ROUNDTABLE

The Denver Radio Club Newsletter

March 2013 Since 1917

PRESIDENT'S MESSAGE

By Bryan Steinberg – KB0A

Despite the recent snows Spring will come shortly and ham activities will really be ramping up. There are so many activities for hams this Spring and summer that you will need to get them on your calendar now so you don't miss any of them. Besides our regular club meetings which, hopefully will not need to be cancelled again this season due to the weather, we have a series of hamfests along the front range. Also June is a busy month with both Field Day (June 22 & 23) and the ARRL Rocky Mountain Region Convention in Estes Park the following weekend (June 28-30). In August is the DRC Hamfest on Sunday the 18th.

Also, do not forget our usual list of technical work to catch up with for the club repeaters. Among these are installing our old Hudson, 147.33 repeater, at a new site; replacing the repeater radios and controller at the Centennial Cone site; switching our 147.33 phone patch over to VOIP; and the list goes on. If you would like to know more, or get involved in any of this work please let me or any member of the club's board know.

My apologies to Steve, KF0RW for the continued rescheduling of his Digital Radio presentation. This will make the 2nd time, with the first being the movement of our holiday meeting to January, then the snow storm that hit this past week. Our March presentation had already been scheduled for a great talk on battery technology. So, we will fit Steve's talk into the schedule as soon as we can.

In February I had the opportunity to do some travelling in the Southwest states and visit the Arizona State ARRL convention as part of the Yuma Hamfest. It was interesting to see what these other organizations do for their events.
The first thing I can say is I was amazed at how many motorhomes, travel trailers and other types of camping rigs can be fit into every open space at the fairgrounds. The inside table sales are used by commercial vendors, those with predominantly "new" items. The used equipment, swap portion of the fest was held on concrete slabs, the backs of cars, campers, whatever outside.

I must admit it was quite nice walking around outdoors at a February hamfest and being comfortable in just a T-shirt and jeans. The climax of the event is a large barbeque dinner where there were about 650 attending. As far as prizes go they have one prize, an Android tablet that goes to one of the attendees. If you wanted to participate in the door prize drawings you could buy tickets. The same went for the grand prizes, of which there were around 16 with a total value of over $11,000, you need to buy tickets to participate in that drawing, as well. It was also fun and surprising to run into some old friends at the event.

I was surprised to learn that the Yuma Hamfest Committee's sole function is to put on the annual hamfest. They are not a regular club, so to speak, and this was their only fund raising function. They distribute some of the proceeds to other state and area ham groups. I also came away with some ideas for our hamfest. But, no, there will not be a barbeque dinner.

I hope to see a lot of you at the March meeting along with other club and ham activities this Spring and Summer.

Until next time,
Bryan, KB0A

Happy St. Patrick's Day

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FEBRUARY MEETING - WHAT'D I MISS

By The Phantom Reporter

Due to inclement weather, the meeting was cancelled!

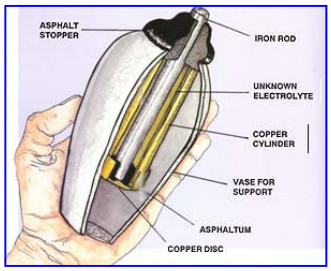
FEBRUARY TECH COMMITTEE REPORT

No Tech Report due to meeting cancellation.

MARCH PRESENTATION ANNOUNCEMENT

By Bill – W6OAV

Interested in learning all about batteries? If so, plan to attend our March meeting. Brian Champlin from **Battery Systems of Denver** will be our guest speaker. Brian will cover the following topics:



- Basics of batteries.
- Materials and construction.
- Explanation of newer available technologies and advantages and disadvantages for specific applications.
- What are Amp Hours and Reserve Capacities and what are the best choices for your applications.
- Battery maintenance and charging to ensure maximum performance over the life of the battery.

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.

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.

