



# ROUNDTABLE

### PRESIDENT'S MESSAGE

By Bryan Steinberg – KB0A

Field Day is just a few weeks away and I want to thank Jason, ACOUA, for stepping up and taking the lead for this year's event. We are on again for Chief Hosa Campground; this is just North of I-70 at the Chief Hosa exit. Once again we will have the Salvation Army food truck providing meals and refreshments. We will also have the Salvation Army communications van and portable antenna tower. Being that the rest room facilities are still non-functional we will be using a Porta-Potty again this year. Please mark the dates on your calendar, setup will be on Friday, June 21<sup>st</sup> probably starting after Noon and continuing into Saturday morning. Feel free to bring friends and family members. We will have a GOTA (Get On The Air) station that will be available for unlicensed operators. Whether you come up for an hour, a day or camp out with us overnight all weekend please come by, do some operating and enjoy the shade and the cooler temps up in the foothills. I hope to see you there another helping to make this another great DRC Field Day in 2013.

What an exciting and lively meeting we had in May. Thanks to Steve, KFORW, for leading the discussion on digital amateur radio. There was definitely a lot of emotion but that was great. I heard that a few folks were disappointed that Steve was not able to do much of a demo of the MotoTRBO radios when we ran out of time. We have asked Steve to come back this month and perform the demonstration of the MotoTRBO radios. Prior to Steve's demos we will have a brief presentation on Field Day logistics.

As usual with Spring here the Tech Committee is stepping up to address their long list of projects. Especially those tasks which require climbing towers and travelling up to the tops of mountains. Are you interested in helping out and/or learning more about the technology we use to relay radio waves across mountaintops? If so, please stop by any of the Tech Committee meetings held at 6:30 PM right before the monthly club meetings. The Tech Committee meets in the room at the Western end of the basement at the Shrine.

Please, don't forget our annual Hamfest coming up in August, the 18<sup>th</sup> to be exact, at the Jeffco Fairgrounds in Golden. While I have been reminding members, and visitors, on the weekly net and in the RoundTable, the "official" email goes out this week to all past vendors. Don't miss out on getting a table and a great location. All tables are assigned in the order the reservation was received. So check out the club hamfest web page now, print out the reservation form and send it in with your check.

Till next time...  
Bryan, KB0A



### INSIDE THE ROUND TABLE

May Meeting - What'd I Miss	Pg 2	Propagation Charts	Pg 6
Automatic RF Frequency Measurement	Pg 3	Up Coming Events & Calendar	Pg 7
So what is Field Day?	Pg 5	DRC Information	Pg 8
HamCon Colorado	Pg 6	Museum Ship Weekend	Pg 9

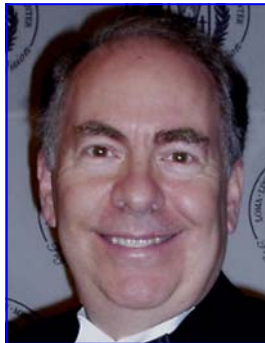
## MAY MEETING - WHAT'D I MISS

By Bill – W6OAV

There were 38 attendees this month. Bryan, KB0A, began the meeting with introductions. He then gave an overview of the processes involved in setting up for Field Day. He announced that Steve, KFORW, had obtained last year's site. Bryan asked for a Field Day coordinator. Jason, AC0UA, volunteered. Jim, KOTOR, finished the business meeting by thanking everyone that helped with both the Lakewood and Wheat Ridge siren tests.

The meeting was then turned over to the guest speaker Steve, KFORW. His subject was MotoTRBO. Steve covered the following subjects:

- Analog verses digital technology.
- Advantages of MotoTRBO over analog systems.
- TDMA, FDMA and AMBE protocols.
- Commercial radios verses amateur radios.
- Advantages and disadvantages of MotoTRBO and D Star.
- An overview of the Front Range MotoTRBO network.
- Networking between repeaters, simultaneous talk groups on the same frequency.
- Additional features offered by MotoTRBO.



The presentation ended with an audience participation discussion of proper emergency communications.

