



January 2014

ROUNDTABLE

The Denver Radio Club Newsletter

Since 1917

PRESIDENT'S MESSAGE

By Gerry Villhauer – W0GV

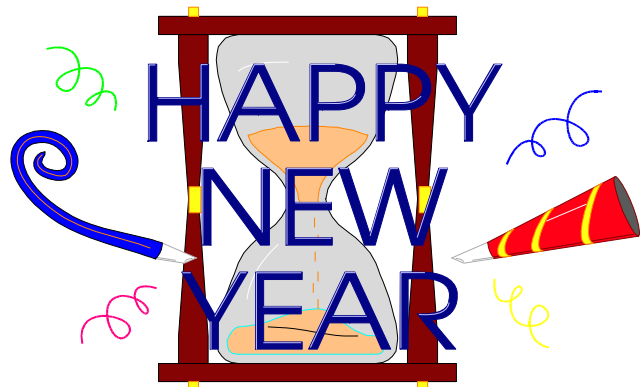
Well here we are, in a new year, 2014. How long will it take you and me to quit writing 2013 on our checks? It has been a very successful year for the DRC. We have enjoyed a steady increase in membership and our meetings and events have been well attended. A thank you for that goes to the membership.

Beyond that, I would like to recognize and thank a couple special people who contribute above and beyond to our success. First thanks to George, AG0S, our RoundTable Editor. We don't see George a lot in person but, believe me he is there. Our RoundTable publication has a wide distribution and reaches several countries. The success of the RoundTable has caused hams in other states to join the DRC because of the interest generated reading it and not wanting to miss the next issue. Second, thanks to Bill, W6OAV, Technical Committee Chairman and monthly contributor of great articles to the RoundTable. Bill's tireless effort to gather information, write interesting articles and make equally interesting presentations is one of things that makes us successful. And not to forget, keeping the Technical Committee on track with our never ending project list. And thanks to Bill, N0LAJ, our Webmaster. A lot of work goes into keeping our website up to date. Bill is right on the spot making changes and updates. Thanks to Bob, KC0CZ, our membership chairman. Bob does a super job on membership duties, distributing the RoundTable and the 2014 membership roster is a product of his hard work. Finally to our Board of Directors for keeping watch on the financial and management side of the DRC. You guys do a bang up job of that. Speaking of success, our Holiday Party, WOW! Thanks to all eighty (80) of you who attended.

Dave, WG0N and Rita, N0UEW, did a great program on the 2013 wild fire season. You two did a wonderful job showing what goes on behind the scene on these monstrous fire operations and the pictures were outstanding. Again great job everyone.

Have you ever thought about sub-atomic particles or cosmic rays? Probably not very much? Come to the January 15th meeting to find out how they affect your everyday life. How they are detected, how they are measured and how this data is delivered to a central processing station using RF relay and microwave radio. Orlen, WW0LF and Dr. Frederic Sarazin, from the School of Mines physics department will be presenting. One of the detection sites is in Argentina and another right here in Colorado. Come find out more about this fascinating science at the January meeting. I wish you all a happy, healthy and prosperous 2014.

Gerry, W0GV
President



INSIDE THE ROUND TABLE

December Meeting - What'd I Miss	Pg 2	Propagation Charts	Pg 6
Who's New & Analyzing Antenna Gain	Pg 3	Up Coming Events & Calendar	Pg 7
Remember When	Pg 5	DRC Information	Pg 8

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W0TX

<http://www.w0tx.org>

DECEMBER MEETING - WHAT'D I MISS

By Bill -W6OAV

This year the weather cooperated and our annual Christmas dinner did not have to be rescheduled due to a snow storm as it had been last year.

We had 80 attendees this year! Folks started showing up at 4:30 PM. The program started at 6:30 PM with introductions by W0GV. The meeting was then turned over to the guest speakers, Dave, W0GN and Rita, N0UEW. They gave us an insider's view of the massive undertaking that has to occur during a forest fire.



Rita began the presentations covering the following items:

- Pictures showing various types of fires and how fires often create their own weather patterns.
- Incident Command (IC) structure and its processes which coordinates all government levels.
- Pictures of various types of aircraft and their special purposes.
- How fire retardant is applied and why.
- How fire fighters fight fires and use the different types of equipment.
- How the Information Officer communicates with the IC, sheriff, VIPs, news media, etc.
- How Fire Camps are setup and their daily routines.