Bill Taylor	**KD0SYF**
James Schatzman	**AC0XU**

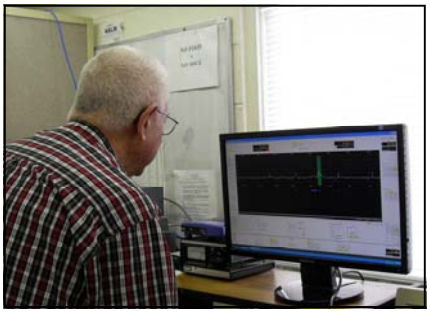
HF DEMONSTRATION

By Bud – K0HVA

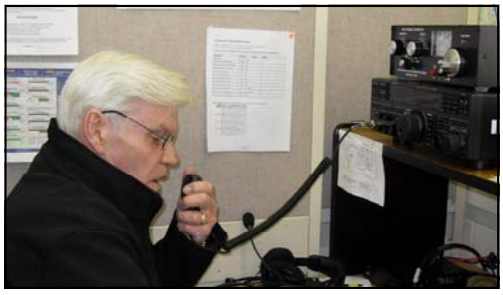
Jim, K0TOR set up a demonstration on Saturday Feb. 23rd at the (WARS) Waterton Amateur Radio Society Ham Shack, call sign - W0NT, near Lockheed Martin.

The demonstration was conducted by Jim and Ray, NB0P the WARS Club President. Ray demoed the club's Yaesu FT-950 HF radio using a 5 element beam on a tower. Two club beams can accommodate both 20 and 40 meters. The demo also included instruction on how to tune the radio, noise blanker operation, use of various filters, and proper etiquette on the air along with many other aspects of using the radio. Also available for use was a Kenwood TS-940, Yaesu FT-847, Alinco DX-70 and a Flex 5000A Software Defined Radio. Much of the club's vintage equipment was on display.

Jim, K0TOR demonstrated the use of his Flex 5000A software defined radio after the QSO Party. This Flex radio is an incredible system in that it has a wide range of filtering that really eliminates many unwanted signals that most radios won't do! The Flex system uses a computer interface that has a waterfall on the screen so that you can actually zero in on signals precisely.



The WARS shack was then turned over to the attendees who worked the Mississippi QSO Party. Many of the contacts received S9 signal reports. Since the shack sits up on a hill in the clear and away from the noise of the city, the beams are very effective.



WHAT'S THE DIFFERENCE BETWEEN EM NEAR FIELD AND FAR FIELD?

Jun. 8, 2012 Lou Frenzel, W5LEF | Electronic Design

Radio waves should really be called electromagnetic or EM waves simply because they consist of a magnetic field and an electric field. A signal from a transmitter applied to an antenna generates the fields. The antenna is the transducer and interface to free space.

As it turns out, an electromagnetic field's characteristics change depending on the distance from the antenna. This varying field is typically divided into two segments—the near field and the far field. A good knowledge of their differences goes a long way toward understanding radio-wave propagation.

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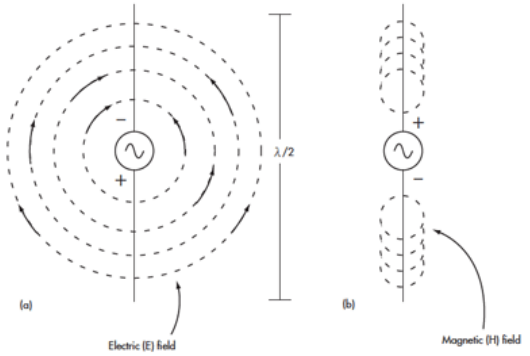
References

