	7	1
W6SX	192	16	6	0

ARIZONA

NG7S	31,213	289	46	3
KC7V	29,468	254	49	4
N7RK	16,920	154	41	6
N7HID	4,592	79	28	0

IDAHO

KA7T	30,628	247	47	5
W7ZRC	23218	209	43	4

MONTANA

N0PP/7	64,923	512	52	5
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NEVADA

KG7D	89,586	535	54	9
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OREGON

AI7B	62,422	468	54	5
KI7Y	5,376	90	22	2

UTAH

W7MR	44,712	406	51	3
NZ7T	23,400	209	48	2
W7HS	15,648	144	45	3
K6XO	9,916	118	35	2
K7URK	5,024	68	31	1

WASHINGTON

K7GE	36,146	288	48	5
W7BYK	22,880	187	48	4
KX7L	17,380	164	41	3
W7RX	15,980	142	43	4
W7TSQ	15,949	159	38	3
N6MZ/7	15,834	162	38	

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HZ1AB	11,780	68	0	19	Y22AA	14,315	88	0	35	EA2CR	18	3	0	2	K3LR	208,662	1052	58	25	NX8I	104,195	726	58	7
SOUTH KOREA				DL7BQ	13,284	113	0	27	SVALBARD				N6CO/3	124,560	626	57	23	K8LIR	101,632	717	54	10		
HL9HH	2,577	173	0	3	DL1RNE/P	12,238	199	0	29	SWEDEN				KB3MM	114,684	640	57	19	CANADA					
TURKEY				DK3GI	11,880	87	0	30	JW8D	495	11	0	9	W3FV	70,623	494	53	10	QUEBEC					
TA4/DK7PE	285,376	464	14	50	DL5SWB/A	11,804	107	0	26	SWITZERLAND				K3UA	68,544	412	54	14	VC20J	142,450	538	52	3	
ASIATIC RUSSIA				Y57UD/P	10,458	121	0	21	SM3CVM	39,786	207	1	37	K3ND	37,359	235	53	10	ONTARIO					
UA8DW	1,200	58	1	3	Y26JD/GRP	8,715	94	0	21	SM3LGO	5,904	51	0	24	W9XR	29,288	216	47	9	VE3DC	123,066	474	51	3
EUROPE				Y43QF	8,575	76	0	25	SM6CMR	4,664	42	0	22	ALABAMA				ALBERTA						
AUSTRIA				DL7QU	3,843	42	0	21	UKRAINE				KU4J	192,610	942	58	27	VE6JY	78,100	293	49	6		
OE6IMD	63,123	229	7	46	DL3KWF	2,520	40	0	15	RT5UO	44,316	243	1	35	FLORIDA				BRITISH COLUMBIA					
BELARUS				DL2RON	1,952	25	0	16	RB5QW	43,168	249	0	38	AA4G	97,090	601	55	15	VC7SV	167,338	557	56	6	
UC2WAF	41,329	225	0	37	DL4KW	1,872	17	1	15	UB5FBV	41,280	248	0	40	NC1R	48,300	352	53	7	VE7ZZZ	101,616	365	52	6
UC2II	24,108	173	0	28	HA6PX	213,640	576	17	53	UB4IX	28,875	191	0	33	GEORGIA				MEXICO					
UC2OT	15,606	116	0	27	HABEK	109,327	354	8	51	RB4INR	20,619	161	0	29	AB4RU	270,528	1030	57	39	6D2X	277,894	741	56	15
BELGIUM				ICELAND				IRELAND				KENTUCKY				ASIATIC RUSSIA								
ON4UN	350,660	660	27	62	TF3DX	4,560	48	0	19	UB5ZKG	19,376	155	0	28	N4XM	102,136	660	55	13	UZ90XJ	2,985	36	0	15
BULGARIA				ITALY				WALES				NORTH CAROLINA				JAPAN								
LZ2JE	97,038	341	13	41	EI4HM	55,468	191	13	36	UB4IIE	5,593	87	0	17	K4PB	62,016	416	53	11	UZ9JWV	1,656	23	0	9
CZECHOSLOVAKIA				LITHUANIA				SOUTH AMERICA				TENNESSEE				EUROPE								
OK1AYP	89,607	370	6	45	YL2GVW	65,969	326	0	41	GW3JI	12,974	101	0	26	N4ZZ	93,852	629	56	10	JABZRY	9,090	142	8	7
OK2TBC	78,528	337	11	37	YL2SM	37,259	196	0	37	GW3GWX	9,296	62	5	23	K4AMC	26,460	246	46	3	JA3ZOH	5,236	101	6	8
OK1DRU	77,598	306	10	44	YL2KO	35,424	196	0	36	YUGOSLAVIA				OKLAHOMA				TURKEY						
OK1JDX	62,112	276	10	38	YL2TW	2,010	28	0	15	YU3EA	178,920	458	18	53	K5CM	113,815	779	56	9	TA1KA/2	160,515	361	3	42
OK2KOD	44,562	233	5	37	NORTHERN IRELAND				ARGENTINA				TEXAS				ASIALAND ISLANDS							
OK3TMI	42,353	230	6	35	GIBKOW	5,562	64	0	18	YU2AJ	106,575	426	2	47	AA5BL	184,160	903	55	25	OHBAM	191,632	652	6	50
OK2PWJ	41,668	199	5	39	THE NETHERLANDS				ARUBA				CALIFORNIA				CZECHOSLOVAKIA							
OK1DWJ	39,223	106	13	48	PA3DFT	95,167	278	13	46	P48PI	487,791	591	51	32	N6DX	140,760	654	56	16	OK1KSO	176,775	440	23	52
OK3CFY	38,560	224	0	40	LA1IE	16,320	94	1	33	PJ9JT	92,855	190	41	8	WB6EGE	20,496	183	43	5	OK3KAP	164,688	440	17	56
OK3KAG	35,610	265	0	30	LA8NC	8,400	73	0	24	FERNANDO de NORONHA				ARIZONA				OK3KFF						
OK3TLO	33,014	226	1	33	LA7SI	3,705	40	0	19	PY8FF	32,465	78	26	17	NF7E	36,250	273	52	6	OK3KCM	81,432	277	11	47
OK1FFC	30,303	193	0	37	LA9GY	1,196	19	0	13	MULTI-OPERATOR NORTH AMERICA				OREGON				OK3RMB						
OK2HI	29,008	174	2	35	LA4BQ	1,105	17	0	13	UNITED STATES CONNECTICUT				UTAH				OK1KSL						
OK3QW	25,113	187	0	33	LA4DM	650	13	0	10	N28A	154,761	797	59	20	NS7K	54,000	375	52	8	OK2KBA	50,360	280	3	37
OK2BWM	20,436	115	1	38	POLAND				MAINE				WASHINGTON				OK2KBA							
OK1FMU	16,675	131	1	28	SP2FWC	82,395	356	2	43	KN1M	63,120	452	50	10	N7NW	61,200	434	52	8	OK1OPT	13,936	127	0	26
OK1FMX	8,844	100	0	22	SP5INQ	54,920	273	0	40	NEW HAMPSHIRE				MICHIGAN				OK1OKE						
OK2PBG	8,554	70	0	26	SP3BGD	48,204	269	0	36	NX1G	267,995	909	59	36	W8CD	160,212	867	57	21	OM5JAK	6,446	73	0	22
OK2PAW/GRP	6,776	80	0	22	SP9GDB	39,680	195	0	40	RHODE ISLAND				OHIO				OK1KCR						
OK1DZR	5,380	64	0	20	SP7GIQ	14,144	110	0	26	W8WEJ	50,700	366	53	7	NK7U	64,080	453	54	6	OK2KBA	50,360	280	3	37
OK2BDR	5,346	75	0	18	SP5NOG	6,256	55	0	23	NEW JERSEY				WEST VIRGINIA				ENGLAND						
OK2BBQ	4,114	61	1	16	SP5GH	6,006	34	0	33	W2GD	309,162	1063	58	44	NS7K	54,000	375	52	8	G8MFO	136,604	321	21	50
OK3TLB/GRP	4,046	74	0	14	PORTUGAL				NEW HAMPSHIRE				ILLINOIS				FINLAND							
OL6BZY	2,595	43	0	15	CT1A0Z	130,784	290	27	40	N2NT	63,030	410	54	12	K7SS	130,985	712	56	11	OH2BCI	110,670	426	3	48
OK2BGR	1,870	18	0	17	RUSSIA				RHODE ISLAND				INDIANA				GERMANY							
OK20U	550	11	0	10	UA3AGH	20,331	154	0	27	W10P	81,048	484	54	12	KT7G	71,858	500	54	8	OH2BCI	110,670	426	3	48
DENMARK				SARDINIA				NEW YORK				MICHIGAN				ENGLAND								
OZ7YY	153,909	462	12	51	IS80MH	11,640	117	0	20	CONNECTICUT				OHIO				FINLAND						
OZ2JZ	31,878	196	0	33	GM3YOR	170,448	423	21	46	N28A	154,761	797	59	20	N7NW	61,200	434	52	8	OH2BCI	110,670	426	3	48
ENGLAND				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
G8NAA	169,119	428	18	51	IT9ZGY	137,293	429	13	46	CONNECTICUT				OHIO				FINLAND						
G3XTT	159,390	355	23	54	SICILY				CONNECTICUT				OHIO				FINLAND							
G3SXW	65,540	212	15	43	SICILY				CONNECTICUT				OHIO				FINLAND							
G4ODV	63,336	203	16	42	SICILY				CONNECTICUT				OHIO				FINLAND							
G4BWP	31,196	136	7	37	SICILY				CONNECTICUT				OHIO				FINLAND							
G3BPM	28,992	97	14	34	SICILY				CONNECTICUT				OHIO				FINLAND							
G3ESF	9,072	78	0	24	SICILY				CONNECTICUT				OHIO				FINLAND							
ESTONIA				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
ES5MC	117,550	444	3	47	SICILY				CONNECTICUT				OHIO				FINLAND							
FAROE ISLANDS				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
OY9JD	122,536	435	5	48	SICILY				CONNECTICUT				OHIO				FINLAND							
FINLAND				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
OH9NV	25,664	160	1	31	SICILY				CONNECTICUT				OHIO				FINLAND							
OG3QJ	19,236	137	0	28	SICILY				CONNECTICUT				OHIO				FINLAND							
OG7NW	9,300	78	0	25	SICILY				CONNECTICUT				OHIO				FINLAND							
OG8LAE	8,514	84	0	22	SICILY				CONNECTICUT				OHIO				FINLAND							
OH6YF	6,555	59	0	23	SICILY				CONNECTICUT				OHIO				FINLAND							
FRANCE				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
F6EPO	44,100	163	16	29	SICILY				CONNECTICUT				OHIO				FINLAND							
F6AML	39,504	140	13	35	SICILY				CONNECTICUT				OHIO				FINLAND							
GERMANY				SCOTLAND				MARYLAND				MICHIGAN				ENGLAND								
DK8ZB	197,500	483	22	57	SICILY				CONNECTICUT				OHIO				FINLAND							
DK3KD	122,976	396	17	46	SICILY				CONNECTICUT				OHIO				FINLAND							
DJ6TK	102,362	352	11	51	SICILY				CONNECTICUT				OHIO				FINLAND							
DJ4S0	101,616	374	9	49	SICILY				CONNECTICUT				OHIO				FINLAND							
DK20Y	101,280	365	15	45	SICILY				CONNECTICUT				OHIO				FINLAND							
DL1JF	70,362	266	9	45	SICILY				CONNECTICUT				OHIO				FINLAND							
Y42DA	32,153	187	1	36	SICILY				CONNECTICUT				OHIO				FINLAND							
Y22PE	27,528	169	1	36	SICILY				CONNECTICUT				OHIO				FINLAND							
Y21EF	26,350	170	0	34	SICILY				CONNECTICUT															

**SSB
SINGLE OPERATOR
NORTH AMERICA**

**UNITED STATES
CONNECTICUT**

W01P	26,840	281	41	3
KA1ILG	7,719	111	30	1
AB1U	3,058	62	20	2

MASSACHUSETTS

KA1BQ	57,929	456	42	11
AA1AA	33,024	345	39	4
KA1DXX	18,103	197	41	2
KB1FP	7,350	93	32	3
W1FJ	2,700	69	16	2
KQ1V	2,340	51	18	2

NEW HAMPSHIRE

K1HAP	31,476	330	38	5
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RHODE ISLAND

K2MN	4,872	78	27	1
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NEW JERSEY

WY2X	113,360	752	48	17
KN2T	66,495	549	45	10
KB2BF	21,567	254	34	5
KD2NT	16,910	199	35	3
K2FL	9,424	140	29	2
K2SB	8,410	125	24	5
W1GD	4,296	79	22	2
K2JF	3,850	71	24	1
WA2VYA	2,793	59	20	1
W2XN	1,558	35	18	1

NEW YORK

K1ZM	163,836	946	52	22
WF2W	51,357	453	47	4
NA2M	23,923	214	42	5
N2WK	15,440	176	38	2
NA2A	12,546	165	32	2
K2ONP	10,296	141	32	1
W2OMV	3,916	80	21	1
WJ2O	1,805	43	19	0

DELAWARE

NX3A	91,896	758	47	9
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MARYLAND

K4YT	82,824	655	49	9
K3IXD	30,240	310	44	1
W3GG	25,158	277	39	3

PENNSYLVANIA

W3BGN	100,165	606	48	19
W3TS	73,514	569	50	9
NE3F	71,624	574	49	7
K2DOX	55,200	503	44	6
KU3X	41,202	449	37	5
K3IPK	38,256	363	43	5
N3GSC	21,804	219	44	2
NN3Q	20,504	215	39	5
K5ZD	18,000	204	37	3
KA3AVB	13,230	177	34	1
N3CWP	12,710	140	39	2
W3EHZ	10,528	151	30	2
K3ND	7,458	101	31	2
AD3Z	7,424	108	31	1
W3AP	6,989	110	28	1
K3CP	6,960	104	28	2
NK3U	6,888	111	26	2
K3ATO	6,200	115	24	1
W3U	306	17	9	0
K3UA	52	5	3	1

ALABAMA

WZ4F	55,440	463	48	7
N4RNK	7,242	105	34	0

FLORIDA

AA4MM	92,750	546	51	19
K4VUD	26,988	229	42	10
W4PC	1,974	44	20	1

GEORGIA

NQ4I	105,896	790	50	11
K4JRB	105,740	701	52	16
K4ODL	50,850	479	45	5
WX4G	49,224	405	49	7
KI4XO	34,992	302	47	7
N4NX	22,256	197	47	5
K3JT	12,350	149	34	4
KB4NJ	9,867	118	36	3
W4DMB	7,242	102	33	1
N4XMX	6,634	101	30	1
W8BLA	4,284	66	27	1
N4HOH	2,231	44	22	1
W4UYC	1,824	45	18	1
N4TOL	1,188	30	17	1

KENTUCKY

KC4DWT	20,480	244	39	1
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NORTH CAROLINA

AA4S	78,603	649	49	8
KF4HK	31,100	293	46	4
N4UH	11,310	133	36	3
W4HVU	6,090	96	28	1
KS4S	966	33	13	1

SOUTH CAROLINA

AC4EX	24,068	256	40	4
K4YYL	18,900	177	47	3
W4TWW	5,024	74	31	1

TENNESSEE

N8UM	81,780	659	51	7
K4IUV	61,490	507	49	6
KE2JO	43,488	422	44	4
K4XG	12,321	162	35	2
K4AMC	2,392	46	23	0

VIRGINIA

WD4KXB	70,238	550	49	9
W4JVN	20,982	254	36	3
W4LMJ	14,079	164	37	2
W4XD	12,573	186	32	1
W4YCY	2,398	53	21	1

ARKANSAS

N3FTI/5	54,488	535	47	2
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LOUISIANA

KB5GON	3,668	64	27	1
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MISSISSIPPI

K5QBG	72,094	581	49	9
KG5XA	4,752	85	26	1

NEW MEXICO

N5IA	25,051	252	44	3
KE5YD	8,037	79	44	3

OKLAHOMA

WM4Z	20,081	223	42	1
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TEXAS

K5WXZ	41,688	349	50	4
AA5NK	32,292	289	47	5
KA5T	14,715	150	42	3
N5RZ	10,865	128	39	2
K5LP	10,836	116	39	3
WK5K	5,856	87	31	1
W5MPX	5,809	77	37	0

CALIFORNIA

N6LL	43,212	377	49	3
W6GO	35,932	313	47	5
N6RZ	24,010	217	46	3
AA6GK	21,480	249	38	2
WB6JMS	17,845	189	39	4
KH6DW/W6	12,492	153	34	2
AJ6T	10,824	146	31	2
KG6AO	9,792	123	35	1
N6AA	8,917	109	36	1
WA6AUE	7,648	105	30	2
KK6C	7,616	97	33	1
KI6CK	6,755	85	34	1
N4ARO/6	6,608	115	27	1
K6HIH	5,760	93	28	2
K6MO	4,300	79	24	1
N6NF	3,059	55	22	1
N6JM	2,599	49	23	0
WA6BOB	1,430	55	13	0
AA6EE	1,296	36	18	0
KI6PG	1,053	39	13	0
K6RRC	910	35	13	0
WA6UFY	384	14	12	0
KJ6JO	168	14	6	0

ARIZONA

NF7E	9,272	120	38	0
KE6GX	7,392	103	33	0

OREGON

N7AVK	29,397	310	38	3
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UTAH

W7MR	35,616	371	47	1
NS7K	10,160	121	40	0
W7HS	7,018	122	29	0
K6XO	1,275	41	15	0

WASHINGTON

W7AWA	5,890	127	18	1
N7LOX	1,068	37	12	0
W7TSO	384	22	5	1

MICHIGAN

KC8P	59,800	551	51	1
N8LMT	14,200	164	38	2
AA8AV	13,283	163	35	2
K8CV	7,744	112	30	2
N8CQA	1,656	40	18	0

OHIO

N8ATR	93,062	697	55	7
N8AA	28,273	256	43	6
KL7FAP/W8	18,648	207	41	1
K8MR	10,728	140	35	1
W8FDN	8,864	125	31	1
K8SVT	7,800	118	28	2
K8KSN	7,232	100	30	2
N8JQX	4,284	69	27	1
N8AXA/QRP	1,848	41	21	0
KW8M	1,764	42	21	0

WEST VIRGINIA

K8OQL	51,499	484	42	7
KV8S	14,315	194	34	1
W8VVE	10,914	153	33	1

ILLINOIS

WB9Z	193,809	1128	57	20
KR9G	17,756	178	42	4
K9ZO	8,588	100	36	2
K9IFO	7,200	105	31	1

INDIANA

KD9SV	100,863	732	53	10
W9HLY	59,900	565	46	4
W9RE	24,390	250	40	5
K80C	7,590	119	29	1
KF9CX	6,976	100	31	1
WB9NOO	2,442	54	22	0
KB9WP	2,178	45	22	0

WISCONSIN

WA1UJU	47,481	459	47	2
WA9TZE	25,200	248	47	1
K9OSH	6,524	99	32	0
KW9E	5,580	87	29	1
WD9IAB	5,518	80	31	0

COLORADO

AD8O	42,300	398	47	3
WD5COV/Ø	41,412	322	53	5
KØGAS	26,085	260	44	3

IOWA

KØRW	6,970	97	34	0
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KANSAS

WØCEM	24,910	256	44	3
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MINNESOTA

KJ8B	48,720	402	52	4
KG5LD/Ø	8,018	101	38	0
WØRXL	559	20	13	0

MISSOURI

KØJPL/Ø	7,986	111	32	1
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NORTH DAKOTA

NTØV	8,588	104	37	1
KAØZFX	6,204	88	33	0

CANADA

PRINCE EDWARD ISLAND

VY2SS	22,400	147	27	5
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QUEBEC

VE200	14,964	108	27	2
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ONTARIO

VC3EJ	336,804	1025	56	12
VE3PN	100,439	443	43	4
VE3MSN	72,756	318	46	1
VE3CUI	20,490	142	29	1
VE3ST	2,888	31	19	0
VE3DO	1,470	24	12	2

ALBERTA



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AFRICA			
CANARY ISLANDS			
EA8BWW	116	5	0 4

MADEIRA			
CT3M	57,860	110	17 38

ASIA			
BAHRAIN			
A92BE	36,762	123	0 33

KAZAKH			
RL9P	762	16	0 6

EUROPE			
AUSTRIA			
OE2FBN	24,990	157	0 34

AZORES			
CU8AI	4,086	31	8 10

BALEARIC ISLANDS			
EA6AAX	20,212	129	0 31
EA6PZ	66	5	0 3

BELARUS			
UC20GJ	20,856	122	0 33
UC2AJV	9,408	84	0 24

BELGIUM			
ON4AEK	35,070	200	0 35

BULGARIA			
LZ2CW	7,128	60	0 24

CZECHOSLOVAKIA			
OK1DXS	65,800	342	0 40
OK2PSZ	900	21	0 10

DENMARK			
OZ7YY	53,550	251	1 41
OZ3SK	34,440	169	0 40
OZ1ADL	1,778	26	0 14
OZ5MJ	1,040	22	0 10

ENGLAND			
G3NAS	12,845	67	2 33

FAROE ISLANDS			
OY9JD	30,286	158	0 38

GERMANY			
Y33VL	27,456	140	0 39

ITALY			
IV3PRK	78,832	304	7 45
IK5EPU	51,435	242	1 44
I3QJZ	44,572	202	7 37
I6FLD	36,616	158	5 41
IV3MUC	10,388	81	0 28
IK2IQR	7,128	78	0 22
I4GZV	5,635	50	0 23
I4CSP	1,419	33	0 11
I8IQM	1,417	26	0 13

KALININGRAD			
UA2EC	8,650	71	0 25

LATVIA			
YL2GUP	10,504	80	0 26
YL2GUO	2,910	39	0 15

NORTHERN IRELAND			
G10KOW	10,114	79	0 26

THE NETHERLANDS			
PA3DWD	20,545	118	0 35
PA0ZH	20,094	121	0 34
PA0IJM	9,408	82	0 24
PA2SWL	1,716	31	0 12

POLAND			
SP9GDB	18,117	106	0 33

PORTUGAL			
CT4RH	17,094	78	8 29
CT1AVR	4,256	44	0 19

ROMANIA			
YO3DCO	560	14	0 8

RUSSIA			
UA3YCC	16,632	111	0 33
RA3ZAP	12,475	100	0 25

SARDINIA			
IS0QDV	25,500	146	2 32

SPAIN			
EA3ALD	40,291	195	2 41
EA3CCN	36,449	180	2 39
EA3DVR	1,862	29	0 14
EA1FBO	810	18	0 10

SWEDEN			
SM6HRR	2,400	32	0 15

SWITZERLAND			
HB9CXZ	57,434	235	4 43

UKRAINE			
RY7D	53,696	505	0 32
RB5LBT	7,383	72	0 23

YUGOSLAVIA			
YZ3AA	20,790	119	4 29

OCEANIA			
HAWAII			
KH6CC	11,712	74	15 1

SOUTH AMERICA			
ARGENTINA			
LU4FDV	342	13	2 4
LU9FBS	108	8	1 2

BRAZIL			
PY5CC	486	18	1 5
PR0R	310	14	0 5
PP0W	295	14	0 5
PU5ATO	63	5	0 3

VENEZUELA			
YV1DRK	16,646	61	20 9

MULTI-OPERATOR NORTH AMERICA

UNITED STATES			
CONNECTICUT			
NY1V	37,444	397	41 3
KB1H	35,150	308	43 7

MASSACHUSETTS			
K1TWF	10,848	150	30 2

MAINE			
W100	57,120	441	46 10

NEW HAMPSHIRE			
NX1G	67,032	515	47 10

NEW JERSEY			
N2NU	166,075	961	52 21
N2VW	10,108	117	35 3

NEW YORK			
K5NA	121,290	822	52 13
W2CWW	46,359	402	43 8

DELAWARE			
AA1K	41,028	360	45 7

MARYLAND			
K3TW	7,101	124	26 1

PENNSYLVANIA			
K3ANS	114,420	860	49 11
KA3VEL	21,084	227	38 4
W3FV	10,140	118	35 4

GEORGIA			
AB4RU	207,860	1209	56 20
K4PI	69,148	543	50 9
AB4WY	63,510	509	49 9
W4DOC	55,998	482	45 9

K04HS	41,817	361	47 6
K4TEA	29,596	272	43 6
N4XKU	10,816	163	31 1

NORTH CAROLINA			
NX9T	52,841	468	48 5

SOUTH CAROLINA			
W4UNP	12,636	153	36 3

TEXAS			
N50LS	132,790	863	56 14

CALIFORNIA			
WB6EGE	1,710	45	19 0

ARIZONA			
N7BXX	64,752	523	51 6

OREGON			
NK7U	49,556	422	47 5

WYOMING			
WC7S	35,088	323	49 2

MICHIGAN			
KF8QE	30,960	336	41 2
W8UVZ	22,908	224	43 3

OHIO			
K7EG	118,976	841	53 11

ILLINOIS			
W9AZ	74,298	598	52 6

INDIANA			
WM9M	2,784	55	24 0

COLORADO			
KE8RO	40,082	388	46 3

MINNESOTA			
WB8SVA	8,388	109	36 0

MISSOURI			
K8LW	95,460	754	54 6
K8LIR	62,381	551	48 5

CANADA			
NEW BRUNSWICK			
VC1FRT	38,570	218	34 4

QUEBEC			
VE2UMS	13,344	115	23 1

ONTARIO			
VE3DC	82,280	392	42 2

BERMUDA			
VP9AD	402,240	943	50 30

EUROPE			
CZECHOSLOVAKIA			
OK3KAP	85,422	367	5 41

GERMANY			
DK8IW	34,164	206	0 36

ITALY			
IR4T	110,067	386	9 48

LITHUANIA			
LY1BZB	14,703	97	0 29

SWITZERLAND			
HB9TA	15,930	105	2 28

CHECK LOGS:			
Thanks to the following stations for their check logs for the SSB contest: OK1DWJ, RA4UDW, SP-0189-60, SP5NOG, UB5SEL, UC20GJ, UV3DUF, W4DA.			

MFJ halfwave vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed!

Operate 40, 20, 15, 10, 6, 2 Meters with this MFJ-1796 ground independent halfwave vertical antenna -- no radials or ground ever needed!

It's only 12 feet high and has a tiny 24 inch footprint! You can mount it anywhere from ground level to the top of a tower -- on apartments, condos, small lots, even on a motorhome. You can take it anywhere -- vacations, field day, DX-pedition, camping, nearly anywhere you go.

Frequency selection is fully automatic -- there are no moving parts, nothing to adjust -- all you do is transmit. It handles up to 1500 watts PEP. You'll work your share of DX because its low angle of radiation really reaches out and brings in DX.

During a contest, you'll love being able to quickly work one station after another from all directions because of its omni directional pattern.

It's so easy to put together that you can have it on the air in an afternoon.

How does MFJ achieve maximum efficiency in such a compact multiband antenna?

The key is *end loading* -- the most efficient form of loading known. The *entire length* of the antenna is always radiating power. There are no lossy traps to reduce effective length.

End loading provides multiband and full electrical half wavelength on each HF band. An optimum combination of capacitive hat and inductive end loading delivers a close 50 ohm match without a lossy impedance matching network.

Efficient high-Q loading coils are wound on low loss ceramic forms. Large 1-inch diameter aluminum radiators are used to keep losses to a minimum.

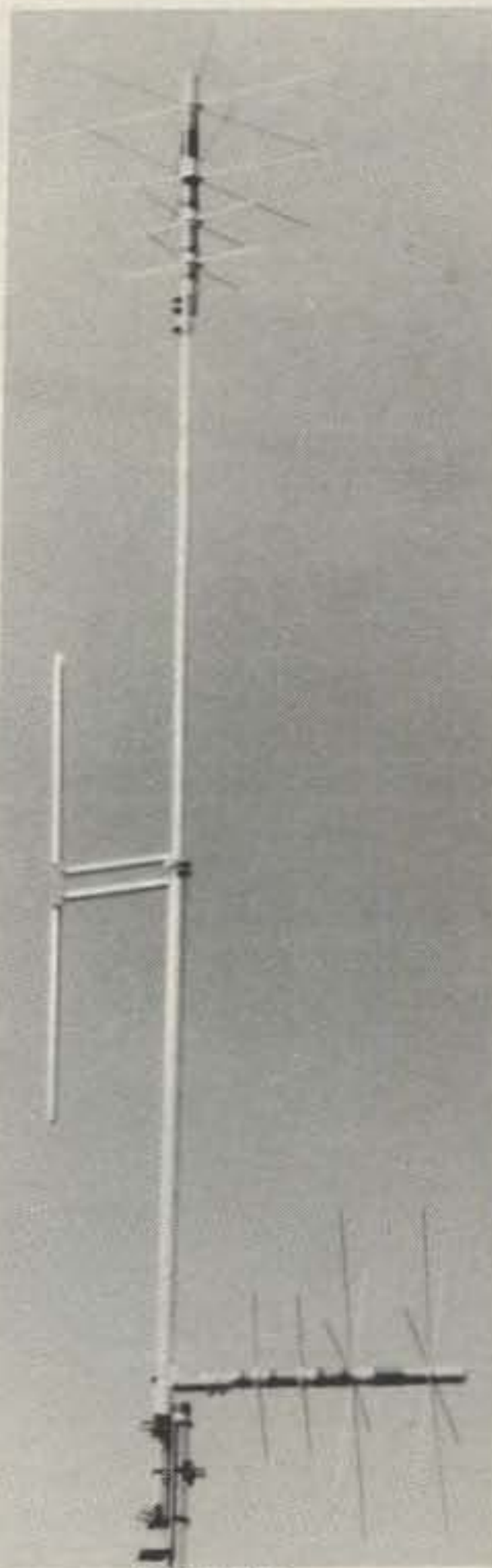
No Radials or Ground ever Needed!

The MFJ-1796 is balanced and center fed to totally eliminate the need for radials, counterpoises or a groundplane -- you don't have the kind of ground losses that's common with a quarter wave vertical.

No Feedline Radiation

There is no feedline radiation that causes pattern distortion and wastes power. The 50 ohm teflon coax feedline exits through the bottom radiator from a low impedance point -- the loading unit is mounted at right angles to decouple the feedline and to provide a low impedance point.

The feedline is further decoupled and isolated from the



MFJ-1796

\$189⁹⁵

antenna with a highly efficient *air-wound* choke balun. This decoupling attenuates RF on the outside of the coax and minimizes feedline radiation that waste useful power.

Easy to Adjust

It's very easy to optimize the MFJ-1796 for your favorite part of the band. Frequency adjustments are nearly independent -- adjusting one band has minimum effect on the resonant frequency of the other bands -- unlike most other multiband antennas.

Built to Last

You get an antenna built with heavy duty, extra thick wall aluminum radiators, machined aluminum parts and stainless steel hardware.

The coils are wound on tough *low loss* ceramic forms using durable *teflon* covered wire that's highly weather resistant.

Full halfwave on 2 and 6 Meters

On 2 Meters and 6 Meters, MFJ's unique stub decoupling and efficient full size halfwave elements really get you out with low angle radiation for lots of DX.

The most for your Money

For **\$189.95**, the MFJ-1796 gives you the most for your money -- no other multiband, automatic band-switching, ground independent DX antenna even comes close.

No Matter What™ Guarantee

You get MFJ's famous one year *No Matter What™* unconditional guarantee. That means we will repair or replace (at our option) your MFJ-1796 halfwave vertical antenna *no matter what* for a full year.

Continuing Service

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

Made in USA

MFJ halfwave verticals are made in the USA. Help our fellow Americans by keeping our money here -- buy Made in USA.

Call Your Dealer for Your Best Price Today

Enjoy DXing and ragchewing on six bands from your apartment, condo or anywhere. Call your favorite dealer for your best price and order your MFJ halfwave vertical today!

Shortwave Regenerative Receiver Kit



MFJ-8100K
\$59⁹⁵

Remember hunching over your regenerative receiver for hours with a pair of phones pressing uncomfortably against your ears?

You could hear just about anything that fancy superhets could hear. Sure, you had to play around with the regeneration control just right and have a steady hand to tune but you could hear'em.

Don't you wish you could relive some of this fun and excitement of your youth -- share some of it with your kids and grandkids?

Well, you can -- with the MFJ-8100 World Band Shortwave Radio Kit.

Spend a fun evening with your child or grandchild and help him put this simple kit together. When you two finish, watch him glow with excitement as he tunes the world bands -- just like you did -- and remember for life.

This baby performs. It has an RF stage to really pick up the weak ones and it goes into regeneration smoothly without pops or dead spots. Stations all over the world will come in loud and clear with just a 10 foot wire antenna.

Listen to international shortwave broadcasts, hams on SSB and CW, WWV, RTTY, packet and much more. Covers all or part of 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15, 13 Meters in five bands.

It has vernier reduction drive, bandswitch, volume and RF gain controls, uses a 9 volt battery and is built into a rugged aluminum cabinet.

Two earphone jacks let you and your child or grandchild listen together with your Walkman style earphones or plug-in speakers. 7x6x2½ inches.

Order one as a gift for your child or grandchild . . . or for yourself.

MFJ-8100K, \$59.95 kit; MFJ-8100W, \$79.95 wired and tested.

300 KHz-200 MHz Active Antenna

Wish you could hear everything your expensive general coverage transceiver or receiver is capable of receiving?

Your ham band only antenna does great in the ham bands . . . but plug this new MFJ all band active antenna into your general coverage transceiver or receiver and you'll hear strong clear signals from all over the world from 300 KHz to 200 MHz--including low, medium, shortwave and VHF bands.

You'll enjoy up-to-the minute international shortwave newscast, ship-to-shore, airline, commercial RTTY and even military traffic. Use your data controller to receive FAX news photos, weather maps, Navtex and more.

Take it on trips and use it with your mobile or QRP rig to listen. Also improves weak noisy scanner radio reception from low band to high band VHF -- hear signals you couldn't hear before.

A J-310 FET handles strong signals and a new *noiseless feedback* circuit gives you excellent low noise reception. A 4.5 GHz MRF-901 transistor lets you receive weak signals well into VHF.

Detachable 20 inch telescoping antenna. Uses 9 volt battery or 110 VAC with MFJ-1312B, \$12.95. 3½x1¼x4 inches.

MFJ-1022
\$39⁹⁵



Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)

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MFJ . . . making quality affordable
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CQ REVIEWS:

The Yaesu FT-890 HF Transceiver

BY JOHN J. SCHULTZ*, W4FA

Yaesu describes the FT-890 as the "world's smallest high-performance mobile" transceiver. Well, it is certainly true that the FT-890 is compact, and it does claim to incorporate in one package a host of features not available in other compact HF transceivers—for example, modern low-noise circuitry, dual VFOs for each band, 32 tunable memories, general-coverage receive, AF speech processing with audio response tailoring, built-in keyer, and a built-in automatic antenna tuner! Although Yaesu refers to the FT-890 as a mobile transceiver, it definitely represents a new-generation compact HF transceiver that is really suited for any portable, mobile, or fixed-station application. The FT-890 does have some innovative circuitry, but its real genesis lies in putting an unusually broad array of features into a very compact HF transceiver package.

Well, since I've already used the word "compact" a few times, its meaning deserves some quick clarification. I don't know if the FT-890 is the "world's smallest." Considering all of its built-in features, the statement is probably true. Considering that the FT-890 has so many built-in features, can be comfortably manually tuned, and has easily viewable frequency, meter, and control displays, it's a notable achievement in a "compact" transceiver design.

Specifications

Table I shows the specifications for the FT-890. They are not quite as "dry" as they look, although you do have to slowly read through them to appreciate their scope. The physical and electrical characteristics are clearly described.

Some of the more interesting electrical specifications include that for the transmitter duty cycle, shaped SSB audio response, the automatic antenna tuner's impedance range, and on the receive side, the excellent IF/Image rejection figures and the excellent shape factor of the standard SSB/CW, wide/AM, narrow/IF filter.

I didn't try to vigorously check every specification, but I did check out a sam-



The front panel of the FT-890 contains a fair number of controls and pushbutton fields, but it's a nicely balanced arrangement for such a compact transceiver.

pling and I feel they are conservatively correct.

Operational Features

The FT-890 is a very sophisticated transceiver. However, the designer of any transceiver faces an enormous challenge in trying to present the features of a sophisticated transceiver to the user. The front-panel layout/controls are pretty much the key to the situation. We all like the sophisticated features of the newer transceivers, but the front-panel layout/controls have to be very strongly "user-friendly" if we are going to enjoy a given radio.

The front-panel layout of the FT-890 strikes a nice balance. The knobs the user is likely to use frequently (main tuning, gain controls, and selectivity controls) are nicely dimensioned. Then there are several fields of pushbuttons which allow access to all sorts of functions. Generally, the pushbuttons to the left of the main tuning allow for mode selection, meter function selection (ALC, power output, or automatic SWR readout), processor on/off, AGC time constant, etc. The pushbuttons to the right all have to do with frequency manipulation except for two, which control the built-in

automatic antenna tuner. The controls for the built-in keyer are on top. "Power-up" customizing of various features seems to be standard on most sophisticated transceivers these days, and the FT-890 is no exception.

Table II presents the FT-890's menus. Actually, they are worth a bit of study, since they summarize various features that would be too tedious to detail in the basic specifications for a transceiver. As can be seen, the tuning rate can be changed, BFO offset displayed, speech-processor IF offset varied, scan modes changed, etc. The FM mode has been well treated. Repeater shift can be varied up to 200 kHz and any CTCSS tone from 67.0 to 250.3 Hz selected.

The FT-890 can be readily used for digital modes and computer control used to remotely handle practically any feature on the transceiver. However, Yaesu, much to their credit, does note that the optional 500 Hz narrow CW filter is not available for reception in the SSB modes needed for AFSK transmission. The 2.2 or 2.4 kHz SSB bandwidths will work, of course, but are not optimum for receiving narrow-shift AFSK.

The FT-890 has a wide variety of frequency setting/manipulation possibilities besides just turning the main tuning knob.

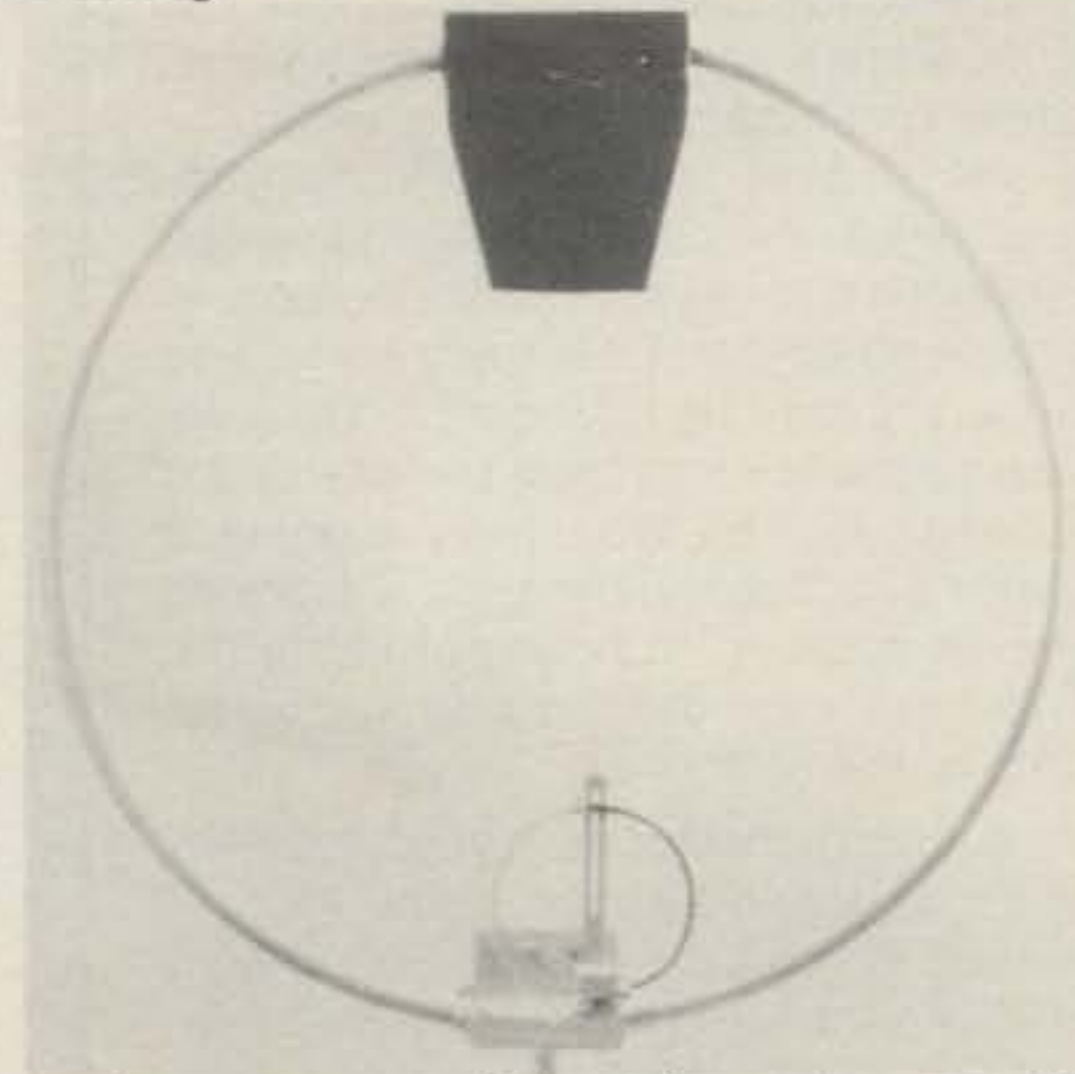
*302 Glasgow Lane, Greenville, NC 27858

MFJ Super Hi-Q Loop™ Antenna

... 36 inch diameter -- it's the smallest, high efficiency 10-30 MHz continuous coverage antenna ever made for ham radio ...

- Only 36" diameter but covers 10-30 MHz
- Round conductor more efficient than flat strip
- No control cable needed
- All welded construction
- Welded butterfly capacitor, no rotating contacts
- Automatic Band Selection™, SWR/Wattmeter

MFJ-1784
\$199⁹⁵



When was the last time you saw a fully assembled multiband HF antenna that fits in the back of a tiny Toyota?

Only 36 inches in diameter, the portable MFJ Super Hi-Q Loop™ is the smallest high efficiency 10 to 30 MHz continuous coverage antenna ever manufactured for ham radio.

You can take it with you and have it up and operating in minutes from nearly anywhere -- on trips, vacations, from hotels, DX-peditions, camping, even from a motorhome.

Its rugged all welded aluminum construction with built-in mounting bracket makes it ideal for home installations where space is limited -- apartments, condos, small lots, attics, closets -- it's so small it'll hardly be noticed.

The excellent performance of a high efficiency small loop antenna is well known and well proven by users all over the world.

It's almost as efficient as a dipole but gives you much better DX performance -- especially when mounted vertically near ground level.

Vertical mounting gives you both low angle radiation for DX and high angle radiation for close-in local contacts -- it's like having a vertical and a dipole combined into one. By rotating it you can null out QRM. Horizontal mounting gives you omni directional coverage.

The MFJ Super Hi-Q Loop™ antenna is a remotely tuned high-Q antenna with a narrow bandwidth that reduces transmitter harmonics, receiver overloading and out-of-band interference. It does not need a ground, radials or counterpoise. It covers 10-30 MHz continuously including the WARC bands with SWR less than 1.5 and handles 150 watts. No external antenna tuner is needed.

It's also a very quiet receiving antenna because it responds to magnetic fields and not electric fields -- you'll hardly notice static crashes during a storm.

10 reasons why the MFJ Super Hi-Q Loop™ beats the competition

Reason 1. The MFJ Super Hi-Q Loop™ has a more efficient radiator -- its large round conductor has less RF loss resistance than a thin flat strip conductor. You radiate more power.

Reason 2. It's built like a tank -- 1.050 inch diameter, thick wall aluminum radiator, all welded construction, no mechanical joints,

welded butterfly capacitor with no rotating contacts.

Reason 3. You don't need a separate control cable -- the coax feedline carries both RF power and tuning control signals. The feedline is decoupled and isolated by a balanced to unbalanced transformer (balun) so the feedline does not radiate.

Reason 4. MFJ's exclusive Automatic Band Selection™ auto-tunes to your desired band and lets you know with a beep.

Reason 5. Dual Fast and Slow tune push buttons make the remote control much simpler to use.

Reason 6. A Cross-needle SWR/Wattmeter with two ranges is built into the remote control.

Reason 7. The remote control is completely self-contained because it

because most of the strip carries very little current ... it is not the amount of conductor surface that determines the resistance to alternating current, but rather the way in which the conductor material is arranged."

Fact: A large round conductor has much less RF resistance than a thin flat strip.

Because the MFJ Super Hi-Q Loop™ uses a large 1.050 inch diameter round conductor for its radiator -- not a thin flat strip -- it's more efficient. You radiate more precious power and waste less as heat.

Remote Control (included) makes MFJ Super Hi-Q Loop™ easy-to-tune and extra portable



Super Loop™ Remote Control

MFJ's exclusive Automatic Band Selection™ feature auto-tunes to your desired band and lets you know with a beep.

It's extra portable because ...

... you don't need a separate control cable -- the coax feedline carries both RF power and tuning control signals.

... you don't need a separate SWR meter -- a two range Cross-Needle SWR/Wattmeter is built-in.

... you don't need a separate power cord because it's battery powered -- you can also use isolated 12VDC or 110 VDC with optional MFJ-1312B, \$12.95. 3¼x6x2½ inches.

uses internal AA batteries (not included). You can also use isolated 12 VDC or 110 VAC with MFJ-1312B, \$12.95

Reason 8. It's an incredibly low \$199.95 -- that's 40% less than the nearest competition.

Reason 9. You're protected by MFJ's famous No Matter What™ one year Unconditional Guarantee.

Reason 10. If you ever need help with your MFJ Super Hi-Q Loop™, you can call MFJ's exclusive toll-free technical help line 800-647-TECH(8324) and get expert help from a friendly MFJ Customer Service Technician.

Round conductor has less RF resistance than flat conductor

The following is quoted from *Electronic and Radio Engineering* by Frederick Terman, 4th edition, page 22: "... with a conductor consisting of a thin flat strip, ... the current flows primarily along the edges, ... the true or effective resistance will be high

How can MFJ make the Super Hi-Q Loop™ so affordable?

By setting up an entire operation to build the MFJ Super Hi-Q Loop™ in volume, MFJ can reduce production and material cost and improve quality.

A production machine was custom built to automatically form thick wall aluminum tubing into precise loop antenna radiators.

MFJ builds the variable capacitor, does the welding, punching and forming and builds the electronics.

By doing as much as possible in-house MFJ reduces cost and brings you a better quality product -- it's Made in USA at its best.

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 Super Hi-Q Loop™ (at our option) no matter what for a full year.

Call your dealer for your best price

Take this portable multiband HF antenna with you and enjoy ham radio wherever you go. Call your dealer for your best price and get your MFJ Super Hi-Q Loop™ today.

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It would be impossible to describe all the possibilities, but they revolve around a total of 84 tunable *and* scannable memories. Two special memories accept frequency limits for scanning in case you wish to constantly scan a small segment of a band. Scanning can be made to stop when the squelch is opened or to stop and then proceed after a time delay. Frequencies can be transferred around between memories. There is no keypad frequency entry. The user has to start by tuning a VFO to a desired frequency and then transferring it around as desired. What are you going to do with 84 tunable memories? I have no specific answer. In hours of using the FT-890 I've only utilized perhaps a few dozen of the memories.

Speaking of memories, if you have read along a bit, you may have noticed that at the start of the article I mentioned dual VFOs for each band and 32 tunable memories. In the preceding paragraph I mentioned 84 tunable memories. How do those numbers add up? Well, I was rather confused at first, but the numbers are correct.

First of all, there are ten bands in the FT-890. Ten meters is split into two bands, the top one starting at 29.0 MHz, although it is not indicated in Table I. Therefore, two VFOs per band accounts for 20 memories. There are 32 tunable memories, *but* each memory has what Yaesu calls a front and back half, or what I would call a VFO A/B feature, since the front and back "halves" are accessed by means of the VFO A/B pushbutton. As long as any frequency placed into either half of any memory is within an amateur band, it can be used for transmission as well as reception directly without having to get back to one of the 20 amateur band memories. Therefore, $2 \times 32 = 64$ and then add 20 and you get to 84!

When I first used the FT-890, I was too hung up on the dual VFO per band scheme used in the FT-1000, where you press a band pushbutton either once or twice to access either VFO A or VFO B for a given band. The FT-890 does not have a keypad, such as in the FT-1000, so obviously Yaesu had to use a different scheme. The scheme used is simple and straightforward, but I didn't catch on to it immediately simply because of my exposure to the FT-1000. In the FT-890, if you select A and then tune around any given amateur band, VFO A will return to the last used frequency on any one of the ten amateur bands. In effect, there are ten VFO A's. The same is true for VFO B. If you toggle between VFO A and B, the last used band frequency in either VFO is displayed. The frequency data for other bands is not lost when you tune around with either VFO on a given band.

The scheme allows great flexibility if you engage in split or crossband operation using VFO A/B setups, or if you simply want to check a given frequency on a band, by toggling the VFO A/B pushbutton, while continuing to operate on another band.

General

Receiving frequency range: 100 kHz – 30 MHz

Transmitting frequency ranges:

160-m band, 1.8 to 2.0 MHz
80-m band, 3.5 to 4.0 MHz
40-m band, 7.0 to 7.5 MHz
30-m band, 10.1 to 10.5 MHz
20-m band, 14.0 to 14.5 MHz
17-m band, 18.0 to 18.5 MHz
15-m band, 21.0 to 21.5 MHz
12-m band, 24.5 to 25.0 MHz
10-m band, 28.0 to 29.7 MHz

Frequency stability: $< \pm 10$ ppm, or
 $< \pm 2$ ppm from -10 to $+50$ °C w/TCXO-3 option

Emission modes: LSB/USB (J3E), CW (A1A),
AM (A3E), FM (F3E)

Basic frequency steps: 10 Hz for CW and SSB;
100 Hz for AM and FM

Antenna impedance: 50 Ω nominal without ATU
16.5 to 150 Ω with ATU (unbalanced)

Supply voltage:
13.5-V DC $\pm 10\%$, negative ground

Power consumption (approx.):
1.5 A receive (no signal)
20 A transmit (100 watts)

Dimensions (WHD): 238 x 93 x 243 mm

Weight (approx.): 5.6 kg (12.3 lbs)

Transmitter

Power output:
adjustable up to 100 watts (25 watts AM carrier)

Duty cycle: 100% @ 100 watts PEP SSB

Modulation types:
SSB: Balanced, filtered carrier
AM: Low-level (early stage)
FM: Variable reactance

Maximum FM deviation: ± 2.5 kHz

Harmonic radiation: > 50 dB below peak output

Spurious radiation: > 40 dB below peak output

SSB carrier suppression:
 > 40 dB below peak output

Undesired sideband suppression:
at least 50 dB below peak output

Audio response (SSB):
not more than -6 dB from 400 to 2600 Hz

3rd-Order IMD: -31 dB typ. @ 100 W PEP, 14.2 MHz

Microphone impedance: 500 to 600 Ω

Receiver

Circuit type: dual-conversion superheterodyne

Intermediate frequencies:
70.455 and 455 kHz, 8.215-MHz Notch IF

Sensitivity:
(for 10 dB S/N, 0 dB μ = 1 μ V)

Frequency \Rightarrow Mode (BW) \Downarrow	150 – 250 kHz (IPO on)	250 – 500 kHz (IPO off)	0.5 – 1.8 MHz (IPO off)	1.8 – 30 MHz (IPO off)
SSB, CW (2.4 kHz)	$< 5 \mu$ V	$< 2 \mu$ V	$< 1 \mu$ V	$< 0.25 \mu$ V
AM (6 kHz BW, 400-Hz, 30% mod)	$< 40 \mu$ V	$< 16 \mu$ V	$< 8 \mu$ V	$< 1 \mu$ V
29-MHz FM (for 12 dB SINAD)	—	—	—	$< 0.5 \mu$ V

Selectivity ($-6/-60$ dB):

Modes	Minimum -6 dB BW	Maximum -60 dB BW
SSB, CW wide, AM narrow (without options)	2.2 kHz	4.2 kHz
SSB, CW wide, AM narrow w/YF-101 option	2.4 kHz	4.2 kHz
CW narrow with YF-100 option	500 Hz	1.8 kHz
CW narrow with XF-455K-251-01 option	250 Hz	700 Hz
AM (wide)	6 kHz	18 kHz

Squelch sensitivity:
1.8 – 30 MHz (CW, SSB, AM): $< 2.0 \mu$ V
28 – 30 MHz (FM): $< 0.32 \mu$ V

IF rejection (1.8 – 30 MHz): 70 dB or better

Image rejection (1.8 – 30 MHz): 70 dB or better

IF Shift range: ± 1.2 kHz

IF Notch filter attenuation: 30 dB or better

Clarifier tuning range/steps: ± 9.99 kHz/10 Hz

Maximum audio power output:
at least 1.5 watts into 4 Ω with $< 10\%$ THD

Audio output impedance: 4 to 8 Ω

Automatic Antenna Tuner Options

Impedance range: 16.7 – 150 Ω (unbalanced)

Frequency range: see Transmitting ranges, above

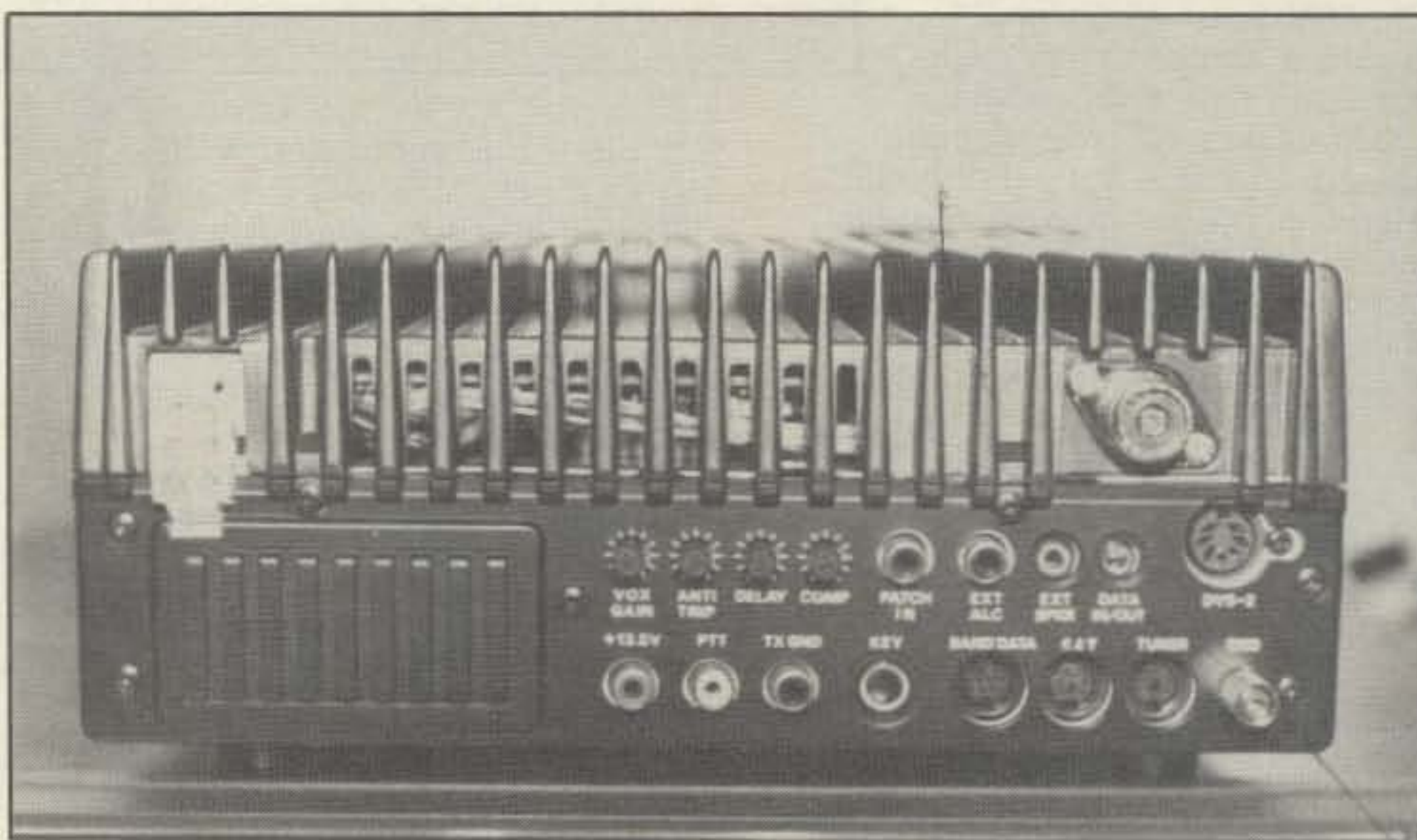
Min. auto-tune & Max. power range: 8 – 120 watts

SWR when matched: less than 1.4:1

Matching time: within 30 seconds

Specifications are subject to change, in the interest of technical improvement, without notice or obligation.

Table I—Specifications for the FT-890.



The rear panel contains some less frequently used controls plus connectors galore for just about any sort of external connection or control.

BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW



MFJ-422B

\$134⁹⁵

The best of all CW world's -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. You get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/ tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 volt battery or 110 VAC with MFJ-1305, \$12.95.

The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5/2 inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

Deluxe 300 W Tuner



MFJ-949D

\$149⁹⁵

MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Antenna Bridge

MFJ-204B

\$79⁹⁵

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed -- take it to your antenna site. Determine if your antenna is too long or too short, measure its resonate frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built-in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, \$12.95.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise ... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, \$12.95.

MFJ-1024 \$129⁹⁵

MFJ-1312, \$12.95.

VHF SWR/Wattmeter

MFJ-812B

\$29⁹⁵

Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.

MFJ Coax Antenna Switches



\$34⁹⁵ MFJ-1701



\$21⁹⁵ MFJ-1702B



\$59⁹⁵ MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year unconditional guarantee. MFJ-1701, \$34.95. 6 pos. 2 KW PEP, 1 KW CW. 1.8-30 MHz. 10x3x1 1/2 in. MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection device. Center ground. 2.5 KW PEP, 1 KW CW. Low SWR. Isolation better than 50 dB at 500 MHz. Negligible loss. 50 ohm. 6 1/4 x 4 1/4 x 1 1/4 in.

"Dry" Dummy Loads for HF/VHF/UHF

MFJ-260B \$28⁹⁵



MFJ-264 \$59⁹⁵



MFJ-264N \$69⁹⁵

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. MFJ-260B, \$28.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 Watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2 x 2 1/2 x 7 in. MFJ-264, \$59.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches. MFJ-264N: "N" connector.

HF or VHF SWR Analyzer™

MFJ-207 \$99⁹⁵

MFJ-208 \$89⁹⁵

MFJ's revolutionary new SWR Analyzers give you a complete picture of your antenna SWR over an entire band -- without a transmitter, SWR meter or any other equipment. Just plug your antenna into the coax connector, set your SWR Analyzer™ to the frequency and read SWR off the meter. You can find your antennas true resonant frequency right at your feedline -- something a noise bridge can't do. Battery operated and handheld sized -- makes it sooooo easy to work on antennas. MFJ-207, 1.8-30 MHz; MFJ-208, 142-156 MHz. 9V battery or 110 VAC with MFJ-1312, \$12.95.

MFJ Speaker Mics

MFJ-283, 284, 285, 285L, 286, 287 or 287L \$24⁹⁵ each

MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk. You get a wide range speaker and first-rate electret mic element for superb audio on transmit and receive. Earphone jack, lapel clip, PTT. MFJ-284 fits ICOM, Yaesu, Alinco. MFJ-286 fits Kenwood. MINIATURE SPEAKER MICS: 2" x 1 1/4" x 1/4". MFJ-285 and MFJ-285L (with "L" connector) fit Icom, Yaesu or Alinco; MFJ-287 or MFJ-287L fit Kenwood; MFJ-283: Split jack Alinco. All features of compact models. One year guarantee.

MFJ-1278 Multi-Mode Data Controller

MFJ-1278 Use computer to transmit/ receive in all 9 digital modes: Packet, AMTOR, ASCII, CW, RTTY, FAX, SSTV, Contest Memory Keyer and Navtex receive. Automatic Signal Analysis™ (ASA™), Easy-Mail™, printer port, 20 LED tuning indicator, AC supply, Host, Multi-gray level modem, CW key paddle jack and tons more. Options include 2400 baud modem (MFJ-2400, \$69.95) and software with cables for IBM compatible, Commodore 64/128, Macintosh and VIC-20. MFJ-1278T, \$359.95. MFJ-1278 with 2400 modem built in.

MFJ-1278 \$279⁹⁵

Options include 2400 baud modem (MFJ-2400, \$69.95) and software with cables for IBM compatible, Commodore 64/128, Macintosh and VIC-20. MFJ-1278T, \$359.95. MFJ-1278 with 2400 modem built in.

12/24 Hour LCD Clocks



\$19⁹⁵ MFJ-108B \$9⁹⁵ MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4 1/2 x 1 x 2; MFJ-107B 2 1/4 x 1 x 2 in.

Cross-Needle SWR Meter

MFJ-815B

\$69⁹⁵

MFJ Cross-Needle SWR/Wattmeter has a new peak reading function!

It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Deluxe Code Practice Oscillator

MFJ-557 \$24⁹⁵

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter (\$12.95) that plugs into a jack on the side.

Earphone jack for private practice, Tone and Volume controls for a wide range of sound. Speaker. Key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8 1/2 x 2 1/4 x 3 3/4 in.

MFJ Multiple DC Outlet

MFJ-1112 \$29⁹⁵

New MFJ DC Power Outlet saves you space and money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 13 1/2 x 2 3/4 x 2 1/2 in.

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Power-Up Functions	Hold this button & turn on	Comments
Panel Button Beeper Enable/Disable	NOTCH	Press a button to see if the beeper is enabled.
Display BFO Offset or Carrier Frequency in CW mode	BAND/MEM DOWN	BFO Offset adds 700 Hz to displayed CW frequency. Affects display only.
Display 10-Hz Frequency Digit at right end of display, or Last Memory (toggle)	BAND/MEM UP	Affects display only.
Make FAST Button press-on/press-off, or active-only-while-pressed	FAST	FAST is displayed when active.
Adjust Repeater Shift (0 to 200 kHz, 100 kHz default). Press RPT/T again after setting.	RPT/T	Shift is displayed. Use tuning knob or DOWN/UP to change in 1-kHz steps.
Cause Clarifier to activate Memory Tune mode when operating on a memory (enable/disable)	NB	Disable to allow clarifier adjustment without automatic switching from Mem to Memory Tune.
Clear All Memories and return settings to factory defaults	HAM/GEN + CLAR	VFOs and Memory 1 default to 7.000 MHz LSB.
Scan Resume Mode: Always after 5-sec pause, or only after squelch closes.	VFO/M	There is always a pause after squelch closes before scanning resumes.
Select Lock Mode: Tuning Knob Only, or Knob & Buttons	LOCK	"Lock" blinks when buttons are locked. MOX and POWER cannot be locked.
Test all Display Segments, and Check Firmware Version	A/B + A=B	Display tests performed for 15 seconds, followed by ROM version number for 2 seconds, and return to normal.

FAST Button Combinations	Hold FAST button and press...	Comments
Set Beeper Audio Frequency (220 to 7000 Hz, 800 default). Press NOTCH again when done.	NOTCH	Repeating double beep sounds and beep frequency displayed in Hz while adjusting.
Display Brightness	Turn CLAR	Choose 1 of 8 levels.
Knob Tuning Rate Selection: toggle 5 & 50 or 10 & 100 kHz per turn	SWR	Affects Tuning Knob rate only: Steps are unaffected.
Speech Processor IF Offset Adjust (± 300 Hz). Must be in an SSB or AM mode. Press PROC again when done.	PROC	Listen to your signal in an external receiver while adjusting.
Display/Select CTCSS Tone Frequency (from standard tones, default 88.5 Hz). Press RPT/T again when done.	RPT/T	Displays tone frequency in Hz. Use tuning knob or DOWN/UP buttons to select.
Toggle Current Memory to be skipped when Memory Scanning (skip/no-skip)	VFO/M	Affects only memory scanning. "SKIP" displayed when activated.

Table II—Power-up settings.

Using the FT-890

In spite of its sophistication, the FT-890 is a relatively easy transceiver to operate and has excellent receive/transmit characteristics.

On the receive side, it has one of the quietest receivers I have heard. Tuning is very smooth, and the fact that the tuning speed can be varied and the various possibilities for quickly stepping the received frequencies in 100 kHz or 1 MHz steps make things easy to adjust. I did not really miss a keypad for frequency entry. The selectivity controls (notch and shift) provide enough flexibility for most QRM situations. The optional 500 Hz CW filter is excellent and just about a "must" for any CW fan. I didn't have a chance to test the optional SSB filter, but I suspect it could be very useful if the FT-890 is to become the main station rig. The built-in 2 1/2 inch loudspeaker provides tolerable audio quality, but I sup-

pose there was just not enough space available to provide much else.

As was mentioned before, the memory possibilities are rather enormous, but it really is a case of using as much or as little as you desire. The basic memory functions are clearly laid out, but you do have to have the manual, or a crib sheet, handy to get into the more advanced memory/scanning functions.

On the transmit side, the FT-890 will provide a clean 100 watts output on all bands. The internal cooling fan did cycle on and off at times, but it has a low noise level. On SSB and AM (!) you can easily tailor your transmit audio by means of the carrier point adjustment provided. The offset (which can be displayed on the readout) can be set between -300 Hz and +500 Hz independently for LSB and USB and between -3 kHz and +3 kHz for AM. I ended up with a +250 Hz SSB setting and received excellent reports. The adjustment

involves a trial-and-error process, but is surely worth the effort. The processor compression level is set by a rear-panel control. I would suggest leaving it at the factory setting rather than trying to "squeeze out" another dB or so of processing.

On CW the built-in keyer performed smoother than I had expected. The 1/2 inch or so of travel on the speed control appears small, but the control is not difficult to adjust. Full and semi break-in worked smoothly. Weighting can be set at 1:3 or 1:4.5 (dot: dash) by the external controls. The sidetone pitch cannot be adjusted. For those who might be interested in QRP CW, the power-level control allows the output carrier power to be varied down to about 3 watts. Battery operation of the FT-890 is quite possible, and I did try it with a 12 V/6 A.H. "Gel-Cell" rechargeable pack. The limiting factor becomes the constant, relatively high current drain during receive periods.

The automatic antenna tuner is one of the fastest available and has a generous matching range which exceeds that shown in Table I, especially on the high impedance side. I did have it loaded, with 100 watts power output being indicated, into a plain 6 foot piece of wire on all bands except 160, 80, and 40 meters, but such usage borders on abuse of the unit. It is, however, an ideal unit if the FT-890 is being used in a mobile installation and you want to QSY beyond the normal bandwidth of the usual loaded, mobile whip antenna.

The RF circuitry of the tuner uses a conventional T network with a long inductor arm grounded at one end and two variable capacitors. The added "trick" is the relay switched capacitors which can be added across the individual variable capacitors or across the entire series combination of the two variable capacitors. I expect a few hundred more matching combinations were achieved by that "trick" as compared to a conventional T network. It's also easier on the variable capacitors.

Overall, I can't stop being impressed by the small size of the transceiver. It doesn't have every operating feature in the world, but it truly is a full-featured, compact HF transceiver that goes far beyond your basic bottom-of-the-line transceiver. It sort of invites you to pick it up by its carrying handle and take it along almost anywhere.

Manual

I'm impressed by well-written operating manuals. No matter how much sophistication the engineers put into a transceiver, it doesn't mean much unless someone can convey to you and me in fairly simple and clear terms how to use the features.

The manual for the FT-890 is very well written and very well organized with plenty of illustrations. If you just want to basically get the transceiver into operation, it is

MFJ TUNERS

MFJ's world famous 3 KW Versa Tuner V

If you won't settle for less . . . here is the finest 3 KW tuner money can buy!

The MFJ-989C is not for everyone.

However, if you make the investment, you'll get the finest 3 KW tuner money can buy. Here's why.

Massive Transmitting Capacitors

You get two massive 250 pf transmitting variable capacitors with detailed logging scales. They can handle amps of RF current and withstand 6000 RF volts because the plates are smoothed and polished and have extra wide spacing.

Precision Roller Inductor

A precision roller inductor lets you tune your SWR down to the absolute minimum. A 3-digit turns counter plus a spinner knob gives you exact inductance control.

Ball bearings on both the front and back shafts give you a velvet smooth vernier feel. Steel end plates and steel shafts give you lifetime durability.

You won't have arcing problems with this roller inductor. That's



MFJ-989C **\$349⁹⁵**

because firm springs put considerable pressure on a plated contact wheel for excellent electrical contact.

Wide, low inductance straps are used for high current connections and a new core gives you excellent RF properties for minimum loss.

Cross-Needle Meter

You get a lighted peak and average reading Cross-Needle SWR/Wattmeter with 200 and 2000 watt ranges. Its new directional coupler gives you accurate SWR and power readings over the entire 1.8 through 30 MHz range.

Super Heavy Duty Balun

You get a super heavy duty current balun for balanced lines. It's made with two giant 2 1/2 inch powder iron toroid cores and wound with teflon wire connected to high voltage ceramic feedthru insulators. It lets you operate high power into balanced feedlines out core saturation or voltage breakdown.

Ceramic Antenna Switch

You get a two wafer 6 position ceramic antenna switch with extra large contacts for trouble free switching.

Plus much, much more

You also get a built-in 300 watt dummy load, full one year unconditional guarantee, flip stand, all aluminum cabinet, tough baked on paint, locking compound on all nuts and bolts. 3 KW PEP. Meter lamp needs 12 volts. Compact 10 3/4x4 1/2x15 inches. Made in the USA. Add \$10 s/h.

Don't settle for less--get yours today!

MFJ's Deluxe 300 Watt Tuner



MFJ-949D **\$149⁹⁵** More hams use the MFJ-949D than any other antenna tuner in the world! Why? Because the MFJ-949D gives you proven reliability, the ability to match just about anything and a one year unconditional guarantee.

You get a lighted peak and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a full size dummy load that easily handles 300 watts of abusive tune-up power.

The inductor switch is specially designed to withstand the extreme voltages and currents that are developed in your tuner—it's not an underrated off-the-shelf switch that can put you off-the-air.

Each MFJ-949D aluminum cabinet is chemically etched to strongly bond MFJ's tough baked-on paint. You won't find a tougher, longer lasting finish anywhere.

MFJ's New 300 Watt Tuner



MFJ-948 **\$129⁹⁵** If you don't need a dummy load but want all the other features of the MFJ-949D, choose the MFJ-948 for \$129.95.

The MFJ-948 features a peak reading lighted Cross-Needle meter with a built-in lamp switch, one year unconditional guarantee and is made here in the USA.

MFJ's smallest Versa Tuner

MFJ-901B **\$59⁹⁵**

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner -- when both your space and your budget is limited. Good for matching solid state rigs to linears.



MFJ'S Super Value Tuner



MFJ-941E **\$109⁹⁵** The new MFJ-941E gives you a 300 watt PEP tuner that covers everything from 1.8-30 MHz -- plus you get a cross-needle meter, antenna switch and balun . . . for an incredible \$109.95. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Antenna switch selects 2 coax lines (direct or through tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors. Measures 10-5/8" x 2-7/8" x 7".

2-Knob Differential-T™ Tuner



MFJ-986 **\$289⁹⁵** The new MFJ-986 Differential-T™ 2-knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. Handles 3 KW PEP.

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

MFJ's peak and average reading cross-needle meter reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95. Current balun reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced. It covers 1.8-30 MHz. Get yours today! Add \$10 s/h.

MFJ's Random Wire Tuner

MFJ-16010 **\$39⁹⁵**

Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2"x3"x4".



MFJ's Mobile Tuner

MFJ-945D **\$89⁹⁵**



Don't leave home without this mobile

tuner! Have an uninterrupted trip as the MFJ-945D extends your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8 x 2 x 6 inches uses little room. Lighted Cross-Needle SWR/Wattmeter makes tuning easy while in motion. Has lamp switch. 1.8-30 MHz. 300 watts PEP. Mobile mount, MFJ-20, \$4.95.

MFJ's Versatile 1.5 KW Tuner



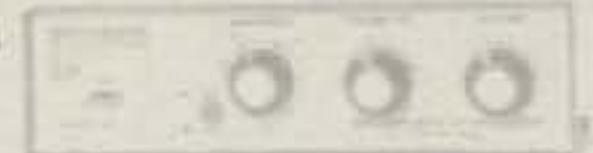
MFJ-962C **\$229⁹⁵** MFJ-962C lets you use your bare-foot rig now and have the capacity to add a 1.5 KW PEP amplifier later. It covers 1.8-30 MHz.

You get MFJ's peak and average reading Cross-needle SWR/Wattmeter. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Plus . . . 6-position antenna switch and teflon wound balun with ceramic feedthru insulators for balanced lines. 10 3/4 x 4 1/2 x 14-7/8 in. \$10 s/h.

