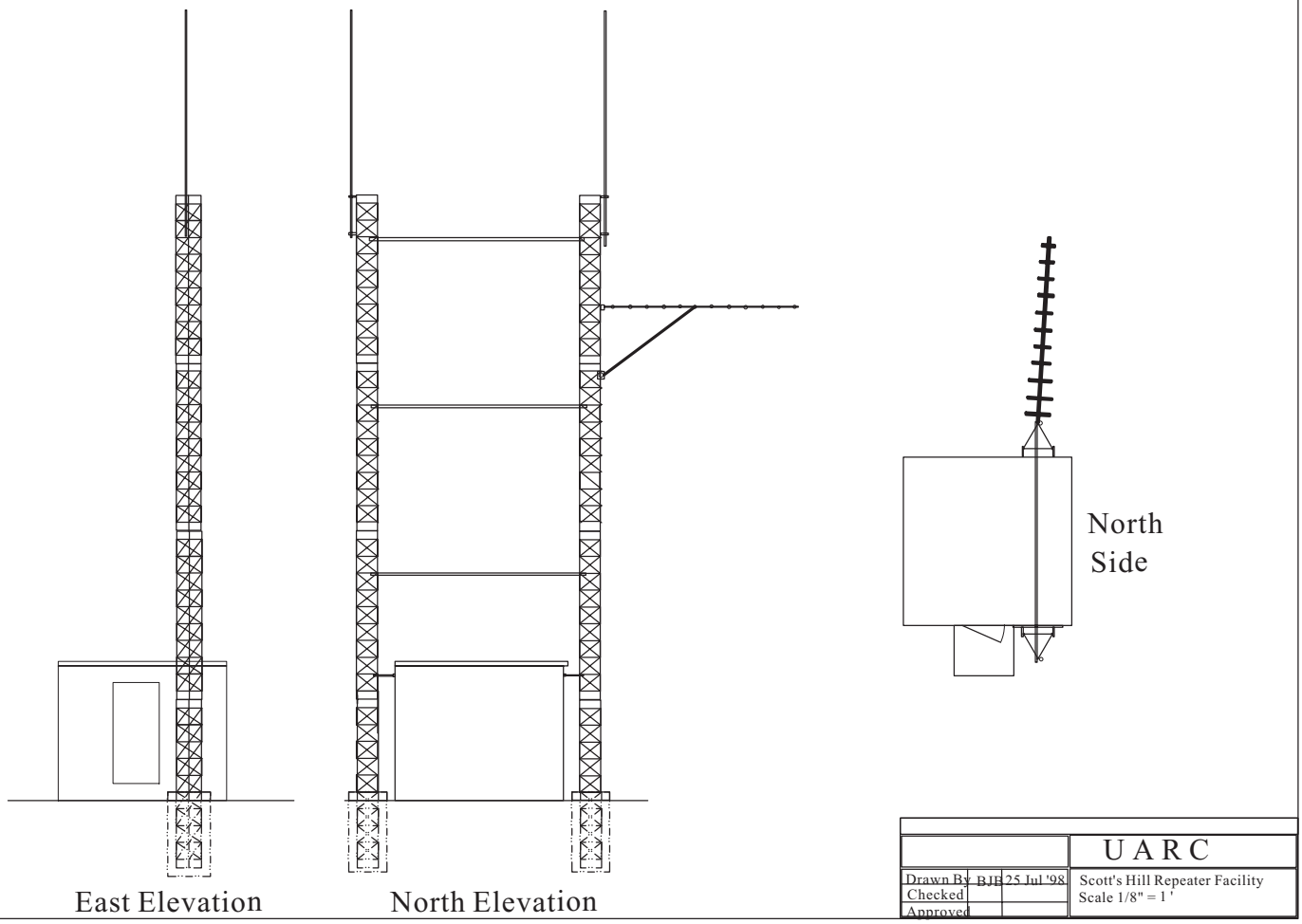
UARC Scott's Hill Repeater Facility



A drawing of the proposed improvements to the building recently acquired by UARC. Located at the 10,000 foot level on the Wasatch Crest between Brighton and Park City the plan is to install a Synchronous and Voting Repeater System linked to our repeater on Farnsworth Peak.

Volume XLII Issue 8, September 1998

The MICROVOLT

Periodicals Postage Paid

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Salt Lake City, UT 84106

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THE MICROVOLT (USPS 075-430) is published monthly except August for $15.00 per year or $1.50 per issue by the Utah Amateur Radio Club, 632 University St. Salt Lake City, UT 84102.
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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

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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 ❑

The Microvolt

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

Volume XLII, Issue 8 September 1998

Photo: Bruce Bergen, KI7OM

QST from the Prez

Yes, *The Microvolt* is back! That must mean summer is almost over and contest season is back. Quite a bit has happened in amateur radio this summer. UARC has secured a building in the Wasatch Mountains for a new repeater system. The club station at the Red Cross has coax runs and conduit. The steak fry is over (quite a success, I might add). Oh yes, there was also this little thing about totally changing amateur radio's licenses as we know it.

As I was contemplating the proposed license restructuring put forth by the ARRL, my thoughts went to the average person that gets involved in amateur radio these days. The statistics show that most new hams are technician class hams. As we all know, that means they are so-called "No-Code" hams. Listening to the repeaters, I think some members of the club might think these people are something less than "real" hams because they did not take a code test. *Personally, this is a bunch of bunk*! According to the FCC, the definition of a "real" ham is someone with a license. My definition is someone that participates in the ham community in some way other than using the repeaters as a convenient way to keep in touch. Not that there is anything wrong with using a repeater to keep in touch, but there is so much more. As you all know, ham radio is a volunteer endeavor in all aspects. Without people willing to help out, everything **stops**! So, the next time you hear someone bad-mouthing a No-Code Tech, maybe you should find out what that person has done to help out the local ham radio community. Of course, I advocate annual re-testing for all license classes (including the code test) for everyone that complains about no-code techs.

The club station project is running along quite well. As I am writing this, the station has conduit up the side of the building, 6 runs of hard-line in the building, and a giant electrical box for the lightening protection system for the antennas. The antennas on the roof are the next thing to be done. There have been about three work parties with about 10 people at the first one, one person at the next one (me), and four people at the next one. We could use a bit more help. If you are interested in helping with any UARC project, PLEASE call us. We need to know if we can call on you to help out with enough notice. We really do not want to call each club member to beg for help. With a club of 500+ members, we should have at least 20 people at each work party without even trying.