Electromagnetic Waves

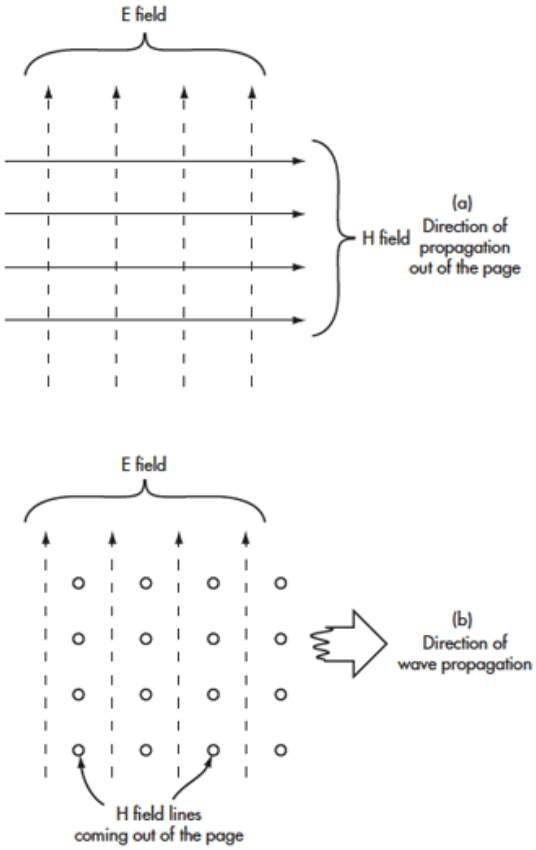
Figure 1 shows how a classic half-wave dipole antenna creates the electric and magnetic fields. The transmitted signal is a modulated sine-wave voltage alternating in polarity, producing an electric (E) field between the antenna elements that switches polarity each half cycle. Current in the antenna elements produces a magnetic (H) field that changes orientation each half cycle. The fields are at right angles to one another.



1. The electromagnetic field around a half wave dipole consists of an electric (E) field (a) and a magnetic (H) field (b). The fields are spherical and cut across one another at right angles.

The fields around the antenna are spherical or curved, especially near the antenna. As these fields travel out from the antenna, rounding becomes less pronounced, turning more planar in character. The receiving antenna usually perceives a planar wave.

Though the fields exist around the antenna, they propagate away from the antenna perpendicular to the two fields (*Fig. 2*). At some point beyond the antenna, the fields detach themselves into packets of energy and propagate independently. In fact, they support and regenerate one another along the way. This "independent" wave is the actual radio wave.



2. At a distance from the antenna, the E and H fields are essentially planar and intersect at right angles. Note the direction of propagation, which is perpendicular to both fields. At (a) the direction of propagation is perpendicular to the field lines shown either into or out of the page. In (b) the magnetic field lines are coming out of the page. You can picture them as lines with arrow points shown as dots.

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The Near Field

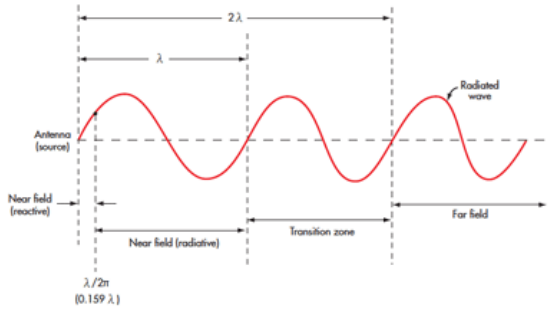
There's seemingly no formal definition for the near field—it depends on the type of application and the antenna. The most agreed upon definition submits that the near field is less than one wavelength (λ) from the antenna. Wavelength in meters is given by:

$\lambda = 300/f_{MHz}$

One readily acknowledged distance from the antenna of the near field is calculated as:

$\lambda/2\pi = 0.159\lambda$

Figure 3 shows the radiated sinusoidal wave as well as the near and far fields. The near field is generally said to be divided into two areas, the reactive and the radiative. In the reactive area, the E and H fields are the strongest and can be measured separately. One field or the other will likely dominate, depending on antenna type. A loop antenna, for example, is dominated by the magnetic (H) field. The loop antenna appears to be the primary as a transformer because of the large magnetic field it generates.



3. Boundaries of the near and far fields are shown with respect to wavelengths at the operating frequency. The antenna is assumed to be at the left and beginning of the wave.

In the radiative area, the fields begin to radiate. It represents the beginning of the far field. In the near field, the strength of the fields varies inversely with the cube of the distance from the antenna ($1/r^3$).

