# Wasatch 100 Endurance Run - 1998
# World's Toughest Hundred Miler

Photo: Mike Collett, K7DOU

Gordon Smith, K7HFV, operates from the Swallow Rocks Aid Station located nearly a third of the way into the race. Frozen popsicles, a regular feature at this station, were a real hit with the runners.

Volume XLII Issue 11, December 1998

The
MICROVOLT

Periodicals Postage Paid

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## Prologue

The Utah Amateur Radio Club was organized under it's present name in 1927, although its beginnings may date back as early as 1909. In 1928, it became affiliated with the American Radio Relay League (club #1602) and is a non-profit organization under the laws of Utah. It holds a club station license with the call W7SP, a memorial call for Leonard (Zim) Zimmerman, an amateur radio pioneer in the Salt Lake City Area.

The club meets each month except July and August. The meetings are held on the first Thursday of the month at 7:30 PM in the Doxey-Hatch Medical Building located at 1255 East 3900 South in Holladay, across the street from St. Marks Hospital.

Club membership is open to anyone interested in amateur radio; a current license is not required.. Dues are $15 per year, including a *Microvolt* subscription. *The Microvolt* and membership cannot be separated. Those living at the same address as a member who has paid $15 may obtain a membership without a *Microvolt* subscription for $9. ARRL membership renewals should specify ARRL Club #1602.

Monetary contributions are gladly accepted. Send directly to the Club Treasurer: Chuck Johnson, 1612 W. 4915 S., Taylorsville, UT 84123-4244. For in kind contributions, please contact any board member to make appropriate arrangements.

UARC maintains the following repeaters: 146.62 (-), 146.76(-), and 449.10. The repeaters are administered by the UARC Repeater Committee. Comments and questions may be directed to any Committee member. The Lake Mountain repeater 146.76(-) has Autopatch facilities on both the Orem exchange (covering Santequin to Lehi) and the Salt lake City exchange (covering Draper to Layton). The 449.10 repeater has autopatch facilities into Salt Lake City only. Due to the volume of traffic, only mobiles should use this autopatch. Autopatch use is open to all visitors to our area and to all club members. Non members who wish to use the Autopatch are encouraged to help with the cost of maintaining the equipment by joining the club.

THE MICROVOLT: *The Microvolt* is the official publication of the club. Deadline for submissions to the Microvolt is the 10th of each month prior to publication. Submissions by email are preferred (bbergen@xmission.com), but other means including diskettes and typewritten submissions can be mailed directly to: Bruce Bergen, 3543 Fieldstone Cir., SLC, UT 84121. In order to maintain ease of conversion it is suggested that you contact Bruce at 943-1365, or via e-mail before making electronic submissions.. All submissions are welcome but what is printed and editing are the responsibility of the UARC board. Reprints are allowed with proper credits to *The Microvolt*, UARC, and authors. ❑

## UARC 1998 Board - Partial Listing

| | |
|---|---|
| President: Tom Schaefer, NY4I | 569-2664 |
| Exec VP: Ray Allen, N7TEI | 963-0790 |
| Vice Pres: Gordon Smith, K7HFV | 582-2438 |
| Secretary: Russell Smith, KC7ZDZ | 463-2568 |
| Treasurer: Chuck Johnson, WA7JOS | 268-0153 |
| Microvolt Editor: Bruce Bergen, KI7OM | 943-1365 |
| Book "Lady": Fred DeSmet, KI7KM | 485-9245 |

## Contents



*For late breaking news listen to the UARC Information Net Sundays at 21:00 on 146.62 or set your browser to:*
www.xmission.com/~uarc/announce.html

We are grateful to the management of Xmission for the donation of this Web-Page service. ❑

# The Microvolt

The Official Publcation of the Utah Amateur Radio Club, Salt lake City, Utah

Volume XLII, Issue 11 December 1998


Photo: Bruce Bergen, KI7OM

## QST from the VP

During 1998, the club undertook more major projects than I can ever remember it doing in a single year. There was the improved and expanded *Microvolt*, the club station, the securing of the Scott's Hill site, the antenna move on the '76 repeater, and continuation of work on the ATV (Amateur Television) repeater, in addition to the normal load of meetings, Field Day, Steak-Fry, web site maintenance, and keeping the repeaters and autopatches on the air. It may seem unimaginative of me not to suggest any new frontiers to conquer in 1999, but I think we will be doing wonderfully well if we just keep the current projects on track. (The treasurer, I believe, agrees. He has had the chance to witness, possibly, the largest cash outflow in the club's history.)

Still, there's lots of room for more participation. It is likely that only about ten per cent of the membership gets involved in the club activities, even to the extent of helping to raise antennas on Field Day. I'm sad, not that 10% have to do all the work, but that 90% miss most of the fun. The real benefit to club membership comes not from sitting back and expecting to receive "services," but by joining other hams in doing something beneficial to the club members and to the ham community at large. There are lots of opportunities, already, to fit most any kind of talent, and probably lots more that people with imagination can invent.

Let's all work to make 1999 a great year for UARC and have a great time doing it!

Gordon, K7HFV

Editors Note:

Since our retiring President, Tom Schaefer, NY4I, was out of town on vacation with his family as this issue of *The Microvolt* was being prepared for the printer your editor has chosen to use an editorial written by Gordon, K7HFV, UARC Vice President as a more than adequate stand-in. ❑

## Featured Member of the Month


Photo: Bruce Bergen, KI7OM

Allen Wright, N7QFI, at the Scott's Hill site. Even with a professional, not all of the paint goes on the walls.

This month we are featuring Allen Wright, N7QFI, who has been an amateur radio operator, with a tech plus license, since 1990. His friend, Robert Perschon, N7ATZ, the former owner of Perschon Paint, first interested him in amateur radio. Robert provided Allen his first study guide book and gave him his first two 2-meter radios. Robert also helped Allen purchase his first low band rig.

Allen is a professional painter employed at the University Of Utah. He is also the Disaster Communications Coordinator for the University of Utah Medical Center and as such works closely with ARES. Allen has used his painting skills many times to help UARC. About 3 years ago he painted the 146.62 repeater tower on Farnsworth Peak, and has helped Gordon Smith, K7HFV and Randy Finch, K7SL on the 146.76 repeater. In September of this year Allen painted the Scotts Hill repeater building as part of the club's renovation efforts on that facility.