Dave then discussed the following items:

- Overview of the various fires that occurred this year.
- Activities and responsibilities of the training and maintenance center in Idaho.
- How the Idaho center coordinates radios and frequencies when sending them to fire locations.
- The types of packaged VHF/UHF repeaters used at fires.
- How repeaters are networked and why.
- Types of antennas used.
- How the field communications center functions.

After the very informative presentation, door prizes were awarded. That activity produced a lot of happy winners!

JANUARY MEETING PRESENTATION

By Orlen - WW0LF

Did you know that you are hit by sub-atomic particles called cosmic rays every second? How do scientists detect and measure the energy in these particles (misnamed as rays)? To find out more about a remarkable cosmic ray observatory come to the January meeting of the Denver Radio Club where Dr. Frederic Sarazin, one of the collaborators of the Pierre Auger cosmic ray observatory project and Orlen Wolf (WW0LF), a research associate at the Colorado School of Mines will be our guest speakers.

About 200 cosmic ray particles strike every square meter of the earth each second. And while low-energy cosmic rays are plentiful, cosmic rays of higher energies are far rarer – only one of the rarest ultra high energy cosmic rays falls on a square kilometer in a century! These rare but especially interesting cosmic rays have energies equivalent to the kinetic energy of a tennis ball traveling at 53 miles per hour, packed into a single proton. To find and measure these rare events, scientists studying high-energy cosmic rays need a truly giant detector. The Auger Observatory collaboration created a detection area in western Argentina's Mendoza Province the size of the state of Rhode Island for this purpose. The observatory is a "hybrid detector," employing two independent detection methods. One technique detects particles through their interaction with water in 1,600 detector tanks. Another tracks the development of air showers by observing ultraviolet light emitted high in the Earth's atmosphere. The detectors are connected via a system of RF and microwave relays to a central processing station where the data is analyzed and categorized. A smaller research and development array of detectors is installed near Lamar Colorado to test different detection and intercommunication systems.

For more information on the Pierre Auger Observatory go to <http://www.auger.org>



Dr. Frederic Sarazin is an experimental nuclear and astroparticle physicist in the subatomic group of the Physics Department at the Colorado School of Mines. Presently, He is involved in two high energy cosmic ray research projects: the Pierre Auger Observatory based in Malargüe, Argentina and the JEM-EUSO mission, a planned optical telescope looking at the Earth's atmosphere on the International Space Station (ISS).

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.

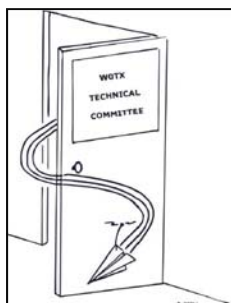
Dean Larson	W6HAB
Lee Ormiston	N0RRL
Sandy Snowbarger	KQ2U

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 6:30pm before the regular meeting.

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

No Tech Committee Report For December

Although there isn't anything to report from the Tech Committee from the December meeting the crew has been working long hours on a new APP of which the result is depicted in the graphic.



Please Let Us Know

Over the years we occasionally hear from hams who have read the RoundTable in other states and countries around the world. We appreciate the comments and we would like to know where you are located. So if you live outside the Front Range or Denver Metro Area and read the newsletter either online, email or hard copy please send a short note via email with your *City, State or City, Country*. We will compile a list and publish it at a later date.

We will not include or retain your name, call or email address.

To respond to this request send your information to AG0S@arrl.net.

Subject: I'm located in...

Thank You

ANALYZING ANTENNA GAIN SPECIFICATIONS

By Bill – W6OAV

There are many meaningless or misleading antenna ads out there. The purpose of this article is to point out how to analyze these ads. Figure 1 shows an ad that appeared some years ago in a very popular ham magazine. The ad specifications sound terrific. However, the ad is totally misleading and meaningless. Can you determine why? More on this later.