Well, that is it for me this month. As we start off the new club season, things will go along quickly. Before you know it, it will be time to select a new batch of officers. *Anyone interested in one particular position I am thinking of?* See you all at the club meetings and enjoy!

Best regards,

Tom Schaefer, NY4I (Class A license holder) □

QTX from the SM

To one and all Utah Amateurs. Please read this ARRL proposal and forward your comments to me. I will be more than glad to hear what you have to say, and also to make your opinions known to our Division Director; Marshall Quiat; AG0X. I want to hear what you have to say about this! We are all in some way concerned about the future of ham radio in our country. This is your chance to make a difference.

vy 73 de Jim - NZ7T

Please respond to NZ7T@ARRL.ORG

ARRL Proposes Simplified Amateur License Structure

The ARRL Board has agreed to propose a simplified Amateur Radio licensing structure with four classes. Lengthy discussion and debate during the Board's meeting July 16-18 led to majority support for a plan for four written examination elements to establish amateurs' operational and technical qualifications instead of the present five, and two Morse code examination elements instead of the present three.

Under the plan adopted by the Board, the entry level to Amateur Radio would be known as Class D and would convey the privileges of the present Technician license. The written examination would be at the same level of difficulty as that of the present Technician examination, but consistent with the privileges of the license. All amateurs now licensed as Technicians would become Class D.

The next step would be known as Class C and would convey the privileges of the present General license, but with phone subbands expanded by 50 kHz on 75 and 15 meters and by 25 kHz on 40 meters. Class C would be the entry level to high frequency (HF) operating privileges. To upgrade from Class D to Class C, an amateur would pass a written examination on the operational and technical qualifications required for HF operation and a 5 word per minute Morse code examination. All amateurs now licensed as General, Technician Plus, and Novice would become Class C. The expansion of the telephony sub-bands would result from "refarming" of the Novice CW bands that are no longer required for their original purpose.

The third step would be known as Class B and would convey the privileges of the present Advanced license, but with phone subands expanded by 50 kHz on 75 and 15 meters and by 25 kHz on 40 meters. To upgrade from Class C to Class B, an amateur would pass a more advanced written examination similar in difficulty to the present Element 4A and a 12 word per minute Morse code examination. All amateurs now licensed as Advanced would become Class B.

The final step would be known as Class A and would convey the full privileges of the present Amateur Extra Class, with telephony sub-bands expanded by 50 kHz on 75 and 15 meters and by 25 kHz on 40 meters. To upgrade from Class B to Class A, an amateur would be required to pass the most difficult written examination in the sequence. Consistent with the practice in many other countries, no additional Morse code examination would be required beyond 12 words per minute. All amateurs presently licensed as Amateur Extra Class would become Class A.

In their discussions, Board members emphasized that the objective is to rationalize and simplify the amateur licensing structure without reducing the requirements for any class of license. Where reductions in Morse code requirements are proposed, there would be a corresponding increase in written examination standards. On the other hand, Board members were adamant that simplifying the structure should not come at the expense of privileges already earned by amateurs. Therefore, present Novice and Technician Plus licensees, having earned entry-level HF operating privileges, would be granted the new entry-level HF license.

Adoption of the simplification plan marks the culmination of 30 months of work by the Board, during which time the input of literally thousands of ARRL members and other amateurs and prospective amateurs was considered. The Board debated a wide variety of options including both smaller and larger numbers of license classes, higher and lower qualification levels, and different privileges. Nine of the 15 Directors voted in favor of the plan, with six opposed. Following the meeting ARRL President Rod Stafford, W6ROD, observed, "The debate was at times contentious and the result was not unanimous.

Some Board members preferred greater simplification; others were uncomfortable with some of the changes being proposed. However, every Board member, without exception, left the meeting knowing that each of his or her colleagues did what they believe is best for the future of Amateur Radio."

Members are urged to contact their ARRL directors to comment on this proposal. E-mail addresses are on page 10 of any issue of QST. Members also may comment on the proposal via the ARRLWeb site, http://www.arrl.org or via e-mail at restrux@arrl.org.

Feel free to write the Utah Section Manager;
Jim Rudnicki; NZ7T at NZ7T@ARRL.ORG.

ARES Wilderness Protocol Test

On Saturday, September 5th, Utah ARES will be conducting a statewide demonstration of the VHF Wilderness Protocol.

Simply put, the wilderness Protocol is a suggestion that those outside repeater range should monitor standard simplex channels at specific times in case other hams have priority calls. This system was conceived to facilitate communications between hams that were hiking or backpacking in uninhabited areas, outside of repeater range. However, the wilderness protocol should not be viewed as something just for hikers. It can (and should) be used by everyone anywhere repeater coverage is unavailable. The protocol only becomes effective when many people use it.

It's simple, really!

Here's how the exercise will work: On Saturday, September 5th, ARES personnel will be monitoring 146.52 Simplex from area EOC's and from the top of select mountain peaks. All amateurs are invited to check in during the first 5 minutes of the hour at 0700, 1000, 1300, and 1600 local time. Please give your location, and if you are camping or hiking, the number of people in your party.

If you would like to learn more about the Wilderness Protocol, consult your ARRL Repeater Directory.

73 es hope to hear you on September 5th.

Jim Rudnicki, NZ7T
ARRL Utah Section Manager, (801)250-0835 ❑

Featured Member Of The Month

Photo: Bruce Bergen, KI7OM

This month we are featuring Eugene Christensen, KC7CSE, who has been licensed for 4 years. However, his interest in amateur radio dates back to 1935, when as an SWL, he bought a Hallicrafters catalogue. It seems he wanted to know if 600 dollars would get him a transmitter and also if he could get a top quality receiver for 150 dollars. He can't remember what type of receiver he had but he does recall that he had a random wire antenna up in a tree. He did not take it to the next step and get his license, but his interest in Ham Radio was kindled.

It wasn't until years later when, thoroughly disgusted with the problems on citizens band radio, and a growing feeling that there had to be a better way to communicate, that he finally did something about getting his license. He signed up for Jerry Bennion, WR7N's, class at Granite Community School. The class was a 6-week course held for two hours on Thursday evenings. Eugene states they would have code practice for 20 minutes at the beginning of each class. During the rest of the week he studied the Gordon West tapes. At the beginning of one fateful evening's class Jerry announced that, at the end of the class, there would be a 5 word per minute code test. Eugene was the only one out of 15 students who passed the test. He was so happy he couldn't believe

that he had passed, but indeed he did receive his Technician Plus license in June of 1994. His goal is to become a good operator and he hopes to get his extra class license.