For four years Allen was our custodian for our use of the Salt Lake County Fairgrounds Auditorium building where UARC previously met. He would be there early before the meeting to open the doors, set up the PA system and when the meeting was over make sure things were cleaned up, and after everyone had left, saw to it that the doors were closed and locked.

Allen is also our repeater and autopatch monitor for the 146.76 repeater. He indicated that one of the biggest problems is so many of the new people do not seem to know how to use the autopatch. They use it like a regular "landline" telephone, where once both parties have hung up, or gone "on hook" no further action is needed. Many don't bother to sign at the end of their QSO and "pound" (#) down the autopatch. An even greater problem is that many people don't realize that in order to use the patch they need to pay dues and join the club. Unauthorized non-member auotpatch use is like a stranger walking into your home and using your phone without your permission. He thinks that perhaps those who are teaching the novice and tech classes in our area should devote some class time teaching potential new Hams autopatch and repeater protocol, since it doesn't seem to be covered in any of the license study guides. Some time spent on these subjects might alleviate a few of the problems.

Allen said he really enjoys his association with the club members. He finds his association with Gordon Smith, K7HFV and Randy Finch, K7SL, especially beneficial because of all the information and new ideas they have given him.

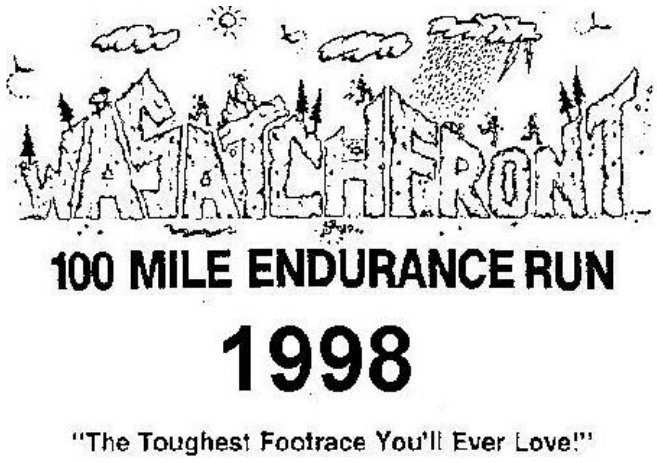
Allen, we appreciate all the help you give to the club.

73 N7HVF, Linda Reeder ❑

## A Blast from the Past

We are sorry but Alan's work schedule this last month has not allowed him to prepare this popular regular feature. We hope to see it back next month.

## WASATCH 100 A SUCCESS




Have you ever had the urge to go out and run a hundred miles over difficult terrain with lots of elevation gain and loss? Well, neither have I. You may be surprised, though, to learn that hundreds of people line up each year to do exactly that.

On the weekend of September 12 and 13, Utah Amateurs executed their biggest public service event of the year: The Wasatch Front 100-Mile Endurance Run. In this event, runners come from all over the world to run 100 miles through the Wasatch Mountains. They start in Layton at 5 a.m. Saturday morning and hope to arrive in Midway no later than 5 p.m. on Sunday afternoon.

The amateur radio community provides a remarkable service to this event, but what those who enter the race do is, perhaps, even more remarkable. The Wasatch 100 is one of several "ultra-marathons," races well over the length of a marathon, in this case, 100 miles. Yes, that's 100 miles on foot --this is not a bicycle or horse race. And to make it even tougher, the course runs over high ridges in the Wasatch Mountain Range. The cumulative elevation gain is about 26,000 feet, and the cumulative loss is about 23,600 feet.

The race begins in the wee hours of Saturday morning. Each runner may have several pacers along the way.

That's more gain and loss than someone would experience if he went from sea level to the top of Mt. McKinley and back. (According to the route expert, the gain and loss is probably even more, but the maps only show 40-foot contour intervals.)

The front runners complete the course in just over 20 hours. A runner is considered having completed the run if he can finish within 36 hours. This year's race was won by Karl Meltzer of Sandy who set a new course record of 20 hours, 8 minutes.

Along the course a runner encounters fifteen aid stations and check points. Each of these stations has water, snacks, "power" drinks, and people who can evaluate a runner's condition and determine if he is in any medical danger.

The aid station at Swallow Rocks with Gordon, K7HFV, on the left obtaining information on runner's in and out times.

A race where 200 runners travel along remote ridges in the mountains presents all sorts of logistical problems. Runners may get lost, disoriented, or even collapse from dehydration or exhaustion. Because of the remoteness of the course, a disabled or lost runner might conceivably miss being discovered until long after the race. Amateur radio helps deal with these problems. Each check point or aid station has an amateur radio station. Operators record the time each runner enters and leaves their checkpoint and relay

The aid station at Big Mountain is at the trail's intersection with State Hiway 65 and attracts a good support group.

the information to a central computer system, also provided by hams. This makes it easy to tell if all the runners who left one checkpoint arrived at the next one or if a search party needs to go investigate.

The amateurs also relay information about runners who drop out, ones who need rides, ones who need to coordinate with their pacers or meet their "crews," that is, friends and family who supply food, clean clothes, and moral support along the way.

Over 80 amateurs participate, providing stations at the starting line, and the fifteen intermediate checkpoints, and an extensive net control station at the finish line in Midway. Each station has its own personality and its own set of challenges. At the early checkpoints, amateurs must be prepared to catch 200 in-and out-times in a half-hour. At the later checkpoints, operators must keep the station operating for 18 or more hours, including the hours of darkness. Many of the checkpoints are at remote locations that must be reached by four-wheel drive, horseback, or on foot.

1997 saw a marginally successful use of packet radio. The aid station at the finish line in Midway, shown here, had a networked system in 1998 and was quite successful.