Figure 1

To properly analyze antenna ad specifications, one must understand:

- dB, dBi and dBd.
- Isotropic radiator.

dB

Let's begin by discussing the dB. One often hears the question "Why is the "B" always capitalized? The "B" is always capitalized to honor Alexander Graham Bell, the inventor of the telephone and the developer of the Bel. The Bel is a measurement of the gain or loss in a telephone system relative to the human ear's response to sound. The BEL is a logarithmic system based on the powers of 10. This provided a wide range of values to accommodate the wide range of human hearing. This system is appropriate for human hearing, but it is not appropriate for non telephone systems.

A more manageable measurement was developed from the Bel. It is called the decibel (dB). The name signifies that the dB system has one tenth the range of the Bel system. Hence it is a much smaller and more manageable measurement system.

It is extremely important to remember that the dB is a **RATIO** and **not a unit**. **The dB is a number determined by the relationship, or ratio, between a reference value and a measured value.** If the measured value is greater than the reference value, the dB value is positive (gain). If the measured value is smaller than the reference value, the dB value is negative (loss).

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Since the dB is a RATIO, to say that an antenna, for example, has 3 dB of gain is totally meaningless..... 3 dB gain relative to what reference?..... a dummy load, a light bulb, another type of antenna? Looking at Figure 1 again, do you see the issue with the gain specifications? The "Omnidirectional gain" line in the body of the ad is specified to be 5.8 dB for one antenna and 4.2 dB for the other antenna. Yes, the signal gain **between** the antennas is 10 dB. However we don't know the actual gain of the antennas relative to other antennas. Who knows, both antennas may have 5.8 dB gain and 4.2 dB gain respectively relative to a rubber duck antenna! So, **between** them, they do have 10 dB of gain but perhaps not much gain individually relative to say quarter wave verticals!

RULE 1. Any antenna gain specification must be referenced to a standard antenna. Common reference antennas are the isotropic radiator (dBi) and a dipole in space (dBd). Let's look at these.

dBi

The dBi, which is used for most commercial antenna gain specifications, uses the isotropic radiator as the reference antenna. So what is an isotropic radiator? It is a theoretical 100% efficient point radiator in space. The propagation pattern of this point is a perfect sphere as shown in Figure 2. The pattern loss is identical in all directions.

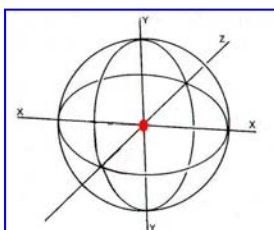


Figure 2

So, why do commercial antenna designers specify their antenna gains relative to an imaginary point radiator in space? Being theoretical with well defined parameters, it is a useful reference for defining antenna gains no matter the type of antenna configuration. All commercial antenna designers are familiar with the isotropic radiator which gives them a common reference.

Since all antennas do not radiate equally in all directions, when put in place of the isotropic radiator, they will show gain relative to the isotropic radiator in the direction of their maximum radiation. They will show loss in the direction of their nulls. Let's compare a dipole to the isotropic radiator. A dipole's pattern in space is a donut shape as shown in Figure 3 (Above Right). Unlike the isotropic radiator, the power distribution is not omni-directional. The radiated power is concentrated broadside to the dipole with less power off the ends of the dipole. This means that the dipole's broad-

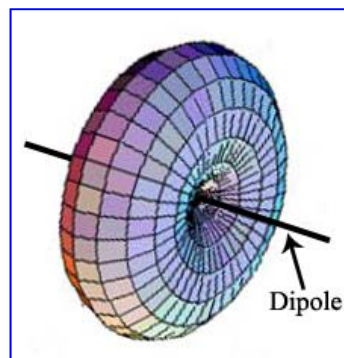


Figure 3

side gain will exceed that of the isotropic radiator when the dipole is placed at the same point as the isotropic radiator. Figure 4 shows the relationship between the dipole's pattern and the isotropic's pattern when the dipole is placed at the same position as that of iso-

tropic radiator. Half of the dipole's donut shaped pattern has been removed to better show the relationship between the two patterns. Also, shown is the schematic of the configuration. Note that the dipole's maximum pattern gain exceeds that of the isotropic radiator by 2.14 dB. Thus, a dipole **in space** is said to have a broadside gain of 2.14 dBi. The "in space" is important. As is discussed several places below, a dipole near the earth has a totally different radiation pattern than it does in space.

