

1-92

Zero Beat

January 1992

Hampden County Radio Association, Inc

Springfield, Mass

Our 45th ARRL Affiliated Year

Next Meeting: **Friday January 3rd, 1992**

Feeding Hills Congregational Church

Feeding Hills, MA

Doors open at 7:30 pm, meeting starts at 8:00

Speaker will be **Dick Frey, WA2AAU**, organizer of the infamous W2SZ/1 operation from atop Mt. Greylock every contest.

Dick's been a mover and a shaker in the VHF/UHF contesting scene for many years. 20 rover stations are part of the W2SZ effort alone! They have been trying to break the 1,000,000 point mark and have succeeded. The talk will include a phenomenal slide show, and a demonstration of the microwave equipment the rover's use.

This talk is highly recommended by many who've seen it at hamfests!
Don't miss it!

Next HCRA sponsored VEC session:

Saturday January 4th, 1992 at

the Minnechaug Regional High School, in Wilbraham Mass.

Starts at 8:45, with exams beginning at 9 am.

Bring your original license and a photocopy, and any certificates of successful completion, with two forms of ID.

Yorke Phillips, K1BXE is the liaison and can be reached at (413) 566-3010.

Test fee is \$5.40. Talk-in of \$146.52 simplex.

January VHF Sweepstakes

Saturday and Sunday, January 18th and 19th.

Special issue of Zero Beat to be sent out!

Don't forget the new club award you can qualify for.

See you during the contest!

In This Issue:

Marconi Memorial Operations

Radio Reminiscences

Brief Visit with the OM

And more....

Upcoming Issues:

Special VHF Sweepstakes issue!

The Blizzard of '78

Radio Clubs of Western Mass

KM1CC Expedition

By

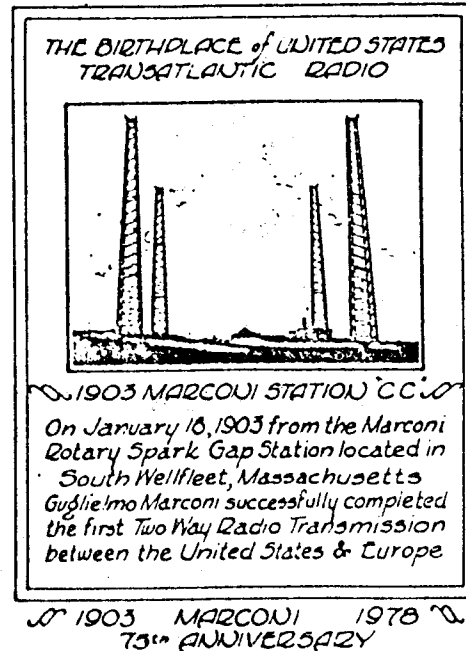
Jeffrey J. Duquette K1BE

With the organizing talents of Art Zavarella, W1KK, (accomplished even while he was on a cruise ship), a contingent of hams from the HCRA journeyed to Cape Cod to help out with the Marconi Memorial Station. Dick Stevens, W1QWJ, Eunie Gordon, W1UKR, Jack Murnane, WB1APD, Barbara Murnane, WB1EHS, Jean Peacor, K1IJV, Bill Wereniski, W1CJJK, and Jeff, K1BE, arrived at about 3 pm on Thursday. They operated until about 7, then went back to Jean's cabin for supper. The station was very elaborate, with SSTV, RTTY, and many antennas and rigs. Everyone went back and did some more operating and at 11 pm the troops returned home to their beds, leaving Jeff to hold the fort. During the night a northeaster arrived, swirling and howling outside at 50+ knots! The National Park Service and the Barnstable Radio Club recommended that everyone leave the station. Jim, K1UQI of Providence, and Jeff decided to stay behind and operate, come hell or high water.

There they were with over ten operating positions and no people! It was like being a kid loose in a candy shop. A car full of operators did return, because their car had gotten stuck trying to get out. With seven hams and no food, except beer crackers and lots of coffee, KM1CC stayed on the air! Pile ups continued on all bands and we continued to keep our schedule with GB3MSA, the memorial station in England. Jeff slept on the floor with SSTV contacts going on beside him. The sound of A2 spark gap thrilled hams from coast to coast and around the globe. Some even made QSO's using their own spark gap transmitters, and their old call signs. (This was around 2 am when the FCC was asleep, we hope for their sakes!) Jeff worked a ham who's brother in law was one of Marconi's original two operators. Working all bands, the tired hams kept banging away at the keys.

The rest of the HCRA team couldn't get out of the driveway so they kept in touch via two meters and landline. Art and Bill mounted a rescue mission from the nearby motel, bringing solace and sustenance to the tired crew. What a sight to see the two of them trudging through the 50 knot winds! Everyone jumped on the food and then went back to operating. The "senior citizens" saved the youngsters again!

The station became accessible on Saturday morning and the team was together again once more. Everybody got some more operating time in and then packed up for home. When we had originally made plans to go down to the Cape, Jeff never thought he'd get to make so many contacts, let alone be the control operator and entire operating staff at times! He was so tired that when Art and Bill bought him a hamburger and a ginger ale, he found himself leaning over trying to



copy the CW the soda was sending!

It was a great experience for all and a thrill to help re-create history. The FCC should reconsider their ban on special event calls because they really do add to ham radio's dimensions. Many thanks to K1VV and the Barnstable Radio Club for sponsoring and organizing a number one operation.

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KM1CC: Marconi 75th Celebration

By

Barbara Murnane WB1EHS

On Thursday, January 19, 1978, eight members of the Hampden County Radio Association (HCRA) of Western Massachusetts appeared at KM1CC to help man the station during the part of the week commemorating the 75th anniversary of Marconi's first two-way transatlantic radio transmission. The Town Of Barnstable Radio Club did an excellent job of organizing and setting up KM1CC, and manning it for the nine day period. All frequencies and all modes of amateur radio were used during this time.

Three YLs were in the contingent from Western Mass in the HCRA: Jean Peacor, K1IJV, Eunie Gordon, W1UKR, and Barbara Murnane, WB1EHS. K1IJV was already operating CW when the rest of us arrived. Jean worked 160, 75 and 40 meter bands. W1UKR and WB1EHS did their operating on SSB while they were there. Eunie on 160, 75, and 20 meters, while Barb stayed strictly on 20. We all stayed on duty until early Friday morning when we went to rest at Jean's home in Orleans.

While we were present there were nine operating positions. One room held the slow scan television set-up, plus the 6 meter rig brought by Art Zavarella, W1KK of the HCRA. The other contained 2 meter equipment plus the RTTY station, and five other stations. The Kenwood TS-520 of Jack Murnane, WB1APD, and the Kenwood TS-820S of Dick Stevens, W1QWJ, all of the HCRA were in constant service from 2130Z Thursday to 1600Z Saturday.

The 240 cycle note, the sound of the Marconi 1903 station rotary spark gap, was reproduced by special permission of the FCC. Its distinctive tone for CW QSOs was transmitted by having the loudspeaker from the tone reproducer taped in place to a microphone. The CW operator simultaneously worked the keyer and the PTT switch of the mike. Its sound was unique and unmistakable to all who heard it.

It is interesting to note that several amateur stations responding to our CQ from KM1CC thought they were listening to a station on Midway Island and turned their beams in that direction, before finding out what was actually happening when we explained it to them.

The severe snowstorms which struck Thursday evening and Friday curtailed the operating time of these YLs Friday, when we were due back at KM1CC. Jean and Eunie tried to drive there Friday but had to turn back to Jean's summer house where five of us were staying. The roads were just impossible and the area to KM1CC was not made accessible until late Friday. Jean was a great hostess, and we

appreciated her having us stay at her house while on the Cape, once known for its sunshine and warmth, but now, in our memories, the place we spent the record breaking snowstorm of 1978!

KM1CC did not go off the air during the storm, as it was manned by a small group of fellows who stayed put and went from one set to another to make contacts with the world, going without sleep, and food other than coffee and crackers which happened to be there, until the "senior citizens" of the HCRA, W1KK and W1CJK finally made it in late Friday with the "meals on wheels" for the young people, one of whom was Jeff Duquette, K1BE, president of the HCRA.

All in all, it was an operating event to remember, especially if KM1CC becomes the last such special event station to be authorized by the FCC. The members of the town of Barnstable Radio Club are to be commended for a very fine job of setting up and operating KM1CC.

And More to This Story...

By

Barbara Murnane WB1EHS

It really was quite a fun experience. Before we left Springfield, I keep wondering how we would know what to do, and where to set up the gear when we got there, but everything fell into place, as it usually does, and we had a great time operating. It was a good thing we did bring some gear down, as the Cape Codders knew we were coming and took some of theirs home, thereby making space for us, but at the same time leaving the station a bit under-equipped, too. As soon as we found the free antennas, and latched onto some coax, we were in business, and stayed operating. Consequently there was not much chance to roam around and look at other logs or setups. The coax Jack found free was the one for 20 meters, so that explains why we stayed on that band!

As far as getting marooned at K1IJV's is concerned, it turned out to be quite a congenial group, and we did make the best of it. Eunie had prepared enough food for eight but only five were at the house with all of it. Jeff, K1BE had elected to stay at KM1CC for the night, and whoever got there first in the morning was supposed to take him back to the house to sleep while the others operated on Friday. The rest is history! Two, W1KK and W1CJK, had chosen to stay at a motel just outside the park entrance, but even so, they could not get back inside to KM1CC until late Friday night. The only time we all eight enjoyed a meal together was Friday night at about 7 before we returned to the station.

Meanwhile, in Orleans at Jean's, there were games to play:

Backgammon, Hearts, Solitaire, Scrabble, etc. and there was a good fire roaring in the fireplace. It was a good thing, because before the afternoon was over, the wet clothes were draped in front of it, and over the curtain rod in the bathroom. We had gotten drenched trying to free the cars from the 10+ inches of snow which had fallen, and then the rain was pouring down on us! And with no snow shovel we had quite a time of it! Jean and Eunie set out in Jean's VW Rabbit to see how things were, and if they made it, we would have gone along then. Jack and I went to get our Rabbit free, and also Dick's (W1QWJ) Volare, but it was a NO GO. Soon, while we were still struggling, and digging out with a garden spade, the only tool available, we saw Jean's car stuck on the slight incline approaching her street, so to the rescue the three of us went. That is when Jack and Dick fell flat on their faces after the car finally lurched forward enough to make it back to the parking area. After being out for so long in bad weather, we were all drenched, and of course, no one had brought a change of clothes. So, by mid-afternoon we were all sitting around in pajamas, and I guess this will never be lived down by the group. I don't even go around in pj's at home, but we all put our best smiles on and made the best of it. However, when the pictures come back from the lab, we will all have a good laugh, I hope!! Dick was very busy with his camera.

Saturday, we finally got out, and to the station again, to collect our gear and our president for the return trip to Western Mass. Jean stayed and returned home Sunday. It was quite a memorable occasion, and I guess you could say we got to know each other better! Thus ends the saga of the merry eight!!!

Born on Marconi's Day

by

Bert Binns W1KZU

Two historic events occurred in 1903: Marconi bridged the Atlantic, and I was born. My father was in the cotton mills and I came to the United States as a wee babe of 11 months. Sons were expected to follow their father's trade, but the mills weren't for me. I fixed radios for the chief electrician and through him became an electrician. Then I started showing films- first the silent ones, then the talkies! During the Depression I made \$65.00 a week, a princely sum in those days.

We're getting ahead of ourselves- in 1917 I earned the signaling merit badge which included flags and morse code. At age 14 my pal went into the Navy and gave me his antenna and back issues of "Wireless Age". I built a loose coupler, and used Murdock condensers and plate and Murdock earphones. Had a cat whisker galena crystal to copy NAA in Arlington, Virginia. (now WWV) That was rare DX in those days! WLC New London was on 24 hours a day handling ship to shore traffic which I copied. Then came vacuum tubes; I first had an Audiotron then a UV 200 detector and UV 201 amp.

When WBZA began voice broadcasting in Springfield from the Westinghouse roof with a dipole strung between two towers, (can still be seen today!) I listened to their "on air" tests in 1920.

Finally became W1KZU in '37. Got on 160 phone in 1938 and my cw went to hell. First store bought receiver was a Hallicrafter's SX 9! Earned WAS on December 1, 1939; WAC, April 1, 1940. In '38 I was running 100 watts with a pair of 809's. In '49 my first MOPA was on 2 1/2 meters.

After the war, Wes, W1LRE and myself built one of the first television sets in the area. Couldn't wait for channel six, New Haven, to come on the air. The excitement of seeing their test transmission is still recalled. When they would broadcast a fight, it was standing room only as the neighbors came over with beer. We used BC 645 tube which cost the government \$1500.00 new, but we bought them at surplus for \$9.99. Western Electric doorknob tubes at .65 were run with the plate red hot. I built an electronic organ from instructions on 450 Mhz, our private duplex phone line!

The HCRA 25th anniversary party was in 1972 with Paul K1PKZ, president, and Jack Sheehan K1JNC as VP. I recall Les Horner, Gordon Cavanaugh and Dick Stevens and the "bachelor boys", always attending the ARRL conventions. I made all of the conventions for years.

Have a Ripley's "Believe it or Not" about Jack Binns, who sent the first SOS, one of the first wireless ops! No relation to me, but I met his daughter years ago on Long Island.