The net control operation at Midway was particularly well equipped and staffed this year. Computer operations and radio operations had separate trailers. There was a local area network comprising seven computers. A custom database program developed by Kirk Boman, KD0J, allowed checkpoint operators

Jerry Wellman's, W7SAR, communications trailer, pictured here at Big Water (top of Mill Creek Canyon) is one of the best equipted mobile facilities.

with packet radio capability to key their times directly into computers at the net control site. A separate computer was available in the pavillion for use by anyone who wanted to make inquiry about a runner's position or times.

The sub-alpine setting of the Poleline Pass aid station made for a very nice campsite.

There were some tense moments, but all the checkpoints got on the air and delivered their information successfully. The operators dealt with cold, rain, 50 mph winds, lost runners, injured runners, and exhausted runners, and took it all in stride. No one was left behind on the course, thanks, in large part, to the communications system. The computer system was able to deliver a printout to each runner showing his times throughout the course.

Over 75% of the runners finished the course within the required time. One of the finishers collapsed on the streets of Midway after having successfully run about 98 of the 100 miles. An ambulance was called and medical personnel checked out the runner's condition. After conferring with the hospital they decided he could complete the run, *then* go to the hospital. So after getting a big infusion of fluids, the runner continued, with the ambulance following close behind. He finished and then the ambulance took him away. This finish must have been gratifying because it was the runner's fourth finish of an ultra-marathon during 1998. This qualified him, joining twenty others, for the "Grand Slam" award. Wasatch is the last of the major ultras, so Grand Slam awards are presented at the Wasatch-100 awards ceremony.

Coordinating all the hams and other volunteers was Claude Grant, WC7G, who somehow was able to get all the pieces to fall smoothly into place. Among all his other duties, Claude has created a very nice web site telling many details about the Wasatch-100. Check it out at:

http://www.xmission.com/~Cwgjr/wasatch.htm.

Then, call Claude and volunteer for the '99 Wasatch 100.

Gordon, K7HFV ❑

## Some History of the 2 and1 1/4 Meter Bands and Associated Repeater Offsets

Bruce,

Here is a message I received from the Frequency Coordinators Remailer about the History and how the 2 M and 220 Mhz bands were planned way back then. Maybe this would be of interest to the UARC members.

John, K7JL

Gents,

Chris Boone inquired as to the rationale for the present 1.6 Mhz split on the 220 MHz band plan. Chris is correct, in that prior to the adoption of new repeater rules by the FCC in 1973 under Docket 18803, the 220 repeater band plan had repeater input/output spacing at -3.0 MHz.

In 1973 or early 1974, just after the FCC reduced the repeater portion of the band to the 222 -225 MHz segment, I had just resigned from the VRAC (as I had just started working for the FCC, it was suggested that some people might visualize some sort of "conflict of interest"). Mike Cox, K3GEG, a close friend of mine, replaced me on the VRAC. Because time was somewhat critical, the VRAC meeting actually occurred on 75 Meter SSB. Since Mike was a Tech licensee, he came to my house to talk on my HF station. Mike and I made the combined suggestion that we go to a 1.6 MHz spacing. Here is the rationale we offered:

1. 1.6 MHz spacing would provide for (almost) maximum use of the repeater segment for repeaters, but would also provide for a 200 kHz-wide simplex segment in the middle. This would supposedly keep all FM activity above 222 MHz, thus reserving the remainder of the band below 222.0 for non-FM users. We suggested 223.50, right in the center, as the national calling frequency. This frequency was suggested as we figured it would be easy for the average user to remember.

2. The second reason that we suggested 1.6 was that the average user could probably relate to subtracting 1.6 from the output frequency, as he was already accustomed to subtracting 0.6 MHz which was the offset on 2 Meters. We tried to make the math as simple as possible!

3. Finally, we suggested that the repeater outputs should be kept at the high end of the band (with a negative offset) so as to keep their relatively high powered signals as far away from TV channel 13 as possible, to minimize the TVI potential That's all there is to it! After some discussion, the VRAC agreed to adopt our suggestion.

On a slightly different note, Steve Mendelsohn mentioned the meeting at which the current 2 meter 600 kHz offset was selected. That meeting actually occurred in about 1967 or '68 at Doylestown, Pa., north of Philly, and was called because chaos was rapidly developing in the repeater portion of 2 meters as a result of the lack of a repeater input/output standard. At that time, the coordinators in the northeastern part of the country were all operating under the wing of the North East Repeater Association (NERA, who Wayne Green later used to refer to as the "Non-Existent Repeater Assn.", HI). NERA, under the guidance of Gordon Pugh, W1JTB, and Bob Pederson, K2IEZ, maintained a computerized database of repeater, control and link freqs, which all of the coordinators contributed to. By the way, it may have been NERA that actually published the first "repeater directory"!

As I recall, the FCC Rules at that time prohibited Technicians from operating in the 147 -148 MHz portion of the band. So the highest FM frequency which they could use was 146.94 (standard channel spacing was 60 kHz due to the use of wide-band FM [+/-15 kHz deviation]) Also, if I remember correctly, wide-band FM was only permitted above 146.0, so all FM activity, from a practical standpoint, was limited to 146 - 147 MHz. The actual channel frequencies were an extension of the standard Land-Mobile channels above 150.8 MHz! .94 was the national calling frequency at that time, so the very first repeater builders in many parts of the country automatically selected the .34/.94 pair to begin repeater operations on (I'm not sure why they selected .34 as the input, but it was probably a decision based on logic). But that's why .34/.94 was the single most popular repeater frequency pair back in the early days.

Second was .34/.76, later to become .16/.76. However, since there was no standard for input/output spacing at that time, anything went. As a result, NERA called a meeting, and all known repeater sponsors and coordinators in the northeast

were invited to attend and participate in an effort to try to make some sense of the disorder that was developing.
Since I had grown into the position of being the "de facto" coordinator for my area (this was before T-MARC existed), I attended along with Steve and many others. Several dozen repeater sponsors attended, as well as all of the northeast's coordinators, and the -600 kHz standard was unanimously adopted! Everybody recognized the benefits of having some sort of standard! (Does 6 Meters come to mind?) After that, it didn't take long for all of the non-standard repeaters to change either their input or their output to conform to the new standard.