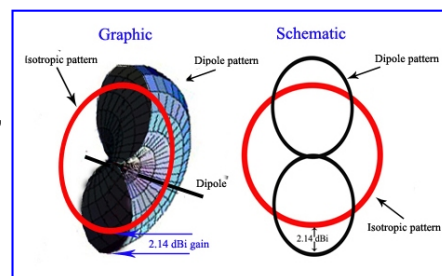


Figure 4

dBd

The dBd, sometimes used with antennas designed for users such as hams and CB'ers, refers to the antenna gain with respect to a reference dipole antenna **in free space**. (This measurement is used because many hams and CB'ers can relate with dipoles but not with isotropic radiators). In free space is important so that the dipoles radiation pattern is not distorted by surrounding objects, such as the ground. More on this distortion later.

Now, let's look at a beam which has a specified forward gain of 5.64 dBi. Sounds good! However, since a dipole has 2.14 dBi gain, that means the specified beam has only 3.5 dB gain (3.5 dBd) gain over a dipole as shown in Figure 5.

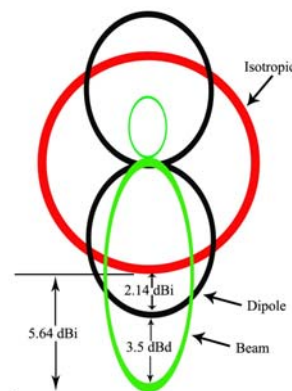


Figure 5

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RULE 2. Remember the relationship between dBi and dBd when analyzing antenna gain specifications. An antenna rated in dBi makes the antenna appear more efficient than if it were rated in dBd as described above. Use the following formulas to convert between dBi and dBd:

- $\text{dBi} = \text{dBd} + 2.14$
- $\text{dBd} = \text{dBi} - 2.14$

Now, a word of caution. Some questionable antenna manufacturers will publish high gain specifications for their HF antennas by modeling them close to earth. The proximity to ground adds extra “ground reflection gain”.

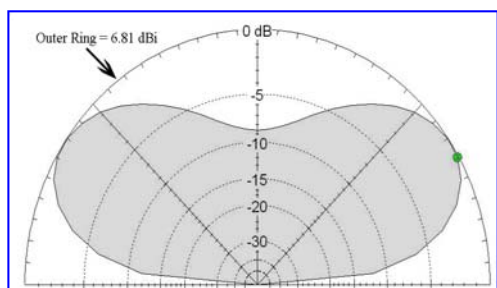


Figure 6

power in other directions. Because of “ground reflection gain” a horizontal dipole located a half wave above the ground has an approximate gain of 6.81 dBd, or 4.67

degrees above the horizon. Figure 6 shows distorted radiation pattern as seen when looking down the length of the dipole. Figure 7 shows the schematic comparing the isotropic, a dipole in space and a dipole a halfwave length above the ground. Moreover, if this dipole is raised or lowered the lobes change and the gains change. Questionable antenna manufactures, using this technique, normally don't specify the antenna's height.

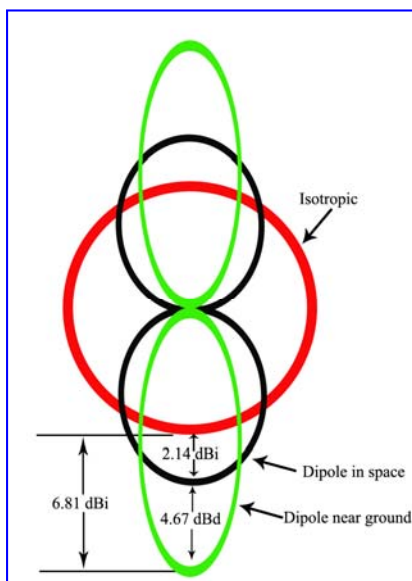


Figure 7

RULE 3. Be skeptical of unusually high gain specifications

How reliable are antenna manufacturers' specifications? Ever notice that very seldom do antenna ads in QST have gain figures. I'm told that proof of gain determination must be submitted to QST before gain figures can be included in the ad. Figure 8 shows an ad that appeared in a leading ham publication with gain figures. Figure 9 shows the same ad which appeared without gain figures the same month in QST. Why do antenna manufactures not back up their specifications with