Not too busy on the bands nowadays. Did work JA7BM on March 4, 1980, Heather and Bill's DXpedition. Heard Heather say she and Bill were going to climb the hill with 20 meter gear. It was a real thrill to me!

Al Jackson, W1OQB got me interested in OSCAR 6. I still get a thrill out of listening to each pass, ascending or descending, and heard Art, W1KK, last week.

I've been married to the same gal for the past 56 years. Lived in Feeding Hills the past 49. Glad to have been HCRA member for all of these years, and to have seen how amateur radio has changed. Most of the Old Timers are now silent keys, but I'll say to all the new hams, "Keep up the good work!"

'73 Bert Binns, W1KZU

Editor's note: Bert saw a request for autobiographies in Zero Beat. He was very ill from the cancer that killed him when he wrote this. He died a month after it was printed.

MARCONI AND SARNOFF CHANGED HISTORY

By
Art Zavarella W1KK

In these days of controversy as to the value of telegraphy in amateur radio, it may be interesting to recall what a vital role the code played in the lives of two of our most celebrated radio pioneers, Guglielmo (Billy) Marconi, and David (The General) Sarnoff.

Billy Marconi was an accomplished "amateur of electricity" at age 20, in 1894. There were at the same time many others such as Franklin the U.S., Faraday and Sir Oliver Lodge in England, Branly in France, Braun in Germany, and Righi, his scholarly neighbor in Italy. All were doing similar experiments with "Hertzian waves". Most were established university scientists mainly interested in the pursuit of knowledge. Marconi did not qualify even for college entrance, but what he did know was the Morse code.

This knowledge had come about by his chance meeting the previous summer at the Livorno seashore, of a retired "charming old man telegraphist", named Nello Marchetti. Since Nello's eyesight was bad he enjoyed young Marconi reading to him. Nello returned the favor by teaching the eager youngster the code then in use by wire telegraphers. This was the unique qualification: The code and the long lines of connecting wires presented Marconi a clear opportunity to use Hertzian waves for the benefit of mankind via improved global communications. This was attested to by his receiving the Nobel Prize in Physics in 1909 along with Professor Braun of Germany.

David Sarnoff's rise to fame and fortune in this country began as a wireless operator for American Marconi on board ship. All was cw in those days, all in Morse code. The forthcoming corporate merger of GE and RCA was nicely set forth in the December 13th issue of the Springfield Morning Union. The three toned musical identity of RCA's NBC are the notes G, E, and C which will signify full-circle reunion with General Electric Company in 1986.

In 1919, GE was part of a consortium that became RCA from assets of American Marconi, which then was producing wireless receivers. Sarnoff, son of a Russian immigrant, must have played his cards well because in 1930 he had risen from pounding brass to become the president of RCA. His keen interest in television research paid off handsomely and by 1940 RCA and the "General" were in clover with their NBC Red network, and ABC Blue network. GE's home entertainment product lines initiated with the acquired Victor talking machine and its dog "listening to his master's voice". The General had proudly proclaimed at the New York World's Fair in 1939, "Now we add sight to sound, with its implications to affect all society!".

So learning the code made a big difference in each of their lives and has affected all of us since then. Wonder which of us today will have an article written in fifty years detailing how learning the code changed the course of history?

Marconi's Cape Cod Transatlantic Wireless Station

By
Frank Caswell W1ALT

Guglielmo Marconi came to Cape Cod, Massachusetts in 1901 to establish the first transatlantic station in the United States. The station was constructed on the sand dunes of South Wellfleet, Massachusetts and was completed in late 1902. The transmitter was of about 30,000 watts power consisting of a three foot diameter spark gap rotor supplied with 25,000 volts of alternating current from a kerosene generator. The aerial wires were to be supported by 200 foot masts. The masts, 20 in number, were placed in a circle 200 feet in diameter in the sand dunes. The Cape Codders were skeptical of the masts being erected in the sand dunes and as they predicted the masts were blown down in a northeast storm in November 1901. Marconi then erected four 200 foot timber towers and in late 1902 the station went on the air for tests.

On the night of January 18, 1903, Marconi attempted to send the following transatlantic wireless message from then President Theodore Roosevelt to the King of England, Edward VII, "His majesty, Edward VII, in taking advantage of the wonderful triumph of scientific research and ingenuity which has been achieved in perfecting a system of wireless telegraphy, I extend on behalf of the American people most cordial greetings and good wishes to you and to all the people of the British Empire. Theodore Roosevelt."

The message was received at the Marconi station in Poldu, England, and for the first time the United States had been linked to England via wireless. A return answer was received at South Wellfleet from King Edward VII and was delivered to the President through the South Wellfleet Railroad telegraph station.

In 1907 the engineers realized that they had built the station too near to the ocean and by 1917 the sand dunes had eroded close to the tower bases. The station soon after had to be abandoned. Today approximately one half of the site has been claimed by the Atlantic Ocean.

MARCONI, PRIMO WIRELESS AMATEUR

By

Art Zavarella W1KK

As we prepare to commemorate the 75th anniversary of the first two-way CW QSO between the United States at Cape Cod, and Poldhu, England by Guglielmo (Wil) Marconi, let's look into a few aspects of this man's life and pioneering developments that definitely label him as Radio Amateur #1.

An amateur Billy was indeed, since he received no formal academic or technical training. Like most present-day young hams one evening he quietly called his poetic Irish mother Annie Jameson to witness his first flush of success in their attic at Pontecchio, Italy. His dictatorial Italian father Giuseppe was not too fond of Billy's tinkering with all those jars and instruments up in the third floor, where in former times silk-worms did their stuff. Up there that night in 1894 as his mother watched, he tapped a telegraph key delicately with one finger, and lo-and-behold at the other end of the room a bell was set ringing, clear, but not much louder than the crickets in the background. Look Ma—no wires!

From then on at age 20 he devoted his entire life to the many technical details necessary for practical two-way communication: people-to-people without wires. His friend and neighbor Professor Righi of Bologna provided invaluable scientific guidance. Meanwhile young Billy read all about Maxwell's mathematical prediction of electromagnetic waves in space (1865), read of Heinrich Hertz's production and detection of radio waves in his lab at Karlsruhe Polytechnic (1887). Billy Marconi's favorites however, were the more practical contemporaries like Benjamin Franklin of Boston/Philadelphia fame, and Michael Faraday of London, the metallurgical, electromagnetic, and induction genius, who like Billy was self educated and endowed with exceptional mechanical skill and experimental vision. One thing about Billy though, he knew that the practical development of wireless telegraphy would be a great humanitarian achievement, especially for people at sea and in remote lighthouse locations, and from his father he inherited an eye for a buck in business.

Like so many of us nowadays, Marconi had to resort to his junk-box for progress. He resurrected an old tank that had been used to store lamp oil and broke it up into two slabs of sheet iron. Using these in place of the big oscillator spheres, and with one on the ground and the other a considerable height above it the signal strength increased (a tankful) up to a mile or so, even over the side of a hill from Pontecchio. He was delighted upon hearing the shot his brother fired at hearing the signal, in the "shadow", deep in the valley. To Billy this meant that unlike light waves, radio waves could and did travel up and down and around curves, as well as line-of-sight. The other junkbox occasion was in the construction of a magnetic tuning device for separating the rapidly multiplying number of

wireless stations. He used some very thin wire used for tying up flowers to make his own "magnetic detector" patented in 1903 and later described as a "jewel of workmanship".

Field Days: Billy Marconi and his loyal technician helpers certainly had their share, in full compliance with Murphy's Law. At Poldhu in September of 1901, a sea gale wrecked the elaborate 20 mast inverted cone antenna of 400 wires 200 feet long. Undaunted they made do with a simple fan sky hook between only two masts 170 feet high supporting 60 wires. A few weeks later in October at Cape Cod a terrific storm wiped out the nearly completed installation sending pine cones crashing through the radio shack only a few feet from the chief operator Vyvyan. Then in December of that fateful year '01 they had the harrowing experiences of Signal Hill, St. Johns, Nova Scotia, where the antenna supporting balloons kept breaking away in the wild North Atlantic gales, and their kites bobbed up and down over the high cliff changing the antenna angle and direction. On this memorable occasion both Marconi and Kemp did hear the series of three dits (S) being sent on a prearranged schedule from Poldhu. After long last, the boy and his kites did succeed in logging signals across the 2,170 miles of ocean, proving how radio waves serenely ignore the Earth's curvature.

Also prominent in Marconi's multi-faceted career are the international and human friendship aspects: native born and lifelong proud Italian, Irish Anglican mother, Billy himself married Bea O'Brien. In the festivities following the success at Glace Bay, four flags unfurled side by side, those of Canada, Italy, the United States, and Great Britain. Here's how a New York newspaper reporter described Billy as he landed on the pier for one of his early visits to introduce wireless to America: "... a serious, somewhat self centered young man who spoke little but then always came to the point ... no bigger than a Frenchman and not older than a quarter century. He is a mere boy, with a boy's happy temperament and enthusiasm, and a man's nervous view of his life work ... When you meet Marconi you're bound to notice that he's a 'for'ner'. His suit of clothes is English. In stature he is French. His boot heels are Spanish military. His hair and moustache are German. His parents are Irish-Italian. ... there's little doubt that Marconi is a thorough cosmopolitan."

So that's how it all began, gang!

Space Shuttle Broadcasts
Shuttle audio will be rebroadcast on 146.595 and 223.940 during any mission. WA1OCK will be doing this, so be sure to listen in!

President's Column

By

Bob LaFleur NQ1C

Marconi at Table Head, Nova Scotia-1902

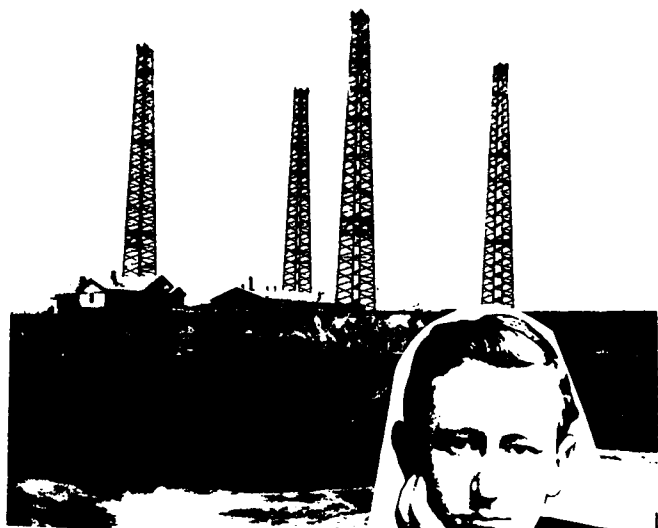
By

Art Zavarella, W1KK

Guglielmo Marconi began experimenting with radio communication in 1895 at the age of 20, and in December, 1901 he transmitted the first radio signals across the Atlantic, from Cornwall, England, to St. John's, Newfoundland. In 1902 he built a station at Table Head in Glace Bay, Nova Scotia, and from here he transmitted the first complete radio messages across the Atlantic Ocean. The first 24 hour commercial service began in 1907 between his powerful new stations at Marconi Towers near Glace Bay, and at Clifden, Ireland. This was extended to duplex service with the opening of receiving stations at Louisbourg, Nova Scotia, and at Letterfrack, Ireland in 1913.

For decades Marconi Company operated radio stations on Cape Breton Island. The stations sent and received messages via wireless to ships far out to sea. They also relayed distress messages that saved thousands of lives, including those sent by the stricken *Titanic* in 1912! A short wave station now operates on the site, maintaining Marconi's memory as the "Voice of the Atlantic Seaboard" in its call letters VA1VAS.

My wife Alice, son Ralph and his wife Ann, and I visited these historic sites in the summer of 1991. I recommend them if you visit Nova Scotia. Nearby Cape Cod also has a smaller museum dedicated to Marconi.



Snow and ice... gosh! My antennas survived last winter, but will they survive this one? I sure hope they do! We're now into the time of year that what you have for antennas will stay that way until spring, and equipment on mountain tops, such as repeaters and packet nodes, may become inaccessible if it breaks down. This is the case for the packet node CHSTR in Chester, MA and for the Mt. Greylock repeaters. So wish our antennas good luck!

This time of year also brings us to the January VHF contest. For those of you who are new to amateur radio, or to the HCRA, the January VHF contest is one of the two contests (the other is Field Day) that the HCRA participates in as a club. The contest is a heck of a lot of fun, and even if you only have an HT, you can still get on and make a handful of contacts. I urge you to give it a try! There's lots more information in the upcoming special issue of Zero Beat about the contest, so I won't carry on about it here, except to say that I urge you to make some contacts, and send in your log, even if you only make a few contacts.

Help! We need help! A great way for the club to make a few extra dollars at a meeting is to have a 50/50 raffle. We sell tickets, and the "prize" is half of the money that we take in. But the biggest problem with having a 50/50 raffle is getting someone to sell the tickets at the meeting. Most of us like to socialize at the meetings, and the last thing we want to do is go around trying to sell raffle tickets. But I'm hoping that one of you might be willing to help the club and take the job of selling 50/50 raffle tickets at the meetings. I really hate to see us miss this opportunity to help defray our increasing costs.