Eugene is very active in scouting. He was instrumental, last May, in organizing and coordinating the successful UARC participation in the Great Salt Lake Council's Scout-O-Rama.. There were five operating stations set up including HF, packet, VHF and satellite operations. He is also currently active in, and a member of UARC, ARES and MARA.

He said that too many people use the hobby as a one way arrangement. The country issues a license to amateur radio operators, and the license provides privileges, but not rights. We should be willing to give back to the country whether it be preparing for and assisting in emergencies or helping others to obtain their own license, allowing them to be of similar service.

We need to become more familiar with part 97 of the FCC Rules and Regulations, which are the rules for amateur radio. If Congress and the citizens of the country are not convinced that amateur radio is providing a public service, amateur radio could be eliminated as a licensed service in the name of a balanced federal budget. Eugene feels that he can already see this weakening of support. Our frequency spectrum is constantly being threatened, primarily by big money interests. He states that the only way that this can be avoided is if everyone would give something back by using these privileges in service to the country and the community.

Eugene is involved in a morse code net every Tuesday and Saturday nights at 9 P.M,. on 28.110 MHz, to which everyone is welcome.

Eugene, thanks for your contributions to amateur radio.

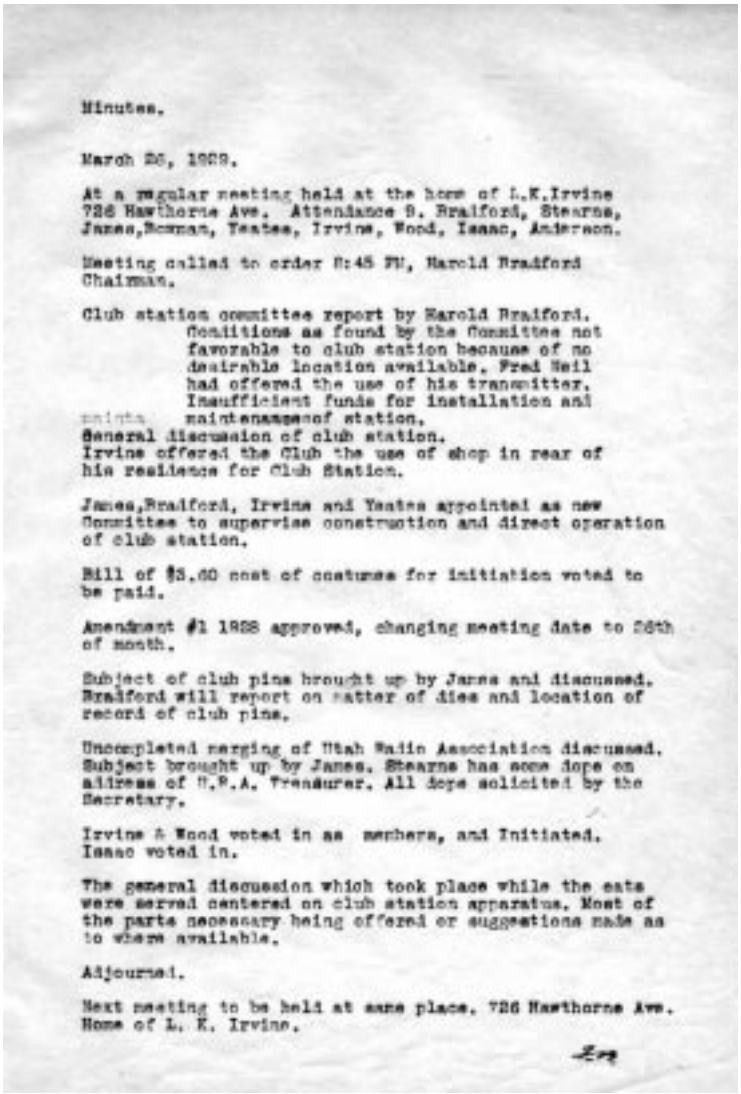
73 N7HVF Linda Reeder ❑

A Blast from the Past

Hello to all,

These minutes from March of 1929 seem to continue the discussion about the how and where of a club station. It seems that an initiation was an integral part of becoming a member. One wonders what kind of costumes, mentioned here, were used in this ceremony. The imagination runs wild with the possibilities. It seems that the completion of the Utah Radio Association merger with the Utah Amateur Radio Club was held up by the lack of "dope" on the address of it's former treasurer. Stay tuned and we'll see if he is found or has absconded with the treasury and taken up residence in South America.

Alan, K7OPT ❑



Minutes.

March 26, 1929.

At a regular meeting held at the home of L.K.Irvine 726 Hawthorne Ave. Attendance B. Braiford, Stearns, James,Bowman, Yeates, Irvine, Wood, Isaac, Anderson.

Meeting called to order 8:45 PM, Harold Braiford Chairman.

Club station committee report by Harold Braiford. Conditions as found by the Committee not favorable to club station because of no desirable location available. Fred Neil had offered the use of his transmitter. Insufficient funds for installation and maintenanceof station.
General discussion of club station.
Irvine offered the Club the use of shop in rear of his residence for Club Station.

James,Braiford, Irvine and Yeates appointed as new Committee to supervise construction and direct operation of club station.

Bill of $3.60 cost of costumes for initiation voted to be paid.

Amendment #1 1928 approved, changing meeting date to 26th of month.

Subject of club pins brought up by James and discussed. Braiford will report on matter of dies and location of record of club pins.

Uncompleted merging of Utah Radio Association discussed. Subject brought up by James. Stearns has some dope on address of U.R.A. Treasurer. All dope solicited by the Secretary.

Irvine & Wood voted in as members, and Initiated. Isaac voted in.

The general discussion which took place while the eats were served centered on club station apparatus. Most of the parts necessary being offered or suggestions made as to where available.

Adjourned.

Next meeting to be held at same place, 726 Hawthorne Ave. Home of L. K. Irvine.

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. If no one answers leave your name, telephone number and a short message on the answering machine and your call will be returned.

Gary, KC7AWU ❑

Photo: Bruce Bergen, KI7OM

The Scott's Hill Electronics site. The UARC building, behind and to the left of the power pole, still has the generator annex attached

Scott's Hill is Revived

It is official -UARC has obtained permission to use another mountaintop site about 20 miles southeast of Salt Lake City! This site, at about 10,000 feet elevation, near Scott's Peak in the Wasatch Mountain Range, will provide coverage into southeast Wyoming and northeastern Utah.