MFJ's VHF or UHF Tuners

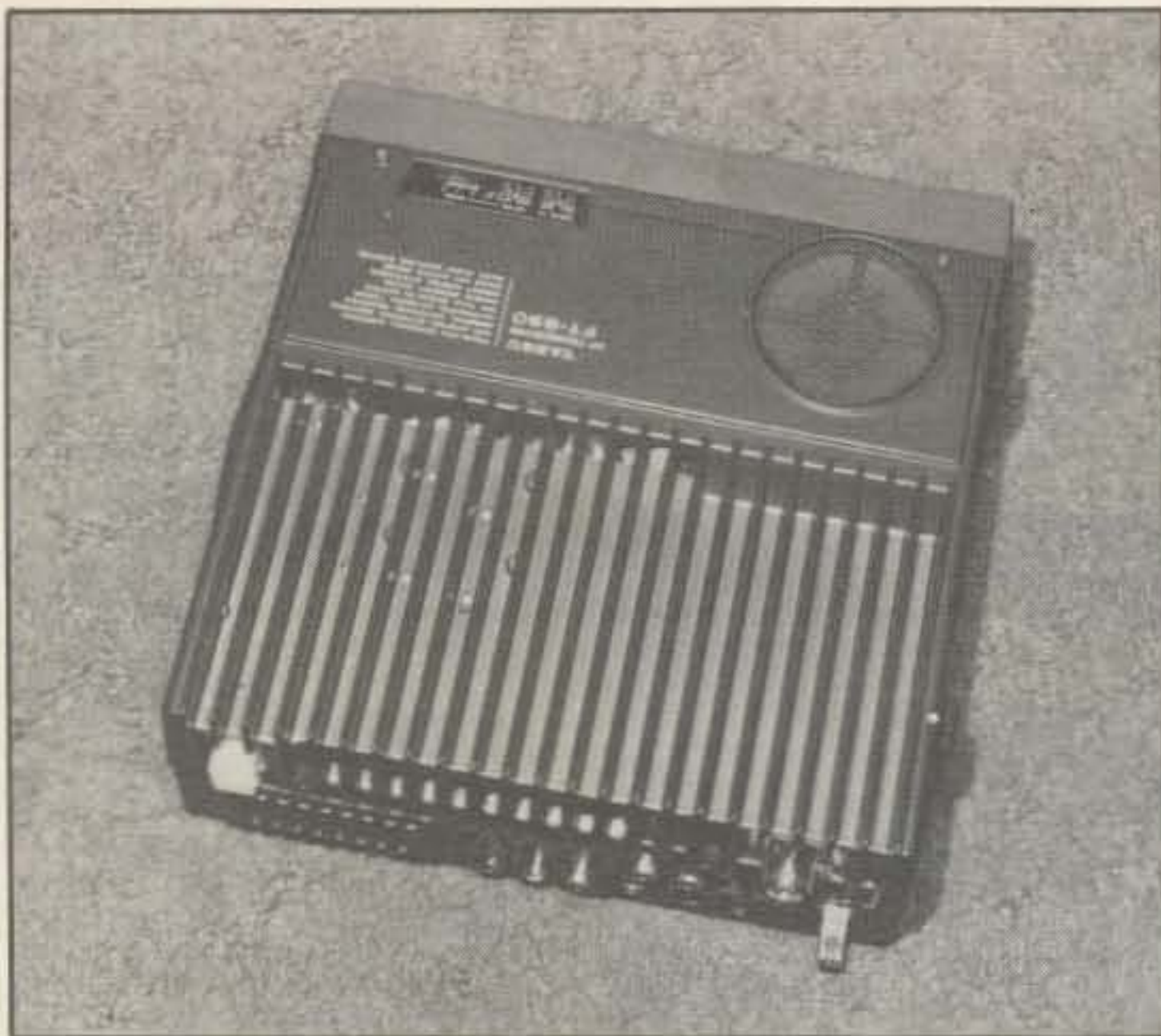
MFJ-921 or MFJ-924 **\$69⁹⁵**



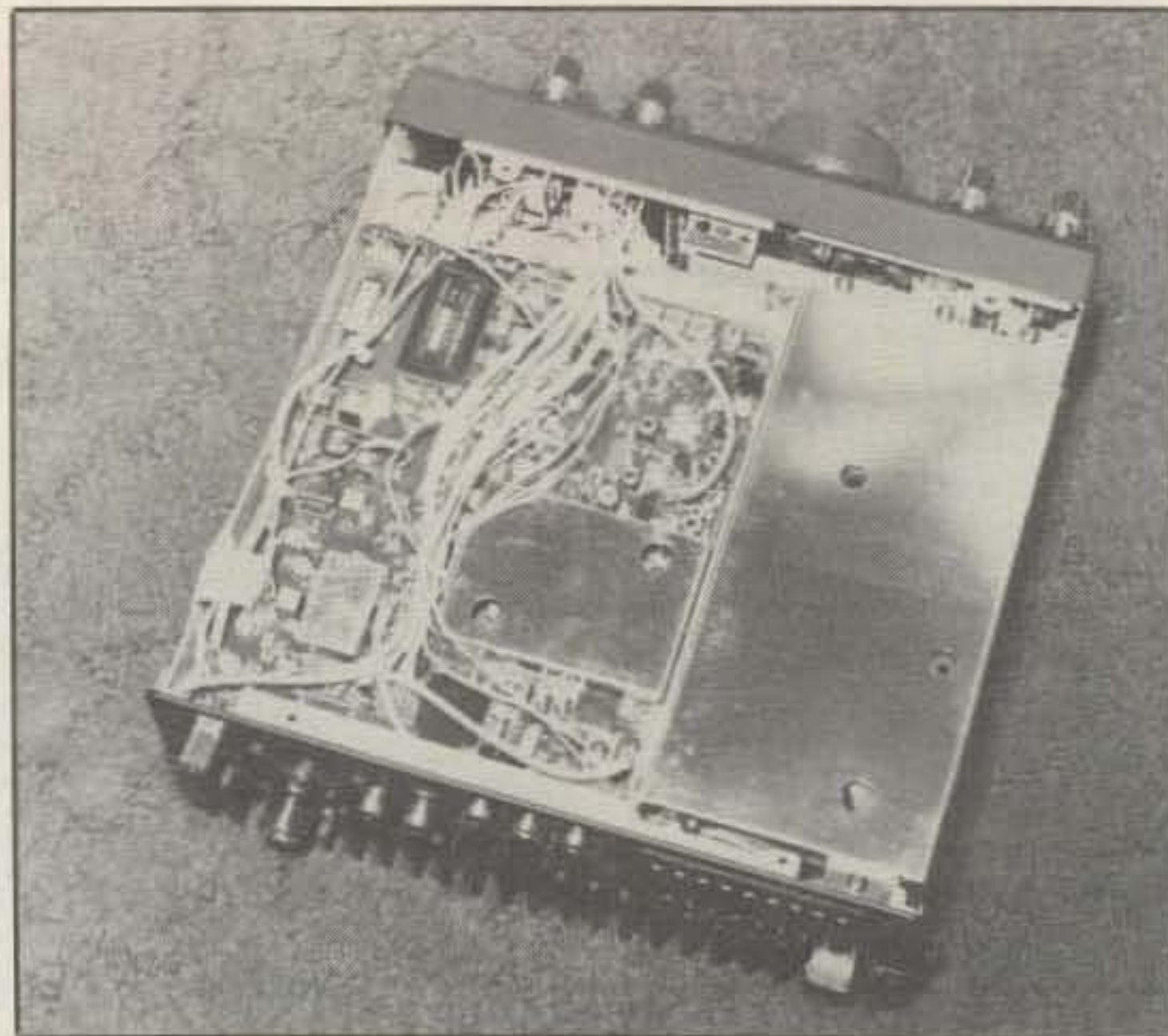
MFJ-921 VHF tuner covers both 2 Meters and the 220 MHz bands. MFJ-924 covers 440 MHz. Built-in SWR/Wattmeter. 8" x 2 1/2" x 3". 2-knob tuning convenient for mobile or base.

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This top view shows the extremely large heatsink which is backed up by an internal fan. Air is sucked in from a vent on the rear panel and exits to the rear of the heatsink. The small internal speaker is obvious. To the left of it and towards the front panel are the top-mounted keyer controls.



Removing the bottom cover, you can see a large PC board and part of the shielding for the automatic antenna tuner (to the right). To the upper left of the PC board are the mounting spaces for the optional IF filters. The larger CW optional filter is installed to the right of the hardly visible, very small, standard ceramic SSB filter. The PC board has to be partially removed for a solder-type installation of the optional filters.

only necessary to read a few pages. If you want to get into the details of using digital modes or computer control, there are detailed discussions.

Power Supply

The FT-890 I tested was used with an FP-700 power supply. The FP-800 is the

heavy-duty power supply for the FT-890, but I didn't have one available at the time of this writing. Just on the basis of compatibility, I would suggest the use of the FP-800 power supply. It also contains a built-in speaker for improved receive audio.

A note of caution should be mentioned. The rear-panel power connector on the FT-890 is similar to that used on some oth-

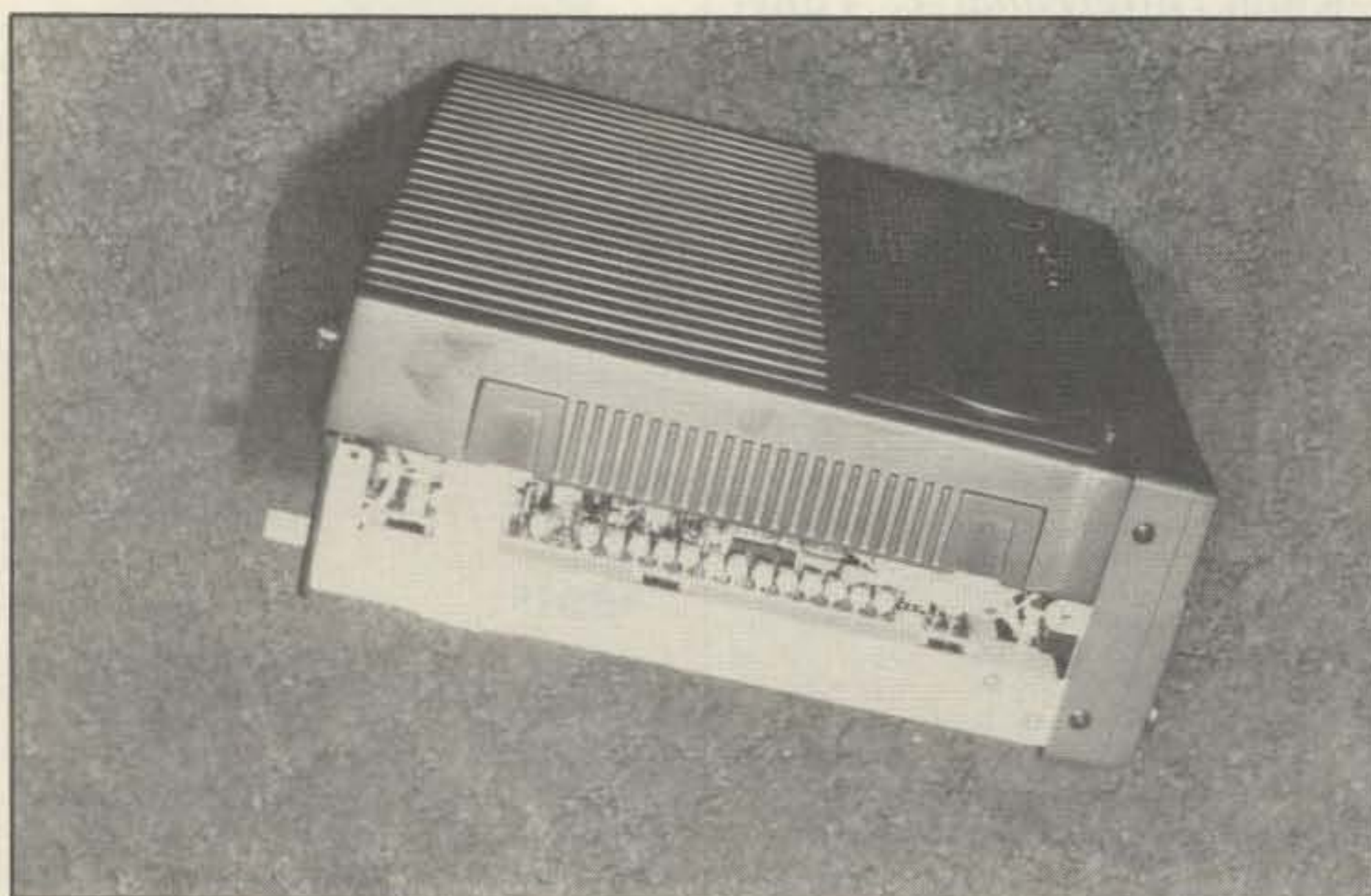
er transceivers. But the wiring may be different, especially where switching of the AC power line in the power supply by a front-panel switch in a transceiver is concerned. It seems a simple enough caveat, but if you are going to intermix different manufacturers' equipment which have similar connectors, check the connections! The power-supply connection of the FT-890 is absolutely simple and straightforward, but a few of the transceivers have apparently already been damaged by amateurs who thought similar power-supply connectors equate directly with interchangeability.

Accessories

The FT-890 will interface with a very wide range of Yaesu accessory items including the DVS-2 digital voice recorder/playback module, which is a very handy item for contesting. The YF-100 500 Hz IF filter, YF-101 2.4 kHz IF filter, and TCXO-3 crystal oven are all dedicated accessories for the FT-890.

Summary

The FT-890 is priced at \$1529.00 (with built-in antenna tuner). The FP-800 is \$299.00; DVS-2, \$299.00; YF-100, \$159.00; YF-101, \$159.00; and TCXO-3, \$99.00. Brochures are available from dealers or from Yaesu, USA, 17210 Edwards Rd., Cerritos, CA 90701.



Since I had removed the bottom cover, I couldn't help but notice this array of 14+ trim pots on one side. Apparently it is intended to facilitate alignment/adjustment of the transceiver without having to access every individual PC board.

No other Multi-Mode gives you all these features -- not one!

... only the easy-to-use MFJ-1278 Multi-Mode and MultiCom™ software gives you all these features plus 9 digital modes . . . Color SSTV, 16 Gray Level FAX, Packet, AMTOR, RTTY, ASCII, Navtex, CW, Memory Keyer

MFJ-1278 Multi-Mode
\$279⁹⁵

MFJ-1289 MultiCom™
\$59⁹⁵



Real Time Color SSTV

- Transmit and Receive Color SSTV
- Robot Color: 72, 36 Seconds
- Robot B/W: 8, 12, 24, 36 Seconds
- Scotty Color: 1 and 2
- Martin Color: 1 and 2

16 Gray Levels FAX/SSTV Modem

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- 16 Gray Levels AP Wire FAX
- 16 Gray Levels B/W SSTV

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- Expandable 32K, 128K or 512K
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High Speed Modems

- 2400 baud Modem
- 9600 baud G3RUH Modem, \$109.95
- Plugs inside MFJ-1278
- Selectable from keyboard
- MFJ-1278 Turbo, \$359.95 with 2400 baud modem

More MFJ Exclusive Features

- Automatic Signal Analysis™ for HF Packet and AMTOR as well as RTTY and ASCII
- Automatic Digipeater Routing™
- QSO and transfer files simultaneously
- Dedicated MARS mode
- Built-in printer port, sidetone amplifier
- Individual radio port level control
- Stored parameters for each mode
- CW iambic paddle input
- Call Alert Beeper™
- Built-in packet connect bell
- IC sockets used throughout
- One year unconditional guarantee



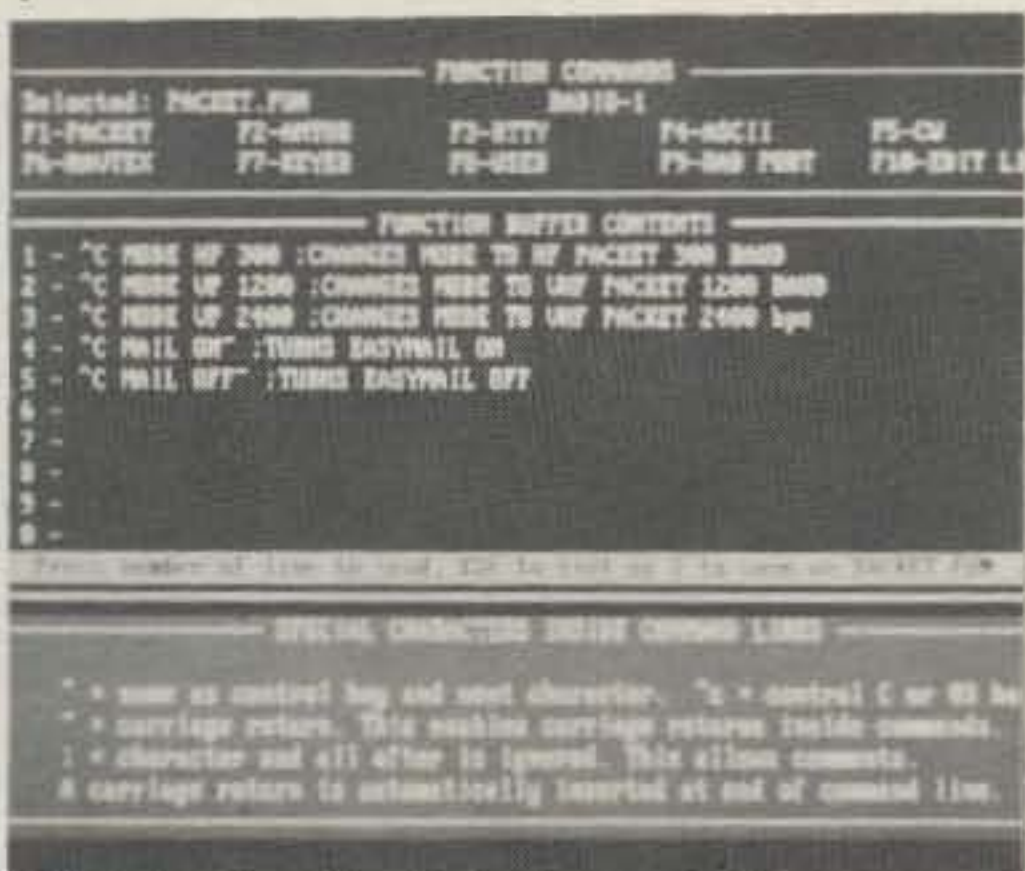
Full Color SSTV picture actually received on 14.230 MHz, using Robot 72 second format. Transmit and receive color and black and white SSTV pictures.



16 Gray Levels WeFAX map actually received on 16.410 MHz. Only MFJ-1278 and MultiCom™ gives you a 16 gray level modem for transmitting and receiving WEFAX, FAX and Color SSTV.



256 Color VGA Packet Picture actually received on packet. Join the fun of packet picture passing. See brilliant full color pictures paint across your screen as they are being received.



Easy and simple . . . MultiCom™ Operation Menu lets you select each mode by pressing a single key. Each mode has 10 user programmable buffers.

New MultiCom™ Terminal Program

MFJ MultiCom™ Starter Pack complete with computer interface cable and instruction. Order MFJ-1289, \$59.95 IBM compatibles, MFJ-1282B, \$39.95 C64/128, MFJ-1290, \$49.95, Amiga MFJ-1287B, \$59.95 Macintosh.

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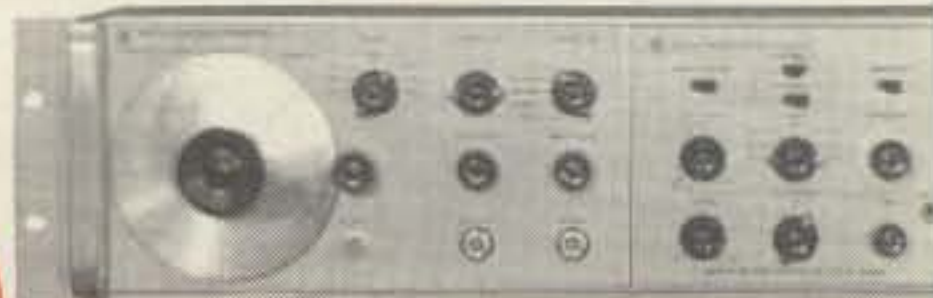


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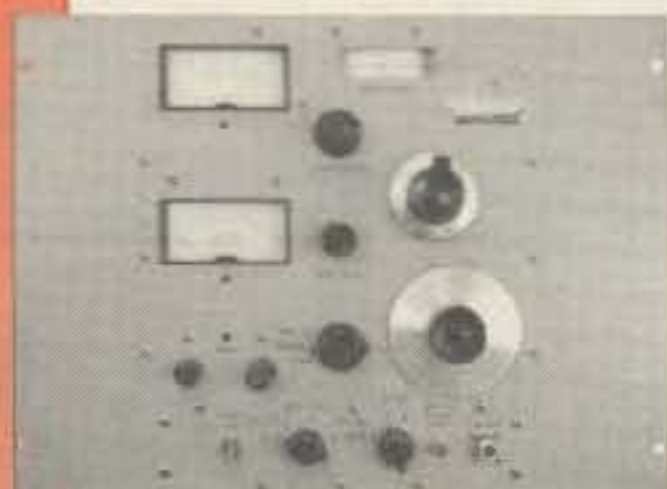
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CIRCLE 160 ON READER SERVICE CARD

Thinking of putting up a new tower? Well, perhaps you should read this article before you pour the base. The base may be used for more than anchoring the tower.

A Tower Base Grounding System

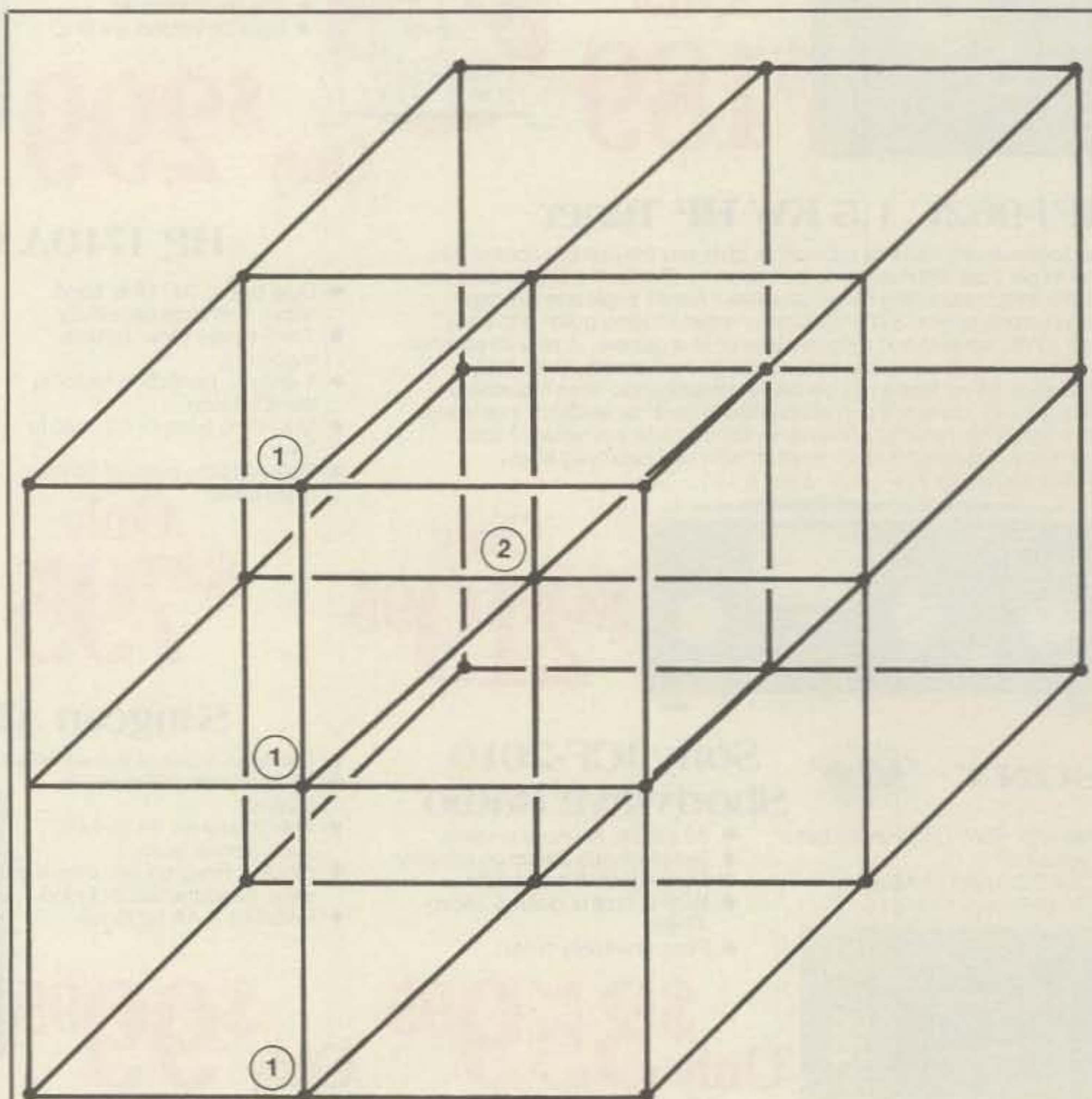
BY DOUG MACKINNON**, VE3OLN

One of the most neglected aspects of an amateur radio installation these days is the provision for an adequate ground system to help protect our expensive transistorized radio equipment from the ravages of lightning. Spark-gaps, gas discharge plugs, M.O.V.'s, and the likes of these devices certainly help, but without a good grounding system to dissipate the massive electrical charge contained within a lightning strike, all the protective devices available will only do a small part of the job for which they were designed. Many amateurs will drive in a single ground rod, or a rod here for the tower and one over there for the shack, and they expect that they will be adequately protected in the event of a direct or near strike. I hope they never learn the truth the hard way.

If you are planning to install a guyed or self-supporting tower now or in the future, why not use this installation as a vital part of your ground system? The increase in cost for the overall installation will be minimal, especially when you consider the advantages of installing such a system.

Many amateurs for years have warned us not to ground our antenna tower through the concrete base installed to support our tower. They claim that should the tower receive a lightning strike, the concrete base would "explode" or be severely damaged. Not necessarily so. In this article we will discuss how you can safely and effectively use your tower base, and the reinforcing rod within it, for an extremely efficient ground system. Why not put all that money you are investing in your tower installation to work for you in the most ways possible?

The concept used here is called an "Ufer Ground." It is based on the works of a Mr. H. G. Ufer, who worked as an engineer for the U.S. Army during WW II. Mr. Ufer was charged with the task of developing an effective ground system for the U.S. Army's underground bomb storage vaults in the area of Flagstaff, Arizona. Mr. Ufer did considerable research and carried on a multitude of tests, many under actual lightning conditions. What he discovered



NOTES:

1. The rods have been offset 4-6" to allow for a triangular tower center leg.
2. Cadweld connection(s) from tower legs to this point.
3. 27 pieces of material total.
4. Thoroughly weld at all intersecting points.

Fig. 1- Drawing of a metal cage which can be embedded in the concrete tower base.

was that if a copper conductor was buried within a poured concrete foundation, and that conductor came no closer than 3 inches to the surface of that concrete foundation, and that conductor was a minimum of 20 feet in length (in a dipole configuration, shorted at the feed point), an effective ground with a typical resistance of between 5 to 10 ohms was obtained (in a typical 1000 ohms per meter soil condition).

Even after repeated tests there was no determination in the condition of the concrete of the effectiveness of the ground system. So much for the exploding concrete theory.

How the Ufer ground works is easy to explain. We all know that concrete absorbs moisture easily. It will retain the moisture it has absorbed for up to 30 days. Due to this stored moisture, the concrete's natur-

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Size of Rerod (in.)	Size of Cage (each face)						
	3 ft.	3.5 ft.	4 ft.	4.5 ft.	5 ft.	5.5 ft.	6 ft.
1/2	364	425	486	546	607	668	720
5/8	445	519	594	668	742	816	880
3/4	518	604	691	777	864	950	1024
1	660	770	880	990	1100	1202	1304
Total linear length of rod	81	94.5	108	121.5	135	148.5	160

Table I—Approximate surge current dissipation value for a cage of a given size. All values are expressed in kiloamperes.

al high pH (7.0 + pH), and its high mineral content, the concrete has an enormous amount of ions available with which to conduct current. Also, because of its large mass and its large surface area in direct contact with the surrounding soil, there is an effective transfer of electrical current though the concrete to the ground.

The heart of our grounding-system plan is a cage made from a reinforcing rod which is arcwelded or cadwelded¹ together. Cadwelding is the most effective way of achieving both a good mechanical and electrical bond between lengths of rod. Cadwelding, though, is not a cheap process. In lieu of cadwelding, arcwelding seems to be an acceptable alternative, as long as all rods are thoroughly welded on all sides, not just tacked. Thorough welding will enhance electrical continuity and current-carrying capacity.

Avoid brazing, or simply tying the sections of rod together. Brazing tends to break down in high current (and high heat) conditions, and simply tying the sections of rod together neither mechanically nor electrically bonds the sections of rod. With a breakdown of or lack of good electrical continuity comes arcing, and it is this arcing that can cause extremely high heat conditions within the concrete block. This extreme heat is what can cause extensive damage and deterioration within the concrete block or foundation.

Since lightning strikes typically have 20,000 amperes plus flowing, and many "super strikes" can exceed 300,000 amperes, we want to design our cage to handle as much current as economically possible.

Table I describes various cage sizes and the theoretical surge current dissipation capacity of the various cage sizes when manufactured with various reinforcing rod sizes. Pick a cage that is right for your tower installation, and it will conduct the current you wish it to theoretically handle. The recommended minimum current handling capacity is 50,000 amperes for any single installation.

The figures in Table I are derived from the values contained in Table II. These figures assume that the conducting material is embedded in standard concrete (131 lb.

Conductor Type	Size (in.)	Theoretical Surge Current Per Foot (amps)
#4 AWG copper (solid)	.203	2150
Rerod	3/8	3400
Rerod	1/2	4500
Rerod	5/8	5500
Rerod	3/4	6400
Rerod	1	8150

Table II—Theoretical surge current capacity of a conductor per linear foot of length.

per cubic foot, 5% by dry weight concrete, or 20 MPA). It should also be noted that these figures are approximate and may vary significantly, depending on the soil conductivity at an individual site. They may also vary due to the type and quality of the welding used.

A good rule of thumb for choosing the appropriate cage size is to deduct 12 inches off the size of the concrete block size specified in the tower installation requirement. For example, if the tower plans call for a 4 foot square concrete block, then you would use the 3 foot square cage. This would allow 6 inches clearance between the cage and the surface of the concrete, which is acceptable. A 3 1/2 foot square cage would also fit, still allowing the 3 inch minimum distance between cable (rod) and concrete surface (3 inches is actually the optimum distance). However, much more precise measuring and positioning would be required. Remember, overkill is better than underkill in this situation. It certainly would not hurt to go to a larger concrete block than is called for. This would allow for higher mechanical and electrical capacity.

Notes on Cage Construction

One or more large-diameter pigtails (#4 AWG or larger) should be cadwelded to the frame, preferably near the center of the structure. These pigtails would be connected to the tower legs within the con-



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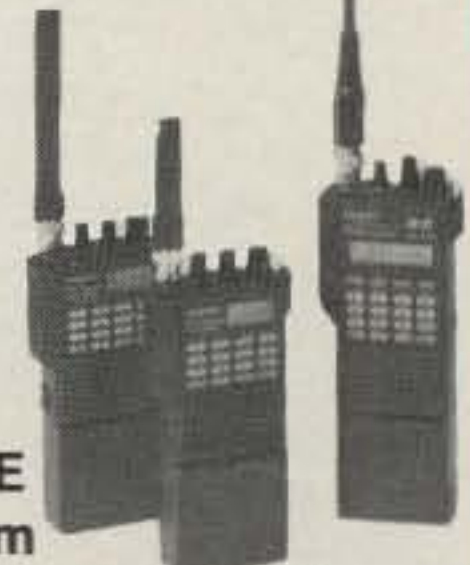
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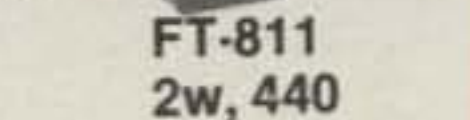
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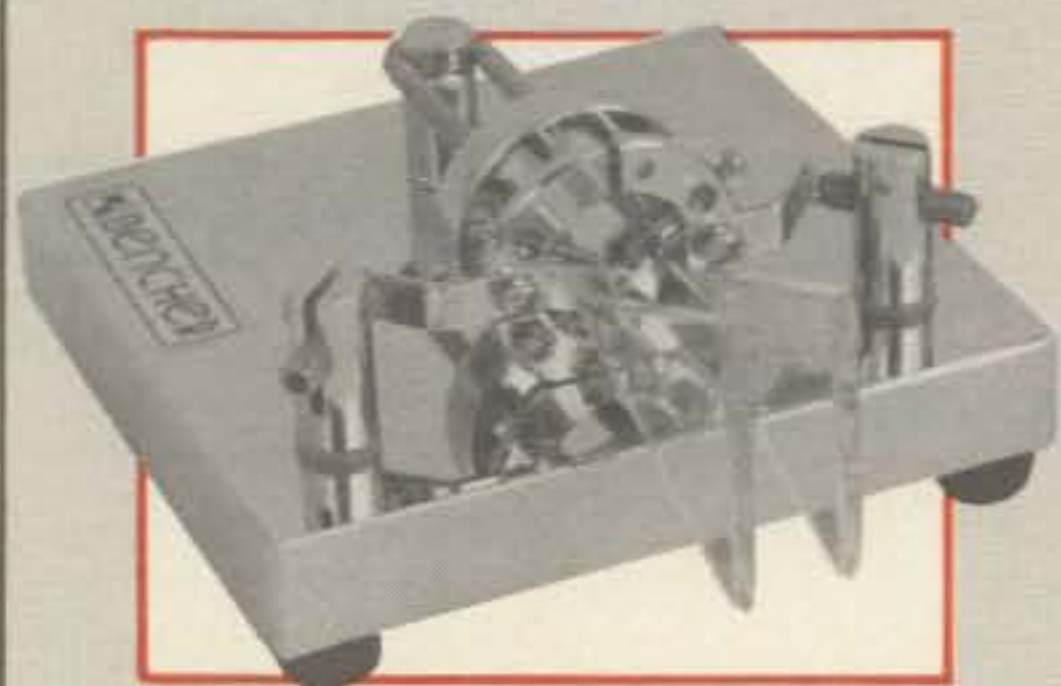
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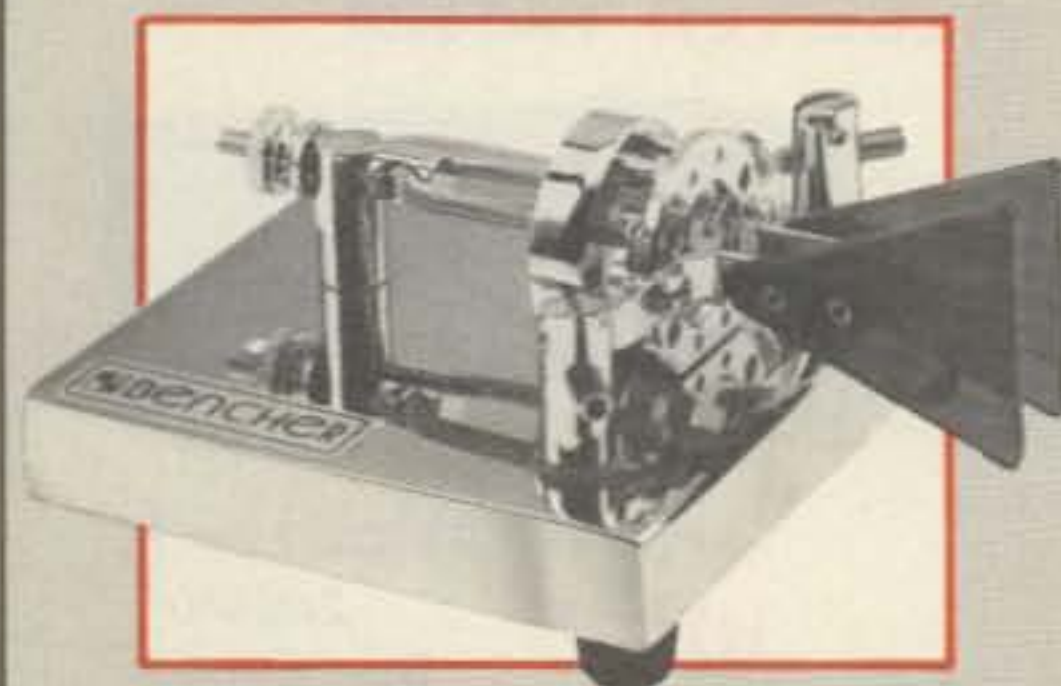


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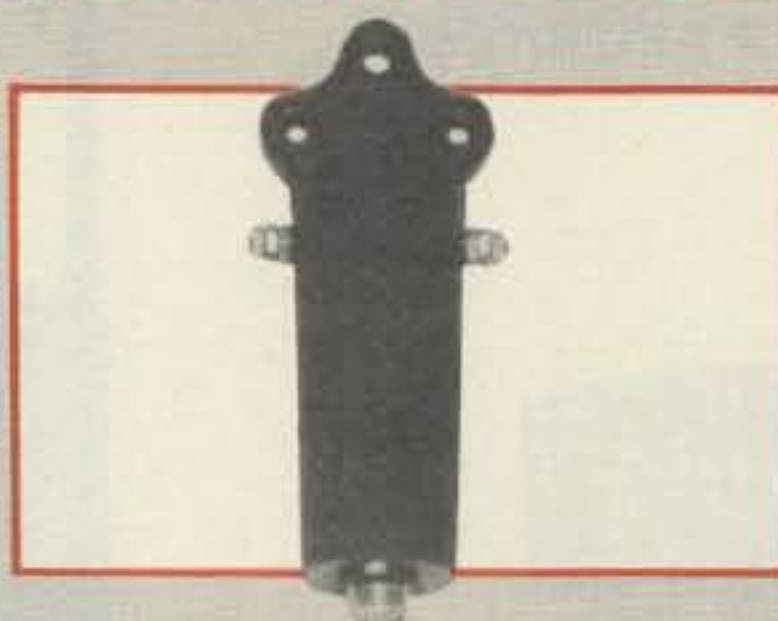
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crete. The conductors should then be cadwelded to the tower legs within the concrete. The conductors should be cadwelded to the bottom of the supplied tower legs. In addition, one or more large-diameter pigtails (#4 AWG or larger) should be cadwelded to the frame and extended to a point outside the concrete block. Connection to the radial ground system and/or radial ground rod system should be done to these pigtails. These pigtails should leave the block in a straight line, at a depth of not less than 6 inches below soil surface. The first ground rod should not be placed closer than 20 feet to the tower base to reduce the chance of soil saturation and ground clumping in the event of a lightning strike.

Remember to thoroughly arc weld or cadweld all sections of rebar to all intersecting points within the block. Tacking, tying, or brazing is unacceptable.

The top of the cage when installed must be below top of grade. If you are using a triangular style tower, it is best to offset the cross braces on one side of the cage in order to accommodate the third leg of the tower being centered in the block. The cage design could be modified to represent any shape or size as long as you adhere to the basic rules.

For guyed style towers you might want to consider installing a smaller version of this cage at each of the guy anchoring points. This, in conjunction with radial ground rods, would make an effective grounding system for the guy wires. Remember, no matter what system or combination of grounding systems you use, you must tie all parts of the system together in order to prevent ground propagation of the strike through the various parts of your ground installation.

Good luck and happy DXing. Keep your eyes on the skies.

Footnote

1. Cadwelding is an exothermic process that has both good electrical and mechanical integrity. It is a highly recommended process for a long-life and low-maintenance installation. Cadweld and cadwelding are registered trademarks of Erico Products, Inc. For more information on cadwelding contact: Erico Canada Ltd., 46 Ingram Drive, Toronto, Ontario M6M 2L6, or Erico Products Inc., 34600 Solon Road, Cleveland, OH 44139.

Bibliography and Further Reading

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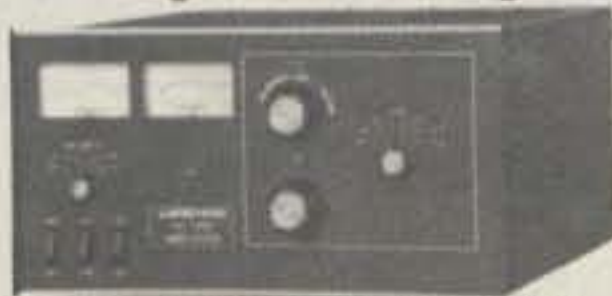
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Being a good neighbor can sometimes offer a lot more than friendship. N4QEX shows us that one good turn leads to another.

The "Good Neighbor" Antenna Mast

BY JOHN T. MYLES*, N4QEX

My QTH, on the shore of Harper's Creek and the Piankatank River in Gloucester County, Virginia, has a pier, and when several years ago I suggested to my neighbor, Harvey Rowe, Sr., that

**Drawer 740, Route 606, Gloucester, VA 23061*

he might want to keep his boat at my pier, I never dreamed that my being a "good neighbor" might lead to an antenna mast construction project.

Harvey is a retired master welder, and when he learned I was scheming to receive a Cushcraft A3S antenna for Christmas, he

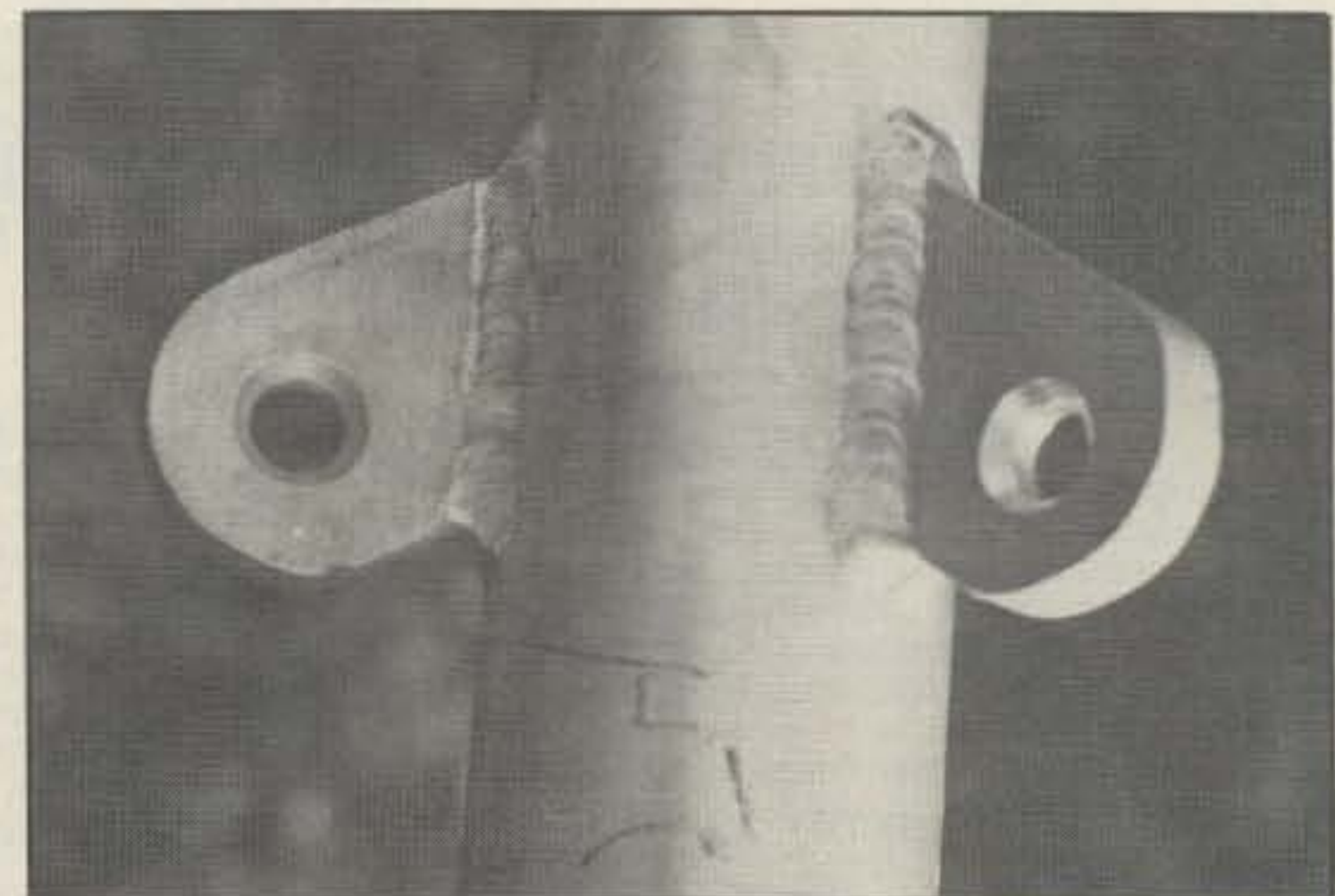


The author, N4QEX, seems extremely happy with the results.

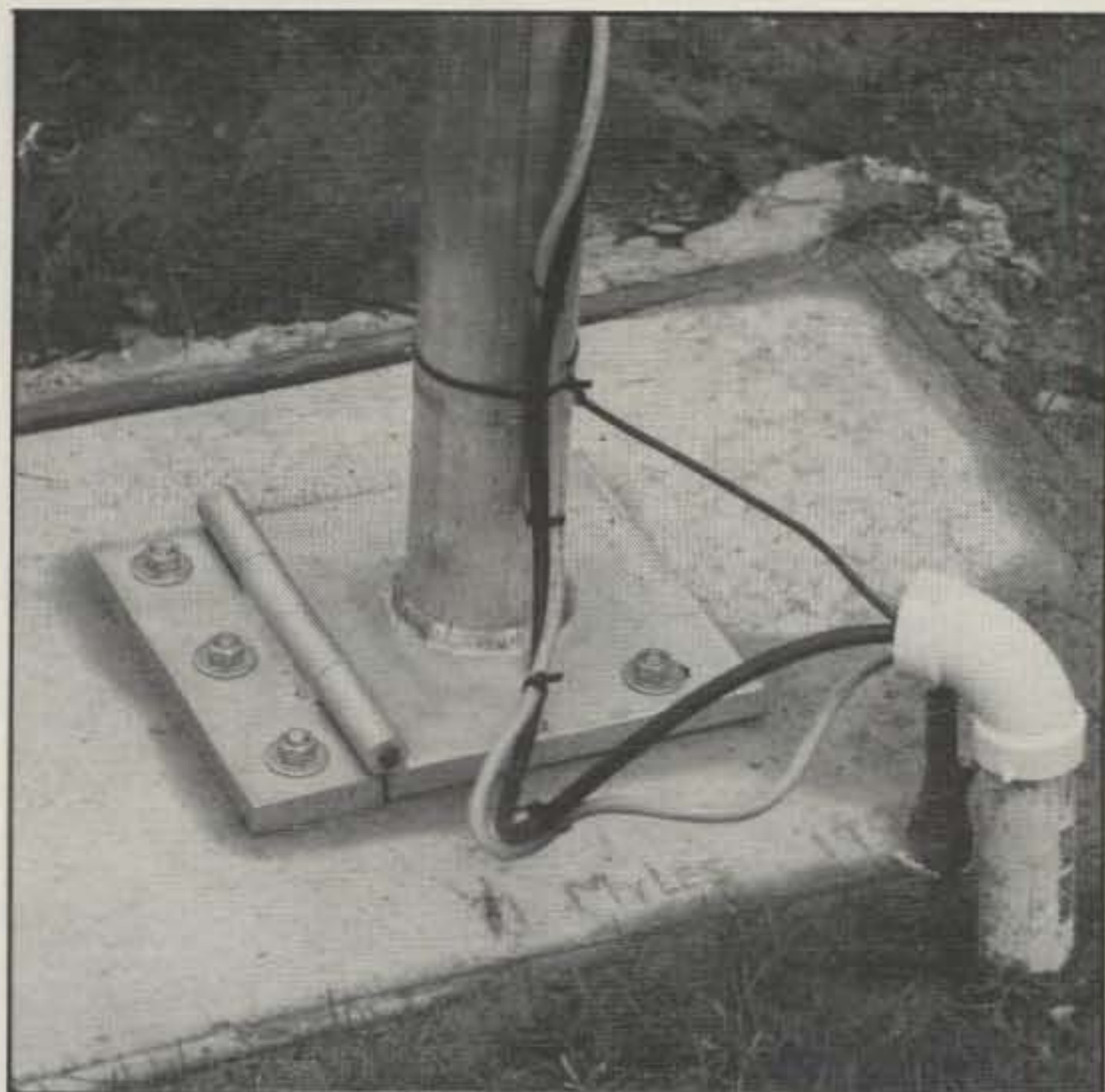
Here's good neighbor and master welder Harvey Rowe, Sr.



Here's an example of Harvey's work—one of the telescoped mast joints.



These guying lugs are also fashioned from aluminum and welded to the mast. Note that the holes are machined and polished.



Close-up view of the hinged base plate. There are two 10 foot copper ground pipes also embedded, one on each side of the concrete base.

With the project completed and guy lines attached, the antenna is ready for raising.



volunteered to build an antenna mast for me. After looking at ads for commercially available masts, I supplied, and he designed and built, the "good neighbor" mast described.

The mast was constructed of three pieces of 6061 aluminum alloy each 21 feet long. Each piece was telescoped into the other for a distance of 7 feet for strength, prior to welding. The complet-

ed mast finished length was 49 feet. Material sizes were as follows:

Bottom piece: 3 3/4 inch OD and 3 inch ID pipe, 21 feet long.

Middle piece: 3 inch OD and 2 1/2 inch ID pipe, 21 feet long.

Top piece: 2 1/2 inch OD and 2 inch ID pipe, 21 feet long.

Three guying lugs were welded to the mast at a height of 30



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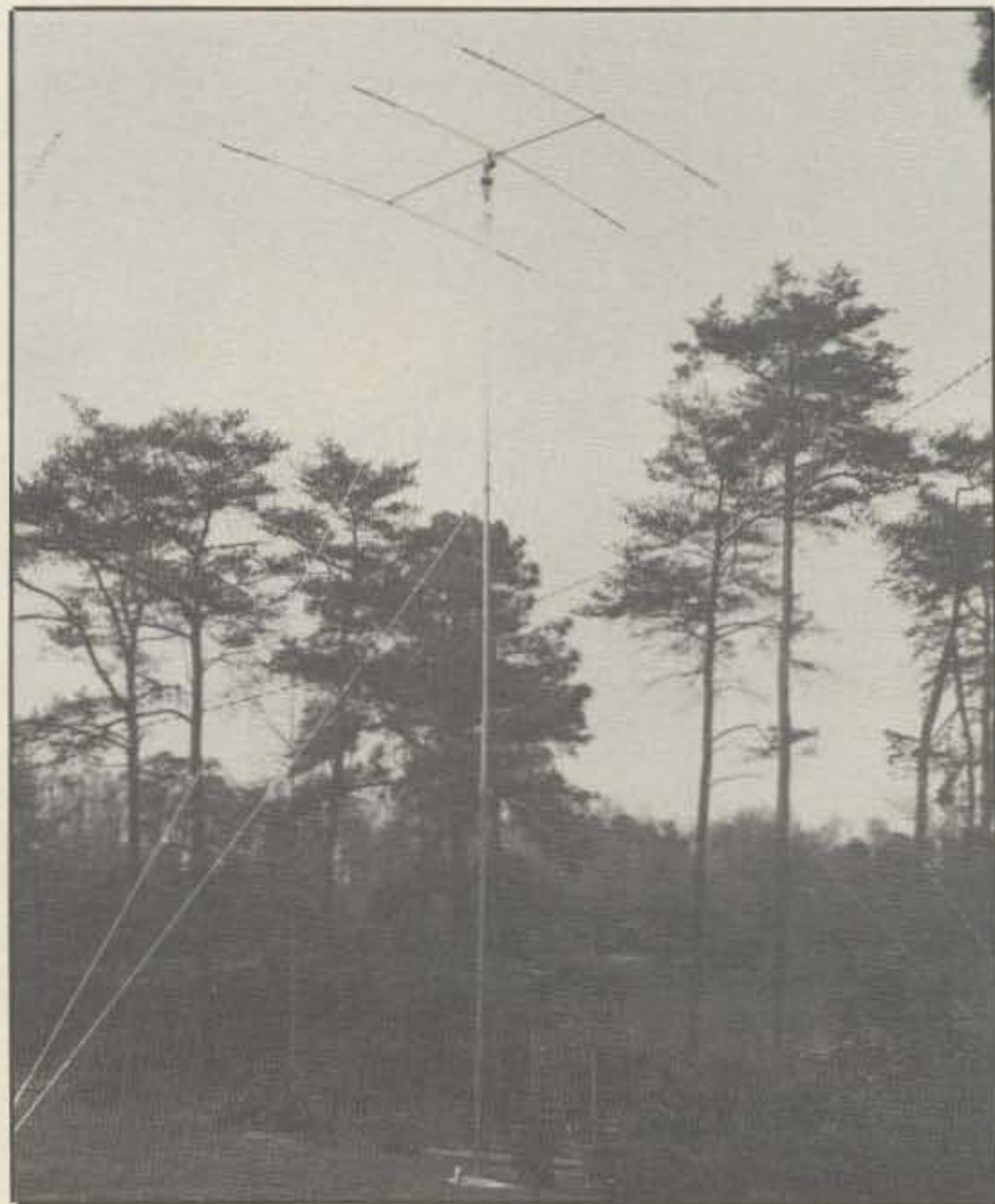
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Here the antenna gets some last-minute tweaking from Warren Bowers, WB4MRH, and Harry Kepley, N4THN, before it goes up.

feet and a height of 47 feet and internally polished so as not to abrade the $\frac{5}{8}$ inch nylon rope used to erect and guy the mast. A cap was welded on the top of the topmost section to keep moisture out. The nylon ropes were used for their strength (I live on a point with water on three sides which is subject to high winds!), and because they do not give rise to harmonics. Although it is often reported, I have never had any significant problem with nylon rope stretching, after an initial tightening. The hinged baseplate was constructed of $\frac{5}{8}$ inch thick 6061



It's a real pleasure when everything goes together, fits, and most important works well.

aluminum alloy, has a stainless steel hinge pin, and was attached by five $\frac{5}{8}$ " x 5" stainless steel bolts embedded in reinforced concrete. Note that the two bolt holes in the base plate to the right of the mast (only one can be seen) are slotted. Before the mast was erected, the base plate was attached to the concrete by the three stainless bolts on the left, and after the mast was placed in an upright position, the two bolts on the right were secured. The base-plate slots allow the base to fit over the bolts during the time of installation so that the right portion of the base plate is oblique.

At this point the antenna rotor and $\frac{5}{8}$ inch nylon guy ropes were attached to the mast, with one side of the hinged base plate bolted in position.

Warren Bowers, WB4MRH, and Harry Kepley, N4THN, helped attach the antenna and the coax and rotor cables, despite damp weather! I kept telling them it wasn't raining!

Finally, the mast was pulled into the upright position by one of the guying ropes using a boat trailer winch attached to a tree. Since then a heavy-duty winch with brake has been attached to an 8' x 8" salt-treated post permanently placed in the ground in concrete. (The ladder line that can be seen from the lower left toward the upper right is the feedline of my double Zepp.)

A "Danger: Watch Wires Above" decal was placed on the mast at eye level as a gesture toward good safety habits, although there are no above-ground power lines within a quarter of a mile.

The aluminum for this project cost about \$200 (Harvey's cost), and his labor (remember the "good neighbor"?) was free. The nylon rope was about \$100, at retail price. These were the major expenses.

I would not maintain that this is **the** antenna mast for everyone, but it works like a charm, and my wife doesn't find it as objectionable as she thinks a tower might have been. I find all antennas and their supporting structures to be one of the more intriguing facets of amateur radio, and felt some readers might want to borrow an idea or two from this mast's construction.

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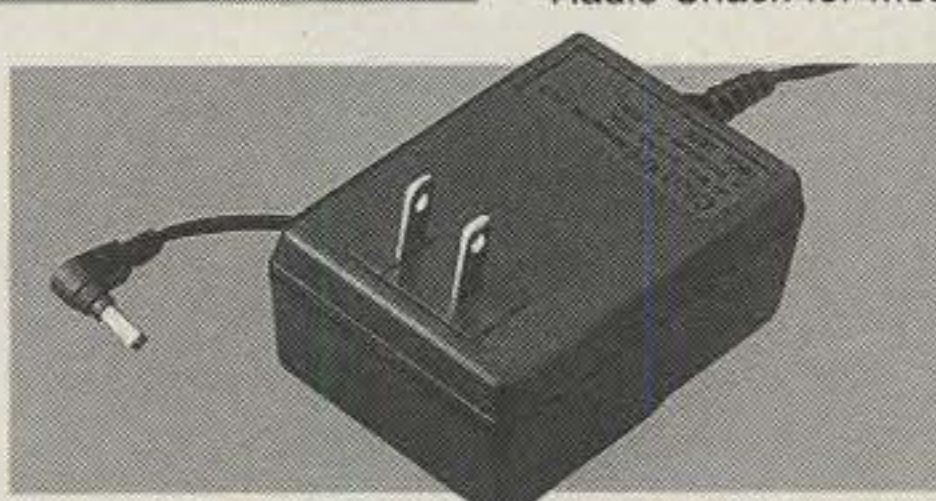


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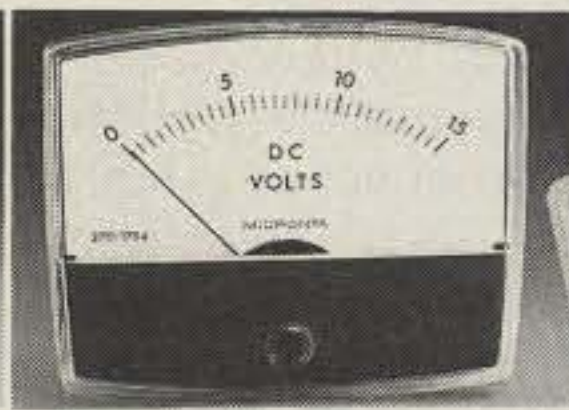
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CQ REVIEWS:

The Alinco DJ-580T Dual-Band FM Handheld

BY DAVE INGRAM*, K4TWJ

Continuous encouragement from local friends finally convinced me to upgrade my FM activities with a dual-band handheld, and I made the move in high style with the new super-featured Alinco DJ-580T transceiver. Yes, I know other big-time FMers went dual band months ago, but talking with friends in large "roundtables" and newcomers on 2 meters was more appealing to me than monitoring the less-crowded range of 70 cm (this UHF band is hot and thriving in most U.S. areas, but less active in the deep south). I have been pleasantly surprised, however, to find many of my old friends and original 2 meter pioneers now frequenting 70 cm. This band is an FM delight, and its range is generally equal to 2 meters. Over half the fun of dual-band operating is using a fancy new rig (the subject of our review), so let's fast forward to the views!

Alinco's transceivers are looking more impressive by the day, and that fact is vividly reflected in their new DJ-580T. I feel quite confident saying whatever you have wanted, dreamed of, or should have dreamed of is factory-included in this handheld. It has super-extended frequency coverage, multiple scan modes, simultaneous dual-band receive, full duplex operation, and a cross-band repeat mode. The DJ-580T also has PL tone encoding and decoding, DTMF paging and messaging, an automatic power off function, battery saver mode, and illuminated keypad/display. There is probably a rocket launcher and a kitchen sink included, too. I find more new features every time I switch on the handheld. You probably have questions galore regarding the DJ-580T, so let's begin with the basic facts and progress in a convenient "show and tell" manner.

Overview

The Alinco DJ-580T is enclosed in a charcoal-gray case measuring 5½" H × 2

*4941 Scenic View Drive, Birmingham, AL 35210



The Alinco DJ-580T ultra-compact dual-band handheld is loaded with features.

1/16"W × 1¼"D, including its bottom-mounted battery pack (see photo). The front is arranged in what I call a modern rather than classic design. That is, the multifunction LCD readout is located at the top, keypad in the middle, and speaker/microphone in the lower area. This is a clever design because when talking into the microphone, the rig's antenna is positioned beside your head rather than in front of your eyes.

The DJ-580T's case is high-impact plastic with a textured space-age-type coating that seems impervious to scratches or damage. The back plate is aluminum for heat sinking, and it has the same textured coating. Everything fits tight and flush. Nothing flops, wiggles, or bends.

Top-mounted knobs control frequency selection and volume/squelch for each band. Directly behind the controls, and protected by a rubber cover, are sockets for an external speaker mic and earphones for each band. If you do not connect an external earphone, both bands are monitored simultaneously on the handheld's built-in speaker. There is also an external DC socket on the transceiver's right side. When 12.5 volts DC is applied to this socket, the rig's battery is bypassed and up to 5 watts output is available.

The handheld is supplied with a 2 meter/70 cm mini duckie antenna, belt clip, and standard "wall charger" that is fitted with a neat desk-type stand. A rapid charger is available as an option. As supplied, the DJ-580T transceives from 144-147.995 MHz and 440-449.995 MHz plus receives from 130-173.995 MHz and 440-479.995 MHz. A simple owner modification described later adds extended reception of AM aircraft from 108-142.9 MHz and FM from 810-998 MHz. Power output with the supplied battery pack is approximately 2 watts high power with two lower power selections. An optional 12 volt battery pack will increase the DJ-580T's output to 5 watts. Battery packs slide on/off the transceiver's bottom.

A handy means of discussing some of the DJ-580T's operating functions involves explaining its LCD readout shown in fig. 1. The small upper-left numbers (#1) indicate memory channels. Non-programmed memories blink, while programmed memories are stationary. The adjacent blocked **S** (#2) indicates when the battery saver function is operational. This feature lets the radio **sleep** when squelched, but "come alive" when a signal appears on frequency. The upper **T** indicates when a PL tone is used (#3), and the adjacent **SQL** indicates when the PL decoder is activated. The adjacent star (#5) appears when you are transmitting on a VFO-selected frequency and receiving on a memory frequency. The adjacent **L, M, H** indicates your selected output power, and the **T** below **L** indicates a 5 second time pause during scanning.

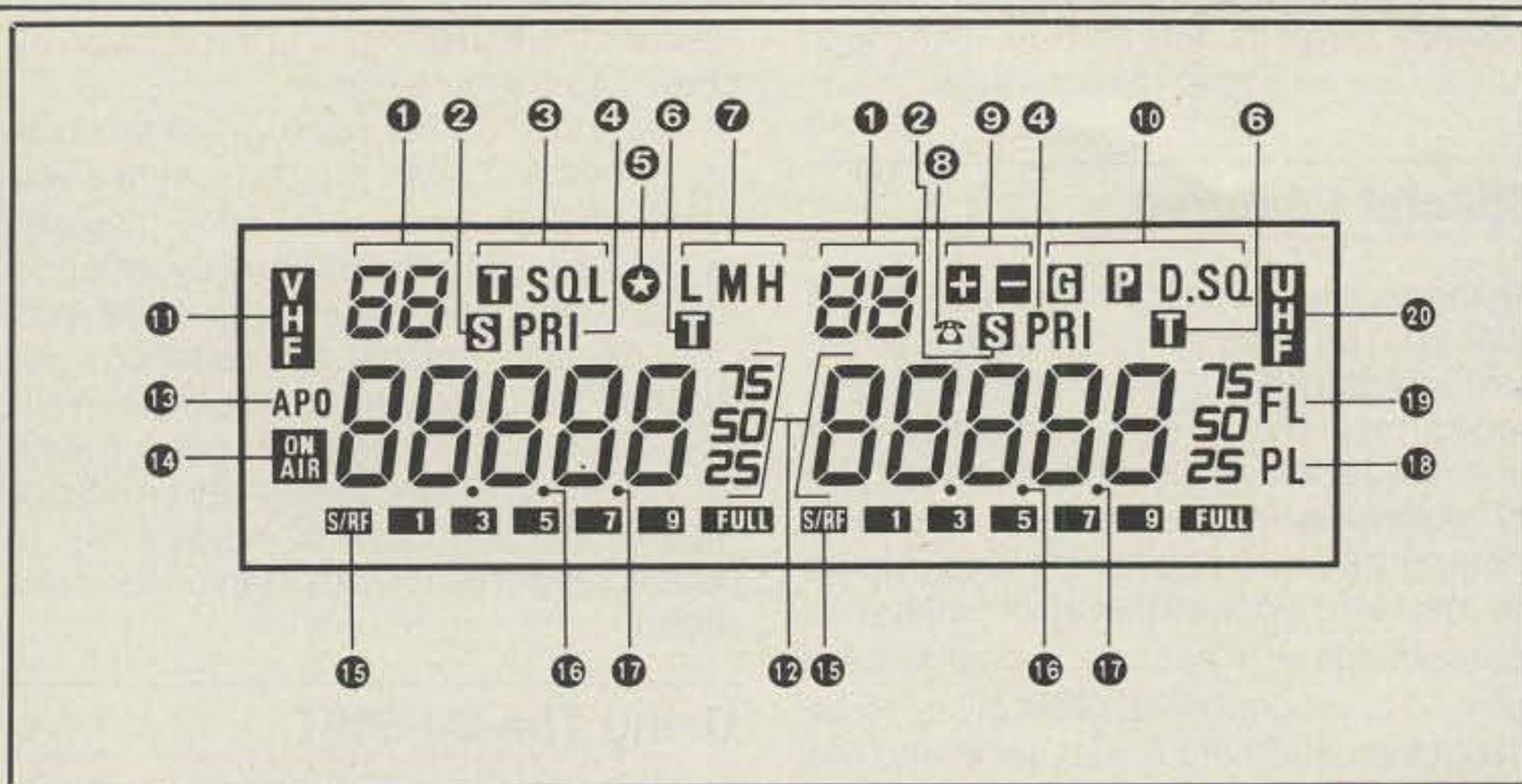


Fig. 1—Close-up view of LCD readout on the DJ-580T (see text).

Continuing to the right, the plus or minus symbols (#9) indicate transmitter offsets, the telephone symbol (#8) indicates DTMF autodialer activation, and **PRI** (#4) indicates Priority Watch or Dual Watch (the latter toggles between two selected frequencies twice a second—almost simultaneous two frequency receive!). The **G**, **P**, and **D.SQ** (#10) indicate various modes of DTMF paging—a clever feature that lets you monitor a busy repeater all day and receive only calls with your three-digit DTMF-keyed code. Finally, the **APO** on the display's middle left (#13) indicates when the automatic power-off function is enabled. You can set the talkie to switch off at any time between 5 minutes and 1 hour of nonuse.

Considering the previous discussion, you might think the DJ-580T is complex and challenging to operate. Not so. It is quite easy to understand and use. Entering a frequency, for example, simply involves pressing the desired band button (VHF or UHF), and then entering all six digits—for example, 146760. You then hold in the **FUNC** button (left side) and press the **1/Shift** key two or three times until "--" appears in the display. For odd repeater offsets, just press the **1/Shift** key again (the preprogrammed 600 kHz/2 m or 5 MHz/70 cm standard offset appears in the display), then rotate the top tuning knob for your desired offset. Programming this information into a memory is also a snap. Press the **D** button, select a desired memory for programming by the top knob, then hold the **FUNC** button and press the **D** button again to program the memory. Could you visualize the memory numbers blinking until you programmed them? That is precisely what it's like when you are holding and using your own DJ-580T.

A Closer Look

Once you are familiar with basic setup and use of Alinco's DJ-580T, the rig's "bells and whistles" really make dual-band operation fun. Its 40 memories can be divid-

ed equally between VHF and UHF, for example, or separated as desired (like 35 memories for VHF and 5 for UHF). You can also program receive-only channels like NOAA weather and aircraft into memories adjacent to local repeaters for quick access plus lock out constantly busy frequencies/memories for scanning. All 40 memories are fully programmable for odd offsets, PL tone encoding/decoding, and DTMF paging.

Scanning capabilities of the DJ-580T are incredible. You can set it for scanning the full range on both bands, preprogram scan limits for each band, or even scan one band while monitoring or scanning memories on the other band. You can also set the handheld to priority scan between only two channels on one band while scanning memories or frequencies on the other band. When band scanning (or manually tuning), you can select various steps from 5–25 kHz. The previously mentioned priority scan, incidentally, switches between a selected VFO frequency or memory channel every 4 seconds while pausing for 1/2 second on the Priority channel. Another type of two-frequency monitoring called **Dual Watch** is also included in the DJ-580T. When this function is activated, the radio cycles between two selected frequencies/channels twice a second. It is almost like listening to two repeaters on the same band at the same time.

Three autopatch-autodialing memories are included in the DJ-580T, and each one stores up to 16 digits. I found three autodialers mated perfectly with my lifestyle—one memory for dialing each of my friends, and one extra for flash-dialing 911/emergency. Programming and using the autodialers is quite easy. You hold the **FUNC** key and press **A** key. You then select an autodialer memory by the top knob, enter the number by the keypad, and press **A** key to store the number. To autodial, you simply hold the PTT switch closed and rock your thumb to also press the **FUNC** key. The number is automatically dialed, and tones are monitored on the handheld's

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IC-728 HF Xcvr./Gen. Cov. Rcvr.	\$889.00
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IC-735 HF Xcvr./Gen. Cov. Rcvr.	939.00
IC-751A HF Xcvr./Gen. Cov. Rcvr.	1329.00
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AT-150 HF Automatic Antenna Tuner	389.00
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IC-R7100 Communications Receiver	1209.00
AH-7000 25-MHz. To 1300-MHz. Omni-Dir. Ant.	104.00
IC-228H 2-Meter, FM, 45 Watt Xcvr.	349.00
IC-229H 2-Meter, FM, 50 Watt Xcvr.	359.00
IC-2410H 2-Mtr./440-MHz., FM, 45W/35W	759.00
IC-3230H 2-Mtr./440-MHz., FM, 45W/35W	689.00
IC-2GAT 2-Mtr., FM, Handheld With T-T	329.50
IC-4GAT 440-MHz., FM, Handheld With T-T	324.50
IC-W2A 2-Mtr./440-MHz., FM, Mini H-H W/T-T	479.50
BP-4 Battery Case	18.00
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BP-7 13.2 VDC, 425 mA.H., Ni-Cad Batt. Pack	83.00
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BP-83 7.2 VDC, 600 mA.H., Ni-Cad Batt. Pack	51.25
BP-84 7.2 VDC, 1000 mA.H., Ni-Cad Batt. Pack	78.75
BP-90 Battery Case	16.75
BC-35 Drop-In Rapid Charger; BP-2, 5, 7, 8	82.25
BC-72A Drop-In Chg.; BP-81, 82, 83, 84, 85, Int.	99.00
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CP-12 Cigarette Lighter Cable W/Noise Filter	19.25
CP-13 Cigarette Lighter Cable W/Noise Filter	19.25
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HM-54 Speaker/Microphone	49.25
HM-65 Speaker/Microphone For IC-W2A	35.75
HM-70 Speaker/Microphone For IC-W2A	36.75
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IsoPole-144 2-Meter Vertical Antenna	49.95
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ARX-450B 450-MHz., Ringo Ranger II Vertical	47.00
AR-270 2-Mtr./440-MHz., Ringo Vertical	58.00
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13B2 144 To 148-MHz., 13-Element Beam	95.00
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RS-20M Same As RS-20A, With Meters	108.50
RS-35M Same As RS-35A, With Meters	159.50
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50 MHz					
0503G	1-5	10-50	6	15/0.6	LPA
0508G	1	170	28	15/0.6	Standard
0508R	1	170	28	—	Repeater
0510G	10	170	25	15/0.6	Standard
0510R	10	170	25	—	Repeater
0550G	5-10	375	60	15/0.6	HPA
0550RH	5-10	375	60	—	Repeater HPA
0552G	25-40	375	55	15/0.6	HPA
0552RH	25-40	375	55	—	Repeater HPA
144 MHz					
1403G	1-5	10-50	6	15/0.6	LPA
1406G	25	100	12	15/0.6	Standard
1409G	2	150	25	15/0.6	Standard
1409R	2	150	24	—	Repeater
1410G	10	160	25	15/0.6	Standard
1410R	10	160	24	—	Repeater
1412G	25-45	160	20	15/0.6	Standard
1412R	25-45	160	19	—	Repeater
1450G	5	350	56	15/0.6	HPA
1450RH	5	350	56	—	Repeater HPA
1452G	25	350	50	15/0.6	HPA
1452RH	25	350	50	—	Repeater HPA
1454G	50-100	350	40	15/0.6	HPA
1454RH	50-100	350	40	—	Repeater HPA
220 MHz					
2203G	1-5	10-40	6	14/0.7	LPA
2210G	10	130	20	14/0.7	Standard
2210R	10	130	19	—	Repeater
2212G	30	130	16	14/0.7	Standard
2212R	30	130	15	—	Repeater
2250G	5	220	40	14/0.7	HPA
2250RH	5	250	40	—	Repeater HPA
2252G	25	220	36	14/0.7	HPA
2252RH	25	250	36	—	Repeater HPA
2254G	75	220	32	14/0.7	HPA
2254RH	75	250	32	—	Repeater HPA
440 MHz					
4403G	1-5	7-25	4	12/1.1	LPA
4410G	10	100	19	12/1.1	Standard
4410R	10	100	18	—	Repeater
4412G	20-30	100	19	12/1.1	Standard
4412R	20-30	100	18	—	Repeater
4448G	5	100	22	12/1.1	HPA
4448R	5	100	22	—	Repeater HPA
4450G	5-10	175	34	12/1.1	HPA
4450RE	5-10	175	34	—	Repeater HPA
4452G	25	175	29	12/1.1	HPA
4452RE	25	175	29	—	Repeater HPA
4454G	75	175	25	12/1.1	HPA
4454RE	75	175	25	—	Repeater HPA



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STANDARD



MODEL 1450G
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All amplifiers (non-rptr) are linear, all-mode with fully automatic T/R switching and PTT capability. The receive preamps use GaAs FET devices rated at .5 dB NF with +18 dBm 3rd order IP. LPA, Standard and HPA amps are intermittent duty design suitable for base and mobile operation. Repeater amps are continuous duty, class C.

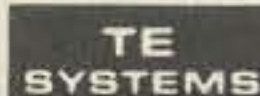
Amplifier capabilities: High-power, narrow or wideband; 100-200 MHz, 225-400 MHz, 1-2 GHz, Military (28V), Commercial, etc. — consult factory. A complete line of Rx preamps also available.

RX Preamplifiers

Band	Model	NF (dB)	Gain (dB)	Connector
50 MHz	0520B	.5	25	BNC
50 MHz	0520N	.5	25	N
144 MHz	1420B	.5	24	BNC
144 MHz	1420N	.5	24	N
220 MHz	2220B	.5	22	BNC
220 MHz	2220N	.5	22	N
440 MHz	4420B	.5	18	GNC
440 MHz	4420N	.5	18	N
1.2 GHz	1020B	.9	14	BNC
1.2 GHz	1020N	.9	14	N



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speaker. Frankly, this feature is as much fun to use as it is to demonstrate.

Special Features

As mentioned earlier, the DJ-580T has a built-in DTMF paging system, and this feature is really neat. When using the pager, you can silently and continuously monitor any busy repeater. Other stations call you by "punching up" your three-digit code on their rig's keypad or by using their (Alinco rig's) DTMF pager. In the latter case, your rig responds with beeps and displays the caller's code until reset. This gives you a visual indication of missed calls (and the caller), and the pager automatically reverses caller/callee codes for easy return-replies. Alinco's DTMF pager is compatible with that of Kenwood and ICOM. It will also receive calls from other transceivers without a pager option. In this case, the caller simply "punches up" your three-digit code. The Alinco responds with beeps and displays **Error** for the caller's code.

DTMF paging is terrific for staying in touch with close friends or family members, and I am convinced it is the wave of the future in FM communications. Alinco carries their DTMF paging a step further with a two-digit message code that is really spiffy. In this case, your friend(s) and you preplan codes such as (1) for "I am en route between point A and point B" and (2) for "I have arrived at Point B." You can then check your transceiver's display for the other party's status, and even look back through previous messages to follow their progression. Imagine how helpful this can be when your spouse is out and alone at night (similar to the "watch over me concept" I described in my new *Modern Mobile Handbook*). Use this feature one time, and you will be sold on its benefits.

Another previously mentioned feature is the DJ-580T's extra receive coverage. Following a simple owner modification, the handheld will copy AM aircraft signals in the 108-142.9 MHz band plus FM in the range of 810-998 MHz.

Here are the mod details. First, slide off the rig's (bottom mounted) battery pack. Next place the handheld on a wide-spread towel and use a small jeweler's screwdriver to remove the four screws from the battery contact plate. Be careful here and do not lose the little screws. They are very small and quite short (!). If one falls on the floor, you could be hunting for it for a week. Next carefully pull the battery contact plate down *just a little*. Peep inside (use a good light), and you will see a red and a blue wire. The red wire may be tucked behind some ICs; it usually looks like a long loop. Cut the red and blue wires (*do not* cut the pink wire). Now carefully replace the battery contact plate and slide on the battery. Reset the radio by holding the **FUNC** key depressed while you turn on the rig. The display will show everything at once.

Release the **FUNC** key and the display will show 145 and 445 MHz.

You should now reprogram various memories and scan ranges, just like you did when first using the DJ-580T. You can access the AM aircraft band by entering a related frequency directly on the keypad or by pressing the VHF key and then holding the **FUNC** key while pressing the VHF key. The 800 MHz band is accessed similarly by the UHF key. Sensitivity on both of these extended ranges, incidentally, is outstanding. You will like it (an understatement).

Using The DJ-580T

If you get the impression I am having a ball with my new DJ-580T, you are right! During the first few hours of operation, for example, I was listening to retransmissions of space shuttle audio on a local UHF repeater while listening to NOAA weather and monitoring a favorite 2 meter repeater. Today I am scanning local 2 meter repeaters while scanning the 70 cm band for previously unrealized activity. This radio is definitely going to see plenty of good use during upcoming travels, too.

I am especially impressed with the DJ-580T's ease of operation. The front keypad is double-labeled according to functions, so remembering keystrokes is not a problem. Night use is really great: the keypad and LCD readout light up like an airplane cockpit. The handheld has very good sensitivity and intermod immunity, and its true FM modulation and detection produce great sounding "full bodied" audio. The APO (Automatic Power Off) function is a real blessing. If you have ever made a dive for your handheld in an emergency only to find the rig was left on and its battery discharged, you will really appreciate this feature.