Some of you may have noticed that I haven't been on the radio as much lately. I'm not doing the Mt. Tom Swap Net (although I will start again in April), and I haven't been on as many nets, or on packet radio nearly as much as I used to be. It isn't because I'm mad at anyone, or that I'm losing interest in amateur radio. It is because I have found another "hobby" to take up that free time that I don't have... square dancing. I'm taking lessons with the Swingles club, and the Dancing Shadows club. And there is usually at least one dance every weekend. So with 3 to 4 nights of square dancing per week, my radio time has been cut dramatically. In April, my two classes will end, and I should once again have more time to spend on radio.

I want to wish everyone a happy and prosperous New Year.



NQ1C's Antenna Installation
(Did you read the Prez's column?)

BRIEF VISIT WITH THE OM - HIRAM PERCY MAXIM

By
Art Zavarella, W1KK

There is so much that HPM/WIAW did for us hams, appropriately entitling him "Father of Amateur Radio", I can recount only a few highlighted personal impressions. It is, of course, well known and documented that he started the ARRL and QST with his young protege college student Tuska around 1915. It may not be so well known that, in my estimation, he and Tuska broke away from the Hartford Radio Club so that the two of them, along with Dave Moore, the 21 year old then president of the Club, could proceed on a national scale with an organization that included public service and relay concepts probably originated in an incident involving our Hampden county: an intermediate Windsor Locks Station relayed a message with his spark wireless from Maxim in Hartford to a Springfield ham who reportedly had a hard-to-come-by Audion for sale. This relay service did the trick. Maxim got the tube! The word relay, indicating use of privately owned hobby equipment for the benefit of others, was adopted in the official non-profit corporate name and has been, through the years, one of hamdom's principal survival assets, even to its present-day version of automatic relay, the 2 meter repeater.

One of the things I admired most in HPM's organizational genius was the high standards which he set for himself and fellow hams as embodied in the six requirements of the Amateur's Code: Courteous, Loyal, Progressive, Friendly, Balanced, Patriotic.

He sure was courteous and friendly me, when as a schoolboy some 55 years ago I rang the door bell to the side entrance of his home in Hartford for an unannounced visit to WIAW. As I look back at it now, I must have had a lot of nerve to go on my bike from an immigrant's family home in the meadows of East Hartford to the home of a famous automotive pioneer off fashionable Farmington Ave in Hartford. At that time he was indeed one of the insurance City's leading citizens, married to the daughter of a Maryland governor, but you'd never know it the way he invited me in to see "Old Betsy" his rotary spark rig which I used to hear on my crystal set and earphone in the cellar of our house way over in East Hartford across the city and across the river, maybe 10 miles distant. Although the details are hazy now it must have been an inspiring visit that urged me to stay on in school and pursue science, unlike most of my neighborhood chums.

When it comes to being balanced, it's hard think of anyone more balanced than HPM toward his hobby, never letting it interfere with duties to his family, business, or community. The famous movies which he also pioneered and relished show him enjoying life with the youngsters in his unique and appealing personality; kindness, sincerity and love of life abounding. He had many patents from his horseless carriage engineering career with Pope Hartford and invented noise silencers that would nowadays enshrine him as an environmentalist fighting noise pollution. As regards community patriotism, it brings to mind my own attendance at the dedication of the municipal airport. Brainerd Field, in Hartford. The reason I went, because I read in the papers that HPM would officiate since he was Chairman of the Hartford Aviation Commission. His patriotism shone brilliantly at the outbreak of World War I. Not only did his silencer company convert wholly to munitions production, but as ARRL president he saw to it that the Navy got its first quota of 500 trained operators at once. Then 2,000 more operators were needed, and largely through HPM's efforts and organization, were immediately enlisted.

Such is the stuff of which our hobby's heritage originated. Quoting from the 50th anniversary message in 1964 of then League President W6ZH: "We must be everlastingly grateful to those old timers for handing down to us these traditions of public service, technical progress, and operating skill. Without them, ham radio would have perished long ago".

New Goodies

Members are encouraged to bring new equipment, building projects, or anything they think might interest fellow hams to any club meeting and show it off. Items and photos of historical interest are also welcome.

Tech Talk - Line Impedance

By

William J. Hall W1JP

A short time ago, I rediscovered the importance of transmission line length in some particular situations. I had just relocated the 2 meter amplifier on the operating table and found that the coax connecting it to the TS700 was a bit too short. I had another cable handy, hooked the two together, and that was that. A few days later, I received a phone call from a neighbor about a "voice" on her TV set. I happened to be on two meters, so I turned on our set and, by golly, there was the "voice - me on practically every channel! Strange, there had never been a sign of TVI on the home set while on was on 2 meters before, why now? I thought about this for a day and then it struck me that the thing that had changed was the location of the amplifier. (the TVI only occurred when the amplifier was on.) I moved the amplifier back to its original location but the TVI persisted. I was getting a bit frustrated and then I remembered - the cable! I put the original cable back between the two units and miraculously, the TVI disappeared! Now I became very curious. I remember something about quarter wave lines and pulled out the handbook to refresh my memory. According to the handbook, quarter wave lines, or odd multiples of a quarter wave, "inverse" the input and output ends. If the output or load is a high impedance, the impact will look like a dead short and vice versa. The formula says that the input impedance Z_1 equals the square of the line impedance divided by the load impedance.

$$Z_1 = (Z_{\text{line}})^2 / Z_{\text{load}}$$

Now if the line impedance is 50 ohms, and the load is 10 ohms, we have

$$(50)^2 / 10 = 2500 / 10 = 250.$$

Conversely, if the load is 100 ohms, the input will look like this $2500 / 100 = 25$ ohms. All this is very interesting, but what does this have to do with the TVI problem? Just this. I measured the new patch line and it turned out to be 39 inches, exactly $3/4$ wave on two meters when you consider the velocity factor of the line. The old line was 25 inches, about one half wave. Apparently, there was some sort of a mismatch between the output of the TS700 and the input of the amplifier. This was inverted by the connecting line, which was an odd multiple of a quarter wave, and either the amplifier or the TS700 didn't like it. Even multiples of a quarter wave simply reproduce the load impedance at the input. My original cable was an even multiple quarter wave and caused no problem. I made up another patch line, this one 52 inches long, ($4/4$ wave or full wave), moved the amplifier to the desired new location, and no TVI!

The message here should be clear. At VHF, and with solid state stuff, the line length can be very important. If you

have a problem with spurs or other funny behavior, try changing your transmission line length: it might bring about a miracle fix!

Reprinted from Intermod, October 1975, Mt Tom ARA

MICROWAVE TRANSVERTERS

SHF SYSTEMS No tune linear transverters and transverter kits for 902, 1296, 1296, 2304, 2400, 3456 MHz. All use 2m i.f. 13.8V. Kits include mixer and L.O. P.C. boards, xtal and all components. Built units include I.F./D.C. switchboard, connectors and compact low profile housing. Other frequency options in amateur band available.

SHF 900K	902-906 MHz	50mW	Kit \$139	Built \$265
SHF 1240K	1296-1300 MHz	10mW	Kit \$149	Built \$265
SHF 1269K	1268-1272 Oscar Mode L	10mW	Kit \$140	Built \$255
SHF 2304K	2304-2308 MHz	10mW	Kit \$205	Built \$325
SHF 2401K	2400 MHz Mode S rcv Conv	10mW	Kit \$155	Built \$255
SHF 3456K	3456-3460 MHz	10mW	Kit \$205	Built \$325
SHF LOK	540-580 MHz L.O.	50mW	Kit \$ 66	

MICROWAVE AMPLIFIERS from

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Linear Power Amps

for SSB, ATV, FM, 902—1296—2304—3456MHz

2304 PA	10mW in 5W out	1240-1300 MHz	\$140
2318 PAM	0.5W in 18W out	1240-1300 MHz	\$215
2335 PA	10W in 35W out	1240-1300 MHz	\$325
2340 PA	1W in 35W out	1240-1300 MHz	\$355
2370 PA	5W in 70W out	1240-1300 MHz	\$695
3318 PA	1W in 20W out	902-928 MHz	\$275
3335 PA	14W in 40W out	902-928 MHz	\$335
1302 PA	10mW in 3.0W out	2304 MHz	\$400
901 IPA	10mW in 1W out	3456 MHz	Write or Call

T/R Switching available, all 13.8 VDC

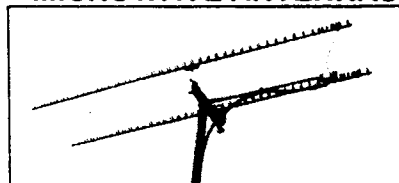
Low Noise Preamps & preamp kits—432, 902, 1296, 1691, 2304, 2401, 3456 MHz, 5.7 and 10 GHz.

33LNA	preamp 6 dB NF 902 MHz	13.8V	\$ 95
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13LNA	preamp .7 dB NF 2300-2400 MHz	13.8V	\$130
1691LNAWP	preamp 1 dB NF 1691 MHz mast mounted	13.8V	\$140
4017LNAK	preamp kit 400-1700 MHz	6 dB	\$ 40

Preamp kits for 2304-10 GHz

Write or Call

MICROWAVE ANTENNAS



Loop Yagis, Power Dividers, Stacking Frames, Complete Array of 902, 910, 1269, 1296, 1691, 2304, 2401, 3456 MHz. For Tropo, EME, Weak Signal, OSCAR, ATV, Repeaters, WEFAX. Commercial point to point. Available in kit form or assembled and tested.

3333LYK	33el loop Yagi Kit	902 MHz	18.5 dBi	\$ 95.00
2345LYK	45el loop Yagi Kit	1296 MHz	21 dBi	\$ 95.00
2445LYK	45el loop Yagi Kit	1269 MHz	21 dBi	\$ 95.00
1844LY	44el loop Yagi (assem.)	1691 MHz	21 dBi	\$105.00
2355LYK	55el Superlooper Kit	1296 MHz	22 dBi	\$108.00
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945LYK	45el loop Yagi Kit	3456 MHz	21 dBi	\$ 79.00

Other models available. Call or write for catalog.

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Bill Olson, W3HQT

Box 2310, RR1 Troy, ME 04987

(207) 948-3741

FAX: (207) 948-5157



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VHF Sweepstakes
Jan 18 & 19, 1992
Special Zero Beat issue will be mailed soon!

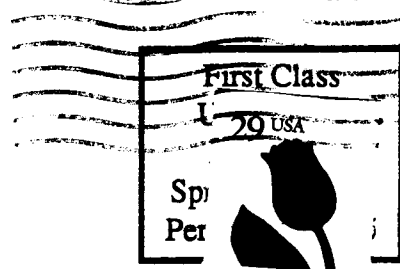
Next Meeting

Friday January 3rd

Feeding Hills Congregational Church

Dick Frey WA2AAU
Speaking on W2SZ/1 operations
during VHF/UHF contests

Hampden County Radio Association, Inc.
P O Box 482
West Springfield MA 01090-0482



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1-92 Special Edition

Zero Beat

Special VHF Sweepstakes Issue
January 1992

Hampden County Radio Association, Inc

Springfield, Mass

Our 45th ARRL Affiliated Year

January VHF Sweepstakes

Saturday January 18th Starts at 2:00 pm est

Sunday January 19th ends 11:00 pm

Don't forget the new club award you can qualify for.

See you during the contest!

Contest exchange is your callsign & grid square!

It's that time of year again! Snow appears and the temperature drops. It's time to get the VHF gear out and tuned up for the biggest and the best VHF Sweeps ever! Many HCRA members have spent many long hours preparing for this contest. Club station W1NY will be on again and you can work them and get a QSL card for every band.

For those to whom this is all new - You operate any VHF or UHF band, or as many as you own radios for. You can work a station once per band, regardless of mode. Multipliers are how many different grid squares you work. (including the one you're in!) Grid squares are world wide squares, 2 degrees by 1 degree, with two letters followed by two number designations, and everyone has one. Collecting them qualifies you for awards. The enclosed map helps to show some of the grids in the U.S. Most of Western Mass is FN32. The exchange is your callsign and grid square.

The Hampden County Radio Association has been active in this contest from its very inception over 45 years ago! The contest efforts this year may set a new club record, IF every member pitches in. Some are hesitant to send in a log for only 100 points, feeling its "too small". Well, one year the club missed breaking 100,000 by 10 points!

The more bands you can work the higher your score! It increases algebraically (almost). If you work stations like KA1ZE, W1NY, N1DPM, AC1T, K1BE, and NQ1C, the QSO can be worth 5 to 10,000 points to the club aggregate score!

Logs, maps, and summary sheets are included in this issue. Make sure you send in your entry. We'll be glad to fill it out for you if you're intimidated by the forms. You'll start accumulating points towards special club awards or may even qualify on this go-around!

In This Issue:

Complete logs, report sheets, and grid map
VHF Propagation
VHF Path Losses
Transverter Kit Review
Microwave Directory
And more.....

Upcoming Issues:

Contest report
Radio Clubs of Western Mass
Russian Radio newsletter
Antenna Articles
Product Reviews

Next Meeting:

Friday February 7th

All new licensees are Welcome!

VHF Propagation

By

Jeffrey J. Duquette K1BE

These people are desperate! The contest is winding down and they haven't made 1 million points! You're the man of the hour! (Ham-of-the-hour?) With your ten watt rig feeding a coat hanger on the kitchen table, you can work all of the high power distant stations. How, you might ask? Desperate times call for desperate measures! They'll strain their ears to pull your signal out of the muck. How far can your signals really go?

This depend on various factors. Single sideband, CW, and FM signals propagate many different ways on VHF/UHF bands. When you see the weather map in the morning paper, check to see if a warm air mass is overrunning a cold air mass. Then you can expect tropospheric bending of your signal which will come down who knows where! This weather inversion causes DX to open to incredible distances. Aim your antenna along the trailing edge and expect to hear stations in a wide coverage area.