The transition zone in Figure 3 refers to the somewhat undefined area between the near and far fields. (Some models don't define a transition zone.) In this figure, the far field begins at a distance of 2λ and beyond.

The Far Field

Much like the near field, definitions vary on the beginning of the far field. Some say 2λ, while others insist that it is 3λ or 10λ from the antenna. Another definition indicates that it starts at $5\lambda/2\pi$, while still another says that it depends on the largest dimension of the antenna D or $50D^2/\lambda$.

Then there are those who claim that this fuzzy boundary between near and far fields begins at $2D^2/\lambda$. Others will say that the far field begins where the near field leaves off, or as indicated earlier, $\lambda/2\pi$.

The far field is the real radio wave. It propagates through space at a speed of just about 300 million meters per second, which is the speed of light or nearly 186,400 miles per second. The E and H fields support and regenerate one another as their strength decreases inversely as the square of the distance ($1/r^2$). Maxwell described this phenomenon in his infamous equations.

Maxwell's Equations

In the late 1870s, before the invention of radio, Scottish physicist James Clerk Maxwell predicted the arrival of electromagnetic waves. Using the laws known at the time from Ampere, Faraday, Ohm, and others, he came up with a set of equations that illustrates how one type of field generates the other, and as they propagate, the two coexist in a supporting relationship. In the late 1880s, German physicist Heinrich Hertz proved Maxwell's theory.

Maxwell developed four basic equations that show the relationship of the electric and magnetic fields as they vary with time. Basically, the electric field changing over time appears to produce charges in motion or current flow that sets up a magnetic field. Other equations say that as the magnetic field varies it can set up an electric field. The waves propagate through space by themselves after leaving the antenna. Those equations aren't shown here, but you may recall that they involve partial differential equations.

Applications

The far field propagates through space, and its strength is defined by the Friis formula:

$P^r = P_tG_rG_t\lambda^2/16\pi^2r^2$

where P_r = power received; P_t = power transmitted; G_r = receive antenna gain (power ratio); G_t = transmit antenna gain (power ratio); and r = range or distance from

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antenna. The formula is valid for free space, line of sight, with no obstructions.

Two important facts arise in this discussion. The received power varies inversely with the square of the range r. It also varies with the square of the wavelength, meaning that longer waves at lower frequencies travel farther. For example, a 900-MHz signal will travel farther than a 2.4-GHz signal for similar power and antenna gains. This expression can be used to analyze all modern wireless applications in terms of approximating signal strength.

To accurately observe signal propagation, one must plot the antenna's radiation pattern in the far field. In the reactive zone of the near field, the receiving antenna may interact with the transmitting antenna via capacitive or inductive coupling and thus give false results. On the other hand, it's been shown that a radiation pattern in the near field can be accurately plotted if special measurement equipment is available.

The near field has also proved useful in communications. This mode is used for applications such as radio-frequency identification (RFID) and near-field communications (NFC).

RFID is the electronic equivalent of bar coding. A thin tag containing a chip that integrates memory and specific electronic code is attached to the item to be identified, tracked, or otherwise processed. The tag, which also includes a passive transceiver, is passed near a "reader" transceiver that emits a strong RF signal picked up by the tag. Both reader and tag antennas are usually loops serving as the primary and secondary of a transformer.

The signal picked up by the tag is rectified and filtered into dc, which provides power to the tag memory and transmitter. The transmitter then sends the code to the reader for identification and further processing. Active tags using a battery sometimes extend the read range beyond the near field. RFID tags come in different frequency ranges, such as 125 kHz, 13.56 MHz, and 900 MHz.

At 900 MHz, the wavelength is:

$\lambda = 300/f_{MHz}$

$\lambda = 300/900 = 0.333$ meter or 33.33 cm

Subsequently, the near field is calculated as:

$\lambda/2\pi = 0.159\lambda = 0.159(0.333) = 0.053$ meter (about 2 inches)

Read ranges usually extend somewhat beyond this point. Therefore, it may actually spill into the far field at this frequency.