The coordinators all worked closely with each other and the sponsors to make frequency changes that accommodated everybody. Many repeaters implemented "dual receivers" during the change-over. For instance, the .34/.76 repeater that I was involved with added a second receiver on 146.16, and ran both receivers simultaneously for several months until all of the users had installed new transmit crystals in all of their equipment (this was in the days long before synthesizers, so everybody was crystal-controlled on a limited number of channels -my GE Prog-Line mobile had 9 channels, with a scanner that I designed! That might have been the first "scanner"). This repeater went to .16/.76 instead of .34/.94 because everybody in this area wanted to keep .94 open for simplex use only.

It wasn't until 1973, under the new FCC repeater rules, that 147 -148 MHz was opened up to Techs (repeaters were permitted only between 146.0 and 148.0, under the new repeater rules). By then, the VRAC had been established, and it undertook the challenge of deciding what kind of band plan to implement for the 147 -148 segment. They selected the in-hi/out-low option, so as to place all repeater outputs in one contiguous segment from about 146.6 to 147.4. That choice was made primarily because the front-ends of most receivers in the surplus Land-Mobile equipment of the day would not cover as wide a frequency spread as their transmitters would. And it was about this time that talk of moving the national calling frequency off 146.94 was beginning. But that's another story. I hope this might be of some interest.

73, Gary

This message sent by Gary Hendrickson GHENDRIC@fcc.gov ❑

## '94 Returns to the Air

After an almost 9-month absence, the Utah VHF Society repeater on 146.94 MHz came back on the air Saturday, October 31. It is operating from a site near Farnsworth Peak in the Oquirrh Mountains west of Salt Lake City.

John Lloyd, K7JL, who holds the Frequency Coordinator office in the VHF Society, reports that the repeater has no links and now requires a CTCSS tone of 110.9 Hz. This is a change from the old 100.0 Hz and will require users to reprogram their radios.

The '94 repeater was one of five amateur repeaters that went off the air February 2 of this year due to a disagreement with the owner of the old site, known as "Little Farnsworth." The 146.88 and 224.78 repeaters had already returned to the air from new sites.

Still off are:

449.9 (Salt Lake County ARES)
449.125 (9600-baud packet repeater)

Also back on the air after various absences are the 146.74 and 448.1 MARA repeaters, and the 145.37 on Tower Mountain in Utah County.

The 145.41 repeater on Scott's Hill is off the air for repairs. It will come back on 145.27, freeing 145.41, the unprotected experimental frequency.

The 147.12 repeater at the Channel 13 site, near Farnsworth Peak, now requires a 100 Hz CTCSS tone for access. This change was made necessary due to interference problems on the site.

Gordon, K7HFV ❑

## Ham Hot-Line

The Utah Amateur Radio Club (UARC) has a Ham Hotline, 583-3002. Information regarding Amateur Radio can be obtained, including club information, testing, meeting information, and membership information. Leave your name, telephone number and a short message on the answering machine if no one answers and your call will be returned.

Gary, KC7AWU ❑

## 1999 UARC Board Nominees

**President:**

**Gary Openshaw KC7AWU**

Ham since l994, Advanced Class working on Extra - trying to beat Fred who is trying to get his Extra. I am interested in holding Ham Radio classes. Will be holding a General upgrade class in February, l999. I am assistant Book Lady and a VE who likes helping with testing. I will strive to continue with progress of the Clup Station, Scott's, and upgrading the quality of QSO's

**Linda Reeder, N7HVF**

I enjoy being on the board because I like helping out the club any that I can. I have enjoyed planning the guests for the meetings and would still be able to help with that. UARC is a great club and I would like to see it continue. I would like to get more people interested in helping out the club. Anyway I hope to be able to stay on the board.

**Executive Vice President:**

**Maurine Strektenfinger KC7HOZ**

I got my license on the last day of l994, and have an Extra class license since l997. It has been a real joy to be part of this hobby. Some of the best friends I will ever have, I have met through Amateur Radio. I also enjoy being a VE, and seeing so many people get their licenses and upgrades. I love being part of UARC and serving on the Board, and if elected to the office of Executive Vice President, I will work hard to keep the Clubs high standards , and help wherever I am needed.

**Vice President:**

**Gordon Smith, K7HFV**

I was first licensed almost 40 years ago as a teenager, and ham radio continues to be my favorite hobby. I joined UARC in the early 1960's and had become *Microvolt* editor by 1963. After something over 15 years in that position, the other officers started looking for positions that might keep me occupied but in which I couldn't do as much damage. At various times I have been Assistant Editor and Vice-President. I seem to remember being President one year, which is odd, because I can't ever remember agreeing to run for that office.

The two Vice-President positions are officially the line of succession in case the President dies, resigns, moves away, or just refuses to perform his duties. Since most of our presidents have been healthy and quite capable of doing the job, the reality has usually been a little different. In practice, the Vice-Presidents take on some of the jobs that aren't explicitly given to another officer. For my part, I have been running the series of UARC-sponsored exam sessions since ARRL-coordinated exams became possible in the early 1980's. We offer tests on the first Saturday of each month for all classes of amateur license. We pioneered (in Utah, at least) the notion of giving the code tests through headphones (to eliminate room echoes), and regenerating the code on a local, sine wave, soft-keyed oscillator, to eliminate tape print-through and allow a choice of pitches. If elected, I hope to continue that series, and to continue contributing to the club's web site and to *The Microvolt*.

**Secretary:**

**Russ Smith, KC7ZDZ**

Russ has been an Amateur operator for 11 years. He has served as the UARC Secretary for one year of his 4 year membership. He especially enjoys Ham Radio and the opportunities for public service the hobby provides.

**Treasurer:**

**Chuck Johnson, WA7JOS**

I have enjoyed being UARC treasurer for the past three years, and would like to continue for next year. The club has undertaken several expensive projects this year, but we are still in good financial shape. I would encourage all UARC members to help recruit new members to the club. You've all heard the old adage that there is safety in numbers. It's true. Our club would be even stronger with more members. Talk it up on the repeaters and with your friends. You don't really want us to have an on-air pledge drive do you? Membership is only about 4 cents per day.