In case you might be wondering why no one has talked about the Scott's Hill Project since January of this year, let me shed some light on the issue. Although the project was considered dead at the beginning of the year, several factors have played in our favor in the ensuing months but there have been a number of interests which potentially could have derailed our request had they been aware of our efforts. It became apparent to the Project Chairman, Bruce Bergen, KI7OM, that negotiations with the Forest Service needed to be carried out quietly, keeping the board and a few selected others informed of problems and progress. A full report to the UARC membership will be made on how this has all taken place and believe me there are some interesting stories to be told.

UARC is proposing to implement a linked repeater system to increase coverage of the 146.62 repeater. The other end of this link will be located on Scott's Hill.

This site can see northeast into Wyoming, to the east into the Uinta mountains, and southeast toward Duchesne. This will provide coverage into Evanston, Heber, Park City, and many of the other high-valley communities in northeastern Utah. It should also provide better coverage into Cache valley than the current Farnsworth Peak site can.

Photo: Bruce Bergen, KI7OM

The entire Scott's hill complex, from about a mile south of the site. The building is just visible -in the center and above a tree.

The site (on Scott's hill, which is west and north of Guardsman Pass) consists of a cinder-block and concrete-slab building that has been abandoned for 20-plus years. The first order of business is to secure the building and perform repairs and aesthetic improvements. This work has already begun and will continue throughout the balance of the Summer and into the Autumn. Only preliminary planning has been done to date and, as the certainty of being able to secure this site was, until recently, in great doubt, we have not made plans to install very much equipment on-site this year.

One of the first orders of business was to remove the wooden structure on the side of the building This was formerly a shack housing a generator for emergency power but had become just an eyesore. Its demolition has been accomplished by a workparty (I won't put the list here because I'm sure that I'll forget

Photo: Bruce Bergen, KI7OM

Photo: Clint Turner, KA7OEI

Before and After pictures of the building. The picture on the right shows the old generator annex having been removed and the access hole having been blocked up. (The mortar is still wet!)

someone...) on August 1, as was the removal of the existing poles, closing of the generator access hole with masonry, cleaning up of the building interior, patching a myriad of old electrical and bolt penetrations and years of weathering, and finally the eviction of a family of ground squirrels. The interior of the building was sprayed down with bleach and cleaned, and the rubble and trash on the site was removed. The building is now secure with our own

Photo: Clint Turner, KA7OEI

Ron Jones, K7RJ, wields a crowbar, making fast work of what turned out to be a relatively well built shelter.

Photo: Clint Turner, KA7OEI

Ron Spiers, KC7MYS, pries loose a board while Chuck Johnson, WA7JOS, works on removing an old meter base inside the shack.

lock on the door We will require a higher security locking system as we begin to install our own equipment in the building. An improved grounding system needs to be installed, and the roof needs to be re-covered. The building and the door need to be painted to protect them from the elements and to improve the aesthetics of the site in general. The painting is planned for sometime near August 15.

The electrical service in the building will need to be in part redone and improved. Finally, the interior of the building might need to be insulated in order to provide some degree of buffering of the temperatures and reduce the likelihood of condensation accumulating on the walls and ceiling.

Plans call for the installation of two towers of four sections of Rohn 55G linked together with Unistrut to provide mounting platforms for the needed antennas.

This repeater will be linked to the 146.62 repeater on Farnsworth Peak and will also be on 146.62. To find out how this synchronous and voting system will work see the article "*The proposed UARC Synchronous and Voting linked repeater system*" on page 9.

Photo: Clint Turner, KA7OEI

Bruce Bergen, KI7OM, wears his bib overalls in the tradition of his father, D. J. Bergen.

If you are interested in helping with this project, please contact the Utah Amateur Radio Club (UARC) Scott's Hill project coordinator, Bruce Bergen, KI7OM, at (801)943-1365 or send him email at bbergen@xmission.com.

Clint, KA7OEI ❑

The Proposed UARC Synchronous and Voting Linked Repeater System

UARC, the Utah Amateur Radio Club, is proposing to implement a linked repeater system to increase coverage of the 146.62 repeater. The existing repeater is on Farnsworth Peak, about 18 miles southwest of downtown Salt Lake City. Currently, this repeater covers down south to Nephi, to the west, well past Wendover, Nevada, and to the north, well into southern Idaho. To the east, however, coverage is severely limited.

Farnsworth Peak is in the Oquirrh (pronounced "Oh-Kerr") mountain range -a range of mountains with peaks mostly in the 9000 foot elevation range. The Wasatch mountain range, along the east side of the Salt Lake valley, has many peaks that are over 11,000 feet. It severely limits coverage to the east for a repeater located on the Oquirrh range.

There are already several repeaters in the Wasatch range. One of these is the 147.18 repeater, which has been atop the Snowbird Ski Resort tram (at 11,000 feet) for over twenty years. This repeater has proven its worth in its ability to cover the high-valley communities to the east reliably over the years.

When the opportunity arose for UARC to be able to obtain permission to place a repeater in the Wasatch range as well, we jumped at it. After considerable red tape, UARC has finally gotten the go-ahead to begin work.

The site (on Scott's hill, which is west and north of Guardsman Pass) consists of a building, that has been abandoned for 20-plus years nestled among several other buildings. The first order of business is to secure the building, perform repairs and aesthetic improvements. This work is expected to begin within a few weeks. Only preliminary planning has been done to date and, as the certainty of being able to secure this site was, until recently, in great doubt, we have not made plans to install very much equipment on-site this year.

But we have done enough preliminary planning to now have a general idea of how the system will work.

What is a synchronous repeater? or
"How can two repeaters operate on the same frequency and not clobber each other?"

One of the advantages of FM (Frequency Modulation) over other modes is that, in the presence of two signals of different strengths, the stronger of the two will override the other without much deterioration of the stronger. This is quite unlike AM where even a very weak signal will result in a heterodyne (a tone) that may be annoying. Signals that are of roughly equal strength, however, will destructively combine, resulting in garbage, and neither signal can be copied.

Why, then, would we purposely put two repeaters on the same frequency?

First, I'll point out that the coverage areas of the existing Farnsworth '62 repeater and Scott's hill do not overlap very much: Farnsworth cannot cover east into the Wasatch range very well, and Scotts, being behind the front range of mountains, does not have a view of the Salt Lake and Utah valleys. On this basis alone one could operate two repeaters on the same frequency -with the Scott's Hill repeater having antennas that direct eastward -and get away with it. There are certain places where coverage overlaps (up the canyons adjacent to the Salt Lake valley, in the Cache valley, and a few other points, primarily to the north.)

