ROUNDTABLE

The Denver Radio Club Newsletter

April 2014 Since 1917

PRESIDENT'S MESSAGE

By Gerry Villhauer – W0GV

Hello DRC Members,

I hope you are all well and getting ready for the spring weather and activities. We continue to run tests on our 147.330 repeater located near Franktown. We will soon be installing a different antenna on the tower and will continue to test the site. Thanks to all who have taken the time to provide feedback on your experience with the site and thanks to Bill, W6OAV, for providing several computer generated plots of the expected signal strength and coverage. We use this information along with your reports from the field as a comparison model.

We were planning to do some radio exercises from our Salvation Army station as I reported last month. Now I am informed that The Salvation Army is moving the place where our station is located to a new facility. I am waiting on a firm date and information on the layout of the new location. We will be calling on the membership to help with the relocation. More information will be provided on the Sunday net as I receive it.

Welcome to our new members! Your name and call signs are listed in this publication. We appreciate you choosing the DRC as YOUR radio club and encourage you to become active with club activities.

A BIG thanks to Paul, WA2YZT, for his very interesting presentation on broadcast antennas and the associated towers and equipment. We had a wonderful turnout, over 50 in attendance for Paul's program.

Our April program promises to be a very interesting presentation on the Raspberry Pi computer. Our club's past President, Robert White, K0RCW, has taken a real interest in the Raspberry Pi and has been experimenting with them for some time now. The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. And better yet, they are very inexpensive; in the $25 range I am told. Don't miss Robert's presentation at the April 16th DRC meeting. I hope to see you all there.

73, Gerry, W0GV
President

Happy April Fool's Day!

INSIDE THE ROUND TABLE

MARCH MEETING - WHAT'D I MISS

By Bill – W6OAV

There were 56 attendees. W0GV began the meeting with introductions. K0TOR than announced the Wheat Ridge siren test date and the required test processes. Afterwards, W0JMC announced the Brighton emergency test scheduled for April 12th. He is looking for volunteers.

The meeting was then turned over to the guest speaker, Paul, WA2YZT. Paul's presentation covered all that Channel 4 had to do to install their tower and antenna system. Before beginning his presentation, Paul passed around a heavy and impressive 3" in diameter copper coax section. He described why the working coax line is filled with nitrogen.

Paul described all that they had to do to install the tower, get the 120' long 5 ton Gin Pole to the top of the tower and what it took to mount and tune the antennas. (A picture of the Gin Pole can be seen in last month's Roundtable announcement of Paul's presentation). When the transmitter was finally activated the result was 40 KW to the antenna and an ERP of 1 million watts!

Paul went on to describe how AM broadcast antennas are constructed and work. He also discussed lightning protection methods.

We all left the meeting with a new respect for what it takes to operate and maintain an HD TV station.

APRIL MEETING PRESENTATION

Raspberry Pi Talk and Demonstration

By Robert – K0RCW

The Raspberry Pi is a fully functional credit sized Debian Linux system requiring only a keyboard and HDMI display (or none of these but instead a wireless connection via another computer using X windows, VNC, or ssh). The hardware uses an SD card for a hard drive and either an etherlink port or an USB Wireless dongle to connect to the Internet. There are many ham radio applications that can run on the RPI, including svxlink which is very similar in functionality to EchoLink in server mode. Using an inexpensive USB sound card dongle, it is possible to implement a full featured echolink node for less than $150.

Who's New In The DRC

The DRC is a very active club in the Denver metro area and we'd like to have all of our members listen for these new calls and personally to make them feel welcome.

Jeromy Labit	KD0YML
Daryl Orr	KD0ZIL
Don R. Shelton	N0KGU

Welcome to our newest members. We have a number of activities throughout the year and we'd like very much for you to participate in serving your community. If you have questions please feel free to ask on any of the repeaters or see the contact information on the last page of this publication. Also please join us once a month at the regular club meeting on the 3rd Wednesday at 7pm. For new hams we have the Elmer session which starts at 6:00pm before the regular meeting.

More information can be found on the Denver Radio Club website at http://www.w0tx.org.