**Ron Speirs, KC7MYS**

Ron has been interested in electrical and electronic topics for most of his life. He is employed as an Electrical Engineer at OEC Medical Systems;

previous to that he was at Evans & Sutherland. Ron has been involved in Amateur Radio for 3 years, and has participated in Field Days, meetings and other activities. He is also interested in photography, and is currently the treasurer of the Photographic Print Society in Salt Lake. He holds a Technician license and is working on code to qualify for more advanced licenses.

**Program Chairperson:**

**Linda Reeder, N7HVF**

I enjoy being on the board because I like helping out the club any that I can. I have enjoyed planning the guests for the meetings and would still be able to help with that. UARC is a great club and I would like to see it continue. I would like to get more people interested in helping out the club. anyway I hope to be ale to stay on the board.

**Sylvia Bernert, KC7KQY**

Sorry, Sylvia had not provided a biographical sketch at press time.

**Jack Warren KC7KEL**

Became a Ham in l995, I have my General Class License. I enjoy being a member of UTAH AMATEUR RADIO CLUB, and serving on the Board. I would be happy to serve another term if the membership would like me to.

**Editor:**

**Bruce Bergen, KI7OM**

A few years ago in a QSO with one of the editors of CQ I was referred to as a "retread" - I was first licensed some 40 years ago and only six years ago "found my way back". I have found my service to the members of UARC to be extremely gratifying and have especially enjoyed editing and producing, what I think, is a quality publication. Of course without the willing contributions made by the many talented members and friends in our area it would not be the publication it is. It is my hope that everyone at sometime will try their hand at writing something about the hobby to share with the rest of us. I am more that willing to help anyone who is willing to give it a try, and if they would like, help put their thoughts into an interesting and understandable form.

Since UARC is intended to be a "general purpose" Amateur Radio Club it is my intention that *The Microvolt* reflect this purpose and provide a forum for ideas and activities of all aspects of Amateur Radio. I hope to provide something of interest for all levels and at the same time challenge your knowledge and thinking.

**Assistant Editor:**

**Steve Perry, KC7IAS (the New N7SWP)**

I am thankful for the opportunity to run for office in UARC. I have been a member longer than I have been a ham and it is about time I give a little time back. It is easy to give 13-15 bucks for dues but time involvement is a better way to contribute to the hobby. I have a lot of respect for Bruce Bergen and look forward to working closer with him. ❑

## Contesting and DXing Taught Here

As the solar cycle improves and Winter approaches many Hams will be looking forward to one of their favorite activities: Contesting and DXing. Would you like to learn what their excitement is all about? Darryl, AF7O and Alan, K7OPT have volunteered to conduct some real life training on several of the upcoming contests. Contact them for arrangements. Daryl at 942-3817 and Alan at 572-8112. ❑

## Club Station Update

If you would like to help with construction of the station, whether to mount antennas, make electrical runs, build furniture, or help with wiring the station itself, contact Alan Seyboldt, K7OPT, at 572-8112.

Alan tells us there is a lot of work yet to be done including:

1.Install connection on Hard line
2.Install Vhf & Uhf antennas
3.Install 50 MHz antenna for Red Cross usage and install their equipment.
4.Test to make sure that their equipment will actually talk to the Red Cross fleet of vehicles. -:)
5.Clean up the Shack (Alan says it looks like his now!)
6.Finally, get a procedure established so that members can use the equipment. ❑

## Those Mysterious Transforms

**Introduction.**

Ham Radio is a great way to penetrate the vast world of electronics, or as I prefer, electrical engineering. It requires some mathematical tools to really conquer. I think one of the best ways to broadly survey electrical engineering is to consider the fascinating topic of transforms. Some readers will already know what I am about to present. But, I hope there will be some folks who will get excited enough to go a bit further. To be sure, more focused articles could be written on several points made below. Anyway, here goes…

**Overview.**

The idea of a transform is to manipulate (or "transform") data from one form of presentation (domain) to another. In doing so the hope is that the new form in the new domain is somehow more friendly to the task at hand. For example, a waveform presented on an oscilloscope plots amplitude against time. We are thinking in the TIME DOMAIN. When we adjust the frequency slightly to improve fidelity of a 20 meter single sideband signal, we are probably thinking in the FREQUENCY DOMAIN. We have had discussions on FM. When we talk about FM limiters that suppress interfering signals, I am considering the TIME DOMAIN. When we talk about the bandwidth of an FM signal I am thinking in the FREQUENCY DOMAIN.

In 1807 Joseph Fourier proposed to the skeptical French Academy that a square wave actually consisted of an infinite number of harmonically related sine waves. They all had a cow (not literally!). But he was right. Hence was born the notion of Fourier series, and the Fourier transform – the granddaddy of all transforms. In 1910, Haar proposed the opposite: that a sine wave could be constructed from an infinite number of orthonormal square waves. Hence was born the beginnings of the Wavelet Transform. Only after considerable evolution (~1980's) has the Wavelet become really useful in digital image processing and data compression. Now it's the rage
.

The Fourier Transform manages to describe signals in terms of "physical" frequencies, whereas the Wavelet Transform takes us to a domain that is a bit abstract. Other transforms are enormously useful (and also a bit abstract), including the Laplace transform, the z transform, the w transform, and the cosine transform. Each one lets the electrical engineer pursue a type of thinking that would otherwise make electronic design more difficult. Following is a short discussion of some important transforms.

**Let's Get to Work…**

**1. Transforming Function.** Sorry for this, but endure the next several sentences – or just skip to the next paragraph. Define a wave form displayed on an oscilloscope (or on a paper sketch of the waveform picture) as a time function, g(t), where g(t) represents the height of the waveform at any time t. Create a second function of both time t and frequency f defined as h(t,f) – the "transforming function." Imagine plotting the two functions g(t) and h(t,f) against time (holding f as an unknown constant), and multiplying their values together at each time and sketching this. Then determine the area under that sketch and draw still another sketch of the result (whew!), and scale it to be "correct." You now have a final function that does not depend on t, but only on f. Call this last function G(f). For you math nerds I have just taken an integral. A compact mathematical expression for the above is (integrated from minus to plus infinity):

$$G(f) = (1/k)\int g(t)h(t,f)dt$$

If this is all done properly you have managed to transform the first waveform g(t) shown on the scope into another "waveform" G(f) that is in some other domain. The hardest part is to decide what transforming function h(t,f) to use.