The rig is small enough to fit in a coat pocket and light enough to clip onto a belt without tugging, so I carry it everywhere. Naturally, an amateur is not fully dressed without a handheld by his/her side!

Conclusion

All aspects considered, I think the DJ-580T is a winner. It has all kinds of features, yet it is easy to use, powerful, and lightweight. What else could one ask for in a "do everything" handheld?!

The DJ-580T (suggested amateur net price \$445.95) is backed with a two-year limited warranty and complemented with a full line of optional accessories such as speaker/mic with remote operating controls (EMS-8Z \$37.95), headset with VOX (EME-10K \$63.95), vinyl case (EMC-17 \$16.95), rapid battery charger (EDC-24 \$19.95), and 12 volt/700 maH battery pack (EBP-22 \$65.95). For more information, contact the folks who know this radio best: Alinco Electronics, Inc., 438 Amapola Avenue, Suite 130, Torrance, CA 90501.



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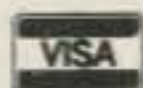


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A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Update

Just about everyone is capitalizing on the "stealth" buzzword. Now J Com offers a series of near-invisible VHF and UHF antennas for mobile operation to make the vehicle less conspicuous as one containing a high-value radio. The new "no holes, no magnet" Stealth antennas are designed to resemble decals and are even available with a printed anti-theft warning. The antennas are 3.5 inch squares of a thick, copper-clad polyamide material having a noncorrosive graphite-colored coating that adheres to the inside of the car windshield. The etched copper antennas present a low SWR over the entire design band, and no adjustment or tuning is required.

The J Com Stealth antennas are available for 146, 220, and 440 MHz. The standard models handle 50 watts RF and are priced at \$59.95; high-powered versions handle 110 watts and are \$69.95. Each antenna is equipped with 16 feet of RG-58/U coax. For more details, Contact J Com, Box 194, Ben Lomond, CA 95005.

ELPA 3/65 Ground Cooperative Antenna.

A very intriguing HF antenna is the Eyring Low Profile Antenna (ELPA). It's a unique, patented antenna designed especially for military use where the idea is to not visibly disclose the operating location. Based originally on an Eyring, Inc., design for a nuclear blast survivable underground antenna, the ELPA 3/65 is "ground cooperative." This means that it can work rolled out on or near the ground; no antenna tuner, tower, or support structure is required. While the military advantages of such an antenna are obvious, there's also a big plus for amateurs living and operating in restricted locations such as apartments, condos, or RV parks where conventional antennas may not be erected.

The antenna, which can be installed or removed in five to ten minutes, is normally laid out in an "H" configuration, being placed either directly on the ground or with the center portions elevated. Broadbanded, it covers 1.8-30 MHz, has a claimed typical SWR of 2:1 or less depending on layout, and handles 200 watts PEP. The ELPA can be set up in a variety of configurations, and two or four ELPAs may be combined. According to Ivie Technologies, which licenses the ELPA technology from Eyring, the antenna is very adaptable and tolerant of site conditions. It can be laid out on asphalt roads and parking lots, though it will not work well on steel-reinforced concrete, nor can it be buried.

The ELPA consists of one or more element feed units (EFUs) connected either directly to a transceiver, or through a power splitter. An EFU, along with its antenna wires, is referred to as an element; multiple elements provide increased directivity and power gain. A typical ELPA employs two EFUs and one power splitter. The ELPA is either laid directly on the ground, or the center two-thirds of its elements are ele-



The heart of the ComTek phased array vertical systems is the outdoor switchbox and the in-shack selector/control box, shown in this photo. For more details, see the text of this month's column. (Photo courtesy ComTek)

vated about 2 feet above the ground on nonconductive stakes; elevating the elements increases the antenna's efficiency. A typical installation makes use of the standard H-shaped layout with four 150 foot elements.

The basic ELPA 3/65 system is \$199 and includes two EFUs, one power splitter, and a manual, but is furnished without wire for the elements. Additional feed units, power splitters, wire, and reels are available from the manufacturer.

A detailed, illustrated brochure is available from Ivie Technologies, Inc., 1366 West Center St., Orem, UT 84057.

ComTek Phased Array Systems Update.

We first discussed the original, single-band ACB-4 switchbox in the December 1989 column. Now Dennis Mitchell, K8UR, offers the updated ACB-4 5-Bander Phased Array Switch System. The heart of the system is a single switchbox to provide the correct power and phase division for a four-element, four-square phased vertical array on the 14, 18, 21, 24, and 28 MHz bands.

Since 1988 ComTek has made phased array systems for low-band DXers on 160, 80, and 40 meters; these early units were single-band affairs. Now the focus is on multiband operation on 20-10 meters, including the WARC bands. The 5-Bander ACB-4 functions as a complete remote-control RF switching system for use with multiband HF vertical phased array antennas. It is designed especially to provide the correct

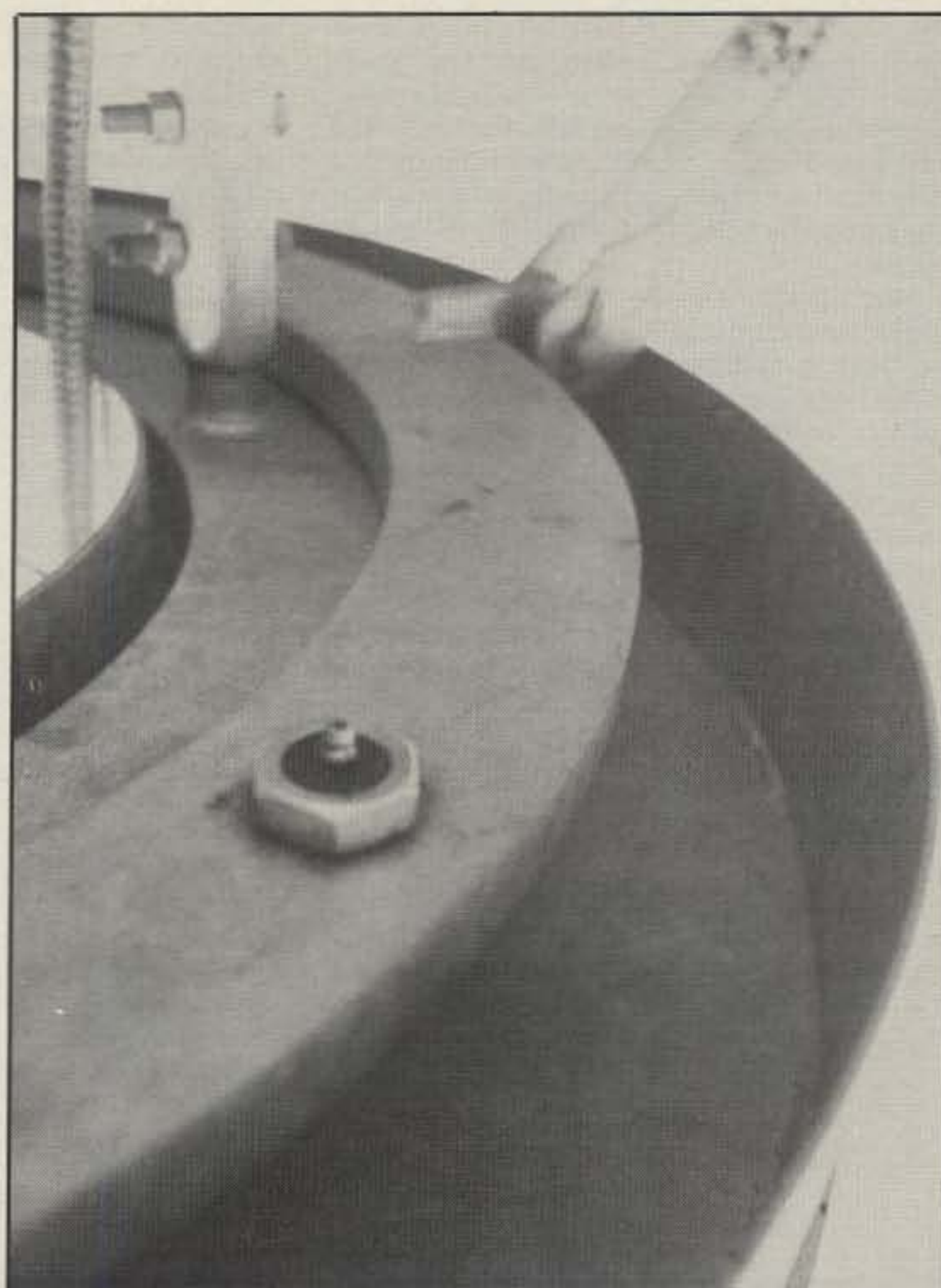
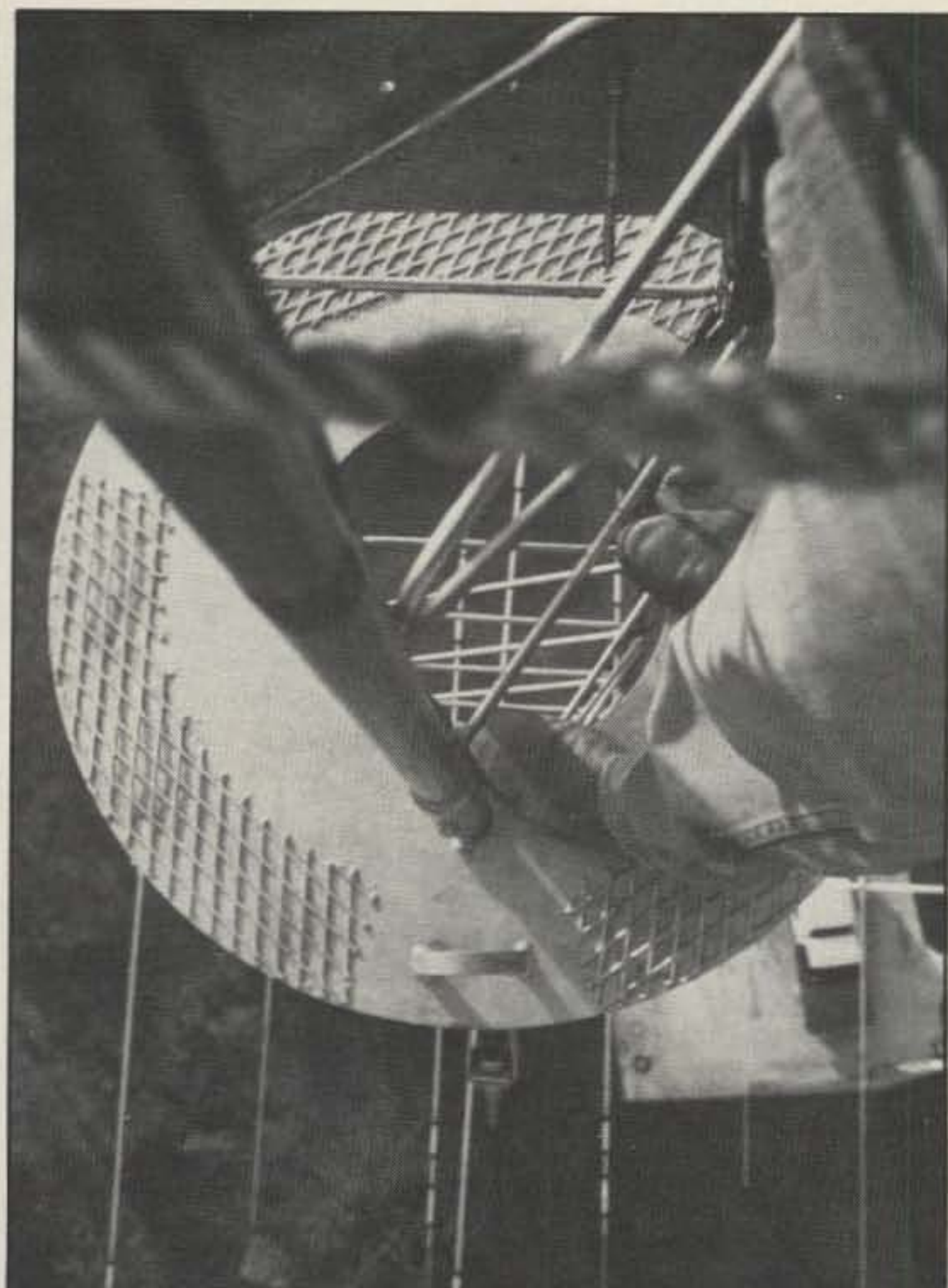
power division and phasing for W1CH-style "Four Squares" (four vertical elements in a square, a quarter-wave on a side). The ACB-4-10/20, which is sold with the switchbox, is \$319 and handles more than 5 KW RF; other models in the ACB-4 series cover single bands and multiple band combinations.

The switchbox itself is of heavy-duty, specially coated 18-gauge steel for long-lasting weather protection. Stainless steel hardware is used throughout, and circuit boards are of thick glass Epoxy. The in-shack selector/control box is an all-metal enclosure with a lexan front panel. The selector knob rotates in either direction without stops; this allows you to switch to the next adjacent direction quickly.

ComTek also offers multiband 20-10 meter verticals to use with the switchboxes at \$99 each; both 2- and 4-element configurations are possible. They also promote a \$699 multibander four-square system that includes the switchbox assemblies, phasing cables with connectors, and four verticals. This system boasts a claimed forward gain of 8.2 dBd, a beamwidth of $+/- 46$ degrees at the -3 dB points, and a front-to-back (F/B) ratio of 25 dB. The four verticals can be installed in a small 15×15 foot square area. For a technical brochure, contact ComTek, 19 Styron Drive, Oriental, NC 28571.

Rotating Tower Systems Update. We've covered the K5IU rotating tower systems before, in the February 1987, August 1988, and Febru-

317 Poplar Drive, Millbrook, AL 36054



Dick Weber, K5IU, has made some design modifications to his Rohn 45/55 assemblies to provide increased weather protection for the drive sprocket system. He changed the upper part of the assembly to a rounded shape; also, he altered the drive shaft bearing and rotor mounts to make drive-chain adjustment easier. There are no changes to the guy-wire bearings, but now there's an optional ice and snow shield. The shield slips over the guy-wire bearing with skirts that drop below the lowest level of the enclosed bearing. The top surface of the shield also makes a good work surface on which to stand. (Photo courtesy Rotating Tower Systems, Inc.)

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ary 1991 columns. To recall, the rotating tower concept lets you effectively multiply your "tower real estate" to rotate multiple stacked arrays, by means of a rotating base that can be installed at practically any height along with appropriate sets of guy-wire bearings. The systems are most frequently installed on Rohn 25G, 45, and 55 towers.

According to Dick Weber, K5IU, the main advantages include easy stacking of antennas, positioning multiple antennas at their optimum heights, and combining various bands (VHF, UHF, and HF) on a common tower having a single means of rotation. Of course, this also means less room being required for installation. Dick recently advised us of some changes and new features.

Dick has made a modification to the Rohn 45/55 designs to provide increased weather protection for the drive sprocket system. This was done by changing the upper part of the assembly to a rounded shape. Also, the drive-shaft bearing mount and rotor mount have been changed to make drive chain adjustment easier. This was done by slotting the drive-shaft bearing and rotor-mounting plate holes. Chain slack is adjusted by moving the drive shaft assembly in or out. (In the accompanying photos, the cover that shields the drive shaft has been removed for clarity.)

No changes have been made to the Rohn 45/55 guy-wire bearings, although there now is

an optional companion ice and snow shield for installations in extreme environments. A shield slips over the guy-wire bearing with skirts that drop below the lowest level of the enclosed bearing. Conveniently, the top surface of the shield makes a good work surface on which to stand.

For details on these unique tower accessories, contact Rotating Tower Systems, Inc., Box 44, Prosper, TX 75078.

New from Mirage/KLM. This firm's antenna line continues to expand with the addition of two triband WARC antennas, the 12-17-30D dipole and the 12-17-30V vertical. Also, they've added a triband dipole for 20, 15, and 10 meters—the KT-31; two new antennas for 6 meters, the 6M-10 and the 6M-14; and a 20-element long boom for 2 meters, the 2M-20LBX.

In addition to RF amplifiers, preamps, and other accessories, the firm offers a well-regarded line of HF log periodic antennas for continuous coverage of 6-30 MHz; a VHF log periodic for 108-154 MHz; HF, VHF, and UHF verticals; triband and monoband HF Yagis; various Yagis for 2 meters, 6 meters, 220 MHz, 432/440 MHz, and 1296 MHz; cross-polarized Yagis for satellite uplink and downlink applications; several satellite circular antennas for 70 cm and 2 meters; and commercial VHF antennas.

To receive a catalog, contact Mirage/KLM, 16890 Church St., Morgan Hill, CA 95037.

Antenna Mart Catalog. In December 1991 we took a look at Bill Wall, KC4UZ's Antenna

Mart catalog of antennas and antenna accessories. One of the star items in his catalog was the KC4UZ Antenna Sidemount, a useful device that allows you to mount multiple antennas on the side of your existing tower.

Antenna Mart also offers several remote antenna switches. The W0MLY SW Series are six- and nine-position weather-tight remote switches that handle 5 KW RF and feature neon indicator lights to tell which antenna is in use at a given time. Other remote switches are available for phasing verticals, reversing rhombics, and other applications. The firm also offers various large HF quads, including unique designs that incorporate five or seven direct-fed, gamma-matched, remotely switched monobanders on a single boom, priced from \$599.

Bill also offers heavy-duty, quick connect/disconnect gin poles to help with safe tower and antenna erection. Rated at 200 lbs. maximum lifting load, depending on the strength of the rope or cable used, the poles fit Rohn and Rohn-type 20, 25, 30, 45, and 55 towers. The mounting points and pulley mount are of all-steel construction except for the pulley itself, which is of T-6 aluminum. The gin poles, which are warranted for 5 years, are priced at \$177.50 and up.

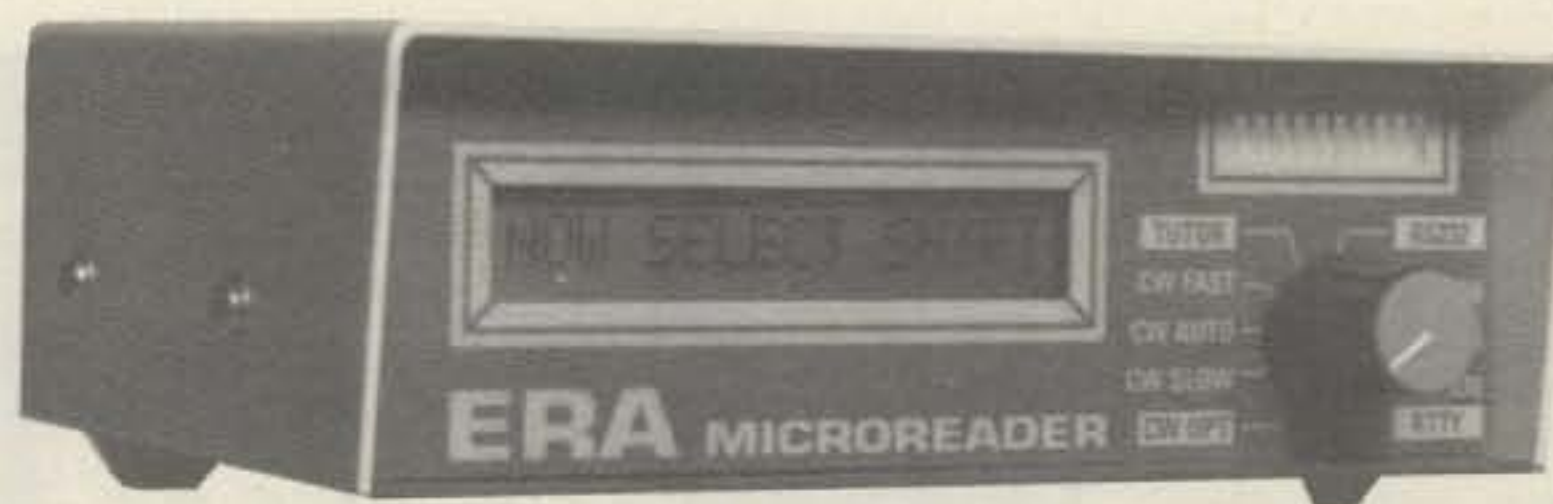
For a catalog, contact Antenna Mart, P.O. Box 699, Loganville, GA 30249.

"Radio Adventure" Catalog. We've described the wide range of antenna and antenna accessory products offered by Jim Stevens,

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CIRCLE 72 ON READER SERVICE CARD

KK7C, of AntennasWest, most recently in the October 1991 column.

Previously, we mentioned that AntennasWest offers a large stack of spec sheets on its various HF antennas. Some of the many AntennasWest products include the BumbleBee HF coaxial dipoles; the TNT, a ready-to-use HF Windom; G5RV all-band "QuickKits"™; QRV ("I am ready") emergency antenna packs; the single-band, two-element DX HalfSquare; a "Slinky" indoor antenna; the QRV-QL QuickLaunch antenna installation kit; the OmniLoop™ for 160-10 meters; TigerTail™ snap-on range extenders for handheld radios; several other novel antennas; solar power supply products; and QSL cards.

Frankly, the many loose AntennasWest spec sheets tended to become unwieldy. Taking the cue, Jim has reorganized them into a 5½" x 8½", 55-page "Radio Adventure" catalog, one that's nicely organized and entertainingly written. The catalog also contains some of Jim's antenna philosophy, including his belief that if you take care in choosing an antenna, you can consistently work DX without a tower and without high power. The new catalog is divided into eight sections: features, antennas, hand-held and portable operation, mobile operation, solar power, build-it-yourself components, QSLs, and ordering information. It's \$1.00 from AntennasWest, Box 50062, Provo, UT 84605.

Soft Topix

HamCall CD-ROM. Several months ago we added a CD-ROM drive to our Gateway 386SX PC. This fortuitous purchase opened up new opportunities because of the massive amount of information (up to about 680 MB) that a CD-ROM can store. One of the first products we sampled was Buckmaster Publishing's HamCall CD-ROM, which Lew McCoy, W1ICP, reviewed in the March 1992 CQ. After seeing Lew's positive review, I knew I wanted to check it out myself.

HamCall, published and edited by Jack Speer, N1BIC, and Steve Shrader, WA4GOX, is a computer database of all 550,000 FCC-licensed amateur stations in the United States, including club, military, and RACES calls, plus selected international listings, for a total of about 820,000 records. Included are about 100,000 cross-references from old to new calls. With HamCall on the IBM, you can retrieve data by callsign, name, address, city, state, ZIP code, or license class, using the included Folio VIEWS™ software; copy output to disk, a database, or printer; generate labels and ASCII text files; and even compile specialized databases, such as club directories and membership lists. You can access the database from an IBM PC or a Mac, although I wasn't able to check out the Mac's access program.

The HamCall CD-ROM is a dynamic product: new update disks are issued in October and April. The updates not only reflect newly issued FCC callsigns, but also expand the international listings. There also are several nice bonuses on the CD-ROM that do more than just flesh out the available space. It contains several thousand IBM PC public-domain (PD) programs and data files, mostly pertaining to amateur radio, broadcasting, cable TV, and electronics. These are a mixture of compressed (archived) and uncompressed files; there also are a few Mac programs. In an attempt to increase the quality of the PD offerings, Buckmaster encourages users to submit new PD programs and promises a free

HamCall CD-ROM for significant program donations. As a further bonus, the FCC Part 97 amateur rules are on the CD-ROM, as is a large selection of service bulletins for popular transceivers, including Kenwood, ICOM, and Yaesu.

The HamCall CD-ROM is \$50 plus \$5 shipping. It, and a catalog of other CD-ROM products, is available from Buckmaster Publishing, Route 4, Box 1630, Mineral, VA 23117.

Shareware Solutions CD-ROM. A review of the Shareware Solutions CD-ROM by Alexander W. Burawa in the July 1992 ComputerCraft (a sister CQ publication) also caught my eye. His review noted the quality and depth of the programs on this single CD-ROM. Included are programs in accounting, data management, artificial intelligence, communications and amateur radio, games, graphics, programming, virus protection, Windows, and more. There are more

than 2900 programs on the CD-ROM.

I've found that one of the big problems with CD-ROMs that contain hundreds or thousands of programs and megabytes of data is, simply, rapidly accessing and using the programs and data. The multi-megabytes of disk space constitute a lot of territory to explore, and to do it right you need a good, fast DOS shell, file finder, or file browser. Also, most programs on CD-ROMs are furnished in archived or compressed form. Therefore, you also have to know how to use file archiving programs such as PKZIP, ARC, ARJ, PAK, LHA, or others. Manually exploring and successfully extracting a CD-ROM's worth of files can be a royal pain.

I was quite impressed with the Shareware Solutions CD-ROM, however. Because of the almost overwhelming number of programs to explore, the publisher has compressed the files to

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save CD-ROM space. But they also have addressed file extraction problems with an easy-to-use, menu-driven control program that describes and rates each program and lets you select program categories, search for programs, automatically extract and copy programs to your hard drive or floppies, print disk labels, and take care of other housekeeping chores. Working with this CD-ROM is a pleasure.

About the only negative I can think of regarding the Shareware Solutions CD-ROM is its high cost: single copies are \$149 and an annual subscription of quarterly issues is \$400. However, this seemingly steep pricing is based on the assumption that you're a shareware vendor yourself and that you'll resell the programs on disk. Anyway, the CD-ROMs probably are worth their cost even if you're an individual user; much of the contents is less than three months old, and most of the rest are less than one year old. Also available are quarterly-issued CD-ROMs in specialized categories such as games, education, and business. These files can be run directly from the CD-ROM.

For more information, contact Advantage Plus Distributors, Inc., 7113 Halifax Court, Tampa, FL 33615.

R.L.S. A completely menu driven, relational log database for the IBM PC is offered by Dennis Ditto, N1DIZ; he calls it R.L.S.—Relational Logging System. The program maintains detailed information about each QSO. A logically formatted data entry screen presents information in an easy-to-read format, and online lookup dictionaries provide assistance and data validation during data entry. The program also provides unlimited free-form remarks for each QSO.

One of the program's key features is the online "ham directory" of all stations you've

worked. Each time you work a new station, it is automatically added to this directory. Another key feature is the online lookup dictionaries for continent, country, mode, QSL bureau/manager, and state; these dictionaries facilitate and help guarantee consistent data entry.

Other features include tracking QSL status for each QSO; printout of the station log in several different formats (detail, summary, portrait, and landscape); powerful searching and sorting by any field or group of fields; printout of QSL reports, cards, and labels in various formats; awards tracking for WAS, WAC, and DXCC; and printout of the ham directory.

R.L.S. is priced at \$69 plus \$5 shipping and is available from Dennis Ditto, N1DIZ, P.O. Box 52, Dover, MA 02030.

DELTA COMM DSS Interface. In the August 1991 column we described the DELTACOMM™ I-7000 Communication Manager for the sophisticated SWL. We noted that it is a high-tech, IBM-PC-based manager for the ICOM IC-R7000 receiver. The I-7000 offers a number of sophisticated features, including lockout of receiver birdies, elimination of redundant logging of channels during search, priority channel monitoring while scanning, file exchange with spreadsheet or database software for custom report generation, user-friendly window-style screens, on-screen help, and a smart setup program. It's priced, then as now, at \$299.

Recently, Delta Research introduced an optional DSS (Digital Signal Strength) interface for the R7000. The DSS option soups up the I-7000, giving it the capability of logging signal levels and monitoring only those stations whose signal levels are within the user-defined threshold, while masking out all other signals. It also permits signal-strength logging while scanning a

database and logging "hit" activity, minimizing confusion when more than one station occupies the same frequency. The new DSS interface logs signal-strength information to a printer and/or a disk file while the I-7000 is scanning.

The DSS interface comes complete with easy installation instructions and an 8-bit DSS A/D converter module. It's priced at \$99 plus shipping to registered I-7000 users from Delta Research, P.O. Box 13677, Wauwatosa, WI 53217.

PC-Kwik Power Pak and Power Disk Update. In the August 1991 and February 1992 columns we discussed these two superb utility packages from Multisoft, now known as PC-Kwik Corporation. To recall, PC-Kwik® Power Pak is a fully integrated PC performance enhancement package. The various Power Pak utilities work intelligently among themselves to conserve and share memory.

PC-Kwik Power Pak V2.13 contains several complementary utilities. It offers functions such as disk caching, video-screen acceleration, a RAM disk, keyboard speedup, a pop-up command line editor, a smart print spooler, and much more. By replacing MS-DOS's slow disk, screen, printer, keyboard, and command line functions with faster and more sophisticated alternatives, the Power Pak utilities reduce or eliminate the bottlenecks that can slow down even the fastest computer.

At the heart of the package is the Super PC-Kwik disk cache, reportedly the fastest in the industry. It has the ability to automatically establish a disk cache buffer in conventional, extended, or expanded memory. The most distinctive feature of the package is the integrated, intelligent use that is made of the computer's memory. Power Pak dynamically shares available memory among its internal programs and with



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		Antenna	

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PC-Kwik Power Pak is a fully integrated PC performance enhancing package. The several Power Pak utilities work intelligently among themselves to conserve and share memory. The included smart disk cache and other accelerator utilities can effectively speed up PCs from three to ten times. (Photo courtesy PC-Kwik Corp.)

other applications, including Microsoft Windows™.

Previously offered only as a separate product but now bundled with Power Pak is Power Disk, a disk enhancement utility to quickly view, test, and defragment (optimize) disk drives. Power Disk includes a disk data reliability test and repair utility as well as a handy tool, PowerScope, for mapping and viewing disk file structures. Power Disk features fast performance, the ability to optimize large disk partitions to one gigabyte in size, and it includes data security features to help ensure that you won't suffer data loss while defragmenting and reorganizing your

disk, even if you lose power during operation.

After using PC-Kwik Power Pak, including both Super PC-Kwik and Power Disk, now offered in a single \$129.95 bundle, I'm quite impressed with them and consider them to be in the same league as PC Tools and The Norton Utilities. As an added touch, the company offers toll-free technical support, a welcome freebie. For more information, contact PC-Kwik Corporation, 15100 S.W. Kill Pkwy, Suite L, Beaverton, OR 97006.

Three From Symantec. The "utilities gang" at Peter Norton-Symantec has an impressive pair of desktop utilities in their Norton Desktop for Windows (NDW) V2.0 and Norton Desktop for DOS (NDD). NDW was originally designed as a combined file-launcher and manipulator for Microsoft Windows 3.0, to replace the awkward Windows Program and File Managers. With the advent of Windows 3.1, NDW offers a suite of features and utilities that fully optimize Windows and make it easier to use. NDW allows full "drag-and-drop" support across the entire desktop: you can drag any file or drive icon to any desktop icon or onto the desktop itself for immediate access.

In NDW, the File Manager, one of the weakest links in Windows, has been integrated directly onto the desktop to simplify file and program management; to access files, you need only click on a drive icon. Also included are over 45 file viewers to allow you to examine files quickly without pausing to load their application programs. NDW also adds a customizable "button bar" to place often-used functions at your fingertips. The product is very fast: it loads several times faster than its predecessor, NDW V1.0. It is list-priced at \$149.

NDD, on the other hand, is designed to give DOS PC users visual drag-and-drop file management, in combination with a full set of disk utilities. NDD is a standalone application that functions much as a super-smart DOS shell, presenting you with an intuitive visual desktop to manage files and run programs with point and shoot simplicity. Without using any DOS commands,

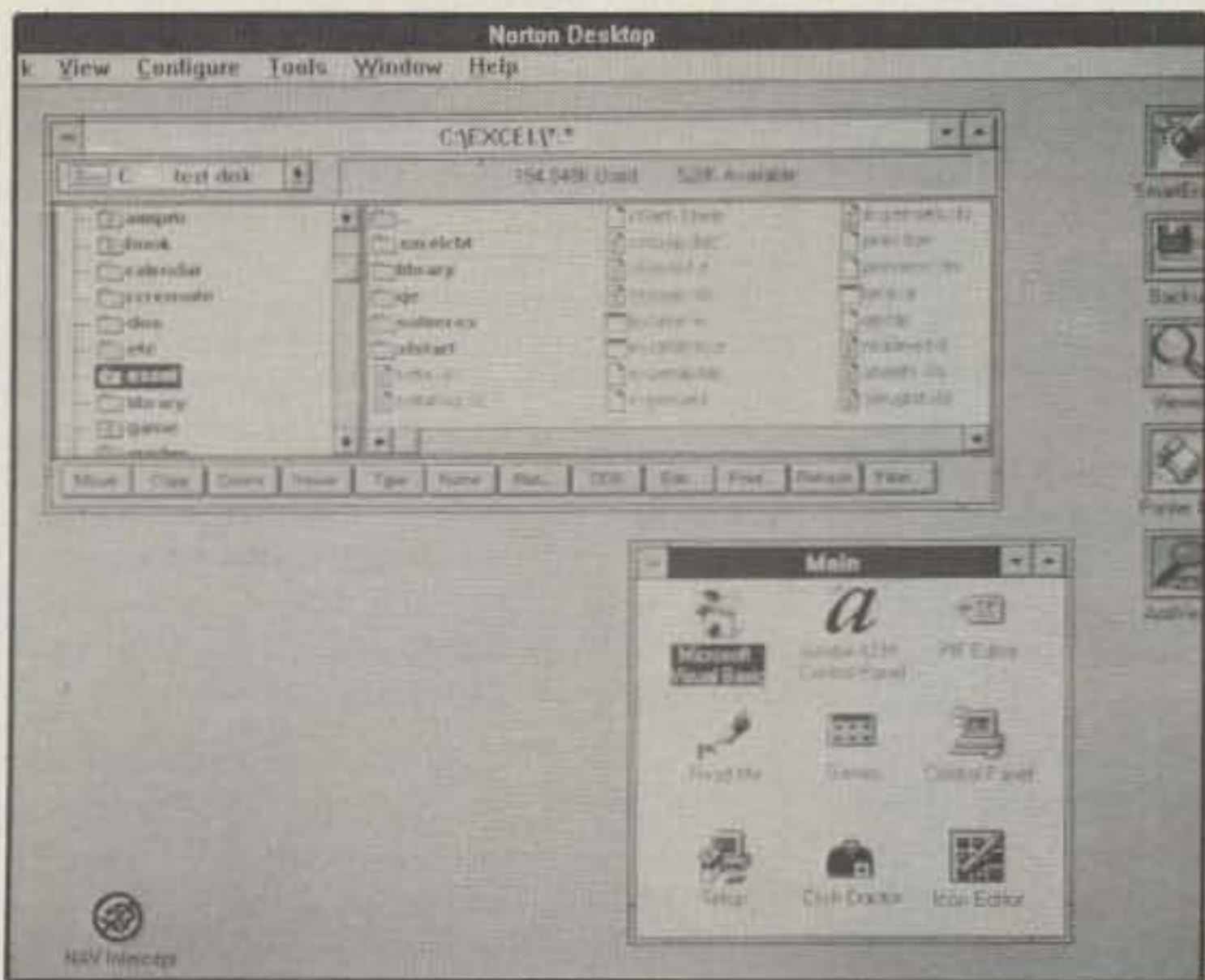
you can move, delete, copy, print, view, back up, and scan for viruses, using the mouse or the keyboard to click, drag, and drop. Included in NDD are several Norton "disaster recovery" utility programs and The Norton Menu, which automatically creates a well-organized menu of your applications. You also can view files in any of over 60 file formats, without loading their applications. A PC-to-PC file transfer utility also is included.

In my view, one of the nicest NDD features is that it breaks new ground for DOS users who are not yet ready to move to Windows 3.1 or IBM's OS/2 operating system. NDD's Windows-like interface uses the same commands as NDW and Windows and has similar features, providing "training wheels" for a later move to Windows. It is \$179 at retail.

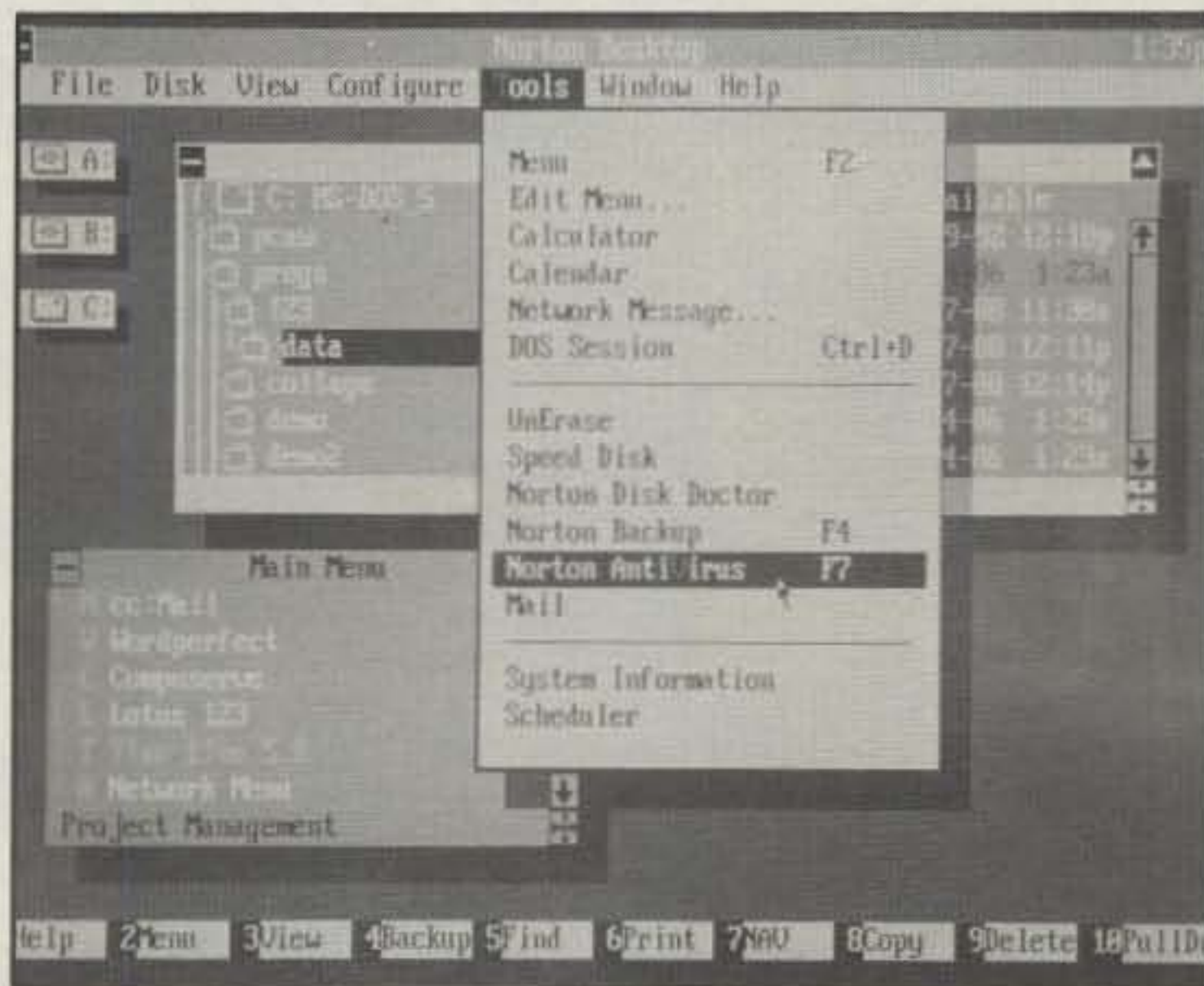
Turning to a third Symantec product, The Norton Backup, we featured the original Norton Backup for Windows and DOS in the May 92 column and followed up with The Norton Backup V2.0 for DOS last fall. Symantec now has upgraded its Windows-specific Norton Backup for Windows to V2.0. The new version is compatible with Windows 3.1 and supports Windows' drag-and-drop capability.

New features in V2.0 include backup support for QIC 40/80 tape drives; emergency DOS restore to allow you to restore Windows backup sets without reinstalling Windows first; password protection for backup sets; enhanced network support; and a reporting feature that lists backed-up files and identifies problems during a backup, restore, or compare. Bottom line: it's an easy product to use, one that doesn't compromise in either performance or features, thereby making it harder than ever to find an excuse to not back up the data on your computer's hard disk. It's \$149, but previous Norton Backup customers qualify for special upgrade prices. For more information, contact Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014-2132.

SquareNote Update. We've been an enthusiastic user of SquareNote™, a powerful but



The Norton Desktop for Windows V2.0 is a comprehensive file management and utilities package that takes advantage of new features in Microsoft Windows 3.1. The updated Symantec software provides users with an easy-to-use, powerful enhancement to Windows as well as a collection of Peter Norton's best data recovery and protection tools. (Photo courtesy Symantec Corporation)



The Norton Desktop for DOS reportedly is the industry's first "drag-and-drop" desktop utility for DOS-based PCs. It combines an easy-to-use visual interface for DOS with an array of tools that together make computing easier for the everyday user. The program also provides data backup, virus protection, file recovery, and hard disk optimization features. (Photo courtesy Symantec Corporation)

easy to use IBM PC personal information manager (PIM) for years. We wrote it up in November 1987, October 1988, and June 1990.

In the "information age" just *finding* things is a very real problem. I use SquareNote to keep track of when I published something so I can precisely refer to it in a subsequent column. Also, when a reader inquires about a particular subject, I can search for and instantly locate all issues in which I covered the subject. I also can search by subject area to respond to readers who can't remember the exact issue in which a particular subject appeared. SquareNote also is of use to those who maintain back issues of *CQ*, *73*, and *QST* and who would like to have a good way of indexing, locating, and retrieving articles.

SquareNote organizes and tracks text; it's a powerful, menu-driven, free-form database. Now version 4.1 is on the street, and it's even more powerful than earlier editions. The upgraded program lets you write, edit, store, retrieve, and maintain notes in much the same way as you would a stack of 3" x 5" index cards. But the SquareNote "electronic card file" program goes far beyond a box of low-tech paper index cards.

The program lets you make and edit notes that are as long as ten printed pages. The program

files the notes under subjects or key words that you type in. You can have thousands of subjects, and you can file any note under as many as 100 of them at any time. When you want to look at one or more notes, you tell the program to gather those notes into a stack by subject or combination of subjects in the review index. Notes in the stack can be edited, deleted, removed, or sent to your wordprocessor.

Recent program enhancements include recall of the review index for only those notes you selected for the current note stack, generation of up to 12 user-defined macros, a resume feature that lets you start a new session where you left off last, the ability to create a new note stack by searching for an occurrence of a text string, and more. Context sensitive help and an online (rather than a printed) user's manual are provided.

SquareNote 4.1 is \$99 postpaid from SQN, Inc., 60 East Chestnut St. #342, Chicago, IL 60611.

Short Bursts

Hardcopy Beam Headings. Brian J. Henderson, VE6ZS, runs a small business that special-

izes in amateur antennas, accessories, and radio repair. One of his products is a hardcopy printout of beam antenna headings, customized to the location (latitude and longitude) of any amateur station. His frequently updated printout provides the usual information, distance in miles and kilometers and true (short path) and reverse (long path) antenna bearings. Also included are both the CQ and ITU zone numbers.

Brian supplies the printout sorted both by alphabetical order of prefix and by country, making it easy to look up the prefix of a given location or the location of a prefix heard. He finds that while many logging and other programs provide similar information, many customers prefer a printed version. The reason, he finds, is that you don't have to shut down the logging program on your PC to look up a different prefix or find an antenna direction, information quickly looked up in the printout.

The printout is \$9.95 and can be mailed anywhere. Contact Brian Henderson, VE6ZS, at BH Electronics, 23 Deermoss Place S.E., Calgary, Alberta, Canada T2J 6P5.

AlphaLab Instruments. Are you concerned about the possible effects of being subjected to strong AC electric and magnetic fields? While the jury may still be out, the evidence suggests that the risk of certain cancers and other physiological and psychological abnormalities can be increased by exposure to AC electric and magnetic fields. Just how this happens is not fully understood, but both magnetic and electric AC fields that surround the body can produce AC electric current inside the body. Apparently this current interferes with the normal transport of ions across cell membranes. What can be done? By measuring electric and magnetic field levels in your home, hamshack, or office, you can move equipment or furniture to reduce your exposure, and can take corrective action to avoid long-term exposure to devices that emit high "electromagnetic pollution" levels.

AlphaLab offers its \$140 TriField™ electromagnetic pollution meter, said to be the only such device priced under \$500 that measures both AC electric and AC magnetic field strength. It also measures radio/microwave power and the full (three-axis) magnitude of field strength, not just strength in one direction. This makes measurement fast and easy, since you can accurately read total magnetic or electric field regardless of the direction in which you're pointing the meter; you don't have to snake the meter around.

Because most electromagnetic pollution problems result from magnetic fields, AlphaLab also sells a less-expensive Magnetic Scanner at \$44. It is said to be the least expensive magnetic field meter available, yet it performs a full three-axis measurement of AC magnetic fields.

For more information and a very educational background monograph on electromagnetic pollution and measuring devices, contact AlphaLab, 1272 Alameda Ave., Salt Lake City, UT 84102.

Wrapping It Up

That's all for this time, guys and gals. Next time, more Antennas and Accessories topics of current interest. See you then.

Overheard: You can make something fool-proof, but it's darned sure you can't make it damnfoolproof!

73, Karl, W8FX

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Gift Certificate offers expire January 4, 1993!

CQ REVIEWS:

The Ham-Pro H144-15 2 Meter Beam

BY JOE LYNCH*, N6CL

In the January 1992 issue of *CQ* Lew McCoy reviewed the Ham-Pro 15 meter beam. As part of the review, Lew covered many technical aspects of Ham-Pro's unique patented driven element. Since the same type of driven element is used in this model, I will not repeat Lew's discourse of it in this review. Instead I will focus on my experience with my 2 meter antenna. And I must say, my experience has been very good.

For me, first impressions are very important because first impressions usually tell what to expect in the long run. My first impression of the Ham-Pro 2 meter antenna was when it arrived on my front porch. When I picked up the box, nothing rattled. This antenna was well packed!

The first thing I look for when unpacking something new is the instruction manual. Again, I was positively impressed. I have seen many instruction manuals, and this is the first one written for antenna construction that so carefully explains precautions and construction techniques one should use in assembling an antenna.

After reading the instruction manual, I removed the antenna parts from the box. I found the packing slip and checked the parts against the packing slip. Everything was there, including a few extra screws. Have you ever dropped a screw in the grass and had to run to the hardware store in the middle of constructing your antenna, only to find that the store does not have the exact type of screw? I thought so. I also noticed that all major parts were labeled. Additionally, I observed that even though some of the director elements were of the same length, each director was labeled separately. These guys really took the time to keep me from making silly mistakes. Finally, I noted that the antenna parts were made from heavy-duty aluminum stock and the holes were machined well, with no burrs or other foreign material obstructing them. I concluded that when this antenna went up it was not going to come down on its own.

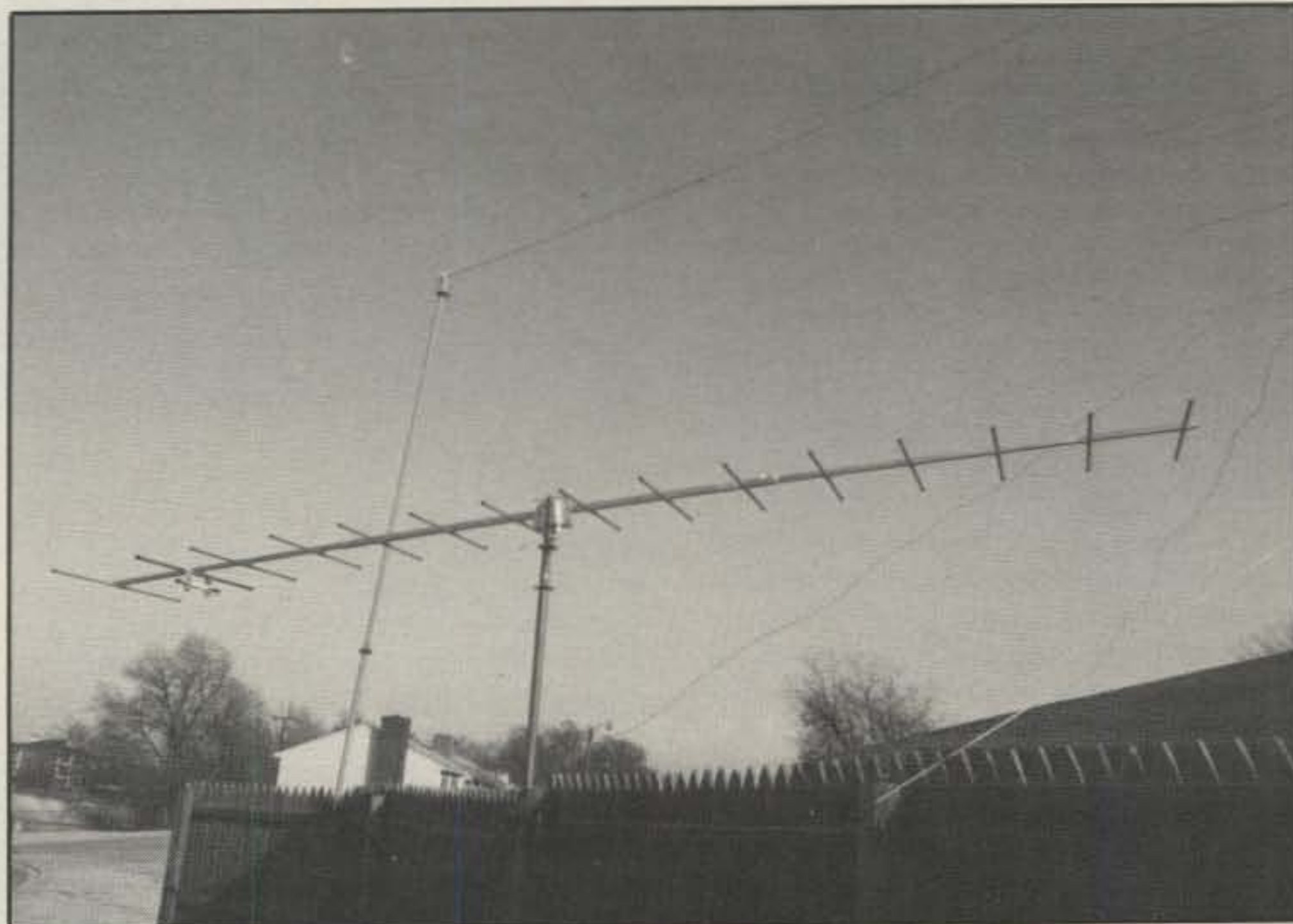


Photo 1- The fully assembled Ham-Pro H144-15.

I had ordered the horizontally polarized version of the 2 meter antenna. The difference between the two versions is in the driven element, which comes already assembled. In the vertically polarized version the driven element is factory adjusted to compensate for the mast being "in the plane" of the antenna. I wanted to use my antenna on SSB on 144.200, principally. I also knew that a "wet noodle" is sufficient to hit any repeater in my area. Therefore, I knew that I would probably be able to hit the repeater with the horizontally polarized antenna, should I so desire. Consequently, the vertical polarization did not matter that much to me.

If you wish to use your antenna in the vertical position, specify that to the Ham-Pro people at the time you place your order. However, if you are going to horizontally stack two antennas that are to be used in the vertical position, you may want to order them with horizontally polarized driven elements. Because the mast attaching the two antennas together will not be

"in the plane" but rather perpendicular to it, the compensation built into the vertically polarized driven element would probably cause it to not work properly in this situation. If you are planning any stacking of more than one of these beams, contact Ham-Pro for advice from one of their engineers concerning your installation.

In Lew's review he reports on the uniqueness of the driven element. I was familiar with the T-match, the gamma match, delta match, and plain old direct feed. However, this balanced double gamma match was a mystery to me. A phone call to Ham-Pro put me in touch with Peter Onnigian, one of the inventors of the driven element (the other is his son, Phil). He sent me the patent monograph, and very quickly I became "educated" on their driven element. One detail I discovered was that because of the frequency insensitive, built-in balun, the antenna bandwidth is not restricted by the bandwidth of the balun. This means that the antenna has a low VSWR over the entire 2 meter band, and

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

then some. As I said, this was not that important to me, as I only wanted to use my horizontally polarized antenna at the low end of the band. However, it is significant if you plan to use the antenna vertically polarized (on FM) to access repeaters with inputs above 147 MHz and below 145 MHz. One other thing: Are you a MARS operator who uses repeaters on 2 meter MARS frequencies? No problem, as the VSWR is still well below 2:1 on those frequencies.

Now to the assembly. The driven element comes with a length of coaxial cable attached to it. One end of the coaxial cable is routed internally through the driven element, the side arm, and the matching section. Its shield is attached to one side of the matching section, and the center conductor is attached to a built-in matching capacitor. The other end of the capacitor is attached to the inside of opposite side of the built-in balun. The assembly is kind of like that of a gamma match, but not quite. However, take my word for the interior connections and do not take apart the driven element to confirm them, as disassembly of the driven element will void your warranty.

The other end of the coaxial cable has a partially assembled N-connector attached to it and is to be routed through the interior of the boom. This routing of the cable through the boom is a nice feature because the coaxial cable is kept out of the pattern of the antenna. The routing of the cable is a bit tricky, though, and it is best to let the instruction book talk you through the procedure.

Take a look at photo 2. You will notice that the N-connector is protected with a piece of shrink tubing. Notice how the connector is started into the $\frac{5}{8}$ inch entry hole. I found it necessary to ever so slightly curl the connector and tubing to get it to turn the corner once inside the boom. However, once inside, the coaxial cable slid right along. The next challenge is getting the coaxial cable back out. As I was routing the cable through the interior of the middle boom section, I kept my eye on the $\frac{5}{8}$ inch exit hole, located approximately in the middle of this boom section. Once the cable was spotted, I used a pair of needle-nose pliers to grab onto the tubing, being careful not to pinch the female basket part of the N-connector. It required just a little effort to pull the connector (and tubing) through the hole. After the cable was out the hole, I pushed the two boom sections together and secured them with the appropriate hardware.

Although there was no mention in the manual concerning the rubber grommet located in the parts bag, I assumed that it had something to do with the exit hole and protecting the coaxial cable from the possible cutting action of the metal around the cable. Therefore, I took the rubber grommet and, finding it cut through to its center, wrapped it around the cable. Then, using a small-blade screwdriver I urged it into the

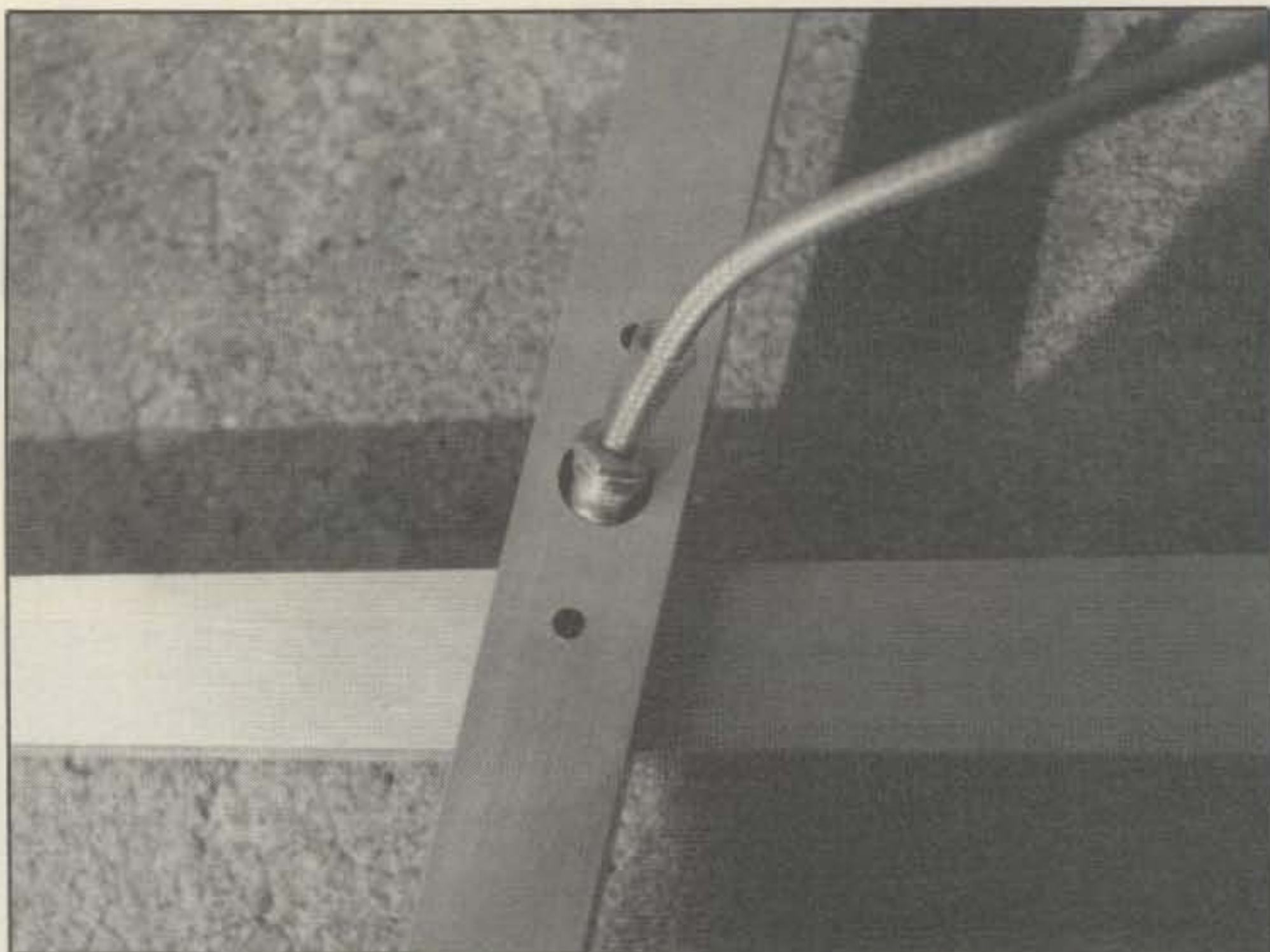


Photo 2- The N-connector penetrating the $\frac{5}{8}$ inch entry hole on the middle boom section.

exit hole. (Subsequent issues of the instruction manual will deal with installing the rubber grommet.)

After being satisfied that the coaxial cable was in its proper place, I found the rest of the N-connector in my parts box. Once again I found it necessary to consult the instruction book to make sure I put it together properly. Then I found an old male N-connector and attached it to the female connector to protect the female connector's threads from possible damage. Final-

ly, I attached the third boom section to the middle boom section and secured them with the appropriate hardware.

Now it was time to attach the elements to the boom. I found the biggest U-clamp and attached the driven element to the boom, according to the instruction manual. The reflector and director elements are insulated from the boom by a piece of polycarbonate tubing. Before attaching these elements to the boom, it was necessary to mark the center of the elements and install

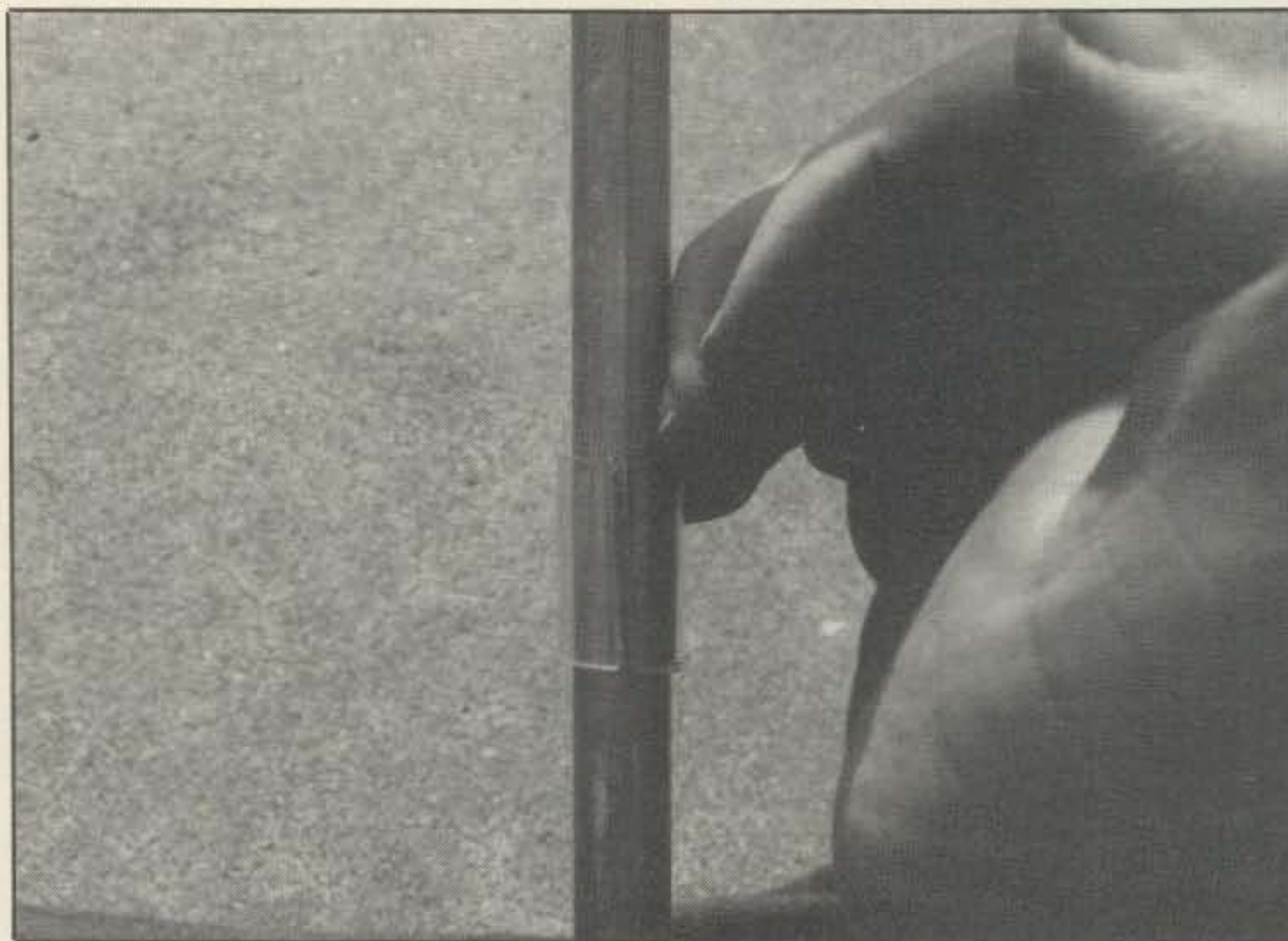


Photo 3- Using my fingernail to pull the polycarbonate tube in place on the element.

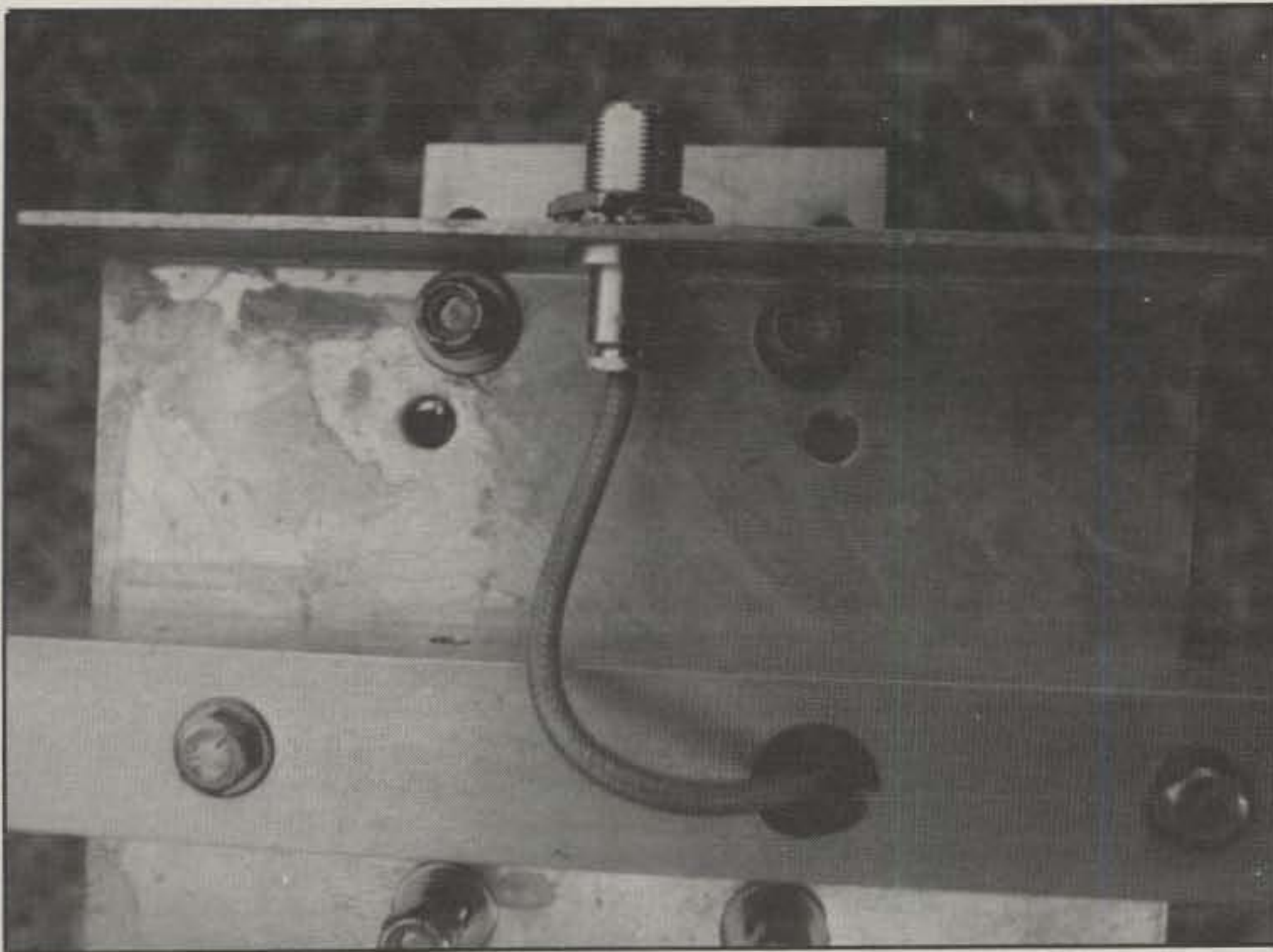


Photo 4- The N-connector is affixed to the boom to mast plate. Notice also the rubber grommet in the exit hole on the boom.

Manufacturer's Specifications

Electrical

Recommended frequency range of operation, MHz	144-148
Useful out of band range in MHz	143-149
Number of antenna elements	15
Antenna boom length in wavelengths	2.66
Gain over a dipole, measured at mid-band*	13.73 dBd
Gain over isotropic (dipole plus 2.15 dB)	15.68
Front-to-back ratio (varies with height, frequency, and angle)*	18-30 dB
First side lobe attenuation from peak value*	12 dB
VSWR: Lowest ratio, when mounted horizontally/vertically**	1.04/1.02
VSWR: Highest ratio, when mounted horizontally/vertically**	1.68/1.93
VSWR bandwidth for 2.01:1**	7.8 MHz
Half-power beam widths, E plane/H plane*	29°/30°
Cross polarization, better than*	38 dB
Safe antenna power, PEP rating, in watts**	2,000
Harmonic suppression, more than**	30 dB
Lightning and precipitation static protection	DC ground

Mechanical

Antenna boom length	18.0 ft.
Antenna boom turning radius	9.7 ft.
Three piece square boom, mid and end sizes in inches	1.25/1.0
Tensile strength: boom, elements, extrusions (6061-T6 aluminum)	45 ksi
Driven and parasitic element outside diameters in inches	.75/1.5
Input connector: 50 ohm, stainless steel, waterproof, UG 556B	Type N female
Coaxial cable: Teflon dielectric and jacket, silver-plated double-braid	RG-142B
Supporting mast diameter: minimum and maximum OD in inches	1.5-2.5
Fasteners: U-bolts/bolts, washers, lock nuts, stainless steel	Type 304/18-8
Wind survival: steady wind speed with 1/4 inch ice coating, EIA rating**	87 MPH
Wind, maximum gusts, without ice coating, EIA rating**	112 MPH
Total wind catch area, at maximum wind pressure direction**	2.53 sq ft.
Wind load at EIA 87 MPH wind velocity, worst wind direction**	76 pounds
Net weight, completely assembled antenna	18 pounds

*Measured on a commercial 7,000 foot long independent antenna range, using EIA RS-409 standards and Scientific Atlanta equipment.

**Measured at antenna input with a Hewlett Packard 8752A RF network analyzer, or computed in accordance with RS-409 standards.

the tubing and end caps. Once I had the tubing started on the element, I found it best to position the element in a vertical position and use my finger nails to pull the tubing down the element and into place. You will see in photo 3 how I pulled the tubing into place. You will notice that I was using one hand. In fact, my other hand was on the camera, and it is best to use both hands for this procedure.

The final assembly procedure involved attaching the boom-to-mast plate and the heavy-duty mast extrusion plate to the boom. Again, a trip to the instruction book is necessary because the position in which the plates are to be mounted and which mounting holes are to be used are outlined in the book. If the antenna is vertically polarized, one set of holes on the boom is to be used, and if the antenna is horizontally mounted, the other set is to be used. The drawings and the instructions are clear as to which one. The last item involved in the assembly is the attachment of the N-connector to the mast plate.

In a traditional gamma match the coaxial cable's shield is grounded to the boom by way of the match. However, the gamma match is an off-center-fed matching device that introduces an out-of-phase relationship to the shield of the coaxial cable. Therefore, radiation from the coaxial cable attached to a traditional gamma match does take place. However, because of the built-in balun and the fact that the coaxial

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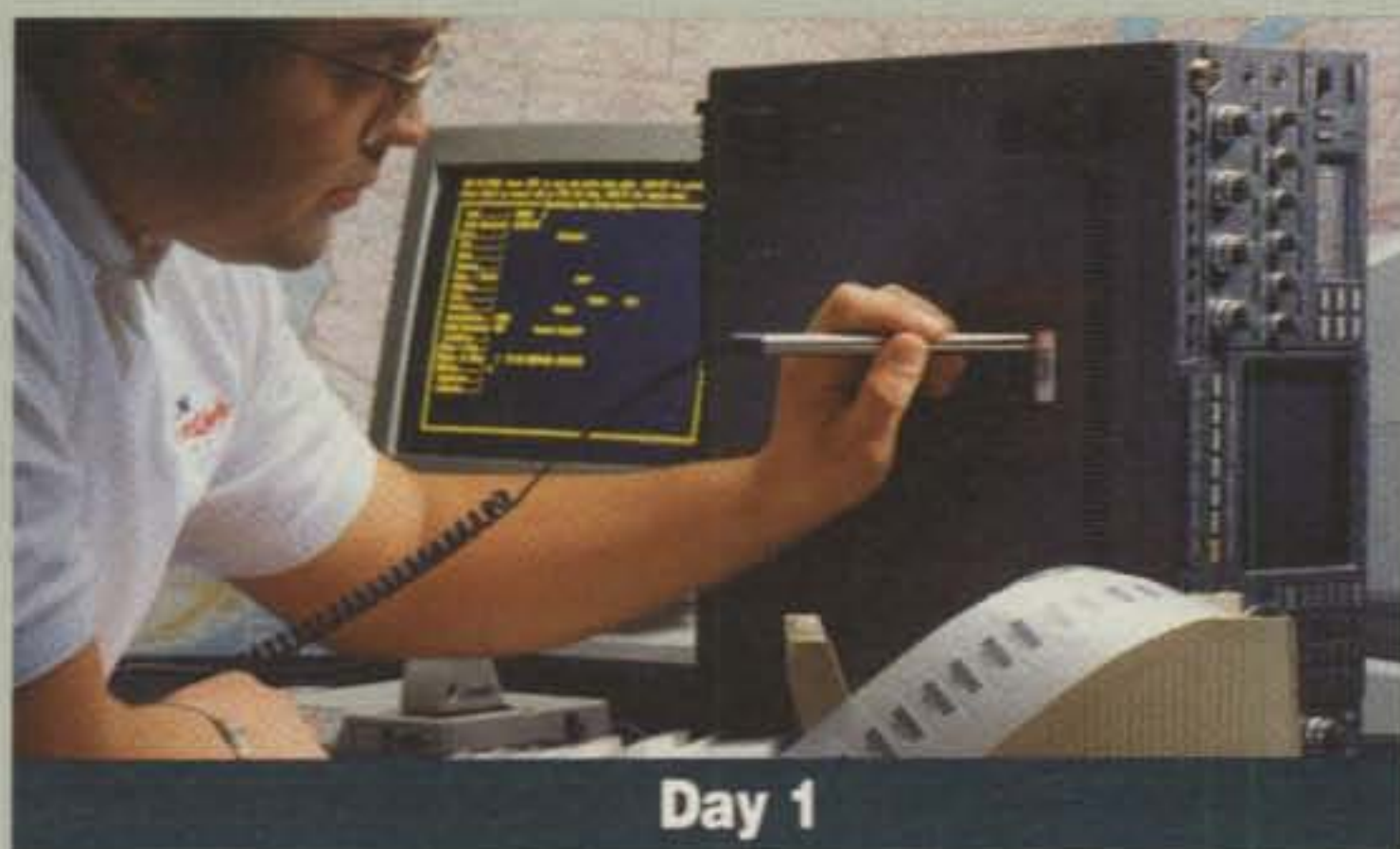


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cable is grounded to the driven element (and subsequently to the boom), then routed inside the boom and grounded again near the exit point (again, subsequently to the boom), the potential for radiation from the coaxial cable is greatly attenuated.

Notice in photo 4 how the connector is affixed. After attaching the N-connector to the boom-to-mast plate, I reattached the

male connector to continue to protect the threads of the female connector. (I recommended to Phil that they supply a plastic cap to cover the threads of the connector during installation of the antenna, and he said that he would include such a cap in future shipments.)

The opening photo of this review, photo 1, shows the assembled antenna temporarily mounted on a mast for the picture.

Subsequently, I mounted it on a Radio Shack rotator, which is mounted on a 10 foot mast that is secured to a tripod mounted on the roof of the duplex apartment (no towers here).

As I finished the installation, I was reminded of the Geminids meteor shower that night by the entertainment in the sky. Turning on the radio, I immediately notice how quiet the antenna was. Initially, I wanted to make sure the coaxial cable was properly soldered. However, first I spun the dial across the band. I heard a few of the bursts of guys running meteor skeds with other guys. Then I got on the liaison frequency and heard Gregg, AA9AO, set a sked with Greg, WQ0P. Knowing that I was "in line" with them (albeit farther southwest from Greg), I decided to listen to their sked. I heard plenty of bursts from Gregg. After Greg and Gregg returned to the liaison frequency, I contacted Gregg. I advised him that I had heard enough from his previous sked to convince him to make one with me. He agreed to run in the remaining 20 minutes of the half hour. In 14 minutes we completed! My first contact with the beam was a winner!

Later that evening I contacted Ernie, W5FYZ, on the liaison frequency. I advised him that I wanted to run with him because I needed his state (let alone his grid square) for WAS. We set up a sked and completed in the minimum time because we were hearing each other on tropo! My second contact was another winner! I can't say the rest of the weekend was that good. I ran with about four or five other guys and had partial completions on all but two of them.