NFC also employs a memory and special coding similar to that of a credit card. An internal transceiver, usually battery powered, can transmit the code to a reader. It also uses the near field as the read range, and it's typically only inches. The NFC frequency is 13.56 MHz, representing a wavelength of:

$\lambda = 300/f_{MHz}$

300/13.56 = 22.1 meters or 72.6 feet

The near field is within:

$\lambda/2\pi = 0.159\lambda = 0.148(72.6) = 11.5$ feet

Because less power is used, the actual read range is rarely greater than a foot.

NFC is expected to be the technology to implement the "digital wallet." With this application, consumers make payments using NFC-enabled smart phones rather than a credit card.

References

Cheung, W. S. and Levien, F. H., Microwaves Made Simple, Principles and Applications, Artech House Inc., 1985.

Occupational Safety & Health Administration, Electromagnetic Radiation: Field Memo, 1990.

Straw, R. D. (Editor), The ARRL Antenna Book, American Radio Relay League, 1997-8.

Volakis, J.L., Antenna Engineering Handbook, 4th edition, McGraw-Hill, 2007.

FROM THE WEB

I don't know how many of you watch Bob Heil's, W9EID, weekly Ham Nation video podcast. Afew weeks ago he devoted a bit of time to the history of Single Side Band radio. It was quite interesting and worth watching. You can find it at **http://twit.tv/show/ham-nation/81**.
Bryan

Here are the dates to mark your calendar, June 28-29 & 30, 2013. That is HamCon Colorado 2013. This Event has been in the planning for nearly two years and is proving to be the Biggest and Best HamCon every for our state. For easy access to the HamCon web page go to the DRC web page and simply click on the HamCon banner. Once there you'll find all the information on Tickets, Meals, Seminars, Vendors and Great Tours and Activities in Beautiful Estes Park, Colorado (Don't miss the great Early Bird offers) Book your hotel at the Rocky Mountain Inn early. HURRY, rooms WILL sell out!

Mark Your Calendar

Friday and Saturday, March 15 and 16

The American Legion Amateur Radio Club Special Event Station to commemorate the birthday of The American Legion. **On those days we will be calling CQ as Special Event Station "N9L"**

Station operation times and frequencies are: 14.270 MHz +/- 5KHz
IRLP Node 4816
146.46 MHz Simplex

Hours of Operation:

Friday, March 15 *between 10 am EDT (1400 UTC) and 4 pm EDT (2000 UTC);*
Saturday, March 16*, between 9 am EDT (1300 UTC) and 4 pm EDT (2000 UTC).*

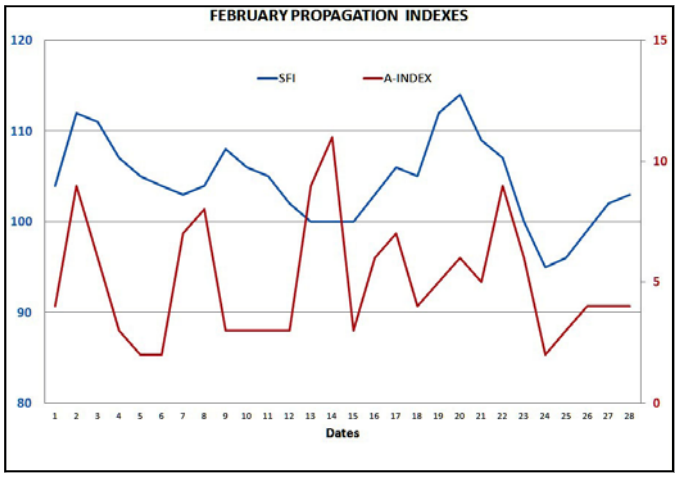
A full color N9L certificate will be sent on receipt of a 9x12 inch SASE to:
TALARC, The American Legion National HQS
700 N. Pennsylvania Street
Indianapolis, IN 46204.