In these overlap areas, then, how do we prevent destructive interference?

The destructive interference between two FM signals (often called doubling) is a result of the two signals randomly adding and canceling each other out as they are modulated. There is also a heterodyne that results between the two carriers not being on exactly the same frequency at any single instant, causing further distortion and noise in an FM receiver.

So, if we can get rid of the effect of the signals randomly adding to each other and heterodyning against one-another, then we can avoid the problem.

The way to do this is to design the system so that the two transmitters are on exactly the same frequency and are modulated in exactly the same way. If this is done, the receiver, when it sees both signals of equal strength, won't be able to tell them apart and will consider them to be the same signal (but coming from different directions) and happily demodulate them.

"Wait a minute -isn't that like multipath?"

Multipath distortion results from reflections of the

same signal arriving at different times to the same antenna. Sometimes they will add up and reinforce each other and at other times they will cancel each other out. This is the effect that you see when you experience picket-fencing while driving (the signal chops in and out, the rate depending on your speed and direction) or when you find that one spot where you can't hear the repeater, but moving a few inches on either side allows you to hear it fine. (That spot is usually the one in the chair that you wanted to sit in to talk, by the way.) If the second transmitter is just like the main transmitter, then isn't that going to behave just like a source of multipath?

Well, since the overlap areas are pretty small, there are only a few places where this is likely to happen. Also, there is a technique that can be used to reduce the problem in areas where overlap occurs.. This technique involves shifting one transmitter slightly off frequency (between 10 and 20 hertz) from the other so that a stationary receiver will never be stuck in a spot where the signal is canceled out completely. The person listening in that spot may hear what sounds like a bit of picket-fencing even when you aren't moving, but you will still be able easily to copy the signal (even though it may be a bit choppy.)

This picket-fencing is not to be as severe as you might first think: First of all, you would have to be in an area where the signals are almost exactly the same strength. You would have to work really hard to find something like that, as it would have to be in a canyon somewhere... Secondly, as you move along, you will find that you will likely hear either one transmitter, or the other: In normal picket-fencing conditions, there is only one transmitter to hear at all, so you are more likely to hear the signal drop into the noise as you picket-fence. With two transmitters, you'll probably hear the other transmitter rather than just noise. This is only true in the overlap area, of course: Outside this overlap area things will be no different than any other repeater.

This technique is applied in the commercial world and has proven to work pretty well. The fact that there is little overlap between the two transmitter sites (and what overlap does exist is in the mountains anyway) makes for an almost ideal implementation of this technique.

Ok, you've convinced me. What's this "voting receiver" thing, then?

As we explained, your receiver will hear either one or the other transmitter as you move around. These two repeaters also share the same input frequency. As you move around, one site will sometimes hear you better than the other. It would make sense, then, to design the system so that the receiver that hears the signal best is the one that feeds both transmitters. This is what the voting receiver system does, then. If you start to get noisy into one site but you still have a good signal into the other, the system will automatically switch to the receiver with the best signal.

This has the effect of greatly reducing multipath in the weaker-signal areas for signals going into the repeater from those overlap areas. Even in some ono-overlap area there may be places where the far site receives a better signal than the near site. In such places, the user will still have a useable signal rather than dropping out.

Some interesting implications...

Running a voting/synchronous repeater system has some interesting implications that deserve to be mentioned:

Improved coverage. If you think about it, the coverage of a two synchronous, voting repeaters is better than the total of two individual linked repeaters on different frequencies. Why is this? For the synchronous, voting system, you will simply hear one or the other transmitter as you move into the overlap area and as you transmit, one or the other receiver is constantly monitoring your signal and choosing the best one. If you had individual repeaters on a linked system, you would need to switch constantly between the two repeaters to see which one was doing best at that instant -even if it only did better for a fraction of a second. That fraction of a second may result in a lost word or sentence, requiring a repeat, and it increases the tedium of trying to make sense out of weak, choppy signal. That doesn't even take into account the hassle factor involved in constantly switching between different repeaters. Don't forget the voting receiver is working for you in receive as well.

Spectrum savings. Repeater channels are at a premium. Using the synchronous/voting scheme you can expand the coverage of a repeater system without occupying yet another repeater channel. The linking between the two repeaters can be done on a UHF or microwave band where spectrum isn't so tight. (That's what that spectrum is for!)

Demonstration of a technology. It is important that

we amateur radio operators improve our methods and develop technology and techniques. Assembling this system will not only advance our state-of-the-art, but lead the way for others to implement similar schemes to improve our ability to provide communications and do that which is required of us as amateurs. (Hint: Read the first portion of FCC Part 97 -the Basis and Purpose part in particular...)

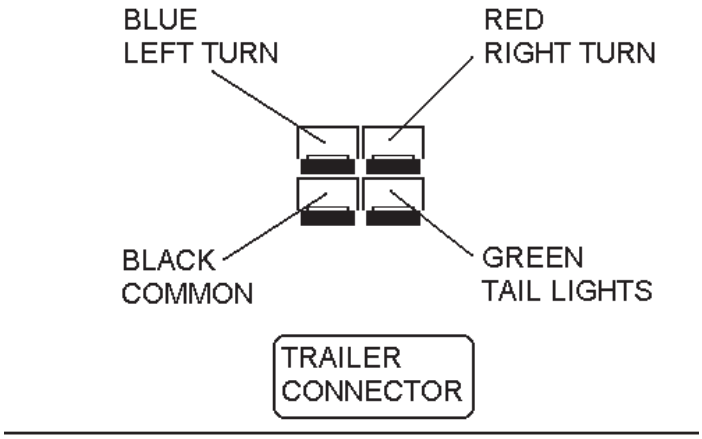
If you are interested in helping with this project, please contact the Utah Amateur Radio Club (UARC) Scott's Hill project coordinator, Bruce Bergen, KI7OM at (801)943-1365 or send him email at bbergen@xmission.com.