Sporadic E skip occurs when intense patches of ionization occur. Solar flares produce these and can be very strong. Listen to W1AW and WWV for the solar index or news of a solar flare. Or if you start to hear stations in California on two meters, suspect sporadic E! F layer openings can also be spectacular, and maybe one will occur during the VHF contest. I remember one year when Ohio stations came in like gangbusters for 20 minutes!

If Donald Duck suddenly seems to be working you on SSB, or the CW has a strange fluttery sound, you're most likely bouncing your signals off of an aurora. Look out the window for the Northern lights, or Aurora Borealis! You don't need to be a high power, super-station like KA1ZE to work Washington state from Massachusetts. Once you hear auroral propagation, you won't forget it. Try pointing those antennas North at night!

Transequatorial propagation occurs along the North/South line of the sun. You can work South American stations on six meters. Tropospheric scatter on two meter CW can go over 500 miles. Signals tend to be weak and fluttery, but what some people won't do for another multiplier! Meteor scatter is beyond the ken of most of us, but some of the club members will be suing it. EME, or bouncing your signals off the moon, is being used more and more. WINY uses it very successfully.

Beam antennas work best, but don't sit out the VHF Sweepstakes just because you feel you don't have a "good" station. Every year many hams rack up over 1,000 points using a rubber duck, 1 watt, and simplex FM frequencies!

Keep in mind the testers want you, and you're doing them a favor. The club score goes up for every station you work, due to the multipliers. The testers, big and small, have the gear to work you, so get out there and do it!

Attention All Radio Amateurs!

The 45th ARRL January VHF Sweepstakes will take place starting on Saturday 18, at 2:00 pm EST and ending Sunday, January 19th, at 11:00 pm EST. There will be considerable club activity. Please participate! Even a few contacts on FM will go a long way towards helping others boost their scores. Every club member should keep a log and send it into the ARRL. Every point matters! The exchange is very simple, just your grid square with other stations. For example, Western Mass is FN32, CT is FN31. It's that easy! It's lots of fun! Pass the word to other club members! CQ Contest!

January 1992 VHF Contest Activity Hours (EST)

Start	End	Day	Event
2:00 pm		Sat	Contest Starts
2:00 pm	7:00 pm	Sat	All bands active
7:00 pm	8:00 pm	Sat	Local FM activity
8:00 pm	9:00 pm	Sat	222 Mhz national activity hour
9:00 pm	10:00 pm	Sat	432 Mhz national activity hour
10:00 pm	11:00 pm	Sat	1296Mhz national activity hour
11:00 pm	12:00 am	Sat	903 Mhz national activity hour
6:00 am	7:00 am	Sun	6 meter activity hour
7:00 am	8:00 am	Sun	Local FM activity hour
8:00 am	9:00 am	Sun	222
9:00 am	10:00 am	Sun	432
10:00 am	11:00 am	Sun	1296
11:00 am	12:00 Noon	Sun	903
12:00 Noon	1:00 pm	Sun	6 meter
1:00 pm	2:00 pm	Sun	Local FM
2:00 pm	3:00 pm	Sun	222
3:00 pm	4:00 pm	Sun	432
4:00 pm	5:00 pm	Sun	1296
6:00 pm	7:00 pm	Sun	6 meter
7:00 pm	8:00 pm	Sun	Local FM
8:00 pm	9:00 pm	Sun	222
9:00	10:00 pm	Sun	432
10:00 pm	11:00 pm	Sun	1296
	11:00 pm	Sun	Contest Ends!

The activity hours listed above are a big help for those who have limited hours available to participate. You're more likely to work everyone by getting on at these times!

FM SIMPLEX FREQUENCIES

446.000 Mhz FM (UHF gives 2 points per QSO!)
223.500 Mhz FM (UHF gives 2 points per QSO!)
146.49, .55, .58 FM (VHF gives 1 points per QSO!)

VHF SS Contest Operation

By

Bob LeFleur NQ1C

Jeff Duquette wrote an excellent article on setting up a VHF contest station. However, you can have the absolute best station in the country, but if you don't know how to operate it, you won't do well in the contest. Conversely, being the best operator but running all bands using your flagpole as your antenna won't do you much good either.

I realize that the VHF contest has just passed, and these two articles may seem a little bit untimely. I am writing this article while these things are hot on my mind, so that when the next contest comes around, I can pull out this Zero Beat and see the "notes" I took on what to do better next time. Every contest is a learning experience for every operator, no matter how well they might have done in the contest. So here are some suggestions, use those that apply and make sense to you.

1. If you only have an FM HT or mobile rig, try to go to a good high location. Take it up to a hilltop, and work as many stations as you can. It won't take long for you to work most everyone that monitors the FM simplex frequencies. After awhile, take your rig and go to another grid square. Most of us are lucky — we're close enough to easily move to another grid. Once you're in that new grid, work everyone again! Don't forget to let everyone know you're in a new grid when you call CQ. You must submit a separate entry for each grid you operate in, but you'll be giving everyone else extra points, and you can get listed twice in QST! You'll also help the club make it to the "unlimited" category.

2. If you have multiple bands, don't be afraid to "sked" people to other bands. It doesn't do much good for a single operator to sit up on 432 or 1296 and call CQ for hours. You'll work a few, but not enough to make it worth your time. You're better off to sit on 2 meters, and ask every station you work what other bands they have.

3. Pay attention to the activity hours. There is a time when it may pay you to browse or call CQ on some of the quieter bands, and that is during the activity hours for those bands. Especially during the first ten minutes or so of the activity hour, you'll notice a big increase in activity on the band. Unless you've really got a hot streak going somewhere else, it pays to take a few minutes to check out the "activity" band.

4. Operate as much of the contest as you can. At 9:00 on Saturday night, don't say "I think I'll go watch a movie now." Granted, you'll have to take some breaks or else you'll go bonkers, but plan them for times when the bands will be a little less active. The evening hours (say 7:00 through

11:00) are especially active, so if you need a rest, take it before things start to jump.

5. Don't give up early. Just because the contest might have been a slow one, don't give up at 8:00 on Sunday evening. The last 3 or 4 hours of a contest usually get quite busy, with everyone trying to get the most out of the last few hours. One year, I almost gave up an hour early, but stuck it out and got 3 new grids in that last hour!

6. Try to balance your time between FM and sideband. You'll be able to rack up a lot of points on FM very quickly, but you'll also "use up" everyone right away. It's good to keep an ear on the FM radios though, because there will be people who will turn on their HT's for 5 minutes, and then be gone for the rest of the contest. So you want to grab those people while you can. I keep separate FM rigs on the various FM frequencies, and if there's a lull in sideband activity, I'll call a quick CQ or two on FM. Remember that you can only have one transmitter operating at a time, so you'll have to coordinate your hands and feet on those PTT buttons and footswitches!

7. Use good omnidirectional antennas for FM simplex. A beam will be to cumbersome to turn for the fast-paced FM activity. The simplex frequencies are usually too crowded and busy to pull in the far away stations anyway. Just because you can hear them with your big beam, the other local stations won't hear them and they'll talk all over you. I have a Hustler G6-144 75 feet in the air, and I was able to work every station I could hear, and every station that I heard other stations work. I tried my 215WB (vertically polarized) on 2m FM, and did not work any extra stations with it.

8. Don't be afraid to dig out that code key hiding in the closet. There is CW activity, and you'll get extra grids if you use CW. Don't be afraid of cross-mode contacts, either. If you hear a weak station calling CQ in voice, but you can't get them to hear you, try coming back to them in CW. I've also called CQ in CW, and have had people come back to me in voice!

9. Make sure you have enough desk space to spread out your papers. You'll need your logs, dupe sheets, grid square maps, activity hours, and other information. You'll also need room for your microphone(s) and keyer. And if you're like me, you'll want a glass of water, too. (But put that in a place where you won't knock it over) A headset/boom mike combination with a footswitch is a good thing to have; it lets you talk hands-free, while you're looking at something or even writing. Just make sure you feel comfortable with your setup, because there are times when you'll be trying to do 4 things at once, and if you're not comfortable, you'll get flustered and do something stupid, like log contacts from one

band on a different band's logsheet.

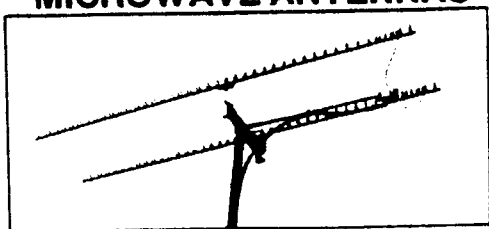
10. A computer is a great tool for contest logging, but you have to weigh it's strengths against the weaknesses. I love computers, and all they can do, but I don't like to use them for a contest operation. They take up too much desk space; even a portable computer will quickly fill up your operating position. You also have to be careful that the computer you use doesn't create too much interference. Some computers are better than others when it comes to interference.

11. Be courteous on the air. Some contacts are going to be tough to pull through; if you have trouble getting the other station's grid, thank him for his patience after the contact is over. If another station asks you to repeat some information several times, don't get upset and spit out the information quickly, but rather, slow down and take your time so the other station can copy you accurately. You may never talk to the specific station again that you are working, but if you get in the habit of being a courteous operator, you will gain a good reputation.

12. Remember, this is a contest, but it's ultimate purpose is that it is supposed to be fun. If you have problems with a neighboring station ruining a band for you, try to work out a schedule with them to share the band. Maybe they can work another band while you get a few hours operating time on the one they were using. If you have other problems, don't get flustered or bent out of shape. If the contest is so bad that you're not enjoying it at all, you probably need to find another area of amateur radio to funnel your interests!

Above all, enjoy yourself and turn in the best score that you can!

MICROWAVE ANTENNAS



Loop Yagis, Power Dividers, Stacking Frames, Complete Array of 902, 910, 1269, 1296, 1691, 2304, 2401, 3456 MHz. For Tropo, EME, Weak Signal, OSCAR, ATV, Repeaters, WEFAX, Commercial point to point. Available in kit form or assembled and tested.

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2445LYK	45el	loop Yagi Kit	1269 MHz	21 dBi	\$ 95.00
1844LY	44el	loop Yagi (assem.)	1691 MHz	21 dBi	\$105.00
2355LYK	55el	Superlooper Kit	1296 MHz	22 dBi	\$108.00
1345LYK	45el	loop Yagi Kit	2304 MHz	21 dBi	\$ 79.00
945LYK	45el	loop Yagi Kit	3456 MHz	21 dBi	\$ 79.00

Other models available. Call or write for catalog.

DOWN EAST MICROWAVE

Bill Olson, W3HQT

Box 2310, RR1 Troy, ME 04987

Review of "The ARRL UHF/Microwave Experimenter's Manual: Antennas, Components, and Design"

Review by

Jeffrey J. Duquette, K1BE

The usual ARRL publication is chock full of worthwhile technical information, but could give lessons to the Government Printing Office on how to present it in a dull fashion with difficult to read diagrams. The UHF/Microwave Manual is an exception to the ARRL's normal publishing standard. The drawings are very large, the type easy to read, printed on high quality paper, and the writing is excellent throughout. It's the information we are interested in, though, not the packaging. Does it teach us what we need to know?

You could not ask for a more complete UHF/microwave manual! It's as technical as you could wish for, but also strikes that balance that explains the basics so well to a novice microwave'r.

Chapter headings are:

1. Brief History
2. RF Safety Practices
3. UHF and Microwave Propagation
4. Microwave Devices
5. Transmission Media
6. Design Techniques
7. UHF Microwave Systems Design
8. Microwave Fabrication Techniques
9. Antennas and Feedlines
10. Earth-Moon-Earth Communications
11. Getting Started in Microwave Measurements
12. Tackling Microwaves with Microcomputers

Sub-topics are covered within every chapter. Experts in every field wrote the chapters and sub-chapters. For example Steve Powlisen, K1FO, whom you all know, wrote the sub-chapter on optimum design for a 432-MHz Yagi. Clarity of style is standard throughout. They go deeper into some areas than you might want to, but I liked it because I hope to someday know enough to really understand what they're telling us.

Any serious microwave/UHF enthusiast should have a copy of this manual. I highly recommend this book!

Available for \$20.00 (\$19.00 through the HCRA,) write to the ARRL, or through various ham radio bookstores.

VHF Sweepstakes
Jan 18 & 19, 1992

HCRA VHF/UHF/SHF AWARDS

New Awards For Club Members

As a member of the HCRA, you can now earn an exclusive award. The intent of this award is to create and improve interest and use of the VHF, UHF, and SHF (microwave) bands. Along with the increased activity, this will also promote technical expertise in the VHF-UHF-SHF frequency spectrum, which our club has been known for throughout its' history!

RULES:

1. To be eligible for this award, you must be a member in good standing of the Hampden County Radio Association..
2. Points earned in any ARRL VHF/UHF-SHF-EME contest count towards these awards.
3. Scores must be listed in QST to count towards the awards. This is how your score will be confirmed.
4. Three categories of awards will be available:
 - A. 10,000 points!
 - B. 100,000 points!!
 - C. 1,000,000 points!!!
5. Points for these awards are cumulative, contest to contest, with no time limit.
6. Points for these awards will be scored per the appropriate ARRL contest entry rules. (See rule #3.)
7. Awards contest commences on January 1, 1992.