My overall impression of the H144-15 was great! It is built like a tank. It is built with common stock. If I were to break an element, I could go to the hardware store and get another stick of aluminum and replace it. It is heavy. Looking at the specifications in Table I reveals that it weighs in at a hefty 18 pounds (a fact confirmed on my bathroom scales). I was supplied with a plot of the VSWR of the driven element as measured in Ham-Pro's test bed. Their measurements indicated a VSWR of 1.5877:1 at 144.000 MHz; a minimum of 1.0595:1 at 145.514 MHz; 1.1716:1 at 146.000 MHz (mid-band); and 1.5877:1 at 148.000 MHz. Ham-Pro tests a model of each of their product line at the Jampro 7000 foot antenna range located in Sacramento, California. Their indicated gain measurement for this model is 13.73 dBd. On-the-air tests indicate very clean front-to-back and front-to-side ratios. While it is not possible to get a true reading monitoring a distant station (due to QSB, etc.), consistently, the antenna performed as advertised when it came to nulling out stations to the side and rear.

The H144-15 is priced at \$145.00 and is available from Ham-Pro Antennas, 6199 B Warehouse Way, Sacramento, CA 95826.

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ALL ABOUT THE WORLD ABOVE HF

What on Earth is A "Grid Square"?

You will have been on VHF for only a short time before being asked, "What is your grid square?" You thought that you studied everything you needed for your amateur radio license tests, and you are almost certain that you do not recall anything about grid squares appearing on any of the exams. Nevertheless, you are puzzled by the question. And chances are, beyond asking for your grid square, the operator querying probably cannot give much of an explanation of its usefulness. So let's look at what on earth they are and why on earth we use them.

More than 40 years ago a system of grid locators was introduced in Germany as a way of spurring activity on VHF and above amateur radio bands. This system was based on a 1° by 1° square. These locators were assigned two letter designators. Initially the system worked well enough for the European and northern Africa areas covered by it. However, expanding the system necessitated replicating the same two letter designators for other parts of the earth, thereby causing obvious confusion.

During the course of trying to obviate the problem, two hams working independently of each other developed nearly identical designator systems. The first, developed in October 1979 by Folke Rosvall, SM5AGM, involved 20° by 10° large units, 2° by 1° middle units, and 6' by 3' small units (the measurement is in minutes, not feet), with the system starting at the principal dateline.

The second, developed in December 1979 by Dr. John Morris, G4ANB, also involved 20° by 10° large units and 2° by 1° middle units. However, the small units were 5' by 2.5'. Additionally, the proposed starting location for his system was the Greenwich longitude.

The following year, in April, a group of European VHFers met in Maidenhead, England. Among the 20 or so proposals presented, these two surfaced as the forerunners. The group determined that modifying Morris's proposal to start at the principal dateline was the best solution.

Meanwhile, the induced activity caused by use of the grid locator system in Europe prompted amateurs in the United States to take a look at developing a system for North America. As a part of this effort, at the 1981 Central States VHF conference held in Sioux Falls, South Dakota, a proposal was made by the Committee on Society Awards, headed by Lance Collister, WA1JXN, to set up a series of three awards. The first was for making 100 contacts on VHF. The second was for making contacts in one-hundred 1° by 1° grid squares. The third was for scoring 1000 points by working stations at increasing distances from one's own QTH. The use of the

VHF PLUS CALENDAR

Dec. 1	Apogee.
Dec. 2	VK5MC Europe: 1410 UTC. First quarter moon.
Dec. 6	Moderate EME conditions.
Dec. 9	VK5MC NA: 0926 UTC, 144.012, (Call .010-). Full moon.
Dec. 10	VK5MC NA: 1024 UTC.
Dec. 11	VK5MC NA: 1124 UTC.
Dec. 13	Geminids meteor shower peak, 1232 UTC. Perigee. Very good EME conditions.
Dec. 16	Last quarter moon.
Dec. 22	Ursids meteor shower peak, 0458 UTC.
Dec. 23	Noisy EME conditions, Sagittarius A and new moon.
Dec. 27	Poor EME conditions.
Dec. 29	VK5MC Europe: 1206 UTC.
Dec. 31	First quarter moon.

(Courtesy W4ZD and others.)

1° by 1° grid squares was the basis for measuring the distances. The proposal was adopted and the awards were put in place and publicized. In the months to follow activity on VHF increased and a few awards were issued.

Back in Europe, however, plans were being implemented to adopt the modified Morris plan, now called the Maidenhead Grid Locator system. Officials in the three International Amateur Radio Union (IARU) regions were contacted concerning adopting the plan within their respective regions. Region 3 became the first to adopt it in 1982. In 1983 Region 2 adopted it. Finally, in April 1984 Region 1 adopted it with an implementation date of 1 January 1985.

With interest in the CSVHF awards program increasing, an Ad Hoc committee was formed by the ARRL to study the adoption of an awards program that would be sponsored by the League as a possible replacement for the CSVHF program. During 1982 the committee, working closely with members of the board of CSVHF, developed the VHF/UHF Century Club (VUCC), which incorporated the concept of the 100 grids. Seeing that the future was in the Maidenhead locator system, the committee designed the program around that system of locator designators.

In January 1983 an article authored by John Lindholm, W1XX, the then Communications Manager, announced the implementation of the awards program. While not entirely spelling out the rules (the rules for the higher microwave frequency awards were still being developed), the article stated that the starting date was to be 1 January 1983. Readers were encouraged to send for copies of the rules and application blanks. (You can obtain your copies by sending a request to the League along with a business-size SASE and two units of first-class postage). The awards provided for decreasing requirements on increasingly higher frequencies. On both 6 and 2 meters the amount of grid squares worked required was 100. On 125 and 70 cm the

amount required was 50 grids. On 903 and 1296 MHz the required amounts were 25 grids, respectively. As the rules developed, requirements were spelled out for the higher bands. On 2.3 GHz the requirement was 10 grids. Beginning on 3.4 GHz and including all above amateur bands the requirements were 5 grids. The recipients would receive *half* century awards for contacts on 125 and 70 cm. For all bands above 70 cm the recipients would receive *quarter* century awards. Initially, no award was offered for repeater or satellite contacts. However, beginning 1 September of this year an award for 100 grids via satellites has become available. Endorsements are available for working more grids on a particular band. However, no other endorsements (such as for mode or propagation path) are available.

(The awards require a modest fee of \$1.00 for the initial application for each band or for the satellite award; subsequent endorsements only require an SASE. If you are a U.S. or Canadian applicant, you must have your QSL cards field checked by an official with a Special Service Affiliated Club. You can request a list of the field checkers near you by sending a letter and an SASE to the League, or in Canada to the Radio Amateurs of Canada organization. If you are a foreign applicant, you will have the field checking of your QSL cards performed by a designated official in your country.)

Interestingly, while this awards program was designed to supersede the CSVHF program, it has done so only in *popularity*, as the CSVHF program still exists today. However, according to Kent Britain, WA5VJB, one of the board members, no one has applied for any of the awards in the past ten years, and it is doubtful that if someone were to do so, the mechanics would be in place to issue any of the awards.

The implementation of the VUCC program was an instant success. The race was on to see who would be first to attain the award on respec-

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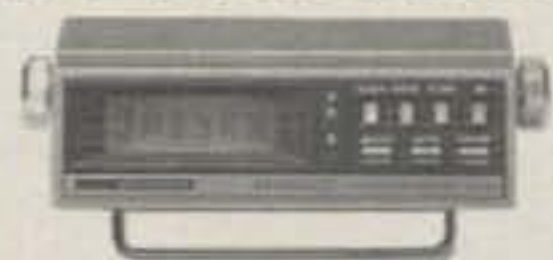
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tive bands. In keeping in step with the change, the June VHF contest rules switched from sections to grid squares as multipliers, thereby creating a whole new scoring procedure. Leaders were still based on sections and divisions. However, point accumulation was based on the grid locator, with its relative uniform size, rather than the arbitrary size of different sections. Suddenly, a grid square had the potential of becoming more rare than Delaware. Efforts were made to be "in demand" by operating from one of these rare grid squares.

Over the years, because of the quickness of VHF contacts, the grid square has come to replace both the QTH and the signal-report information as the exchange for many VHF and above QSOs (the exception being meteor scatter and EME contacts, which still use a modified signal-report system). However, this has not eroded what is considered a legitimate QSO. VHF operators have maintained a high sense of ethics. An operator considers that he or she must hear both call signs and the grid square (or signal report on meteor scatter and EME QSOs) and an acknowledgement from the other operator that he or she has also received the same information in order for both operators to consider a QSO complete. It is well accepted that if one operator has not received all the information necessary, the contact is incomplete and both operators will wait for another time to attempt again. Rarely found on VHF is the "give him numbers" type of QSO.

So back to the question: "What is your grid square?"

The grid square designator consists of up to six digits, two letters followed by two numbers, followed by two letters. The starting grid field,

the 20° by 10° large unit, begins with "AA." It is located between 180° and 160° W and 90° and 80° S. The next field, "AB," is found also between 180° and 160° W. However, it is found between 80° and 70° S. Each successive field in that column is ten degrees more north and is designated by an increasing second letter, with the most northern field being designated "AR." The next field to the east starts the alphabetical sequence all over with the designator of "BA," and continues the same progression north. The final field, found at the opposite corner (between 160° and 180° E and 80° and 90° N), is designated "RR."

Determining what grid square you are located within the grid field is just a matter of locating your longitude and latitude. There are one hundred 2° by 1° grid squares in each grid field. (Actually, these are not squares but rectangles that become increasingly distorted as one moves away from the equator. However, as a throw back to the old system, the name "square" stuck. Plus, it is easier to say "square" than "rectangle"—less syllables). They are numbered between "00" and "99," with the lowest number located at the southwest corner of the grid field and the highest number located at the northeast corner of the grid field. You can find your two-digit number by counting how many degrees you are located east and north of the southwest corner. For example, if you are located within 100° and 80° W and 40° and 50° N, you are located within grid field EN. If you are located between 96° and 94° W and 43° and 44° N, you count one square for each two degrees east of the corner and one square for each one degree north of the corner. In this example, you are two squares east and three squares north

of the corner. That would put you within grid square EN23, or somewhere in northern Iowa or southern Minnesota.

Do you want to figure out your exact designator (down to the last letter)? Well, it gets a bit more complicated, but not out of reach. You must know your location down to the last 2.5 minutes. If your starting point is an even degree, for each five minutes east of your degree intersection, you increase the first letter by one increment, beginning at the letter "A." If your starting point is an odd degree, for each five minutes east of your degree intersection, you increase the first letter by one increment, beginning at the letter "M." For each 2.5' north of your degree intersection, you increase the second letter by one increment. In neither the longitude nor the latitude designations will you find a letter beyond "X." Again in the above example, if the location fell between 95° 20' and 95° 25' W, and between 43° 15' and 43° 17.5' N, your grid locator would be EN23QG, and you would be located very near, if not at the four corner intersections of Osceola, Dickenson, O'Brien, and Clay Counties in Iowa. Rarely in North America are the last two letters used except to indicate exact locations for measuring distance records. It is important to note that the system of finding your fifth and sixth designator is reversed when you are south of the equator and/or east of Greenwich longitude.

If you don't want to bother with figuring out your location and looking it up in your atlas, you can purchase a couple of aids from the ARRL. The ARRL Grid Locator map for North America is available for \$1.00 plus a business-size SASE. The ARRL World Grid Locator Atlas is available for \$5.00 plus \$1.00 shipping. The Atlas also in-

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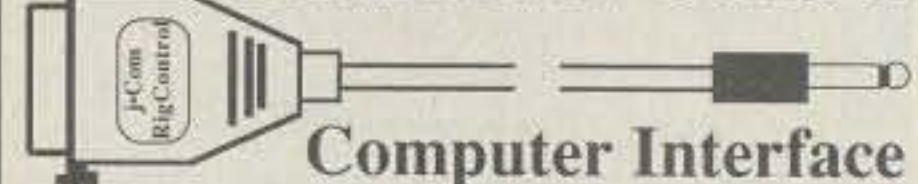
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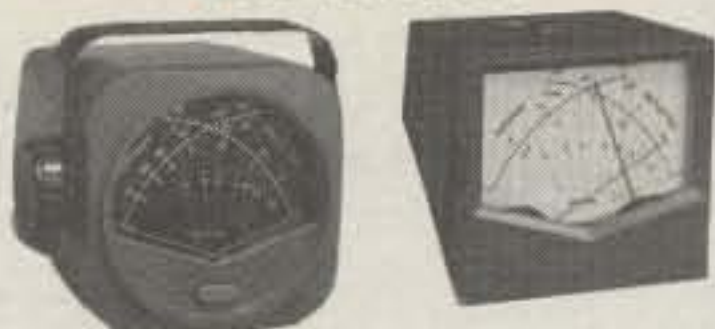
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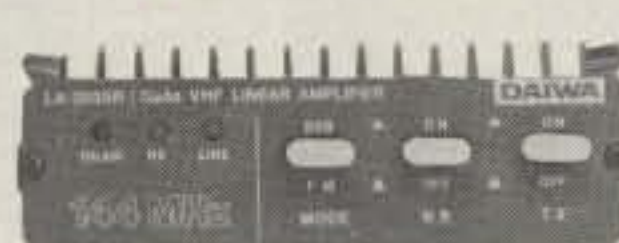
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cludes documentation for a BASIC program that you can use to calculate your grid square. Both items can be purchased directly from the League and may be available at your local amateur radio store.

The quest for completing contacts with stations in different grids rivals that of county hunting on HF. As with any economy of space and time, someone who wishes to go on a grid expedition would probably also want to put on as many grids as possible. You may recall the grid expedition of Pat, W5OZI, Nick, W5FUA, and John, KB5IUA, at the exact intersection of DM70, DM80, DL79, and DL89, or the Chip Angle, N6CA, grid expedition to the four corners of DM05, DM06, CM95, and CM96. The ARRL allows this sort of expedition as long as the exact intersection can be determined by physical means. In both of these cases they had the benefit of a survey marker.

Is the use of a Global Positioning System (GPS) receiver good enough? Not according to

the present rules, for two reasons. First, the Department of Defense (DOD) agency responsible for the transmission of the satellites on the system "dirties" these transmissions enough so that the accuracy can be determined only to within 50-100 feet. (During the Gulf War, however, the system suddenly got very "clean"). The system is good enough, however, to determine when you have crossed from one grid square to another because you can travel the extra 100 feet to assure yourself that you are now within the boundaries of the new grid square. Second, users are cautioned that the system is not yet fully operational (remember hearing that phrase on radio station WWV at 14 and 15 minutes past the hour?).

While we are on the subject of GPS, I might mention that I have heard that at least one manufacturer of a receiver provides software built into the EPROM that will convert your geographic location into your grid square location. It seems that there is a growing interest in us-

ing "our system" for land surveying. When I find out more about this receiver, I will let you know through this column.

With an awards program in place for nearly ten years, one wonders if there is any need for tweaking or improving the program. In this editor's opinion, yes. For example, there is no provision for a reverse VUCC award. For instance, if Chip, N6CA, operating from the above-mentioned four-corner grid location, worked Mike Ramirez, W6YLZ, located in DM14, Mike would get credit for four grid squares, while Chip would get credit for only one grid square. As you can see, Chip gets less credit for doing more work. In an attempt to "fix" the problem, John Lindholm issued a letter advising the operators to "loan" each other the other's station. In the above example Chip would "loan" Mike his station and vice versa. Chip, now operating from "Mike's station," signs Mike's callsign and vice versa. Chip has to repeat that process for each and every station that he works from this location, which is at least a bit time consuming. It is this editor's opinion that a reverse VUCC award should be offered, thereby recognizing the accomplishments of the grid expeditioner.

What is the future for grid squares? As an incentive for activity, it still presents a challenge. There are 32,400 grid squares in the world. To date, Fred Fish, W5FF, has worked the most grids—around 750. Additionally, Fred has worked all of the grids in two fields (perhaps this also should be an award). Even so, his total accumulation represents only 2.3 percent of the total squares available. Even for the leader, there is still plenty of challenge left in the program. And when the VHF operators who fled the bands for 10 meters because of the "easy" DX once again return, there will be even more stations active to work from different grid squares.

What do you think should be changed? Should a VUCC program be introduced on 10 meters during the next few years' lull in activity? Let your League official know. After all, if you are a member, it is your League.

QST VHF Editor W3XO Retires W3EP Named Replacement

In early October Bill Tynan, W3XO, and QST jointly announced Bill's retirement as the editor of "The World Above 50 MHz" column. In addition to his responsibilities as editor, Bill served this past year as president of AMSAT and president of the Central States VHF Society. All of these responsibilities kept him hopping. According to Bill, he felt that it was time to focus his energy toward AMSAT. Therefore, he has reluctantly given up his position as editor. (His term as president of CSVHF expired on 30 September. The presidency automatically passes to the host of next year's conference. The host of the 1993 conference, your editor, took over that position on 1 October).

When I was considering taking on the editor's position for CQ's VHF column, I sought out Bill's advice and input. I considered Bill a mentor and occasionally called on him for fact checking before going with a story in my column. Every once in a while I would scoop Bill. However, it was never done with any invidious intent. Bill and I both realized that good, healthy competition kept both of us on our toes—which made for better reading in both columns.

Bill was only the fourth editor of the "World Above 50 MHz" column. He held that position for nearly 18 years. His contributions to the VHF

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community through his reporting on VHF and above activities are immeasurable.

I have the highest respect for Bill and his knowledge of the VHF and above world. I have used past issues of his column for material for this column. When I was at the Microwave Update meeting in Arlington, Texas in October 1991, I was in awe of Bill's erudition in speaking of operating on the VHF and above frequencies. He and his wife, Mattie, were most excellent hosts of this year's CSVHF conference at Kerrville. I will very much miss my friendly competitor at QST. However, I wish Bill the best of success as he continues at the helm of AMSAT.

Along with the Bill's retirement notice came the announcement of Bill's replacement. Emil Pocock, W3EP, no stranger to the world of VHF and above, has been delegated the responsibilities of being the new column editor. While my friend Emil has big shoes to fill, he is nevertheless extremely well qualified. He has published many articles in QST over the years (two this year alone, as well as guest editing a portion of the October "World Above 50 MHz" column). He has also contributed to many conference Proceedings. Emil takes the helm this month.

While I looked to Bill as a mentor, I consider Emil my friend. Nevertheless, we write for competing publications. However, I expect all of our competition will be amicable. Therefore, I look forward to many years of friendly rivalry with Emil as we both report on your activities on the VHF + frequencies.



Greg Abercrombie, KK4NO, a member of a disaster relief team from the South Carolina Baptists, operated three to four radios and a cellular telephone for up to 16 hours a day for a week from a middle school in Homestead, Florida, following Hurricane Andrew. Also shown is Choice Watson, one of the unit leaders.

More on Hurricane Andrew

VHF Plus Operators Double as Hurricane Relief Volunteers. During the aftermath of Hurricane Andrew many VHF operators put down

their quest for new grids and took up the responsibilities of assisting their fellow humans through communications. Typical among the relief volunteers was Greg Abercrombie, KK4NO. Greg was part of a team sent to Homestead, Florida by the Baptists of South Carolina. He spent a

week-long shift as a radio operator, working from a middle school in Homestead. Dave reported that he spent upwards of 12 to 16 hours on the radios. He said that his operating the VHF contests helped train him for his duties. He also said that listening to three radios at once during con-

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Connector:
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446MHz 7.2dB
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UHF (PL-259)



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1/2 wave
222MHz 3.6dB
5/8 wave
446MHz 6.0dB
5/8 wave x 2
Max Power: 100 watts
Length: 3'
Connector:
UHF (PL-259) OR
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5/8 wave x 3
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446MHz 6.2dB
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B-10
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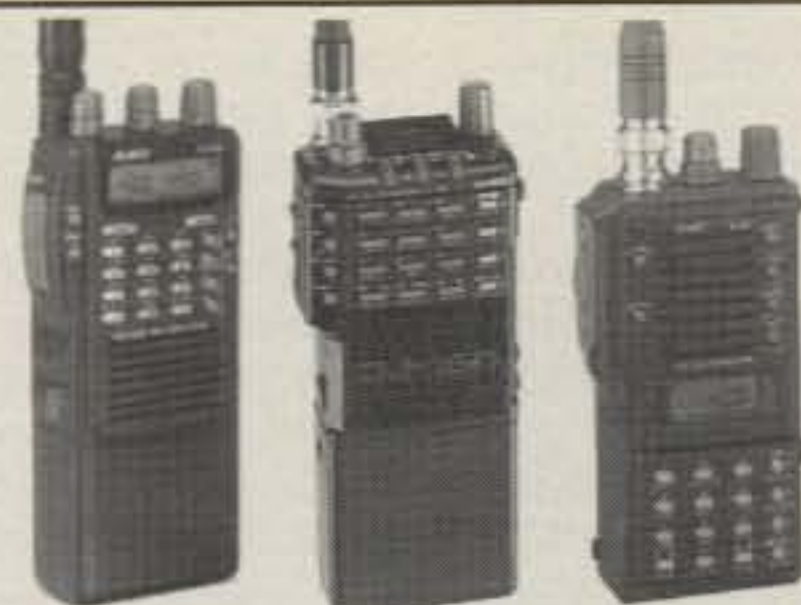
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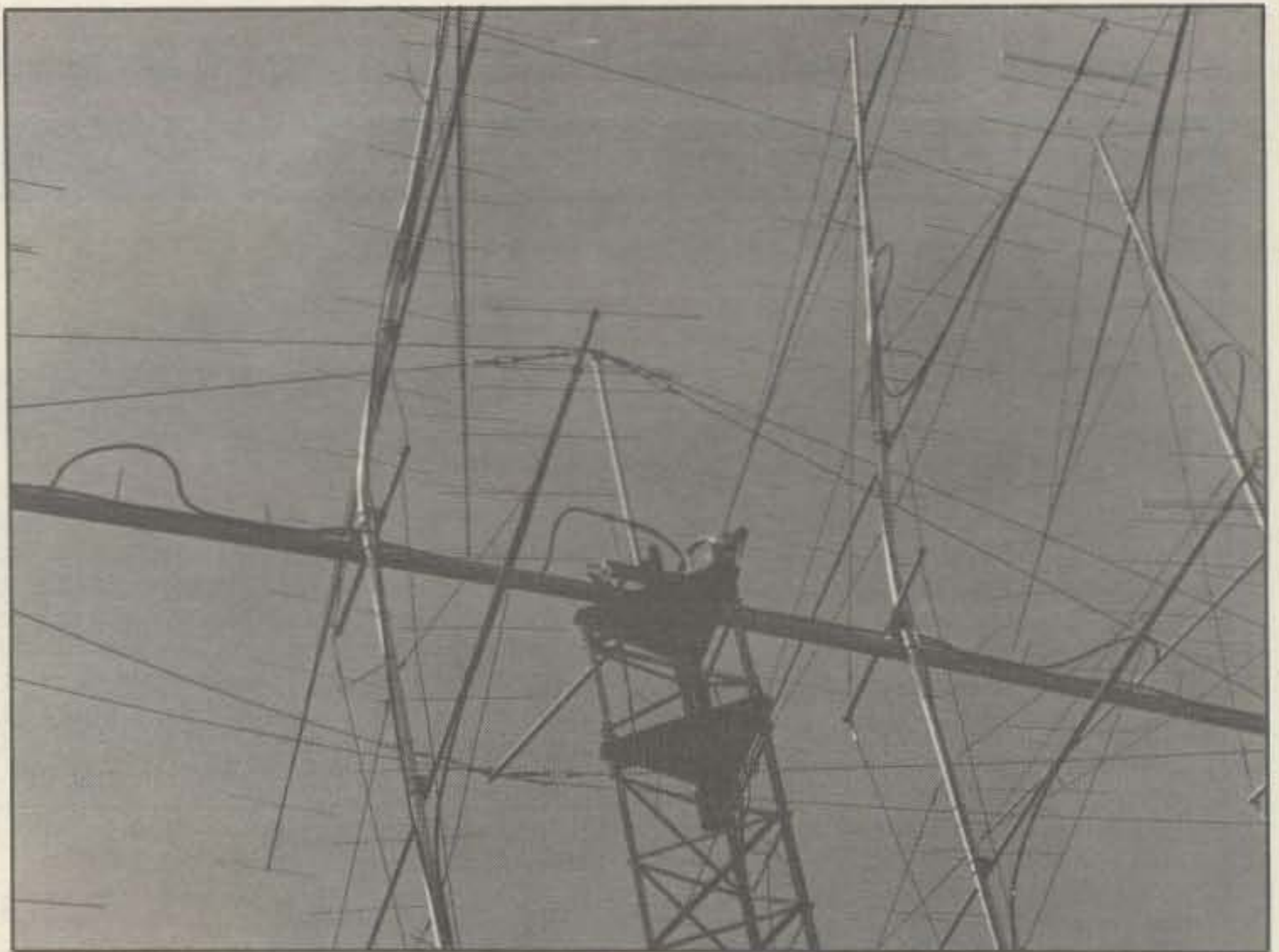
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From left to right, Mickey Caison, one of the unit leaders for the South Carolina Baptist teams, Secretary of Defense Dick Chaney, and Greg Abercrombie, KK4NO, at a middle school in Homestead, Florida. Secretary Chaney and President Bush surveyed the damage to the school during Greg's week of relief work.



Two of the inside cross booms of Bob Taylor, WB5LBT's EME array sustained damage from Hurricane Andrew.

tests equipped him to be able to operate the HF radio, the VHF amateur radio, the UHF business band radio, and the cellular telephone all at the same time.

Greg reported that his team's principal responsibility was providing meals, serving upwards of 7000 people a day. However, Greg reported that during one day the team prepared an estimated 16,820 meals. Greg was fortunate to be there when President Bush and Secretary

of Defense Dick Chaney made a tour of their facilities. He said that he felt their sincere appreciation for the work of volunteers such as his team. Among the other amateur radio operators assigned to the team were: Stan Ricketts, KN4OU, Dave Vittum, W1DV, Dave Edmonds,

WB4AFP, and Mark Stoughton, N4VNG. **Ellen White, W1YL.** Last month I wrote of the terrible destruction of Hurricane Andrew and its effect on the QTH of Ellen, W1YL, and Bob, W1CW, White. I have since found out that because of the extensive damage, they intend to

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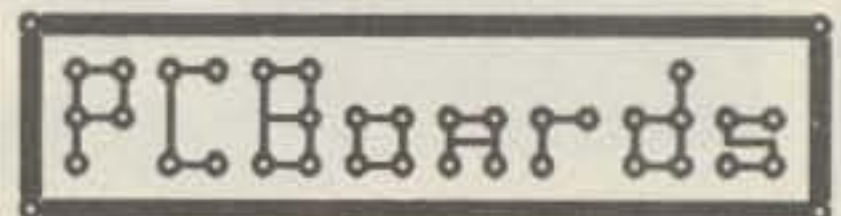
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abandon their home in Homestead and relocate to the Tampa area. While she covers little related to VHF, I feel akin to her as a fellow columnist. Therefore, I am devoting a bit of my column space to ask you VHFers who are also DXers to drop her a note. Her temporary address is: c/o Jim White, K1ZX, 5605 E. 127 Ave., Tampa, FL 33617. The storm did much damage to their computers, which effectively destroyed her work in progress on future columns, so any input to her column would also be appreciated.

Silent Keys

Ansel "Grid" Gridley, W4GJO. The VHF and above airwaves were a bit more silent late August when Grid Gridley, W4GJO, lost his battle with cancer. Grid was a gentleman's gentleman and a pioneer's pioneer. Ed Tilton, W1HDQ, the first editor of QST's "The World Above 50 Mc," remembered Grid from as far back as 1936. He recalled that they used to work each other on 5 meters and later on 2.5 meters when they both lived in New England. Grid's long-time friend Ken Cooney, W2GU, knowing that the end might be near for him, had a special scroll made for those of us who attended the CSVHF conference to be able to sign. Ken framed the scroll and presented it to his old friend shortly after the conference.

Among Grid's pioneering feats were: the first 5 meter coast-to-coast contact (he almost completed WAS before we made the switch to 6 meters); the first operator on 432 MHz; and the first operator on 1296 MHz. Grid also contributed many highly technical articles to QST over his long amateur radio career. Ted Goldthorpe, WA4VCC, remembers a time when he was living in West Virginia and among his first contacts

on 6 meters AM was Grid. Kent Britain, WA5VJB, remembers Grid as his very first DX contact on 2 meters. Rex Turner, W5RCI, never personally met Grid. He nevertheless remembers him as a very good friend. Rex also reported that they often had daily on-the-air skeds.

Among the many kind things that one can say about a fellow human is that he or she has left a warm and beautiful memory in one's mind and heart. This is unconditionally true of Grid. Grid, we salute you, one of the heroes of the VHF family. You most certainly will be missed by all of us.

Bill Gillette, WB2KIW. On September 24 one of the well-respected members of the Rochester VHF Group also became a Silent Key. Bill Gillette, WB2KIW, was the RVHFG Contest Chairman in 1982 and 1983. He was an enthusiastic contesteer. His special phonetics, "Kisses Indian Women," in honor of his Native American wife, provided plenty of call recognition during the contests. Bill will be missed by all who knew him, especially his fellow contesters at RVHFG.

On The Air

The air was alive with tropo conditions during the middle of September. Most of the reports indicating this excellent propagation came from the east coast and eastern midwest. Some operators experienced good conditions before and during the ARRL contest. Some other operators experienced good conditions Sunday evening of the contest, with conditions lasting through to the next couple of evenings. What follows are reports that your editor has received to date.

Dave Hallidy, KD5RO. Dave reported that he was able to complete VUCC on both 5.7 GHz and 10 GHz during the contest. He also completed a number of personal bests during the

contest weekend, including: his longest DX on 10 GHz via a QSO with W2SZ/1, on Mt. Greylock, Massachusetts, and new states and grids on 2304, 3456, 5.760, and 10 GHz.

Rick Roderick, K5UR. Rick estimates his raw score to be about 200K. Among his DX were W2SZ and WB1GQR, several VE3s, W8s, and W9s. He also reported that he worked over 100 grids on 2 meters and in excess of 60 grids on 432.

Frank Moorhus, AA2DR. Frank reported the following activity, all on 2 meters: On September 12 from his truck he worked K1WHS, W1XX, KH2F/3, N8FND, WA3YON, KM1H, W2SZ/1, and WA1ZYZ. On September 15 he worked N4JQQ, also from the truck. Then he went inside the house and worked the following: N4NVV, NE4C, K4HJE, VE1AIM, WA4VCC, and VE1SLM. On September 17 he worked WD4LDR, WB3LJK, WB4DBB, WD4MOB, K4RWP, and KC4YO. Finally, on September 21 he worked WA8PYA, W8HBG, and W8WZG.

Dave Olean, K1WHS. Dave, in FN43 (Maine), reported the following highlights from his contest log: on 2 meters (between 1900 UTC September 13 and 0300 UTC September 14), N4KWX, N4JQQ, N2CJP, N4OHE, WF9M, WN3C, K4ME, K9OYD, KM4ID, K4QIF, WB4JEM (EL89), N4TWX (also EL89), WD4AFY, K4HJE, WA4VCC, K4AGV, and K4CW. Also during the same time frame, on 70 cm he worked the following: W4IY, N8FMD, WA4OVW, KC4MOP, KA4CKI, K2UOP/8, K4FTO, and N8OMN. Monday night following the contest added even more contacts. Among the log entries were the following: On 2 meters Dave worked KU8U, K4CAW, WG8Q, VE3KDH, K8MD, WB8TGY, WA8UVH, K8WKZ, N8LMT, WD4AFY, W4ISS, VE3DSQ, VE3SCP,

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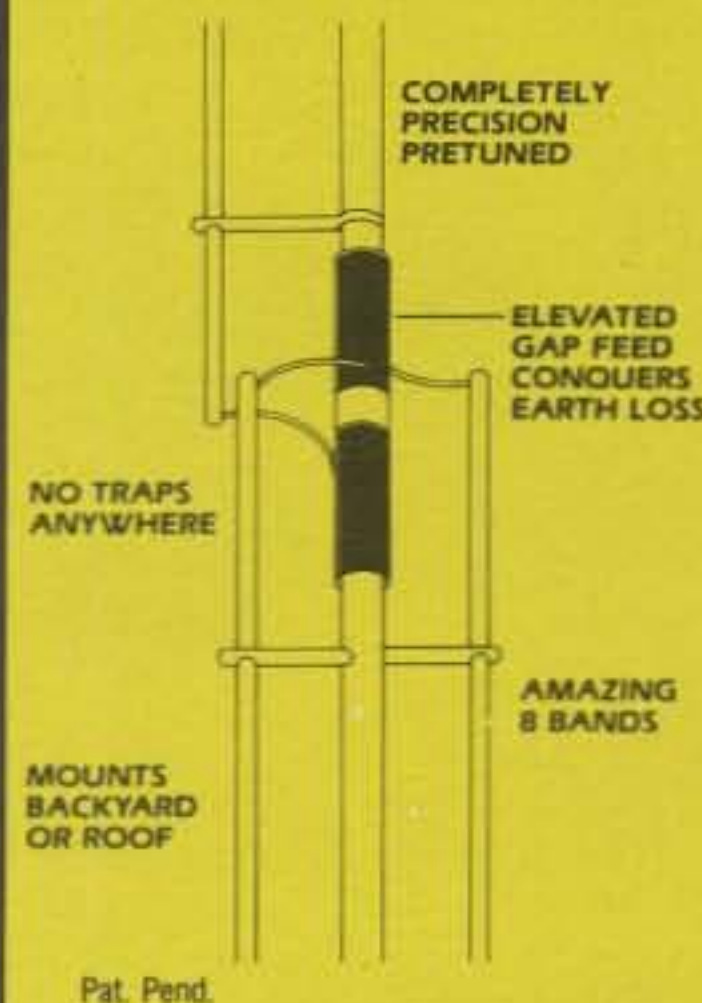
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WA8WZG, VE3ENN, VE3SIM, WO8A, VE2PK/3, KC2BW, WO8A, VE3EWP, NE4C, WA4WMC, and N3JNP. On 70 cm he worked KB8NNE, W8AC, K8MD, WA8VPD, WB8TGY, WA8HTL, VE3CWV, WA4VCC, KB4CSE, K9OYD/4, K4AGV, WA4ZBF, VE3SCP, VE3EWP, VE3DSQ, and N3JNP. On 903 MHz Dave worked W8IDU. On 1296 MHz he worked W8IDU, VE3UD, W8IDU (again, this time on SSB), K4CAW, WA4ZIA, and VE3EWP. Not bad for a couple of days work, Dave! Incidentally, if you wonder why K1WHS has showed up in so many of your logs these past couple of years, it is because Dave moved his shack to another end of his property that is 200 feet higher in elevation. He reported that it now makes all the difference in the world. He only misses openings when he is not in the shack. Maybe Dave should get a baby monitor and hang it in the shack with the receiver by his bedside (kind of like monitoring one of your children, Dave).

Len Parsons, W5AL. Len reported that WB5VYE/R gave him three new grids—DM82, DM83, and DM92—on 1296 MHz during the contest. Additionally, he worked WB0TEM, K0CQ, N0EKT, W0BJ, WB0JQQ, N0JEQ, and WQ0P on 1296, all for new grids. He also reported that he worked many of these stations on 432 and 222 MHz, also for new grids. He says that he now has worked 32 grids on 1296 MHz, 78 on 432 MHz, 54 on 222 MHz, 228 on 144 MHz, 507 on 50 MHz, and 321 on satellite. Len also reported one amusing incident that took place between him and Larry Lambert, N0LL, during an opening on 432 on 4 September. He said that Larry's signal was S-9 plus on 144, 222, and 1296 MHz. However, his signal on 432 MHz was only S-1. Larry later checked his antenna and

found that the coax had fallen out of the connector and was laying on the ground. The S-1 contact was by way of the length of the center conductor of the coax (one foot off the ground) acting as the only antenna.

Andy Blackburn, WD4AFY. Andy reported the following: On September 14 on 2 meters he worked K1WHS, W2SZ, W1FW, and WA1MBA. On September 15, continuing on 2 meters, he worked W1AIM, WA3HMK, WZ1D, W1EOX, K1VYU, WA4PGM, KM1H, KM1X, W1FJH, WB4GCS, K1WHS, and WR3E. On September 14 on 432 MHz he worked W2SZ and K4KAE. The next day, continuing on 432 MHz, Andy worked KM1H and K1WHS. Finally, on September 15 on 1296 MHz he worked KC4YO.

Ray King, WB8YFE. Ray reported that he worked into Indiana, South Dakota, Iowa, and Minnesota during the September 4 tropo openings. During the September 12-14 openings he worked across the south and east. He watched the path move from west to east as each day progressed. On the 12th he reported that tropo existed in all directions, with stations worked as far south as EM30 and EM24 and as far east as FN21. On the 14th he worked stations in FN32 on 432 MHz. He stated that the band was full of W2s/W3s. On the 14th the path switched northeast, where he worked stations in northern W2 and VE3. He also heard a few W1s. He reported that his best DX heard was Carl, KM1H.

Hal Perry, KC4YO. Hal reported tropo existing on Friday night before the contest. Among the highlights are: Beginning around 0230 UTC (the 12th) he worked W0PW on 1296 and 903 MHz, with S-9 plus signals, N0JEQ, on 432 and 1296 MHz, WD5BKV on 1296 MHz, and K5SW, on 432 and 1296 MHz. On Saturday morning he

worked K5AZU on 144 and 1296 MHz. Hal also reported many new grids on 903 and 1296 MHz. During the contest most of the tropo was to his northwest. On Monday morning he had another good tropo opening into Georgia and Florida. He reported that the QSO with Andy, WD4AFY, was accomplished with both ends running only 10 watts. Then on Wednesday evening things fired up again for him, this time to the northeast. He worked stations in FN00, FN03, FN20, FN30, FN31, FN40, FN41, FM18, FM19, FM29, FM09, EN90, and EN91. Among the highlights are: VE3FAC on 432 and 1296 MHz; N2CEI on 144, 432, and 1296 MHz; WA2TEO on 144-1296 MHz; WA4VHF on 432 and 1296 MHz; K2ZRJ on 144-1296 MHz; N3JNP on 144-432 MHz. Hal reported that he had difficulty making many contacts on 903 MHz because when the band opened he was swamped with interference from TV stations, with some of the signals 20 over S-9.

Sam Whitley, K5SW. Sam reported the following tropo activity: On the 12th between 0130 and 0511 UTC he worked KM0A, WA0SJR, N4VC, WA0OVE, KC4IS, K4LRX, KA9AAD, KD9CDM, N9GXC, WD4EWX, and KC4YO, all on 2 meters. Also worked on that day was KC4IS on 222 MHz and KC4YO on 1296 MHz. On the 13th between 0202 and 0237 UTC he worked WA4TTG, W0FY, and KB8NNE, all on 2 meters. Starting around 0237 UTC he began hearing W2SZ on 222 MHz. He finally worked him and the operator on the 'SZ end asked him to move to 144.151 MHz. Sam reported that they heard each other enough for callsign exchange but not for the full report on that band. Sam believes that the distance for the 'SZ contact on 222 MHz is around 1300 miles, making it a new land tropo record.

W2SZ. This contest group claims an incredible 1.7 million points (which if it stands will be a new record) for the contest. The raw band, QSO/grid totals are as follows: 50 MHz 423/63, 144 MHz 872/111, 222 MHz 178/58, 432 MHz 358/76, 903 MHz 733/29, 1296 MHz 115/43, 2304 MHz 62/21, 3456 MHz 46/15, 5760 MHz 38/15, 10 GHz 42/11, and 24 GHz 28/7.

Other Rumored Contest Scores: K1TR 110k, K1RZ 215k, WA2TEO 230k, WA1GQR 140+k, and W4IY 319k.

Comet Swift-Tuttle Recovered

Joe Rao, an amateur astronomer (whose paper on this year's *Perseids* was cited in the November column) has reported to your editor that the Comet Swift-Tuttle, the parent of the *Perseids* meteor shower, was recovered on 26 September by a Japanese amateur astronomer. What does this mean to the VHF + operator? According to Joe, who has extensively studied the historical sightings of the comet, next year the earth may possibly pass through the new debris stream being produced by the comet. This traversing of the rubble could produce a tremendous meteor storm during the return of the *Perseids* meteor shower next August. More coverage on this topic will be forthcoming in a future column.

This Month's Meteors

There are two showers scheduled for this month. This first, the *Geminids*, is predicted to peak around 1232 UTC, 13 December. It is a good north-south shower, producing an average of 50-60 rocks per hour at its peak.

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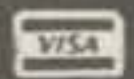
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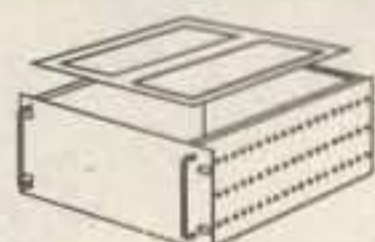
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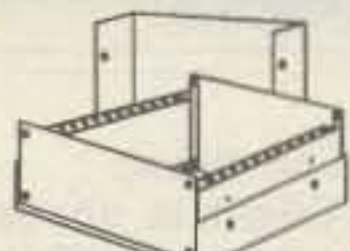
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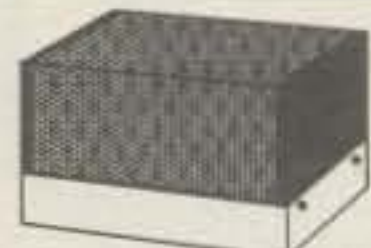
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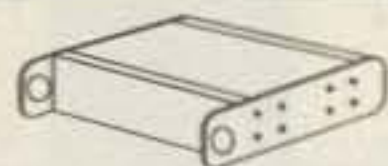
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The three N6C's—Chip Angle, N6CA; your editor, N6CL; and Terry Baxter, N6CW—pondering over whom Ted Collins, G4UPS, was referring to when he announced on 28.885 MHz one morning last January that he was hearing N6C—something calling "CQ" on CW on 6 meters.

video tape was supplied by Bill Rowe, N0TG, and featured his group's DXpedition to Navassa. (and having a near-miss QSO with WA4NJP during some not-so-ideal EME conditions). If I missed your toes this year, I won't next. Thanks go to Jimmy and his friend, Drew, for making it all wonderfully possible.

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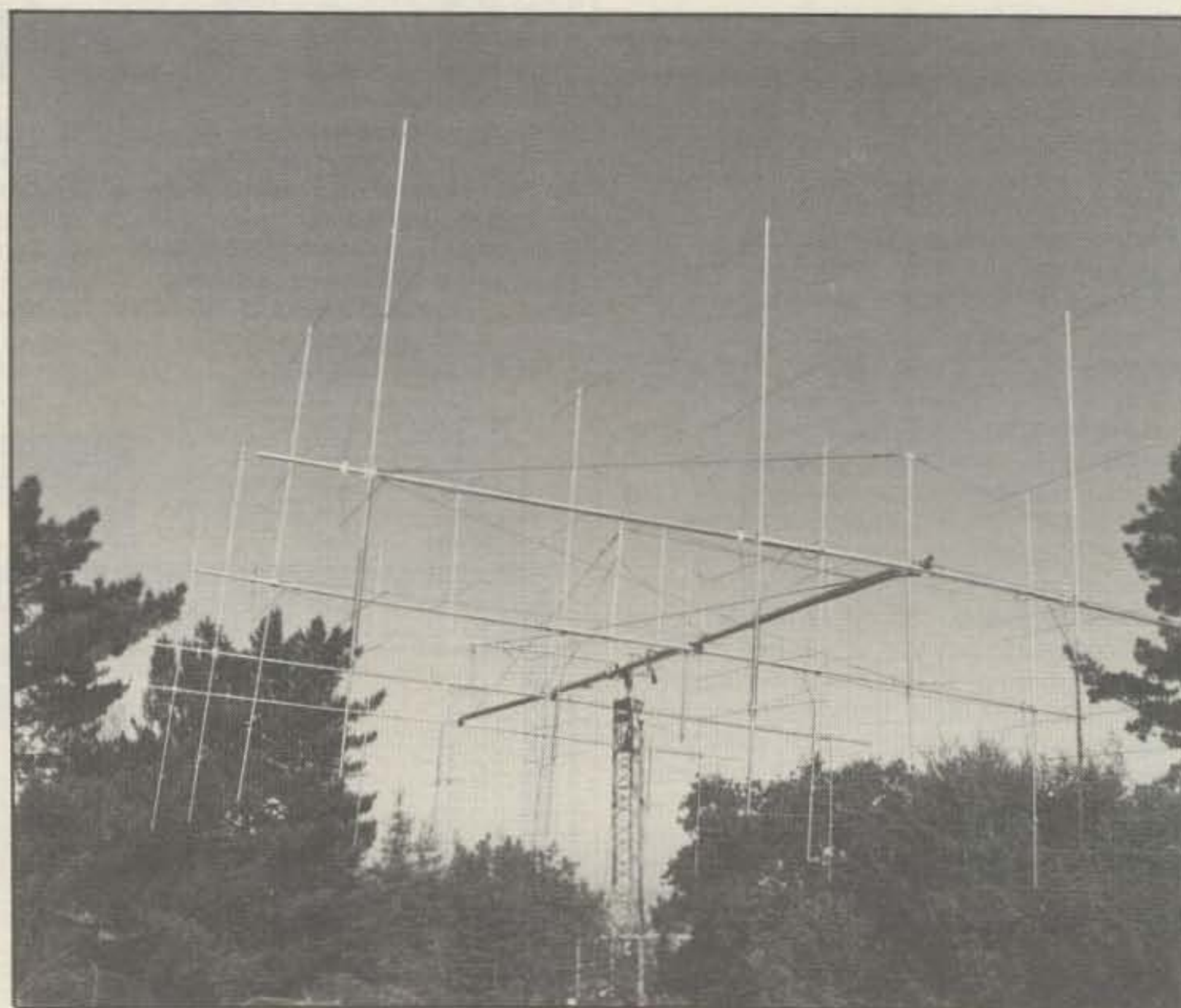
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And Finally

A Way To Remember Our Heroes. This year we have lost some of the heroes of the hobby. As fellow VHF operators, they were also part of our family. While it does little to soothe the loss, sometimes making a contribution to the favorite charity of your hero helps make the memories continue to be good. If you would like to do something like this and need some direction, may I suggest that you contact the Pack Rats and consider making a contribution to the medical mission in Nepal where Gene Zimmerman, W3ZD's son, Mark, works as a doctor. For more information, contact Allen L. Boblitt, K3EOD, Mt. Airy VHF Radio Club, 8389 Langdon Street, Philadelphia, PA 19152.

My best wishes go to all of you for the holiday season and for the new year. My thanks go to RVHFG, the Pack Rats, the "West Coast VHFer," the "Terrestrial VHF+" newsletter, Ted Goldthorpe, WA4VCC (for the many topic ideas he has given me), and to all of you who take the time to send me your input for this, your column. As always, I will continue to look to my mailbox to hear from you as you support your column. If you cannot wait for the postman, then call me. You know the number—405-528-6625. Until next month . . .

73, Joe, N6CL



Jim Treybig, W6JKV's 6 meter EME array pointing straight up. The 16 vertical poles are the sixteen 6-element M² antennas that make up the 96-element array. Look for Jim's station and a growing number of other stations on 6 meters EME.

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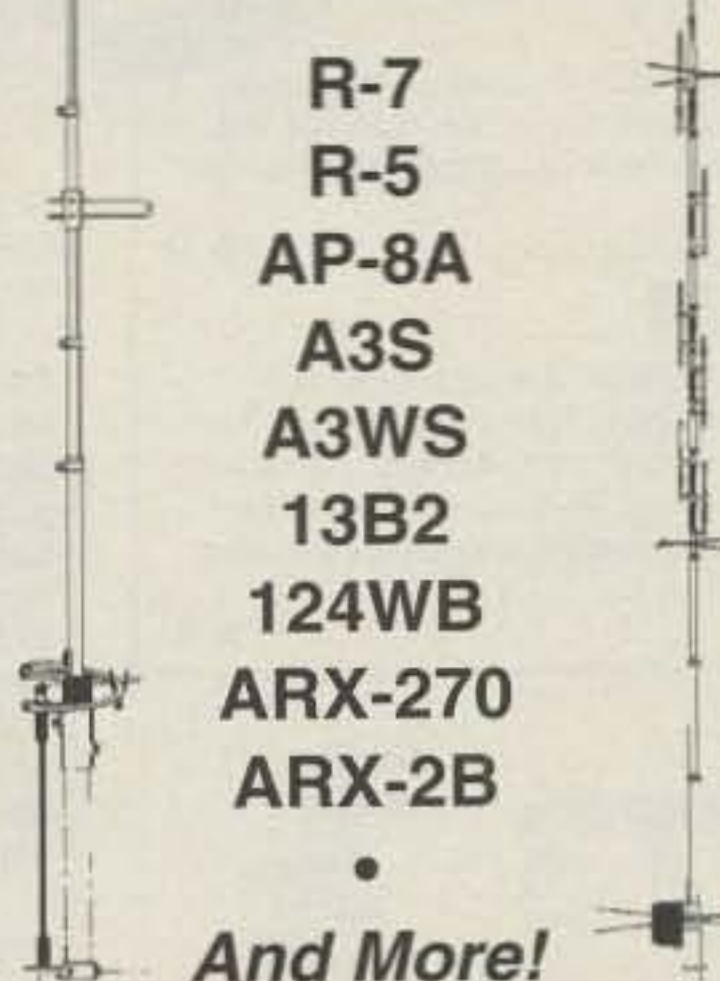


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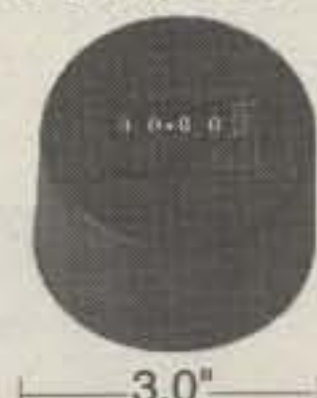
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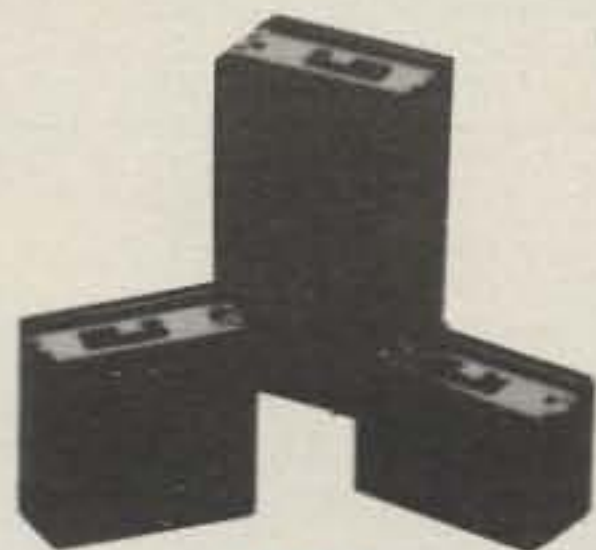


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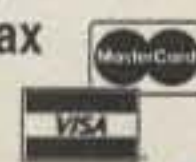
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A LOOK AT THE WORLD AROUND US

An Amateur Radio Christmas!

Happy Holidays, gang! Can you believe twelve months have passed since we last exchanged seasons greetings and looked at special amateur radio goodies to start your New Year right? My how time flies when you're having fun, and 1992 has indeed been a good year for amateur radio fun! Sunspot counts have been high, HF DXing has been a blast, and QRP has surged in popularity. ICOM introduced their new IC-728, Yaesu their FT-890, and Kenwood their TS-450. Ten-Tec shifted to selling factory-direct, and the famous old name of Swan has just re-entered the market with their new little Atlas Model 310.

Will 1993 be an equally exciting year? Opinions may vary, but judging by the goodies debuting in this month's column and in advertisements throughout this issue of *CQ*, I am convinced '93 will be yet another great year for amateur radio.

The best way to ensure good times even more naturally involves gearing up with a new rig, accessory, or operating aid, so we again divert this month's column in that direction. Enjoy our views of special treats, and remember featured items are available directly from their manufacturer or dealers, not from me. I am simply your guide on this visual tour. Remember, too, supplies run dry quick during the holidays, so ordering early is encouraged. If you would like an item in your hands within a couple of days, also consider paying a few bucks extra for quick Federal Express delivery.

That's enough K4TWJ philosophy. Now let's look at the goodies, and they are fantastic: a neat new transceiver, miniature key, QRP books, and grayline calculator.

Expanding Your HF Fun

Leading this year's collection of amateur radio treats is the new Atlas 310 HF transceiver shown in photo 1. This little critter is a new third generation of the famous Atlas 210X. It has a super-updated receiver and an impressive transmitter that pumps out 150 watts on SSB or 120 watts on CW. It covers 80, 40, 20, 15, and 10 meters as supplied, and 30, 17, 12, and 160 meters after adding optional crystals. The new Atlas 310 is only 3.2"H x 8.5"W x 8.4"D,

4941 Scenic View Drive, Birmingham, AL 35210



Photo 1— Every ham's holiday dream—a new HF transceiver! This Atlas 310 is a real gem, and it slides right into its optional power supply/speaker console that makes all rig connection automatically!



Photo 2— Check out this Backpacker I CW transceiver from Tejas RF Technology. It is easy to build and a blast to operate.

and it is especially designed for simple and easy operation. Look at the front panel and you will see the 310 has Passband Tuning, three selectable receive bandwidths (2.7 and 1.8 kHz for SSB plus 600 Hz for narrow CW), RIT, noise limiter, and a classic analog dial below its digital readout. There are no memories or similar-related rocket-launcher buttons which accidentally punched cause confusion. This makes the new Atlas quite appealing for newcomers, mobileers, and everyone who likes care-free operation.

The Atlas 310 is a real beauty in stand-alone form, but check out its optional (15 inch wide) AC power supply and speaker console for home use or clever (9 inch wide) mobile mount. Just slide the transceiver in place and power, mike, and speaker connections are made automatically. You can even pull the rig out of the car, step indoors, and continue an ongoing QSO!

For more information or to order your own Atlas 310, contact Atlas Radio Com-

pany, 1556 Lower Lake Court, Cardiff, CA 92007 (619-944-9622).

Want to have some real outdoor hamming fun in 1993 and get rolling with a new interest in the process? Check out the new little Backpacker I QRP transceiver just announced by Tejas RF Technology. This tiny CW rig is shown in photo 2, and it is available in kit or fully assembled versions. The kit is 100 percent complete, including all instructions, case, screws, and nuts, and it even qualifies for the "homebrew" category of QRP contests.

The Backpacker I is built on three circuit boards (receiver, transmitter, and VFO) and fits into its 2.5"H x 6.5"W x 5.5"D case with enough spare room for a small battery pack or keyer. The rig can be built for operation on any single band from 80 through 10 meters including WARC's, and changing bands simply involves changing one crystal and rewinding three or four toroids. Neat!

The Backpacker I has one of the best direct conversion receivers I have seen. It is quite sensitive and has front-panel selection of wide, narrow, or extra-narrow selectivity, plus an adjustable sidetone that tracks with the front panel's volume control. The transmitter has time-sequence keying, full break-in with solid-state switching, and loafs along at two watts output. I could continue indefinitely about this little gem (my first QSO with it on 30 meters was 3B8CF in the Indian Ocean), but space is limited.

For more information or to order your own Backpacker I, contact Bill Hickox, K5BDZ, at Tejas RF Technology, 17 South Briar Hollow, Suite 101, Houston, TX 77027 (713-840-8600).

Our next item is a genuine heart-throb any amateur would be delighted to own: the new ultra-miniature handkey made by G4ZPY in England and shown in photo 3. This little gem measures only one inch square and qualifies as the smallest operational key in full production today. I shot this photo with a magnifying lense on the camera so you can see the key's fine details and superb workmanship. The upper parts are brass polished to the lustre of gold and mounted on a base that resembles glazed mahogany. Tension is adjustable via the rear knurled nut attached to an internal spring, and travel is adjusted by turning the knob after releasing its locknut/skirt. Contacts directly below the



Photo 3- G4ZPY's new miniature key measures only 1 inch square, and it really works. The little critter has so much sparkle it almost looks like jewelry.



Photo 5- This modern version of the classic Space Spanner regenerative kit is now available from MFJ Enterprises. It covers all the popular HF shortwave and amateur bands, and assembles in a few hours.

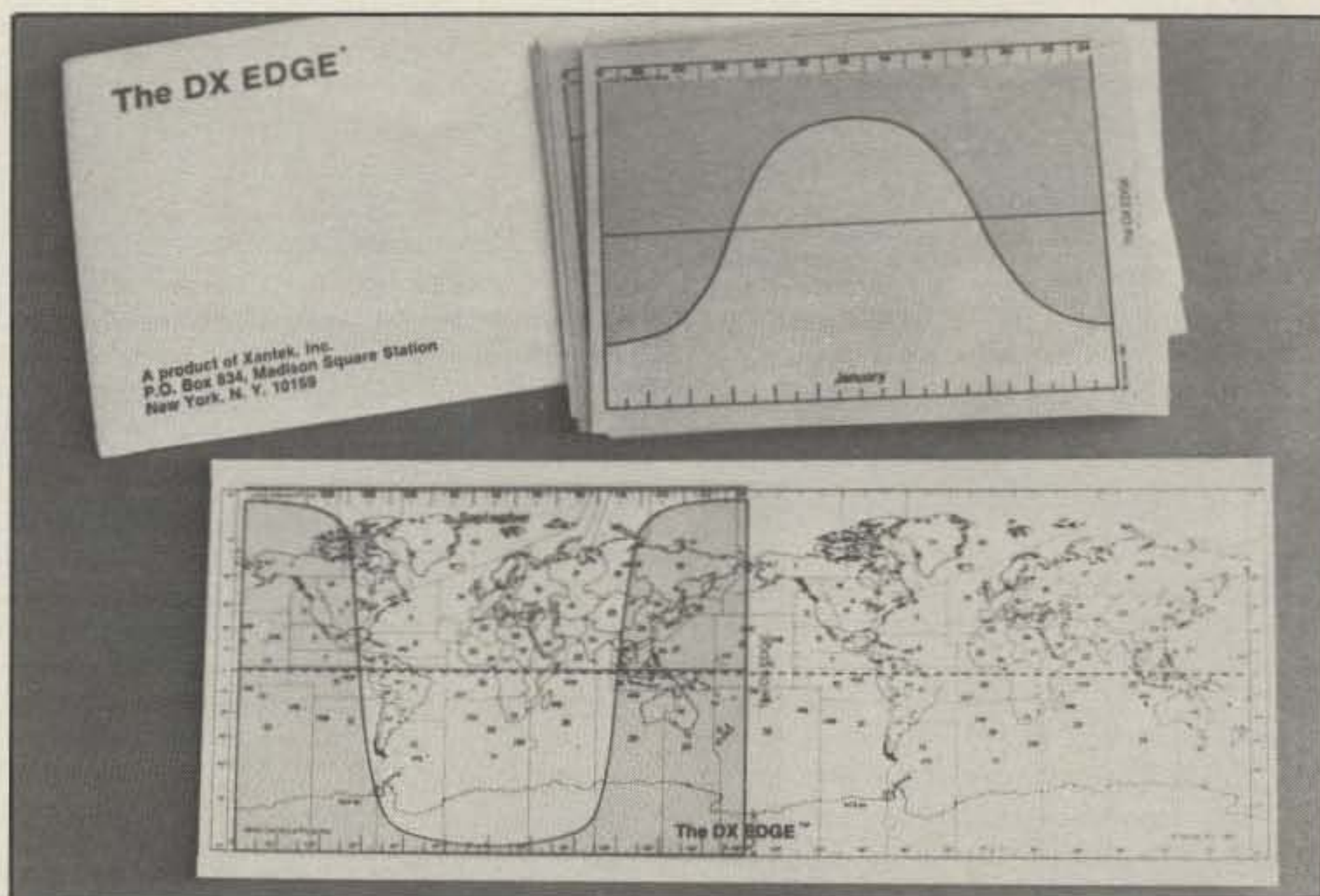


Photo 4- Want to work more DX in '93? Latch on to the famous Xantek DX Edge gray-line calculator. It estimates optimum DXing times in a flash.

knob connect to tiny binding posts at the key's rear. The key is incredibly small, but it handles very well, and it is for portable operating.

For more information on this genuine collectible or several other models of beautiful keys and paddles, contact Gordon

Crowhurst, G4ZPY, 41 Mill Dam Lane, Burcough, Ormskirk, Lancs, L40 7TG England (telephone 011 44 704 894299; call before 7 AM your local time, and rates may be lower than business-hour calls in the USA).

Next up is an often overlooked yet

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super-handly DXing aid you can use anywhere and anytime to estimate good band openings: the DX Edge gray-line calculator shown in photo 4. Several computer software versions of this sliderule-type item are presently available, but they all lack its simplicity and convenience of use (you can whip out the DX Edge while mobiling or watching TV and quickly plan optimum times for working various HF bands).

The DX Edge comes with slide-in overlays for each of the twelve months, and shows world areas in daylight and darkness at a glance. The gray line indicating dusk and dawn around the world (optimum DX path) is indicated by a red "terminator" on the overlay. The sliding overlay also shows time around the world with reference to your QTH, while the white sliderule/fixed section shows countries, prefixes, zones, latitude/longitude, etc.

As an example of use, you can slide an overlay to indicate sunrise in the eastern USA and see western Australia, plus the Philippines and China are on the gray line's "opposite end" and going into evening/darkness. Looking along the top edge, you see the local (US time is approximately 6 AM, while the DX areas are approaching 8 PM—perfect for 30 or 40 meters). By sliding the overlay farther to the west, you can see Far Eastern areas can work into the United States around 9 AM their local time and 7 PM US time on 10 or 12 meters.

The previous examples were strictly ba-

sic applications for the DX Edge. It is a blast, and the more you use it, the more hidden benefits you will find. This is one gift you can enjoy for years on end. It is available through the HR Bookstore, orders telephone number 1-800-457-7373.

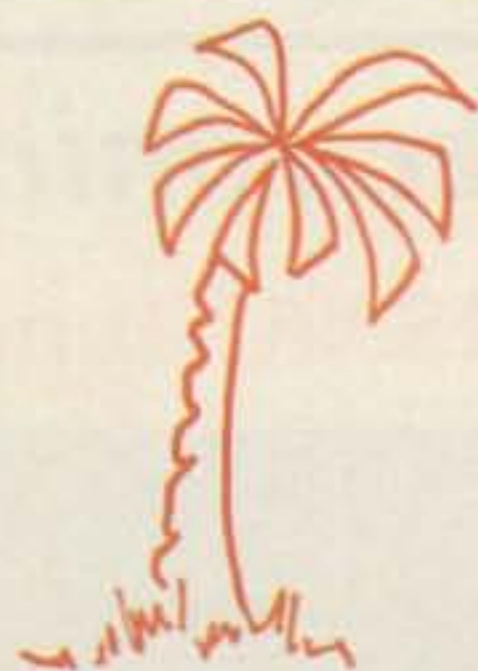
Cold winter nights, lighthearted kit building, and classic regenerative receivers always rekindle old-time amateur radio fun, and the new shortwave receiver kit shown in photo 5 fills that bill to a tee. This new MFJ-8100 covers 75/80 meters, 49, 40, 30, 20, 25, 22, 17, 15, and 13 meters in five selectable bands. It is a classic regenerative receiver, all solid state, and has dual low-impedance output sockets so you can plug in one or two regular Walkman-type earphones. Several of the amateur bands are electrically bandspreaded, and a vernier drive makes tuning much easier than in the good old "hold your breath while copying" days. Combine this receiver with a little QRP transmitter, and you have a nice battery-powered setup that will be a blast to use. The MFJ regenerative receiver is available in kit or wired and tested form. You can order it direct from MFJ Enterprises, Inc. at 1-800-647-1800.

Our next item is a neat and clever alternative to those piles of information sheets and charts we all habitually stuff into a drawer and can never retrieve when needed—*The Ham's Book of Knowledge* shown in photo 6. This book is produced in two separately-available volumes by Ed

Schneider, AA7AN, and it contains every particle of information imaginable useful to hams. The main book is a good newcomer's guide for station setup, antennas, FMing, repeaters, band charts, and conversion tables galore. It also contains extensive information on wires, coax cables, grounding, and lightning protection new amateurs will find helpful. The second book contains beam headings customized for your QTH, DX distances, QSL information, and geographic data on countries around the world. It also has an extensive list of countries by prefix, time conversion tables, and a vast listing of manufacturers/dealers with telephone numbers and equipment types. I am still wondering how AA7AN can produce these large volumes at such low cost. They are very impressive. If you want to start the new year right and in an organized manner, this *Ham's Book of Knowledge* is the way to go. To order it, contact In-Phase Publications/AA7AN, 6502 Wildcat Drive, Cave Creek, AZ 85331-6130 (602-488-4325).

VHF Treats

Now shifting our views from low bands to VHF, we begin with a unique item guaranteed to spice up your life: the new Alinco SR-4 simplex repeater controller shown in photo 7. Connect this unit to the microphone and speaker sockets of your 2 me-



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HighPower at 2m & 70cm

The **rfconcepts DualBandAmp** provides the added power needed for both mobile and ham shack use. The DualBand's sensing circuits detect the transmitted frequency and automatically switch the compatible output amplifier in line for 200 watts at 2m and 125 watts at 70cm.

Rated to handle from 20 to 50 watts input, the **rfconcepts DualBandAmp** was designed for use with most dual-band radios on the market. Its new Sine-Sink™ heatsink and all-component PC board mount design assure reliable performance and low maintenance. Additional features include a switch selectable LED bargraph which displays relative output or reflected power, an antenna high VSWR LED, a thermal shutdown LED, and dual frequency band indicators.

For a detailed specification sheet, call your **rfconcepts** dealer or contact **rfconcepts** direct.

The **rfconcepts DualBandAmp**, added power for both 2m and 70cm, automatically.

December 1992

rfconcepts - Division of Kantronics U.S. inquiries Reno, NV, Voice 702.827.0133 FAX 702.324.3289
International inquiries 1202 E. 23rd St, Lawrence, KS, 66046, Voice 913.842.7745 FAX 913.842.2021

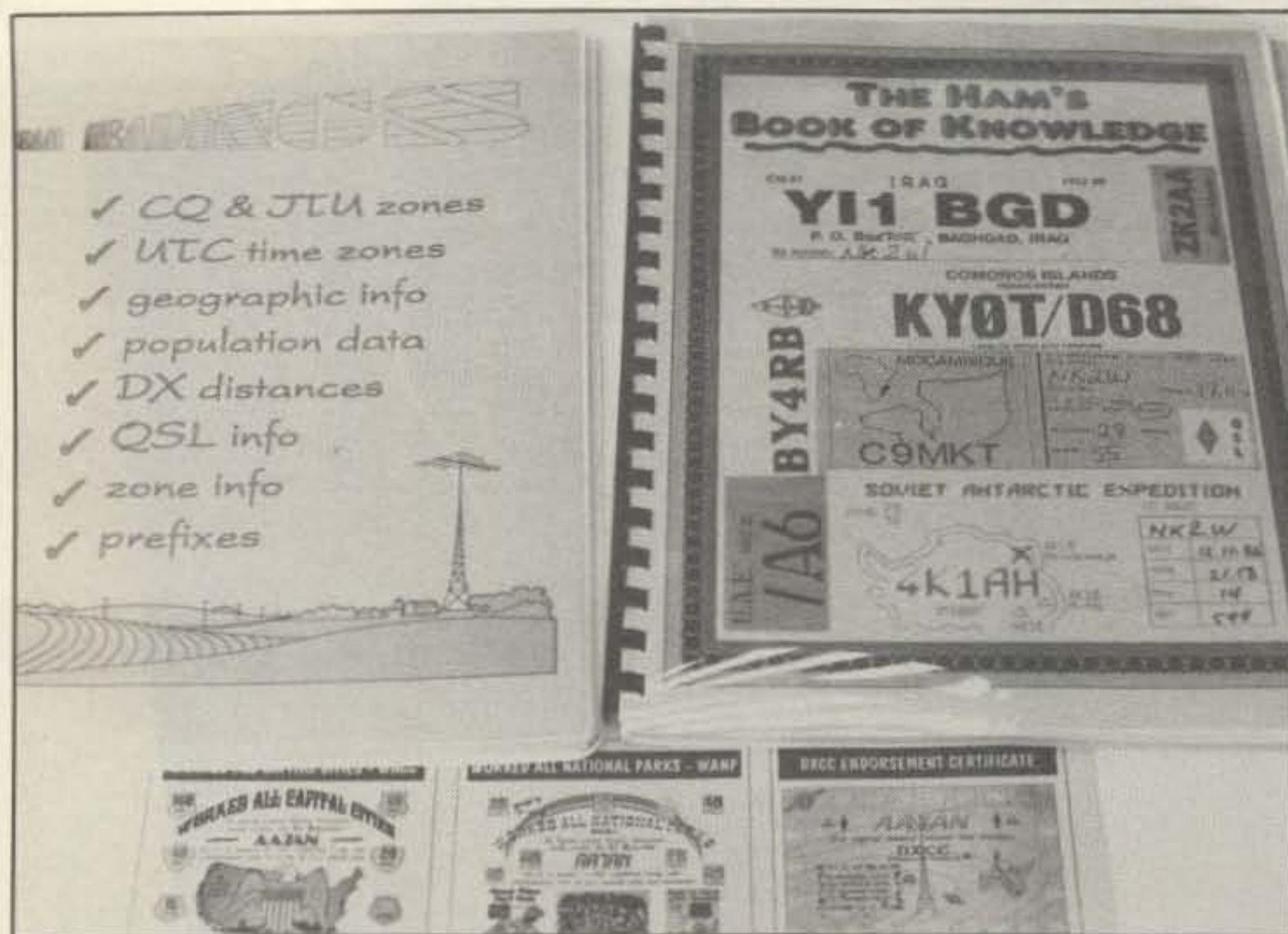


Photo 6- What is the beam heading for Reunion Island, the distance to Perth, Australia, local time in Zaire? What type coax should you use on a 2 meter antenna, or how is the best way to protect your station from lightning? These questions plus many more are answered in The Ham's Book of Knowledge.

ter, 70 cm, or dualband FM transceiver, and you have an instant single-frequency repeater that can cover a wide area or only your neighborhood according to your selected antenna and power level. How does a simplex repeater work? You transmit to it just like a regular repeater (but no offset), then it repeats your message (on the same frequency) immediately thereafter. This is neat because it does not require a special pair of frequencies, and uses only one antenna. The SR-4 is fully remote-controlled,

so you can switch and select all functions right from your handheld.

The SR-4's big surprise is its built-in voice mailbox you can use to leave and retrieve messages with amateur friends and family members. Now put all of the previous functions together and visualize the unlimited possibilities. Connect the SR-4 to your home rig, tromp out with your handheld, and you have a full personal communications system right by your side.

Full details of the SR-4 obviously over-



Photo 7- Alinco's new simplex repeater system connects directly to your existing home or mobile FM transceiver, goes where you go, is fully remote controllable, and has a voice mailbox. Now this is the way to generate some real excitement while vacationing!



Photo 8- Striving for a space-shuttle QSO, big-time VHF DXing, or grid-square chasing? Falcon's new 100 watt 2 meter amplifier is the way to go.

flow our available space, so check with your local dealer or Alinco Electronics, 438 Amapola Avenue, Unit 130, Torrance, CA 90501 (310-618-8616) for more information.

Whether you are setting up a big repeater system or simply want a high-power VHF station for big-time DXing and contesting, nothing turns the results like high power. Furthermore, no RF amplifier I have seen can hold a candle to the Falcon power MOSFET amplifier shown in photo 8.

Falcon Communications has always had an impeccable reputation of producing only the best, and this new 100 watt output amplifier truly reflects that philosophy. It is virtually foolproof in operation, has several self-protecting features, has eleven front-panel status-monitoring LEDs, and is a unit you can use for years without worry. The amplifier operates Class AB1, so it is suitable for FM, CW, and SSB operations alike (great for OSCAR!). The amplifier has a built-in AC power supply that is adaptable to almost any line voltage.

If you have been dreaming about going VHF in high style, here is the answer! This 2 meter amplifier is produced by Dan Peters, NY6U of Falcon Communications, P.O. Drawer 8979, Newport Beach, CA 92658 (714-760-0340) and is available from amateur radio dealers nationwide.

Now for classy VHF mobileers, we spotlight the new PRO•AM MM-144 candy-kiss-based antenna shown in photo 9. This new antenna adds 3 dB in eye appeal to any car. It has a very slender whip and 1 inch diameter base that is fitted with a new

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1000W PEP



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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 IKW PEP)

ZA-721

7/21 MHz Dual Band Zepp

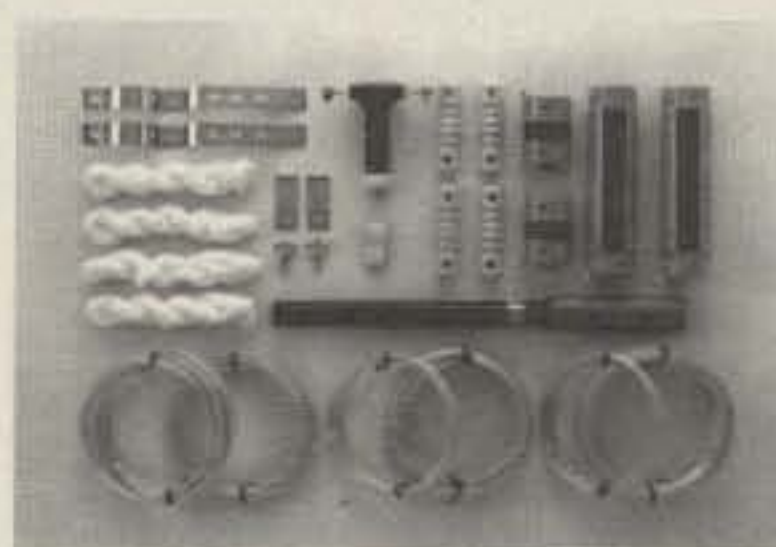
This popular antenna is only 39 feet long. Highly flexible stranded copper wire is coated with clear vinyl for excellent corrosion resistance. Power is 600W PEP.



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 IKW PEP)

AW- 3.5 Antenna Wire

7 Strand Annealed Copper Wire
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Glass Fiber Mast
Weight .66 lbs.
Length 43.3"



AL-207FM

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High Performance
Low Radiation Angle
Power 250W FM
PL-259 Base
Lightweight 1.2 lbs.
Length 53.1"



AL-144FL

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HPS-55X

TA-144VW

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CM-144W

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Roof Mount
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Lightweight 12 oz.
200W PEP
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PL-259 Base

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Super wide-band
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on 25-1000 MHz.
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and 900 MHz.
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titanium magnet rather than the conventional alnico magnet, and it holds in place at the highest speeds imaginable. The antenna is sold complete and ready to use, with coax and BNC connector to fit any handheld. You must see one of these new-style antennas "in person" to fully appreciate their trim design. They are sharp!

Similar "candy kiss"-based antennas are available for 440 MHz and 2 meter/70cm/dualband operation. These antennas are manufactured by PRO•AM, 185 West Hamilton Street, West Milton, OH 45383 (513-698-4194) and are available from dealers nationwide.

Christmas Gold

Our mini review of holiday goodies would not be complete without a new item in ama-

teur radio jewelry, and H & M's callsign belt buckle shown in photo 10 fills that bill perfectly. The buckle is designed to accept standard 1 inch wide belts and measures 2 inches long by 1 1/8 inches high. It is available in an economical 10-karat gold-filled or lavish 14-karat gold version. Now this is the way to show off your new belt-clipped talkie in high fashion!

H & M's full line of amateur radio jewelry is especially popular during the holidays, so ordering early is heartily encouraged. Tell Harold, KB2MB, you read about this in our CQ column, and receive a \$5.00 discount until the end of 1992. Contact H & M Jewelry Company at 26 Edgecomb Road, Binghamton, NY 13905 (1-800-285-8587).