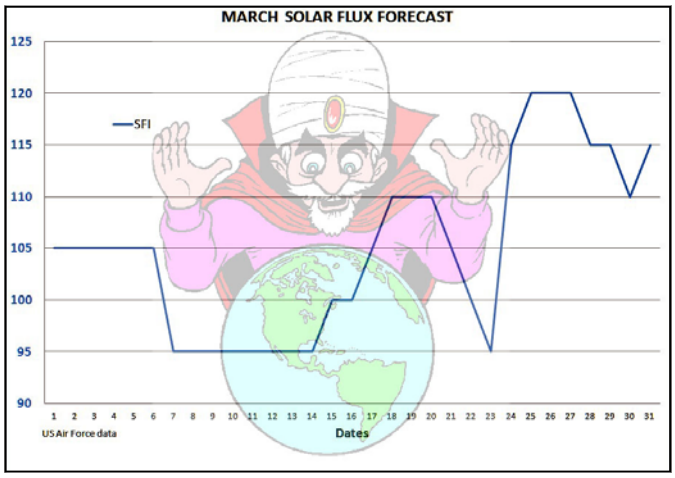
Past & Future Propagation Conditions

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 **www.w0tx.org**.





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**.*

April 6 – LARCfest
Boulder County Fairgrounds
http://w0eno.org

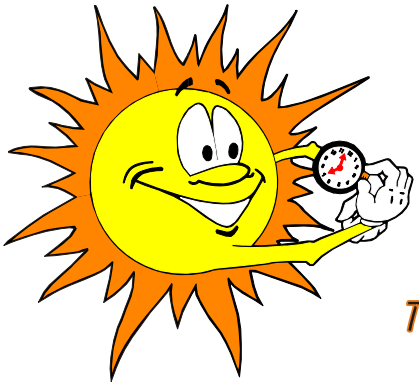
June 28 – Rocky Mountain Division Convention
Rocky Mountain Park Inn, Estes Park, Colorado
http://www.hamconcolorado.org

July 27 – PPRAA Megafest
Lewis Palmer High School, Monument, CO
http://www.ppraa.org

August 27 – DRC HamFest
Contact Bryan - KB0A for More info.

THE ROUNDTABLE ARCHIVE

Have you been looking for a back issue of the Roundtable? Many are available on the DRC web site. Access **http:/www.w0tx.org**. On the left side of the page, click on "Roundtable".



DON'T FORGET DAYLIGHT SAVINGS TIME! AND SPRING IS JUST AROUND THE CORNER TOO!

MARCH 2013

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2 *Dr. Seuss Birthday* ***ARRL Int'l DX Contest Phone*** Begins 0000U
3 ***ARRL Int'l DX Contest Phone*** Ends 2400U	4 Last Quarter	5	6 ***Learning Net*** **7:30pm**	7	8	9
10 DAYLIGHT SAVINGS TIME	11 New Moon	12	13 ***Learning Net*** **7:30pm**	14	15	16
17	18	19 First Quarter	20 First day of Spring ***DRC Meeting*** Elmer 6:30pm General 7:00pm	21	22	23
24/31	25	26	27 ***Learning Net*** **7:30pm** Full Moon	28	29	30

Check www.ARRL.org for Contests and Rules!

DRC Board of Directors

President	KB0A	Bryan Steinberg	303-987-9596	kb0a@arrl.net
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Board Member	K0HTX	Dave Gillespie	303-880-1938	k0htx@comcast.net
Board Member	KD0CXX	Paul Meenach	720-746-1488	TBD
Board Member	N3PQ	Frank Ortega	303-452-0283	n3pq@hotmail.com

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Swapfest Mgr	KB0A	Bryan Steinberg	303-987-9596	drcfest@comcast.net
Field Day	OPEN for 2013			
Tech. Committee Chair	W6OAV	Bill Rinker	*Check Roster*	
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Web Master	N0LAJ	Bill Hester	*Check Roster*	

DRC Repeaters

BAND	Freq / Shift / PL Tone	Additional Information
6m	53.090mHz (-1mHz)	
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 (-) 100Hz PL	**Saint Anthony's**
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 and sole 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**