MARCH TECH COMMITTEE REPORT

By Bill – W6OAV

This report provides an overview of items discussed at the March meeting.

TS-940 Repair (K0TOR)

Goal: Determine if re-soldering and cleaning connectors will fix radio.

Work In progress as time permits.

Voter System Redesign (W0GV)

Goal: Evaluate the test location at K8ZTT's site:

- Review the Radio Mobile coverage plots.
- Have members, when mobile, note coverage compared to plots.
- Evaluate raising the antenna.

Several members have submitted coverage experiences. Hardware has been located for an antenna which will be mounted on the tower.

(Continued on page 3)

(Continued from page 2)

145.49/448.625 Repeater - New Controller Programming (AC0UA)
Goal: Program and test our 7330 controller to allow the splitting of the repeaters when D13 ARES uses the 145.49 repeater for emergency activities (plus other features).
AC0UA has finished programming his test controller. Now he's now waiting for WW0LF to deliver the club's controller so that he can program it.

145.49/448.625 Repeater - Controller and Radio Upgrade (WW0LF)
Goal: Replace the S Com 7k with the preprogrammed S Com 7330 and replace the Sytnors with Kenwoods.
Once AC0UA completes programming the controller, WW0LF will install it as noted here.

Existing Voter System Tune Up (W0GV/WA2YZT)
Goal: "Tune up" the existing test voter configuration consisting of the Station 4 central voter site and the N1ETV remote receiver site:

- Items to be completed:
  - Rewire link receiver to voter controller interface. KB0A to obtain configuration from WA2 YZT.
  - Adjust UHF link transmit antenna position - KB0A will use analyzer to check the receive antenna system.
  - Sync the hang times of Station 4 and the remote.
  - Calibrate the local and remote audio levels and responses - KB0A will use IFR to set levels.

Should be completed in April

147.33 Auto Patch (WW0LF)
Goal: Re-program the auto patch controller to allow calls to the 720 exchange.
Should be completed in April

Red (Call) indicates project coordinator.

OPERATION WHIRLWIND
AN EMCOMM EXERCISE

By Jack – W0JMC

THIS IS A TRAINING EXERCISE ONLY!!
For all volunteer members/groups (ARES/CERT/MRC/SAR, etc…) in the North Central Region and this includes all member of DRC including non-licensed family who would like to participate as role players.

- On April 12, 2014 favorable weather conditions created a line of thunderstorms over the Denver metropolitan area. Feeding off ambient moisture the storm that developed formed a rapidly moving squall line. The advancing front spun an F-2 tornado near Brighton, touching down east of the city.
- The surrounding residential community sustained moderate damage. The actual scope of the storm's impact is not known.
- Due to the amount of damage, most roads in the area are unpassable and public safety personnel and heavy equipment are not expected on the scene for several hours. Local volunteer responders have been activated to respond to the storm.

When: Saturday, April 12th

Time: Exercise will be from 0900-1200
(role players to arrive at 0730/responders to arrive at 0830)

Where: Vestas Training Facility
13239 Weld County Road 4
Brighton, CO 80603

Paved parking will be limited. Parking in the surrounding fields is at your own risk, as there are lots of broken pieces of junk out there. It's recommended that you carpool up if you can.

If you wish to participate please respond to Jenn Scott WØJEN at jenn@omegaresponders.org or 720-270-2975 and let her know of your interest in participating as a radio operator or a role player.

See you all there.

Don't forget to join in Wednesday nights at 7:30pm for the DRC Learning Net ! 145.49/448.625 machines
Watch the RoundTable for Upcoming changes to Learning Net Schedule

ARRL Rocky Mountain Division News

Greetings --

This note is to announce that the 2014 ARRL Rocky Mountain Division Convention scheduled to be held in Laramie, Wyoming this July has been CANCELLED due to extenuating circumstances. We thank those involved with its planning for the time and effort put forward on behalf of hams across the Division.

We are grateful that the Albuquerque Duke City Hamfest has stepped forward to serve as alternate host of the 2014 ARRL Rocky Mountain Division Convention. It will now take place August 8-10 in sunny Albuquerque, New Mexico. Led by individuals who organized the 2011 Division Convention in Taos, the annual Duke City Hamfest is a standing three day amateur radio convention that occurs in one of Albuquerque's largest hotels, so it will ably fit the bill as a Division Convention members have become accustomed to.