CATEGORIES:

1. MULTIOPERATOR: Any station with more than one operator regardless of the number of bands you're on.
2. SINGLE OPERATOR: Any station with only one operator.

Multioperator category will also encompass the ARRL's "LIMITED MULTIOPERATOR" category. It may also include the "ROVER" category if the maximum allowable operators for that category are used. (2)

Single operator category will include "QRP-PORTABLE" and the "ROVER" category if only one operator is used. This category will also include all of the operators of a multioperator station that are HCRA members.

For example, WINY turns in a score in the January VHF Sweepstakes of 150,000 points. WINY has 5 operators that are HCRA members: NC1B, NC1I, AC1T, W1KK, and

N1DPM. WINY would be listed in the multioperator category with 150,000 points. AND the five operators would be listed in the Single Operator category each with 30,000 points. (150,000 divided by 5 = 30,000) This is to encourage multioping without losing your "personal" single operator status for that contest.

Note that N1DPM and the others can also operate his home station and rack up additional points in the single operator category!

Let's say that WINY had a 6th operator that was not an HCRA member, then the 150,000 points would be divided 6 ways giving individual operators 25,000 points each. This is done so that multioperators are not tempted to run with "hired guns", but to draw on the resources within the club.

HOW TO ENTER:

A postcard with your callsign and points submitted sent to K1BE are all that is necessary. You do not have to submit logs or photocopies to the club. However, the score is not officially counted until listed in QST's contest report. This is to make sure it is sent in. Multioperator stations should send a more complete listing, perhaps a copy of the summary sheet.

Jeff Duquette, K1BE, 18 Anvil Street, Feeding Hills, MA 01030-1530 will coordinate this and keep all of the records.

Calls will be printed in Zero Beat periodically (June, September, and January), with totals to date. (This assumes the results were available from QST in time.)

While you must be a club member to qualify, you are NOT required to submit your scores for the HCRA during club competitions. (We'd have no way of knowing, anyway!)

AWARD PRESENTATIONS:

Awards will be presented at the annual June banquet. The awards for 10,000 and 100,000 point categories will be a frameable certificate. These will be numbered! (Who'll get #1?) The award for the MILLION POINTS category will be a nice plaque.

Let's all get out there and strive to win some of these awards and get activity level up on ALL these bands, not only during contests but at other times as well. Remember, we lost 220-222.0 Mhz primarily because the groups that wanted it showed the FCC that the amateur community was not using that frequency spectrum!!! LET'S NOT LET THAT HAPPEN AGAIN!

Path Loss and VHF/UHF Communications

By
Fred Stefanik N1DPM

Path loss is the amount of attenuation that occurs to a signal as it travels through space. Most of us know the gains and losses associated with our station equipment, but we don't usually take path loss into consideration in our selection of amateur equipment. This article will give you some insight into what path loss is, and how to consider path loss when looking at your current or future station needs.

There is a simple equation that you can use to calculate path loss:

$$\text{PATH LOSS} = 36.6 + 20 \log(\text{MHZ}) + 20 \log(\text{MILES})$$

As you can see, the path loss increases whenever you increase your operating frequency and/or the distance between two stations. The path loss for two dipole antennas spaced one wavelength apart is 19.85 db. For those of you who find math difficult, refer to Table #1, where the losses have been computed in db for the two meter and 70 cm amateur band over a range of miles. This table will be discussed in more detail later.

As you've guessed by now, this computation of path loss is just the text book approach, and represents the best possible case. Other factors certainly create other degradation of signals. In fact, about the only type of communications where the computed path loss is accurate is the up and down links to satellites.

According to the NAB handbook, terrain plays a major part in the degradation of signal in conjunction with path loss. A smooth terrain will have a path loss of about 6 db, one that is rather hilly or with small mountains will increase the path loss to 12 db, and mountainous terrain can have an added loss of over 23 db!

From the numbers in Table #1, you've already noticed that the path loss for 70 cm is always 10 db more than the same distance on 2 meters! This is very important. You'll recall that a loss of 3 db means you've lost half the power, and if you've lost 10 db, you've lost 90% of your power!

Let's look at an example: A fictional repeater on 2 meters, WINY/R. A repeater user located nearby, W1KK, who has a one watt rig and a simple antenna. (If you know Art, you know that this is fictional!) We'll assume that W1KK is barely making it into the repeater. Note that the distance they are apart is not important to this discussion, just the fact that W1KK is in a fringe area.

Now, if we moved both stations to 70 cm, and left everything else the same, W1KK would not be able to work the WINY/R repeater with the added path loss of 10 db. In fact, to compensate for the 10 db loss, W1KK would have to increase his power to at least 10 watts!

There are other ways to make up for path loss. Gain antennas at either end and improved receiver performance play a major role. Less lossy coax, duplexers, receiver preamps, and other components can all supplement the need to increase power.

One sees quickly that this applies to repeater operation on all bands. Many hams use handi-talkies (HT's), more so on two meters than 70 cm. So it becomes even more important that the 70 cm repeater makes up the differences in path loss.

What makes this even more difficult is most 70 cm receivers are not as hot as 2 meter receivers, and many of the 70 cm rigs have half the sensitivity. So 70 cm repeater owners spend a lot of time and money building receiver systems that are capable of supporting HT users.

The inverse direction is also true. To compensate for path loss and decreased 70 cm receiver sensitivity, the 70 cm repeater usually runs more power for equal performance to its' 2 meter counterpart. This is one reason the FCC allows higher ERP (effective radiated power) for the shorter wavelengths. A 70 cm repeater that runs the maximum ERP and also has good receive characteristics demands a duplexer with low loss and high power capability, and this does not come cheap!

The commercial service uses high power to make up for the losses. Hams don't have the funds to go that route, recent advances in semi-conductor technology has brought the cost of 70 cm equipment down to the best cost performance ratio

Table #1

Distance in Miles	2.5	5	10	20	30	50	100
Path Loss 146/445	88/98	94/104	100/110	106/116	109/119	114/124	120/130

ever. All three of the major equipment manufacturers have 70 cm offerings that include 25+ watts out and GasFET front ends for real hot receiver performance. Even the HT's are incorporating high efficiency designs.

When selecting your gear for VHF or UHF, you should set your goals and define your expectations. Since most of the use is on repeaters, we'll limit our discussion to that arena. Point to point communications have many other concerns, which we won't address.

Since path losses are higher at 70 cm, you'd think the coverage area of a 70 cm repeater would be significantly less than a 2 meter machine. Experience has shown that this is not true, not because of technical reasons, but because of implementations. Many 2 meter repeaters are quite old, running tube-type gear. Most 2 meter systems have not invested money or effort in minimizing losses; clearly the need is not there. The opposite is true of 70 cm systems. They are new, and can match or outperform their 2 meter counterparts!

The point being made here is that you must first evaluate each system you wish to utilize. Ask current users or the repeater sponsor what kind of coverage the system has. Get details, not just if it can be hit in Podunk Hollow, but how well, how reliable, and using what kind of equipment. Remember, power and antenna information is most important!

As a general rule of thumb, unless you are fairly close to the repeater site, and relatively line of sight, (no mountains, etc), do not expect to get much use out of the low power position on an HT if it's under one watt on 70 cm. Many 70 cm systems have multiple receivers in different locations to improve coverage, so you should also take this into consideration. 70 cm is close to microwave and you will have more problems with blockage.



Another issue for HT use is battery life. Whether 2 meters or 70 cm, it's a better investment to purchase "high power" battery packs. The Kenwood TH21/31/41 series is a good example. The standard battery provides 7.2v to the radio, and its life is limited by the 180 ma hour rating. The external c cell battery pack delivers 9v, which results in increased power output. A single C nicad cell may have a rating of 1800 ma

hours or better. Kenwood also offers a longer life battery pack, as well as a quick charger. ICOM HT's have a similar setup, with the larger battery packs improving life and power output.

HT antennas are important to consider. By their very nature, they are not very efficient. Many manufacturers offer high gain antennas for HT's, but it's very difficult to prove their claims. First hand observations have shown no significant improvements, and in one case, degradation! Stubby duck antennas are common, but offer no performance gain, and may actually perform worse.

For mobile, (and base) offerings, you should again evaluate your needs. Most radios have high/low power settings. In most cases, five watts low power setting will meet your needs, with a decent mobile antenna. High power will come in handy on trips.

In mobile applications the antenna is an important part of the total performance. Your best choice is a gain antenna. As it will be vertical, mount it in the center of the truck lid or roof for most effective ground.

Through the glass antennas are not good choices and should be avoided. The only good thing to say about them is they are easy to install! Since they try to transmit energy through glass, which is an insulator, there is loss. The match between sides of glass is hard to keep constant, as auto glass is constructed of multiple layers of glass and plastic, and sometimes contains metallic compounds. Temperature can vary the tuning of the matching network, and the losses can go from bad to worse! The mismatch can damage the rig, even those with protection.

Proper installation is important. Many hams will install and tune a mobile antenna with the VSWR bridge at the rig end of the coax. For a proper installation, the VSWR should be checked at the antenna end of the coax. The length of coax between the rig and antenna can make a difference. You may need to cut the coax several times to find the optimum match. Don't forget that even for short runs, coax and connector quality are important, and even more so on 70 cm!

There are many issues that affect station performance, and path loss will directly affect your ability to communicate. The higher the frequency, the greater the path loss! Although we talked mostly about 70 cm, if you applied what is said here to your 2 meter station, its' performance will be maximized. In closing, remember the FCC requires the minimum power to carry out communications. Raising the power level is not the answer to all communication problems. Don't forget the path loss!

1992 VHF SS:

Improving your Scores

Here is a partial listing of stations that worked the 1991 sweepstakes. If you work the DX stations remind them that we are up here in FN32 and they should turn their beams towards us!

Bands you can work these stations on in 1992: (1991 score is listed!)

A= 50 Mhz;
B= 144 Mhz;
C= 220 Mhz;
D= 432 Mhz;
9= 902 Mhz;
E= 1296 Mhz;
F= 2.3 Ghz;
G= 3.4 Ghz; H= 5.7 Ghz; I = 10 Ghz;
J= 24 Ghz; K= 48 Ghz; L= Light.
?= may add additional bands not listed.

Western Mass Section

NQ1C	ABCDE	25,440
NA1W	BCD9E	14,940
WA1MBA	BD9EF	11,240
W1RIL	ABCD9EF	10,120
K1BE	ABCDE9F	8,325
N1JJD	ABCDE9F	-0-
K1II	ABD	4,100
NA1X	BCD	3,872
KA1TBS	BD	3,792
W1CJK	BCD	3,690
KC1OR	ABCD	3,196
WA1ZUH	B	2,988
NM1K	BCDE	2,964
N1DOP	BC	2,925
WA1EEC	ABCD	2,700
WA1YCA	BCD	2,432
N1ABJ	BC	2,210
KA1WER	BC?	1,520
N1HKF	ABCD	1,368
WA1POB	AB	1,243
KA1OXQ	AB	1,216
AC1T	ABCD	1,188
KC1TV	B	1,134
K1NWE	BC	1,072
W1NMQ	ABD	924
N1PF	ABD	763
N1DUY	BCD	714
W1KK	ABCD	712
W1UWX	BCD	621
WA1EYF	ABD	553
WA1WRM	AB	518

K1JG	BCD	490
K1MAL	B	416
KA1TBS	BD	415
W1UPH	B	405
KA1WER	BC	357
K1JAO	B	321
K1JDL	B	318
KA1DNX	BD	304
KA1HTK	BD	288
N1FUS	B	264
NJ1E	BD	248
N1EVE	BD	240
WB1GLZ	AB	222
W1ALL	B	219
K1UOR	BC	198
W1EQO	BC	196
KA1MPS	BCE	195
KA1TFU	B	183
WA1SMH	BD	180
W1DGJ	B	154
N1IBR	B	140
KA1WER	B	136
N1CDR	B	120
KA1WNQ	B	110
KA1VWW	B	100
KB1MU	B	98
N1CQT	B	96
N1GXR	BD	81
N1EPE	B	72
W1VNE	B	64
K1BXE	BDE	63
KC1CC	B	60
N1FMT	B	51
KA1WNQ	B	34
KC1OR	B	30
N1HKF	BC	15
W1DKY	B	15
WB1FIQ	B	12
WB1GNQ	B	4
WB1FIQ	E	12
W1NY (AC1T, K1GX, N1DPM, N1GVV, N1GXR, NC1B, NC1I, WA1UQC)		
ABCD ?		214,866

Connecticut Section

KA1ZE	ABCD9E	124,850
WA2TEO	ABCD9E	159,433
WA1VRH	ABD	52,962
W3EP/1	ABD	32,604
K2LME	BCDE	12,628
NM1K	BCDE	5742
K1FO	D	5,508
KA1VED	BCD	2,304
K1WVX	AB	1,785

K1CPJ	ABCD	1,250
K1CYD	BD	960
K1MVR	BD	790
NR1L	ABCD9E	780
K1CYD	BD	564
KA1VEC	B	112
N1AEH	B	54
N1GVV	B	46
N1EHS	B	4
NR1L (+KA1QAS)	ABCDE	6,144
KA1QAS (+NR1L)	ABCD	4,160
KA1TMV (+K1CPJ)	C	264
KA1QAR (+K1CPJ)	C	156

New Hampshire		
K1TR	ABCDE	68,628
AF1T	ABCD9EFGI	27,083
AC1J	ABCD	5,576
WA1T	ABD	5,208
KA1LMR	ABCD	270
Rhode Island		
WF1B	ABCD	27,550
W1AQ	ABD	13,488
Vermont		
K1LPS	ABCD	1,104
Eastern Mass		
N1BWT	ABCD	9,009
KX1C	ABCD	7,524
K1DAT	ABD	3,640
WA1LBK	ABCD	2,046
Maine		
NY1E	ABD	3,277
NYC Long Island		
WZ2O	ABCD9E	39,064
N2GHR	ABCD9E	65,188
Northern New Jersey		
N2CEI	ABCD9EFG	162,047
KA2TVA	ABCDE	16,656
WB2ONI	BCD9EFGI	7,254
WA2TLM	EFI	6,912
N2WM	ABCD9	92,547
Southern New Jersey		
WC2K	ABCD9EFG	272,340
WB2YEH	ABCD9EFG	89,984
KA2WKA	ABCD9E	73,100
N2SB	ABCD9EF	72,675
K2YY	ABCDE	42,639
W2EIF	ABCD9EF	27,120
K3GYS	ABCD9E	6,188
WC2F	ABCD9EF	127,490
K2UYH	BDEI	20,064
Western New York		
KD2KQ	ABCD9EF	34,020
W2HPF	ABCD9EFI	33,696

KD2YB	ABCD9EFGI	27,328
WB3JSU/2	ABCD9EFGI	98,000
WB2ELB	ABCD9EGIL	50,468
KW2T	ABCD9I	30,450
Eastern Pennsylvania		
WA3NUF	ABCD9EFGIJ	126,621

Remember, this is a partial listing! The new technicians will be on, and other new stations, new bands will be added. If you hear them on one band, ask to try to work them on different bands! Tell them to beam FN32!!!!