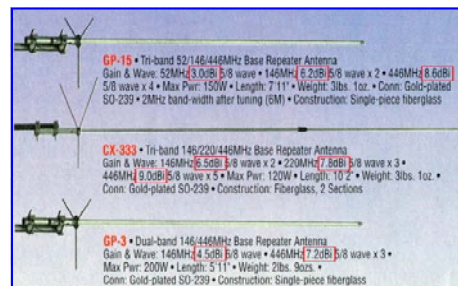


Figure 8

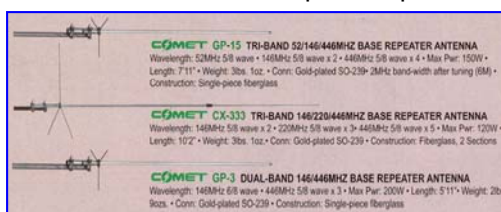


Figure 9

QST? Makes one wonder! I'm assuming that these antenna manufactures are using theo-

retical values. We all know the difference between theory and practice!

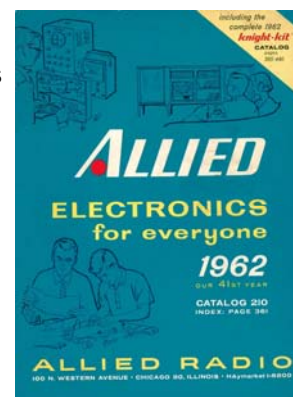
In summary, do your best to understand antenna specifications, who is making them and how they are making them.

REMEMBER WHEN?

By Bill – W6OAV

The purpose of this memory article is to let the newer hams know what ham radio was like in the late 50s and early 60s and to bring back memories to the older hams like me.

This article describes a ham's “ham store” and one of their many kits that was very popular with hams back in the 50's and early 60's. Also, there is brief description of what HF operation was like in 50s and early 60s.



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The ham's "ham store" was Allied Radio. From the 50's until 1970, Allied Radio was the ham's source of electronic parts, amateur and CB equipment, audio systems and many miscellaneous electronics equipment. Allied Radio had a great mail order system and a large catalog. In 1970 all that started to change. Tandy Corporation (Radio Shack) bought Allied Radio. Allied Radio began to cater only to the industrial market.

Before the buyout, one of the popular features provided by Allied Radio was their relatively inexpensive kits. They were called Knight Kits. The kits included receivers, transmitters, transceivers, test equipment, audio equipment, etc. The kit manuals were well documented.

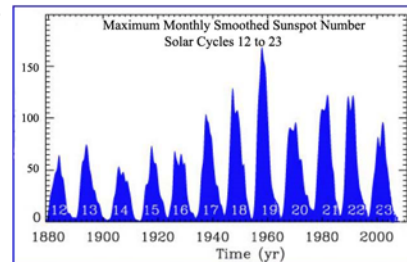
One extremely popular low cost kit among hams was the Knight Kit C100 three transistor handy talkie (HT). The HT consisted of one RF transistor and two audio transistors. As a receiver, the RF transistor functioned as a regenerative detector with a two transistor audio amplifier. When the Push to Talk was depressed, the RF transistor functioned as a transmitter with a two audio transistor AM modulator. The C100 ran 100 milliwatts on CB channel 7. All one had to do to put the C100 on 10 meters was to change out the crystal and remove a couple of turns on the antenna and oscillator coils.



Many hams installed a multi-position switch and several crystals for multi-frequency operation. Also, modifying the RF transistor circuit components upped the power output. I modified two C100s and worked many foreign stations (DX) on 10 meters.

Using the C100 10 meter HT, simple as it was, was a blast. One could easily work the world.

The reason was because we were in Solar Cycle 19, the most active solar cycle ever measured. DX was "workable" day and night with low power.