That winds up our views of new goodies this year, gang, and may you find not just two or three, but all of them in your Christ-

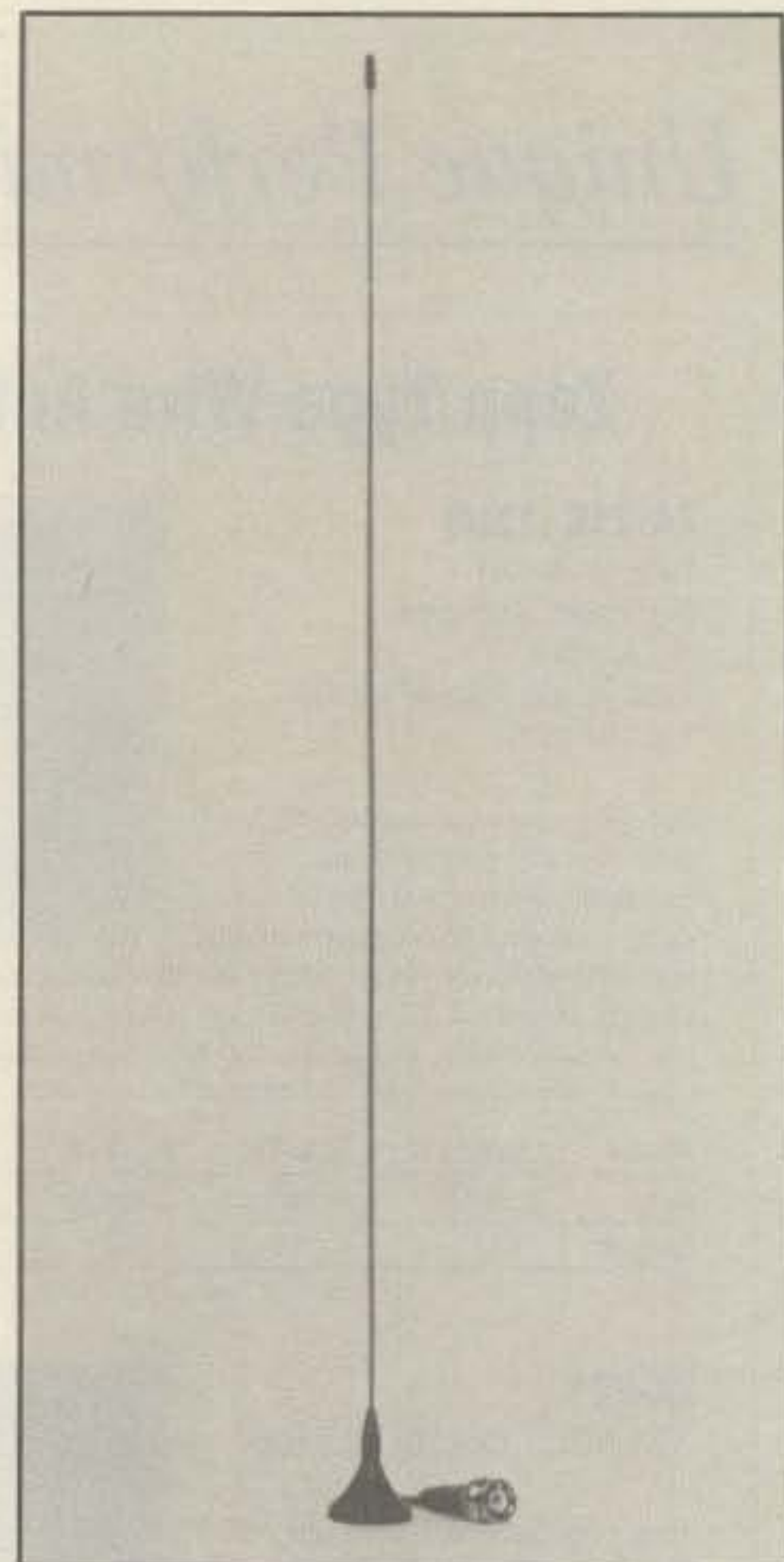
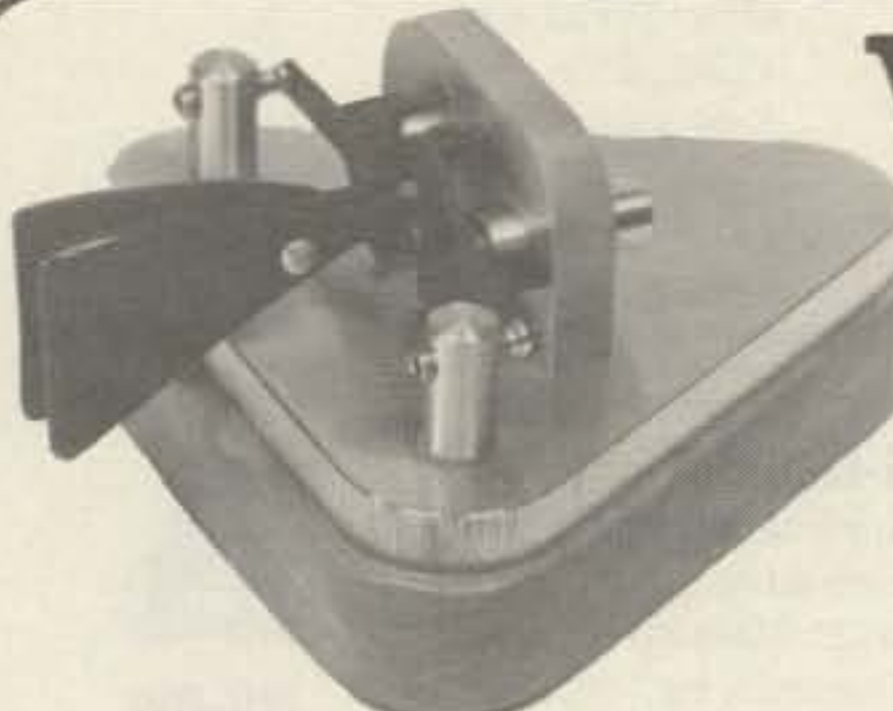


Photo 9- The well-dressed VHF/UHF mobileer's antenna for '93: PRO•AM's new 1 inch diameter mag-mount "Kiss" antenna is available for 2 meters, 70cm, or dual-band 2m/70cm operation.


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Photo 10- A touch of gold: H & M's new 14-karat gold-filled buckle for belts 1 inch wide. This item is a real beauty.



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mas bag. Now that would be a ham holiday supreme!

One final tidbit: I am once again planning to hold another on-the-air Christmas party during the Saturday and/or Sunday before Christmas, and will be giving away lots of goodies and new books to friendly contacts. Do try to join in; it's a blast. I will be operating around 14.200 to 14.240 kHz between 2200 and 2300 GMT. See ya there!

73, Dave, K4TWJ

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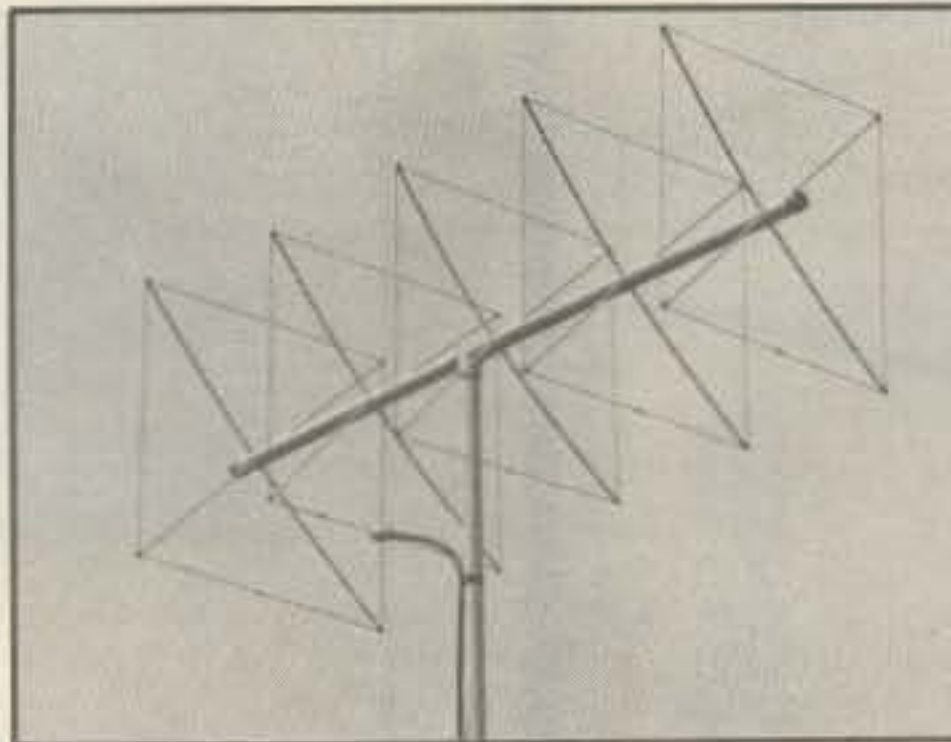
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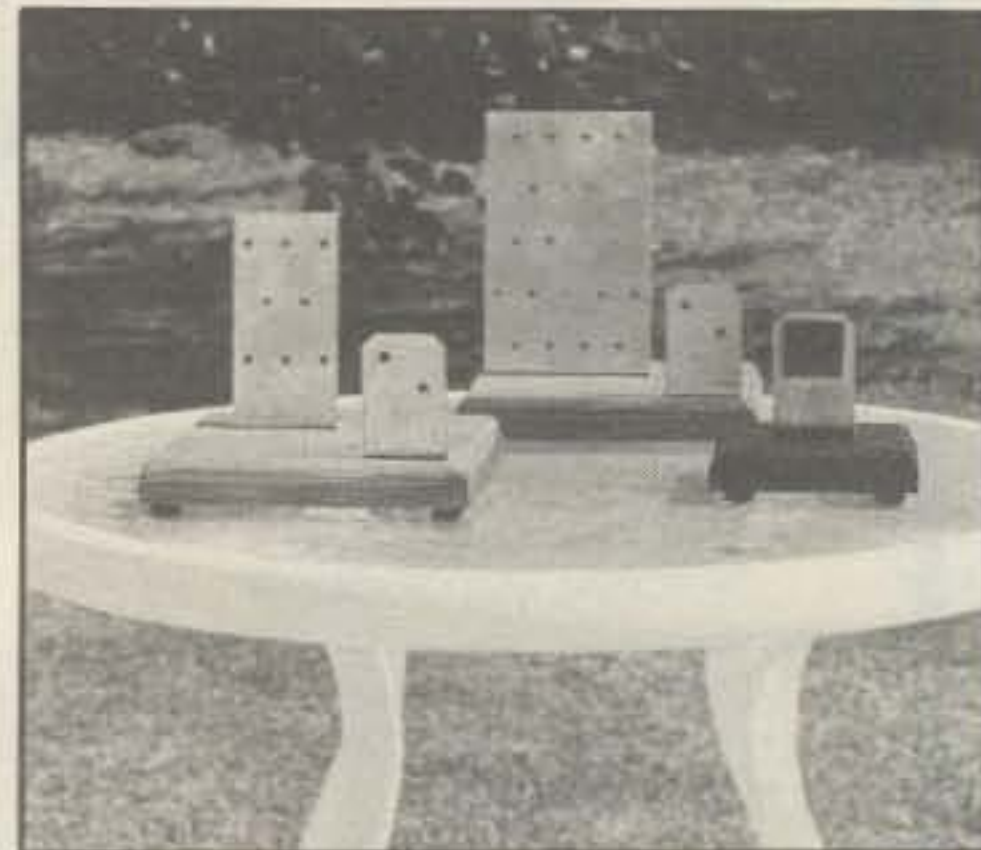


MAX System Antennas

MAX System Antennas has announced a new line of quads for 2 meter SSB and FM applications. Included are a lightweight 3-element model and a 5-element beam. The two antennas are complete (no soldering or adjustments required) and require just 5 minute assembly. They are of broad-banded design and are constructed with lightweight PVC booms and stiff fiberglass spreaders supporting pre-tuned one-piece elements. The 3-element model has hardware for mounting on a vertical mast or tower leg. The 5-element quads include an 18 inch mast to be attached to your mast with hose clamps or U-bolts. Prices: 3-element \$39.95, 5-element \$59.95 (add \$4.00 shipping in USA).

MAX System Quads may be ordered from Cellular Security Group, 4 Gerring Road, Glou-

cester, MA 01930 (1-800-487-7539), or for more information circle number 101 on the reader service card.



Handie-Base Stand

The Handie-Base is a stand for a handie-talkie or hand-held scanner. It is constructed of wood and metal with rubber feet, providing a steady surface to which to attach the unit before placing it on a flat surface such as a table. If the hand-held has a belt clip, the stand will provide a secure site for using it as a portable, or the user can attach a coax from an external antenna along with a power supply and an extension speaker mic, thus creating a base station from the hand-held.

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Tel: 705-742-3122

1-800-9-DRAKE-0 (1-800-937-2530)

The stands are priced at \$14.95, plus a hand-held scanner model at \$13.95, a large model for tall battery hand-holds at \$16.95, and a model for small SWR/Power meters at \$10.95. In each case specify radio model. For more information, contact Handie-Base & More, P.O. Box 2504, Broken Arrow, OK 74013-2504, or circle number 108 on the reader service card.



Optoelectronics R20 AM Communications Interceptor

Optoelectronics Inc. has announced the pager-size Model R20 AM Communications Interceptor, a modern version of the crystal detector radio with microwave diodes and transistors replacing the chunk of galena. A ten LED bargraph provides a relative signal level display using 3 dB steps, for all RF signals that are detected. The frequency range covered is from 0.5 MHz to over 2.5 GHz. The detected audio output is amplified and processed using automatic level circuitry.

The R20 AM Interceptor can be used to check two-way radios for RF output, make RF signal strength measurements, locate stuck transmitters, test microwave ovens for leakage, and more. The R20 measures 4.2" x 2.4" x 9". An internal 9 volt battery provides up to 4 hours of operation. A single power switch and 2.5 mm phone jack are mounted on top of the case. The unit is priced at \$119. For more information, contact Optoelectronics Inc., 5821 NE 14th Ave., Fort Lauderdale, FL 33334 (800-327-5912 or 305-771-2050), or circle number 104 on the reader service card.

Clear-Jacketed RG Mini 8(X) From CABLE X-PERTS

Cable X-PERTS' clear-jacketed RG Mini 8(X) has a very soft, extra-flexible, ultraviolet resistant, clear PVC jacket. Clear Mini 8X can blend into any surroundings, is aesthetically appealing, and still has the same electrical characteristics as the firm's standard 95% braid-coverage black-jacketed material. Price is \$.19/ft/100 ft and up.

For more information, contact CABLE X-PERTS, Inc., 113 McHenry Rd. Suite 240, Buffalo Grove, IL 60089 (708-506-1886), or circle number 109 on the reader service card.

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THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The Off-Center-Fed Multiband Antenna

The single-wire, off-center-fed "Windom" antenna is nearly as old as amateur radio itself. The antenna faded into obscurity during the 1940s as newer and sexier antennas came along, but the idea itself remained, as it seemed to have merit (fig. 1A).

In the early 1950s some amateurs resurrected the Windom and substituted a 300 ohm ribbon line for the single-wire feeder and used a balanced antenna tuner at the station to achieve multiband operation. The idea worked, but bringing the feeder into the shack was a direct invitation for TVI!

The Early Days

It was thought that coax feed might clean up the TVI, so the next variation on the off-center-fed (OCF) antenna was to shorten the ribbon line and add a 4:1 balun and a 75 ohm coax line running to the station (fig. 1B).

Again the scheme worked, and this version of the antenna was shown in both the *ARRL Handbook* and the *ARRL Antenna Book* for almost ten years. The editors of these publications, however, warned readers that "it is claimed that the antenna offers a good match for the 300 ohm line on four bands, and although this is more wishful thinking than actual truth, the system is widely used and does work satisfactorily."

The use of 75 ohm coax with the antenna was a handicap, as very few 75 ohm SWR meters existed at that time. Meaningful information on real-life OCF antenna operation was skimpy and mainly based on hearsay, as accurate RF measuring equipment was generally unavailable to the amateur fraternity.

OCF Antenna Mysteries Are Solved!

Finally, in 1954 William Wrigley, W4UCW, a Research Engineer at the Georgia Institute of Technology, provided in detail the analysis of an off-center-fed dipole antenna.¹ He gathered and organized the available information on the subject and

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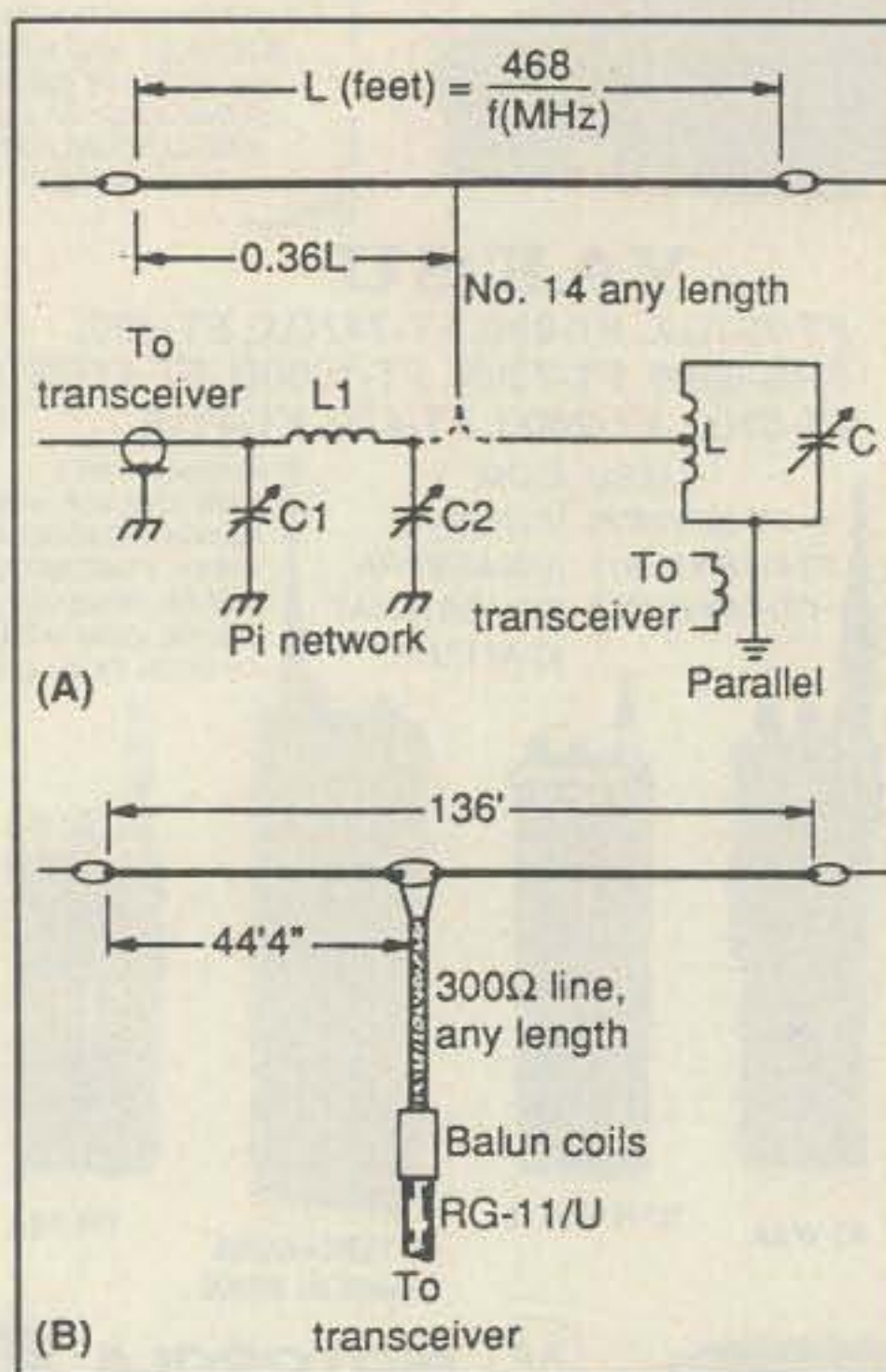


Fig. 1—The OCF antenna was featured for many years in ARRL publications. (A) The original Windom antenna. (B) The coax-fed version of the Windom. (Original drawing appeared in the ARRL Handbook.)

added additional data that he had derived. He investigated harmonic operation of the antenna and provided meaningful numbers concerning the feedpoint resistance (radiation resistance) of a dipole in free space as the feedpoint is moved away from the center (fig. 2).

The plot shows that two points exist along the dipole where a 300 ohm termination is possible, one on each side of the center point. In this example the points are about 60 electrical degrees from the center of the antenna (30 degrees from each end). This is equivalent to a distance of 16.6 percent from either end of the dipole.

When the dipole is mounted 0.1 wavelength above ground, however, Wrigley showed that at this height the 300 ohm tap point is 23 degrees from one end, which is equivalent to 12.7 percent of the total antenna length. Obviously, the tap point varies with respect to antenna height above earth. Either amount is much less than the tap distance shown in the handbook illustration (B).

Next Wrigley showed that this point or any other feedpoint along the dipole is

resistive and has no reactive component at antenna resonance, contrary to popular belief.

Wrigley now examined harmonic operation of the half-wave antenna. Fig. 3 shows the relationship, illustrating that for good harmonic operation on the higher frequency amateur bands, an 80 meter antenna should be cut to resonate below the low edge of the band. He suggested that a length of 136 feet is an acceptable compromise for multiband operation (80, 40, 20, 15, and 10 meters). This length resonates at about 3.45 MHz.

As a whole, his data agrees closely with that derived by modern computer antenna analysis.

The Wrigley OCF Antenna Design

As his theoretical example Wrigley chose a 136 foot, 80 meter OCF dipole placed 25 feet above ground (0.1 wavelength at 80 meters, 0.2 wavelength at 40 meters, 0.4 wavelength at 20 meters, etc.). The resonant frequencies of this antenna are 3.42 MHz, 7.10 MHz, 14.27 MHz, and 28.75 MHz. The calculated bandwidths for a 2:1 SWR were 51 kHz on 80 meters, 88 kHz on 40 meters, 194 kHz on 20 meters, and 214 kHz on 20 meters. Not very encouraging!

W4UCW then computed results when antenna height was boosted to 65 feet (0.25 wavelength at 80 meters). He concluded that the best compromise feedpoint position for harmonic operation was at a 150 ohm point on the antenna. Bandwidth was improved on the two lower bands, but the problem of obtaining a 150 ohm line was difficult.

He reasoned that the use of a coaxial pair of 75 ohm lines was impractical, as the coupling effects due to the induced currents in the outer surface of the shields would produce unpredictable distortions in impedance, and that these distortions would vary on different harmonics.

Wrigley's conclusion was that the OCF antenna, tempting as it might seem, was impractical. No feedpoint position could be found that would match a 300 ohm feed system and permit multiband operation, and even if one was found, bandwidth of the antenna was too narrow for everyday use.

And there the matter stood for 17 years.

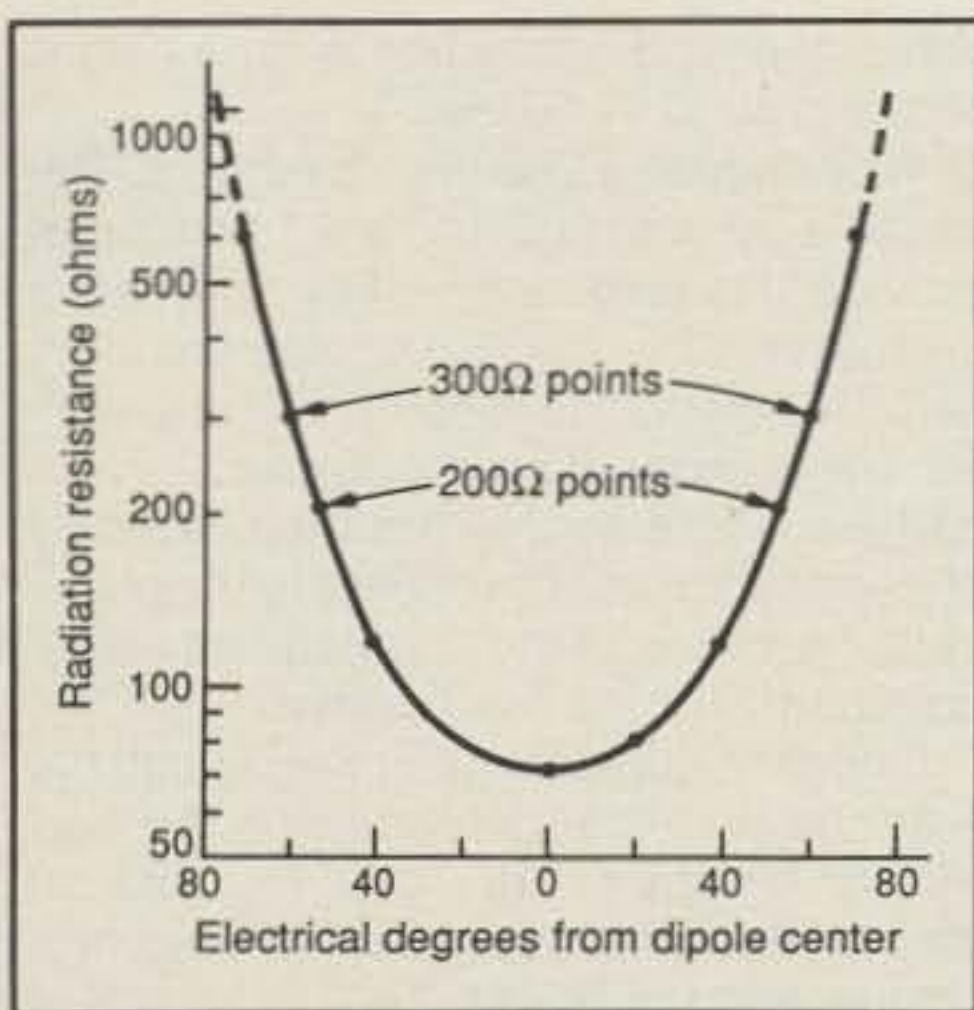


Fig. 2- W4UCW's graph of radiation resistance of a dipole in free space as the feedpoint is moved away from the center.

The OCF Antenna Lives!

It must be remembered that Wrigley's studies were theoretical, based upon an infinitely thin dipole in free space. Imponderable things such as end effect, wire diameter, and the presence of imperfect earth below the antenna could not be taken into account. Of course, these parameters enter into the design of a real-life antenna! But the data supplied by Wrigley formed the basis upon which to build a practical OCF antenna. He pointed the way. It remained for someone to build the antenna and make meaningful measurements on it.

In 1971 a modified form of the OCF antenna was built by Spillner, DJ2KT, and described in the German magazine *QRV* in December. It gained popularity in Europe under the name "FD4 Windom." Fig. 4 shows a version of this antenna, which made use of a simple voltage-type 4:1 balun built by Sorbie, GM3MXN.² Sorbie also found that he could load this simple antenna on the 18 and 24 MHz bands, as well as on the harmonic bands of 80 meters.

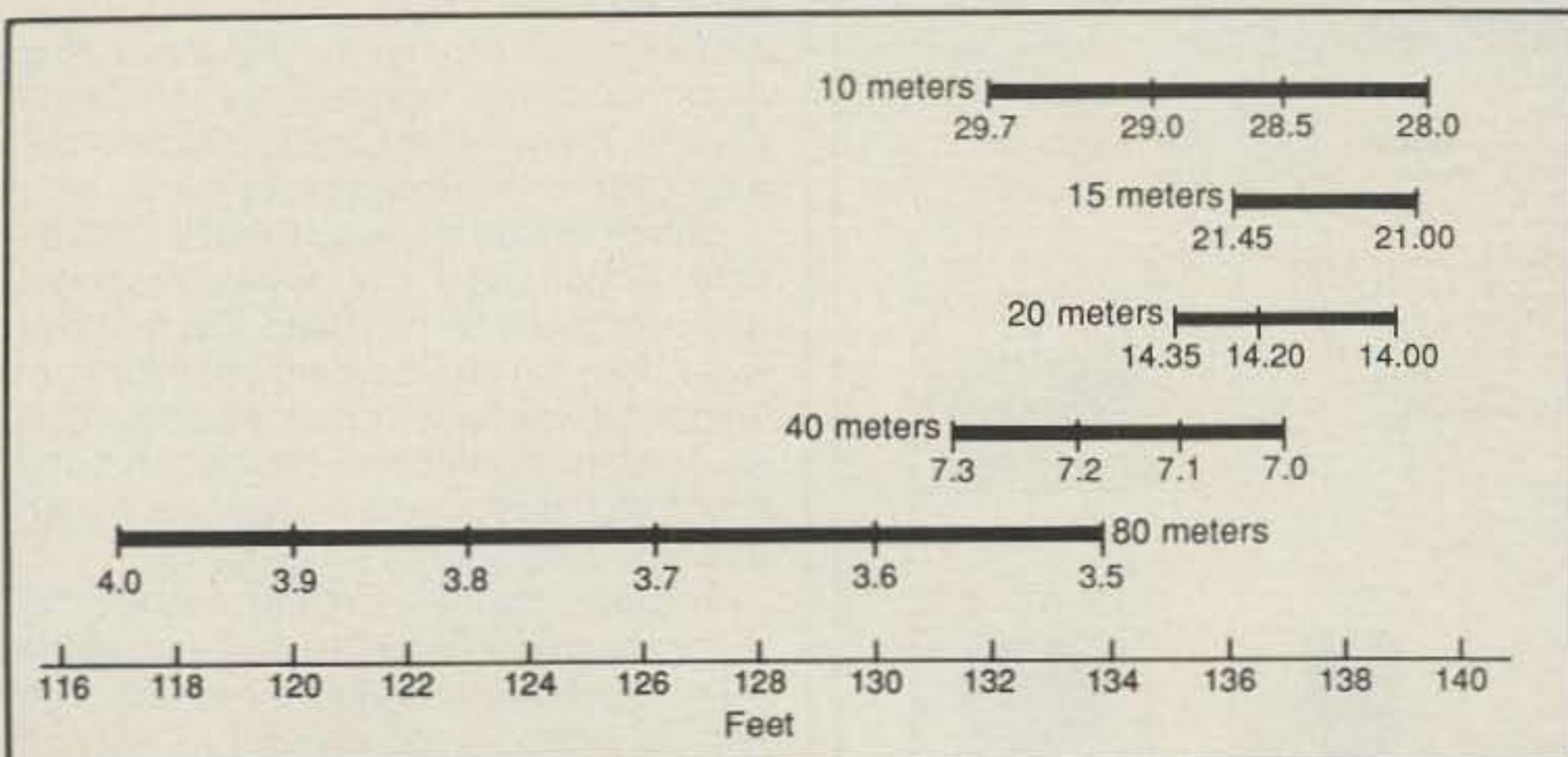


Fig. 3- Harmonic relationship of HF bands as illustrated by W4UCW. (See text for details.)

In 1983 Scholle, DJ7SH, and Steins, DL1BBC, connected two OCF dipoles in parallel for coverage of all amateur bands between 160 and 10 meters. Exceptional bandwidth was shown in SWR plots of the installed antennas. Was W4UCW wrong in his pessimistic bandwidth predictions? Or, at last, was this the ultimate multiband HF antenna?

The DL7SH/DL1BBC antenna was described in a 1990 *QST* article and created quite a stir.³ Several commercial versions of this design promptly hit the market, and one such antenna was reviewed in *QST* with mixed results.⁴ Bandwidth seemed very good, but the antenna was especially susceptible to parallel-mode currents flowing on the outside of the coax shield. This made exact measurements difficult.

All of this information was intriguing, so I decided to use a computerized antenna modeling program to examine an OCF. If it looked promising, I decided I'd build one myself and try it out.

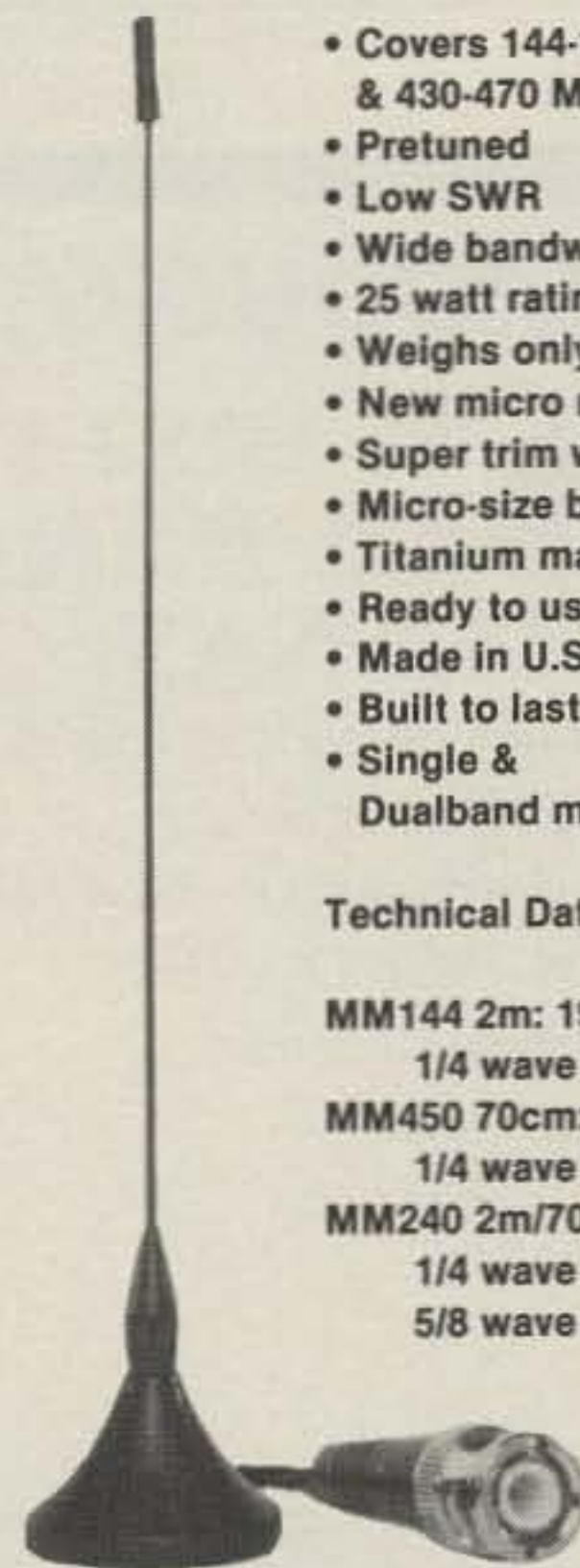
An Examination of The OCF Antenna

The antenna feedpoint data provided by Wrigley and others can quickly be checked by using a modern computerized antenna modeling program such as MN 4.5 produced by Brian Beezley, K6STI.⁵

Operation of the MN program is interesting. It divides an antenna into segments. The program user chooses the number of segments for his analysis. MN then uses the wire segmentation to model conductor current in sections called *pulses*. Current is uniform within each pulse. In my case I chose 68 pulses, as each pulse is equivalent to a foot distance on a 7 MHz antenna. This made computation easy. By iteration, the feedpoint may be moved along the antenna from the center towards one end. A readout is obtained of antenna resistance and reactance at each specified point, and the SWR for a match to a 200 ohm feed system can be

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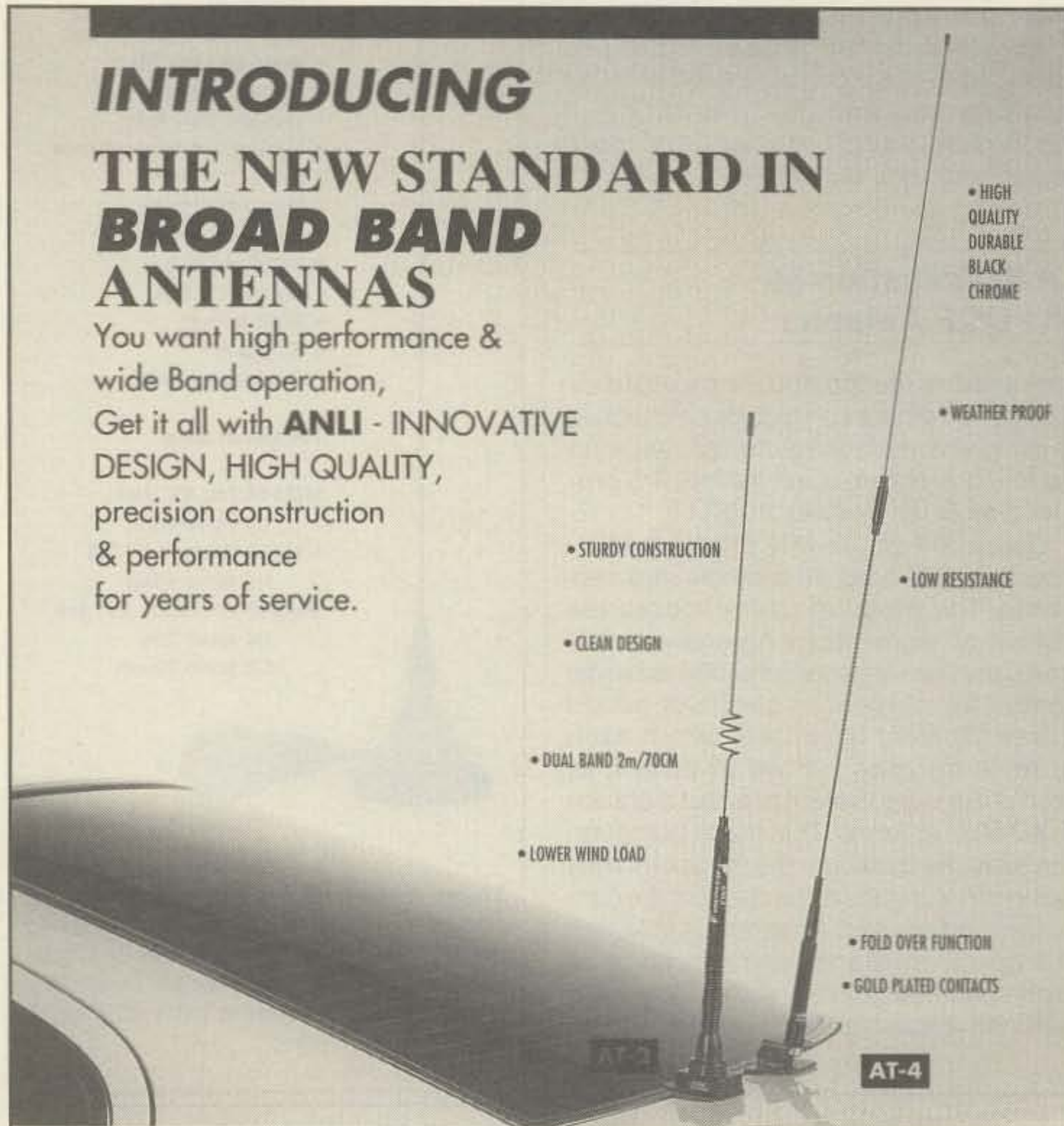
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computed. The simulation is for a height above ground of 40 feet.

Why choose a 200 ohm feedpoint? Because a 50 ohm line and a 4:1 balun can provide this termination. For Europeans and others who use 75 ohm line and a 4:1 balun, a 300 ohm feedpoint can be selected. The number of segments in the antenna file and the source are then carefully chosen by the user to duplicate the physical dimensions of the antenna and the requirements of the feed system.

Once the 200 ohm point was found, the antenna was then scanned on the harmonic frequencies—20, 15, and 10 meters. It was quickly found that Murphy's Law was in full flower. The optimum tap point was different on each band and also varied with height above ground. In addition, if the shorter section of the flattop approaches a half-wavelength on 10 meters (about 17 feet), the antenna presents a high feedpoint impedance and is useless on that band.

The only practical solution was to find a compromise point that provided a reasonable feedpoint impedance on all bands. A practical antenna height of 40 feet was chosen. Otherwise, I could spend the rest of my days juggling height versus feedpoint versus SWR versus wire size. I settled on #14 wire, and my goal was a maximum SWR limit of 2:1 on 40 meters and the harmonic bands.

The W6SAI OCF Antenna

It is not readily apparent to me that any feed system by itself could alter the intrinsic bandwidth of a dipole antenna. A computer run on a sample antenna to check bandwidth seemed like a good idea. Using the MN technique, the 7 MHz dipole 40 feet high was chosen as the program guinea pig. In turn, it was fed at the center, 31 percent from one end and then 19 percent from the end. Inputting these data to the computer and making a frequency run from 6.7 to 7.4 MHz revealed that in all cases the bandwidth of the dipole, taken between the 2:1 SWR points, was about 420 kHz, identical within the measuring tolerances of the experiment. This cast doubt in my mind that dipole bandwidth is a function of feedpoint placement.

Space limited me to a 40 meter OCF dipole. Accordingly, the computer model was configured for that band. The tap point was chosen at 20.5 percent from one end. This point was based on data gathered on an 80 meter computer model, and one which would provide a reasonable match to a 200 ohm source on all bands.

The dimensions were fed into the computer file, and a run was made across the 40 meter band and its harmonics. The results looked good enough to warrant construction of a real antenna and to hang it from a yardarm on the tower.



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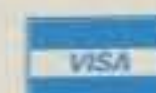
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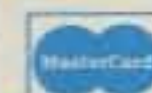
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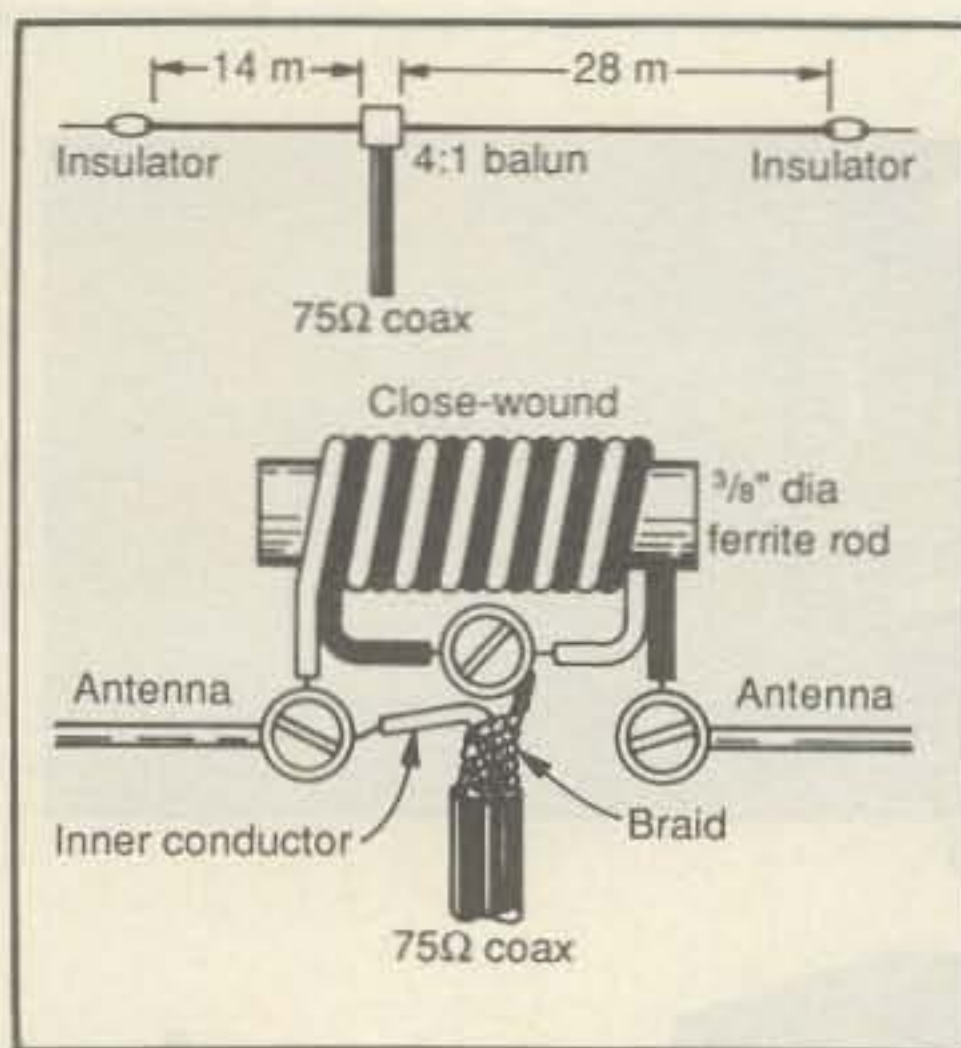


Fig. 4- The "FD4 Windom" with balun placed at feedpoint. This version was used by GM3MXN. The "m" refers to meters, whereas 14m = 45' 11⁵/₁₆" and 28m = 91' 10⁵/₁₆". (Drawing courtesy of the British magazine Radio Communication.)

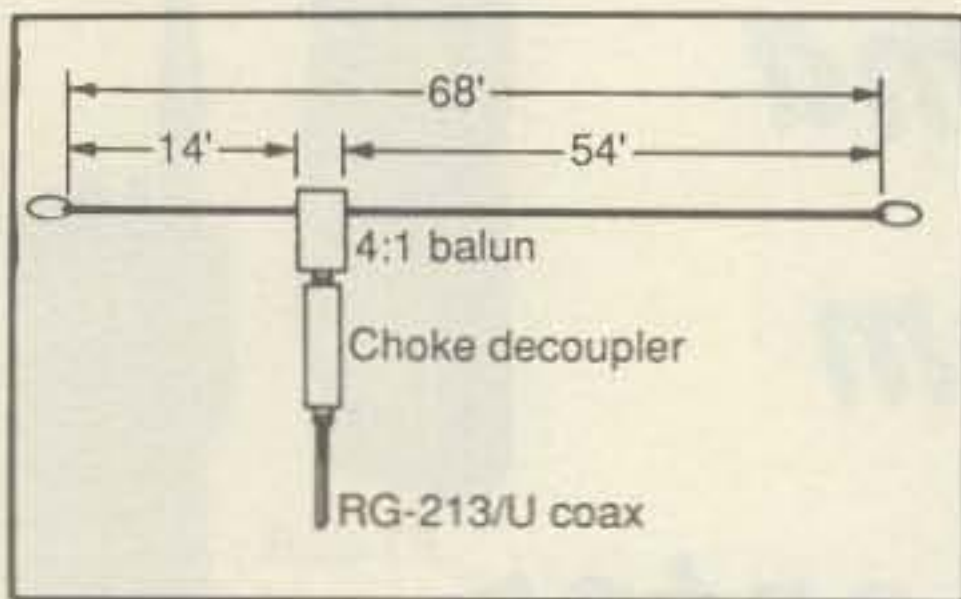


Fig. 5- The OCF dipole at W6SAI for 40, 20, 15, and 10 meters.

Building An OCF Antenna

The next step was to build an OCF dipole and make direct impedance and SWR measurements. Perhaps the amazingly broad SWR curves exhibited by the German antenna were a result of ground loss caused by the low height of the test antennas. At DL1BBC the antenna was only about 22 feet above ground at the center, rising to 26.25 feet at the ends. The DL7SH antenna was only 16.4 feet above ground and partially passed over a garage roof. The antenna was in an inverted-V configuration. I was curious to see what my OCF antenna would do at a reasonable height above ground, when checked with reliable instrumentation.

My real-life 40 meter OCF antenna was 68 feet long and fed 14 feet from one end. A 4:1 current-type balun was used (Radio Works B4-2KX) along with a ferrite choke decoupler (Radio Works C1-2K) to "cool off" the coax line and permit accurate measurements.⁶ A 50 ohm transmission line connected the antenna to the test equipment (fig. 5). The antenna was placed in an inverted-V configuration, with the balun and decoupler at the 40 foot eleva-

tion and the antenna ends at a height of about 30 feet.

Antenna Measurements

The first step was to check antenna R (resistance) and X (reactance) at various frequencies. An HP-606A signal generator and a calibrated General Radio 916 RF bridge were used. A Kenwood R-2000 receiver served as a null detector. After these tests, measurements would be repeated with an SWR meter.

Alerted by the QST review, citing transmission line problems, ferrite sleeves were placed along the coax line to decouple it from the antenna field and to increase the common-mode impedance. Each sleeve consisted of six ferrite beads (Amidon FB-43-1020) placed close together and held in position by plastic cable ties.⁷ The coax line was RG-213/U. The line was run down to ground level (at which point a sleeve was placed) and then taken away from the antenna at right angles to it.

The R and X figures derived from the RF bridge were converted to SWR measurements, and the resulting curves are shown in figs. 6 through 9. Operational bandwidth on each band exceeds the values predicted by W4UCW, and in fact, are comparable to figures previously predicted by the computer program. It seemed as if the multi-band antenna was at hand.

Line Current Problems

The last step was to add an additional 50 feet of coax to cover the distance to the operating position. SWR measurements on all bands were run using the station transceiver, a Bird 43 directional wattmeter, and a Daiwa model CN-720 SWR meter. Curves for the General Radio Bridge measurements can be compared with those made with the SWR meter.

On 40 meters the operational SWR was approximately 2:1, dropping to about 1.6:1 at the high end of the band. Antenna resonance was near 7.35 MHz (fig. 6). On 20

meters highest operational SWR was at the low end of the band, being about 1.9:1 (fig. 7). At the high end, SWR ran close to 1.4:1.

SWR response on 15 meters was very good, running from about 1.4:1 at the low end to 1.35:1 at the high end (fig. 8).

The 10 meter curves were quite flat, running from about 2:1 at the low end to about 2.4:1 at the high end (fig. 9).

Why the difference in the readings between the instruments? There are several reasons. First, common-mode current tends to flow on the outer surface of the coax shield even with extensive ferrite suppression. Second, it is difficult to decouple the line running to the transceiver, as it runs parallel to the antenna, near the ground, for some distance. Ferrite sleeves along the line helped a lot. Finally, neither the SWR meter nor the Bird wattmeter can be classified as a precision instrument. It would take a lot more line decoupling and a network analyzer (costing many kilobucks) to get more accurate SWR readings. Unfortunately, even with the best isolation possible, it is still possible for unwanted parallel currents to flow because the line is asymmetrically coupled to the antenna. Current induced from the short leg probably will not be equal to that induced from the long leg. The currents will not cancel completely. Hence, some parallel current is bound to flow on the outside of the coax shield.

Given the choice, I believe the RF bridge measurements to be the more accurate of the two sets because of the residue shield current.

In any event, the curves looked good. It was easy to load the antenna directly with a tube-type transceiver. A solid-state job required the service of the built-in antenna tuner to achieve full output when the SWR approached 2:1.

The G.R. bridge told me that operation on the 18 and 24 MHz bands would be difficult, as the SWR on those bands would be very high. However, SWR measurements run at the station indicated SWR values less than 3:1 on those bands! To

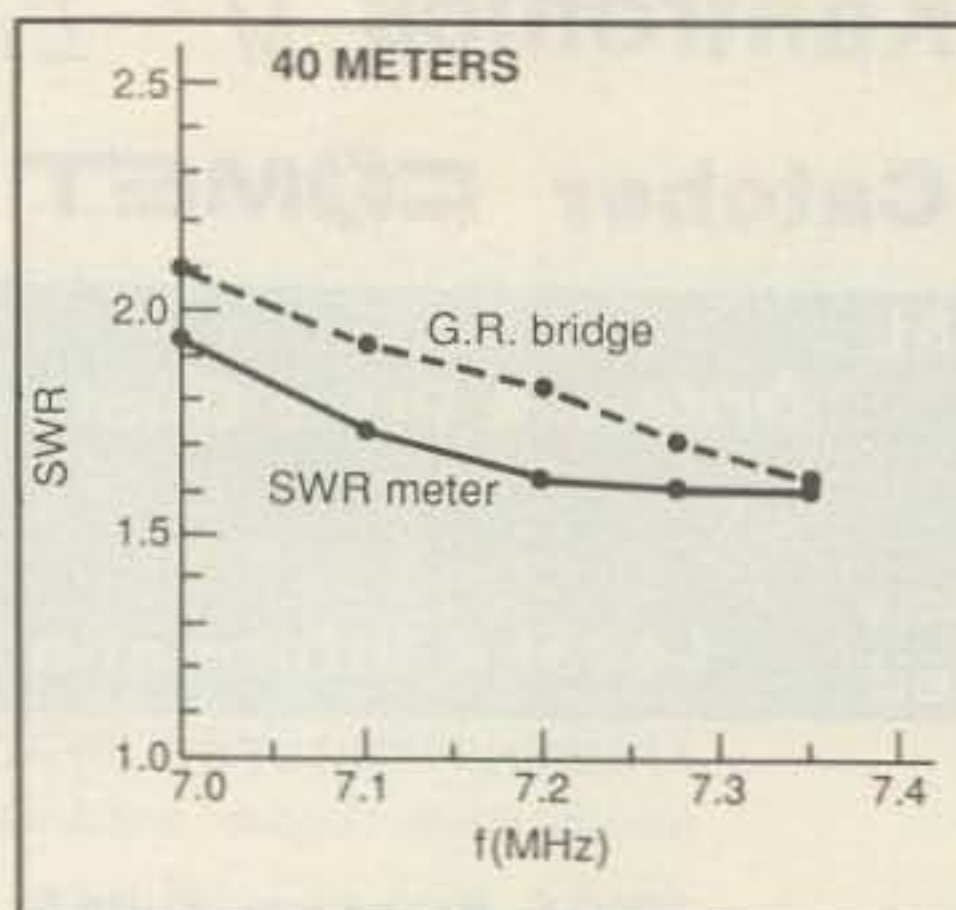


Fig. 6- The OCF dipole showing measured SWR curves for 40 meters.

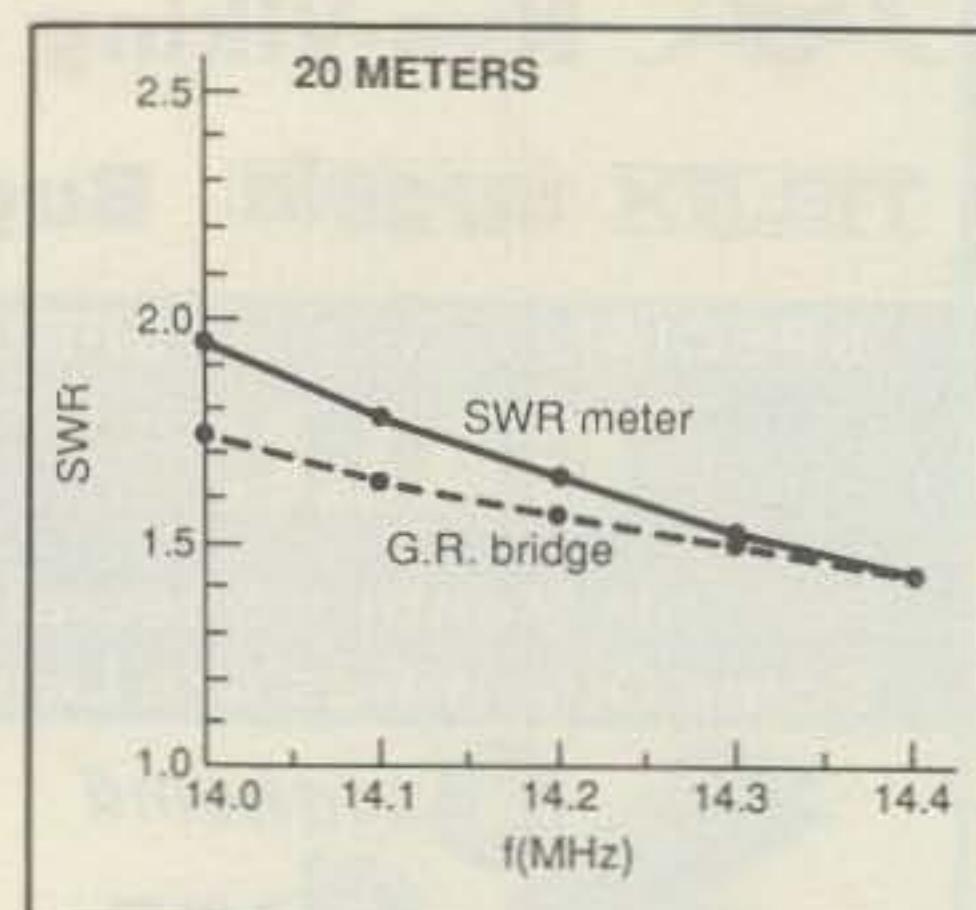


Fig. 7- The OCF dipole showing measured SWR curves for 20 meters.

prove it, I worked plenty of DX on 18 MHz, and a few stations on 24 MHz, in spite of the band sounding "flat." Operation on 24 MHz was not as good as I had hoped. All of this bears future investigation.

The Final OCF Antenna

The conclusions I reached from these interesting tests are that the OCF concept is practical, and a suitable antenna can be designed for harmonic operation provided antenna length and feedpoint are properly chosen. For 80 meter fundamental and harmonic operation the OCF antenna should be about 136 feet long. For 40 meter fundamental and harmonic operation a length of 68 feet is recommended. For a 50 ohm line with a 4:1 current balun the tap point lies about 20 percent from one end, depending upon antenna height and location. I chose a tap point of 20.5 percent. A good, current-type balun is required for proper antenna operation.

A ferrite line decoupler is required just below the balun. Additional ferrite decouplers along the line and at the transmitter are recommended if the line runs parallel to the antenna for any distance.

Either antenna will operate with reasonably low SWR on the harmonic bands, plus provide operation on the higher WARC bands.

If a tube-type transceiver with pi-circuit output is used, an ATU (antenna tuning unit) probably will not be required at the station. If a solid-state transceiver is used, it is less forgiving, and an ATU (built-in or auxiliary) will be required. Otherwise, power output of the transmitter will drop as coax SWR rises.

The Bottom Line

The OCF antenna seems particularly susceptible to common-mode currents flowing on the outside of the coax shield. The effect of these can be reduced by use of decoupling sleeves. If the proper precautions are taken, the OCF will prove to be a workable, multiband HF antenna that is an asset to the modern amateur station.

There are still unanswered questions: Why does the antenna seem to work on 18 and 24 MHz? What is the effect of the ferrite balun on overall operation? What is the effect of antenna height above ground? Would a sleeve-style W2DU 4:1 balun be more effective than a ferrite toroidal balun? Can the tap point be placed at a more advantageous position? I'm sure other experimenters will enjoy playing with this intriguing antenna and getting the answers to some of these questions.

For more information I suggest reading "How to Design Off-center Fed Multiband Wire Antennas Using That Invisible Transformer in the Sky" by Frank Witt, AI1H, in *The ARRL Antenna Compendium*, Vol. 3, to be published at an early date.

The OCF antenna? Well, as for me, I'll

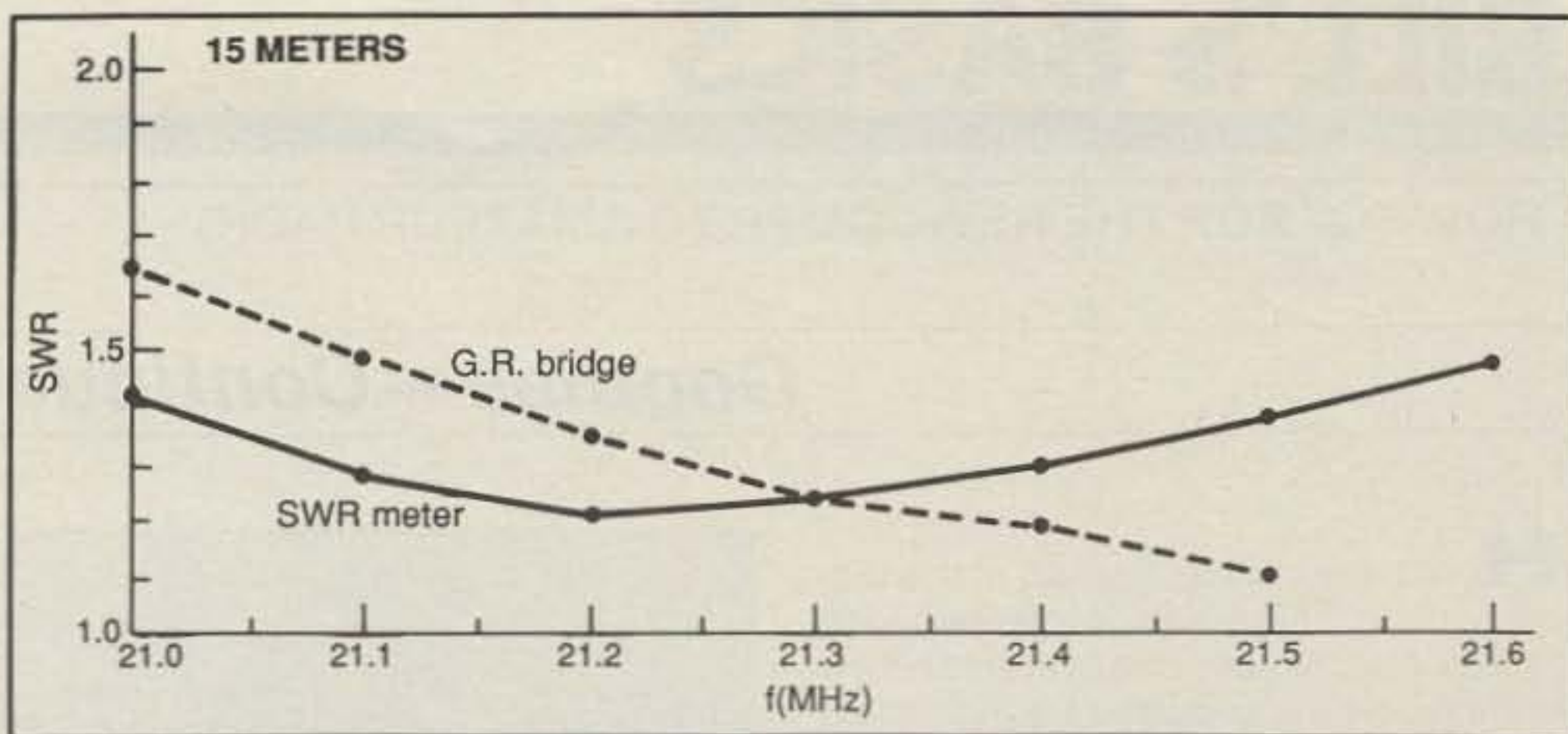


Fig. 8- The OCF dipole showing measured SWR curves for 15 meters.

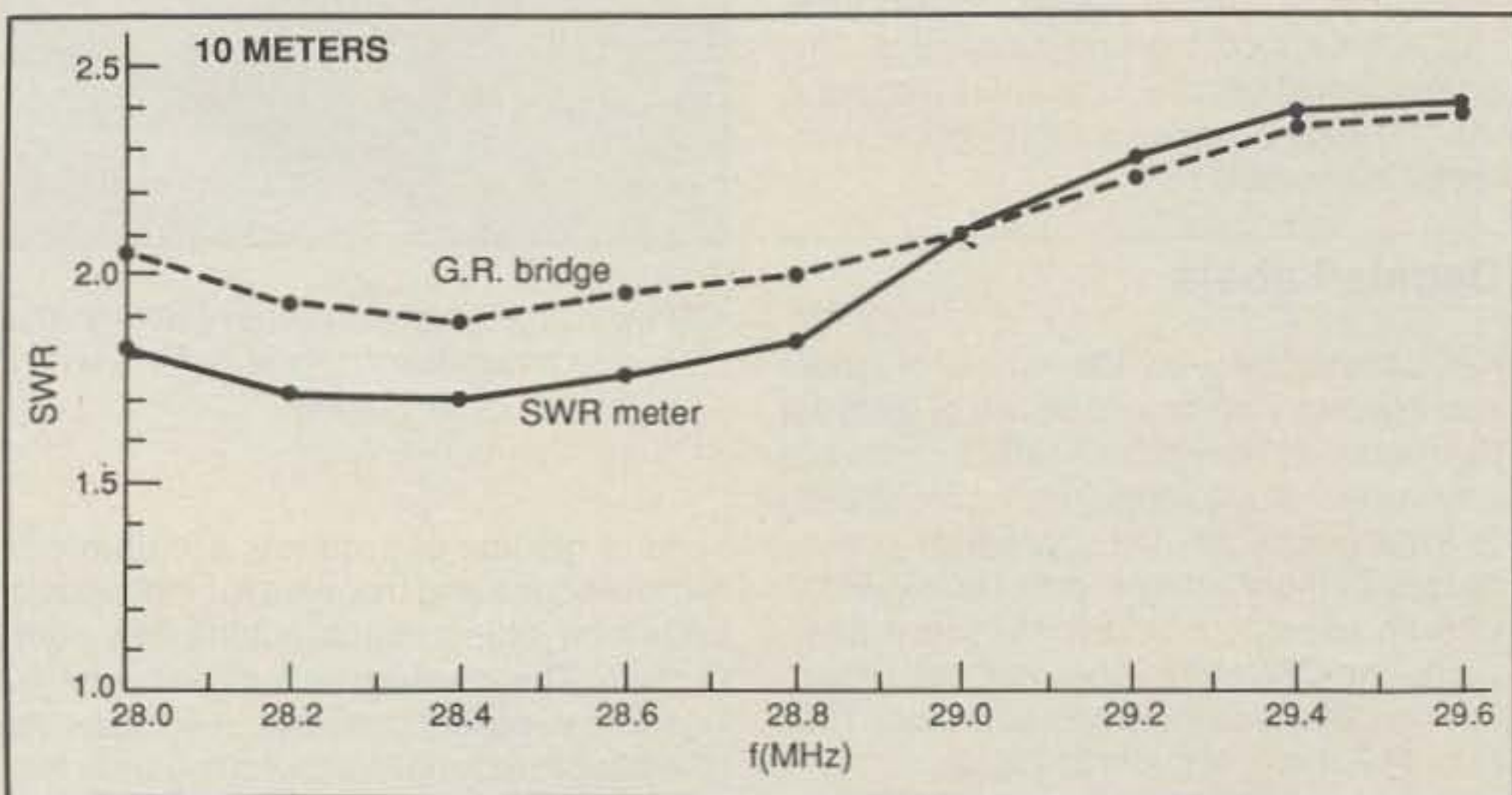


Fig. 9- The OCF dipole showing measured SWR curves for 10 meters.

take a 6-element Yagi on an 80 foot boom at 125 feet for 20 meters any day.

Footnotes

1. Wrigley, Wm., "Impedance Characteristics of Harmonic Antennas," *QST*, February 1954, pp. 10-14.
2. Sorbie, Tom. See "Technical Topics," Pat Hawker, *Radio Communication*, Dec. 1990, p. 31.
3. Belrose, John and Boulaine, Peter,

"The Off-Center-Fed Dipole Revisited," *QST*, Aug. 1990, pp. 28-34.

4. Healey, James. See Product Review, "Garant Enterprises GD-8 'Windom Antenna,'" *QST*, Sept. 1990, pp. 30-32.

5. Beezley, Brian, 507 1/2 Taylor St., Vista, CA 92084. MN Antenna Analysis Program.

6. Radio Works, Box 6159, Portsmouth, VA 23703.

7. Amidon Associates, Inc., Box 956, Torrance, CA 90508.

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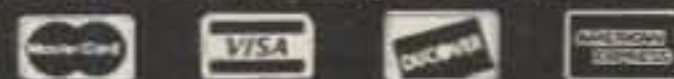
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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Goodies—Continued

Here is the concluding part of this two-part article. This article is intended to let amateurs know about the available nonoperational-type articles that are available to us. The first part of this article covers amateur radio groups, badges, balloons/banners/blimps, belt buckles, calendars, clocks/time, clothing, and cups/mugs. This article should be read in its entirety to learn the full range of amateur radio goodies currently being sold.

Decals/Labels

K-K Labels offers a wide variety of labels and specialty items which are of interest to amateurs. They offer a rather complete assortment of logo designs that are related to amateur radio. Their product line includes self-adhering report forms which can be used to convert standard postcards into QSL cards. They also sell raised-print business cards. Their address is P.O. Box 412, Troy, NY 12181-0412.

See also ARRL/Amateur Radio Groups, Caps Unlimited/Clothing, and Time & Again/Clocks.

Desk Items

See LQV Engraving/Signs, Robin Terrill/Signs, and Trophies by Edco/Trophies.

Jewelry

Fallert's Engraving sells callsign pins of one line (1 by 3 inches) at \$1.25, two lines (1 by 3 inches) at \$1.50, and three lines (1.5 by 3 inches) at \$2 each ppd. Any desired logo (ARRL, CD, MARS, etc.) can be added at 75 cents more per pin. The address is 27 Verlynn Avenue, Hamilton, Ohio 45013.

Callsign lapel pins, tie tacs, pendants, rings, and gifts are available in 14 karat gold (plus other precious and non-precious metals) from Harold Sasnowitz, KB2MB. His company's address is H&M Jewelry, 26 Edgecomb Road, Binghamton, NY 13905-4017 (1-800-285-8587). Callsign pins range in price from \$49.95 to \$289.95, OM Operator Rings range from \$209.95 to \$499.95, and YL Operator Rings range from \$209.95 to \$379.95. He also has watches, station clocks, and other gifts. Addi-

45527 Third Street East, Lancaster, CA 93535-1802



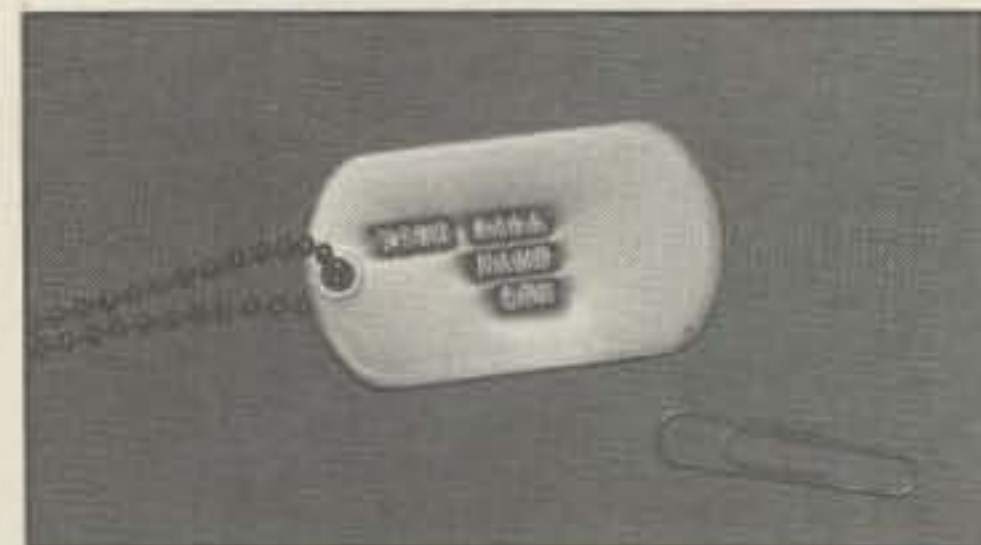
OM operator rings and other jewelry and gifts are available from H & M Jewelry (KB2MB).

tions to his line of products are amateur radio plaques and trophies for individuals and clubs, plus a sharp-looking new-style tie bar. The photograph shows one of Harold's excellent products. A \$5 discount is available to amateurs who mention this column when ordering. I suggest you call or write to request their free catalog.

Another source of custom-embroidered patches is Hein Specialties, 7960 South Glen Lake Road, Glen Arbor, MI 49636-9711 (616-334-4385, FAX 616-334-4521). Custom-embroidered key fobs are also sold by this company. They also market custom-enameled emblems (cloisonnes). It is advisable to send an SASE (#10 envelope) with your request for details of their entire product line.

JPW Enterprises sells high-quality stainless-steel identification tags at \$4.29 each ppd. A \$3 handling charge applies to all non-U.S.A. orders. These dog tags are 1.125 by 2 inches, and each one weighs less than one-quarter ounce. Up to 17 digits (letters, numbers, and spaces) can be embossed on one to five lines. You may want to order these tags for your children, luggage, and pets, as well as for yourself. A 24 inch chain is supplied with each dog tag. The address is P.O. Box 353, Logan, UT 84321.

Embroidered patches and woven patches are among the many specialty items which are offered by Logo Imprints, P.O. Box 9685, Sacramento, CA 95823-0685 (916-393-0646, FAX 916-393-3742). Earl Carder, N6WJG, is the president of Logo Imprints. They also sell appliques, award jewelry, blazer buttons, cloisonne jewelry, enamel jewelry, golf divot kits/bag tags, key holders, metal decals, and pocket



These stainless-steel dog tags can be embossed with up to 17 digits and come from JPW Enterprises.

knives. Their line is so extensive that you need their catalog to fully appreciate what is available from this company.

One-of-a-Kind Jewelers sells silver tie tacs and lapel pins with callsigns raised in a sterling frame and a dark background. Size is about 1 1/8 by 5/16". Each costs \$19.95. Visa and MasterCard are accepted. The address is 145 East 6th Street, Durango, CO 81301 (303-247-5884).

The Phoenix International Trading Company offers watches featuring club logo designs. Their address is P.O. Box 22844, Tampa, FL 33622.

License Plate Keychains. You can buy a 2.25 by 1.125 inch keychain showing your callsign on a miniature version of your state's license plate. The price is \$5.25 each, prepaid. The address is Andrew Plaks/N6RKO, 3241 Fleetwood Drive, Riverside, CA 92503.

Medals, Pins, and Embroidered Emblems. Larry Plotkin, K4JXI, sells a nice assortment of these items, plus ribbons and trophies. Their assortment is too extensive to cover in this article. Information can be requested by writing to Lane 4 Awards, P.O. Box 693944, Miami, FL 33269 (305-653-9434, FAX 305-592-5854).

Also see ARRL/Amateur Radio Groups and Vibroplex/Amateur Radio Groups.

Lamps

One of the best accessories I have added to my station during the past decade is a simple variable-intensity desk lamp from Littlite. It can be operated on 12 VDC or 115 VAC. It has a weighted base and color filters available as accessories. This lamp is available in a variety of forms, and it has a useful variety of accessories. A printed flyer can be requested from Littlite/CAE, Inc., 10087 Industrial Drive, P.O. Box 430,



James H. Nelson, WB7QAP, of Yakima, Washington has been a shortwave listener since 1952. He became an amateur radio operator during 1977. He operates in the 15 meter band (code and voice) most of the time. His station includes ICOM IC-751A, Kenwood TR-7730, and Yaesu FT-101EE transceivers.

Hamburg, MI 48139. The lamp can be secured in place using the snap mount that is supplied with the lamp. Also, screws are provided for use in mounting the lamp directly to a desired surface.

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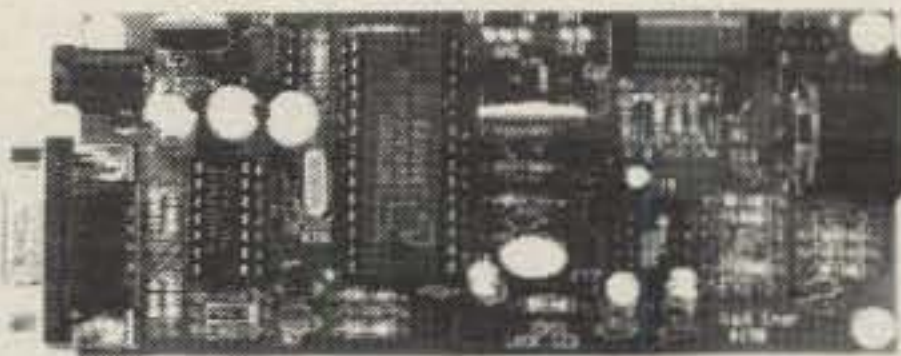
R&J Fial Enterprises sells metal license plate frames and license plate key tags/badges. The frames are available in black matte or chrome. Up to 18 spaces can be used in the top space of the frame. A maximum of 26 spaces can be used in the space at the bottom of the frame. The face/lettering color combinations available are black/white, blue/white, gold/black, green/white, red/white, white/black, white/blue, white/red, and yellow/black. The face color is listed first in each pair, with the lettering color following it. License plates are priced at \$12.45 for regular mail,



Amateur radio license plates are available through motor vehicle in your state, and R & J Fial Enterprises sells metal license plate frames.