VHF SS Frequencies

You may only work a station once per band per grid square, regardless of mode.

Don't be afraid to ask a station for a sked on another band. Once you work a station on one band, work them on all the bands they have.

6 meters:

CW 50.075-50.100
DX window 50.100-50.120
SSB 50.120-50.200
Calling frequency 50.125
FM 52.525 Mhz

2 meters:

CW 144.075-144.100
SSB 144.100-144.250
Calling frequency 144.200
FM simplex 146.49, 146.55, 146.58

220 MHz:

CW/SSB 222.075-222.125
Calling frequency 222.100
FM simplex 223.50

70cm:

CW/SSB 432.075-432.150
Calling frequency 432.100
FM Simplex 446.000

903 MHz:

CW/SSB 903.085-903.115
Calling frequency 903.100

1296 MHz:

CW/SSB 1296.085-1296.125
Calling frequency 1296.100

73 Review

by Peter H. Putman KT2B

SHF Systems Linear Transverters for 1240 and 2304 MHz

Explore the microwave bands with these easy-to-build kits.

Down East Microwave
Box 2310, RR1
Troy ME 04987
(207) 948-3741
Price Class: \$140-\$310

One of the biggest obstacles to increasing the amateur population on our microwave bands has been, and continues to be, the lack of ready-made equipment at reasonable prices. Several manufacturers have offered a line of linear transmit and receive converters (known as transverters) that are ready to run out of the box, but at prices that may discourage newcomers.

For those with the technical know-how, the best method has been to "roll your own" equipment, either completely from scratch or from a kit. If you have access to microwave test equipment, this process isn't all that difficult. For those who don't, and who possess only a basic knowledge of microwave operation, it can be an uphill battle all the way with all of the precise assembly and alignment involved!

Things have changed considerably with the advent of microwave monolithic integrated circuits (MMICs) over the past few years. These devices offer broadbanded, no-tune performance with reasonable gain and noise figures at affordable prices. MMICs can be used both as low-power RF gain stages and as RF amplifiers on receive, and they are reasonably stable in operation.

SHF Systems has introduced a line of linear transverters which make extensive use of

these devices, along with etched microstrip circuitry. As a result, even the basic kit builder can be up and running on several microwave bands with a minimum of test equipment and time. [Ed. Note: Down East Microwave is the sole distributor of the SHF Systems kits.]

The SHF Transverters

Currently, SHF Systems offers transverters for 902 MHz, 1296 MHz, 2304 MHz, and 3456 MHz. In each case, the complete transverter consists of a local oscillator (LO), transmit upconverter, and receive downconverter. All three are located on one PC board on the 902 MHz version. The other three use a separate LO board. Our review versions (SHF-1240 and SHF-2304) are very similar in operation and appearance, although the SHF-2304 transverter board is smaller in size. Both use the same LO circuit, with different crystal frequencies, and both systems use an intermediate frequency (IF) of 144 MHz, making them a natural for use with 2 meter multimode equipment, and even 2 meter FM transceivers.

The key to a stable microwave signal is a stable local oscillator. The SHF-LO employs a 2-stage circuit of BFX89 devices, functioning as a crystal oscillator and buffer amplifier. A series of MMICs and one HP2835 diode multi-

ply the signal into the 540-580 MHz range. Two 3-stage bandpass filters and one low-pass filter ensure a clean signal at the output. An option allows the user 4 dBm more gain (required for the 2304 input).

For 1296 operation, the LO signal is doubled by another HP2835 diode into two more MMICs and associated filters, resulting in an LO injection frequency of 1152 MHz. Both 144 MHz IF ports are coupled to a pair of Wilkinson splitters in a "rat race" mixer scheme. At 2304 MHz, operation is similar except that the 4th harmonic of the LO is selected (2160 MHz) and filtered before injection into the Wilkinson splitter.

Actual TX and RX mixing is performed by a pair of HP2835 diodes on the SHF 1240, while a tiny diode pack of HP-HSMS2822 diodes do the trick at 2304. In either case, there are no tuning adjustments to be made, only some careful soldering when installing these diodes. These mixers are quite sensitive, as only 1 mW of energy at 144 MHz is required for drive.

Both boards are completely symmetrical. This means that either side of the board can be used as a receive or transmit converter, or that both sides could be used for the same purpose. As in the LO, no tuning adjustments are necessary. Depending on the model, different MMICs are used as TX and RX gain stages with 3-pole bandpass filters between the cascaded gain stages.

Although the noise figure performance of the MMICs used is quite good, a GaAsFET preamplifier on the RX side will yield noticeable improvement. Typical power output on both boards is in the range of 10 mW, but higher outputs can be obtained with more drive and LO injection. The RX conversion gain is typically 20-25 dB, more than enough to drive the front end of a 2 meter multimode transceiver.

Construction

The manual for the SHF LO states that it can be built in under two hours. I took just about two hours to be extra careful, since the case lead identification on the various MMICs can be confusing. For the record, large case MMICs (such as MSA-0404 types) have a dot on the OUTPUT lead, and smaller MMICs (such as the MSA-0685) have it on the INPUT lead. Most cases of trouble with these kits are a result of incorrect lead positioning.

You won't need much test equipment to

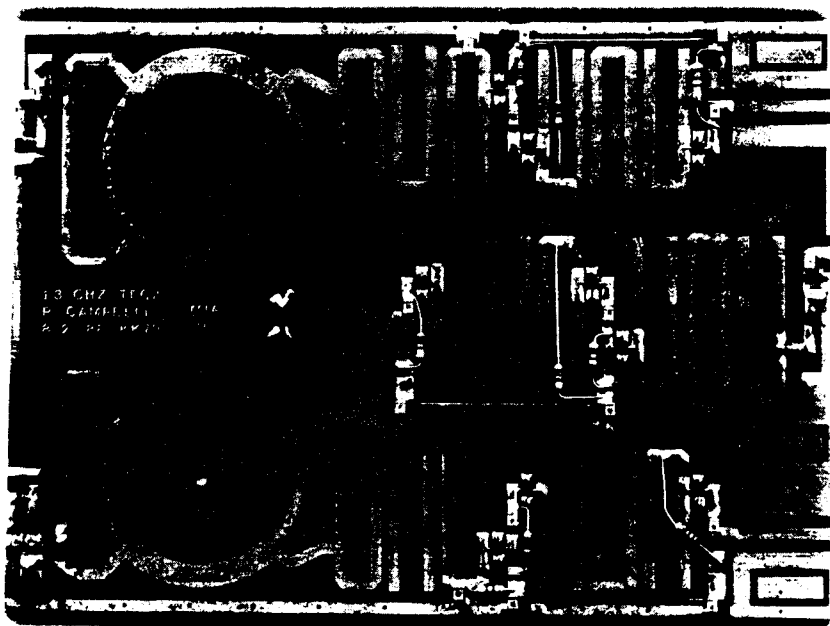


Photo A. The SHF-1240 transverter board (1296 MHz).

check the LO. A simple VOM will do, as you peak the crystal trimmer for current. This will typically be in the range of 200 mA, and a distinct peak will be observed. A 600 MHz or higher frequency counter is handy to verify the actual output frequency while you make this adjustment. An RF millivoltmeter can be used to measure actual LO levels, or a diode probe and FETVOM will suffice for relative output.

The transverter boards present varying levels of difficulty. The SHF 1240 version is assembled on G10 epoxy board and can be done in about one hour. The SHF 2304 uses Rogers Duroid material, and all of the grounding holes for each MMIC must be soldered from the top to the bottom ground plane, using copper foil supplied in the kit. This adds about 30 minutes to an hour to the job.

MMIC installation is simple. I suggest cutting the leads prior to soldering, and watch those case dots! Once the MMICs are soldered in, they are very difficult to remove without destroying them. Fortunately, they are also relatively inexpensive (\$2-\$6, depending on the model), so you won't break the bank if you goof up.

Testing the transverter boards may require nothing more than a sensitive frequency counter on transmit, and another 2304 MHz signal source on receive. Since there's no tuning to be done, the units will either work fine or they won't work at all when powered up! The input power level of 1 mW may be problematic, so the distributor (Down East Microwave) offers a PIN-diode IF switch and attenuator kit as an accessory. This kit can handle up to 3 watts of 144 MHz energy, depending on the resistors installed.

Performance

Both transverters have worked very well here and in portable operations. I soldered the LO to the back of the SHF 1240 board and installed the combination in a Radio Shack metal housing (CAT# 270-272), using BNC connectors for 1296 RX and TX connections as well as 144 MHz In/Out. This chassis also accommodates the PIN diode board. The addition of a Down East 1296 preamplifier and RF power module completes the station, giving me 6 watts output in a small package.

The 2304 MHz station was installed in an enclosure sold by Down East Microwave. Again, the LO was soldered to the back of the transverter board. Since this combination is much smaller, I was able to fit it and the PIN diode board into this enclosure. SMA connectors were used at the 2304 RX and TX connections, with a BNC at 144 MHz. Down East sells an inexpensive 2304 GaAsFET preamplifier kit using an AvanteK ATF10135 device which was also added. A pair of Frontier Microwave

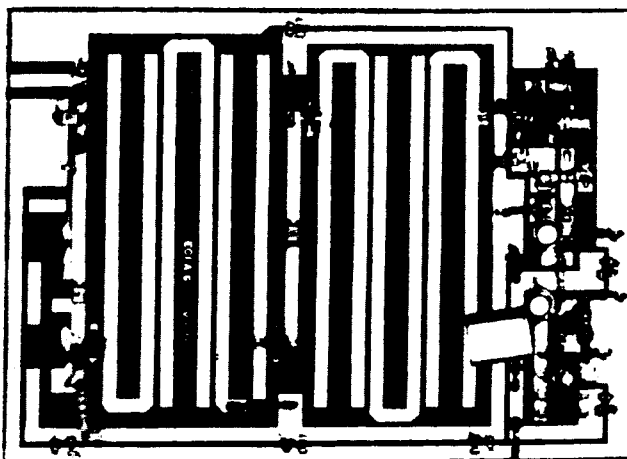


Photo B. The SHF-LO board.

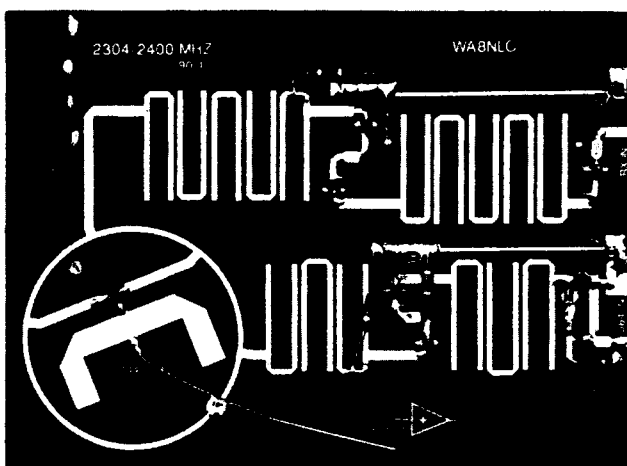


Photo C. SHF 2401K receive converter (for mode S receive).

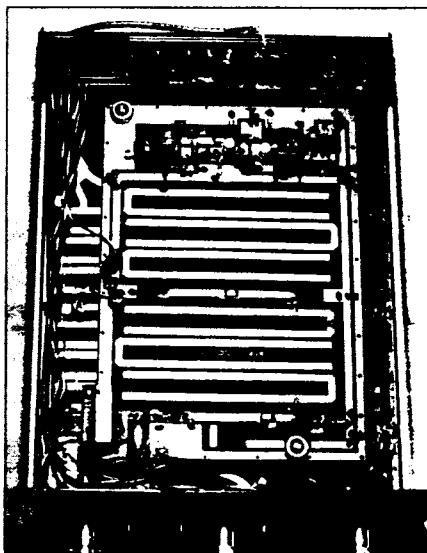


Photo D. The SHF 1240 complete transverter.

gain stages brought the output up to 2 watts.