Note: A good MotoTRBO FAQ: [http://www.portablecomm.com/MotoTRBO/MotoTRBO\\_faqs.htm](http://www.portablecomm.com/MotoTRBO/MotoTRBO_faqs.htm)

## JUNE MEETING ANNOUNCEMENT

By Bill –W6OAV

The June 19<sup>th</sup> meeting will have a logistics presentation by Jason, AC0US, Field Day Chairman, on the upcoming DRC field day event to be held the weekend of June 22<sup>nd</sup>. Additionally, Steve, KFORW, will present a follow up discussion on MotoTRBO. This particular discussion will cover purchasing MotoTRBO, setting up the radio, "CPS" software, hand held antennas, use of Bluetooth with the radios, and more. There will also be an update on new TRBO repeaters along the front range.



## TECHNICAL COMMITTEE REPORT

By Bill – W6OAV

This report provides an overview of items discussed during the May Technical Committee meeting.

**Relocate Remote End of MotoTRBO Internet link. Research is continuing for a location.**

**Consider narrow banding one, or more, of our UHF repeaters.**

**The St Anthony site would be a good location for implanting a narrow band repeater. Reprogramming is all that would be required. Most new radios can operate narrow band. KB0A will discuss this with the CCARC.**

**Need a Freq Coordinator position @ CCARC . Still looking for a frequency coordinator.**

**Need a Field Day coordinator. AC0UA has volunteered. [Thank you.](#)**

**Design and implement a TSA emergency cell/laptop charging station.**

**N1ETV and KA0BBQ will work this project.**

**TS-940 Repair.**

**KOTOR is making good progress. There were many problems with the 940.**

**Assign status to future planned projects. Eight additional projects assigned to either "In queue" or "To be scheduled".**

## NEW TO AMATEUR RADIO?

Now is your chance to sneak away from the house, head for the hills and work some DX. Field Day 2013 is just a few weeks away June 22<sup>nd</sup> and 23<sup>rd</sup>. Field Day is the single most popular contest weekend all year. Come find out why. For more information about Field Day 2013 come to the June meeting on the 19<sup>th</sup>.

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

## 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.

Brian G. Cook	N0TBM
Laura Cook	N0UXS
Kevin Schmidt	KD0UCG
Axel Sjogren	W0GKR
Kenneth St. John	K0UZ

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>.

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## AUTOMATIC RF FREQUENCY MEASUREMENT

By Ed Mersich – WA6RZW

Soon after becoming a ham, I got my first PC, (personal computer). Throughout the years, radio has served as a convenient resource of projects and challenges to further my computer adventures. So too is the present endeavor to automate precision radio frequency measurement. A couple years ago I became interested in "frequency"; more specifically the measurement of frequency. I started out slow, with low frequencies. Before tackling radio frequencies I cut my teeth on the 60Hz power line. It turned out to be an interesting, rewarding and learning experience. You can see the results on my Power Grid Frequency Web Page at: <http://wa6rzw.homelinux.net/addon/grid/gauge/hertz.html>

While I have been aware of ham radio FMT (frequency measurement tests) for many years, I did not give it serious thought until a couple years ago. The ARRL sponsors a semi-annual FMT run in the spring and fall each year. The FMT is a technical exercise for hams to measure the frequency of an unknown HF radio signal and report their results. It's a technical contest. The first ARRL sponsored FMT was carried out on October 24<sup>th</sup>, 1931; with a second test on October 31<sup>st</sup>. These

first tests were made on 80 and 40 meters by 16 crystal controlled stations from coast to coast. That first FMT produced frequency reports from 212 hams including 8 DX stations. The latest ARRL FMT was held on April 11<sup>th</sup>, 2013. Four transmitting stations provided 6 separate test signals on the 80, 40 and 20 meter bands. A total of 61 receiving stations, including 5 DX operators reported results. Considering there are over 750,000 U.S. hams today, FMT is truly a niche endeavor, (0.00747% of U.S. hams reporting).

I have now participated in several FMTs and it is a challenge. The "pro-hams", have been turning in results with sub 10mHz (<0.010 Hz) error figures, with several regular 0 Hz error reports for a couple years now. These very accurate measurements are made using computer software analysis tools, and SDR (software defined radios). There are several popular, low cost (free) and very accurate and powerful software tools available to assist in the measurement of frequency. PC (computer) based tools such as Agro, Fldigi, and Spectrum Lab are commonly used for FMT. Spectrum Lab provides the capability to analyze the spectrum of an audio signal via the PC's soundcard, using FFT (Fast-Fourier Transformation); a method of providing mathematical analysis to complex waveforms. While Spectrum Lab is a very powerful tool with a significant learning curve, it is by far the most popular item in the FMT toolbox.