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
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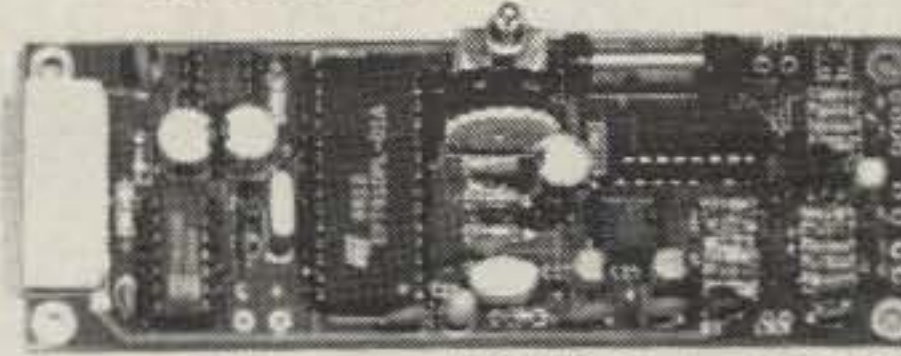
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
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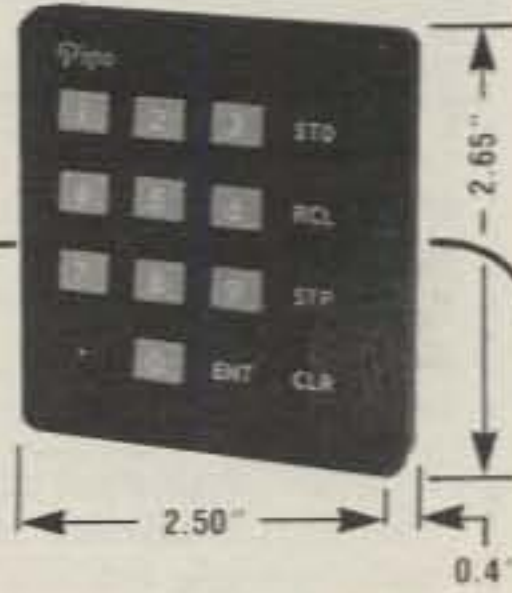
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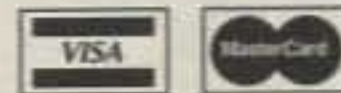
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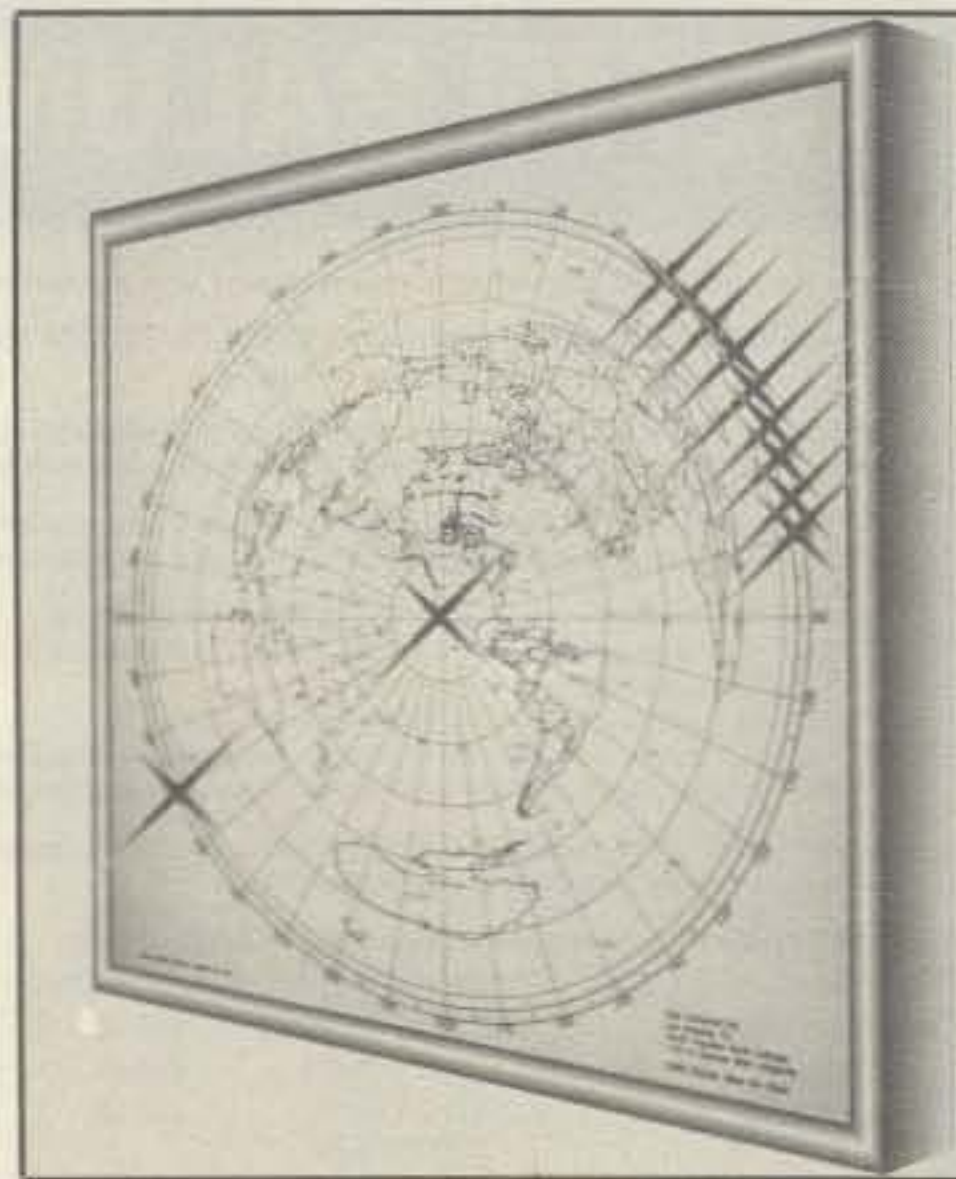
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Also see ARRL/Amateur Radio Groups and Robin Terrill/Signs.

Maps

Vector Control Systems offers a plastic laminated great circle map of Earth. The overall size is approximately 22.5 (wide) by 21.5 (high) inches with a pertinent (information) size of about 20.25 (wide) by 19.5 (high) inches. The diameter of the Earth presentation is 18 inches. The continents are outlined in black on the white background and the countries are outlined in green. Amateur radio callsigns of countries are shown in red. Your stated location is shown at the center of the map with lines every 10 degrees showing true beam headings to all parts of the world. Distances are shown by 2000 mile rings centered around your station.



Vector Control Systems' VBI-360 Beam Indicator.

Three versions of these full-color great circle maps are available. A laminated 16 or 22 inch version is priced at \$35. A customized beam heading DXCC list is included at no extra charge with this \$35 purchase. Framed 16 and 21 inch versions sell at \$59.95 and \$74.95 each, respectively. A beam indicator version of this great circle map sells at \$189.95, when shipped to

a domestic (U.S.A.) address. It has bright LED indicators which show 5 degree resolution. It has a decorative 16 by 16 by 1 inch frame. It also features an adjustable beam width and the long path indication. A simple rotor connection enables one to see the beam heading displayed on this beam indicator. This map is a useful and decorative addition to a shack. The address is 1655 N. Mountain, Suite 104-45, Upland, CA 91786 (714-985-6250, FAX 714-985-3482).

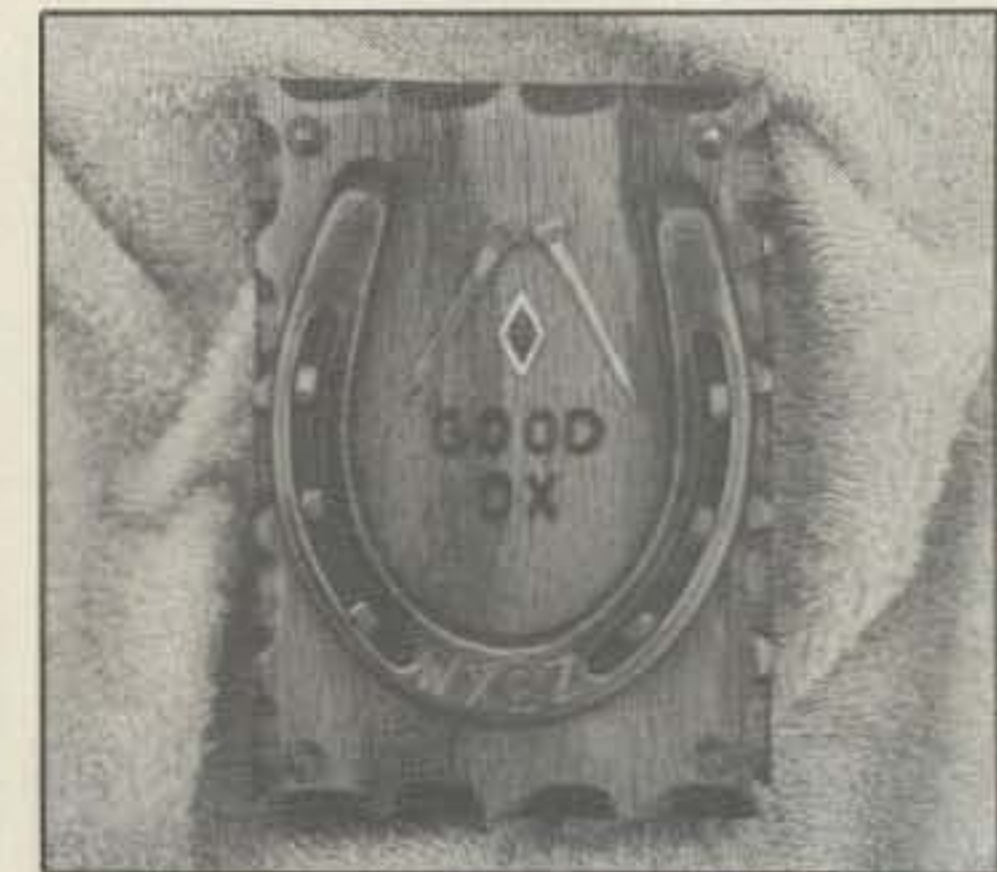
Wikle Cartographic offers 32 by 32 inch great circle maps centered on one's location. The purchaser must provide their latitude and longitude. If desired and requested by the buyer, her/his callsign, name, city, and/or state is shown on the map. A single map is priced at \$25, including shipping and handling. Additional maps cost \$20 each. Coastlines are shown in black, country borders are red, great circle routes/distances are orange, latitude/longitude lines are blue, and amateur radio callsign prefixes are printed with green ink. Their address is P.O. Box 652, Stillwater, OK 74076 (405-743-0097).

Patches

See ARRL/Amateur Radio Groups, Hein Specialties/Jewelry, Logo Imprints/Jewelry, A.T. Patch/Clothing, Jerry Plotkin/Jewelry, and Vibroplex/Amateur Radio Groups.

Plaques

Blacksmith Brownie is Jeffry Brown, WX2Z. He sells a very nice 3.5 by 5 inch plaque which features a genuine hot forged pony shoe that is polished before it is hand stamped (with the purchaser's callsign) on



This horse-shoe plaque with hand-stamped callsign is crafted by Blacksmith Brownie.

an anvil. The pony shoe is detailed in gold prior to being mounted with authentic horseshoe nails on a 0.75 inch thick piece of finished red oak wood. The basic price of a plaque is \$9.70 ppp. A gold ARRL logo pin can be added (between two horse shoe nails) at the additional cost of \$4. It is interesting to note that Jeffry has been a real blacksmith more than two decades. Each

Scanners/Shortwave/CB/Radar

COMMUNICATIONS ELECTRONICS INC.

Emergency Operations Center
We're celebrating our 24th anniversary with special pricing on Scanners/Shortwave/CB and Radar. Hurry, offer ends March 31, 1993.

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Bearcat® 200XLT-C

List price \$509.95/CE price \$209.95/SPECIAL
12-Band, 200 Channel • 800 MHz. Handheld
Search • Limit • Hold • Priority • Lockout
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz.
Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.

The Bearcat 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz band and only 100 channels, order the Bearcat 100XLT-C for \$149.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. If you like to use your scanner in your vehicle, order a cigarette lighter plug part #PS001 for \$14.95 each. A spare battery pack, part #BP205 is \$39.95. An extra AC adapter for charging your battery pack is part #AD140 and is \$14.95. A magnetic mount antenna with a BNC connector part number USAMMBNC-C is \$39.95.



For more information on Bearcat radio scanners or to join the Bearcat Radio Club, call Mr. Scanner at 1-800-423-1331. To order any Bearcat radio product from CEI call 1-800-USA-SCAN.

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- Bearcat 800XLT-C base \$229.95
- Bearcat 760XLT-C base/mobile \$239.95
- Bearcat 560XLA-C base/mobile .. \$89.95
- Bearcat BCT2-C mobile \$149.95
- Bearcat 65XLT-C handheld \$119.95
- Bearcat 70XLT-C handheld \$129.95
- Bearcat 100XLT-C handheld \$149.95
- Bearcat 200XLT-C handheld \$209.95
- Uniden MR8100-C surveillance \$259.95
- Shinwa SR001-C mobile \$379.95

Shortwave

- Grundig Satellite 500-C..... \$359.95
- Grundig Cosmopolit-C..... \$179.95
- Grundig Yacht Boy 230-C. \$139.95
- Grundig Traveller 2-C..... \$79.95
- ICOM R1-C handheld \$429.95
- ICOM R100-C mobile \$579.95
- ICOM R71A-C base \$999.95
- ICOM R72A-C base \$889.95
- ICOM R7000-C base \$1,179.95
- ICOM R7100-C base \$1,199.95
- ICOM R9000-C base \$4,679.95
- Sangean ATS800-C \$79.95
- Sangean ATS803-C \$159.95
- Sangean ATS818CS-C..... \$209.95

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- Uniden PRO310E-C CB Mobile \$64.95
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NEW! Ranger RCI 2970-C

CE price \$409.95/Introductory SPECIAL

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- SMHV1-C Scanner Modification Book, Volume 1
- SMHV2-C Scanner Modification Book, Volume 2
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- LIN-C Latest Intelligence by James Tunnell
- NPD-C Uniden National Police Directory
- FBE-C Uniden Eastern Frequency Directory
- FBW-C Uniden Western Frequency Directory
- ASD-C Air Scan Directory
- TSG-C Top Secret Registry of U.S. Govt. Frequencies
- TTC-C Tune in to Telephone Calls
- CBH-C Big CB Handbook/AM/FM/Freeband
- TIC-C Techniques for Intercepting Communications
- EEC-C Embassy & Espionage Communications
- CIE-C Covert Intelligence, Electronic Eavesdropping

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List price \$599.95/CE price \$289.95/SPECIAL
16 Channel • 25 Watt Transceiver • Priority
Time-out timer • Off Hook Priority Channel

The RELM RH256NB is the updated version of the popular RELM RH256B 150-162 MHz VHF sixteen-channel land mobile transceiver. RELM is the choice of many public safety agencies because this radio has built-in CTCSS tone and scanning capabilities as well as a priority function. The radio technician maintaining your radio system should also order programming instructions, part number PI256N for \$10.00.

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Public safety agencies responding to hazardous materials incidents must have accurate, up-to-date weather information. The Davis Weather Monitor II is our top-of-the-line weather station which combines essential weather monitoring functions into one incredible package. Glance at the display, and see wind direction and wind speed on the compass rose. Check the barometric trend arrow to see if the pressure is rising or falling. Our package deal includes the part #7851-C Rain Collector, and the external temperature/humidity sensor, part #7858-C. The package deal is order #DAV1-C for \$449.95 plus \$15.00 shipping. If you have an IBM PC or equivalent, when you order the optional Weatherlink computer software part #7862-C for \$149.95, you'll have the world's most powerful computer weather station at an incredible price.

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Felino SM. Angeles, DU1CMN, of Antipolo, the Philippines is employed by his government. His station includes a couple of General Electric units which have been converted for 10 meter operation. He uses a Ten-Tec Argonaut for QRP (low power) operation on the high-frequency (3-30 MHz) bands. His antenna system includes a ground plane and a 3-element Yagi-Uda for 10 meters, plus 15 and 40 meter dipoles.

buyer must clearly list the call sign to be stamped on the pony shoe. One can order a plaque with their class of license burned into the wood. The date the license was initially issued can also be burned into the wood. A popular version of this plaque has GOOD DX burned into the wood. Blacksmith Brownie's address is P.O. Box 382, Department C, Hamburg, NJ 07419 (201-827-5414).

Also see ARRL/Amateur Radio Groups, Robin Terrill/Signs, and Trophies by Edco/Trophies.

QSL Items

Azimuth Communications Corporation sells customized three-ring binders that can be used to store QSL cards which apply to DXCC, WAC, WAS, and WAZ awards, plus a general QSL binder. Their size is about 19 inches high by 13 inches wide with a 2 inch depth. Each binder is attractively and appropriately finished, making them enhancements to one's shack. Each binder sells at \$19.95. Twenty pages of clear three-QSL holders cost \$12.95. These pages are punched for use in the binders. Doc Dean, K6OXU, also sells awards-base tracking software at \$24.95 with free awards-base software. Shipping and handling costs are not included in the above prices. Doc is getting ready to market a 24-hour station clock with giant size digits and a clear see-through LCD readout, plus a black brushed finish. Their address is 3612 Alta Vista Avenue, Santa Rosa, CA 95409-4049 (707-577-8007, FAX 707-573-1482).

Joe Saunders, K3UAL, has clear plastic QSL card holders which enable an amateur to display received cards without having to damage them with tape or thumb tacks. I have used this type of QSL display

many years. It has the added flexibility of allowing one to quickly and easily change the cards displayed. These plastic display holders sell at \$5 for a package of three. Each holder can be used to display up to 20 QSL cards. Joe is also a QSL card printer. His address is 1520 Jutewood Avenue, Hyattsville, MD 20785 (telephone 301-773-9383 and 301-773-5074). If you want samples of his cards, send 50¢ (stamps or cash) with your request.

Also see MFJ/Amateur Radio Groups and 7-Mike Hamstuff/Clothing.

Ribbons

See Jerry Plotkin/Jewelry.

Rubber Stamps

Gary Pierce, K6CAQ, sells three-line rubber stamps at \$6 each, ppd. Send an SASE with your request, if you want additional information. His address is 5521 Birkdale Way, San Diego, CA 92117.

Doug Reid, WB8MKV, sells a variety of rubber stamps for use by amateur radio operators. These stamps can be used to imprint envelopes, QSL cards, stationery, and anything else. His style M-4 stamp shows an elephant and "Don't Forget To QSL." Style M-8 has "Amateur Radio" (plus your call sign) enclosed in a circle. Style M-10 appropriately shows "Ten-Ten" (plus your number). Style M-20 has the outline of a telegraph key. The M-4, M-10, and M-20 stamps cost \$4.95 each. The M-8 stamp is priced at \$10.95, which also pays shipping and handling fees. The address to use is Reid Associates, 6680 Mellow Wood Lane, West Bloomfield, MI 48322 (313-851-0260).

Signs

Custom Call Signs markets both magnetic and suction-mounted call sign displays for car window or trunk attachment. These signs are easily transferable from one vehicle to another. The price is \$10.80 apiece and two for \$18.85, including shipping and handling costs. The address is 1923 W. Edward Lane, Merrick, NY 11566.

LQV Engraving markets call sign desk plates, identification badges, and small signs. Your request (with an SASE) will bring a data sheet with prices. The address is P.O. Box 4133, Overland Park, KS 66204-0133. Mac McCoy, W0LQV, runs this company.

The Sign Center offers an excellent 8 by 19 inch 100% magnetic sign at \$9 each, plus a \$5 shipping charge. The overprinting is black and orange against a white background. The Amateur Radio Emergency Service (ARES) insignia is accompanied by large lettering of "Amateur Radio Communications." An area is reserved to add call sign below the word "Radio." Another

AMATEUR RADIO W1AW

SIGN ON sells 2 1/4 by 8 inch custom call signs on black, blue, or red plastic with suction cups for mounting on a car window, or magnetic mount for trunk mounting.

area is reserved for name or group insignia. The part number is AR819. Their plastic placard is 8(H) by 12(W) inches, resulting in its part number being AR812. It fits a car's sun visor, or it can be placed on a dashboard inside the windshield to provide police with quick identification of an emergency communications vehicle. It is lettered "Amateur Radio Communications," using black print on orange background. The cost of each AR812 is \$1.60, plus the usual \$5 shipping and handling charges. Obviously, a group order is advisable.

Part number AR312 is a 3 by 12 inch vinyl bumper strip with black on an orange background showing "Member Amateur Radio Communications." A pressure-sensitive removable adhesive allows one to attach this strip to a surface and easily remove it without damaging that surface. The AR312 price is 60 cents each with the usual \$5 charge, so quantity orders are advisable.

Part number ARKIT costs \$30, ppd. It consists of two AR819, one AR317, and one AR312 packaged in a rigid storage folder.

Additional amateur radio items are available from the Sign Center. A combination order form and brochure can be requested. The address is the Sign Center, Inc., P.O. Box 4097, San Diego, CA 92164. Their toll-free telephone number for Californians is 1-800-553-7446; all others can use 1-800-654-5373.

SIGN ON sells 2.25 by 8 inch custom call signs featuring the words "Amateur Radio" and one's call sign in white lettering on black, blue, or red all-weather flexible plastic. These signs are sold with suction cups for mounting on a vehicle's window, as well as a magnetic-mounted version for trunk mounting; state which type is desired. The price is \$9.95 each, or two for \$18.00. The address is 1923 Edward Lane, Merrick, NY 11566. *SIGN ON* has served amateurs well during the past decade.

Robin Terrill, N4HHP, sells six items which are of interest to amateurs. A six-color car license plate showing one's club logo sells at \$5. Call sign is shown in black lettering on a white background of another license plate at \$5. A goldtone plastic badge can be silkscreened and engraved with name and call sign at \$5. A 6 by 3 inch solid mahogany desk pen set, showing call sign, sells at \$12. A solid mahogany

block features call sign engraved with a CO-2 laser engraving machine. Its price is \$12. A 7 by 9 inch walnut-finish wall plaque sells at \$20. It has a solid brass plate. It is silkscreened and it is engraved with license data. Shipping and handling costs are not included in the above prices. Their address is 4240 S.W. 20th Street, Ft. Lauderdale, FL 33317.

Whiterock Products Company sells an RF actuated call sign display (Model CSD-1) which lights up to display call sign while transmitting 5 watts (or more) on any HF, VHF, or UHF frequency. The price is \$49.95, plus a \$4 shipping and handling fee. A 12 VDC adapter (Model DC-1) is included. A delay is built in to eliminate flickering during transmissions. Two weeks is



This RF-actuated light-up call sign display is available from John Roblin, WA6KYO.

required to fill each order. John Roblin, WA6KYO, suggests that orders should be submitted well in advance of Christmas. The address is 1555 14th Street, Santa Monica, CA 90404 (310-394-1050).

Also see Lightwriters/Clocks.

Trophies

Trophies by Edco is an excellent source of a wide range of desk signs, wall plaques, and trophies. Their catalog is priced at \$5.00. Rick Cordary, KN4CV, is the president of this company. Their address is 3702 Davie Boulevard, Ft. Lauderdale, FL 33312-3494 (305-587-0137, FAX 305-581-7680).

Also see Jerry Plotkin/Jewelry.

Summary

Six former suppliers of amateur radio goodies have gone out of business during the past year, and 36 more of them did not answer my requests for update or validation of their previously published data.

73, Bill, W6DDB

K2AW'S FAMOUS HI-VOLTAGE MODULES

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UG-21D/U	N Male RG-8, 213, 214 Delta	3.25
UG-21B/U	N Male RG-8, 213, 214, Kings	5.00
9913/PIN	N Male Pin for 9913, 9086, 8214 Fits UG-21 D/U & UG-21 B/UN's	1.50
UG-21D/9913	N Male for RG-8 with 9913 Pin	3.95
UG-21B/9913	N Male for RG-8 with 9913 Pin	5.75
UG-146A/U	N Male to SO-239, Teflon USA	6.00
UG-83B/U	N Female to PL-259, Teflon USA	6.00

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- Call Indicator
- Works with any FM radio
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ARE-20 DigiTalker

- Talking Frequency Counter
- Works with any VHF/UHF handheld
- Announces the transmit frequency in voice
- Size: 5-1/4"W x 4"D x 1-1/2"H
- Battery Operated
- No connection to the radio required



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All ARE products have a one year limited warranty.

WHAT'S NEW AND HOW TO USE IT

Often, when working with electronic circuitry the need to isolate one portion of a circuit from another arises. This is especially true when the AC power line is involved. A component that should be considered in such cases is the optical isolator, or opto-coupler as it is commonly called. This device consists of a light source, usually an LED, and a receiver of the emitted light, usually a photo-transistor or similar light-sensitive component. Both are housed in chip form, such as the 4N35 unit shown in fig. 1.

In operation, current flowing through the LED causes it to light. The light passes through a small gap in the chip to the base

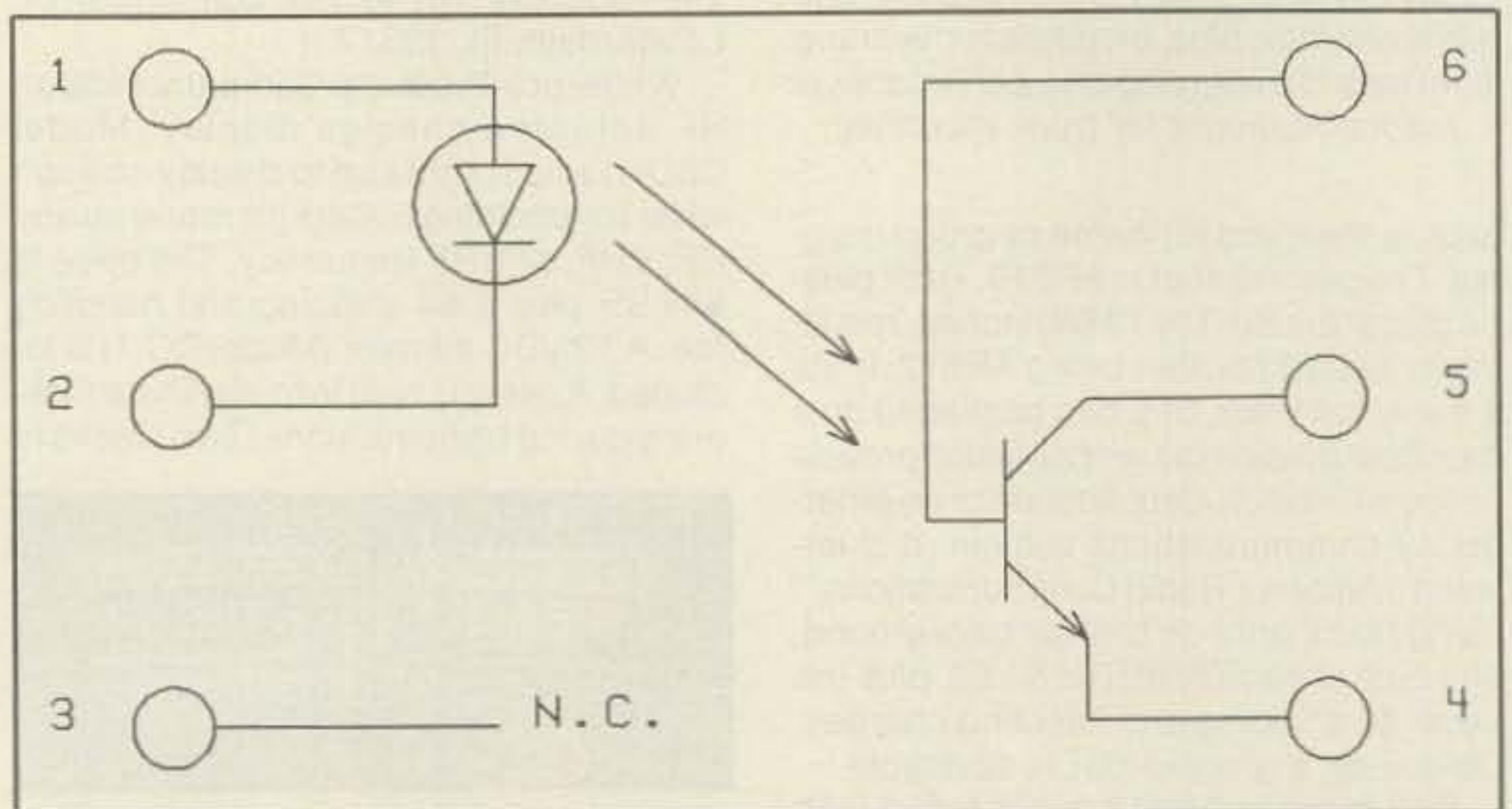


Fig. 1- Schematic of the 4N35.

c/o CQ magazine

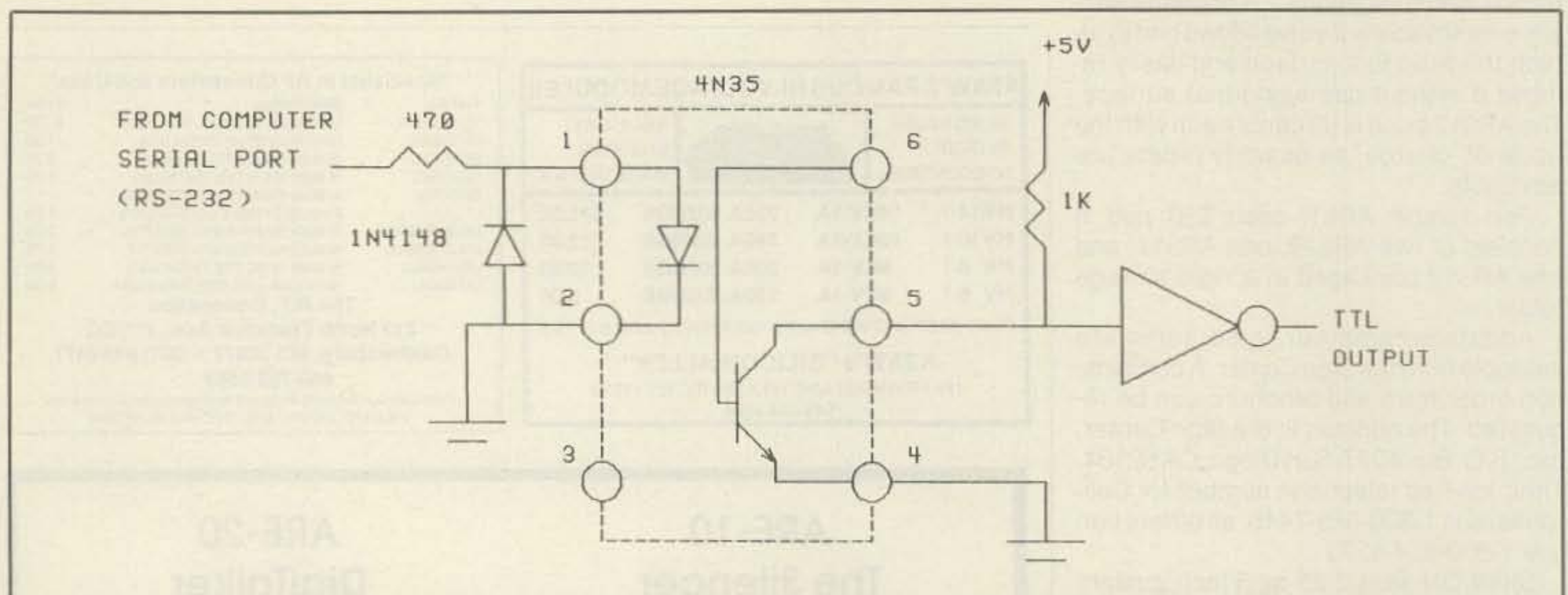


Fig. 2- RS-232 to TTL converter/isolator.

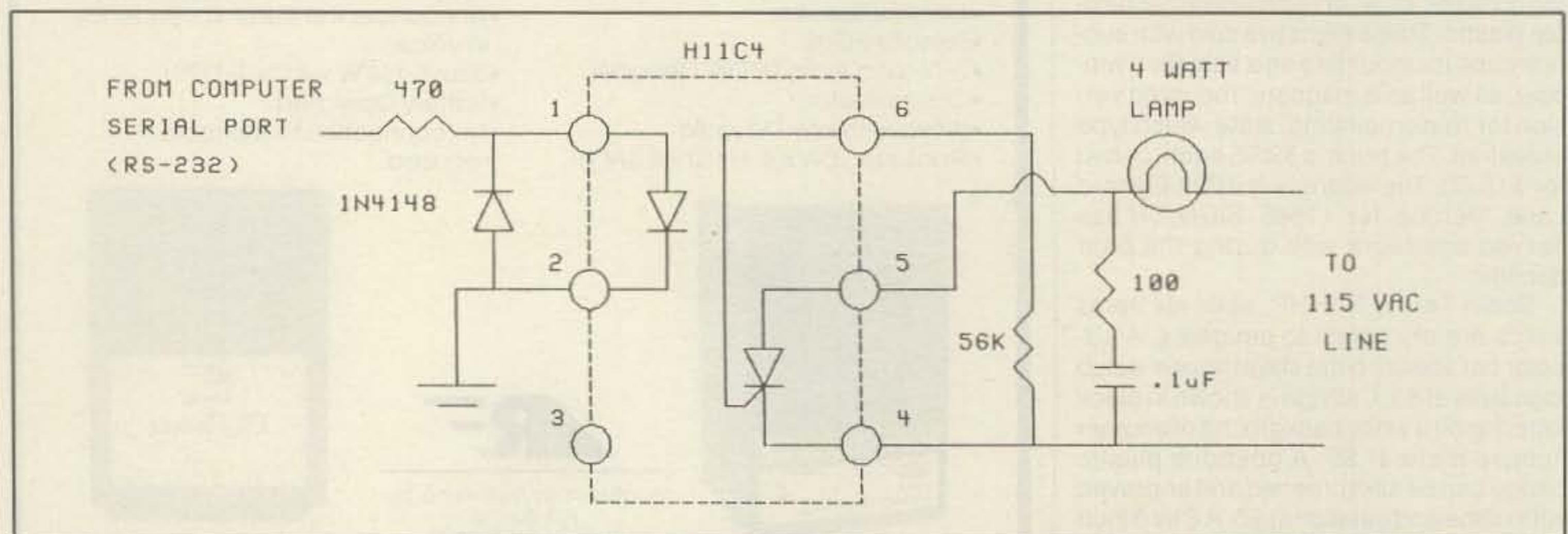


Fig. 3- RS-232 isolated AC line control.

HF Equipment

IC-781 Xcvr/ps/tuner/scope..... Regular \$6529.00 SALE 5298



IC-765 Xcvr/ps/keyer/tuner..... \$2859.00 2348



IC-751A 9-band xcvr/SW rx..... \$1629.00 1348

PS-35 Internal power supply..... 239.00 219⁹⁵

FL-63A 250 Hz CW filter (1st IF)..... 62.00

FL-52A 500 Hz CW filter (2nd IF)..... 120.75 109⁹⁵

FL-53A 250 Hz CW filter (2nd IF)..... 120.75 109⁹⁵

FL-70 2.8 kHz wide SSB filter..... 62.00

IC-735 HF xcvr/SW rcvr/mic..... 1149.00 949⁹⁵

PS-55 External power supply..... 239.00 219⁹⁵

AT-150 Automatic antenna tuner..... 469.00 399⁹⁵

FL-32A 500 Hz CW filter..... 72.25

EX-243 Electronic keyer unit..... 68.00

UT-30 tone encoder..... 19.25



IC-725 HF xcvr/SW rcvr/mic..... \$893.00 729⁹⁵

AH-3 Automatic antenna tuner..... 512.75 449⁹⁵



IC-728 HF xcvr/SW rcvr/mic..... 1099.00 899⁹⁵

IC-729 HF xcvr/SW rcvr w/6m..... 1419.00 1168

AT-160 Antenna tuner..... 413.00 349⁹⁵

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IC-4KL HF 1 kw amp w/ps..... 7459.00 5998

SP-3 External speaker..... 68.25

SP-7 Small external speaker..... 54.75

SM-6 Desk microphone..... 50.25

SM-8 Desk mic; two cables, scan..... 93.25

AT-500 500w 9 band auto ant tuner..... 618.25 529⁹⁵

AH-2 8-band tuner w/mount & whip..... 819.00 699⁹⁵

AH-2A Antenna tuner system, only..... 559.00 499⁹⁵



All prices Subject to Change without Notice. Check with salesperson



VHF/UHF Base Transceivers Regular SALE

IC-275H 100w 2m FM/SSB/CW..... \$1589.00 1298

IC-475H 100w 440 FM/SSB/CW..... 1819.00 1498

IC-575A 25w 6/10m xcvr/ps..... D 1455.00 1158

IC-575H 25w 100w 6/10m xcvr..... 1699.00 1398

IC-1275A 10w 1.2GHz FM/SSB/CW..... D 1924.00 1598



VHF/UHF FM Transceivers Regular SALE

IC-28H 45w 2m FM/TTP mic..... \$389.00 329⁹⁵

IC-228H 45w 2m FM/TTP mic..... 429.00 349⁹⁵

IC-229A 25w 2m FM/TTP mic..... 439.00 369⁹⁵

IC-229H 50w 2m FM/TTP mic..... 439.00 369⁹⁵

IC-38A 25w 220 MHz FM xcvr..... 439.00 369⁹⁵

IC-449A 35w 440FM xcvr/TTP..... 529.00 439⁹⁵

IC-2330A 2m/25w/220 25w FM xcvr..... 821.00 689⁹⁵

IC-1201 10w 1.2GHz FM xcvr..... 849.00 719⁹⁵

Dual band FM Transceivers Regular SALE

IC-2410A 25w 2m/440 FM/TTP mic...D \$889.00 729⁹⁵

IC-2410H 45w 2m/35w 440 FM/TTP..... 939.00 769⁹⁵

IC-3230A 25w 2m/440 FM/TTP mic..... 739.00 619⁹⁵

IC-3230H 45w 2m/ 35w 440 FM/TTP..... 839.00 699⁹⁵

Multi-band FM Transceiver Regular SALE

IC-901 50w 2m/35w 440 FM xcvr..... \$1069.00 879⁹⁵

UX-R91A Broad band receiver unit.... 539.00 449⁹⁵

UX-19A 10w 10m unit..... 319.00 269⁹⁵

UX-59A 10w 6m unit..... 369.00 319⁹⁵

UX-S92A 2m SSB/CW module..... 639.00 549⁹⁵

UX-39A 25w 220MHz unit..... 479.00 399⁹⁵

UX-129A 10w 1.2GHz unit..... 589.00 489⁹⁵

UX-49A 440MHz module for IC-900..... 369.00 319⁹⁵

IC-970A 25w 2m/430MHz xcvr/ps..... 2839.00 2348

IC-970H 45w 2m/430 MHz xcvr/ps..... 3079.00 2548

UX-R96 50-905 MHz receive unit..... 419.00 349⁹⁵

UX-97 1.2GHz band unit..... 1059.00 899⁹⁵

VHF/UHF Mobile Antenna Regular SALE

AH-32 2m/440 Dual Band mobile ant.... \$ 41.25

VHF/UHF Repeaters Regular SALE

RP-1520 2m 25w repeater..... \$2369.00 1968

RP-2210 220MHz 25w repeater..... 2009.00 1658

RP-4020 440MHz 25w repeater..... 2439.00 1998

RP-4020/50W 440 50w repeater..... 2649.00 2198

RP-1220 1.2GHz 10w repeater..... 2759.00 2298

Handhelds Regular SALE

IC-P2AT 2m HT..... \$419.00 349⁹⁵

IC-P3AT 220MHz HT..... 419.00 359⁹⁵

IC-P4AT 440 MHz HT..... 469.00 389⁹⁵

IC-2A 1.5w 2m HT • *Closeout*..... 199⁹⁵

IC-2AT 1.5w 2m HT/TTP.... 269.00 219⁹⁵

IC-02AT/High Power 2m... 349.00 289⁹⁵

IC-03AT 2.5w 220 HT/TTP... 329.00 279⁹⁵

IC-2SAT 2m/TTP..... 379.00 309⁹⁵

IC-2SRA 2m/25-905 rx..... 579.00 479⁹⁵

IC-24AT 2m/440MHz/TTP... 459.00 379⁹⁵

IC-3SAT 220MHz HT/TTP... 359.00 299⁹⁵

IC-4SAT 440MHz HT/TTP... 399.00 329⁹⁵

IC-4SRA 440/25-905 rx..... 579.00 489⁹⁵

IC-26AT 2m HT/TTP..... 399.00 329⁹⁵

IC-46AT 440MHz/TTP..... 399.00 329⁹⁵

IC-126AT 1.2GHz/TTP..... 519.00 429⁹⁵

IC-W2A 2m/440 HT..... 589.00 499⁹⁵

IC-X2A 440/1.2 HT..... 749.00 629⁹⁵

PS-70 2A power supply for HT's..... 79.00 69⁹⁵

Aircraft band handhelds Regular SALE

A-2 5W PEP synth aircraft HT..... \$575.00 429⁹⁵

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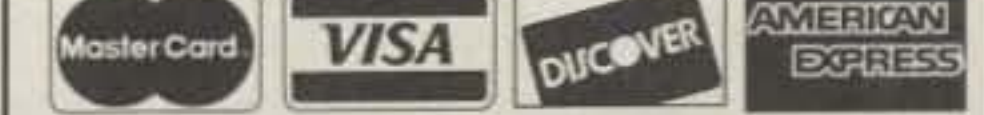
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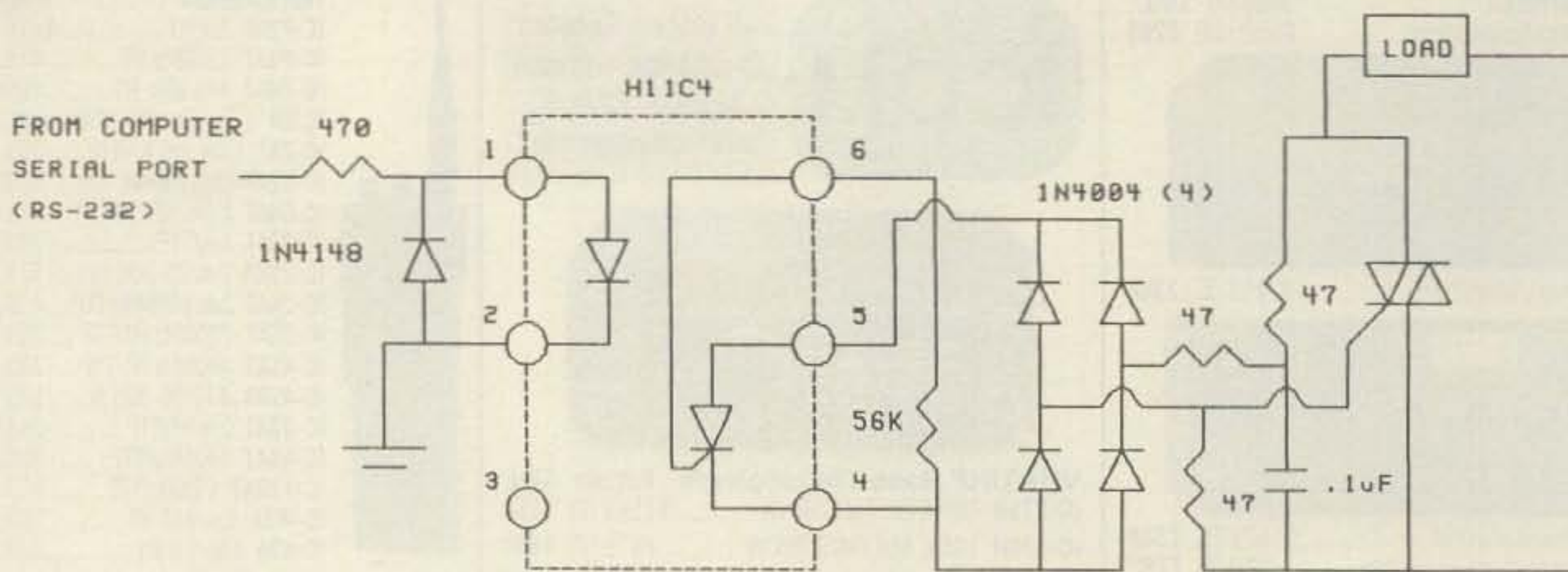


Fig. 4- RS-232 115 VAC 10 amp control system.

of the photo-transistor, where it begins to bias the device. When the LED current is high enough, the transistor turns fully on and saturates in exactly the same manner that a conventional transistor saturates when its base current exceeds the level needed for its collector load. Since there is no direct electrical connection between the LED and photo-transistor, however, unlike the conventional transistor, the input and output are totally isolated from each other. Fig. 2 shows a practical example of this, an isolated digital transmission sys-

tem for converting RS-232 signals from a computer into TTL levels for an experimental circuit. Due to the opto-coupler, any failure on the part of the experimental circuit will not be reflected back into the computer to cause damage.

Operation of the circuit is straightforward. When the computer produces a negative RS-232 output level, diode D1 conducts, preventing any current flow through the LED in the opto-coupler. Since there is no "light base bias," the photo-transistor stays cut off and the output of the 4N35 re-

mains high. The TTL inverter sees a high, or logic 1, at its input, and consequently produces a logic 0, or low, at its output. Now, when a positive RS-232 level comes along, the LED lights. This causes the photo-transistor to conduct, dropping the input to the TTL inverter low, which causes it to produce a high, or logic 1, output. In this way the RS-232 signal has been isolated and converted to TTL in one step. The isolation between the computer and the experimental circuit is so high (7500 volts AC or DC) for the 4N35, that nothing short of a lightning strike will be coupled to the computer.

There are many types of opto-isolators available today with all sorts of output devices. These include actual logic gates, darlington, photo-diodes, and even SCRs and triacs for use as AC power line controls. Fig. 3 is an example of such an application.

Here our computer is being used to control an AC load, which can be anything up to 300 ma for the Motorola H11C4. Although not high current by AC line standards, the output will drive indicator lamps or relay coils with no chance of the voltage and current spikes produced by these devices being coupled back to the computer.

If more current is required, the H11C4 can be used to drive an external SCR or triac to control up to 10 amperes as shown in fig. 4.

While we have just touched on opto-isolators this month, they are devices well worth considering in future experimenting, especially where the AC line is concerned. Units such as the ones described in this column are inexpensive and readily available, and the experimenter will do well to obtain several and "put them through their paces."

A very happy holiday season to all of my readers, and a sincere thank you for your letters and comments. The choice of many of the topics covered in future installments of Math's Notes is a direct result of your requests and interests.

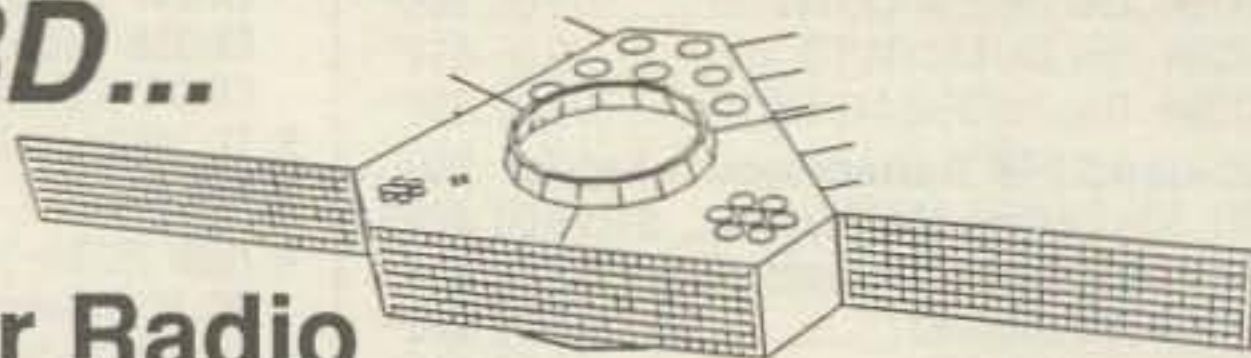
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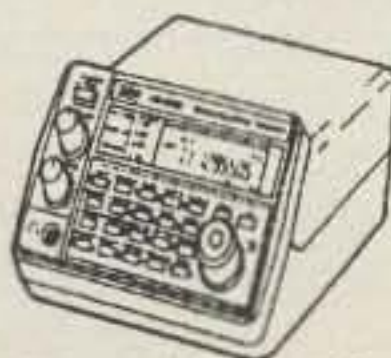
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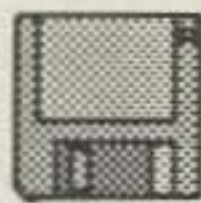
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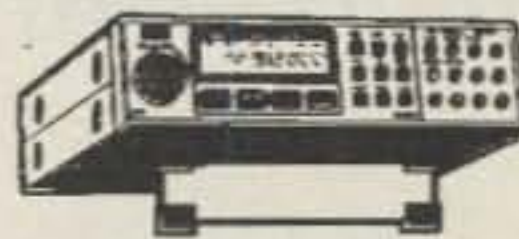
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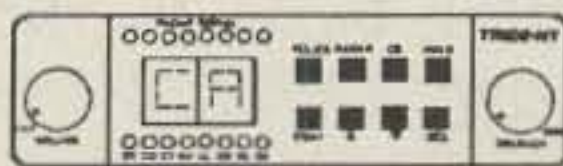
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In this month's column we begin with the first of a two-part series that will answer a lot of reader mail. Christmas may possibly see you with a new terminal node controller, or even better, one of the all-mode controllers such as the AEA PK-232mbx, Kantronics KAM, or the MFJ-1278/Turbo, which feature packet, AMTOR, RTTY, CW, WeFax, etc.

I will describe the meaning of the generic packet controller commands and some commands that may be specific to certain terminal node controllers (TNCs). Because the TNC/packet command list is so large, I've divided this subject into two parts so that there will be sufficient space to fully define each command.

Some of the command definitions covered herein may not be compatible with all TNCs. However, it is not my intention to break out each TNC and its associated commands. For the most part, these commands are universal except for the feature commands. We will cover each definition in the order in which it appears under the designated function group heading. In addition, we will cover only those commands that are directly associated with packet. This is not a command table for AMTOR or other digital modes.

Let's continue with this simple approach to the packet commands. Here is the command syntax divided into seven function groups.

1. Asynchronous Commands
2. Special Character Commands
3. Identification Commands
4. Link Control Commands

5. Monitor Commands
6. Timing Commands
7. Feature Commands

The related commands syntax will be covered under each of the headings along with the function of that command.

Asynchronous Commands

8BITCONV: Useful when transferring files or sending control codes that use binary letters and numbers. When this command is set to ON, bit seven is allowed to be transmitted in the converse mode.

This command is useful when transmitting control or non-ASCII characters. All eight bits are transmitted from the terminal to the distant station as if the packet controller were in the transparent mode.

If long binary files are to be transmitted to a distant station, the "Transparent" mode will be more forgiving with file transfers. Terminal parity can be set to none while using the transparent mode.

ABaud: This is the common acronym derived from the AutoBaud routine. The ABaud is used to establish the terminal to TNC baud rate.

The TAPR TNC2 and clones use external DIP switches to set the terminal to TNC baudrate. **Be sure the TNC is OFF when changing any of these DIP switch settings.**

The AutoBaud begins the search at 300 BPS. In some TNCs it is activated by entering an asterisk (*) during the autobaud search routine. The search will display:

PRESS * TO SET BAUD RATE

When this message is displayed, you have about 2 seconds to depress the asterisk (*). Once you have the baud rate set and your callsign entered, at the CMD: prompt you should type:

AB <space> (baudrate) <enter>

The HBaud rate represents the "on air" speed (see HBaud).

With the data terminal speeds increasing, it is best to choose a terminal program that will support speeds of 1200 BPS and above. The principal reason for doing so is because you may find yourself trying to operate 2400 BPS HBaud over the air, yet the terminal display is falling behind because the terminal will not display the incoming information as fast as it is being received.

AUTOLF: Sends linefeed to terminal after carriage return.

When this command(s) is turned on, the TNC will automatically add a linefeed after the carriage return is pressed, or if a carriage return is present in the file being transferred.

BKondel: This command defines the method of character deleting.

When BKondel is off, the back slash (\) will echo to the display or screen when a character is deleted. When on, a backspace-space-backspace is echoed to the display. Many operators leave this command on.

ECHO: Allows viewing local keyboard entries.

If local keyboard characters are not appearing on the screen, set this command to ON. If double characters appear each time a key is pressed, set the ECHO command to OFF. ECHO is most often set to OFF when the terminal program has DUPLEX set to HALF, and ON when DUPLEX is set to FULL.

SCreenl: The numerical value entered with this command will set the format of the screen width from 0 to 255 letters or characters.

Many terminals display in an 80 column format—thus the reason for the default of 80. If your terminal display has fewer than 80 characters, you can format the screen length to match the screen width.

If your terminal display is automatically formatted or given a linefeed and carriage return, simply set the SCREENL to zero (0).

Flow: Prevents incoming (received) packets from interfering with those packets being typed or entered.

Note: When using split-screen terminal software, set FLOW OFF. If this command is ON, the local keyboard entries will not be affected by incoming packets. Once a keyboard entry is made, the terminal will stop any display of incoming messages or packets. When text is entered, the terminal will allow the incoming packet(s) to be displayed.

PARITY: Parity sets the data parity for terminal to computer data flow.

The controller will only send serial output with eight data bits and one stop bit. By setting the parity, you are defining the disposition of the eighth bit.

TRFlow: When ON, TRFlow provides software flow control in the transparent mode. The settings of START and STOP de-

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	PIN 7 & 8	Ground/Shield
KENWOOD (4 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (3.5 MM)	Receive Audio
	PIN 3 & 4	Ground/Shield
KENWOOD (5 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (3.5 MM)	Receive Audio
	PIN 4 & 5	Ground/Shield
KENWOOD (6 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (3.5 MM)	Receive Audio
	PIN 6	Ground/Shield
KENWOOD (8 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (3.5 MM)	Receive Audio
	PINS 7 & 8	Ground/Shield
ICOM (4 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (3.5 MM)	Receive Audio
	PIN 4	Ground/Shield
ICOM (8 PIN)	PIN 1	AFSK INPUT
	PIN 2	Push-To-Talk (PTT)
	Ext Spkr (Late Models Pin 8)	Receive Audio
	PINS 6 & 7	Ground/Shield

PACKET USERS NOTEBOOK

TABLE 1

BucK4ABT

Table 1- The microphone pin number(s) and the TNC function to which the pin should be connected. More transceiver mic pinouts will be defined in next month's column.

termine the type of flow control.

TXFLOW: Enables hardware flow control when in transparent mode. When ON, the XFlow determines the flow control that is used during the transparent mode. If FLOW is OFF, software flow control is not used. The XON and XOFF characters are used when XFLO is ON.

XFLOW: Enables software flow control for converse mode, when ON.

When XFLOW is ON, the terminal should respond to the flow control characters that are entered as XON and XOFF. When the XFLOW is OFF, the controller will respond to hardware flow control only—e.g., CTS and RTS.

Special Character Commands

CANLINE: As defaulted, it is CTRL-X, and with this action the current line being typed in will be canceled.

This command character can be changed by entering a new command character following the CANLINE command. This command is not often changed, and is usually left as defaulted.

COMMAND: CTRL-C, which is used to

return to the command mode from the converse or transparent mode.

Since all references are made to the CONTROL C, it is good to leave the default character as is.

CANPAC: The CTRL-Y cancels a packet or a terminal output from the buffer.

This character function is executed from the command mode.

DELETE: Back space character.

Issues a backspace when the BACKSPACE key is depressed.

SENDPAC: Carriage return will cause packet to be sent.

The default character should be used, since HEX \$0D is the carriage return. This allows a packet to be formed and sent each time a carriage return is pressed in the converse mode.

START: CTRL-Q restarts printing after CTRL-S.

This control character will restart display or printing of incoming packets after they are halted by a CTRL-S. CTRL-S is the stop character.

STOP: CTRL-S will stop output to the screen or printer.

Sometimes used with software handshaking, this command is most often used

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to hold the packets in the TNC buffer while the terminal or computer is off-line doing other tasks.

The buffer of the terminal or computer should be open when the start character (usually CTRL-Q) is invoked following the return of the computer to packet operation; otherwise, all data will be scrolled off the screen and lost.

STREAMSW: This command selects the character to be used in switching between streams or ports of the controller.

The selected character can be passed in the converse mode and will be ignored in the transparent mode and will continue through the controller as data. If you wish

to change streams while in the transparent mode, you must return to the command mode to do so.

XOFF: The XOFF command will stop data flow from the controller.

This command is used to stop packets from the controller to the terminal or computer. The start character will resume data flow.

XON: CTRL-Q restarts terminal data flow.

When the CONTROL Q is enabled, the controller to terminal data flow will resume. The computer or terminal buffer should be open so no data will be lost when the command is invoked.

Identification Commands

BEACON: Beacon timing intervals after $n \times 10$ seconds.

Options: EVERY & AFTER.

A value of zero will turn the beacon OFF (not a bad idea, with channel congestion). Each increment of one is equal to 10 seconds in most controllers.

Because of overcrowding, beacons are beginning to be frowned on, except when used to make important announcements.

If the option EVERY is used (Beacon EVERY), then a beacon will be sent $n \times 10$ seconds. If the option AFTER is used (Beacon AFTER), the beacon will be sent *once* after the specified interval of no link or digipeat activity.

MYCALL: To install your callsign into the controller for station identity.

The callsign is the first input after you establish communications with the controller. This gives the controller an identity and establishes a way for other stations to connect to your station.

An SSID from 0 to 15 can be added to the callsign to distinguish between controllers which you may have on other bands or locations.

myALIAS: Alias callsign for digipeating.

This command is usually used for a shortened callsign for nodes and digipeaters. In most applications the myALIAS will reflect the local airport identifier.

The digi call for Atlanta, Georgia is "ATL." This is the airport ID for the Atlanta airport. The myALIAS for my local digi is ABT1, and reflects a part of my callsign. The alias is either selected to make the digi call easy to remember or for the geographic location.

HID: Issues an ID every 9.5 minutes when digipeating.

When ON, an identification packet is sent every 9.5 minutes if the station is in use as a digipeater. If the HID is OFF, then the IDs will not be sent regardless of use.

Next month we will cover the balance of the packet command list beginning with the LINK Level command set. Be sure to keep this month's column and Part II (next month's column) within easy reach, as you may find them helpful with the new TNC.

Happy Holidays, and Happy Packeting!

73, de Buck4ABT

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Silent Key

In addition to the passing of WB4GQX and WD4BIW (to whom we dedicated last month's column), this year also saw the loss of David L. Reasoner, N4KTY. David wrote the first "Packet Primer," which was later printed in many club newsletters and in CTM magazine. It was so well written that I used it (with David's permission) as a hand-out pamphlet at packet forums in the 1980s. As with WB4GQX and WD4BIW, David will be missed.

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NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for December is:

**Bill Inkrote, K2NJ
USA-CA All Counties #756
Mixed, 3-13-92**

The following was written by Paul Scipione, AA2AV, USA-CA All Counties #770.

"I've really been looking forward to writing this profile of Bill. He is not only a good friend and darn good county hunter, but he is also a genuine character! The headline for his profile should read 'K2NJ: Compulsive Home Run Hitter.'

"Bill was born in Edison, New Jersey in 1947 and fortuitously grew up at the highest point of elevation between New York and Philadelphia. He was playing back-lot baseball with his buddies one day when he hit a home run into the backyard of the neighborhood grouch, Harold. Not wanting to have to pay for a replacement ball, Bill sneaked into the old man's backyard to retrieve his home-run ball and was just leaving when Harold nailed him. Always one to put a positive spin on things, Bill said that he had come to ask the old man what all those strange-looking wires and tower contraptions in his backyard were. Harold immediately took the lad in tow and the rest is history: Hamdom gained an operator and contester, and county hunting gained one of its best net controls and mobile operators. Old Harold (W2DFV, now a Silent Key) lent Bill an old straight key and other study materials, and Bill became a proud new Novice, WN2FVO, at age 15.

"Bill's first station was a homebrew transmitter consisting of a single 6146 tube, and his receiver was an old S38E Hallicrafters that his dad had stored away in the attic. Exhibiting a lifetime trait early, WN2FVO got into award chasing as a Novice and soon became member number 1513 of the old QRP Club. He upgraded to General (became an Extra Class with his current callsign in 1976), and while still in high school, Bill wandered across Cliff Evans, K6BX, and his old CHC (Certificate Hunters Club) daily net on 14.340. He was hooked. He even went out with a high school buddy to Pike and Monroe in Pennsylvania and ran that line on 40 meters CW. By the time Bill graduated from high school he had collected several hundred counties.

333 South Lincoln Ave., Mundelein, IL 60060



Bill Inkrote, K2NJ, USA-CA All Counties #756, with some of his many awards gracing the walls of his New Jersey shack.

"In July 1965 Bill joined the U.S. Air Force and was sent to Biloxi, Mississippi for training at the Electronics School. He bought an HW32 transceiver and got back on the 14.340 CHC Net, which at that time was also the FHC (Flying Hams Club) Net. Bill often operated as net control along with W9BJH and KØRJU (Tillie). The Air Force then sent Bill to the frigid north country to a radar station in Keewenau, Michigan. Bill was an electronics tech and also operated the MARS station there. While it may have been cold and remote, the folks on the CHC Net were in seventh heaven. Now they had one of their own to run the remote counties of northern Michigan and the Upper Peninsula!

"Bill quickly rejoined the 14.340 as a net control, often teaming up with his 'buddy' Bertha, WA4BMC. One day Bill and Bertha got into a terrific argument over the air with the ever-officious K6BX, who was pontificating so much that the mobiles temporarily got pushed down to 14.336. Bill and Bertha decided to leave 'The Great One' talking to himself up on 14.340 and took mobiles such as W5HDK (Uncle Ben), W5DAU (now SK), and K8CIR (Otis Beyer) down to 14.336. And that, folks, is why the majority of our CHing to this day is done on 14.336! You might say that K2NJ was 'there at the beginning.'

"Bill continued daily NCS duty on 14.336 throughout 1967-69 while at the Air Force station in Michigan. His signal was easily heard—Collins and Eldico rigs with a 5-element beam up on a 100 foot tower. Bill happily and compulsively added several thousand new counties to his list. He was headed for early USA-CA fame when he got sidetracked by what turned into an

USA-CA Special Honor Roll

Bob Banner, K6PQA
USA-CA All Counties #776
Mixed, 8-3-92

Rolf Arvidsson, SM4BNZ
USA-CA All Counties #777
Mixed, 8-10-92

Frank Blanchard, Jr., AA4LB
USA-CA All Counties #778
Mixed, 8-13-92

Louis R. Bligh, NW1O
USA-CA All Counties #779
All CW, 8-17-92

Jerry Kopstein, N9AC
USA-CA All Counties #780
Mixed, 8-17-92

Kenneth G. Hanson, NC2O
USA-CA All Counties #781
All Mobile, 8-29-92

even greater compulsion—chasing German DLKs (radio districts, something akin to counties except smaller). There were 1000 DLKs in Germany, and the German Radio League gives out DLD awards starting at 100 DLKs and running up to the coveted DLD 1000 award. Chasing DLKs is hard work because there are no nets, the German callsigns don't tell you anything about the operator's DLK, and most of the chasing is done in CW. Fortunately, Bill was and is an excellent CW op, although he had the handicap of not speaking German.

"Bill got his DLD 100 award in 1973 and on October 31, 1989 became the first, and to this day only, American op to get the coveted DLD 1000 (number 624). You will see it gracing the walls of his New Jersey shack in the accompanying photo. It hangs right up there with various CQ and ARRL contesting awards and also the DXCC Honor Roll (Bill has worked all current countries). Bill is truly a compulsive home-run hitter!

"Which brings us back to county hunting. I first got 'the bug' when I wandered across N7BKW (Dave) and W5UJO (Joe) back in early 1990. I can recall mentioning my new-found interest to Bill, so I wasn't entirely surprised to hear K2NJ re-surface during 1991 on 14.336 with a booming signal (his current station is an

USA-CA Honor Roll

3000		1500	
KN4JR	802	KN4JR	1047
SM4BNZ	803	JF1SEK	1048
AA4LB	804	AA4LB	1049
N9AC	805	N9AC	1050
NC2O	806	4X4RE	1051
2500		1000	
KN4JR	883	KN4JR	1247
K2MF	884	AA4LB	1248
AA4LB	885	N9AC	1249
N9AC	886	N7OTR	1250
2000		500	
VE3DUS	959	KN4JR	2626
KN4JR	960	LU4FM	2627
AA4LB	961	AA4LB	2628
N9AC	962	N9AC	2629
		DF7HX	2630

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 nonsubscribers, 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 June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for airmail reply.

ICOM 761, SB220 linear, and a KLM 34XA beam on a 70 foot fixed tower). He quickly became one of the regular NCSes and also started operating mobile with an Atlas 210X purchased from his boyhood friend Bob Vallone, who was WB2GLI while growing up in Jersey, but is now WA4ETN in Georgia. Bill had gone back through all of his old logs (compulsively kept!) and found that he was only about 400 counties short of getting the USA-CA award.

"The key factor that had gotten K2NJ back into CHing was the new PC logging program that he was using—DHLoger, written by Jim Wade, VE1DH. Jim's program is for 'truly neurotic' hams who live/eat/breathe paper chasing. DHLoger is geared toward county hunting. But just in case that isn't enough for you, it also tracks clinically neurotic and compulsive awards such as WAZL (New Zealand branches), WABA (Bermuda parishes), DDP (Departments of Paraguay), and the YOA (Romanian counties). This program is for 'real sickies'; it even contains a total master count of the total of all your various separate award counts! Maybe that's why not only K2NJ but also AA2AV use DHLoger!

"Bill went about his final quest (after 25-plus years) for the USA-CA with typical military precision—all out war. He started spending 25 or more hours a week as an NCS, even though he is busy as a supervisor at AT&T, and as a husband (married to Gail, WB2AXG), father (two young daughters and a son), and homeowner (5 acre 'Jersey spread' complete with count-

less dogs, cats, and chickens, most of which greet every visitor). Bill went about it with a passion, working them mobile or fixed.

"Bill and I collaborated on trying to get the callsigns and phone numbers of fixed hams in the really hard counties we had left in common. Bill's remaining county list started to shrink a lot faster than mine, and by late February 1992 he was down to fewer than a dozen. He was getting so many telephone calls that he needed a professional switchboard! He was in a race with his buddy Ed Hexter, AC4MP, to finish, although Ed had the advantage of an HF station at the office. One day Bill got a call at work, and having his priorities straight, he excused himself from an AT&T meeting and went out to the employee's parking garage, screwed on his mobile antenna, and laid rubber getting up to the rooftop to work a new one in Tennessee. Bill's CHing was getting so serious that, would you believe, he and his family suffered three 'medical emergencies' during one week alone!

"Finally, K2NJ was down to just one county for the 'whole ball of wax,' Powder River, Montana. 'Powder River!' I screamed at him over the phone. 'Why, I got that one from KK7X months ago!' It just goes to prove that one CHER's last one is probably another CHER's first one. And if you don't believe that one, dig this: By sked, Bill was able to work his last one when Bruce (N7MVX) traveled through Powder River in early March. Bill was ecstatic: 'There ain't nothin' like finishing it up after 20 plus years!' he boomed over the net on 20 meters.

"Bill quickly got his final cards in and got USA-CA All Counties #756 on March 13, 1992, about one hour after Dorothy had awarded Ed, AC4MP, number 755. Bill took just a day or two off to celebrate and then jumped right back into CHing and NCing. His first day back on, Bill took net control, and the first mobile he ran was Dennis, KK7X, in, you guessed it, Powder River, Montana!

"K2NJ is now nearly half-way done with his second time around award and is keeping separate books on other county hunting awards. 'Hey, let's face it,' Bill gives a hearty laugh. 'Life is too short to run at anything less than full speed! Besides, I get a kick out of all of this!'—73s, Paul, AA2AV."

Awards Issued

Millard H. Solomon, KN4JR, reported on the Special Honor Roll last month, also received USA-CA 3000 #802, USA-CA 2500 #883, USA-CA 2000 #960, USA-CA 1500 #1047, USA-CA 1000 #1247, and USA-CA 500 #2626, All SSB, dated 7-24-92.

Bob Banner, K6PQA, rounded out his collection of county confirmations and

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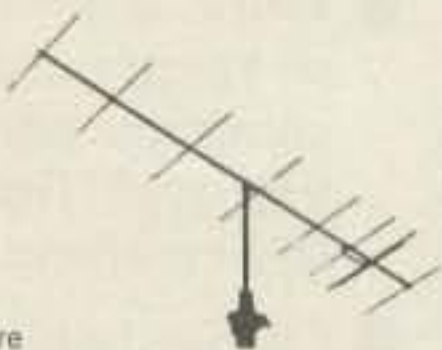
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qualified for USA-CA All Counties #776, Mixed, dated 8-3-92.

Rolf Arvidsson, SM4BNZ, completed his paperwork and received USA-CA All Counties #777 and USA-CA 3000 #803, Mixed, dated 8-10-92.

Frank Blanchard, Jr., AA4LB, filed his completely filled record book and qualified for USA-CA All Counties #778, USA-CA 3000 #804, USA-CA 2500 #885, USA-CA 2000 #961, USA-CA 1500 #1049, USA-CA 1000 #1248, and USA-CA 500 #2628, Mixed, dated 8-13-92.

Louis R. Bligh, NW10, put the finishing touches on his good record and received USA-CA All Counties #779, All CW, dated 8-17-92.

Jerry Kopstein, N9AC, did it all in one giant leap, qualifying for USA-CA All Counties #780, USA-CA 3000 #805, USA-CA 2500 #886, USA-CA 2000 #962, USA-CA 1500 #1050, USA-CA 1000 #1249, and USA-CA 500 #2629, Mixed, dated 8-17-92.

Kenneth G. Hanson, NC2O, took a double step to complete his quest and received USA-CA All Counties #781 and USA-CA 3000 #806, All Mobile, dated 8-29-92.

Barry G. Siegfried, K2MF, added to his good record by claiming USA-CA 2500 #884, Mixed, dated 8-8-92.

Bert White, VE3DUS, took another good step toward his goal and received USA-CA 2000 #959, Mixed, dated 7-20-92.

Hideo Takahashi, JF1SEK, submitted his good application for USA-CA 1500 #1048, Mixed, dated 7-29-92.

Egon Ron, 4X4RE, earned another gold seal for his certificate by claiming USA-CA 1500 #1051, All CW, dated 8-21-92.

William B. Baxter, N7OTR, filed his qualifying application for USA-CA 1000 #1250, Mixed, dated 8-26-92.

USA-CA 500 certificates went to:

Millard H. Solomon, KN4JR, USA-CA 500 #2626, All SSB, 7-24-92.

Radio Club Rosario, LU4FM, USA-CA 500 #2627, All SSB, 8-3-92.

Frank Blanchard, Jr., AA4LB, USA-CA 500 #2628, Mixed, 8-13-92.

Jerry Kopstein, N9AC, USA-CA 500 #2629, Mixed, 8-17-92.

Guenther Keim, DF7HX, USA-CA 500 #2630, All SSB, 8-26-92.

Awards Available

Hungarian Radioamateur Society Awards. These general rules are applicable to the several awards sponsored by the Hungarian Radioamateur Society.

Hungarian awards can be obtained by licensed radio amateurs and SWLs all over the world. All amateur bands and modes may be used, except QSOs via repeaters. Contacts/receptions may be made from any location within the same DXCC country. Each station may be contacted only once on any band, any mode.

The log should show the callsign(s),

name, and QTH of the applicant as well as the following information: station worked/heard, date, time UT, band, mode, and received report (SWLs should indicate the station being worked by the heard station).

Each list must be accompanied by a statement from the applicant's national society or from any two amateurs other than the applicant that the QSL cards of the contacts/receptions listed are in the possession of the applicant and that the items of the cards are correctly listed. *Exceptions:* The Szeged Festival and DUNAFERR awards need only log extract; for the HCS Award, enclose confirming slices cut from the QSL cards.

Foreign participants in HA-DX and HG-VHF contests may apply for the following Hungarian Awards upon the contest QSOs using separate application forms: Budapest, Balaton, Dunakanyar Pannonia, Savaria, WHD.

Fees for the various awards are as follows: Pannonia, Savaria, Balaton, and Budapest 10 IRCs; Hungarian Rummy, Hungarian Canasta, Szeged Festival, and worked Hungarian Districts 5 IRCs; Videoton Bronze 2 IRCs, Silver 3 IRCs, Gold 5 IRCs; Hungarian Castle Series Bronze 5 IRCs, Silver 8 IRCs, Gold 10 IRCs; Dunakanyar 6 IRCs; DUNAFERR no fee, but postage should be sent. Sticker: SASE or SAE plus IRCs for postage.

Decisions of the MRASZ Award Committee are final. All correspondence may be sent to the manager or to MRASZ, Hungarian Radioamateur Society Award Committee, P.O. Box 20, Nagytarcsa, H-2142 Hungary.

Budapest Award (BPA). The Radioamateur Society of Budapest issues this award. The applicant must submit proof of



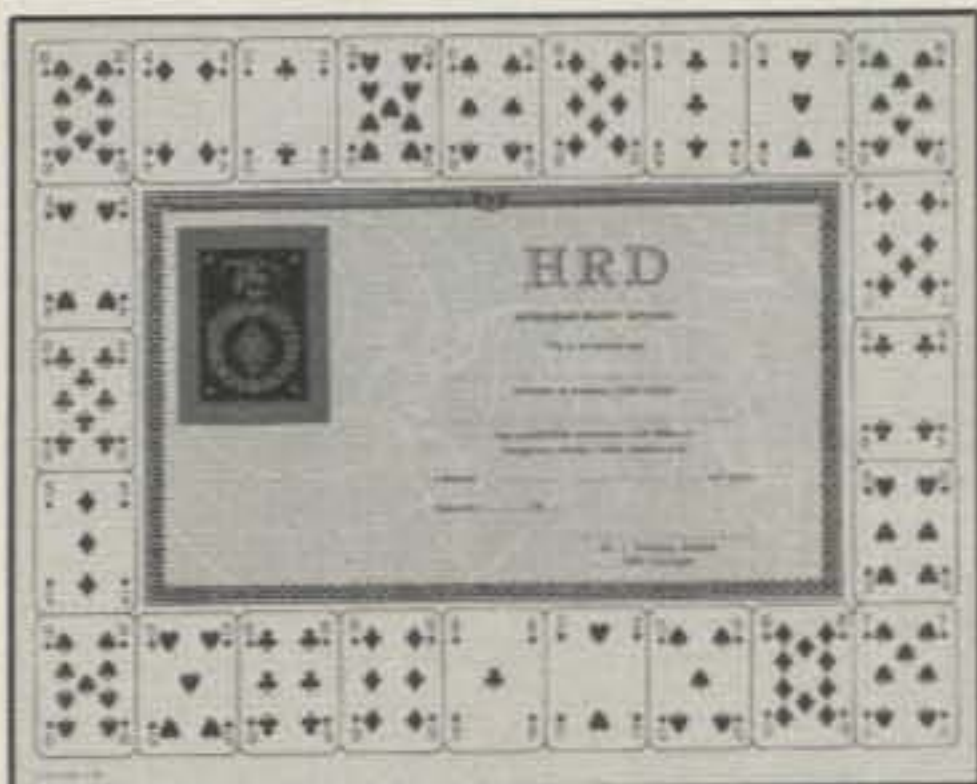
The Budapest Award sponsored by the Radioamateur Society of Budapest.

contacts made on or after January 1, 1959.