I've used the 1296 station twice from mountaintops and it has been extremely reliable over a range of battery voltages, working down into the 11.5 volt level without difficulty. Although the PIN diode board offers a MMIC IF post-amplifier stage as an option, I found it to be unnecessary when used with a Yaesu FT-290R II transceiver. Due to tolerances in the LO crystal used, however, my

actual 1296 frequency was off by about -8 kHz from what was displayed.

On 2304, the displayed frequency was much closer, reading low by 5 kHz. Since the 2 watt gain block needs 24 VDC, I use a dual power supply system in the base station. A surplus Microwave Associates 24 VDC SMA relay is also powered by this system. When portable, I use only the first gain stage which needs 12 VDC and develops about 360 mW output, more than enough power when mountaintopping with a 45 element loop yagi.

Other Observations

I can honestly say that these are the easiest microwave kits I've ever assembled. They both worked right off the bat, although the 2304 MHz unit exhibited some instability in the MS0885 TX output stage. This is due to a downgrading by AvanteK of this device from "unconditionally stable" to "conditionally stable" at this frequency. Repositioning a resistor lead to function as a choke cured the problem.

As with any microwave equipment, you'll be working with some very small components, especially the chip capacitors and diode packs. I suggest using a well-lit work area and placing sheets of white typewriter paper under the components to locate them quickly. Doubling over a strip of masking

tape on paper and sticking the parts to it until needed works very well.

The documentation for these kits is constantly being upgraded. For 1296, it rates a B+, and is suitable for the builder with basic kit-building experience. Having a knowledgeable ham friend is a plus. For 2304, I give the documentation a C- as it had several errors on a hand-drawn pictorial diagram and showed two resistors connected to the wrong leads on MMICs. Unlike the 1296 kit, no schematics are shown.

Bill Olson of Down East Microwave has made every effort to ensure that buyers of these kits get the correct information when questions do arise—even to the extent of shipping some extra parts gratis, so "factory support" rates an A+. Thanks, Bill!

To summarize, both kits represent a low-cost, low-risk way to become active on microwave frequencies. And you'll have the added benefit of learning a few things about microstrip and surface-mount construction techniques along the way.

The SHF-1240 complete kit, including TX/RX converter and LO board, is priced at \$139; the assembled board is \$179; the transverter in an enclosure with a PIN diode IF switch is \$225. The SHF-2304 complete kit, including TX/RX converter and LO board, is \$195; the assembled board \$235; complete transverter in an enclosure with a PIN diode IF switch is \$310. 73

The Microwave Directory

*Where to find a wide range of goodies
for operation at 902 MHz and above.*

by Pete Putman KT2B

Ever wondered where to find chip capacitors? Low loss microwave relays? Power dividers? Isolators? Schottky diodes? Or perhaps you need a medium-power gain block to drive the high power amplifier you also need! Or tubes for it. Or even an antenna array. Stymied?

Hopefully, you won't be after reading through this compilation of microwave sources. I've spent a good deal of time rooting out sources for anything from ATC chips to Z-match devices. . . to help get your next project rolling. While this list is by no means exhaustive, it IS extensive and represents businesses from all over the US and Canada. In most cases, the proprietors are also amateurs, active in a wide variety of microwave operations.

Take a careful look. There are some really neat items available, and all at prices that won't break the bank! Most of these dealers will supply you with a catalog upon request. Each is listed with a brief description of the product(s) sold and any observations I have from past dealings. So, without further delay. . .

Advanced Receiver Research

PO Box 1242
Burlington CT 06013
(203) 582-9409
VISA/MC accepted

Jay Rusgrove W1VD has been building some beautiful preamplifiers over the years, and makes a nice sequencing board for mast-mounted types. ARR also sells the TR10GA Gunnplexer/Transceiver combination for wideband 10 GHz FM work as well as the TR24GA system for 24 GHz. A line of microwave preamps is in the works. Catalog available.

Bob Seydler

Rt. 2 Box 2170
Boerne TX 78006
(512) 650-3001 Days; (512) 249-2152 Eves.
Bob N5KET and Alan Dickinson N5BHX have accumulated a huge quantity of surplus

microwave equipment, ranging from power amplifiers, isolators, Gunn diodes and Gunn oscillators, PLL/DRO oscillators, complete transceivers and components. PHEW! If you can't find it here, then where? Price list available.

Communications Concepts, Inc.

508 Millstone Dr.
Xenia OH 45385
(513) 426-8600

A source of hard-to-find chip caps, RF power transistors, and kits for VHF and UHF. Catalog available.

Distributor Specialists

1942 14th Street
Santa Monica CA 90404
(213) 452-3445

Distributor Specialists carry a full line of high-power relays including Dow-Key Type 60 and 260 series and Marshall CX500 series. Price list available.

Down East Microwave

Box 2310 RR1
Troy ME 04987
(207) 948-3741
VISA/MC accepted

Home of the famous "loopers"! Bill Olson W3HQT is the proprietor, and in addition to loop yagi kits for 903, 1296, and 2304 MHz, he manufactures a line of linear solid-state amplifiers for 903 and 1296. Power levels range from 3 to 70 watts output. In addition, Down East carries the SHF Systems series of transverters for 902 through 5760 MHz. Low noise preamps and kits are available for 432 MHz through 10 GHz. Catalog available.

EMCOM Industries

Ed Emich
10 Howard St.
Buffalo NY 14206
(716) 852-3711

Contact Ed Emich KB2KHK for waveguide and 10 GHz frequency meters. He also

can design prototype specialty microwave items for your specific needs.

Frontier Microwave

RD1, Box 467
Ottsville PA 18942
(215) 795-2648 Eves.

Dave Mascaro WA3JUF has been building solid-state gain blocks for quite some time, and offers a line of custom-built amplifiers to cover the spectrum from 902 to 2304 MHz, with power levels from 10 mW to 50 watts. He also builds low-noise preamplifiers for 902 and 1296. They're good for a variety of applications as low-level drivers or final stages. Price list available.

Hamtronics, Inc.

65 Moul Rd.
Hilton NY 14468-9535
(716) 392-9430

A lineup of kits and modules for VHF and UHF including 900 MHz. High quality and economical GaAsFET preamp kits from 10m through 70cm. Catalog available.

Hi-Spec Company

PO Box 387
Jupiter FL 33468
(407) 746-5031

If you're ready to add a bit of power to your microwave signal, Hi-Spec would be a good place to start! A full line of cavity amplifiers is available for 902, 1296 and 2304 MHz. And you can now gang 'em up with the Hi-Spec line of modular RF decks, using a common high voltage supply (yours or theirs). Up to 200 watts out can be obtained on 903 and 1296, with up to 100 watts available on 2304. . . a potent punch. Price list available.

Microwave Components of Michigan

PO Box 1697
Taylor MI 48180
(313) 753-4581 evenings

Another regular visitor to Dayton! Norm Alred WA8EUU is the proprietor, and he's got quite an assortment of hard-to-find com-

ponents, such as chip and leadless capacitors, chip resistors, microwave diodes, GaAsFET devices, MMICs, piston trimmers and SMA connectors as well as a lineup of Mitsubishi power modules. Norm also builds some nice low-noise preamps from 6m to 1296 MHz. Price list available.

Mountaintop

P.O. Box 178
Somis CA 93066
(805) 482-0320

(Answering machine during daytime or contact directly after 7 pm PST)

John Kitchens NS6X offers a selection of surplus VHF, UHF and microwave parts. He also has MA/COM 10 GHz Gunnplexer systems as well as sideband units for 10 GHz. He still has some of the popular Tonna antenna line in stock.

Pauldon Associates

210 Utica St.
Tonawanda NY 14150
(716) 692-5451

Preamps and power amplifiers for 2m up to 1.2 GHz. Bricks and exciters for 70 cm, 900 MHz and 1.2 GHz. Catalog available.

PC Electronics

2522 Paxson Lane
Arcadia CA 91007
(818) 447-4565
VISA/MC accepted

Always wanted to be TV, eh? Tom W6ORG and Maryann WB6YSS O'Hara can satisfy your craving with a full line of ATV transmitters and accessories for 70cm, 902 and 1296 MHz. Receive converters are also available, and you can even buy the boards to "roll your own" ATV station. Amplifiers and antennas round out the equipment list. Catalog available.

RF Parts

1320 Grand Avenue
San Marcos CA 92069
(619) 744-0728, (800) 854-1927 order line

All kinds of RF power transistors and parts for VHF and beyond. Power modules (bricks) for a variety of bands and input power are available to help simplify amplifier projects. Specialty tubes can be had as well. Catalog available.

Satellite City

2663 County Road I
Moundsville MN
(612) 786-4475
(800) 426-2891

An economical source of 18" and 24" dish antennas as well as Gunnplexers and associated equipment. They also have some real deals on used satellite equipment for FM ATV experiments.

SHF Microwave Parts Co.

7102 W. 500S
La Porte IN 46350

Alan Rutz WA9GKA carries a smorgasbord of equipment for 10 GHz experimenters. Gunnplexers, Gunn diode sources, horns and waveguide are among some of his offerings.

Sinclabs Inc.

Specialty Products Div.
85 Mary St.
Aurora, Ontario, Canada L4G 3G9
(416) 841-0624
In the U.S. contact:

East Coast Amateur Radio

496 McConkey Dr.
Tonawanda NY 14150
(716) 835-8530

For those high-power enthusiasts, Sinclabs produce a nice series of water cooling jackets which mount on a 2C39, 7289 or 7815 tube. Also they offer 900 and 1296 MHz 2-way power splitters. 10m to 2m or 220MHz transverters are available as well. Catalog available.

Spectrum International

P.O. Box 1084-S
Concord MA 01742
(508) 263-2145

For years John Beanland G3BVU/W1 has carried the fine line of Microwave Modules transverters and converters. Although Microwave Modules no longer supply the ham market, he still has some 1296 transverter boards available. He will continue service and repair for any of the units out in the field. John carries a lineup of loop yagis for 1268, 1296 and 1691 MHz as well as a series of high quality interdigital band filters from 420 MHz up to 1691 MHz. ATV channel filters are available designed for specific frequencies. He also offers a wide range of equipment for GOES weather satellite reception on 1691 MHz including a complete high quality system. Look for more interesting transverter packages in the coming year. Catalog available.

SSB Electronics USA

124 Cherrywood Dr.
Mountaintop PA 18707
(717) 868-5643 M-F after 6:30 p.m. Any time on weekends.

Gerry K3MKZ carries the high quality SSB Electronics series of transverters from 6m all the way up to 10 GHz. Also a line of preamps for EME, OSCAR and weak-signal work both mast-mounted or in the shack. A mode S receive converter is available as well. Check out their 100 watt amp for 1200-1300 MHz. A 40-page catalog is available for 85 cents worth of stamps.

Steve Kostro

Box 341A RD1
Frenchtown NJ 08825
(201) 834-1304 9 a.m.-7 p.m.
(201) 996-3584 after 9 p.m.

Steve N2CEI is another "partsmonger" and at hamfests he sets out a tray of components that looks good enough to eat. You'll find all kinds of bipolar and GaAsFET devices available as well as MWA and AvanteK MMICs; HP-5082 diodes, chip components, helical filters, connectors and Teflon™ PC board material. Steve also sells a line of GaAsFET kits based on the WB5LUA designs for 902, 1296 and 2304 MHz. Price list available.

Surplus Sales of Nebraska

1315 Jones Street
Omaha NE 68102
(402) 346-4750 or (402) 346-2939 FAX
Compuserve 76357.3664
VISA/MC/AMEX accepted

The catalog alone is worth an inquiry! Surplus Sales is a familiar face to Dayton attendees and has an incredible range of new and used parts for sale. It would be impossible to list them all, but items in Catalog #5 of interest to microwave fans include feed-through capacitors, 7289/3CX100 tubes, RF connectors, coaxial relays, attenuators, and power modules. (And I'm only up to page 21!!)

T.D. Systems

2420 Superior Dr. 'B'
Pantego Tx 76013
(817) 861-5864

Steve Franklin WB5KGL has designed a series of AM and FM ATV transmitter and receive modules (along with a video control center) for the 70cm, 900 and 1200 MHz bands. They are designed for mast mounting to eliminate feedline losses. Catalog available.

TE Systems

P.O. Box 25845
Los Angeles CA 90025
(213) 478-0591

A series of medium to high-power amplifiers for the 144, 432 and 1296 MHz bands complete with built-in GaAsFET preamps. Catalog available.

The Antenna Center

505 Oak St.
Calumet MI 49913
(906) 337-5062

A good source of high quality spun dishes specifically designed for high accuracy at the 12 GHz Ku satellite band. These should be great performers on the amateur microwave bands and come in sizes ranging from 2 feet to 6 feet. The 2- and 3-foot models are UPS shippable. Price list available.

The RF Connection

213 N. Frederick Avenue #11
Gaithersburg MD 20877
(301) 840-5477
(800) 783-2666 orders
VISA/MC accepted

If it has anything to do with a connector... Joel Knoblock probably has "it" somewhere in his vast inventory of connectors, adapters, coaxial cable, switches and relays. Joel is a regular at major hamfests, including Dayton, and has even come out with his own "house brand" type 9913 coax. Price list available.