For my part I have self imposed rules, no graphic analysis software, I have elected to use hardware measurement tools, with no repeats of measurement configurations. While I have made measurements with piles of test equipment, countless BNC jumper cables my thoughts have turned to automation. How to automatically measure an unknown signal to within <1Hz accuracy. To this end I decided to interface my HF receiver and all test equipment needed to accurately measure radio frequencies to a computer and automate the process, providing a web user interface.

I called my project ARFM (automatic radio frequency measurement). At the heart of the process is a homebrew software program called, "scripter". Scripter is a flexible program able to communicate with various categories of products, such as test equipment, radios, computers, and various interface devices, such as serial, usb, ethernet, and gpib, converters and adapters. It communicates with specialty communications resources such as "hamlib", (backend for fldigi) and "usbttmc", (USB test & measurement class device).

*(Continued on page 4)*

(Continued from page 3)



FMT Test Equipment

Scripter can communicate with virtually anything, and is easily extensible. The hardware components used in the automated frequency measurement process consists of a HF communications receiver, frequency counter, AF/RF signal generator and a general purpose Linux OS based computer. A few auxiliary, but critical hardware devices are use for inter-device communications. These devices include, USB (universal serial bus) and serial RS232 converters, USB extender, USB hub, GPIB (general purpose interface bus) controller, internet to RS232 serial server. In addition to the communications accessories, a Trimble Thunderbolt GPS clock/reference source, together with a 10MHz reference signal via a fiber optic distribution network is included.

The actual frequency measurement is a three step process. While too complicated to describe in detail, here is an abbreviated description. I place the receiver in the CW mode and make a rough VFO "A" adjustment. This initial tuning results in an audio heterodyne (beat) tone around 600Hz, and counted by the counter, the computer fine tunes the radio to refine the 600Hz tone. After the initial VFO "A" tuning the computer takes a series of frequency samples of the beat frequency. We use the best quality results from the samples. The computer controls the radio via the CAT (computer aided-tuning) interface. Control is transferred to VFO "B" and the "B" antenna input.



FMT 20m Test Run

The second radio antenna input is connected to an RF signal generator. Using the previous sample frequency, the computer now adjusts the RF signal generator to reproduce the original beat tone. The RF frequency generator is now set to the original unknown RF frequency. We use the frequency counter to measure the final frequency and report it via the web page interface.

On the evening of April 11<sup>th</sup> ARRL FMT, band conditions were rather poor. With marginal solar propagation numbers and severe weather from West of the Mississippi to the East coast I was a bit apprehensive about my prospects. I was not able to copy the first test transmission on 20m; there was just too much QRN and QSB. I was able to copy and measure the remaining five test signals. Error figures for the tests ranged from 0.84 to 0.030 Hz; all within the "official" <1Hz error tolerance. My results as shown below with error value shown in bold.

WA6RZW	CO	W0	80m	40m	20m
K5CM			3,599,778.16 <b>-0.38</b>		
W8KSE			3,599,756.54 <b>0.84</b>		14,121,898.27 <b>-0.03</b>
WA6ZTY				7,054,994.62 <b>-0.09</b>	
W6OQI				7,055,111.37 <b>-0.16</b>	

WA6RZW April '13 FMT Results

You can learn more about my project at: <http://wa6rzw.homelinux.net/addon/fmt/arm>. There are numerous ways to measure and calculate unknown radio frequency, with hundreds of variations to the process. The challenge of FMT need not be expensive. FMT can provide a step up to a greater understanding of the mysteries of radio communications, physics, and mathematics. You can find much more about FMT, and Spectrum Lab on the web, there is a Yahoo Group called "FMT-Nuts", where you can find other hams passionate about this little explored aspect of ham radio. FMT is open to all ham classes, as no transmitter is required, even non-hams are encouraged to participate.

At the heart of the ARFM process is the "scripter" program. Scripter is quite flexible and extensible with potential for interfacing and communicating with radios, test equipment, computers, all manner of serial and USB devices for diverse applications. If you're a computer enthusiast and experimenter, "scripter" is available under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. If you are interested in using or studying the code in greater detail, please contact me.

## So What Is Field Day?

Excerpted from <http://www.arrl.org/field-day>

ARRL Field Day is the single most popular on-the-air event held annually in the US and Canada. On the fourth weekend of June of each year, more than 35,000 radio amateurs gather with their clubs, groups or simply with friends to operate from remote locations.