Conditions: DX stations have to obtain 25 different QSLs from HA, HG5 stations. European stations have to obtain 75 different QSLs from HA, HG5 stations. VHF stations have to obtain 50 different QSLs or 5000 kms summarized distance with HA, HG5 stations. VHF/UHF contacts via satellite or EME QSOs count with 500 kms/QSO value.

Bronze: "hand rummy," collecting 14

Manager: Verebes Janosne, HA5YR, P.O. Box 64, Budapest, Hungary H-1475.
Hungarian Rummy Diploma (HRD).
 The Radioamateur Society of Somogy county issues the HRD Awards. The applicant must submit proof of contacts made on or after September 1, 1972. The HRD Award is issued in three classes:



The Hungarian Rummy Diploma offered by the Radioamateur Society of Somogy County, Hungary.

cards in accordance with the rules of the game.

Silver: full collection of one of the four series plus one joker of the same color. For example, diamond 2 . . . A plus red joker (14 cards).

Gold: full pack, containing 54 cards.
 HRD-108: two packs of QSL cards are necessary for the award from 108 different stations.

Hungarian Canasta Diploma (HCD).
 Three canastas (21 cards) have to be confirmed in accordance with the rules of the game.

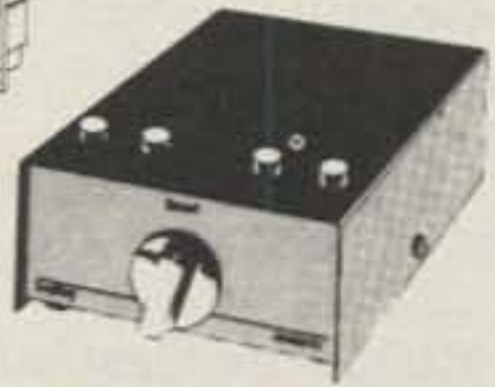
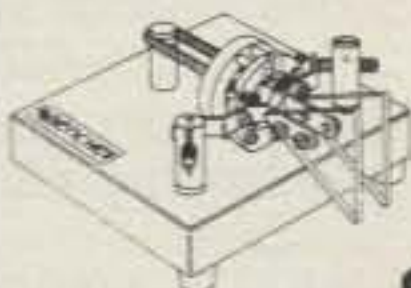
The canasta contains 7 cards of the same figure. Two of them can be equivalent—for example, 7 cards of figure 5, 7 cards of figure 8, and 7 cards of kings. Not more than 3 cards may be substituted by the 4 jokers and the "little-jokers" in one canasta. Note: Contacts on or after April 4, 1980 are valid for HRD-108 and HCD.

Amateur stations belonging to radio club "Tivadar Puskas" can send any kind of HRD cards for the QSOs. These stations are HA, HG3, GA, GB, GD, GH, GL, GM, GR, GU, HD, HF, HH, HS, HV, HX, HY, KGO, KGL, HM, KGR, KGU, KHC, and HHJ.

Allocation of the HRF cards:
 HA/HG call area 1: spade/heart R/a = A; diamond/club R/b = J
 HA/HG call area 2: spade/heart R/a = 2; diamond/club R/b = J
 HA/HG call area 3: spade/heart R/a = 3; diamond/club R/b = J
 HA/HG call area 4: spade/heart R/a = 4; diamond/club R/b = J
 HA/HG call area 5: spade/heart R/a = 5; diamond/club R/b = Q
 HA/HG call area 6: spade/heart R/a = 6; diamond/club R/b = Q

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- 26 Memory Channels

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- 40 Memory Channels
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HA/HG call area 7: spade/heart R/a = 7; diamond/club R/b = K
 HA/HG call area 8: spade/heart R/a = 8; diamond/club R/b = K
 HA/HG call area 9: spade/heart R/a = 9; diamond/club R/b = K
 HA/HG call area 0: spade/heart R/a = 10; diamond/club R/b = K
 ??? red and black joker = Y

The award manager is Dr. Janos Mihalyfy, HA3GA, BAJCSY-ZS.u.24, III/2, Kaposvar, Hungary H-7400.

Worked Hungarian Districts. The Hungarian Radioamateur Society issues this award. The applicant must submit proof of contacts made on or after January 1, 1958.

Conditions: DX stations have to obtain 10 QSLs from any 5 Hungarian call areas (HA, HG1, 2, 3, ... 0). Two cards are need-

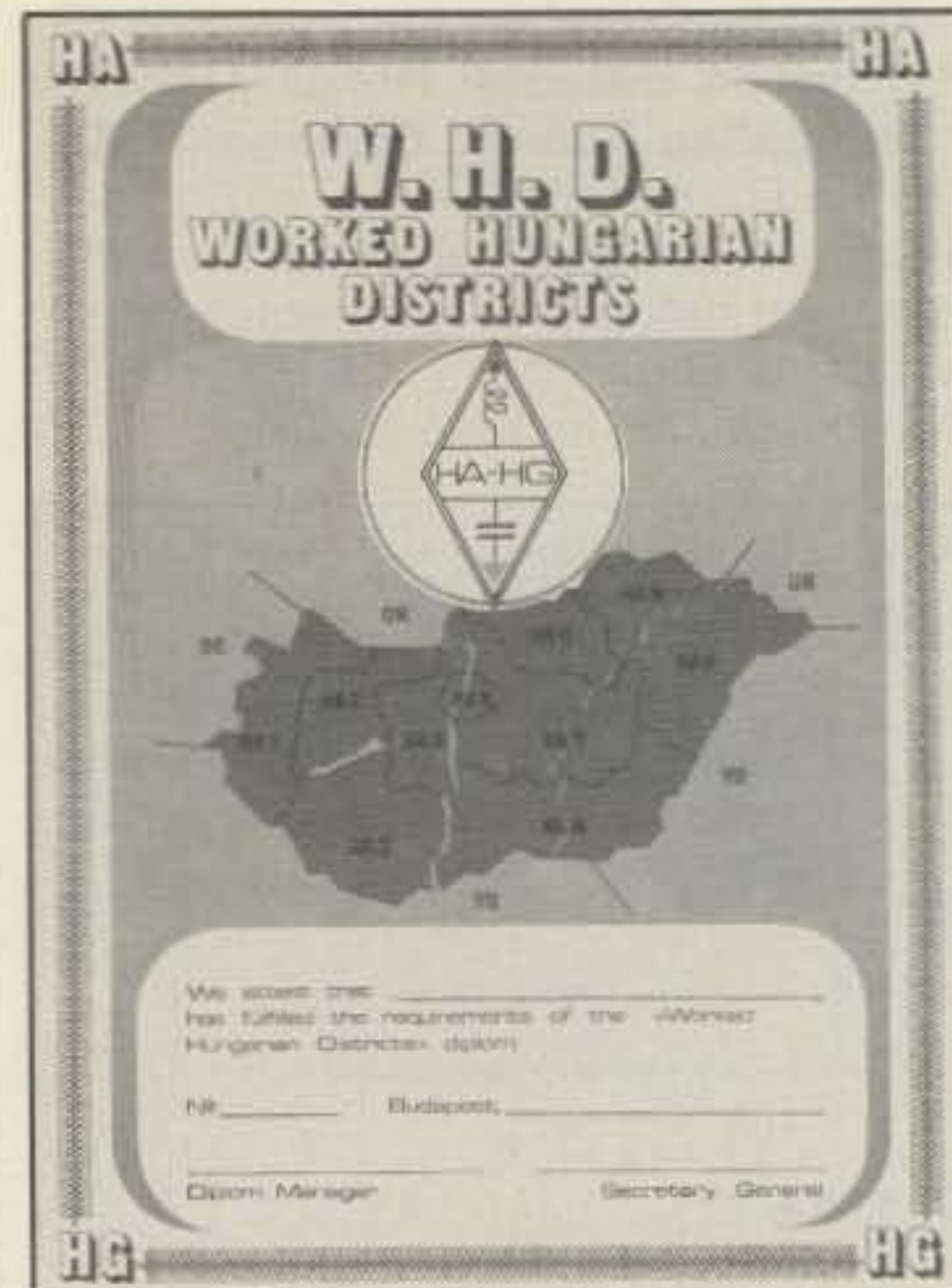
ed from each call area on two bands. European stations have to obtain 16 QSLs from any 8 call areas. Two cards are needed from each call area on two bands.

On VHF: DX stations have to obtain 10 QSLs from any 5 call areas; 2 cards are needed from each call area. European stations have to obtain 16 QSLs from any 8 call areas; 2 cards are needed from each call area.

Send all correspondence to MRASZ Award Committee, P.O. Box 20, Nagytarcsa, H-2142 Hungary.

Hungarian Castle Series (HCS). The Hungarian Radioamateur Society issues the HCS Award. The applicant must submit proof of contacts made on or after January 1, 1968.

Conditions: Many Hungarian stations in each call area have special cards for the



The Worked Hungarian Districts Award available from the Hungarian Radioamateur Society.



The Hungarian Castle Series issued by the Hungarian Radioamateur Society.

HCS award, from number 1 to number 36. The HCS award is issued in three levels: Bronze: Nr 1-12 or Nr 13-24 or Nr 25-36.

Silver: Nr 1-24 or Nr 13-26.

Gold: Nr 1-36 (all cards).

Following is the distribution of QSL numbers by call areas:

HA, HG1—7, 22, 25, 31
 HA, HG2—6, 8, 12, 15, 21, 23, 30, 32, 35
 HA, HG3—3, 14, 23, 30, 32, 33, 35
 HA, HG4—17, 23, 30, 32, 35
 HA, HG5—1, 13, 36
 HA, HG6—4, 10, 11, 34
 HA, HG7—2, 5, 19
 HA, HG8—16, 20, 24
 HA, HG9—18, 27, 28, 29
 HA, HG0—9, 26, 29

All correspondence should be sent to MRASZ Award Committee, P.O. Box 20, Nagytarcsa, H-2142 Hungary. Send application along with confirmation sections cut from the QSLs.

Happy Holidays, everyone!
 73, Dorothy, WB9RCY

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1110 RG8X 95% shield (mini 8).....	.19
1130 RG213/U 95% shield mil spec NCV jkt.....	.39
1140 RG214/U dbi silver shld mil spec.....	1.85
1705 RG142B/U dbi silver shld, teflon ins.....	1.50
1310 RG217/U 50 ohm 5000 watt dbi shld.....	1.05
1450 RG174/U 50 ohm .100" od mil spec.....	.14
1410 RG58/U mil type 50 ohm 95% shield.....	.14

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PL259TS PL259 teflon ins/silver plated.....	1.59
PL258AM Amphenol female-female (barrel).....	1.65
UG175/UG176 reducer for RG58/59 (specify).....	.22
UG21D N plug for RG8,213,214.....	3.35
UG83B N jack to PL259 adapter, teflon.....	6.50
UG146A SO239 to N plug adapter, teflon.....	6.50
UG255 SO239 to BNC plug adapter, Amphenol.....	4.75
UG255TS SO239 to BNC Teflon Silver.....	5.95
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UG175S/UG176S reducer (silver) specify.....	.45
UG88C BNC plug RG58,223,142.....	1.45
UG273 BNC jack to type N.....	4.05
UG58A type N chassis receptacle.....	2.35

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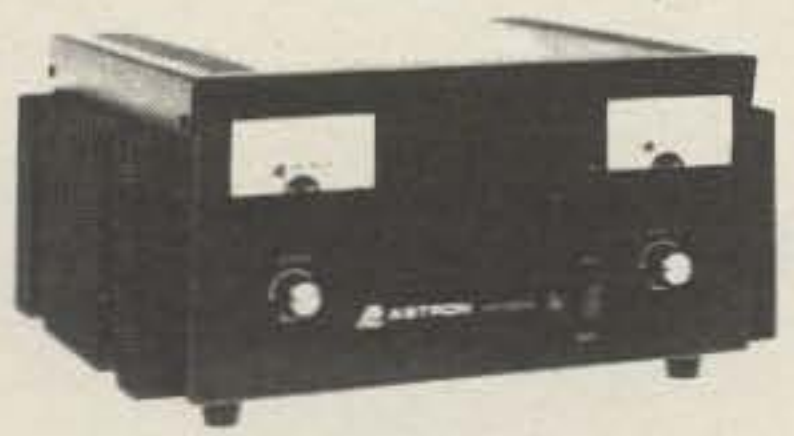
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- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)



MODEL VS-50M

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 3/4 x 7 3/8 x 9 3/4	12
SL-11R	•	•	7	11	2 3/4 x 7 x 9 3/4	12
SL-11S	•	•	7	11	2 3/4 x 7 3/8 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-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

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) @13.8V	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 3/8 x 9 3/4	12

NEWS/VIEWS OF ON-THE-AIR COMPETITION

A Cookbook for Low-Power Contesting

One of the problems of contest reporting is that we often spend too much time focusing on the "big guns"! Over the next several columns I am going to give some attention to a sorely needed topic: contesting for the little guy. I hope you enjoy this subject as much as I have enjoyed reporting on it.

In this month's edition we have the pleasure of reading some expert commentary from Tom Owens, K7RI. Tom's comments represent the perspective of a contester whose goal was to win the low-power category of the 1991 CQ World-Wide DX Contest—from the Pacific Northwest. He has a good 50' x 100' city lot location on a hill in Seattle, Washington. One tower supports two phased tribanders, a 2-element monobander on 40, and two slopers on 80. The tower serves as a vertical on 160. His rig is an FT-1000D.

A Sound Approach to Contesting From an Average Station

By Thomas J. Owens, K7RI

Ham radio contesting can be a lot of fun, even for those of us with modest stations. The idea, of course, is to have a good time. By defining what you hope to accomplish and writing down the prerequisites necessary to bring it about, you will be better equipped to make whatever preparations are necessary in time for the starting gun.

Good planning sets the tone for an entire contest. By having and using a practical game plan, you will be able to compete more effectively—even with stations superior to your own, but whose operators lack a sound plan of attack. If a high score is not your main objective, this article will still increase the likelihood of a satisfying contest experience. And if score is your main concern, you will have an edge over much of your competition.

Realistic Goals. Assessing your station's strengths and weaknesses and your skills as a contest operator is the first step. This is important before each contest because rules, personal objectives, band conditions, operator skills, and the configuration of your station itself can vary from one year to another.

Only by understanding what your station is capable of at the present point in the sunspot cycle can you design a challenging yet realistic band plan. If your 100 watts is capable of working 6 countries and 6 zones on 80 meters, you know not to spend much more time on that band

Calendar of Events

Nov.	21-23	ARRL Sweepstakes SSB Contest
Nov.	28-29	CQ WW CW DX Contest
Dec.	4-6	ARRL 160 Meter Contest
Dec.	6	Finland 75 Years Anniv. Contest
Dec.	12-13	ARRL 10 Meter Contest
Jan.	1	ARRL Straight Key Night
Jan.	2-3	ARRL RTTY Roundup
Jan.	2-3	Michigan QRP Club CW Contest
Jan.	16-17	HA DX Contest
Jan.	23-25	ARRL VHF Sweepstakes
Jan.	29-31	CQ WW 160M CW Contest
Jan. 30	- Feb. 7	ARRL Novice Roundup
Feb.	7-8	1993 Classic Radio Exchange
Feb.	13-14	New Hampshire QSO Party
Feb.	13-14	EA RTTY Contest
Feb.	20-21	ARRL DX CW Contest
Feb.	26-28	CQ WW 160M SSB Contest
Feb.	27-28	RSGB 7 MHz CW Contest
Mar.	6-7	ARRL DX SSB Contest

once those totals have been realized. Why? Because it likely can be spent more profitably on other bands, or even sleeping. Information such as this enables you to set viable band-by-band objectives tailored to what you want to accomplish.

How much advance preparation is required

depends on what goals you decide upon, how well honed your contesting skills are, and the condition of your station. The key to enjoying a contest is to set realistic goals, both in terms of how much time you are willing to spend and what you hope to accomplish. Are you trying to work that last state or country on 10 meters? Enough countries to complete DXCC? Maximize your score, win all the marbles in your state or call area; or, perhaps, even win the country in your entry classification?

By preparing well in advance, you are able to avoid common pitfalls, capitalize on conflicting opportunities that arise during the contest, and cope with unpredictable events without losing your overall focus.

Band Plans. If score is the objective, you need to understand the mechanics of how it is computed and design a band plan accordingly. From the Pacific Northwest, for example, it is not possible to work as many zones and countries as someone with a similar station in most other parts of the country. On the other hand, under certain conditions it is feasible to work appreciably more contacts—that helps level the playing field. A very aggressive low-power band plan for the 1991 CQ World-Wide SSB DX Contest is illustrated in Table I for a Seattle station. Those numbers would have resulted in a score of about 1.4 million. As it turned out, no one in the country scored that high in the low-power



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category. Nevertheless, it is better to set expectations high if maximum score is your main objective.

Consider this. A serious East Coast rival would shoot for higher multiplier totals, especially on the low bands, but QSOs in the aggregate would be significantly lower. The point: useful band plans are highly personalized. They capitalize on strengths, minimize weaknesses, and are

Band	QSOs	Zones	Countries
160	5	4	4
80	15	6	6
40	80	20	30
20	200	30	60
15	500	35	70
10	600	35	80

Table 1—A very aggressive low-power band plan for the 1991 CQ WW SSB DX Contest in Seattle.

tailored to conditions in your part of the country. In addition to setting targets for mults and QSOs, they consider different styles of operating at various times throughout the contest that increase the probability of achieving those totals. That means striking a balance between running stations yourself and hunting for missing multipliers. More on this later.

Commitment. Once your objectives have been established, it is necessary to make two types of commitment: station and operator.

Antennas and all other station equipment should be reliable and working properly. Negative external factors such as power-line noise or electric-fence problems must be identified and resolved before the contest. If you intend to use a computer for real-time logging and have not done so before with the identical computer and software you will be using, run tests to be sure your receiver is not interfered with by the computer and associated peripherals and that RF does not trash visual displays that will appear on your monitor or otherwise raise havoc with the computer. Be sure to make all tests at the maximum power level you will be using and do

so on each band and every antenna or combination of antennas that will be used. Leave ample time to correct these and any interfacing problems that may arise. Several weeks are suggested. (For serious efforts, backup equipment is advisable, even if it is necessary to borrow from a friend.)

From an operator standpoint, physical rest in the days before the contest is a must if you hope to effectively deal with the fatigue a 48-hour contest can visit upon all but the youngest of contesters. That means striking a prudent balance between familiarizing yourself with band conditions a day or two early and getting some extra sleep. Efforts in this regard pay handsome dividends, especially for those of us who are less proficient at handling sleep deprivation. Psychological preparedness is equally important. One key to a top-ten ranking is to maintain your focus and good judgment during the heat of the battle, both during discouraging conditions and periods when several bands are hot at the same time. That means having a mindset in sync with objectives, being able throughout the course of the contest to understand where you are in relation to your ultimate goal, and making whatever adjustments are necessary. For this operator, the goal is usually maximum score, but for you it may mean something else.

Computers. Most serious contesters use computers real-time to do their logging, duping, multiplier tracking, scoring, and other record keeping. Good contest software lessens operator fatigue during the contest and can help you maximize your score. It also eliminates hours of pre-contest preparation and post-contest paperwork. When the contest is over, it is over; no more time spent over logs and dupe sheets to determine how well you did. The computer has



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Gail, KA3ITN



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At K7RI we started logging contests live in 1981. Besides introducing another dimension of fun to contesting, it provides a very real edge over stations that are not computerized. A word of caution, however, is in order. Become proficient at using the software well in advance of the contest! You need to be thoroughly familiar with the program's on-line features and use them often. That means lots of practice beforehand. It also helps if you are able to touch-type, although lightning speed is not necessary. Using important software features should be intuitive during the contest.

General Strategy. Understanding how scores are computed is essential if you expect to make the decisions necessary to really maximize your score. The final score is simply the result of total QSO points multiplied by the total number of multipliers. For example: 2100 points \times 300 mults = a final score of 630,000.

In reality, the CQ World-Wide DX Contest may be thought of as *three* contests, or, if you will, modes: one of rate, one of mults, and one of trade-offs.

The object of rate mode is to work as many DX stations as possible over an extended period of time, regardless of whether or not they are a new multiplier. That means controlling a frequency by calling CQ and working stations that call you. The idea is to create your own pileup so you can amass a large number of QSO points relatively quickly. This necessitates speaking fast, being able to pick out calls almost immediately and recognizing instantly whether or not you have already worked that particular station on the current band. The challenge is to hold the

frequency, sustain the pileup as long as possible, and work through it as quickly as you can.

The object of mult mode is to only work stations that are new multipliers—that is, a new zone or country on the current band. That entails being on the right bands at the right time, systematically tuning them, locating new multipliers, and working them as quickly as possible. The idea is to find other stations that are CQing, determine if they are a new multiplier,

and, if they are, work them right away. This necessitates breaking a pileup and that requires good timing, brute force, or both. The challenge is to locate and work new mults in a hurry and not waste much time when you can't break the pileup (come back to it later or find another station for the multiplier). Keep in mind that new zones are double mults in that they will count for both the zone and a country. Accordingly, they are worth more time to work if necessary.

Getting Your Feet Wet

1. Assess your station. Based on your station's known capabilities, list all six bands and project the number of zones, countries, and QSOs that your station is capable of working. (Be sure not to forget the US and Canada as countries and zones 3, 4, and 5 on each band. The same is true for Mexico and zone 6.)

2. Make a band plan. After deciding the times of day and night you are willing to commit to the contest, make a band plan that sets specific goals for each band. (If not familiar with the contest rules, read them.)

3. Set a realistic scoring goal. Add the total number of projected zones for the six bands. Do the same for countries. Add those two numbers together to determine how many multipliers you anticipate. Then total all projected QSOs and multiply that figure by 2.5 to estimate your QSO points (this assumes only a handful of US stations and not too many dupes). Finally, multiply the total number of multipliers times QSO points to determine your projected score. Make whatever adjustments are necessary to your scoring goal and band plan if you want to manipulate the number to get a higher score.

4. Use a computer. If at all possible, use a computer with contest software. Borrow this equipment from a friend if you do not have your own and someone will accommodate you. (An alternative is to guest op at a station that has this equipment.)

5. Make some operating aids. If the use of a computer is out of the question, make the following operating aids for each band: summary sheet, zone check-off sheet, country check-off sheet, and dupe sheet. (Ask a friend or acquaintance familiar with contesting to lend a hand. Most testers are more than willing to help.)

6. Have a good time. Try to meet your scoring objective, but having a good time should take priority. If you like, invite a friend to guest operate with you.

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Trade-off mode is a little different. Its purpose is to do whatever will contribute most to your score at a particular point in time during the contest. That means remaining flexible and knowing how many QSOs it would take to equal one new multiplier. The idea is to avoid passing over stations and multipliers that may not be available later in the contest. This requires dropping other priorities at the time if the multiplier in question is rare or otherwise not likely to be available later in the contest due to changes in propagation or limited participation on the part of that operator. In such cases, the station should be worked NOW if at all possible. This is the most difficult mode. It requires instincts that come from years of experience and up-to-date knowledge of what currently is needed.

Out West. In the Pacific Northwest we have fewer and shorter openings to Europe and Africa than do other parts of the country. Poor conditions and flares can keep us from working even the most active countries in Europe and Africa. Can you imagine not hearing a G, LA, OH, or SM on 10, 15, or 20? Yes, we often have long openings to Asia and that helps, but the huge decline of JAs who participated casually and answered our CQs several years ago has nullified that advantage significantly. JA runs simply aren't the bread and butter they used to be, and the three low bands present a tough task as far as a volume of multipliers is concerned. Most of us simply aren't loud enough to cut through the majority of the QRM. Sometimes, however, we have middle of the night openings on 20 and 15 to Europe that no one else in the country seems to get and that helps our high-band totals.

In short, making the top ten as a single op in the all band category from the Northwest is a real challenge. Conditions have to be just right.

A Seattle Game Plan. Since an average station cannot compete with other parts of the country as far as multipliers are concerned, we have to make up for it with more QSOs. A general game plan might look like this:

First 24 Hours. From start of contest run JAs as fast and long as possible on 10 and 15 until they close. The band with highest rate takes priority, but 10 is favored until dead if rates are about equal. A balance of contacts is preferred. The sole goal is rate, rate, rate, but some mults call too—good conditions bring a smattering of Scandinavians, South Americans, Asians, and Pacific. When 15 dies, move to 40; if an opening and workable, 30 minutes looking only for new European mults. Then 20 for all available mults (lots of Europe): a balance of run and search and pounce. Back to 40 to the Caribbean and South America for new mults only. Check 20 and 15 for any over the top openings. If there, work as long as productive (rate and mults). If not there or when over, back and forth between 40, 80, and 160 for whatever easy mults are there. When 40 opens to JA, run and call JAs until sunrise with periodic checks of the low bands for easy mults. At sunrise, 10 to South America and Caribbean until Europe opens on 10, 15, or 20. When Europe opens, try to get rate by running them; otherwise, call every station you hear that is not a dupe. Bounce between top three bands and try to keep mults equalized as much as possible. Must exercise extreme care not to miss short openings to Africa on top three bands. The goal is rate and mults. When JA path opens again, sole goal is rate.

Second 24 Hours. Around 0000 UTC check the early 40 opening to Europe for new mults only; also, work whatever other mults you can. Milk what's there. Back to 10 and 15 for rate to JA

but periodically tune top three bands for new mults during JA runs. Back to 20 for Europe, Pacific, etc. Check over the top on 20 and 15 again. More effort on 160, 80, and 40 looking for mults that are easier to get the second night. Mult chasing off and on all night along with the rate game to JA until sunrise.

The second day is a repeat of first with more emphasis on mults, especially during the last opening to different geographical areas. Timing is more important and special emphasis is given to the trade-off between working new mults versus more QSOs; also keen awareness to the probability of working double mults. If JA totals are too low, more time on them when that path reopens. That means burst runs every 30–40 minutes alternated with mult hunting expeditions across the various bands. Last three hours devoted to new mults on 10, 15, and 20 plus bursts of rate to JA. Final 30 minutes on 40 if Caribbean or other easy mults are missing.

Low Power Strategy. For the most part, everything so far applies equally to running low or high power. The focus narrows now to consider low-power contesting more closely. As above, illustrative comments address the all band category of the CQ World-Wide DX Contest.

Maximizing score means working as many zones and countries as possible on 160–10. It also means logging as many different DX stations as you can on each of those bands. Avoid multiple QSOs with a station on the same band; such dupes take time yet add nothing to the score. One stateside QSO is needed on each band for the country multiplier, as is one contact with zones 3, 4, and 5. Other US QSOs have no value and should be avoided unless, of course, another stateside station needs you for a multiplier.

As with high power, it is imperative to track your progress throughout the course of the contest and adjust your operating style to compensate for missing multipliers and too few QSOs. From two perspectives, timing is more important in the low-power category. First, seldom will you be able to break pileups by virtue of being louder than everyone else, although you should test the waters and try. Second, multiplier and QSO deficiencies must be watched more scrupulously and care taken not to miss any opportunity to overcome them, lest it go unrealized.

A few proven strategies are discussed below. It is a foregone conclusion that by becoming more proficient at using them, your score will improve—often dramatically.

Search and Pounce (S&P). Here the idea is to systematically scan an entire band, identify what is there, and bag your prey as it is encountered. Start the expedition at 14.150, for example, and slowly traverse the band to 14.350. Accurately identify every station you can and work it before QSYing. Two variations of spectrum safari exist: work every DX station that is not a dupe, or only stations that are new multipliers. Which you choose depends on whether or not rate is your objective at that particular time in the contest.

Controlling a frequency and running stations for hour after hour is rarely possible without high power and lots of gain. Accordingly, low-power contesting is mostly a search-and-pounce affair. Our rate contest is mainly the first variation of spectrum safari.

Charting the Bands. When searching and pouncing the bands for new mults, time can be saved by making a note of stations (and their frequencies) you cannot work. The idea is to keep checking back a little later and trying again.

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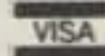
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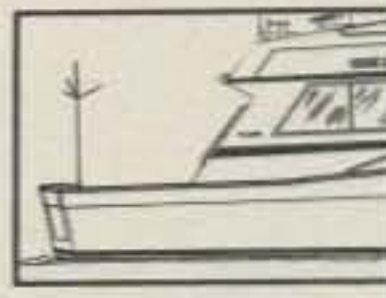
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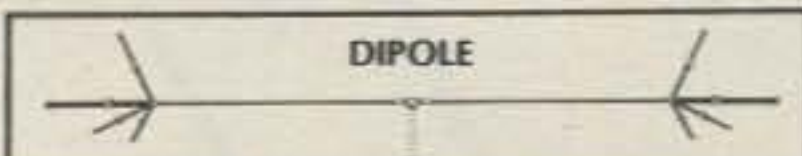
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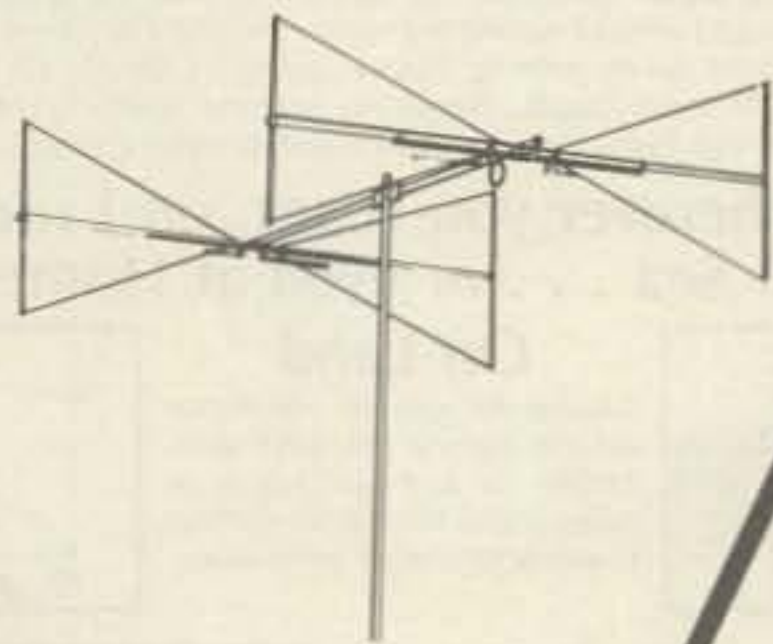
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Propagation may favor you then and a quick contact may be possible. If your radio has memories, use them for this purpose. Otherwise, write down the frequencies and calls on a piece of paper. (If you're using contest software, put both the frequency and call in the program's memory.)

It's amazing how much more you can add to your score by doing this. Low-power buffs may also want to consider noting all unworked stations, not just those which would be new mults.

Breaking Pileups. You need persistence and finesse. To get through it is often necessary to observe the other operator's rhythm and time your calls just before the beginning of the pileup (not always easy), or a lull in it. Crisp, well-timed calls with undistorted audio yield the best results. When using phonetics, don't get cute; use the standard ones (Bravo not Barcelona in honor of the Olympics!). If you can't get through, it may be necessary to wait until the path improves or for another stronger opening. A suggestion: Keep in mind that any other multiplier will do the same for your score. Often it is necessary to just move on and not bloody yourself any longer. Give up. That's right. Give up—on that station. When the pileup on big signals is just too great, reach for your VFO. Tune across the band. You may find weaker stations in the same country or zone begging for contacts elsewhere on the band (try the high end). This works especially well for very active zones and countries with modest to extensive activity.

A key to success with low power is not getting hung up trying to break all the pileups. It can't be done, even with high power. Use the mosquito technique. If you can't draw blood fairly quickly, buzz the bands and move to the next available donor.

Running (Your Own Pileups). We petite pistols find it advantageous to slither off to some secluded scrap of spectrum and, although in jest, nefariously promise all comers a case of beer and tickets to the Super Bowl. In any event, the time to run stations is when you get your best rate. Usually this is during the peak of an opening to areas of the world with lots of activity. From out West, decent rates are sometimes possible to JA on 10 and 15 before the bands close. It is quieter and big guns are armed and blasting away elsewhere.

The best hope with low power is spurt and sputter rates. Here's how that goes. When most workable stations have been logged and switching bands is not the answer, find a *clear* frequency high in the band and call CQ like a big gun. But speak *much more slowly and casually*—no fever pitch tone in your voice! Often this technique can produce higher rates than continuing to search and pounce, because you will attract new and sometimes rare stations who want activity yet shy away from BIG pileups and ops with lightning tongue.

Yes, it works. But don't count on it lasting forever. In time, someone will drive you off the frequency—usually sooner than later. Nevertheless, think positive and try it. The results may surprise you.

Running vs. S&P. Often during a contest we have to choose between conflicting opportunities. With hot band conditions, high rates are possible. That means lots of needed QSO points in a hurry and getting them when it is easiest to do so. Yet this time is also usually one of the most multiplier-rich periods in the entire contest. You don't want to squander either of these opportunities, especially if the opening is likely to be short-lived or is the last one of the contest to a particu-

lar part of the world. So what should you do? Run or search and pounce? The answer lies in your band plan. Look at it to see where you are in relation to those totals. It will be evident where you are most deficient and that area often provides the greatest probability for improvement.

Mults = QSOs Tradeoff. To help answer the run versus search-and-pounce question, take a look at how many QSOs would have to be worked to equal one new multiplier. If that ratio was 1 mult = 11 QSOs, you would opt for rate provided eleven good contacts could be logged faster than one new multiplier. Searching for multipliers would be the choice if you could continue to work one new mult faster than eleven non-duplicate contacts.

Software. Contest programs are a topic of their own. Suffice it here to say that besides performing the logging and duping functions, they provide needed information and help the operator make the right decisions during a contest. For the uninitiated, consider the following questions.

1. Which zones are missing on this band?
2. What countries are missing on this band?
3. Is the zone or country of the guy I'm working needed on any other band(s)? Is he willing to QSY with me to another band where I need him?
4. Is my rate high enough right now?
5. Should I keep running stations or search and pounce for *all* the unworked DX stations I can find?
6. Should I search and pounce *only* for new mults or continue my pileup?
7. What can I do while running stations to effectively hunt mults at the same time?
8. Other than running a partial call search, is there a reliable way to avoid duping stations that I call when searching and pouncing?
9. I hear L2AB and don't know what country he is in or where to point my antenna. What should I do?
10. On what band am I missing active DXpeditions?
11. What if I copy two or more stations at the same time during my runs? Can I enter them simultaneously?
12. I only heard part of his call. How can I tell if we worked before?
13. How can I chart the bands so I can tell stations that are new mults from those which are simply unworked?
14. Is there a fast and easy way to log ops who only give their suffix when they first call during my pileups?

In Perspective. Answers to a few of the issues posed above are not always crystal clear, but a good software program can provide most of the information that needs to be considered. No program, however, is a substitute for your own good judgment. Even so, stations that are computerized have a significant edge over those which are not. And, as mentioned earlier, being computerized certainly adds another element of fun to contesting.

Conclusion. This article was written with the idea of helping low-power operators maximize their score and have fun doing it. As a friend used to say, contest long and enjoy it. May the gods of propagation be with you.

Final Comments

I'll be running complementary columns over the next several months from different geographic perspectives as well as a

look at QRP! Hopefully, you'll learn a new trick or two to maximize *your* future contest score.

Although hard to believe, the holiday season is already upon us. My family (Barbara, Timothy, Katelyn, and Kendra) and I wish you a safe and joyous time with friends and family. And as always, please remember that the deadline for the April issue is February 1st.

73, John, K1AR

December's Contest Tip

If you don't think you can run stations at the beginning of the contest, spend 30 minutes prior to the opening gun logging multipliers. Ten or 20 memories loaded with multipliers' run frequencies can really help you get off to a fantastic start!

Independent Finland 75 Years Anniversary Contest

0000-2400Z Sun., Dec. 6

The Finnish Amateur Radio League (SRAL) has the pleasure of announcing a special event contest in celebration of the 75th year of independence of the Republic of Finland. This special occasion will be held on Finland's day of independence. The purpose of the contest is to establish as many friendly contacts as possible between the OH operators and the rest of the world in celebration of this special occasion on CW and SSB. Finnish stations can be identified by their OH and OG prefixes.

Categories: Single Operator (All Bands or Single Band), Multi-Single, QRP (maximum 5 watts output), and SWL.

Exchange: RS(T) and serial number beginning with 001. OH/OG stations will be sending RS(T) and a 3-digit OHC number (Finnish county).

Multipliers: Each OHC-number is a multiplier once in the contest. Additionally, ten special event "FIN" suffix stations (e.g., OG1FIN) will be activated and worth 5 extra multipliers per band worked.

Scoring: Each valid QSO is worth one point. The same station may be worked on CW and SSB per band. CW and SSB QSOs must be made on the appropriate subbands. Final score is total QSO points times total multipliers.

Certificates and special prizes will be awarded to top scorers in each category. Each DXCC country and US/JA call area winner will be awarded a special certificate. All entries must be postmarked no later than December 31, 1992 and sent to: The Finnish Amateur Radio League (SRAL), Attn: Jukka Kovanen, OH3GZ, P.O. Box 44, SF-00441 Helsinki, Finland.

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YO 5.0 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, and minimum SWR. YO models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground effects, and construction tolerances. YO works from HF to microwave with Yagis of up to 50 elements. YO runs hundreds of times faster than MININEC. YO is calibrated to NEC for high accuracy and has been extensively validated against real antennas. YO is intuitive, highly graphical, and fun to use. YO 5.0, \$100. YOC 5.0 (assembly language algorithm kernel, much faster, coprocessor required), \$130.

NEC/Yagis 1.0 provides highest-accuracy analysis of Yagi designs with the professional-standard Numerical Electromagnetics Code. NEC/Yagis 1.0, \$50. Coprocessor, hard disk, and 640K memory required.

MN and YO include both coprocessor and noncoprocessor versions as well as comprehensive antenna-design libraries. All programs include extensive documentation. Inquire about commercial licenses. Add 7.25% CA, \$5 overseas. Visa, MasterCard, U.S. check, cash, or money order. For IBM PC, 3.5" or 5.25" disk.

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ARRL 10 Meter Contest

0000Z Sat. to 2400Z Sun., Dec. 12-13

This is the 20th annual 10 Meter Contest organized by the ARRL. It's a worldwide activity in which DX stations can work other DX and are not limited to working W/Ks and VEs only.

A maximum of 36 hours operating time is permitted out of the 48-hour contest period for all stations. The same station can be worked on SSB and again on CW for QSO points.

Categories: Single operator, mixed mode, SSB only and CW only. Multi-operator, single transmitter, mixed mode only.

Exchange: W/VE stations (including KH6 and KL7) send RS(T) and state or province. DX stations (including KH2, KP4, etc.) send RS(T) and QSO number starting with 001. Maritime or aeronautical mobile, RS(T) and ITU region. Novice/Tech must identify (I/N or I/T).

Scoring: SSB QSOs are worth 2 points, CW 4 points, Novice/Tech CW QSOs 8 points.

Multiplier: U.S. states (50 plus District of Columbia), Canadian provinces (NB, PEI, NS, VE2-8, VY1, VO1, VO2), DXCC countries, and ITU regions (1, 2, or 3).

Final Score: Total QSO points times the sum of U.S. states, Canadian provinces, DX countries, and ITU regions, per mode.

Awards: Certificates to the top-scoring single operator station in each category (including I/N and I/T) for each ARRL section and DXCC country. And to the top-scoring multi-operator station in each ARRL division and each continent.

Indicate the multiplier only the first time it is worked. Dupe sheets are required for logs with 500 or more QSOs. The usual disqualification criteria will be enforced. A large SASE will get you log and instruction forms.

Mailing deadline for all entries is January 15th to: ARRL 10 Meter Contest, 225 Main Street, Newington, CT 06111.

ARRL Straight Key Night

0000Z to 2359Z, Jan. 1
 (7 PM Thurs. to 7 PM Fri., EST)

This is a friendly meeting on the air using a straight key only. Suggested frequencies on 80, 40, and 20 meters are 60 to 80 kHz up from lower band edges, 10 kHz from lower Novice bands.

Use SKN instead of RST in the exchange to clue in other stations. Include a list of stations worked plus your vote for the best fist heard during that period (not necessarily one you've worked).

This is not a contest, so any additional chatter is encouraged.

Send your report and vote for "best fist" and "most interesting QSO" to ARRL SKN, 225 Main Street, Newington, CT 06111 by January 10th.

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CQ WW 1991 SSB Contest Errata

CU3LF should be listed with the low-power entries. His result (1,131,760 points) places him as the #2 Europe low-power all-band entry.

KE6UP was erroneously omitted from the results. His final tally was 140 QSOs/48 Zones/60 Countries for a score of 38,340 in the low-power all-band category.

G3NKC was erroneously omitted from the results. The team's final score was 3,105,797, #1 England Multi-Single. Credit is given to the fine operating team of **G3NKC, G3NAS, G3VHB, G3KDB, and G0ES.**

JF3LOP was erroneously omitted from the results. He should have been listed among the Single Operator, 14 MHz High-Power entries in Japan.

N7AVK should be listed with the Single Operator, All-Band entries as #1-W7. His score was mistakenly listed as a Single Operator Assisted score.

WA0QOA/2 was erroneously omitted from the results. He should have been listed among the Single Operator, All-Band entries with a final score of 393,499.

W3AP was erroneously omitted from the results. The team's final score was 4,408,340, #2-W3 Multi-Multi. Credit is given to the excellent operating crew of **W3AP, NE3F, KS3F, NT3V, NZ3G, and KD3FK.**



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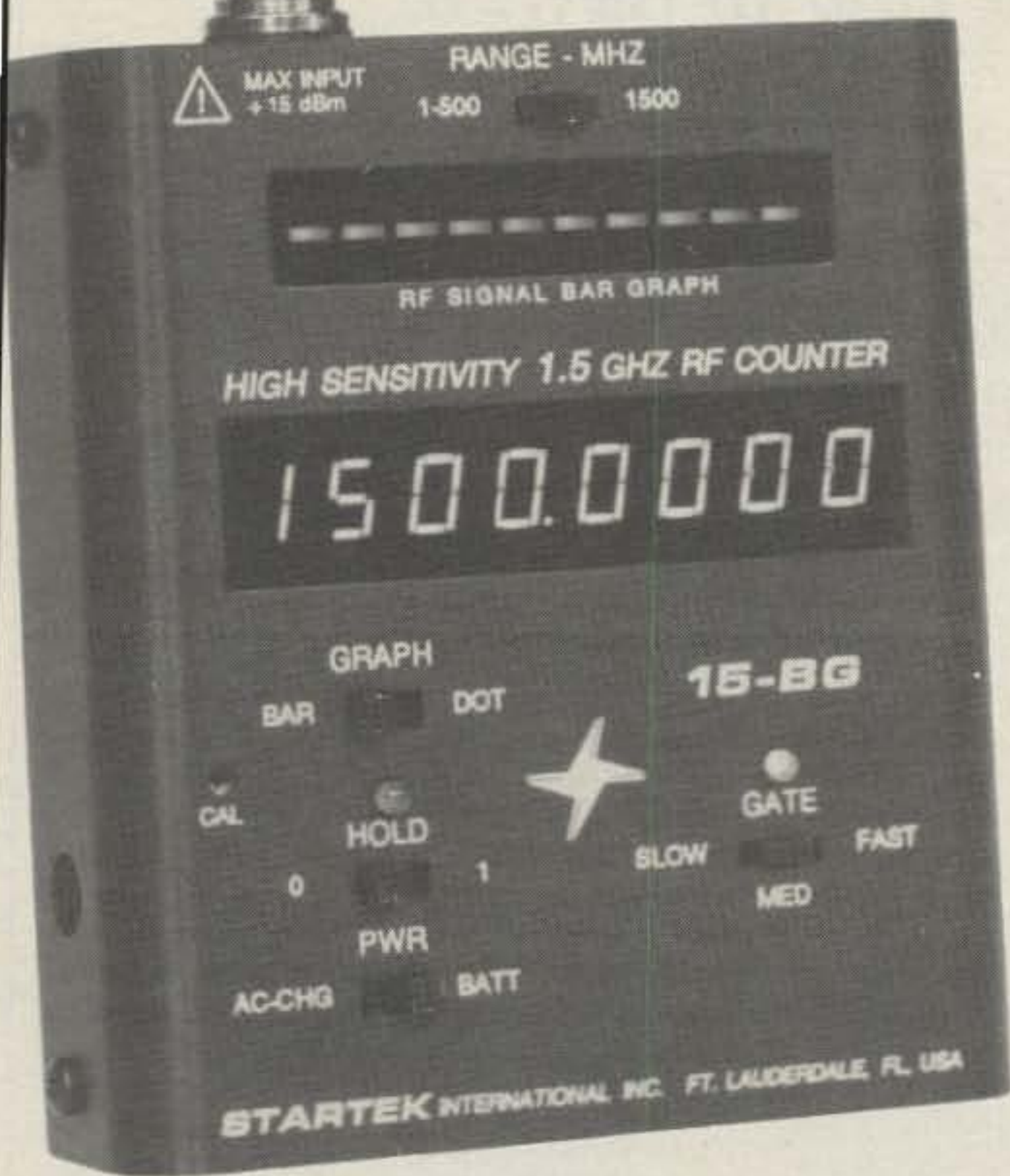
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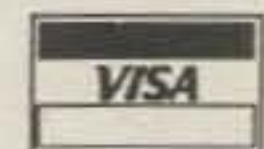
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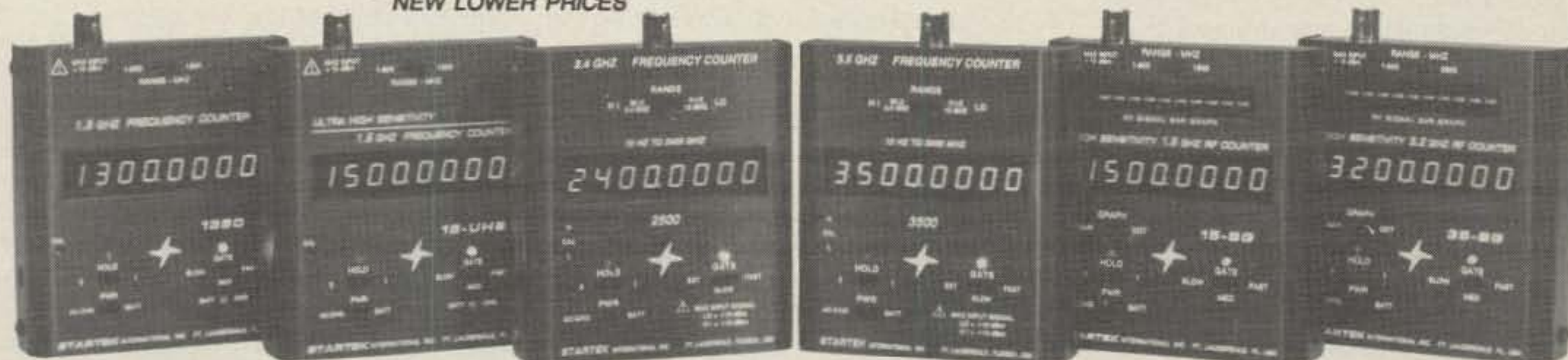
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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

The 1992 Amateur Radio Year in Review

Every year about this time we pause to reflect on the amateur radio happenings of the year. Amateur radio keeps changing, and 1992 was no exception! Here are what we feel are the major amateur radio stories of the year.

Amateur Radio Grows!

Perhaps the biggest story of 1992 is the continued success of the Code-free Technician Class ticket. Everyone remembers what happened five years ago with "Novice Enhancement." The FCC's objective in this 1987 proceeding was to strengthen sagging interest in amateur radio by giving beginners a sampling of voice operation. They still had to learn the Morse code, however.

Novice Enhancement supposedly was to be the salvation of amateur radio. But it didn't work out that way. After starting off well, interest quickly subsided, and amateur radio was back in the doldrums again. The message learned was loud and clear: New amateurs liked the 10 meter and VHF voice privileges, but continued to show little interest in learning Morse code. Microcomputers came into their own in the 1980s. In the high-tech world of personal computing, beginners considered manual telegraphy an archaic form of digital communication.

The big question in code-free hamming was would the enormous initial interest wear off just as it did with Novice Enhancement. And since the public now had two entry routes into amateur radio, what effect would it have on the Novice Class? Having two entry paths into amateur radio actually was not the FCC's original plan.

The FCC earlier believed that the Novice Class would be far less popular than VHF entry, and therefore possibly unnecessary. When the amateur community violently objected to eliminating the Novice Class, however, the FCC retained it as an alternate route into amateur radio. The idea here was that youngsters might find learning the code easier than the more complicated Technician written examination. Frankly, it appears that the FCC's initial strategy was the right one.

*National Volunteer Examiner Coordinator,
P.O. Box 565101, Dallas, TX 75356-5101
(817-461-6443)*

The first No-Code Tech license was issued in March 1991. Everyone was waiting and watching to see how many newcomers would be joining the ranks starting in March 1992. Would it drop off? Well, the statistics are in and the good news is that interest in code-free hamming is indeed continuing.

More than 25,000 people became amateurs during the first six months of no-code in 1991—a whopping increase of more than 70% over 1990. The good news is that more than 27,000 applicants joined the amateur ranks during the same period in 1992—an increase of nearly 8% over 1991's big figures. And there can be no doubt that the Codeless Technician Class is the path of choice. The number of new Novices is now declining dramatically.

At the beginning of 1991 the census of amateur operators was a shade over 500,000. In August 1992 (the latest month for which I have FCC statistics) the amateur census stood at nearly 580,000—an increase of nearly 16%. The number of Technicians, however, jumped from 127,000 to more than 185,000—more than a 45% gain. In other words, three quarters of the increase in the total number of amateur radio operators is simply due to the Technician Class! Novice operators, on the other hand, increased less than 5% during that period, from 94,000 to 98,000. I certainly would call the new Technician Class an overwhelming success.

The popularity of VHF/UHF repeater, satellite, and data communications, especially on 2 meters, is also a primary reason for the popularity of the Technician Class. Ten years ago there were far more Novices than Technicians. Back then, HF operation was the mainstay of amateur radio. While the number of Novice operators has increased only about 15% during the past decade, Technicians have skyrocketed by nearly 250%.

The FCC has now proposed to discontinue the separate Novice testing program and bring it under the VEC System, which examines all other classes. In 1990 eighty percent of all newcomers entered amateur radio at the Novice level. For the first eight months of 1992 seventy-five percent have joined at the Technician Class level.

The "Experimental World Above 50 MHz" has now become the backbone of amateur radio communications. You can do everything on the microwaves you could on the high frequencies—and with

greater reliability and (usually) at less cost. While we old timers may look upon the code key with nostalgia, we must face the fact that it has been replaced by the microprocessor.

Changes To Business Rule

On June 18th the FCC released the long-awaited Notice of Proposed Rule Making looking toward relaxing restrictions on business communications. The American Radio Relay League had earlier asked the Commission to modify the Section 97.113 "Prohibited Communications" rule to allow for more public-service activities. The League suggested expanding some business-related amateur radio operations and permitting communications which might be provided through other radio services as long as it was not conducted on a regular basis.

The Commission used the ARRL's proposal as the basis for their NPRM. The public comment period on this matter closed on October 1st, and the FCC is now digesting everyone's views. We will probably see a change in the amateur radio prohibited communications regulations sometime around mid-year 1993.

1992 WARC

Representatives from 164 nations met in Spain last February for the 1992 World Administrative Radio Conference to consider high-frequency broadcasting and new space radio services such as high-definition television, low Earth orbiting satellites, satellite sound broadcasting, and new mobile satellite services. Amateur radio matters were not on the agenda, but our frequencies could have been affected, since spectrum had to be found to accommodate the new services. Particularly at risk were our Amateur Satellite Service frequencies.

Fortunately, WARC-92 had very little impact on amateur spectrum. One of the major results, however, was the adoption of a resolution stating that it was desirable for the Amateur and International Broadcasting Services to have exclusive (rather than shared) allocations at 40 meters. The resolution agreed that a future WARC should consider realigning the 7 MHz Amateur Service allocations.

FCC Rejects Amateur Spectrum Protection

Almost assuredly, HR-73, the Amateur Radio Spectrum Protection Act, isn't going anywhere. The bill, which has dozens of Congressional co-sponsors, would prevent the FCC from diminishing amateur frequencies without providing equivalent replacement spectrum.

The FCC is opposing the legislation and says the bill would restrict their future capability to react to changing requirements. They said, "The effectiveness of the Commission's spectrum management policy depends on its ability to amend the table of frequency allocations when public interest and the nation's telecommunications needs require revisions of spectrum use. Further, the Commission needs flexibility to respond in the best interest of the United States in international spectrum allocation matters to meet future requirements." The FCC also believes enactment of the bill will set a bad precedent, since it would encourage other radio services to also ask Congress for similar spectrum protective legislation.

Focus on RFI Shifted to Cause

Early in the year the FCC began redirecting its focus on radio frequency interference handling from investigating individual complaints to working with electronics manufacturers and exploring possible future regulatory action. While not completely discontinuing RFI investigation, consumers are now being urged by the FCC to seek help from manufacturers of the appliance receiving interference.

The Communications Act was amended several years ago to give the FCC authority to establish standards for RFI immunity for home electronic products. It has never used this authority. The Commission believes it is using too much of its resources to send out staff to look at individual problems rather than let cable, telephone, and appliance firms first try to correct the problem.

The FCC also hinted that it might decide to require RFI immune products because it is being asked to solve more interference problems with less resources and that voluntary efforts by electrical groups continue at a "snail's pace." It also noted new regulations in force throughout the European community require electronic products to demonstrate an adequate level of electromagnetic immunity from outside interference.

FCC Cracks Down On Freebanders

Last March engineers from all FCC field offices across the nation participated in an

enforcement campaign targeting the illegal radio operation that takes place between CB Channel 40 and the bottom of the 10 meter amateur band. More than 60 "freebanders" were identified, fined, and shut down.

The amount of all FCC administrative fines has been increased to coincide with a new fee schedule. Penalties are now commonly in the \$2,000 to \$10,000 area bracket.

Licensing and Callsign Changes Coming

The FCC hinted at the Annual VEC Conference held in June of some possible changes in the Commission's licensing and callsign assignment systems. Private Radio Bureau Chief Ralph Haller said that he was looking into a program called "auto grant," which would allow a 24-hour licensing turnaround through electronic filing of amateur applications. The goal is paperless communications with the FCC's licensing facility in Gettysburg, Pennsylvania. Present rules require the Commission to act on a signed license application. New FCC Authorization legislation would permit the FCC to issue a license without actually seeing an applicant's signature.

Haller also said a new computer system would be coming on-line in 1993, and that software was being written that will permit the FCC to accommodate requests for special amateur callsigns within the next three years "... although the target date is less."

Licensing of Visiting Foreign Amateurs

There are currently two ways in which foreign amateur radio operators may be licensed to operate their equipment in the United States. One is to obtain a regular ten-year term amateur radio operator's license by passing the required FCC examinations. While FCC examination opportunities are available in a few foreign countries, most visiting amateurs would have to take the tests after they arrived in the US. This is not workable, since it normally takes up to two months to receive a license from the FCC. Most foreign amateurs visit the United States for only a short period of time.

Second, citizens of the 76 countries whose governments have signed reciprocal operating agreements with the United States may, on the basis of the amateur service licenses issued by their own countries, be issued one-year permits to operate amateur stations while in this country. The FCC currently issues more than 2000 reciprocal permits annually. Many visiting foreign amateurs are ineligible for a reciprocal permit, however, because there is no reciprocal agreement

between our government and theirs.

The FCC has proposed a third way which is being termed a "temporary visiting amateur operator's license." It would complete the whole process during one quick visit to an exam session, either before or during the visit. It would work this way.

Teams of accredited Extra Class Volunteer Examiners would (1) review identification, (2) inspect the foreign amateur's license to be certain it is current; and (3) determine the extent of the operating privileges. The VEs would accept the foreign license as proof of qualification in eight of the nine operational and technical topics contained in the question pools. The topic that is not covered by a foreign license is the Part 97 Rules.

The VE team would then administer a 20-question test, Element 5. The questions would be taken from the "Rules" sub-element in each of the existing question pools. There are about 400 Rules questions in these pools. The minimum passing score would be 18 questions answered correctly. If a foreign amateur passes the examination, the VEs would make a record of the examination and issue a Certificate of Successful Completion of Examination.

This CSCE would authorize amateur operating privileges in the United States for up to a 60-day period, which could begin immediately. VEs would also be available to answer any questions that the foreign amateur might have concerning operating his equipment while in this country. The coordinating VEC would maintain a data base of temporary visiting amateurs which would be made available to the FCC on a regular basis.

The beginning and ending date of the single 60-day period would be indicated on the CSCE. Operating privileges would be those authorized by the foreign operator's own license, not to exceed those of a U.S. Amateur Extra Class operator. The visiting foreign amateur would identify his station by prefixing his callsign with the letter "W" followed by the station's U.S. numerical area location. Public comments closed on this FCC originated proposal on October 26th.

Amateur Radio Flies On Two Shuttle Missions

A total of six astronaut amateur operators orbited during Space Shuttle missions STS-45 and STS-47. All operated amateur radio extensively during their flights both individually and in conjunction with schools! Each of these missions also had a foreign amateur on board. Belgian amateur Dirk Frimout, ON1AFD, blasted off aboard *Atlantis* on March 23rd and Japanese amateur Mamoru Mohri, 7L2NJY, was part of September's *Endeavour* crew. Both were scientific missions.



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SAREX, NASA's Shuttle Amateur Radio Experiment, is designed to demonstrate the feasibility of amateur shortwave contacts between the Space Shuttle and ground amateur radio operators. SAREX also serves as an educational opportunity for schools around the world to learn about space first hand by speaking directly to astronauts aboard the Shuttle via amateur radio.

HF Packet Forwarding Dispute Settled

It was decided at the July 1992 ARRL Board Meeting to replace the five-year STA (Special Temporary Authority) which allowed an experimental system of fully automated HF packet stations with semi-automated forwarding. This meant that an on-line control operator would check the frequency before transmitting to reduce the potential that automatic HF stations would interfere with ongoing communications.

There was no question, however, that the STA participants demonstrated that HF packet is a viable medium through which data can be successfully moved. Over the years thousands of pieces of traffic have moved over the HF packet network. The move to semi-automated forwarding caused a major ripple of discontent among the backers of HF packet. They maintained that it would effectively kill the mode.

A meeting between the HF packeteers

and the ARRL's Digital Committee was scheduled for late September in Dallas to determine if an acceptable alternative could be reached. Before the meeting could be held, however, a voluntary digital band plan was hammered out on September 4th at the IARU Region 2 meeting held in Curacao, Netherlands Antilles. (Region 2 includes the western hemisphere—i.e., North and South America.)

The new international digital band plan calls for HF digital segments between 3580-3635 kHz, 7035-7050 kHz, 10.130-10.150 MHz, 14.070-14.112 MHz, 18.100-18.110 MHz, 21.070-21.125 MHz, 24.920-24.930 MHz, and 28.070-28.189 MHz. In addition, 7100-7120 kHz was selected for HF packet operations within Region 2. The U.S. delegation objected to the 40 meter digital band segments because it affected CW and Novice operations.

On September 26th the ARRL Digital Committee met with five representatives of the present HF automatic-forwarding STA networks to discuss continuing the existing operational forwarding networks while protecting the interests of other users of the bands. The adoption by the IARU Region 2 meeting of the digital band plan opened the door to reconsideration by the ARRL Digital Committee.

The end result is that the ARRL Digital Committee will now ask that the ARRL's Board of Directors petition the FCC to incorporate the Region 2 digital band plan into the US regulations.

What's in Store For Next Year?

A good question, but certainly the FCC will be acting on four of their recent Notices of Proposed Rule Making. These are (1) including Novice testing under the VEC System, (2) easing restrictions on business communications, (3) temporary licensing of visiting foreign amateurs, and (4) privatizing the examination of Commercial Radio Operators.

This last proceeding looks toward turning the administration of commercial radio operator examinations over to the private sector. The FCC asked for and obtained legislation in 1990 (Public Law 101-396) permitting the Commission to utilize persons believed qualified to prepare and administer commercial radio operator license examinations.

The background of this proceeding is identical to the 1983 proposal to privatize administration of amateur radio operator examinations. President Reagan signed the Communications Amendments Act of 1982 into law on September 13, 1982. Public Law 97-259 contained an amendment that permitted volunteers to prepare and administer amateur radio license examinations.

See you next month.

73, Fred, W5YI

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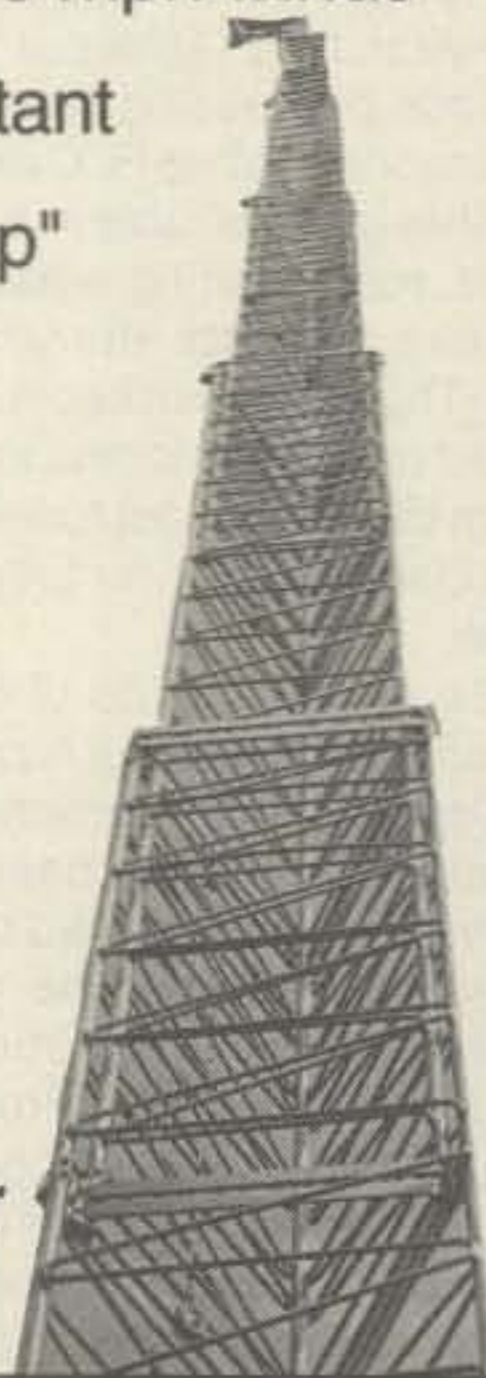


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NEWS OF COMMUNICATION AROUND THE WORLD

Cycle 22 Retrospective

As Sunspot Cycle 22 winds down, DXers can take a moment to look back over the past few years and review some of the DX highlights. Since Cycle 22 began in mid-1986 DXers have enjoyed some of the best propagation we have ever seen. At times the bands were almost as good as they were during the late 1950s, when Cycle 19 peaked. The improved radios, antennas, and increased DX activity during the past few years have made Cycle 22 even more productive for DXers than that historic cycle.

Even more dramatic than the excellent propagation, however, have been the numerous major DXpeditions and changes in attitudes toward amateur radio in dozens of formerly rare DXCC countries. We can examine the effects of these events by comparing the Most Wanted countries list from 1986, at the start of Cycle 22, with the 1992 Most Wanted list. (The complete 1992 Most Wanted Countries Survey and analysis is available for \$2.00 postpaid from P.O. Box 50, Fulton, CA 95439.)

By far the most spectacular change from 1986 has been in **Albania ZA**. Albania led the 1986 Most Wanted list, as it did for years. By 1991 eighty-seven percent of DXers responding to the survey said they "needed" an Albanian contact. All that changed last year, when **ZA1A** came on the air, followed by many local Albanians. The combination of the tens of thousands of ZA1A contacts, regular activity by locals, and a scattering of other Albanian operations has driven ZA out of the #1 Most Wanted spot. In fact, Albania is #100 in the 1992 Survey; it went from #1 to #100 in a single year! Albania is now so common that it won't even appear on future Most Wanted Surveys. Quite a change for the long-term #1 Most Wanted country!

Many other countries have also moved down the Most Wanted list due to fundamental changes in government attitude toward amateur radio. Although less dramatic than the Albanian situation, the appearance of numerous stations in countries such as Laos XW, Vietnam 3W/XV, Mozambique C9, and Cambodia XU has driven these once-rare countries into the ho-hum category. Vietnam was the 6th Most Wanted country in 1986; six years



The Hungarian World Bus DXpedition has provided DXers with thousands of QSOs from Iran and Bangladesh. From left: HG5CHI, WZ6C, HA5HO, and HG5BKG.

later it is 58th. Sixty-eight percent of DXers needed a Vietnam contact in 1986; only 24% still wanted one in 1992. Laos was also in the Top Ten Most Wanted in 1986; it was down to 40th this year.

Among the more striking decreases in demand during Cycle 22 is the case of China. For years at or near the top of the Most Wanted list, China hasn't even been in the Top 100 for several years. In fact, China is now one of the 100 *easiest* countries to work, and should be in most DXers' initial DXCC applications.

Other countries falling completely off the Most Wanted list in Cycle 22 are Taiwan BV, Mozambique C9, Macao XX9, and Mayotte FH. The change in demand on the first two is again due to an increased tolerance of amateur radio, and subsequent numerous operations by residents and long-term visitors.

Another major factor that rearranged the Most Wanted list in the past sunspot cycle has been major DXpeditions. The **South Sandwich VP8SSI** operation dropped that Antarctic spot from 13th in 1986 (3rd Most Wanted in 1991) down to 31st, even before any QSLs were mailed. The **3Y5X** Bouvet operation drove Bouvet

from 3rd in 1986 down to 30th. **XY0RR**'s Burma operation knocked Burma from 4th in 1986 down to 24th, with the percentage of DXers saying they needed Burma dropping from 72% in 1986 down to 40% this year. Other successful DXpeditions to spots such as Navassa, Clipperton, Market Reef, Palmyra (Jarvis), Afghanistan, and many more provided more rare countries on the air making thousands of contacts than at any comparable time in postwar DXCC.

The combination of major DXpeditions and regular activity from the Most Wanted countries in the past sunspot cycle has given a record number of DXers their last DXCC countries. Not only have the ranks of the Honor Roll swollen in the past cycle, but the number of DXers who have Worked Them All has soared. Cycle 22 will be remembered fondly by DXers.

The comparison between the 1986 and the 1992 Most Wanted lists reveals more about the changes in DXing over the current sunspot cycle. Of the two dozen countries on the 1992 list but not on the 1986 list, one third are New Ones: Peter I Island 3Y, Yemen 7O, Western Sahara S0, Conway Reef 3D, Penguin Islands ZS1, Bana-

The WPX Program Mixed

1575 NX3A 1577 JA3BKP
1576 IK3ITX

SSB

2331 3A2LZ 2336 IK0FVC
2332 IK6JRI 2337 EA5GJM
2333 HC2HYB 2338 KD9CN
2334 NX3A 2339 N2JNZ
2335 IK3ITX

CW

2752 DL9MFL 2756 DF4ZL/5B4
2753 DF4ZL 2757 NX3A
2754 9H3DK 2758 ON7NVU
2755 DF4ZL/CT3

VPX

275 KA4RRU

Endorsements

Mixed: 450 JA3BKP. 500 WW0E, JA3BKP. 550 JA3BKP. 900 OH3MIG. 950 OH3MIG. 1000 OH3MIG. 1050 OH3MIG. 1100 OH3MIG. 1150 OH3MIG. 1200 OH3MIG. 1250 OH3MIG. 1300 OH3MIG. 1350 OH3MIG. 1400 OH3MIG. 1450 OH3MIG. 1500 OH3MIG. 1550 OH3MIG. 1600 OH3MIG. 1650 OH3MIG. 1700 OH3MIG. 1750 OH3MIG. 1800 OH3MIG. 1850 OH3MIG. 1900 OH3MIG. 1950 OH3MIG. 2000 OH3MIG. 2050 OH3MIG. 2100 OH3MIG. 2150 OH3MIG. 2200 OH3MIG. 2250 OH3MIG. 2300 OH3MIG. 2350 OH3MIG. 2400 OH3MIG. 2450 OH3MIG. 2500 OH3MIG. 2550 OH3MIG. 2600 OH3MIG. 2650 OH3MIG. 2700 OH3MIG. 2750 OH3MIG. 2800 OH3MIG. 2850 OH3MIG. 2900 OH3MIG. 2950 OH3MIG. 3000 OH3MIG. 3050 OH3MIG. 3100 OH3MIG. 3150 OH3MIG. 3200 OH3MIG. 3250 OH3MIG. 3300 OH3MIG. 3350 OH3MIG. 3400 OH3MIG. 3450 OH3MIG. 3500 OH3MIG. 3550 OH3MIG. 3600 OH3MIG. 3650 OH3MIG. 3700 OH3MIG. 3750 OH3MIG. 3800 OH3MIG. 3850 OH3MIG. 3900 OH3MIG. 3950 OH3MIG. 4000 OH3MIG. 4050 OH3MIG. 4100 OH3MIG. 4150 OH3MIG. 4200 OH3MIG. 4250 OH3MIG. 4300 OH3MIG. 4350 OH3MIG. 4400 OH3MIG. 4450 OH3MIG. 4500 OH3MIG. 4550 OH3MIG. 4600 OH3MIG. 4650 OH3MIG. 4700 OH3MIG. 4750 OH3MIG. 4800 OH3MIG. 4850 OH3MIG. 4900 OH3MIG. 4950 OH3MIG. 5000 OH3MIG. 5050 OH3MIG. 5100 OH3MIG. 5150 OH3MIG. 5200 OH3MIG. 5250 OH3MIG. 5300 OH3MIG. 5350 OH3MIG. 5400 OH3MIG. 5450 OH3MIG. 5500 OH3MIG. 5550 OH3MIG. 5600 OH3MIG. 5650 OH3MIG. 5700 OH3MIG. 5750 OH3MIG. 5800 OH3MIG. 5850 OH3MIG. 5900 OH3MIG. 5950 OH3MIG. 6000 OH3MIG. 6050 OH3MIG. 6100 OH3MIG. 6150 OH3MIG. 6200 OH3MIG. 6250 OH3MIG. 6300 OH3MIG. 6350 OH3MIG. 6400 OH3MIG. 6450 OH3MIG. 6500 OH3MIG. 6550 OH3MIG. 6600 OH3MIG. 6650 OH3MIG. 6700 OH3MIG. 6750 OH3MIG. 6800 OH3MIG. 6850 OH3MIG. 6900 OH3MIG. 6950 OH3MIG. 7000 OH3MIG. 7050 OH3MIG. 7100 OH3MIG. 7150 OH3MIG. 7200 OH3MIG. 7250 OH3MIG. 7300 OH3MIG. 7350 OH3MIG. 7400 OH3MIG. 7450 OH3MIG. 7500 OH3MIG. 7550 OH3MIG. 7600 OH3MIG. 7650 OH3MIG. 7700 OH3MIG. 7750 OH3MIG. 7800 OH3MIG. 7850 OH3MIG. 7900 OH3MIG. 7950 OH3MIG. 8000 OH3MIG. 8050 OH3MIG. 8100 OH3MIG. 8150 OH3MIG. 8200 OH3MIG. 8250 OH3MIG. 8300 OH3MIG. 8350 OH3MIG. 8400 OH3MIG. 8450 OH3MIG. 8500 OH3MIG. 8550 OH3MIG. 8600 OH3MIG. 8650 OH3MIG. 8700 OH3MIG. 8750 OH3MIG. 8800 OH3MIG. 8850 OH3MIG. 8900 OH3MIG. 8950 OH3MIG. 9000 OH3MIG. 9050 OH3MIG. 9100 OH3MIG. 9150 OH3MIG. 9200 OH3MIG. 9250 OH3MIG. 9300 OH3MIG. 9350 OH3MIG. 9400 OH3MIG. 9450 OH3MIG. 9500 OH3MIG. 9550 OH3MIG. 9600 OH3MIG. 9650 OH3MIG. 9700 OH3MIG. 9750 OH3MIG. 9800 OH3MIG. 9850 OH3MIG. 9900 OH3MIG. 9950 OH3MIG. 10000 OH3MIG.

SSB: 350 DF4ZL. HC2HYB. IK6JRI. IK3ITX. IK0FVC. N2JNZ. 400 DF4ZL. HC2HYB. IK3ITX. 450 DF4ZL. HC2HYB. 500 DF4ZL. DE0DAQ. HC2HYB. 550 IK4FNF. DF4ZL. DE0DAQ. 600 IK4FNF. IK6YEF. DF4ZL. DE0DAQ. 650 IK4FNF. DF4ZL. 700 DF4ZL. 750 DF4ZL. 800 DF4ZL. N9ICH. 850 DF4ZL. EA1AX. 900 DF4ZL. EA1AX. 950 DF4ZL. IK2ECP. EA1AX. 1000 DF4ZL. IK2ECP. EA1AX. 1050 K9UQN. 1100 K9UQN. 1150 K9UQN. 1200 K9UQN. 1250 HP6AYV. 1350 KA0ZFX. KF7RU. 1400 KA0ZFX. 1600 IK5ACO. 1650 IK5ACO. 1900 LU8ESU.

CW: 350 DL9MFL. EA2CKP. DF4ZL. DF4ZL/CT3. DF4ZL/5B4. 400 DF9MFL. DF4ZL. DF4ZL/CT3.

DF4ZL/5B4. 450 DF4ZL. DF4ZL/CT3. 500 DF4ZL. 550 DF4ZL. 600 DF4ZL. 650 DF4ZL. 700 DF4ZL. 750 DF4ZL. 800 DF4ZL. EA6AAK. 850 DF4ZL. EA6AAK. LA3GI. 900 DF4ZL. 2600 W3ARK. 2650 W3ARK. 3150 N6JV.

10 Meters: OH3MIG, DL4MCF, N2JNZ
15 Meters: OH3MIG
20 Meters: OH3MIG
40 Meters: DL4MCF, KF7RU, K0IFL
80 Meters: DL4MCF

Asia: OH3MIG, HA5NK, JA3BKP
Africa: JF1SEK, OH3MIG
No. Amer.: OH3MIG, HA5NK
So. Amer.: JF1SEK, HA5NK, K0IFL
Europe: HA5NK, JA3BKP
Oceania: OH3MIG, JA3BKP

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ba T33, Rotuma 3D, and M-V Island 4J1. In every case there has been at least one major DXpedition to the new country, making many thousands of contacts. No dedicated Honor Roller should have missed any of these. In fact, most are not particularly rare, except for Peter I Island and the new Yemen. Apparently, many DXers missed the first (and only) Peter I DXpedition in 1987. Peter I is the Most Wanted country in 1992 by a large margin over #2, Bhutan A5. The new Yemen is also quite high on the 1992 list: 11th. (In 1986 South Yemen 7O was the 2nd Most Wanted country, while North Yemen 4W was 8th.)

Many of the other changes to the Most Wanted list over the past sunspot cycle are the type that happen regularly. Most of the non-New Ones on the 1992 list but not on the 1986 list are countries the scarcity of which varies from year to year. For example, **Marion Island ZS8MI** illustrates the effect of an active resident. Marion was 74th Most Wanted in 1980, but had risen to 18th by 1986, as there were no amateurs

among the South Africans stationed there. Another year of ZS8MI operation pushed it down to 58th in 1991. It is up to 34th this year. Tristan da Cunha ZD9, Crozet FT/W, Jan Mayen JX, and Juan Fernandez CE0 are among those DXCC countries the popularity of which varies depending on the activity of any residents.

What Didn't Happen This Cycle

The comparison between the Most Wanted lists at the start of the current sunspot cycle and today also reveals what *didn't* happen in the past six years. A few countries remain about as wanted as they were in 1986: Libya 5A, Andamans VU4, and Bangladesh S2 are highly wanted in both surveys. (Bangladesh will drop this year, as S21A, some S21Z- short-term visitors, and HA5BUS/S2 made thousands of contacts after the 1992 Survey was conducted.)