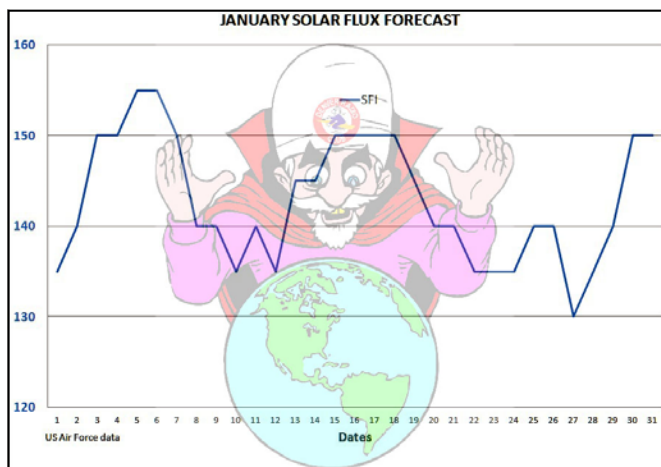
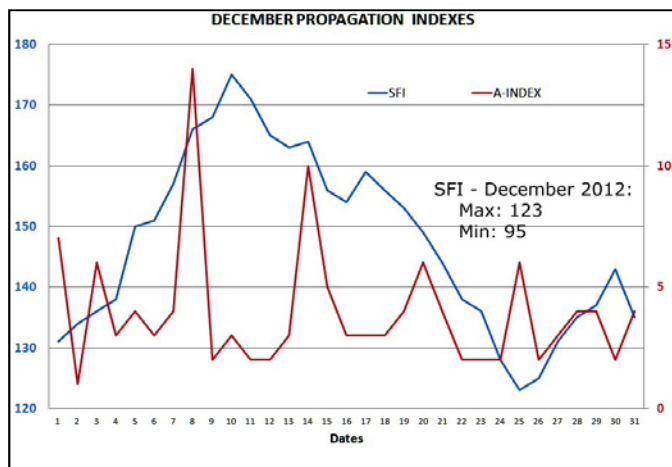
Solar Cycle 19 was a very exciting time for hams as well as for non hams. There were several intense aurora displays whose intensity frightened people in Europe and the US. The displays were visible in the US as far south as San Francisco, Salt Lake, Denver, Philadelphia, etc. I remember seeing several of these fabulous displays in Omaha! Not only did these geomagnetic storms cause complete radio black outs, they also disrupted the telephone networks. The storm's magnetic fields inducted strong noise voltages in the buried and above ground cables! Wonder what would happen to our communications, among other things, if those storm levels occurred today! Cycle 19 provided exciting times not only for hams but also for non hams.

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>.



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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

January 18 – NCARC Winter Hamfest

First National Bank Building at the Ranch
<http://www.ncarc.net>

February 9 – ARA Swapfest

Adams County Fairgrounds
<http://www.n0ara.org>

April 5 – LARCfest

Boulder County Fairgrounds
<http://w0eno.org>

Sept. 28 – PHC Pueblo HamFest

First United Methodist South Building
Email: sworley.sw@gmail.com

More to come...



HAM RADIO OUTLET
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HRO 12 STORE BUYING POWER WORKS FOR YOU!!

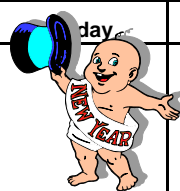








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NEW YEAR ~ NEW ELMER SESSION START TIME

The Elmer Session is Going to Start a 6pm beginning in
January before the regular DRC Meeting!

Please Note the regular meeting start will remain unchanged.

JANUARY 2014						
DRC Net Sunday's at 8:30pm Local on 145.490 & 448.625 (No PL)						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 Learning Net 7:30pm ARRL Straight Key Night 	2	3	4 ARRL RTTY Round-Up Begins 1800U
5 ARRL Kid's Day 1800U to 2359U ARRL RTTY Round-Up Ends 2400U	6	7	8 Learning Net 7:30pm 	9	10 Save The Eagles Day 	11 Amelia Earhart Day 
12	13	14	15 DRC Meeting Elmer 6:00pm General 7:00pm	16 	17	18 ARRL January VHF Sweeps Begins 1900U
19 ARRL January VHF Sweeps Ends 0359U Jan 20	20 Martin Luther King Day 	21	22 Learning Net 7:30pm	23	24 	25
26	27	28	29 Learning Net 7:30pm	30 	31	

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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	Not in service at this time!
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

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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**