**2. Fourier Transform.** Joseph Fourier (mentioned above) was clever enough to pick an h(t,f) that transformed the physical time domain into the physical frequency domain. Fourier's h(t,f) is $e^{-j2\pi ft}$. Note that "j" represents the square root of –1 and "e" is that special number used so often in calculus, wherein the value of $e^x$ equals its own slope at x. Electrical engineers use Fourier's invention frequently when they are designing radios and filters, and doing digital image processing.

**3. Laplace Transform.** Sometimes it is difficult to "evaluate the integral" using Fourier's transforming function (i.e., try it out on a step function – it doesn't work!), so there is a trick to embellish it as

$h(t) = e^{-(\sigma+j2\pi f)t}$, where "$\sigma$" is a real number. Usually $(\sigma+j2\pi f)$ is replaced with "s" (so $s = \sigma + j2\pi f$). You now have the Laplace transform. Electrical engineers use this frequently to do analog circuit analysis and feedback control (how about that LO and synthesizer in your rig). Otherwise, one would have to use complex integrations and differentiations instead of simpler algebra and Ohm's law.

**4. z Transform.** Much of modern technology uses computers. Computers are digital , not analog (at least to a first order approximation!). Digital signals are often sampled from the analog world, meaning that there is a "sample time delay" from one sample to the next. Laplace analysis does not handle this problem very well, except it turns out that a "pure delay" of time, T, does have a Laplace transform of $e^{-sT}$. Thus, define $z = e^{sT}$ (and therefore $z^{-1} = e^{-sT}$). Therefore, a signal x(t) multiplied by $z^{-1}$ in its transformed domain represents x(t-T) in the time domain, a very useful notion (if you know what to do with it!). You now have a tool that electrical engineers use when processing data from the real world inside a computer (digital signal processing).

**5. w Transform.** I mostly mention this to emphasize that z transforms can be used for feedback control when a computer is in the loop. The w transform provides a "sampling correction" to the z transform -- kind of an offshoot. (And, the z transform is an offshoot of the Laplace transform, which evolved from the Fourier transform – interesting…) Engineers can use z and w transforms to design effective digital feedback controllers and servos (yes, usually better that using fuzzy logic!).

**6. Cosine Transform.** This transform uses a cosine term (not surprisingly) as the transforming function h(t,f). It is used for compression of large amounts of digital data, so that they can be stored or transmitted more efficiently (and less expensively). This transform is less calculation intensive than the Fourier transform, and so it can be made to execute in real time (instead of post processing when there is lots of data). Engineers use this for digital image processing applications.

**7. Wavelet Transform.** Like I said earlier, this fad is in! There are actually a variety of transforming functions, h(t,f). Some are really clever but strange looking (Ingred Daubechies – 1980's), and some are fairly standard (like a Gaussian bell curve first used for wavelets in the 1940's). They are variously "tuned" to achieve the objective of the engineer. They are pretty slick for data compression and even spatial filtering of a digital image.

73, Steve Curtis, AB7LF

Editors Note: I have been driven, since accepting the job as *The Microvolt* Editor, to provide a high quality club publication which both entertains, informs and educates on a broad range of subjects relating to Amateur Radio. I realize that Steve's short presentation on transforms may well be beyond the present understanding of many readers but I hope it will stimulate some to stretch a little and others to experience that "aha, so that's what that's all about" feeling. I hope this removes some of the mystery from the subject of transforms and how it might be applied in Ham Radio in DSP filters and other similar applications. For those who might count themselves among the "mathematically challenged", perhaps this will spur some questions which Steve can either shed some further light upon in a follow-up article or (heaven forbid) confuse you even more. ❑

## NC7J Utah DX Packet Cluster

**What is a DX Packet Cluster?**

A Packet Cluster system or network starts when one physical station is set up with Packet Cluster Software and is linked to one or more stations who have installed Packet Cluster Software. These Packet Cluster nodes when 'connected' (via packet radio or the Internet) make up a DX Packet Cluster Network... Clusters are connected to Clusters, expanding the network to a large geographical region. The Utah DX Packet Cluster is one of the nodes which makes up part of the West Coast Packet Cluster Network. (25 to 50 nodes with 200 to 450 users all connected in one cluster network). Individual users (you) connect to a local node via a packet radio or via the Internet. Once connected, you are capable of announcing DX spots about DX stations that you are hearing on any of the amateur frequencies. These 'announcements' that you 'spot' as you hear DX stations are echoed within seconds to all of the other users that are connected to the network. This alerts all of the other stations that are connected to the fact that you can hear a specific DX station on a certain frequency. You, in turn, as a station connected to the network get all of the other stations announcements or "spots" regarding the DX stations that they are hearing. A data base is kept on the local Packet Cluster node that can also be queried to find out what DX stations have been active. You

can leave Mail messages for the other local or remote users on the network, chat with other connected stations, retrieve DX related information, look at data regarding current solar conditions, etc, etc, etc!!! There are many more features that will help you find and confirm DX. If you are interested in DX contacts on the HF bands or DX grid square contacts above 30MHz, keep reading! You will find that the Utah DX Packet Cluster will be very valuable tool.

**Tell me more! How do I connect to the NC7J Utah DX Packet Cluster?**

You can connect to the Utah DX Packet Cluster via packet radio or via a telnet session over the Internet.

**Packet Radio Connections:**

The Utah DX Packet Cluster node is located in Clearfield Utah. You can connect via 1200 baud packet radio directly on 144.95MHz. The direct connection coverage, covers from South of Clearfield down into the Bountiful area, with moderate coverage up into the Ogden area. To connect to the cluster direct on 144.95MHz, simply tell your TNC to connect to NC7J. Assuming you can hear the cluster on 144.95MHz and you have a good enough signal to stay connected.