More details about the 2014 ARRL Rocky Mountain Division Convention in Albuquerque will be provided soon. Please mark your calendars!

73,
Brian Mileshosky N5ZGT
Director, ARRL Rocky Mountain Division

Dwayne Allen WY7FD
Vice-Director, ARRL Rocky Mountain Division

Tuner Matches – Antenna System On All But One Band?

By Bill – W6OAV

THE PROBLEM

A common practice today is either to rely on a transceiver's built in antenna tuner (Note 1) or to use an external antenna tuner to match a random length antenna system, such as a G5RV, random length dipole, a Zepp, a random long wire, etc. A common problem is that the tuner will match the antenna system on all but one band. The problem is usually because the impedance of the transmission line at the tuner on that band is outside of the tuner's impedance matching capability.

THE SOLUTION

This matching problem can often be resolved by inserting approximately a 1/8 wavelength section of transmission line between the tuner and the transmission line. This section will act as a transformer and change the impedance of the transmission line at the tuner. This impedance transformation usually puts the impedance within the tuner's impedance matching capability. The length of the section is not critical. If the 1/8 wavelength section does not resolve the problem, shortening the section by half might resolve the problem. Depending on the particular band in question, the added section may cause a matching issue on another band. Thus, experimenting with the new section length may be necessary.

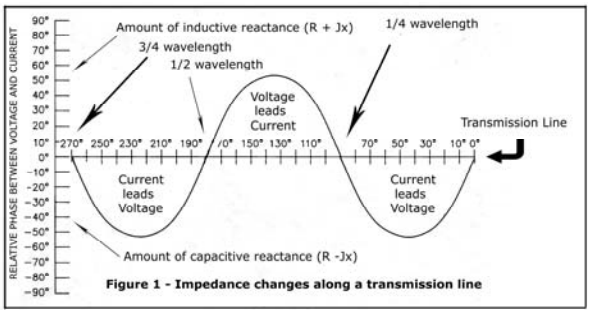

Figure 1 - Impedance changes along a transmission line

THE EXPLANATION

So, what is happening in this situation? Well, as shown in *Figure 1*, above. if one were to measure the impedance at various points along a transmission line, they would see that the reactive impedance varies widely between zero and very high values (Note 2).The greater the SWR, the higher the reactive variations (phases) will be. The reactive impedance will be either inductive (Z = R + Jx) or capacitive (Z = R - Jx) depending on whether the RF voltage leads or lags the RF current. Note that the reactance is minimal every ¼ wavelength along the transmission line.

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The formulas for calculating the impedance along a transmission line are very complex. As shown in Figure 1, the voltage (**I**) and the current (**E**) are complex numbers containing both phase angles and magnitudes. Thus vectorial division is required to determine the impedance at a point on the transmission line. The following general formula summarizes the vectorial calculation. The impedance (**Z**) at any given point along a transmission line is:

Z = **E** (Complex sum voltage) / **I** (Complex sum current)

AN EXAMPLE

For the sake of discussion let's assume a hypothetical station whose tuner cannot match an antenna system on 20 meters. (The transmission line can be open wire or coax).

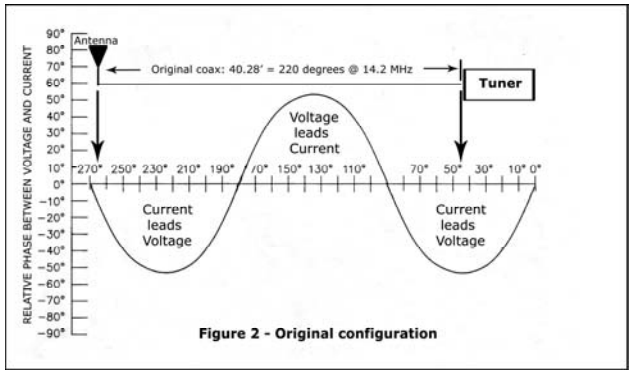


Figure 2 - Original configuration

Figure 2, shows the transmission line configuration of our hypothetical station. The transmission line is 40.28' long which equates to 220 degrees in length at 14.2 MHz. The transmission line's reactive impedance at the tuner is highly capacitive. The RF current leads the RF voltage by about 45 degrees which, for our discussion, is outside the matching range of the tuner.