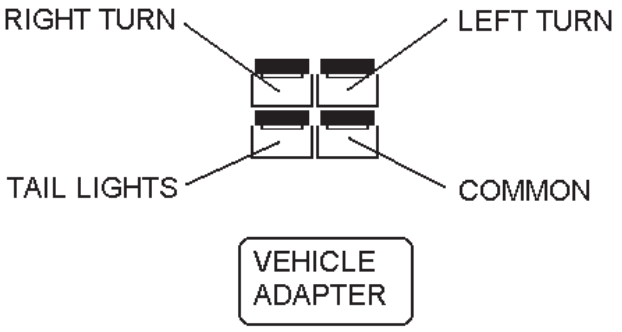
Clint, KA7OEI ❑

Vehicle Lights on the Club's Generator/Tower Trailer

This information is for those who may have occasion to tow the club's Generator/Tower Trailer. The trailer is equipped with the customary rear trailer lights, which have the dual filament bulbs. The lights are on the "American" standard, that is: the low-current filament is the "running" or "tail" lights, and the high-current filament is dual purpose for brake or turn signal. This results in a 4-wire system: Common Ground, Tail, Right Turn and Left Turn. (Some vehicles, particularly imported ones, have separate bulbs for Stop and Turn; these systems are incompatible with the trailer's wiring, and a conversion adapter would be needed to be compatible.)

Unfortunately, there is no common standard for trailer connectors. There are many styles and sizes, and wiring within any size can vary. To avoid repeated changes to the trailer's wiring, the club leadership has agreed on the following scheme. The cable on the trailer terminates with a housing containing 4 Anderson Powerpole connectors (1327 series). Their definition is shown in the illustration. It will be the responsibility of the person towing the trailer to make an adapter, which will connect between the Anderson connectors and the connector on the towing vehicle. The person with the towing vehicle would keep his or her own adapter, and would be assured that the trailer would always have the Anderson connectors as shown.





The author has been very disappointed with the quality of commercially available trailer connectors. Their contacts are of tin-plated or bare brass, and are not designed to be soldered. Crimping screws are usually steel, which rusts and corrodes in a short time in our harsh, salty winters. In my opinion the only solution is a connector with contacts plated with gold or silver. AMP connectors make a very robust connector in their CPC (Circular Plastic) series. I have been using these on my vehicles for several years. There are 7 contacts rated at 25 amperes. The AMP parts numbers are:

Square Flange Receptacle	206227-1
Plug	206226-1
Male Contact (Gold)	66261-2
Male Contact (Silver)	66261-4
Female Contact (Gold)	66740-6
Female Contact (Silver)	66740-2
Backshell With Clamp	206138-1
Sealing Cap for Receptacle	207446-1

A complete mating installation would consist of a Receptacle, Plug, Male Contacts, Female Contacts, 2 Backshells and a Sealing Cap. These connectors can be purchased locally from Kimball Electronics.

Ron Speirs, KC7MYS ❑

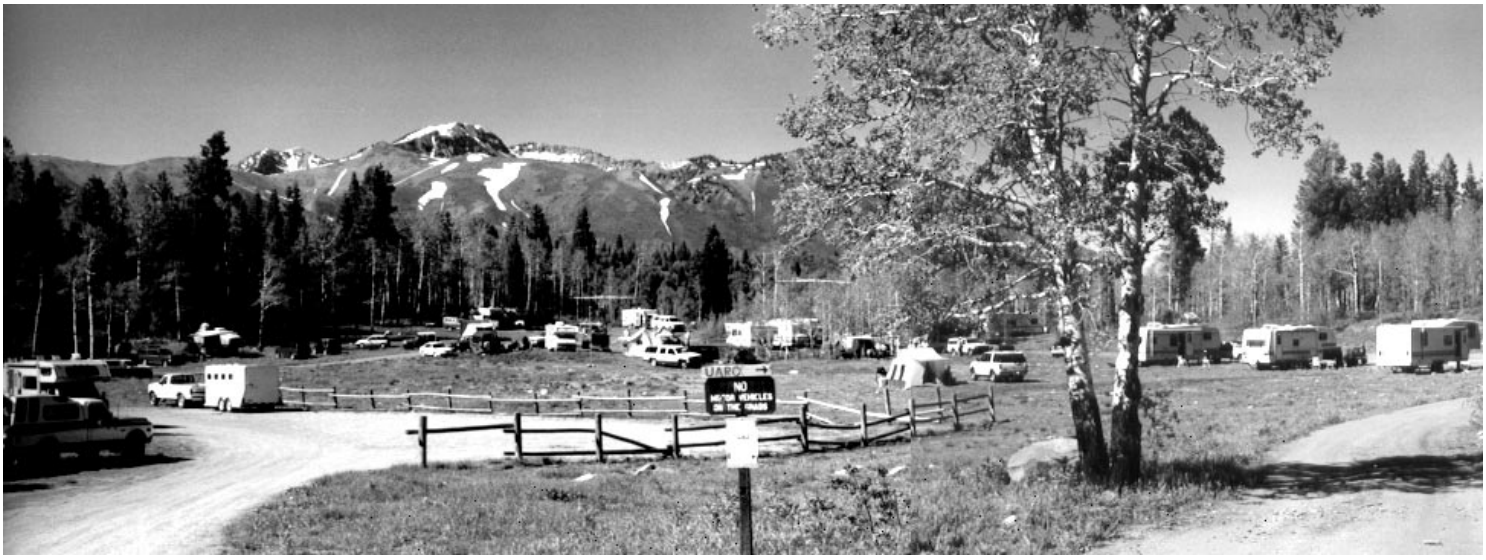


Photo: Bruce Bergen, KI7OM

With the exception of the three vehicles on the far left, everything in sight, plus several tents and tent-trailers not visible, is part of the UARC Field Day encampment

1998 Field Day a Success

Contest points, weather, food, attendance, Technician participation --it doesn't much matter what your criterion is, UARC's 1998 Field Day entry was a big success.

Field Day is a national contest for operations " in the field," and this was its 65th year. Field Day is amateur radio's biggest contest. More operators participate in Field Day than in any other single operating event.

UARC entered from a mountain site near Payson Lakes. There had been disturbing reports about mud in the campsite and on the road, but everything dried out just in time for Field Day. The daytime weather could hardly have been more pleasant.

Photo: Bruce Bergen, KI7OM

Two of our CW "Ringers", Jeff, K7JEF, and Darryl, AF7O were working the CW pile-ups like shelling peas out of the pods.

Several very good CW operators made possible a club score better than any in recent memory. The CW contact points were more than double last year's value; phone operators made almost a 58% improvement; and the total contact score improved by more than 84% (1997 total 2870, 1998 total 3984)! For the whole story of our score, check out UARC's 1998 Field Day score on the club's web page under http://www.xmission.com:80/~uarc/announce.html .