So how do I connect via packet radio if I live outside of the coverage of the 1200 baud port at the cluster site on 144.95MHz? Don't despair! You can still connect to the cluster using the excellent Netrom node network that has been put in place up and down the Wasatch Front. Most stations in the Salt Lake City area will want to connect to the **SLC5** node on 145.05MHz. Stations in the Bountiful and Layton area can connect to the **DAV** node on 145.07MHz. If you are located up in the Ogden area you will find that connecting to the **DELLE** node on 145.09MHz will do the trick. These nodes have very wide coverage and even give coverage down into the Utah County area and also up to the Brigham City area (and who knows where else), check and use the best node for your area. Talk to a local packet radio guru if you have questions about connecting to one of the Netrom nodes, there are other Netrom nodes that will allow connections to the Utah DX Packet Cluster. When you connect to a node, issue a node list with the 'n' command. If you see **UTDXC** listed, you should be able to connect. (The connection speed will vary with the number of hops into the cluster)

Once you have connected to a Netrom node like **DELLE, DAV** or **SLC5,** you then simply need to connect to **UTDXC** (Utah DX Cluster). This will connect you in over a 9600 baud link direct to the cluster from any of the above nodes that were mentioned.

**Internet Connections:**

To connect to the cluster via the Internet you need to telnet to port 8000 at nc7j.qrq.com. **What the heck does that mean?** If you are running Windows 95 and, you have a connection to the Internet, you are only a few steps away from connecting to the cluster. Any computer that can access the Internet should be able to connect, talk to a local Internet guru if you have questions, they should understand how to set you up to telnet to nc7j.qrq.com on port 8000.

To connect using Windows 95 you need to run the 'telnet' program that will get installed once you have a Internet connection.

1- Select 'Start->Run' from the Start button in Windows 95.

2- Type "telnet" into the open dialog and press the OK button, this will run the Windows 95 telnet client. (You should now see it running on your screen)

3- Now that you have the telnet client running, select the 'Terminal->Preferences' menu option and make sure that the 'local echo' option is turned ON and click OK (you only need to do this once).

4- Select the 'Connect->Remote System...' option from the menu and type 'nc7j.qrq.com' into the 'host name' and type '8000' into the port (replacing the word 'telnet') and then press the Connect Button.

Assuming you already have a connection to the Internet, you will then connect direct to the Utah DX Cluster! You will need to login with your callsign and then select and verify a password that you must remember each and every time you connect to the cluster via a telnet session on the Internet.

**Where do I go from here?**

The first thing you should do after connecting to the cluster is type ‘help' at the cluster prompt! Play around with the different commands and then take a look at the NC7J DX Cluster Web Site: http://nc7j.qrq.com . This web site has links to the latest Packet Cluster USER Manual at:

http://www.lurpac.lancs.ac.uk/g0vgs/user/usrman402.html

Questions about the Utah DX Packet Cluster can be addressed to Max George, NG7M, Email: ng7m@qrq.com or Jim Lawrence, W7CT, Email: w7ct@qrq.com.

We hope you enjoy the cluster, it has and continues to be a very rewarding project.

Best Regards and good DX,
de Matt - NG7M and Jim - W7CT ❑

## December Meeting: Elections and 1999 Plans

We don't have a big-name speaker to announce for the December meeting, but it's really one of the most important meetings of the year. *You* get to supply the program as well as the agenda for the coming year! Come to think of it, that is a big name!

The December UARC meeting will be held on Thursday, December 3, 1998, at 7:30 p.m. The program will include a final chance for nominations, elections for 1999 officers, and a discussion of where the club should be going and what it should be doing for the coming year.

Last month, there were two chances for members to nominate candidates for office: one before the presentation of the nominating committee's choices, and another afterward. In December, there will be yet a third chance, just before the election itself.

Here are the current nominees (listed alphabetically by last name for each office):

President:
- Gary Openshaw, KC7AWU
- Linda Reeder, N7HVF

Executive Vice-President:
- Maurine Strektenfinger, KC7HOZ

Vice-President:
- *Gordon Smith, K7HFV

Secretary:
- *Russ Smith, KC7ZDZ

Treasurer:
- *Chuck Johnson, WA7JOS
- Ron Speirs, KC7MYS

Program Chairpersons (vote for two):
- *Linda Reeder, N7HVF
- Sylvia Bernert KC7KQY
- *Jack Warren, KC7KEL

*Microvolt* Editor:
- *Bruce Bergen, KI7OM

Assistant Editor:
- Steve Perry, KC7IAS

*Incumbent

The discussion about next year will give everyone a chance to express their own ideas about where the club should be headed. What do you think the club should be doing next year? What kind of programs would you like to see? Now that our club station is operational, how can we manage it so it does the most good for our members and still meets our obligations to the Red Cross? Where should Field Day be held? Who would be willing to be Field Day chairman?

These are the kinds of questions you might want to consider so you can express your opinion and tell the new officers where you can offer help.

The author (K7HFV) can't resist the chance for a brief editorial comment here. It may be tempting to recommend that the club supply a new DSP radio for each member during 1999 or offer private tutoring for each member toward the Extra Class license. Before you make a request, consider one thing: the scarce resource in the club is not ideas for new beneficial services, it is people with the time and ambition to bring them to fruition. If you have an idea for something new and you are willing to spearhead the idea and do the work of organizing the effort to make it happen, your suggestion may well be received with open arms. However, if you are just suggesting something you would like other members to do for you, and you have no intention of contributing anything to the effort, it may be much harder to see it become reality. The way to get the most out of your membership is not to sit back and see what the club will do for you; it is, rather, to work with others to make things happen.

There are lots of areas where some would like to see "the club" do more, but which are neglected for lack of volunteers. Included would be public relations (for example, issuing press releases for Field Day and notable public service events), wider coverage of ham events in *The Microvolt* and the web site, more licensing instruction classes (including ones for General, Advanced and Extra), a more exotic repeater directory on our web site, a state map showing

coverage of all the repeaters, and more software (for example, CW teaching programs) available n the web site. With a little reflection, even if you don't want to run for an office, maybe you can see an area where you could contribute.

We hope 1999 will be a bright year for UARC. Bring all your ideas to the meeting. Of course, as with any UARC meeting, there will be a chance to check out the latest book offerings from ARRL and to match up faces with the voices you've been hearing on the bands. Don't miss it!