Field Day is a picnic, a campout, practice for emergencies, an informal contest and, most of all, FUN!

It is a time where many aspects of Amateur Radio come together to highlight our many roles. While some will treat it as a contest, other groups use the opportunity to practice their emergency response capabilities. It is an excellent opportunity to demonstrate Amateur Radio to the organizations that Amateur Radio might serve in an emergency, as well as the general public. For many clubs, ARRL Field Day is one of the highlights of their annual calendar.

The contest part is simply to contact as many other stations as possible and to learn to operate our radio gear in abnormal situations and less than optimal conditions.

We use these same skills when we help with events such as marathons and bike-a-thons; fund-raisers such as walk-a-thons; celebrations such as parades; and exhibits at fairs, malls and museums — these are all large, preplanned, non-emergency activities.

But despite the development of very complex, modern communications systems — or maybe because they ARE so complex — ham radio has been called into action again and again to provide communications in crises when it really matters. Amateur Radio people (also called “hams”) are well known for our communications support in real disaster and post-disaster situations.



*Plan to attend the DRC Field Day 2013 event at the Chief Hosa Campground on the North side of I-70 at Exit 253 . It is truly a special event sponsored by the Amateur Radio Relay League nationally and your very own Denver Radio Club locally.*

*You don't have to stay the entire time but you should come and get on the air. For Technicians and Generals you have a rare opportunity to work the bands that are not normally available to you.*

*Also this is a time when members and new members can get together for an eye-ball QSO.*

## QUESTION OF THE MONTH

By Bill – W6OAV

### QUESTION:

I plan to install a 10 meter quarter wave vertical (8.2') with an 8' ground rod at the base Will the quarter wave length ground rod act as the other quarter wave half of the antenna thus creating a vertical dipole? Will this remove the requirement for radials?

### ANSWER:

I assume you are referring to the classic diagram of a quarter wave vertical as shown in Figure 1. This is a “functional schematic” of a vertical. In reality, a vertical does not work this way. The earth acts as the other quarter wave. As shown in Figure 2, the RF current

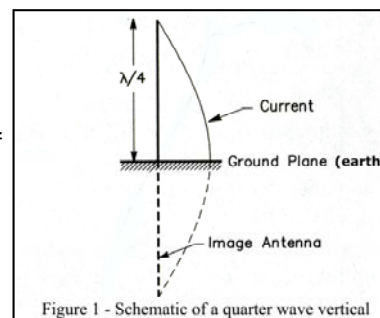


Figure 1 - Schematic of a quarter wave vertical

flows in the upper few inches of the lossy earth. Thus, the ground rod has no effect on the RF current flow in the earth. Radials are needed to provide a less lossy path for the RF current flow. Without radials, most of your RF

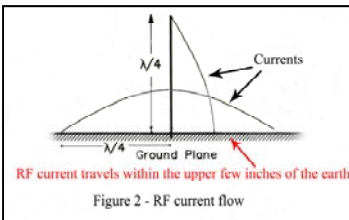


Figure 2 - RF current flow

power will dissipate in the earth's surface. As a general rule, adding 4 quarter wave radials will increase the vertical's radiated signal by 10 to 15 dB! Increasing the number of quarter wave radials to 16 will increase the radiated signal by about a dB or two. Anything beyond 16 radials is a waste of money since the improvement will be minimal.

The radials do not have to be exactly a quarter wave in length. Since they are so tightly coupled to the earth they are not resonant. They are just a low loss path for the RF flowing in the ground. Also, as Figure 2 shows, the bulk of the RF current is within first 1/8 wave length of the base of the antenna. Therefore, many 1/8 wave length radials are better than a fewer 1/4 wave length radials. Radials longer than a quarter wave make very little improvement in the radiated signal as the current in the ground beyond a quarter wave length is minimal. Some hams, including myself, have had great success by laying chicken wire on the ground underneath the vertical.

Thank you for submitting your question.