Those high-speed, never-tiring, CW operators were Bill, N1BR; Tom, NY4I; Jeff, K7JEF; Dick, K7MZ; Alan, K7OPT; Darryl, AF7O; and Bill, AA7XS.

The Novice/Technician station turned in an additional 80 contacts.

Photo: Bruce Bergen, KI7OM

La Sauciere, Jerry, WR7N, provided the epicurean touch to our dinner.

Jerry Bennion, WR7N, provided some of the Dutch

oven cooking he is famous for in a roast beef dish. Numerous contributed luscious side dishes rounded out the marvelous Saturday night dinner.

Steve Perry, KC7IAS, made sure satellite contacts were made giving us additional bonus points.

Ron Speirs, KC7MYS, was on hand to present a slide show of slides taken the very same day.

Two tri-band beams, phased verticals on 40 meters, and dipoles for 80 and 10 meters were the principal antennas used.

An unusual feature of this year's event was an informal "star show" presented by Carla, KC7HON. The mountains make a great place to view the heavens and Carla had come prepared with an 8-inch telescope borrowed from the Salt Lake Astronomical Society.

Photo: Chuck Johnson, WA7JOS

Hiss and Hertz, separate facilities with all the comforts of the home radio shack and then some.

Thanks to Joel Neal, KC7UBP, this year's Field Day chairman. Joel made sure all the loose ends were tied down and everything went smoothly. He even took a day off from work to drive to Ogden and tow the porta-Johns down. (Having them was a condition of our Special Use Permit from the Forest Service.) Thanks also to Eugene, KC7CSE, who towed them from the Salt Lake valley up to the Field Day site.

There were many other operators and helpers not mentioned here, including those who operated, logged, contributed tents and equipment, and acted as mentors for the newcomers. Thanks to all.

Gordon, K7HFV ❑

Stainless on Stainless - BEWARE

My son Daland (KC7LNR) and I volunteered to bring the club's generator/tower trailer to Field Day this year. We had the trailer for a couple of weeks prior to Field Day, and this gave us the opportunity to examine and check out the equipment on it.

There was a 5-element 2-meter beam on which the nuts on the U-bolts were seized. When I inquired of the machinist where I work, he instantly recognized the problem as a stainless steel bolt and a stainless steel nut. When pieces of this metal are in close contact, they experience "galling", which causes the nut to seize on the bolt.

After Field Day, I noticed that there was a short pipe still attached to a longer pipe at a right angle on the trailer. This was the pipe above the rotor which attached to the center member of the HF beam. Sure enough, the two U-bolts and nuts were completely seized. I removed them (by breaking them) and replaced them with new hardware. These two U-bolts are shown in the illustration.

Stainless Steel U-Bolts from the UARC trailer mounted antenna which had to be broken apart because of galling.

Photo: Ron Spiers, KC7MYS

In the ASM Handbook, published by The Materials Information Society, Volume 18, page 715, we find this statement about wear of Stainless Steels:

> Galling can be considered a severe form of adhesive wear. With high loads and poor lubrication, surface damage can occur on sliding metal components. The damage is characterized by localized macroscopic material transfer, that is, large fragments or surface protrusions that are easily visible on either or both surfaces. This gross damage is usually referred to as galling, and it can occur after just a few cycles of movement between the mating surfaces. Severe galling can result in seizure of the metal surfaces.

Stainless steel is nice because it doesn't rust, but don't use stainless steel nuts and bolts together.
Select another material for one of them, such as zinc, cadmium or chromium.

Ron Speirs, KC7MYS ❑

JOTA - Jamboree On The Air

Scouting Fun in the Air Waves!

Jamboree On The Air is an annual international event in which Scouts and Scouters from all over the U.S. and the world (propagation permitting) communicate with each other by means of Amateur Radio.

This event is being locally sponsored by the **Great Salt Lake Council - (BSA)** and the **Utah Amateur Radio Club**. A **Radio Merit Badge Workshop** is offered as a central part of the program. Make this your Unit's Fall Camporee or Big Event and come join the fun.

Where: Pine Canyon BSA Camp and Training Facility in Tooele County.

When: 4:00 pm Friday, October 16th to 4:00 pm Saturday, October 17th (Overnighter)

Who: All Scout, Varsity, Explorer Units and their Leaders. Please remember *Two Deep Leadership*.

Cost: $5.00 per boy registered - Includes the1998 JOTA , BSA Patch.

What: Each unit will be responsible for their own adult leadership, food, and camping arrangements. The sites are first come first serve but there is plenty of area to camp. Come with a desire to learn and experience Amateur Radio and have a good time. Each participant should bring a pencil and something to write on. Each scout will register and receive a copy of the Workshop Worksheet which will be needed to complete the Radio Merit Badge.

Advanced Registration: To assure yourself that there will be enough patches pre-register with Keith Bingham, KI7SL, at 968-9189 or David Tanner, KC7SUJ, at 250-0835. All Scout Units should have a *Tour Permit* from their Council Office.

Directions: For directions to Pine Canyon BSA Camp call the Council Camp Desk or James Dupaix at the Great Salt Lake Council (801)582-3663

Help: UARC members, we can use your help to teach skills and assist the Scouts make radio contacts with your equipment. Especially if you or someone you know is an Amateur Radio Operator and a Registered Scouter come enjoy the event with us. We especially need Scouts to teach or help teach classes. Contact David, KC7SUJ, at 250-0835, for details on how you can help. You might also what to visit the ARRL JOTA website at http://www.arrl.org/ead/jota.html

David Tanner, KC7SUJ ❑

Five Repeaters Still Off the Air

Four of the five amateur repeaters that went off the air February 2 of this year remain off as negotiations continue with the site landlord. No further information is available about when they might return to the air. The repeaters involved are:

146.94 (Utah VHF Society)
449.9 (Salt Lake County ARES)
224.78 (Operated by KD0J)
449.125 (9600-baud packet repeater)

The repeaters were all located in the Oquirrh Mountains on a site called "Little Farnsworth."

The weekly Utah VHF Society Net, normally held on the 146.94 repeater, is now being conducted on UARC's 146.62 repeater. This net meets each Tuesday evening at 8 P.M., Mountain Time.

The 146.88 repeater is back on the air from a temporary site in the Salt Lake Valley. It is used by Salt lake County ARES.

Gordon, K7HFV ❑

September UARC Meeting

The fall UARC season will start with a bang on Thursday, September 3, (doors open at 6:00 PM) with the annual Fall Swap Meet. Bring your goodies -- station equipment, parts, test gear, etc., and be ready to look for some good values. (We can't guarantee that there'll be any, but they're always worth looking for.)

