ROUNDTABLE

The Denver Radio Club Newsletter

February 2012 Since 1917

PRESIDENT'S MESSAGE

By Bryan Steinberg – KB0A

As we are moving further into 2012 the sun spot numbers are climbing with the concurrent increase in DX activity on the higher HF bands. Are you HF-active? We've already seen a number of large CMEs (Corona Mass Ejections) which have produced phenomenal Northern Light displays which have been seen into the Northern part of the US. So far, we have been spared any major electric system blackouts, but at least one is possible as we continue to move into the peak of of the sun's cycle. Are you prepared? Do you have battery and/or generator backup capability to keep your station on the air when "All else fails?"

As I hope you know the DRC supports The Salvation Army, West Metro Fire District and the City of Lakewood with emergency communications capabilities. Are you interested in helping out when an emergency strikes? If so, contact our EmComm Coordinator Bob Zimprich, KBØBZZ. You will find Bob's contact info in the back of every issue of the Roundtable.

Thanks for Bill, W6OAV, and Bill NØLAJ, for their great presentation on using the Radio Mobile program to determine propagation characteristics for working with our local repeaters. In particular it has helped us to better understand the coverage patterns of the new St Anthony repeater.

One more thanks for Paul, KDØCXX, not only is he a board member but Paul have agreed to help the club by taking on the Education Coordinator position. Thanks Paul!

Our February meeting will feature a presentation by RT Systems which provides software for programming Yaesu and Icom radios. RT Systems has recently moved to the Denver area and contacted us to present to the club. I expect that we will hear information about their programs and cable offerings and, hopefully, their plans for new features. Our March meeting will feature Wayne Heinen, NØPOH, who will fill us in on using meteor scatter for HF propagation Join us at our regular meeting location, the El Jebel Shrine in Denver. 7:30 PM for the membership meeting and 6:30 for the Elmer or Tech Committee meetings.

PS – the 2012 club rosters are in, so if you did not get yours at the holiday party or January meeting be sure to check with Bob, KCØCZ, at the club meeting.

Until next month…

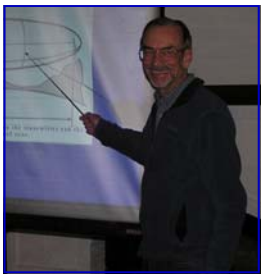
Bryan – KBØA
President

INSIDE THE ROUND TABLE

JANUARY MEETING - WHAT'D I MISS

By Bill – W6OAV

There were 49 attendees at this month's meeting. After introductions, Bryan, KB0A , covered upcoming ham fests. He then turned the meeting over to the guest speakers Bill, N0LAJ, and Bill, W6OAV. The presentation consisted of two parts. W6OAV covered basics of using VE2DBE's "Radio Mobile", a free software application that derives the radiation pattern of a station as well as RF profiles between stations. Time did not allow covering the many advanced applications features. N0LAJ followed with a tutorial on RF propagation basics, including Fresnel Zones, refraction, diffractions, path loss considerations, etc. The tutorial was designed to aid a user in interpreting the output of Radio Mobile.



Quite a few in the audience expressed interest in using the application. Anyone wishing to learn about it should download the user's guide from VE2DBE's web site: http://www.cplus.org/rmw/english1.html,

When ready to download and install Radio Mobile, download and use G3TVU's installer and Quick Guide from:
http://www.g3tvu.co.uk/Quick_Start.htm

FEBRUARY MEETING ANNOUNCEMENT

By Bill – W6OAV

Rod and Karin Thompson (KU4HP and KD4DXX) will discuss their line of radio programming software produced by their company, RT Systems, which recently relocated to Broomfield, CO. They will cover the following:

- How to set up memory channels without using the radio's function key.
- How to program D-Star channels with just mouse clicks.
- How to customize the rest of radio menu items the way you want them.

Rod and Karin met while attending the University of Alabama, Huntsville where he studied electrical engineering and she studied civil engineering after having obtained a degree in mathematics. Both are 20+ year hams.

In 1991 they developed and were the first to sell the highly popular SAM Amateur Radio Callsign Database which was greatly needed in the ham community.

In 1995 they went on to introduce the first programmer for the Yaesu FT-11. When Yaesu announced that this radio would "clone radio to radio" they worked to make it talk to the computer. Once they found out this could be done, programming for amateur radios from the computer was born. This caused quite a change to the industry since today there is not a successful HT or mobile radio that does not have the ability to be programmed from the computer. With the recent addition of the Alinco line, RT Systems currently offers programming for 84 different radios.

They have learned how to do many things with these radios and they work today to help others enjoy the hobby through tech support that extends well beyond the use of the programs. RT Systems owns every radio for which it does programming (some are really antiques now!) and is able to do live testing to better understand all features.

Rod hosts a D-Star repeater which will be operational soon and will be open to everyone and available for testing or just plain fun. You can be sure it will be monitored during business hours and every effort will be made to answer any call in hopes of encouraging use of the D-Star system worldwide.

JANUARY TECH COMMITTEE REPORT

By Bill – W6OAV

This report provides an overview of items discussed during the January Technical Committee meeting. Comments on items are red.