In order to transform the transmission line impedance to a less reactive impedance, the station operator inserts an additional approximate 1/8 wavelength (8.2') of transmission line at the tuner. This action moves the tuner further down the transmission line. *Figure 3,* top right, shows that the additional transmission line transforms the impedance to a very low (close to zero) reactance.

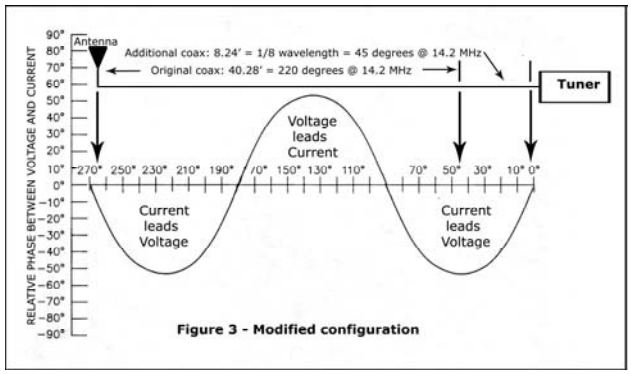


Figure 3 - Modified configuration

This puts the impedance well within the matching capabilities of the tuner.

As mentioned above, the length of the additional transmission line is not critical. Sometimes experimenting with the line length may be necessary to both allow matching on the "problem" band and yet not causing matching problems on another band.

Notes:

1. *Most antenna tuners in radios are "mop up" tuners. That is, they are designed to "fine tune" an antenna system which is close to resonance and has relatively low reactive impedance.*
2. *The impedance, and not the SWR, changes along a transmission line. The SWR remains the same along the transmission line other than it might measure slightly lower at the transceiver due to transmission line loss.*

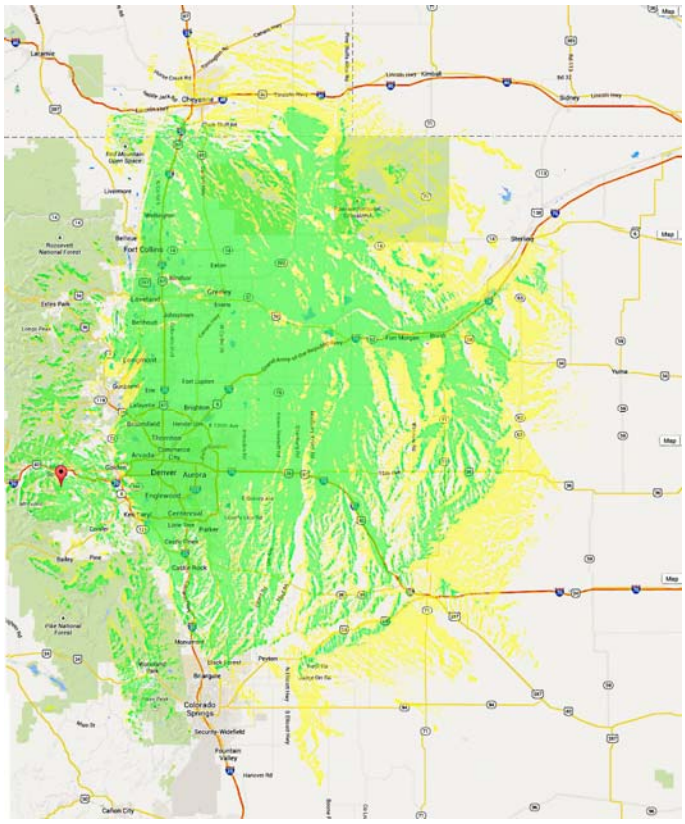
GEOSPACIAL RF MAPPING

SQUAW MOUNTAIN REPEATER COVERAGE

By Bill – W6OAV

This map on following page shows the coverage that can be expected with a mobile using a quarter wave whip on the roof, having 1.5 dB coax loss and a receiver sensitivity of 0.5 microvolts. The coverage map is based on a required reliability of 80% (The percentage of time where the signal will be above the mobile's receiver threshold to consider the path to be liable). The coverage will be a slightly larger with a mobile using a gain antenna.