An important point: The September 3rd meeting will be the first in our new location:

Doxey-Hatch Medical Center (top floor)
1255 East 3900 South
Salt Lake City, UT 84107 ❑

Earth Grounding Construction Materials

We are often asked about the types of materials that make the best earth grounding systems. Wire conductors are available in many gauge sizes, and also in stranded, solid, woven, covered, bare, and strap forms. Compounding the choices are the availabilities of different metals such as copper, aluminum, brass, etc.

So which is best? The answer is to make an appropriate choice for the application intended, but the length of the conductor is the most serious consideration. Grounding protection for lightning or RF interference is best served by the shortest possible conductor length, including even zero length (bolting items together with no wire length). In fact, conductor length is so significant that often the effectiveness of short length can be hundreds of times the effectiveness of larger wire in longer length. Whatever you use, use the least amount possible.

As to the materials, here are some important observations to keep in mind:

- Brass has about 5% higher resistance than copper and aluminum about 20% more than copper. For that reason copper and brass make the best choices, but not overwhelmingly. Any of these three materials are well suited for most grounding applications, but the availability and price of copper make it the preferred choice. Another advantage of copper and brass is that they do not react unfavorably with oxygen as much as aluminum. Copper can be placed in direct burial for additional ground surface contact without suffering from short lifespan. In many cases copper in the ground may outlive you, and you may have to include it in your will!
- Take a look at the specific application. If you are grounding a tower where concern over direct lightning hits is a factor always use a conductor that has a similar current carrying capacity as the tower frame itself. In most cases that size will be in the range of #4 copper or larger. If the current capacity of the tower frame is much larger than the ground wires attached to the base then the ground wire may act like a fuse, burning open and compromising the ground system. Make sure connections are tight and clean - then add long term weather protection for the joints by employing anti-oxidant compounds and/or moisture coverings. If you are grounding equipment internally inside a structure smaller wiring can be used, perhaps in the range of #12 down to #4 or the largest cable that can be physically managed.
- Don't be misled by the various claims of "perfect types" of conductors. There's barely a measurable difference between solid, heavy stranded, strap, coated, bare, etc. The most important element is still length, but it's also a good idea to NOT use bare braided conductors, such as recycled coaxial cable shield. The reason for this is that when exposed to air these collections of woven tiny conductors oxidize and, the electrical contact between adjacent conductors is compromised. To large fast rising currents and RF signals the entire woven assembly appears to be a large number of tiny parallel conductors, and some of the package grounding effect is lost. Best bet - covered stranded wire such as THW or THHN, or even soft welding cable. They offer good flexible workability and they maintain long term conductivity. Solid strap is also a good choice but somewhat more difficult to obtain and work with.. Just remember: Don't use much of whatever you choose!

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FCC Licensing Restructuring Proposal

This information came out too late to be included in detail with our Section Manager's letter but I'm certain that in coming issues these pages will have several points of view expounded before anything of substance really happens.

Now that the FCC has opened a docket (WT Docket No. 98-143) and has released its Notice of Proposed Rule Making, comments to the FCC are in order until the deadline of December 1, 1998. The League's initial assessment and a copy of the docket and Notice of Proposed Rule Making itself can be viewed at:

http://www.arrl.org/news/restructuring/faq.html

Bruce, KI7OM ❑

Licensing Class

An Amateur Radio No-Code Technician and Technician Plus Licensing Class beginning Thursday, August 27th, at 7:00 PM is being offered at the Salt Lake Sugarhouse, LDS Stake Building on l7th South and 11th East in Salt Lake City, Utah. The class will run for 6 consecutive Thursday night sessions. Although Morse Code is not necessary to get a license, for those interested in broader privileges, we will be teaching code from 9:00 PM until 9:30 PM. Pre-registration would be appreciated. Please call Gary, KC7AWU, 484-3407. The class is free, but the manual cost is $20.l7.

Gary, KC7AWU ❑

A Point of View on Using Our Spectrum

Hi to all,

I have noticed, as with probably many of you, that the lower (CW only) portion of the 10 Meter Band is populated with unwelcome and unlicenced illegal AM and sideband transmissions. Instead of getting mad and turning off my radio, I did just the opposite. I turn it on, turn up the power, and tune it up, right on the offending stations. I had a few DX takers and the offending stations soon left the freq. I had fun working a portion of our band that is mostly left alone. I feel that we should use the frequencies that are allotted to us, especially now the propagation is up. If we want the people who are illegally using our frequencies to feel at home, then all we need to do is not use them. But I for one, had a ball running contacts right on top of them. Try using the lower portion of 10 Meters, you will make contacts that you did not think possible and you will make the people using AM on the frequency have to find another place!

73 Alan Seyboldt K7OPT ❑

For Sale:

Rohn HBX-48 tower (48 ft.), **Tailtwister** rotor, **Mosley** Pro 57 5-band beam (20-10m). $1000 for all, not sold separately. Available in mid-September. Gary Haskett, KD0TA, Elko, NV, phone 702-753-4948, e-mail: ghaskett@hotmail.com ❑

Utah Amateur Radio Examination Schedule for September

09/16/98 (Wed.) Provo
Steve Whitehead, NV7V
Phone: H 465-3983 B 225-5200

09/29/98* (Tues.) Salt Lake City
Eugene McWherter, N7OVT
Phone: H 484-6355

*Only Novice and Technician elements (1A, 2, and 3A) given at this session.

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

Editorial

Many of you are old enough to remember Red Skelton's skit character of a likeable vagrant *Freddy the Free Loader*. It seems that we have a lot of "Freddy the Free Loaders" hanging around. By that I don't mean just non-members using UARC's and other club's repeaters and phone patches on a regular basis, but also members who never participate in club projects, and licensed operators who have not made themselves available for community emergency communications services such as ARES..

Most of the "Freddy the Free Loaders" in this hobby will contribute time, money, talents, and energy if simply approached and asked. It is just human nature for many people to sit back and let someone else do it rather than reaching out and finding a niche where they can be useful. I challenge you, the reader, to first examine your own "Free Loader" status, then go out of your way to individually invite someone else to become involved as paid up members in a worthwhile club or community project. Many people will not respond to an appeal by someone to the at large community that "we need volunteers". We are a unique community with an incredible base of talent waiting to be developed and used. You'll be surprised that most people really would like to be involved, were waiting to be asked directly, and just wanted to know that someone cared.

73 - Bruce, KI7OM ❑