VHF Communications

280 Tiffany Ave.
Jamestown NY 14701
(716) 664-6345
(800) 752-8813 orders only
VISA/MC/DISCOVER accepted

A source of Hamtronics kits. Price list available.

delay circuit is complete, and at that point the amplifier is ready to go.

The 12-volt relay circuit requires a hard contact closure to ground rated at 150 mA of current draw. When you key the amplifier without drive, the plate current reads about 120 mA, and the grid current should be zero. I found no erratic plate or grid current readings at this point while tuning the plate and load controls along with the input tuning. This means the amplifier is very stable and won't go into oscillation while the drive is still at zero.

The nominal input drive is 10 to 15 watts, while 25 watts is maximum. As seen by the table, even 5 watts will give over 100 watts output. This amplifier really runs well. I found its efficiency at about 60% or better, depending on the drive. Wiring the amplifier for 220 VAC resulted in better regulation, with about a 150-volt drop in the high voltage supply at full output. If you have a dedicated line for the amplifier, it can run fine at 110 VAC, drawing close to 14 amps at full output.

Easy to Tune

Overall, tuning is straightforward. For the most part you are looking for maximum output while checking to make sure the grid and plate currents are not exceeded. I used a Bird Model 43 with various elements, up to 1000 watts for all tests. My own station consisted of a multimode Yaesu FT-901DM, with the FTV-901R transverter at 15 watts for some of the testing; and a multimode Yaesu FT-736R VHF and UHF rig at 25 watts for the high power testing.

My transverter only had 15 watts, but even at that level my output was still 450+ watts! With the 25 watts from the FT-736R, this amplifier really puts out the power—at least 700 watts! And if you really watch the grid/plate current and don't exceed maximum ratings, you can get almost 1000 watts power SSB.

On-the-air checks while running SSB were all very good, and I had no bad reports of audio distortion or splatter up and down the band. In fact, most people commented on how good the amplifier sounded! Putting the amplifier in and out of the line was fun, since the gain difference is about 15 dB! And that's really handy when trying for that extra grid square on 2 meters.

I also run plenty of FM simplex with key-down times of 5 to 10 minutes for each "go-around" during an entire evening. There has been no problem with the amplifier as long as I keep the power output around 400 to 450 watts. Don't let it get any higher than that on FM unless you want to purchase a new tube soon! After having the opportunity to run this kind of high power on 2 meters for the past couple of months, I see a whole new world open up.

Most of the rigs today have good receivers, but unless there is something such as the Commander II in the output, the score is not even. I was always hearing very well, but now I can work anything that comes through on the receiver!

One final note: I am really glad to see an all-American company producing such a well-made piece of equipment! [7]

Continued from page 53

Wyman Research, Inc.

R.R. #1, Box 95

Waldron IN 46182

(317) 525-6452

Don Miller W9NTP offers a lineup of FM video transmitters and receivers for the 900 and 1200 MHz bands. He also carries a series of AM ATV transmitters, receivers and transceivers for the popular 70cm band as well. Catalog available.

Well...there you have it. Again, the list is by no means exhaustive! Surely there are more entrepreneurs out there peddling microwave components at hamfests than I know about. And, of course, I purposefully omitted the major manufacturers who already heavily advertise their microwave products, such as transceivers and preamplifiers for 23 centimeters.

Clip this article out (or put this issue aside) to use the next time you come up against a wall when searching for parts or whole assemblies. Amateurs are supposed to be a resourceful lot. Above 900 MHz, you haven't much choice! This will make the job easier.

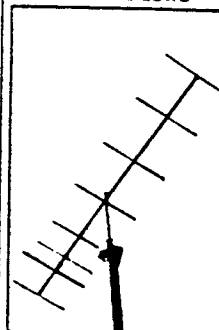
See you on 902...1296...2304...3456...5760...10368...etc.... [7]

Contact Peter Putman KT2B at 3353 Fieldstone Dr., Doylestown PA 18901.

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ELECTRICAL SPECIFICATIONS:

Gain 13.3 dBi +/- 25
E-Plane beamwidth 40 deg
H-Plane beamwidth 45 deg
Bandwidth 4 MHz
Sidelobe attenuation
1st E-Plane -20 dB
1st H-Plane -14.5 dB
SWR < 1.5:1 144 to 148 MHz
F/B ratio 22 dB

MECHANICAL SPECIFICATIONS:

Length 11 ft. 9 in.
Stainless Steel hardware
except U-Bolt
Mast up to 1 1/2" diameter
Wind survival 90+ MPH
Aluminum: 6061 T-6
Element Insulators: Black Delrin
Coax connector: N-type
Weight: 3.5 lb.

ALSO AVAILABLE

FO12-144 FO15-144 FO22-432 FO25-432 FO33-432 FO16-220 FO11-440
POWER DIVIDERS FO22-432 ATV STACKING FRAMES

We supply those hard to find parts for the home builder
1/4" Delrin insulators \$9.50/50. 1/4" Stainless keepers \$8.75/50

Communications Accessories

Fred Gore KA1TBS

40 Birchwood Road

Southwick, MA 01077

413-569-3579

Where to Mail Logs

If you do not understand how to complete the report summary sheets, immediately after the contest, mail your logs and summary sheet off to the Zero Beat editor, and he'll be glad to do it for you. Sign the summary sheet, and complete the information you do know, i.e. address, etc. Comments and photographs provided will also be forwarded to the ARRL.

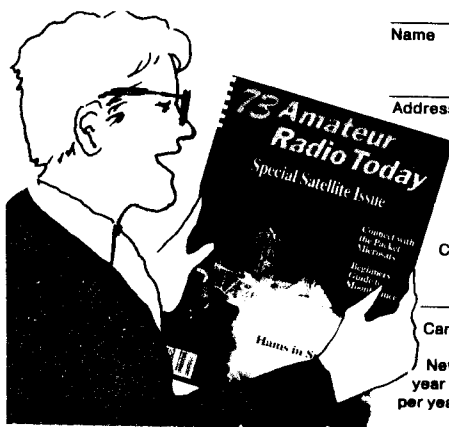
If you're not a member of the HCRA and/or if you want your logs sent in for a different organization, plainly mark your desires, and it will be taken care of.

Editor's address: Jeffrey J. Duquette K1BE 18 Anvil Street Feeding Hills, MA 01030-1530

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VHF SWEEPSTAKES

CALL USED _____

GRID SQUARE LOCATOR _____

ARRL SECTION _____

Call of operator if different from call used _____

_____ Single operator station. I wish to be listed in QST as: _____ Multi-band

_____ Novice Single operator station. _____ Single-band _____ MHz

_____ QRP Portable station.

_____ Multioperator station (show calls of all operators/loggers) _____

_____ (not eligible for single-band awards)

QSOs
(minus duplicates)

QSO Points

Grid Sq.
Multiplier

Claimed Score

50 MHz (1 pt. each)				50 MHz
144 MHz (1 pt. each)				144 MHz
220 MHz (2 pts. each)				220 MHz
432 MHz (2 pts. each)				432 MHz
902 MHz (4 pts. each)				902 MHz
1296 MHz (4 pts. each)				1296 MHz
2300 + (8 pts. each)				2300 +
TOTAL ALL BANDS				TOTAL ALL BANDS

Figure your score for each band operated as well as your total score for all bands. Band scores equal QSO points X multiplier on that band. All-band score equals total QSO points X total multipliers from all bands operated.

ARRL Affiliated Club:

Hampden County Radio Association

I have observed all contest rules, as well as all regulations established for Amateur Radio in my country. This report is true and accurate to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee.

Date _____ Signature _____ Call _____

NAME: _____ CALL: _____

Comments:

ADDRESS: _____

VHF ∞ UHF ∞ SHF Contest Log

Call Used Grid² Log Sheet of

Date	Band	Time	Call Worked	Grid ²	Mult	Notes
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[illegible]

30 Contacts per page

Totals

VHF ∞ UHF ∞ SHF Contest Log

Call Used Grid² Log Sheet of

Date	Band	Time	Call Worked	Grid ²	Mult	Notes
------	------	------	-------------	-------------------	------	-------

[illegible]

30 Contacts per page

Totals

VHF ∞ UHF ∞ SHF Contest Log

Call Used Grid²

Log Sheet of

Date _____

Band

Time

Call Worked

Grid2

Mult

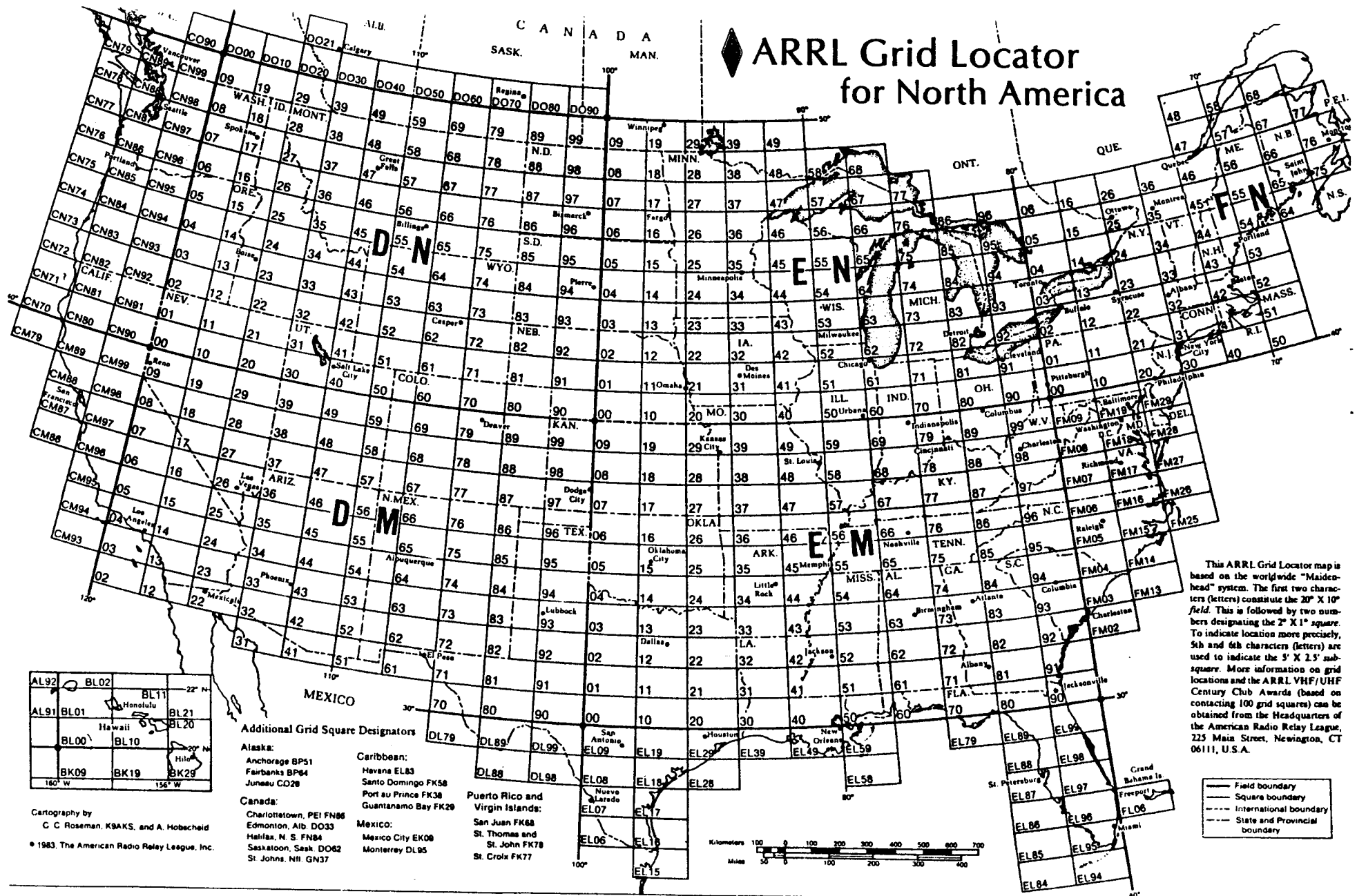
Notes

[illegible]

30 Contacts per page

Totals

ARRL Grid Locator for North America



This ARRL Grid Locator map is based on the worldwide " Maidenhead " system. The first two characters (letters) constitute the 20° X 10° field. This is followed by two numbers designating the 2° X 1° square. To indicate location more precisely, 5th and 6th characters (letters) are used to indicate the 5' X 2.5' sub-square. More information on grid locations and the ARRL VHF/UHF Century Club Awards (based on contacting 100 grid squares) can be obtained from the Headquarters of the American Radio Relay League, 225 Main Street, Newington, CT 06111, U.S.A.

Cartography by
C C Roseman, K9AKS, and A Hobscheid
© 1983, The American Radio Relay League, Inc.

January VHF Sweepstakes

Saturday January 18th Starts at 2:00 pm est

Sunday January 19th ends 11:00 pm

Don't forget the new club award you can qualify for.

See you during the contest!

Contest exchange is your grid square!

*Complete log, grid map,
and summary sheets
are enclosed!*

Next Meeting

Friday February 7th

Feeding Hills Congregational Church

Doors open at 7:30 pm, Meeting starts at 8 pm

All new licensees are Welcome!

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**VHF Sweepstakes
Jan 18 & 19, 1992**