The area in green represents field strength above 1.58 microvolts. The area in yellow represents field strength between 0.5 and 1.58 microvolts. The overall specifications are shown top right of page 6.



Description	Squaw 449 MHz*****
Frequency	449 MHz
Base Name	Squaw
Latitude	39.67929135 °
Longitude	-105.49312212 °
Elevation	3489.6 m
Base Antenna Height	12.2 m
Base Antenna Gain	14.1 dB
Base Antenna Type	cardio
Base Antenna Azimuth	75 °
Base Antenna Tilt	0 °
Mobile Antenna Height	1.5 m
Mobile Antenna Gain	0.0 dB
Tx Power	25.00000 W
Tx Line Loss	1.5 dB
Rx Line Loss	1.5 dB
Rx Threshold	0.500 µV
Required Reliability	80%
Strong signal margin	10.0 dB

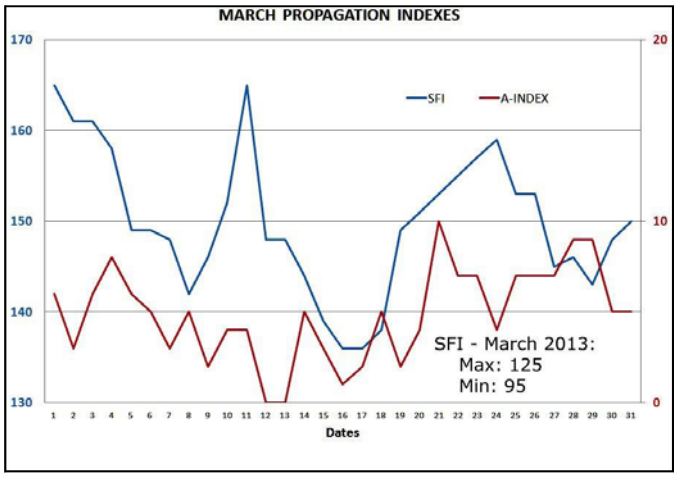
General coverage area of the 449.350 repeater located on Squaw Mountain as described on the previous page of the RoundTable. The map may be enlarged for greater detail.

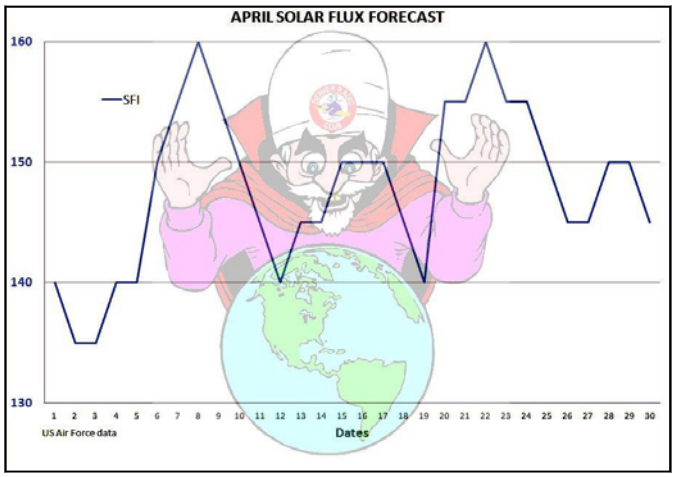
Past & Future Propagation Conditions

By Bill – W6OAV

The charts below show the Solar Flux and "A" indexes for last month and the forecast for this month's Solar Flux index.

Refer to the September 2010 *Roundtable* for more complete information on interpreting these charts. Issues of the *Roundtable* are available at http://www.w0tx.org/RoundtableAccessPage.htm.