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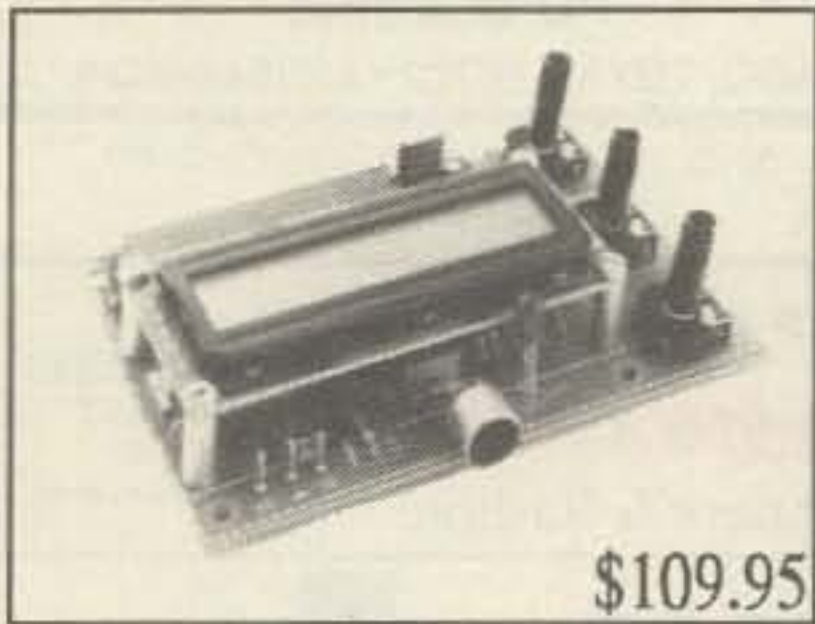
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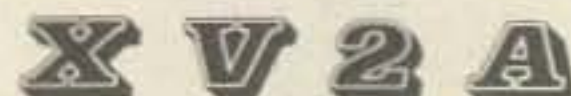
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XV2A is an example of the opening of Southeast Asia to amateur radio operations in Sunspot Cycle 22.

dropped far down the list, other countries that were not represented on the amateur bands rose up the ranks. Many of these countries were very easy to work prior to Cycle 22, but for one reason or another have not been active recently. Examples of these countries are Tunisia 3V, Uganda 5X, and Ghana 9G. Ghana in particular was very low on the 1986 list—84th, with 17% of DXers needing a 9G QSO. With but one limited 9G operation during Cycle 22, demand for Ghana has risen to 46% of DXers needing the country, 12th on the 1992 list. (The good news is that Ghana is expected to revert to civilian rule early in 1993, and amateur radio should soon be permitted again.)

A couple of other countries moving up in Cycle 22 illustrate what happens to a country without an active resident. Macquarie Island VK0, Kermadec ZL8, and Amsterdam Island FT/Z are far higher on the 1992 list than at the start of Cycle 22. Perhaps some amateur will arrange to be stationed at one or more of these spots before the end of Cycle 22.

Cycle 22 has been a very good time for DXers. Political changes, major DXpeditions making thousands of contacts, and workable new countries have combined with excellent propagation to lift thousands of DXers onto and up the Honor Roll, many to the coveted #1 spot earned by working them all.

What will the rest of Cycle 22 bring us? In between the solar flares, on days of above-average flux, we can still expect to work lots of DX. DXers may not work a rare station on as many bands as at the peak of Cycle 22, but we should have good chances at QSOs on at least a band or two. And DXpeditioners are already poring over the 1992 Most Wanted list, making plans to put several of the rarer countries on the air before Cycle 22 ends. Meanwhile, DXers may keep an ear out for the following upcoming DX operations.

December Events

The special-event station VI150SYD wraps up operation at the end of the year. An attractive QSL contains details of the

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15 Meter SSB

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430 EC1CTH

20 Meter SSB

896 WB4ZGS 899 ON4ADZ
897 K9ZWH 900 WD4BTF
898 N5GAP 901 AC4DT

40 Meter SSB

78 OE3WWB

80 Meter SSB

60 OE3WWB

10 Meter CW

133 JM1NKT

17 Mixed

14 JA1ADN 15 OH2MIG

All CW

17 K4CIA

RTTY

40-20 meters N4CC

All Band WAZ SSB

3987 JF0VCY 3991 EA3BBD
3988 I4ZXO 3992 DL9KJ
3989 JE1RRK 3993 WB2AQC
3990 KB6YM 3994 KA1WHL

CW/Phone

7255 VE3NLU 7261 ZL1AA
7256 SM0XG (CW) 7262 JA9BGO (CW)
7257 EA6BD (CW) 7263 VO1FB (CW)
7258 JP3LKR 7264 DJ2UP (CW)
7259 KA4RRU 7265 HB9BWB (CW)
7260 W8JCC

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ x 9½ 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).

150th anniversary of the city of Sydney, Australia. The card is available from VK2WI, via the Australian bureau, or direct to Box 1066, Parramatta NSW 2124, Australia. Return postage, US\$1, or one IRC would be appreciated.

Desecheo KP5 will be active around the end of the year, thanks to the same team that activated Navassa Island last year. Look for **N0TG/KP5**, **KW2P/KP5**, **AA4VK/KP5**, **W0RJU/KP5**, and **WA4DAN/KP5** December 28 to January 4, on all bands, 160-10 meters, including the new bands, on CW, SSB, and RTTY. QSL direct to Randy Rowe, N0TG, P.O. Box 891, Desoto, TX 75123-0891.

Steven Muster, G4UOL, will operate from the Isle of Man as **GD4UOL**



Romeo Stepanenko, 3W3RR, led DXpeditions to many rare spots in Cycle 22: Burma XY0RR, Spratly 1S0RR, Iran 9D0RR, Afghanistan YA0RR, and others.

November 20 to December 4 on CW only, 11 kHz up from the bottom of the bands. Steve will concentrate on the new bands outside the CQ WW CW test. Steve has been operating from the Isle of Man for two weeks each year for the past four years, and has made about 26,000 QSOs going into this year's trip. He needs only a few more countries on the low bands to complete 5-Band DXCC in only 10 weeks! QSL via his home call: 60 Genesta Road, Westcliff on Sea, Essex SS08DB, UK.

Charles Lewis, ex-A22AA, is now active from Sao Tome S9 as **S92SS**. QSL him direct at C. Postal 522, Sao Tome, DRSTP, West Africa, via Portugal. He also has his A22AA and A25AA logs and cards. He requests an SAE and return postage, please, with US\$1 preferred over IRCs. Charles is logging on a computer donated to him by *The DX Bulletin*.

Some German operators plan to operate from several Pacific spots this winter. YL Brigit, Y58AO; Tom, Y31XO; Holger Hannemann, Y58IO; and Frank Streifeneder, Y32QD, will start in Fiji 3D in November, operate CQ WW CW from the Solomons H4, then on to New Caledonia FK and Wallis Island FW. While in the area they'll investigate side trips to Western Samoa 5W, Tuvalu T2, Western Kiribati T30, and Nauru C2.

Finally, a group of Thailand amateurs plans to activate a New One for Islands On The Air December 10-12. They'll operate as **E28DX** from Kho Samui Island in the Malay Peninsula North East group at 30 kHz up on CW, and 14195, 21200, and 28480 kHz on SSB. QSL to Viroj J. HS1HSJ, P.O. Box 89, Bangkok 10220 Thailand, with IRCs or US\$1 to assist with expedition expenses, please.

The New IRCs

Many DXers have asked where they can find the "new" IRCs, the ones good for airmail return postage. Actually, it doesn't make any difference what the IRC says on the back; all current IRCs are now exchangeable for one unit of airmail postage

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• ReadyMade 105 ft G5RV	\$50.00
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N Connector	For 9913, 9086, CQ-Flexi	\$3.15
Connectors	Full line of Connectors & Adapters	
RG-8X	95% Braid, premium quality	10¢
CQ-RG-8X	95%, Type II, Non-contaminating	23¢
CQ-RG-8XMM	95%, Solid Dielectric, ""	27¢
CQ-RG-213	Certified-Quality, 95% + + + braid	40¢
9086	International (like 9913, but better)	48¢
CQ-Flexi	New! Flexible 9913-type, very low loss	
	For Crank-up tower, rotators, HF - UHF	62¢
R-1 Rotator	8 conductor (2 x 18, 6 x 24) up to 125' run	20¢
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R-4 Rotator	8 conductor (2 x 14, 6 x 18) up to 300' run	48¢
#14 Stranded	Hard-drawn (7 x 22) special antenna wire	8¢
#14 Stranded	Copper-clad (7 x 22) special antenna wire	9¢
#14 VariFlex	19 strand CuClad, flexible, tight strand	11¢
#13 Insulated	New! #18 19 str, CuClad, jacket, flexible	15¢
450 Ohm	#18, Cu-Clad, poly, Windows	13¢
450 Ohm	New! #16 19 str, CuClad, Poly, Windows	18¢
300 Ohm	New! #18 19 str, CuClad, Poly, Windows	16¢
300 Ohm Twin	#18 7 str, Cu, similar to orig. Belden	13¢
1/2" Tinned Braid Ground Strap		65¢
RADIO WORKS' Center Insulator, best available		\$7.95
End Insulators Doo-bone 60¢ or 6" Universal		\$2.00
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C1-2K 2KW 'Retro-Fit' Bakun, PL-259 in & PL-259 out	\$16.95
4KRF-LI 4KW 'Retro-Fit' Bakun, SO-239 in, PL-259 out	\$23.95
4K-LI 4KW RFI Line Isolator, SO-239 in & SO-239 out	\$19.95
4KV-LI 4KW Line Isolator for Verticals, SO-239 in, PL-259 out	\$23.95
Y1-4K 4KW 'Yagi Bakun' 160-10M, for beams, SO-239 in, WIRE out	\$24.95
Y1-5K 5KW 'Yagi Bakun' 160-10M, for beams, SO-239 in, WIRE out	\$29.95

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B4-1.5K 80-10M 1.5 KW balun, SO-239 in, WIRE output	\$19.95
B4-2K Precision 2 KW 80-10M balun, SO-239 in, WIRE output	\$27.95
B4-2KX 'Current-type' 160-10M 2KW+, SO-239 in, WIRE output	\$39.95
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CIRCLE 51 ON READER SERVICE CARD

to another country. This has been true since February 1991. Obviously, many postal workers don't know about this change in regulations. (Few postal workers know *anything* about IRCs.) If you want to cash in some IRCs for postage in the US, you should get one unit of airmail postage (stamps, not cash) for each IRC: \$0.50. Refer reluctant postal workers to the International Mail Manual, Section 392, for details.

In theory, the same exchange holds for all member countries of the Universal Postal Union. Any current IRC may be exchanged for one unit of airmail postage to another country. However, the word hasn't necessarily filtered down to every postal worker worldwide. In any case, there is no reason for DXers to try to locate the new IRC; any IRC is at least theoretically worth airmail return postage.

Note that some countries have different postage rates for different countries. The IRC can be redeemed for one unit of airmail postage, but that might not be enough to return the letter to you. For example, one IRC in South Africa will get a letter by air

5 Band WAZ

As of August 31, 1992, 346 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

OE3WVB
 LA1VFA

The top contenders for 5 Band WAZ are:

N4WW, 199	K6EID, 199
SP9PT, 199	IK8CNT, 199
K6YRA, 199	W1JR, 199
PY7ZZ, 199	W8SEY, 199
DL9WW, 199	N7RT, 199
K0CS, 199	VE7AHA, 199
KB0G, 199	W1FZ, 199
AA4KT, 199	IBIGS, 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	

The following have qualified for the basic 5 Band WAZ Award:

LU6FAZ, 183 Zones
 KU0A, 155 Zones
 HB9DGZ, 150 Zones
 VO1FB, 198 Zones

797 Stations have attained the 150 zone level as of August 31, 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).

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4351	9N2AA	2694	11EEW	2287	W1BWS	1945	N6JM	1604	W9IL	1332	YU3PG	1025	NH6T
4016	F9RM	2667	KA5W	2276	IT9QDS	1914	YU1GR	1589	YU2CQ	1329	F1HWB	1008	IK2BLA
3956	K2VV	2659	IN3ANE	2274	SM6DHU	1905	DK5AD	1572	NV9S	1323	YU1PJ	994	WM0G
3344	EA2IA	2658	W2FXA	2205	SM0AJU	1855	W8UMR	1553	VE1RJ	1300	CT1QF	975	F6CDJ
3231	VE3XA	2649	I2PHN	2202	I2MOP	1835	WE2L	1549	W3KH	1294	JA6GWU	963	CT3CU
3206	K6JG	2637	YU7SF	2141	YU4EXA	1829	K9AGB	1548	LA7JO	1287	I2EAY	920	WB2PCF
3175	K6XP	2564	PA0SNG	2133	3A2LF	1812	K2OLG	1522	YU3NU	1282	LU8DY	915	W4USW
3101	N4NO	2557	4N2NA	2121	HA0HW	1811	I2DMK	1497	W7CB	1249	N3ED	906	YU7FT
3056	N6JV	2546	YU7BCD	2106	K5UR	1811	WB2YQH	1485	YB0TK	1241	TF1MM	904	WK0B
2983	W4BQY	2534	IT9TOH	2075	I2EOW	1793	YT7WW	1483	PY2DBU	1236	KI3L	875	RB5MP
2965	PY1APS	2530	HA0DU	2073	N4UU	1789	YU7RU	1468	K5DB	1229	KS0Z	815	W6LC
2904	I2PJA	2508	N2AC	2068	K9QFR	1788	YU1GR	1455	YU7DR	1222	WD9HC	778	VE3OMM
2845	WA8YTM	2499	YT7DX	2062	4N7ZZ	1776	W6OUL	1417	I0AOF	1164	W9IAL	750	JN3SAC
2840	SM3EVR	2498	SM7TV	2053	K2POF	1709	G4OBK	1405	CT1YH	1149	NJ1T	733	N3KR
2829	N4MM	2471	I6SF	2052	KL7AF	1667	VE3MS	1405	DF4ZL	1146	N7JXS	720	EA3CWX
2821	N9AF	2470	K9BG	2040	YT3AA	1662	WB4RUA	1384	KS4S	1120	W0JIE	714	VE6BMX
2817	YU1AB	2376	I8YRK	2040	W0SFU	1648	KB0G	1381	IK2ILH	1101	G4SDJ	684	K6DYP
2801	K0BLT	2340	4X4FU	2010	YU3EO	1646	N2AIF	1375	WB3DNA	1094	K0IFL	670	WK3Z
2797	ZP5JCY	2339	UA3FT	2006	W4UW	1629	DF6EX	1352	WB2ABD	1089	W0IZV	642	VE3GOV
2779	PY4OD	2301	KF2O	1970	HA0IT	1628	WB8ZRL	1342	KA5TQF	1081	K9BQL	640	JR3TOE
2748	W9DWQ	2295	HA8XX	1956	K8LJG	1626	SM6CST	1335	A16Z	1041	I5ZTC	635	JA4DUD
2733	I2UIY												

SSB

3937	F9RM	2303	EA9AKN	1883	HR1KAS	1508	I2TZK	1239	DK5WQ	1050	KB2DE	869	DK7NP
3780	I0ZV	2282	W4BQY	1871	PY4OY	1471	YU7SF	1227	KB0C	1044	WB6SRK	854	VE3MS
3303	K2VV	2280	I4CSP	1858	I2EOW	1445	N4UU	1200	ZS6AOO	1038	WB6GFJ	831	NH6T
3288	ZL3NS	2256	PA0SNG	1854	W4UW	1401	KF7RU	1198	K2EEK	1035	IT9SVJ	831	IT9JPK
3170	VE1YX	2250	WA8YTM	1850	K5RPC	1394	K9LJN	1167	W5ILR	1034	HA5NK	822	WD5KBB
2917	K6JG	2244	I4ZSQ	1811	KD9OT	1393	KA0ZFX	1162	HP6AYV	1029	W5LLU	815	KE7UH
2889	I2PJA	2213	KA5W	1797	K5UR	1392	KE6KT	1152	W5AWT	1019	CT1CQK	806	IK6KYL
2815	WD8MGQ	2159	I5ZJK	1747	SM0AJU	1391	HA0IT	1151	G4OBK	1016	5Z4BP	791	KA9MOM
2810	K6XP	2089	HA8XX	1742	CT1AHU	1367	LA7JO	1138	N2AIF	1010	CT1DIZ	787	CT1YH
2676	ZP5JCY	2085	I2MOP	1703	WE2L	1367	N2AC	1136	I7VEZ	1010	LU1VK	771	HP2CWB
2622	I2PHN	2067	I8YRK	1698	CT1BY	1360	K8LJG	1135	OE2EGL	1003	DF4ZL	750	NM5Y
2608	CT4NH	2041	WA4OMQ	1686	SM6DHU	1350	LU8DY	1116	CT1BWW	998	IK2AEQ	736	EA1IF
2554	N4MM	2024	W9DWQ	1684	4X6DK	1345	IT9JKY	1112	WA2FKF	990	NG9L	728	YU1PJ
2481	I6ZJC	2010	PY4OD	1673	EA4KK	1335	EA1AK	1101	FE6FNA	976	I8IYW	728	CT1ZW
2466	I0AMU	1994	YU7BCD	1654	IK5ACO	1332	F1HWB	1097	W6OUL	972	K9BQL	708	EA3EQT
2460	OZ5EV	1986	YU2NA	1645	IK8GCS	1315	CT1UE	1092	KA5TQF	958	IK2DUW	697	YV7QP
2445	EA2IA	1971	WF4V	1633	KC8YM	1305	WN5MBS	1091	TF1MM	951	KB0G	664	SM6CST
2421	N4NO	1969	KF2O	1600	KL7AF	1290	LU7HJM	1090	I3ZSX	951	KB4HU	646	KB8DAE
2409	W0YDB	1944	EA3AQC	1590	XE1OX	1288	WB8ZRL	1081	K3IXD	942	KC2FC	643	JR3TOE
2403	I8YZP	1920	IBKCI	1581	IN3QCI	1286	IK7DBB	1073	KS4S	917	KK5P	625	G4XTA
2379	IT9TOH	1913	K9QFR	1580	CX6BZ	1285	EA3FHT	1062	IK0EIM	899	A16Z	612	JA4DUD
2371	NJ0C	1897	W3ARK	1543	K2POF	1278	IK2DUU	1056	G4SDJ	894	N3ED	610	K16PG
2362	11EEW	1892	LU8ESU	1534	EA2AOM	1267	G4MVA	1055	OE6CLD	885	EA3BOX	608	CE5FSB
2350	I2UIY	1885	CT4UW	1514	N6FX	1258	I8WYD	1054	K8MDU	881	WM0G	608	VE3GOV

CW

3315	K2VV	2211	I6SF	1673	K5UR	1468	IK0ADY	1296	I8YRK	1019	IK2ECP	846	AC5K
3244	WA2HZR	2147	WA8YTM	1656	G4UOL	1461	ZS6EZ	1293	11EEW	1013	WB8ZRL	808	YV7QP
3034	N6JV	2128	LZ1XL	1623	G4SSH	1442	K8LJG	1280	IK3GER	1010	YU1PJ	797	W4UW
2717	VE7CNE	2085	4X4FU	1599	KL7AF	1439	YU3NU	1244	DL2HBX	993	N3ED	794	LA7JO
2674	N4NO	2042	YU7BCD	1584	W8IQ	1433	F6HKD	1222	YU2CQ	988	AH6JF	754	WB5MTV
2491	W3ARK	1948	KA5W	1557	K2POF	1428	I7PXV	1187	YU3PG	954	W9IAL	754	KA5TQF
2486	PY4OD	1899	N4MM	1556	SM0AJU	1405	CT1YH	1151	ZP5JCY	951	N4IR	749	WB5LRY
2452	EA2IA	1884	VE7DP	1555	W9PWM	1362	I2IWM	1133	JA9CWJ	949	IS0FIC	744	RB5MP
2407	YU7LS	1801	I2UIY	1553	N6FX	1360	VS6UW	1110	I2EAY	933	K3UA	700	EA1MV
2406	K6JG	1756	N4UU	1536	KF2O	1359	HA8XX	1093	EA1AK	923	YU4BR	700	VE3OMM
2381	YU7SF	1723	KA7T	1526	HA0IT	1330	KB0G	1091	NF5Z	923	DF4ZL	699	JN3SAC
2373	K6XP	1700	N4YB	1525	VE1RJ	1327	DJ1YH	1085	NJ1T	900	3A2LF	698	4X6DK
2345	IT9TOH	1700	YU2NA	1517	SM6CST	1319	W6OUL	1070	LU2YA	862	EA6AAK	659	TF1MM
2344	I1YRL	1692	IT9VDO	1513	K9LJN	1310	G4OBK	1059	A16Z	858	KS4S	617	DK7NP
2340	W4BQY	1686	EA7AZA	1511	W1WAI	1306	LA9XG	1036	KA1CLV	855	W0JIE	606	I5OOV
2275	N2AC	1681	SM6DHU	1490	OZ5UR	1305	W5AWT	1022	EA5AR	851	K9QFR	601	N5GFX
2252	W9DWQ	1678	T14SU	1476	G3VQO	1303	N2AIF						

to a neighboring country, but it takes two IRCs worth of postage to get an envelope back to the US. Also, if you ask for more than a single card back, you should include an additional IRC. A single unit of airmail postage often covers only 10 grams, about the weight of the return envelope and a

single card. Finally, if you want to provide a little extra for the DX station or overseas QSL manager, you might want to include an additional IRC.

(Thanks to Sandy Farley, N7PQP, Communications Specialist for the United States Postal Service, for IRC information.)

Under the Tree

Tiare Publications has a couple of new books of interest to the DXer. Bill Welsh, W6DDB, has written *PSE QSL!*, a 60-page introduction to DX QSLing. The beginner

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By Jan D. Perkins, N6AW

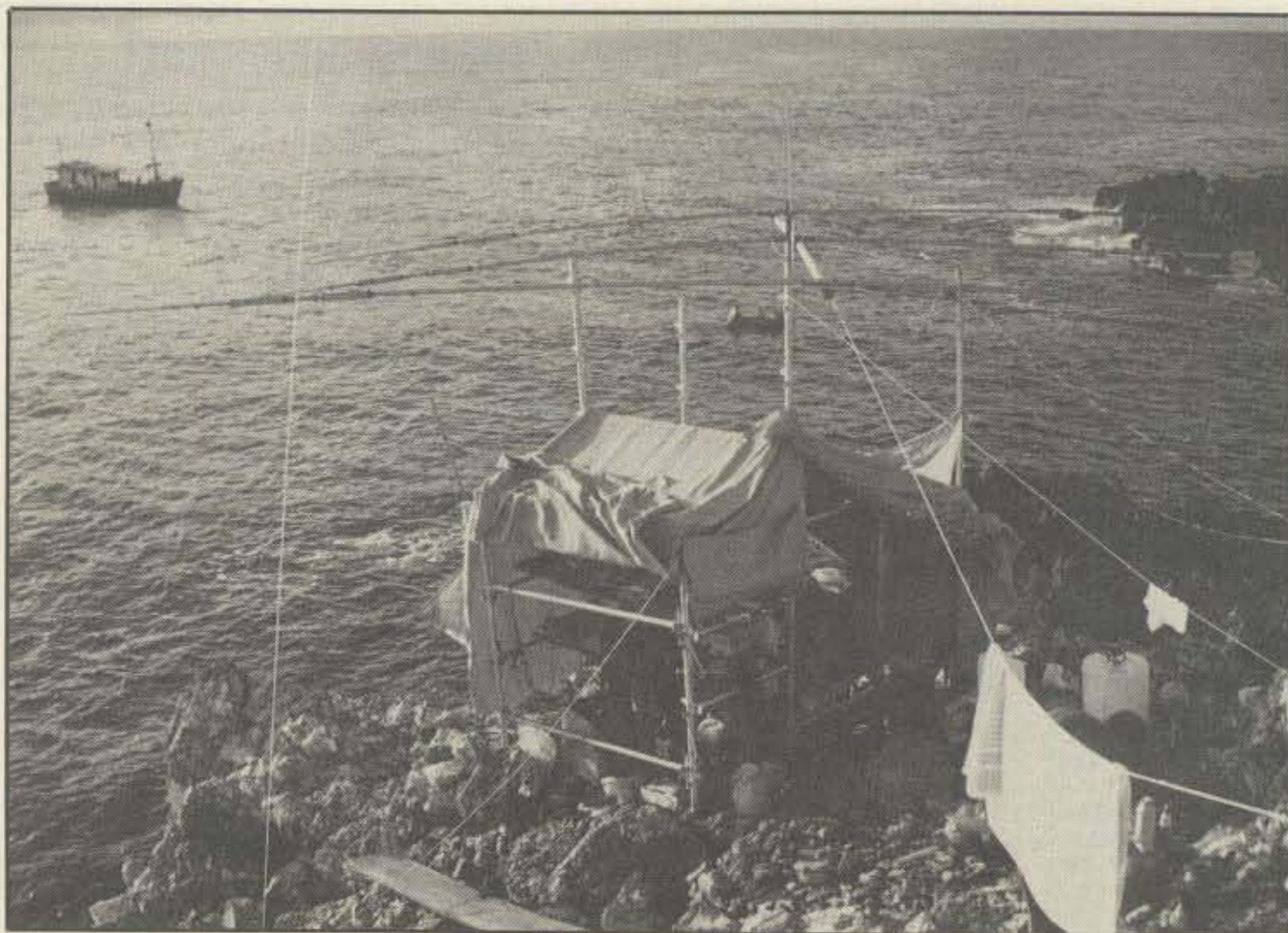


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CIRCLE 91 ON READER SERVICE CARD



The PY0SR St. Peter and St. Paul Rocks operation was one of dozens of major DXpeditions in Cycle 22.

will find many useful hints on the design and mailing of QSLs in this book. Also, Bob Halprin, K1XA, has written *Ham Radio Contesting*, another beginner's guide, this time for contesting. Of particular interest to many DXers will be the sections on using a computer in contesting. *PSE QSL!* costs \$9.95 and *Ham Radio Contesting* costs \$14.95, both plus \$2.00 shipping each, or \$3.00 for foreign orders. Visa and Mastercard accepted: P. O. Box 493, Lake Geneva, WI 53147-0493.

QSL Notes

J8/N2HNQ, J85A, and J80X are all St. Vincent calls of JH4IFF, during August. QSL any of JH4IFF's calls via his home call.

QSL the special-event station of **JU830C** via the Mongolian Radio Sport Federation's club call JT1KAA. **JT1T** and **JU1T** are also MRSF club calls; QSL via JT1KAA, Box 639, Ulan Baton 13, Mongolia.

Azores Island DXers have formed the Sao Miguel DX team and will QSL any of their members' operations via P.O. Box 1414, 9500-Ponta Delgada, Azores Islands, via Portugal. Members are CU2AA, CU2AE, CU2AF, CU2AP, CU2AV, CU2CE, CU2CR, and CU2DX.

QSL **5V7DP** via the new manager: N6MMF.

HC1EA has not provided logs to W2KF, and W2KF can no longer serve as QSL manager for HC1EA. Try direct to Carlos Calderon C., P.O. Box 2761, Quito, Ecuador, South America.

5U7M reports that he will QSL 100% via the bureau for his Niger contacts. He asks that you *don't* send cards, SASE, IRCs, etc., direct; QSL via the JARL bureau.

QSL contacts with **UB3JX**, since April 1, 1992, via new manager W2FXA.

QSL **ZA/G3MHV** and **ZA/KA6ZYF** via their home bureaus, or direct to them at P.O. Box 1489, Santa Monica, CA 90406-1489.

Bermuda VP9 cards from VP9MP, VP9MN, VP9OM, VP9CB, and VP9YL are available from Bob, WB2YQH. Bob also handles cards for **XT2BW**.

QSL **HP1XFG, HP1XFJ, HS0JUA, HS0IYY, HS0C, JH8YDY/JD1, 5H1YK,**

CQ DX Awards Program

SSB

1971	DU1CHD	1974	WA0QII
1972	OE7SEL	1975	EA3CWK
1973	G0KJW/M	1976	VK4ARB

SSB Endorsements

320	I8YRK/323	275	WA0QII/281
310	K1UO/319	250	I3ZSX/250
310	W5LLU/316	200	G0KJW/M
310	KB1JU/314	200	EA3CWK/215
300	VE3DLR/307	28 MHz	OE7SEL
300	OE7SEL/300	28 MHz	G0KJW/M

CW Endorsements

310	N7MC/313	310	N7RO/312
-----	----------	-----	----------

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.

7Q7JA, 7Q7JA/HI8, V51/7Q7JA, 9J2HN, and 9N88C via JH8BKL.

For QSLs from YI1BGD, try LA5NM, who is currently in Svalbard; he may have logs.

To QSL contacts with stations in what was Yugoslavia, the USPS asks that DXers use the newly recognized international names of the countries: Bosnia-Herzegovina, Croatia, Slovenia, and the former Yugoslav republic of Macedonia. Only contacts with stations in Serbia and Montenegro should use the word "Yugoslavia" in the address.

Pirates, Bootleggers, etc.

EP/WA1HFF in August was by a bootlegger, according to WA1HFF. Don't QSL, please.

Likewise, 9G1PP from June 1988 is not a legitimate operation, according to purported QSL manager G0CAD.

The EP2MM contacts since 1970 have been by a Slim, says Clyde Stottlemire, W5TQG, who held that call in 1968-69. Unfortunately, he no longer has logs for his Iranian operation.

QSL Manager Volunteers

Everett LaPorte, KC1OC, is willing to serve as a QSL manager for a DX station; con-

QSL Information

3D2ZG to JH9XZG
4J4GAT to DL1VJ
4J4JJ to UG6JJ
4K3/RA3YM to RA3YG
4K3BB to RB5CB
4K4BVI to UY5XE
4K4LC to UA6LC
4L8FWW to UF6FWW
4L24A to K1MZZ
4Z4UT to WB2FTK
5H3NU to I1HAG
5J129P to HK6LRP
5N4S8G to WB5KYF
5R8GW to F6FNU
5W1KH to I4ALU
5W1VJ to G4ZVJ
7Q7JL to G0IAS
7Q7LA to G0IAS
7Q7XX to JH3RRA
7X4AN to DJ2BW
7Z1AB to WB2QMP
9A1CRU to YT2IX
9A2PM to KA9WON
9A4AA to 4N2AA
9H1AZ to 9H5AZ
9H1EL to LA2TO
9H3PB to DF4EK
9J2SZ to SP8DIP
9K2GS to WB6JMS
9K2SH to WB6JMS
9M2NA to VE3CHZ
9M6NA to JE1JKL
9M8DB to AA5AZ
A22MN to WA8JOC
A35NP to DK6NP
AM7CEZ to EA7CEZ
AM92GZH to EA7GZH
AP/WA2WYR to KK6TX

BZ5HAN to BY5HZ
C9RJJ to W8GIO
CJ8PW to VE8PW
CP6RP to I0WDX
D2EL to EA7EL
D2FGC to OK1AJN
EA9UK to EA9LZ
EF8VBV to IC8AWP
EHBEB to EA3MM
EU10 to F6AML
F6BLQ/D2 to F6ELE
FK8CR to F6EWK
FK8GJ to F6CXJ
FM5FE to F1NCZ
F05BI/P to F6HSI
FP/VE1KM to K1RH
FS4PL to FG4BG
FY5PL to ON4ZD
FY5YE to W5JLU
H44GC to K2PF
HC8K to KT1N
HF8POL to SP9DWT
HP2CWA to N4YWY
HZ1AB to K8PYD
J5UAI to NW8F
J73FTC to N9DTP
J8/N2HNO to JH4IFF
J8BX to JH4IFF
JW1CCA to LA1CCA
JW2IJ to LA2IJ
KH8/DF6MS to DJ3QC
OD5SK to KB5RA
P29DK to N4COF
P29JA to JH7MSB
P29KH to WD4DZV
PY8TUP to PY1RO
PY1NAP to PY1RO
R19A to K1MZZ

R040A to SP9HWN
S21A to W4FRU
S79KMB to KN2N
S92IJ to DJ5IO
S03JE to SP3GVX
SU1AY to OE6EEG
T32LN to VK4CRR
T32MV to AA6MV
TM3IF to FD1OZF
TM9WPX to FF1NZH
TR8YA to F6FUN
TU2PA to KE0LS
TV9CEE to F1MXH
U5WF to DJ0XC
UB9X/UB2KA to UB5KDD
UC2AAA to F6AML
UF7FWW to UF6FFF
UL4I/UZ9AWO to UA9AQN
UL7TX to UW6HS
US76BL to UB5BBN
UY7U to SM2DYS
UZ9MYL to W0BIU
V2/AA4BQ to AA4BO
V73CT to OKDXA
VE1ST to VE1ANJ
VE8CW1 to VE2SEI
VI4FOW to VK4CHB
VK2CWG to W6FGD
VP2MLD to KC4DWI
VP8CGK to VK4MZ
VP9MN to WB2YOH
VQ9QM to W4QM
VQ9RB to WA4DPU
VQ9WM to K7IOO
VS6WV to K0TLM
VY6QST to K1ZZ
XT2DK to OE3DKS

YB47RI to YB8VM
YJ8AFU to NA5U
YN/SM00IG to SM0KCR
ZA1J to HB9BGN
ZD8VDC to WB5VDC
ZF2SO to W5ASP
ZF2SE to WA0JTB
ZK1AL to I4ALU
ZK1AR to WB6HGH
ZK1XR to N7NKG
ZK2VJ to G4VZJ
5B4AAL to P.O. Box 1642, Nicosia, Cyprus
9A2PA to P.O. Box 60, Krizevci, Croatia
9A3GW to P.O. Box 5151, 41040, Zagreb, Croatia
9D0RR to P.O. Box 766, Brooklyn, NY 11230-0766
A71BV to Khalid, P.O. Box 2260, Doha, Qatar
C88NS to P.O. Box 6577, Rabat, Morocco
EP2PP to P.O. Box 2274, Monrovia, Liberia
HH2PK to P.O. Box 1095, Port au Prince, Haiti
VR6BX to P.O. Box 21, Pitcairn Island
X0BYAF to P.O. Box 4, Easter Island, Chile
YI1BGD to Deya, P.O. Box 7361, Baghdad, Iraq
ZA1BM to P.O. Box 5, Elbasan, Albania
ZA1FD to P.O. Box 1, Elbasan, Albania

tact him at 42 Mathews Avenue, Waterville, ME 04901-5233.

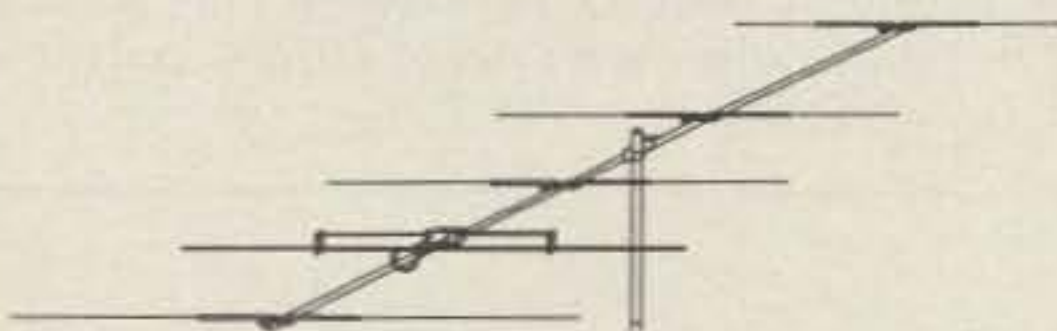
Duncan Kreamer, W1GAY, is not only willing to serve as a QSL manager, but will

even pay for the cards and additional postage; contact him at P.O. Box 637, Vineyard Haven, MA 02568.

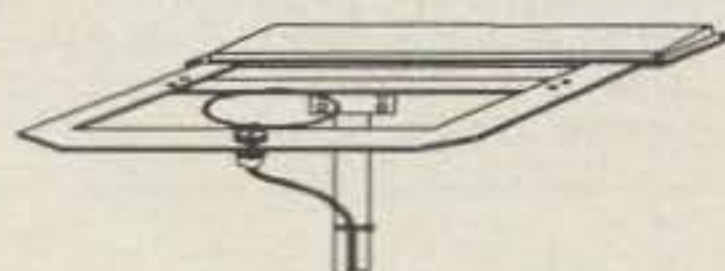
73, Chod, VP2ML

M2 's Christmas list for winter weather projects.

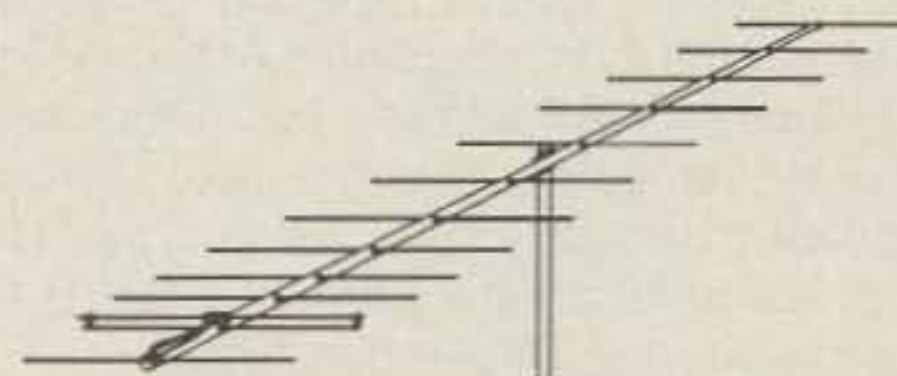
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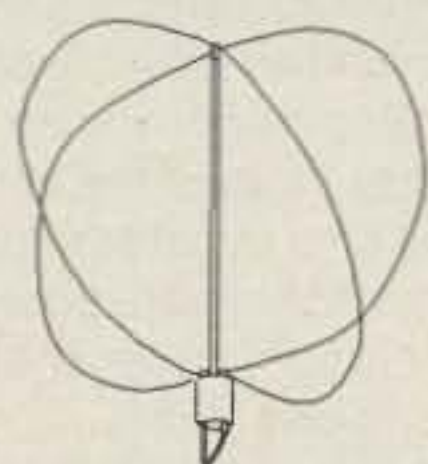
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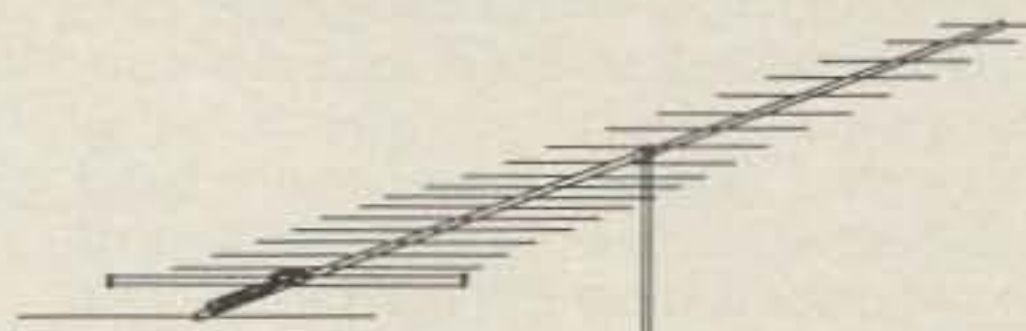
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works TROPO & E skip.
2M \$59 6M \$97



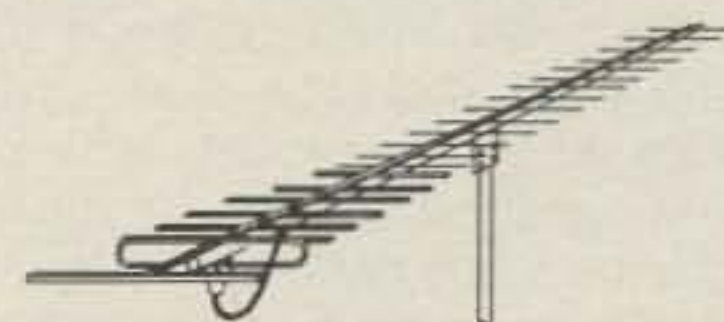
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THE SCIENCE OF PREDICTING RADIO CONDITIONS

1992: Another Good Year for HF Propagation

Although the solar cycle began to decline steadily during 1992, the solar count continued to remain high enough to produce another good year for the users of the HF spectrum.

While all necessary data is not yet available, it looks as if the year began with a smoothed sunspot count of 124 and dropped to approximately 85 by the end of the year. Solar activity was therefore moderately high during 1992, and this was reflected in the generally good conditions that were observed on all of the HF bands.

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a mean sunspot number of 64.4 for August 1992. Daily values ranged between a high of 103 recorded on both August 3rd and 4th, and a low of 20 reported for August 25th. This mean value results in a 12-month smoothed sunspot number of 116 centered on February 1992. The sunspot cycle is measured by the value of smoothed sunspot number, and February's level is a drop of eight points from the previous month's count. A smoothed sunspot number of 85 is forecast for December 1992, as the 21st sunspot cycle is expected to continue its steady decline.

A corresponding 10.7 cm mean solar flux level of 123 was reported for August 1992 by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 175 centered on February 1992. A smoothed 10.7 cm flux level of approximately 128 is expected during December 1992.

December Band Openings

During December the density of ionization in the northern hemisphere is expected to increase more rapidly after sunrise than during other seasons. Atmospheric noise and static levels should be at seasonally low values during the month, and signal levels are expected to be exceptionally strong during many band openings.

During December the 10 and 12 meter bands should open an hour or so after sunrise, peaking on signals from an easterly direction before noon, from a southerly direction during the afternoon hours, and from a westerly direction during the late afternoon and early evening hours.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for December 1992

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 5, 11-12, 15, 17	A	A	B	C
High Normal: 4, 6, 14, 16, 18, 31	A	B	C	C-D
Low Normal: 3, 7, 10, 13, 19, 23-25, 29-30	B	C	D	D-E
Below Normal: 1-2, 9, 20, 22, 26, 28	C	C-D	D-E	E
Disturbed: 8, 21, 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 December 1st and 2nd, fair (C) on the 3rd, good (B) on the 4th, excellent (A) on the 5th. Conditions should be fair (C) on Christmas Eve and Christmas Day, and good (B) on New Year's Eve.

Excellent openings are expected on the 15 and 17 meter bands to one area of the world or another from shortly after sunrise through the early evening hours. These should be the optimum bands for DX openings during much of the daylight period.

Good-to-excellent DX propagation conditions are forecast for 20 meters during December. Opening at sunrise, the band is expected to remain open to one area of the world or another through the daylight hours and into the early evening. To some areas of the world 20 meters may remain open during many of the hours of darkness as well. DX propagation conditions should be optimum on this band during and shortly after local sunrise, and again during the late afternoon and early evening hours.

DX propagation conditions on the lower frequency amateur bands should improve considerably during December and the winter months. Static levels should be at

Bulletin

This issue of CQ should reach most readers in time for the CW weekend of the CQ World-Wide DX Contest, November 28 and 29. Here is an updated day-to-day propagation forecast for the weekend made at press time. Regrettably, because of the severe radio storm which took place on September 9th and 10th, we must now downgrade our previous forecast of High Normal propagation conditions during the CW Contest weekend. There is a strong tendency for this storm to recur sometime between November 29th and December 1st. November 28th, the first day of the contest weekend, still looks like at least Low Normal conditions, with periods of High Normal. The problem is the forecast for the second day, November 29th. If the storm holds off until the 30th, Low to High Normal conditions should continue through Sunday, deteriorating towards the very end of the contest. However, if the storm should begin on the 29th, Below Normal to Disturbed conditions can be expected for most of the day. The odds are in favor of the storm holding off until after the end of the contest. Let's hope that the odds will hold up in favor of the better conditions.

seasonally low values, and signal levels are expected to be stronger than at any other time of the year. DX openings on 30 and 40 meters should begin during the late afternoon hours, with the opening first to Europe and to other areas in a northeasterly direction from the USA. The bands are expected to remain open to one area of the world or another through the hours of darkness and until shortly after sunrise, when conditions are expected to peak to Oceania and to other areas in a generally southerly and westerly direction.

DX conditions on 80 meters should be fairly good during December. Relatively strong signal openings should be possible to many areas of the world during the hours of darkness, with conditions expected to peak as the sun rises at the easternmost terminal of a DX path.

Even the 160 meter band should have its share of DX during December. Some

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band opening (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in () after the time of each predicted opening. 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate standard time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

fairly good openings are likely to take place when the transmission path is entirely in darkness, or when part of the path is in darkness and the other part is either in twilight or at dawn.

To optimize DX openings on 30, 40, 80, and 160 meters, remember that signals peak just as the sun begins to rise at the easternmost terminal of a path.

Short-skip conditions during December favor the 40 and 80 meter bands for daytime openings less than 250 miles in length. Try 80 and 160 meters for this same distance at night. For openings between 250 and 750 miles, 40 meters should be optimum during the day, and both 80 and 160 meters at night. Try 20 meters during the day for openings between 750 and 1300 miles, 30, 40, or 80 meters from sunset to midnight, and 80 meters from midnight through the sunrise period. Try 30 and 40 meters again for an hour or so after sunrise. For openings between 1300 miles and the maximum one-hop distance of 2300 miles, 17, 15, or 20 meters should be optimum during the day; 20, 30, and 40 meters from sundown to midnight; and 40 and 80 meters from midnight to sunrise. Ten and 12 meters should also provide good short-skip openings between 1300 and 2300 miles during much of the daylight period.

This month's column contains DX Propagation Charts valid through mid-February 1993. Short-Skip Propagation Charts for December appeared in last month's column.

December 15, 1992 - February 15, 1993 Time Zone: EST (24-Hour Time) EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central	07-08 (1) 08-09 (2)	06-07 (1) 07-08 (2)	23-01 (2) 01-05 (1)	14-16 (1) 16-17 (2)
Europe & North Africa	09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	08-09 (3) 09-10 (4) 12-13 (3) 13-14 (2) 14-15 (1)	05-07 (2) 07-09 (3) 09-11 (2) 11-12 (3) 12-15 (4) 15-16 (3) 16-19 (2) 19-23 (1)	17-19 (3) 19-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 17-19 (1)* 20-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-13 (1)	23-02 (1) 02-04 (2) 04-06 (1) 06-07 (2) 07-11 (3) 11-13 (2) 13-14 (1)	16-19 (1) 19-23 (2) 23-03 (1) 19-02 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-09 (2) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-08 (2) 08-10 (1) 10-13 (2) 13-16 (3) 16-21 (2) 21-23 (1) 23-02 (2) 02-06 (1)	18-20 (1) 20-22 (2) 22-00 (1) 20-23 (1)*
Western Africa	08-09 (1) 09-10 (2) 10-11 (3) 11-13 (4) 13-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (3) 13-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	01-06 (1) 06-08 (2) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-21 (3) 21-01 (2)	22-22 (1) 22-02 (2) 02-03 (1) 00-03 (1)*
Eastern & Central Africa	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-23 (2) 23-01 (1)	18-00 (1)
Southern Africa	07-08 (1) 08-10 (2) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4) 15-17 (2) 17-18 (1)	12-14 (1) 14-15 (2) 15-18 (4) 18-20 (3) 20-01 (2) 01-03 (1)	18-19 (1) 19-21 (2) 21-00 (1) 19-22 (1)*
Central & South Asia	08-10 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 18-20 (1) 20-23 (2) 23-01 (1)	06-08 (1) 20-22 (1)
Southeast Asia	09-10 (1) 10-11 (2) 11-13 (1) 18-20 (1)	09-10 (1) 10-12 (2) 12-14 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-22 (2) 22-03 (1)	05-07 (1)
Far East	17-18 (1) 18-19 (2) 19-20 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 02-04 (2) 04-07 (1) 07-09 (2) 09-11 (1)	05-08 (1) 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	08-10 (1) 10-13 (2) 13-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	12-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-04 (3) 04-06 (1) 06-07 (2) 07-09 (4) 09-12 (2)	01-02 (1) 02-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	09-10 (1) 10-11 (2) 11-12 (1) 15-17 (1) 17-19 (2) 19-20 (1)	08-10 (1) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	07-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-02 (1) 02-04 (2) 04-07 (1)	03-05 (1) 05-07 (2) 07-09 (1) 05-08 (1)*

Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-12 (4) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	07-09 (4) 09-11 (3) 11-16 (2) 16-17 (3) 17-21 (4) 21-00 (3) 00-03 (1) 03-05 (2) 05-07 (2)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-11 (2) 11-14 (3) 14-16 (4) 16-17 (2) 17-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-04 (2) 04-07 (2) 07-09 (1) 09-11 (1)	19-21 (1) 21-02 (2) 02-05 (1) 21-03 (1)*
McMurdo Sound Antarctica	NIL	06-09 (1) 16-18 (1) 18-20 (2) 20-21 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (2) 02-04 (3) 04-06 (1) 06-08 (2) 08-09 (1)	00-05 (1)

December 15, 1992 - February 15, 1993 Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-16 (2) 16-19 (1) 19-22 (2) 22-00 (1) 00-02 (2)	15-17 (1) 17-18 (2) 18-01 (3) 01-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (2) 10-12 (1)	22-00 (1) 00-02 (2) 02-06 (1) 06-08 (2) 08-11 (3) 11-12 (2) 12-14 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-11 (2) 11-12 (1)	04-06 (2) 06-10 (1) 10-12 (2) 12-14 (3) 14-18 (2) 18-22 (1) 22-02 (2) 02-04 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-09 (1) 09-11 (2) 11-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-01 (1)	18-21 (1) 21-23 (2) 23-01 (1)
Eastern & Central Africa	08-09 (1) 09-12 (2) 12-13 (3) 13-14 (2) 14-16 (1)	08-10 (1) 10-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	11-14 (1) 14-16 (2) 16-19 (3) 19-21 (2) 21-00 (1)	19-00 (1)
Southern Africa	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-18 (1)	07-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-21 (2) 21-00 (1)	18-19 (1) 19-21 (2) 21-22 (1)
Central & South Asia	08-10 (1) 18-20 (1)	07-09 (1) 18-19 (1) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-22 (2) 22-00 (1)	06-08 (1) 19-21 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-13 (1) 16-17 (1) 17-19 (2) 19-20 (1)	09-10 (1) 10-12 (2) 12-14 (1) 12-14 (1) 16-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-18 (1) 18-20 (2) 20-21 (1)	04-07 (1)

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South Pacific & New Zealand	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (2) 07-09 (3) 09-12 (2) 12-18 (1) 18-20 (2) 20-00 (3) 00-02 (4) 02-04 (3) 04-05 (2) 05-06 (1)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 03-07 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 15-17 (1) 17-19 (2) 19-20 (1)	08-10 (1) 10-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	05-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-03 (1) 03-05 (2)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-11 (3) 11-15 (2) 15-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (3) 02-04 (2) 04-06 (1)	17-18 (1) 18-19 (2) 19-00 (3) 00-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-11 (2) 11-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	04-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-02 (3) 02-04 (2) 07-09 (1)	19-21 (1) 21-02 (2) 02-05 (1) 21-04 (1)*
McMurdo Sound Antarctica	NIL	07-09 (1) 16-18 (1) 18-20 (2) 20-21 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-04 (2) 04-06 (1) 06-07 (2) 07-09 (1)	22-05 (1)

December 15, 1992 - February 15, 1993
Time Zones: PST (24-Hour Time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	22-00 (1) 00-03 (2) 03-06 (1) 06-09 (2) 09-11 (3) 11-14 (2) 14-16 (1)	18-21 (1) 21-00 (2) 00-01 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-09 (1)	06-07 (1) 07-09 (2) 09-10 (1)	16-18 (1) 22-00 (1) 00-02 (2) 02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (1)	17-22 (1) 22-00 (2) 00-01 (1) 19-23 (1)*
Eastern Mediterranean & Middle East	07-09 (1)	07-08 (1) 08-10 (2) 10-11 (1)	22-00 (1) 00-03 (2) 03-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1)	18-21 (1)
Western Africa	08-09 (1) 09-11 (2) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	05-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 00-03 (2)	18-22 (1)

Eastern & Central Africa	09-10 (1) 10-12 (2) 12-14 (1)	08-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	08-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	18-20 (1)
Southern Africa	08-10 (1) 10-12 (2) 12-14 (1)	07-09 (1) 09-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	07-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1) 00-02 (1)	18-20 (1)
Central & South Asia	17-19 (1)	07-10 (1) 16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	05-07 (1) 17-20 (1)
Southeast Asia	09-11 (1) 14-15 (1) 15-17 (3) 17-18 (2) 18-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	03-08 (1) 04-06 (1)*
Far East	14-15 (1) 15-16 (2) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-14 (1) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	02-04 (1) 07-08 (1) 08-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-10 (1) 02-08 (1)*
South Pacific & New Zealand	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-23 (4) 23-00 (3) 00-02 (2)	22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 00-03 (1)* 03-06 (1)* 06-07 (1)*
Australasia	10-13 (1) 13-15 (2) 15-17 (3) 17-19 (2)	08-09 (1) 09-12 (3) 12-15 (2) 15-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	18-20 (1) 20-22 (2) 22-02 (1) 02-05 (2) 05-06 (1) 06-08 (2) 08-10 (4) 10-12 (2) 12-14 (1)	01-03 (1) 03-06 (2) 06-08 (1) 00-03 (1)* 03-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-10 (3) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (2) 07-09 (4) 09-13 (2) 13-15 (3) 15-19 (4) 19-20 (3) 20-00 (2) 00-06 (1)	17-18 (1) 18-19 (2) 19-23 (3) 23-03 (4) 03-04 (2) 04-05 (1) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-13 (3) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-22 (3) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1) 06-07 (1) 07-08 (2) 08-09 (1)	20-22 (1) 22-01 (2) 01-04 (1) 22-02 (1)*
McMurdo Sound, Antarctica	NIL	06-09 (1) 14-16 (1) 16-19 (2) 19-21 (1)	16-18 (1) 18-20 (2) 20-00 (3) 00-04 (2) 04-06 (1) 06-08 (2) 08-10 (1)	23-05 (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.

**Indicates best times to listen for F-2 layer openings on 6 meters.
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.

VHF Ionospheric Openings

Solar activity is still high enough that some 6 meter DX openings may be possible during December. This will probably be the last year, however, for such openings for the remainder of this solar cycle. Check for openings towards Europe, Africa, and the east for an hour or two before noon. These openings, if they occur at all, should favor locations in the eastern half of the country. Openings towards the Pacific, Australasia, and the Far East favor locations in the western half of the country and may occur during the late afternoon and until just before sundown. Openings towards Central and South America and the Caribbean area should be possible from about an hour or two before, to about an hour after, noon. Generally, 6 meter openings are most likely to occur at about the same time that 10 meter conditions are peaking for a particular transmission path.

A major meteor shower, the *Geminids*, is expected during the second week of December, reaching peak intensity between the 12th and 13th with a meteor count of approximately 60-70 an hour. A second, but less intense, shower, the *Ursids*, is scheduled to peak between December 21-22, with a meteor count of approximately 15 an hour. Both showers should produce brief periods of ionization which may make possible short-skip openings on the VHF bands for distances up to approximately 1300 miles.

December is not an optimum month for trans-equatorial scatter propagation. An occasional 6 meter opening, however, may be possible via this mode towards South America. The best time to check for TE openings is during the evening hours between 8 and 11 PM local time. Openings, if they occur at all, will favor locations in the southern tier states.

Some auroral-type VHF ionospheric openings are likely to occur during December for distances up to approximately 1300 miles, particularly when conditions on the HF bands are expected to be Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column for those days during the month that are expected to be in these categories.

A secondary seasonal peak in sporadic-E propagation is expected during December (the major peak occurs during the summer months). This should result in a number of good short-skip-type openings on the 6 meter band between distances of about 800 and 1400 miles. Sporadic-E conditions usually peak during the early evening hours, but some openings may occur at other times as well.

The editor of this column would like to take this opportunity to extend his warmest wishes for the Holiday Season to readers everywhere.

73, George, W3ASK

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The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy wire, anchor, or base failures. **Used towers in many cases are not as inexpensive as you may think if you are injured or killed.**

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OUR READERS SAY

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Editor, CQ:

Regarding your September 1992 cover, it appears that there are actually two unique characteristics about N4TG's contest station. First, despite all of the awards, there's no computer present, and note the manual log! Second, it's an all made in U.S.A. station—Ten-Tec, ETO, Ameritron, AEA, MFJ... A nice change from the usual.

Thomas Kuehl, AC7A
Tucson, AZ

Thanks From The Ukraine

Editor, CQ:

The whole world hasn't any words to thank CQ for the great job you do for hams worldwide! I'm in love with CQ, and it's the truth. In my 17 years as an active ham I saw many copies of ham radio magazines, but no one can be equal to CQ! I don't know how you do it, but I can't live without CQ. I reread it every day many times! Frankly speaking, I know by heart every page, every piece of CQ I have. Thanks again for your great job.

Anton Koval, UB5COS
Cherkassy, Ukraine

"40 Plus WARC" Correction

Editor, CQ:

Received my October CQ yesterday and was pleased to see my article ("40 Plus WARC" p. 42) in it. I picked up a couple of errors in the article. Basically, here are the errors:

Fig. 1—connections on the center insulator should be the same as in fig. 2. Also, wire identification W3 should read W4, and the wire that is marked 17 (17 meters) should be shown as W3.

Photo 4—where the identification reads "End of 30 meter dipole," it should read "30 meter dipole."

I'm sure that anyone bright enough to start building this antenna will catch these errors, but I just wanted to let you know.

Dick Genaille, W4UW
Winston-Salem, NC

Hamfest A Success

Editor, CQ:

I would like to take this opportunity to thank you for your kind donation for the Sky High Hamfest, which was held on Silver Star Mountain on August 28, 29, and 30, 1992. The weekend was a tremendous success. There were hams registered from throughout British Columbia, Alberta, Saskatchewan, and a few from the United States, Prince Edward Island, and one from Switzerland. Needless to say, the prize for the farthest distance traveled went to the ham from Switzerland. Over 500 people were registered.

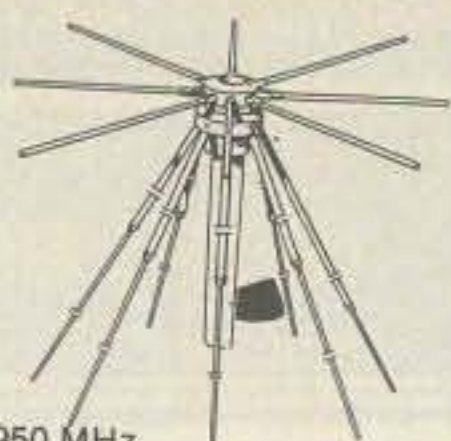
We really appreciate the support we received from local businesses. Their donations of prizes for the raffle and door prize draws made this event a success.

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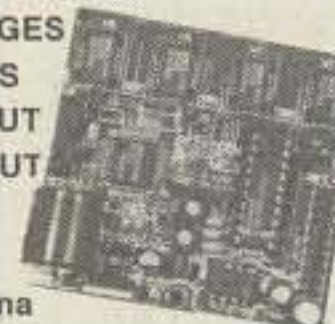
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Dorothy Lindley, VE7DAL
Secretary Sky High Hamfest



A Wedding Field Day

Editor, CQ:

My husband and I were enjoying our wedding reception of March 21, 1992, when we realized that several of our guests were hams. Our photographer, not missing a beat, snapped this picture of the amateur radio operators in our wedding. Listed from top left are Bob O'Hara (N7UXZ), Craig Stokowski (WA1WZY), Scott Baer (N7TXA), Kim Carpenter (N7TWZ), Mike Donnelly (WD7M, father of the bride), George Tarleton (NZ7H), Cynthia (Donnelly) Kibbe, the bride, Wayne Kibbe (N7RCH, the groom), and Matt Ronning (WA7HDZ). In addition, there were also two other hams, Chris and Laura Radicke (N7TWW and N7TWY, respectively), who are not pictured.

I should mention that with all this influence, I have decided to go for my own license! I thought your readers might enjoy this picture of our "Wedding Field Day," and I hope they wish me luck as I prepare for my exam.

Cynthia Kibbe
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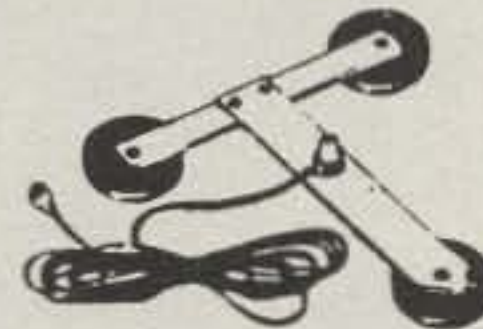
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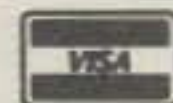
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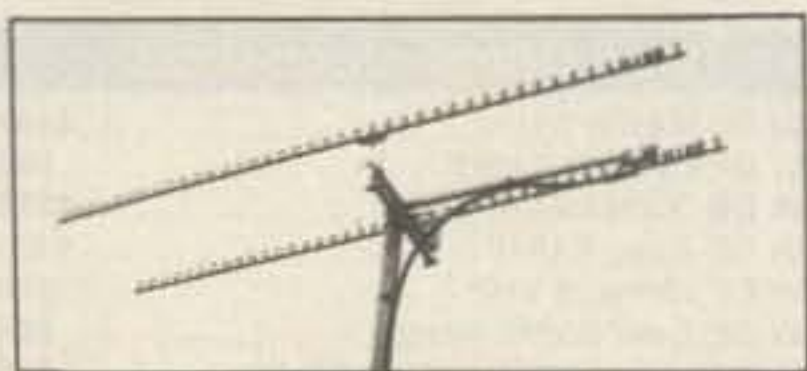
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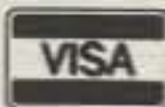
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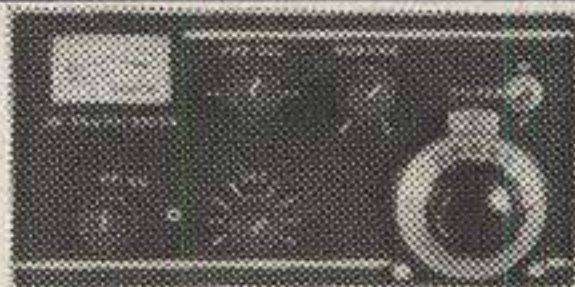
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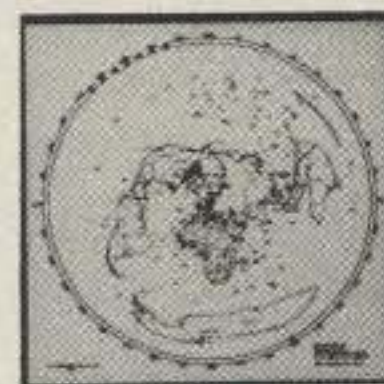
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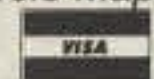


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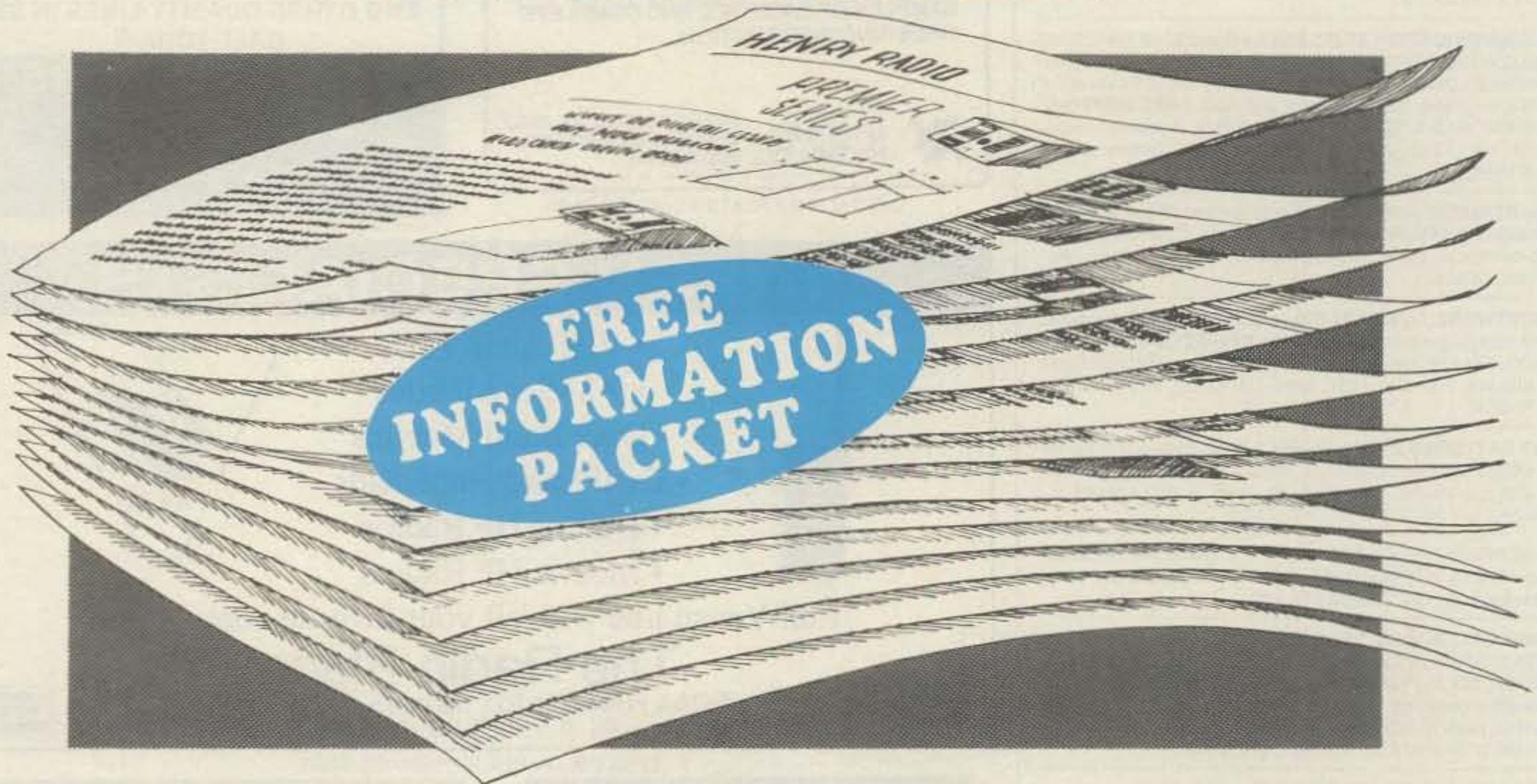
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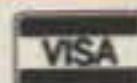
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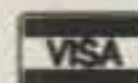


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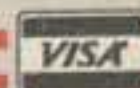
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 - DTMF Encoder Built-In
- SPECIAL DISCOUNTS APPLY!**

KENWOOD

TH-28A VHF HANDHELD

- Transmit-2 Meter
- Receive-2 Meter & 440MHz
- 40 Memory Channels
- Message Paging

TH-78A

V/UHF HANDHELD

- RX 118-173.995 MHz
 - TX 144-147.995 MHz
 - UHF 438-449.995 MHz
 - Dual Band Receive
 - Message Paging
 - 50 Memory Channels
- HOLIDAY SALE!**

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FT-2400

- TESTED TOUGH 2 METER MOBILE
- 3 Power Levels with a High of 50 Watts
 - Receive 140-174 MHz
 - CTCSS Encode Built-in
 - Automatic Repeater Offset
- \$25. OFF COUPON!**

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DJ-580T

TWIN BAND
HANDHELD

- Rx 130-173.995 MHz
 - 400-519.995 MHz
 - Up to 5 Watt Output
 - Multiple Scanning Modes
 - Direct Freq. Selection
 - 40 Memory Channels
 - Cross Band Full Duplex
- CALL TODAY!**

KENWOOD

TM-241A

COMPACT 2M,
FM, MOBILE

- Receives 118-174 MHz
 - Big 50 Watt Output
 - 20 Memories
 - CTCSS Encode Built-in
 - Automatic Repeater Offset
 - Easy To Read Display
- HOLIDAY SALE!**

YAESU

FT-530

DUALBAND HANDHELD

- 2M, 130-174 MHz RX
- 140-150 MHz TX
- 70cm, 430-450 MHz RX/TX
- 82 Memories
- Built-in CTCSS With Dual Decode
- Dual In-band Receive

\$25. OFF COUPON!

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"This FT-890AT is great in the field!"

"Yaesu did it again!"

FT-890AT

Compact HF Transceiver

- Automatic Antenna Tuner Hybrid High Speed Design Covers 160-10 meters
- I.P.O. Intercept Point Optimization
- DDS-Direct Digital Synthesis
- F.S.P. Frequency Shift Speech Processor
- General Coverage Receiver 100 KHz to 30 MHz
- Pass Band Shift and 30db Notch Filter
- Noise Blanker with Adjustable Pulse Width
- Built-In Iambic Keyer
- 32 Memories plus 20 VFOs
- FM Repeater Operation Automatic 10 Meter Repeater Offset w/Selectable CTCSS Encode
- All Mode Squelch
- DFCS-Duct Flow Cooling System
- **Accessories:** Contact your Dealer for full details.

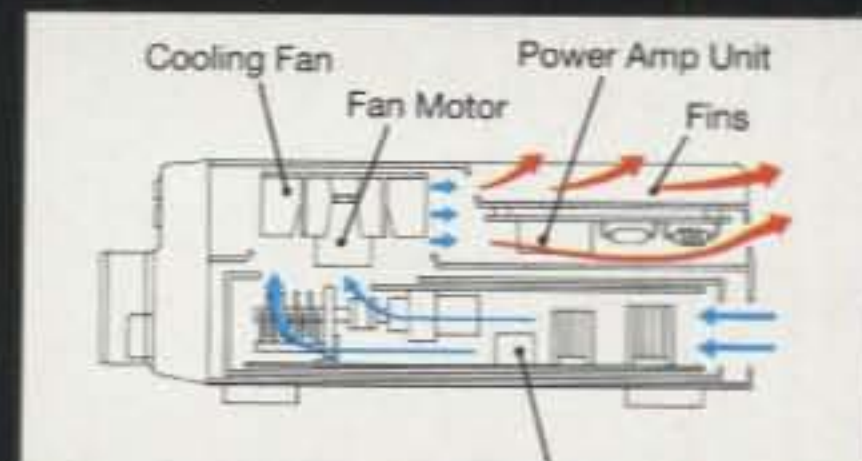
Field days and contesting are challenging. We built the FT-890AT for times when you need the high performance of a base station – like the FT-1000 – but the practicality of a compact, rugged mobile. In fact, the FT-890AT is the mobile version of the FT-1000. Designed to be the world's smallest HF with a built-in antenna tuner, its superior receiving performance is a direct result of FT-1000 technology.

Since field work is demanding, the front panel has been simplified. Seldom used VOX controls are on the back. For faster TX/RX switching, the FT-890AT has two direct digital synthesizers (DDSs). With its unique duct flow cooling system, die-cast aluminum upper case and heat sink, the FT-890AT can't be beat for superior field work and DX-peditions.

Not just a "field" radio, with the optional FP-800 AC Power Supply, MD-1C8 Desk Mic and YH-77ST Headphones you've got a performance-plus base station loaded with features and affordably priced.

To see what that means for you, contact your Yaesu dealer today.

Duct Flow Cooling System (DFCS)
Rugged aluminum top panel heat sink and internal thermally switched fan draws air through the heart of the transceiver.



Built-in Antenna Tuner
Tunes most antennas 160-10 meters.

YAESU

Performance without compromise.™

Usually if a rig is this loaded, the price is too.



DVS-2 (Optional)
Digital Voice Recorder
with 16 seconds of memory
each on RX and TX.

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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.

"200 watts, real cross band receive, even two flywheel-weighted main knobs!"

"Right, there's only one real performer - the FT-1000."

"Yaesu did it again!"



never heard before.

large, flywheel-weighted tuning knobs for the two receivers, front panel RX antenna selector for quick switch to a spotting antenna and two large displays so you can see what's happening all the time. This is the type of practical design you'd expect from a world leader in radio communications.

The FT-1000 is the perfect blend of electronics and human engineering. It's the Best of our Best.

Contact your Yaesu dealer today and tell him you want the best, too. You want the FT-1000.

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Performance without compromise.SM

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MD-1C8

SP-5

DVS-2

FT-1000

FL-7000

The Dream StationSM

FT-1000 All Mode HF Transceiver

RF Power Output:
Up to 200 Watts
True Cross-band Dual Receive:
Two Large Tuning Knobs
Front Panel RX Antenna
Switch: For Beverage or Loop
Direct Digital Synthesis (DDS)
Automatic Antenna Tuner:
Built-in, 30 Memories
Frequency Range:
100kHz-30MHz (RX),
160-10 meters (TX)
100 Memories: Independent
ATU and Mode/IF Filter
Memory
CW Spot and Two CW Key
Jacks for Maximum
Convenience
Dynamic Range: 108 dB
Optional Digital Voice Recorder
(DVS-2): 16 Seconds Each
RX/TX

Accessories:

- SP-5 External Desk-top Speaker
- LL-5 Phone Patch Unit
- MD-1C8 Desktop Microphone
- YH-77ST Stereo Headphones
- FL-7000 500W Linear Amplifier
- DVS-2 Digital Voice Recorder



Hear signals you've

You're a competitor. You want optimum receiver performance and you want "muscle" on transmit. With the FT-1000 you'll hear signals you've never heard before, and it's first with 200 watts – more power than any competing transceiver.

Recognized throughout the world by experts such as *Radio Communications* magazine in the UK for the FT-1000's "excellent top flight receiver", *cq DL* magazine in Germany for its

"hand warm" operation at maximum RF output, and the ARRL Lab which judged it "best overall", it's easy to see why the FT-1000 is the choice of top DX'ers all over the world.

A peerless combination for elite-class contesting and DX operation, these exclusive features will maximize your score: Dual Receive – mixed at audio for either mono or

stereo monitoring, lets you watch a multiplier or new country on one frequency while running QSOs on another frequency or band; Diversity Reception – using two antennas at different heights or opposite polarizations; and Extensive Cascaded IF Filtering – for unmatched selectivity in those battles on "the low end". Outstanding front panel design features two



DVS-2 Optional Digital Voice System provides instant playback.

It's Not Just Theory Anymore.

The First And Only TriBand™ Handheld

ICOM has designed the ultimate handheld — the TriBand Delta 1A. Now, for the first time, you can operate three bands — 2 meter, 70cm & 1.2GHz — from one handheld!

Three Fully-Controllable Bands!

Literally like having three radios in one! Each band has separate tuning, volume, scanning & squelch controls. The easy-to-read display shows all three frequencies in use, plus S-meter & memory channel settings. There are 78 memory stations, 26 per band.

Simultaneous Reception!

The IC-Δ1A receives all three bands *simultaneously*, and transmits on one band while receiving on the other two. Gives you an overview of the action, then lets you copy and talk over all VHF & UHF bands and repeaters.

Cross-Band Double Duplex!

For the first time true CBDD operation is possible in a handheld. Perfect for crossbanding & auto-patching, and a priceless emergency mini-communications center.

Explore the Final Frontier!

Look for unexpected activity on the still new and untried 1.2GHz band, without having to give up familiar frequencies. The IC-Δ1A is your ear on the future of amateur radio.

Supertenna!

The compact, attractive unit includes a newly-designed triband antenna with triplexer for maximum performance.

Built-in DTMF Personal Pager!

Silently monitors any or all channels for your 3-digit DTMF-keyed calls.

And More!

Illuminated display & keypad, 24-hour clock/timers, auto power-off, dual phone jacks, triple digital squelch and lots more, together for the first time in a handheld.

TriBand™
IC-Δ1A



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