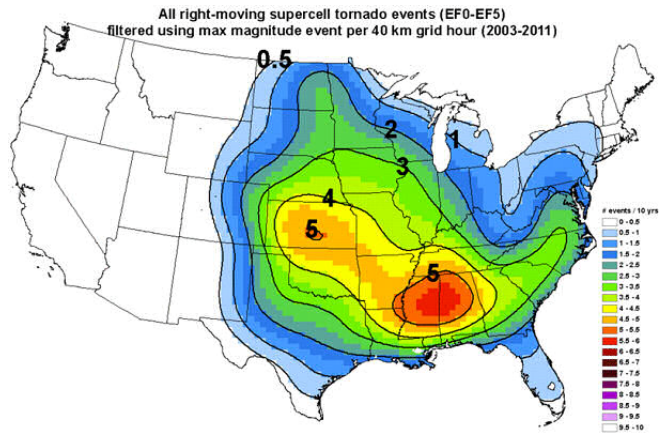
Here are the dates to mark your calendar, June 28-29 & 30, 2013. That is HamCon Colorado 2013. This Event has been in the planning for nearly two years and is proving to be the Biggest and Best HamCon every for our state. For easy access to the HamCon web page go to the DRC web page and simply click 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!**

### SPC TORNADO ENVIRONMENT WEBPAGE

*A tornado environment dynamic webpage browser for the contiguous United States is now available.*

A tornado environment--convective mode sample spanning the 2003-2011 period displays statistical information of supercell-related convective parameters accompanied by smoothed tornadic convective mode climatology images. Through a collaborative effort between Storm Prediction Center (SPC) forecasters, SPC techniques development meteorologists, a National Severe Storms Laboratory scientist, and a graduate student with the University of Oklahoma, this specific work is an example of a Research-to-Operations (R2O) web-based tool. This tool has multiple applications that can serve to enhance severe storm training material, provide a climatological reference to forecasters in a real-time situational awareness warning situation (via decision support), and, in a post-mortem setting, act as an outreach mechanism to the severe storms community.



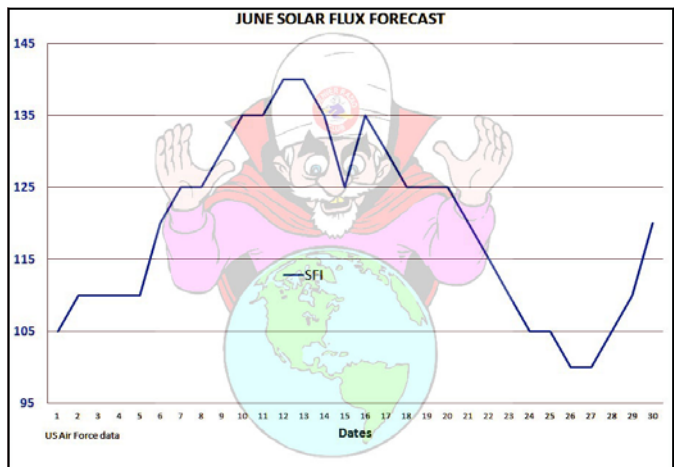
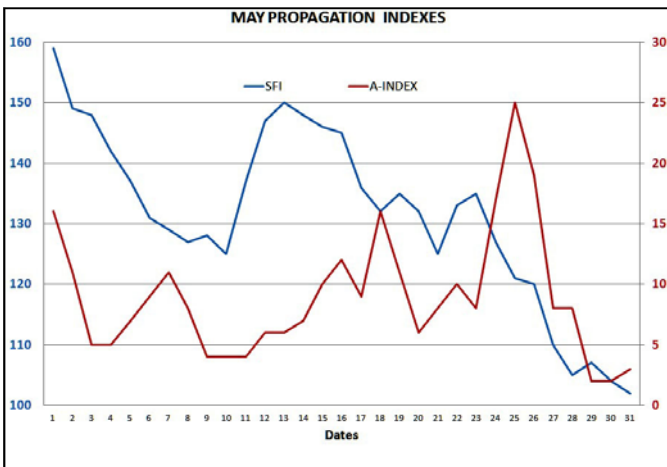
Link to the Tornado Environment Webpage:  
<http://www.spc.noaa.gov/exper/envbrowser/>

### 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](http://www.w0tx.org).



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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](http://www.arrl.org/hamfests).

**June 22-23** – DRC~ARRL Field Day  
 Chief Hosa Campground  
 More information at June Meeting and  
 At <http://www.w0tx.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 18** – DRC HamFest  
 Contact Bryan - KBOA for More info.  
<http://http://www.w0tx.org/hamfest.htm>









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### THE ROUNDTABLE ARCHIVE

Have you been looking for back issues of the RoundTable? Many are available on the DRC web site.