UP COMING EVENTS

HAMFESTS & CONVENTIONS

*The following are the HAMfests & Conventions which have been registered with the ARRL so far. More information can be found on **www.arrl.org/hamfests**.*

2014

April 5 – **LARCfest**
Boulder County Fairgrounds
http://w0eno.org

June 7 – **MRC Tailgate Party**
Lions Club Pavilion, Delta, CO
http://montrosehamradio.org/

July 26 – **PPRAA Megafest**
Lewis-Palmer High School
http://ppraa.org/megafest

August 17 – **DRC Hamfest**
Jefferson County Fairgrounds
http://www.w0tx.org

Sept. 28 – **PHC Pueblo HamFest**
First United Methodist South Building
Email: sworley.sw@gmail.com

WHEAT RIDGE SIREN TEST

By Jim – K0TOR

The Denver Radio Club will be supporting the City of Wheat Ridge siren test at 11:00 AM on Wednesday, April 16th. Wheat Ridge has 15 sirens plus 11 other listening sites to evaluate siren coverage. If you covered a Wheat Ridge siren on last years siren test you will be contacted to cover this same site this year. If you did not participate last year and would like to this year please call Jim Beall k0tor@arrl.net, or telephone me at 303-798-2351. If I am unavailable please leave me a message. We need additional radio operators to replace those that worked last year and are not available this year and we have several new monitoring sites to cover this year. We request that you be on site by 10:30 AM and the test is completed by 11:30 AM. For those who are available we will meet for pizza following the siren test at the Wheat Ridge Police Department training room. This is a great public service and a fun exercise. If you would like to help, please call. Thank you.

We will also be supporting the Lakewood Siren test on Wednesday, May 14th. So please mark this date on your calendars.

APRIL 2014

DRC Net Sunday's at 8:30pm Local on 145.490 & 448.625 (No PL)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 	**2** ***Learning Net*** **7:30pm**	3	4	5 ***LARCFest***
6	7 First Quarter	8	9 ***Learning Net*** **7:30pm**	10	11	12
13	14	15  Full Moon	16 ***DRC Meeting*** **Elmer 6pm** **General 7pm**	17	18	19
20 ***Easter*** ***SSB Rookie Roundup*** Begins 1800 U Ends 2359U	21	22  Last Quarter	23 ***Learning Net*** **7:30pm**	24	25 	26
27	28	29 New Moon	30 ***Learning Net*** **7:30pm**			

Check www.ARRL.org for Contests and Rules!

DRC Board of Directors

President	W0GV	Gerry Villhauer	303-467-0223	w0gv@arrl.net
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Board Member	N3PQ	Frank Ortega	303-452-0283	n3pq@hotmail.com

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DRC Repeaters

BAND	Freq / Shift / PL Tone	Additional Information
6m	53.090MHz (-1MHz) 107.2Hz PL	
Packet	145.05MHz<>14.105MHz	
2m	145.490MHz (-) 100Hz PL	**Linked to the 70cm - 448.625MHz machine.**
2m	147.330MHz (+) 100Hz PL	**Local Area, Members Auto-Patch Does Not TX a PL!**
2m	147.330MHz (+) 131.8Hz PL	***Test mode in SE area. Send signal reports to Tech Committee.***
1.25m	224.380MHz (-) 100Hz PL	
70cm	447.825MHz (-) DCS~073; NB 12.5; +/- 2.5	**Saint Anthony's Note: This is a narrow band repeater requiring DCS.**
70cm	448.625MHz (-) 100Hz PL	**Linked to the 2m - 145.490MHz machine.**
70cm	449.350MHz (-) 100Hz PL	**Wide area coverage with Echolink Node # 4140.**
70cm	446.7875MHz (-)	**MotoTRBO Repeater | Slot 1 – DMR-MARC WW, Slot 2 – Local**

Editor's Note

DRC members - this is your newsletter. If there is something which is club or amateur radio related that you'd like to see as a regular feature, email suggestions to the editor. Members are the heart of The Denver Radio Club, if you have an expertise or an interest in a particular segment of ham radio that you'd like to write about, you may email your submissions to AG0S@arrl.net. Submission deadline is the 25th of the Month. **Editor**