Gordon, K7HFV ❑

## Editorial

I was first licensed in 1958 and became re-licensed only 6 years ago for what were probably some the same reasons many of you initially became amateur radio operators. I have enjoyed, and continue to enjoy, the opportunity to serve you and others as members of the Utah Amateur Radio Club.

I have several concerns that I would like to share with you, the members of UARC.

First, it seems that whether it is helping with Field Day, the Steak Fry, or the Club Station, the same small group generally volunteer, or show up to help. It is understandable that you can't be involved in every activity or project, but there is always something that you can help with even if it is just bringing cold soft drinks to those pulling coax at the club station or assisting in the teaching of a class. There have been members who have treated UARC like a utility and seemed to figure that the dues entitled them to a range of services without apparently ever thinking that being a member is instead an opportunity to be involved as volunteers in a broad range of projects or services. The advantage of being an actively involved member is that you get back many fold what you put into it, and with a lot of us helping a little, a lot gets done.

A second concern has to do with a major feature of amateur radio, as indicated in Part 97, the *Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art*. In order to contribute to the radio art, all of us need to extend our knowledge and abilities. If you entered the hobby initially as a means of providing a family intercom, or as a cheap (?) substitute for cell phones, we sincerely hope that your horizons have since been broadened and your eyes opened. It is my intention, as your Editor, in perhaps some small ways, to broaden these horizons, by occasionally providing some challenging concepts in the pages of this newsletter. So if you were wondering what transforms have to do with Ham Radio perhaps you might want to go back and reread Steve's excellent piece on this subject. The answer to this question though is "more and more".

73 - Bruce, KI7OM ❑

## New ARRL Site Provides Youth With a Place to Meet

A new page on ARRLWeb aims to take advantage of youth interests in computers and the Internet to offer younger hams a place to get together online to arrange on-the-air schedules. Amateur Radio youth groups can just visit the Youth Skeds Database at http://www.arrl.org/ead/youthskeds/ and make skeds with other schools or young people's groups. The ARRL Educational Activities Department credits Phil Downes, N1IFP, for coming up with the idea. Regardless of age, grade level, school or group affiliation, youngsters worldwide can register at this site. This adds them to the list of groups wishing to get acquainted with others via Amateur Radio.

"The purpose of this particular ARRL Web page is to answer a growing need, thanks to the wide Amateur Radio interest on the Internet," said ARRL Educational Activities Correspondent Dan Miller, K3UFG. "This is a meeting place for youth groups wishing to interact, and contact each other via Amateur Radio. This can be schools at any level, or scouts, or CAP, or any youth auxiliary club."

At the Youth Skeds home page, entering a state (without entering a city) makes it possible to scan a statewide list of groups who have registered. Or you can pinpoint an area by entering a city and state.

"This is a brand new service of the ARRL and is available to all Amateur Radio youth groups, whether they are affiliated with the ARRL or not," Miller said. "Of course, becoming affiliated would provide additional benefits, but the decision is theirs."

Miller says he'll be happy to provide additional information. Call him at 860-594-0340; e-mail dmiller@arrl.org ❑.

## Examination Schedule for December

12/05/97 (Sat.) Salt Lake City
Gordon Smith, K7HFV
Phone H 582-2438 B 534-8116

12/16/98 (Wed.) Provo
Contact: Steve Whitehead, NV7V
Phone: H 4653983 B 2255200

For more detail either call the contact or checkout the information on our webpage
http://www.xmission.com/~uarc ❑

## Wanted: RF Engineer

Get paid for doing what you enjoy doing as a hobby. Marshall Radio Telemetry, Inc. is looking for an engineer who will help us develop new receivers, antennas, and transmitters. Professional experience is desirable but not required if you have extensive experience building and working with amateur radio equipment. We are offering a full-time position but will also consider part-time.

Our products are used world-wide to track animals in the wild. An animal carrying one of our miniature VHF transmitters can be located by our hand-held receiver with a yagi using techniques that hams use in fox hunts. We have numerous applications for our products and are looking for a motivated, can-do individual with good people skills. We offer benefits and a casual work environment. We have facilities in Logan, Utah with other offices in Malad, Idaho. If you are qualified and live in the Salt Lake area we can probably work something out. Please send your resume to:

Attn: David Marshall, AA7SM
530 Deep Creek Road, Malad, ID 83252
fax (208) 766-9999
e-mail: lisa@marshallradio.com ❑

## General Class Upgrade Course

UARC is planning a class, to begin in February, for those wishing to upgrade to General Class License. We expect all participants to hold a Technician Plus License and be able to send and receive code at a rate of at least 5 wpm. To properly plan the class now, we need to determine the level of interest. If you are interested please contact Gary Openshaw at 484-3407. If you get the answering machine leave your name and telephone number.

Gary, KC7AWU ❑

## *The Microvolt* Advertisement Fee Schedule and Policy

November 12, 1998

UARC policy will follow closely that of the various On-the-Air Swap Nets with the notable exception that *The Microvolt* can accept and run commercial ads. The UARC Advertisement Policy for *The Microvolt* is that commercial ads related to Amateur Radio will require the Editor's approval and will be run on a space available basis and will require the fee listed below. Non-commercial ads from either members, or others in the inter-mountain area, with For Sale or Want Ads for Amateur Radio or Amateur Radio related items, will be run without charge as long as they stay within reason. For an estate sale, of a silent key's radio equipment, a short summary list is acceptable.

Published Ads will follow the same *Microvolt* layout conventions as used with featured article text, namely 12 point Times New Roman font, block format, no paragraph indentations, single spaced paragraphs with double spacing separating paragraphs. Photographs of publication quality and camera ready copy will be accepted as well as most electronic graphical formats. For more detail on preferred and acceptable formats for submission of ads please contact the Editor.

**Commercial Advertisement Fee Schedule**

For "camera ready" or electronic copy per issue:

Full Page (8 ½" x 11") - $80
Half Page (4" x 11" or 5 ½ x 8 ½" ) - $50
Quarter Page ( 4" x 5 ½") - $35
Business Card (4" x 2") - $25

Non-camera ready and non-electronic copy will have a negotiated adder to the above fee.

Bruce Bergen, KI7OM
Editor, *The Microvolt* ❑