Scan the QR code or go to <http://www.w0tx.org/RoundtableAccessPage.htm>

JUNE 2013							<i>DRC Net Sunday's at 8:30pm Local on 145.490 &amp; 448.625 (No PL)</i>						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 <i>Atlantic Hurricane Season Begins</i>							
2	3	4	5 <i>Learning Net 7:30pm</i>	6	7	8 <i>ARRL VHF QSO Party Starts 1800U</i>							
9 <i>ARRL VHF QSO Party Continues</i>	10 <i>ARRL VHF QSO Party Ends 0300U</i>	11	12 <i>DRC Meeting Elmer 6:30pm General 7:30pm</i>	13	14  <i>Flag Day</i>	15 <i>ARRL Kid's Day 1800U to 2400U</i>							
16  <i>Father's Day</i>	17	18	19 <i>Learning Net 7:30pm</i>	20	21 <i>First Day of Summer</i>	22  <i>ARRL Field Day June 22 &amp; 23, 2013 www.arrl.org</i>							
23/30  <i>ARRL Field Day June 22 &amp; 23, 2013 www.arrl.org</i>	24	25	26 <i>Learning Net 7:30pm</i>	27	28	29 							

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## DRC REPEATERS

BAND	Freq / Shift / PL Tone	Additional Information
6m	53.090MHz (-1MHz)	
Packet	145.05MHz<>14.105MHz	
2m	145.490MHz (-) 100Hz PL	<a href="#">Linked to the 70cm - 448.625MHz machine.</a>
2m	147.330MHz (+) 100Hz PL	<b>Local Area, Members Auto-Patch Does Not TX a PL!</b>
2m	147.330MHz (+) 131.8Hz PL	<b>Not in service at this time!</b>
1.25m	224.380MHz (-) 100Hz PL	
70cm	447.825MHz (-) 100Hz PL	<a href="#">Saint Anthony's</a>
70cm	448.625MHz (-) 100Hz PL	<a href="#">Linked to the 2m - 145.490MHz machine.</a>
70cm	449.350MHz (-) 100Hz PL	<a href="#">Wide area coverage with Echolink Node # 4140.</a>
70cm	446.7875MHz (-)	<a href="#">MotoTRBO Repeater   Slot 1 – DMR-MARC WW, Slot 2 – Local</a>

## 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**



# MUSEUM SHIPS WEEKEND

The Brazos Valley Amateur Radio Club, KK5W is participating in this year's Museum Ships Weekend. **June 1-2, 2013**. Our call sign, KK5W will be credited as a contact with both WW II Submarine USS Cavalla and Destroyer Escort USS Stewart. Visit our web page for more information, [www.bvarcmswe.org](http://www.bvarcmswe.org). We will be operating from Seawolf Park in Galveston, Texas, NA-143.

Frequencies as follows:

SSB	CW
7.260 MKHz	7.039 Mhz
14.260 MHz	14,039 MHz
21.360 MHz	21.039 MHz
28.360 MHz	28,039 MHz

Amateur radio operators in the Galveston - Houston area are cordially invited to participate. You can sign up on the web page if you would like to operate KK5W during the event at Seawolf Park.

KK5W will also host two VHF Nets for Houston-Galveston amateurs to contact the local museum ships using the WA5CYI repeater 146.94 (-) PL 167.9 on Saturday and Sunday from 11AM - 1 PM Local time. We are anticipating the USS Texas (NA5DV), Elissa (N5E), and the Grandcamp/High Flyer Memorial (AC0TX) will be on the net.

Operation on OSCAR satellites is planned for daytime passes on Saturday, June 1. A balloon launch is scheduled for Saturday morning,

For the second year, KK5W is sponsoring the Texas Navy Award. This year's Texas Navy Fleet is expanded to include:

- USS Cavalla and USS Stewart KK5W
- USS Texas NA5DV
- Tall Ship Elissa N5E
- USS Lexington W5LEX
- SS High Flyer and SS Grandcamp Memorial AC0TX
- National Museum of the Pacific War N5P

For KK5W and AC0TX, one contact counts for both ships.

Provide evidence of two way communication (log extract) with at least four of the call signs during MSWE 2013 to earn the 2013 Texas Navy Certificate. Work all six to earn the coveted "Clean Sweep" endorsement. Visit our web page, [www.bvarcmswe.org](http://www.bvarcmswe.org) for information on how to claim the certificate.

73,  
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[www.qrz.com/db/k5hm](http://www.qrz.com/db/k5hm)