Voter System

Goal: Design, build and test a 147.33 MHz voter system consisting of a central voter site and one remote site (Phase 1).

- Phase 1 Items to be completed as time permits:
  - ♦ Re-install the voter controller and reconfigure the interface between the controller and the UHF link receiver.
  - ♦ Adjust UHF link transmit antenna - KB0A will use his analyzer to check the receive antenna system.
  - ♦ Calibrate the local and remote audio levels and responses - KB0A will use the IFR to set levels.

KB0A will accomplish the above as time and weather permits.

- Phase 2 initial items:
  - ♦ Determine the transmitter's coverage areas and "dead zones" for possible remote sites:
    - ∗ Use Radio Mobile plot to identify the "dead zones".
    - ∗ Pick predominate "dead zones" for possible remote sites.

N0LAJ and W6OAV have successfully used Radio Mobile software to determine the RF dead zones. More detailed coverage maps will be emailed to tech committee members in the near future for analysis.

ST. Anthony Repeater

Goal: Improve coverage.

- Replace the present antenna with a X30 omni vertical.
- WW0LF will make up a coax jumper for the new antenna.
- K0HTX will supply the necessary ladder when the antenna is replaced.

Tech committee members will record the present signal strength for benchmarking after the antenna is replaced.

Discussion tabled until next meeting.

Noise at Station 4

Goal: Reduce the power line noise affecting all systems.

WW0LF finally was able to obtain a Xcel contact. The DRC is 64 on their noise abatement list. WW0LF will maintain contact with Xcel to monitor their progress with the list.

Club ATV

Goal: Investigate possibility of the DRC building a digital Amateur TV (ATV) system.

Steve, KF0RW, and Ed, WA6RZW, discussed the possibility and benefits of the DRC building a digital ATV system. Ed is willing to donate a digital ATV transmitter to get the project going.

The presentation appeared to be well received and the matter is now under consideration. Bryan, KB0A suggested that the DRC choose a chairman for the project. Two tech committee members expressed interest.

New MotoTRBO Repeater

Goal: Build a new MotoTRBO repeater.

- Due to notification that digital repeater frequencies are going fast, KB0A has submitted a Request for Coordination (RSE) to the CCARC for a pair of MotoTRBO frequencies to be used by the club. The RSE has specified the St. Anthony Hospital campus as the site. Develop a project plan.

Discussion tabled until next meeting.

TS-940 Failure

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

K0TOR has repaired all problems except for the automatic tuner. He had to replace several parts.

Additional Items

- W0GV is working to acquire a door key for the Hudson site.
- W0GV is working with the Rocky Mountain Ham group to keep status of their 3GHz data backbone system available to the Tech Committee.

Discussion tabled until next meeting.

W0TX PACKET GATEWAY LIVES AGAIN!

By Bill – W6OAV

Just before Christmas the 20 meter side of the 2 meter to 20 meter packet gateway died. Remote testing indicted that the TS430 transceiver was not properly working. The TS 430 and its power supply were delivered to Ron, W9UW, for analysis. Ron found that the Kenwood power supply had jumped from 12 v to 22 v. According to the Internet this is a very common problem with that power supply. Fortunately, the TS430 wasn't damaged.

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Right after New Year's Day Ron and I reinstalled the TS430 and a new Samilex power supply at Station 4. At right, Ron is configuring the TS430 for packet operation at Station 4. Note the six meter repeater behind Ron and N1ETV's homebrew 6 meter duplexer to his right.

In the back of his pickup, Ron is using his portable packet station to remotely reprogram the gateway TNC. Note Ron's high tech computer table and sun shade. True ham innovative spirit!

SAFE WI-FI COMPUTING – PART 5

By Bill – W6OAV

Part 5 discusses some of the common ways hackers can attack a station at a Wi-Fi hotspot. The reader might want to review the acronym definitions contained in the introduction to this document.

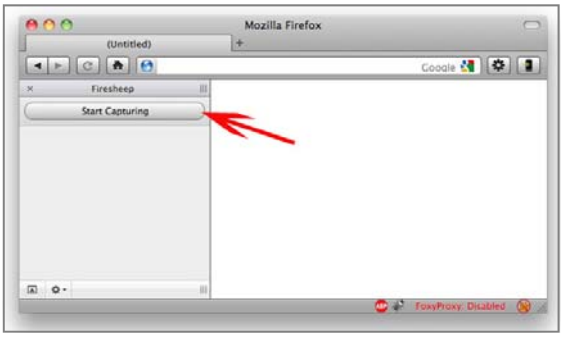
First a couple of questions:

1. If the hotspot is using WPA2, the most robust encryption, is a station user safe when using this network? The answer… Not necessarily. Everyone using the WPA2 network was given the same password. Hence, everyone is using the same encryption.
2. Are you safe when accessing a web site using https://www? ("https" means that the connection to the web site is encrypted). The answer…Not necessarily. Many sites encrypt the log-in but not the cookie that is transmitted after the log-in. A hacker can capture that cookie for hacking by using a free Firefox plug-in called Firesheep. Keep in mind that, according to several computer magazines, this plug-in has been downloaded over a million times! Do you think these people are downloading this application just for the fun of it?

There are many ways the hackers can attack your station and/or intercept your critical information. Some of the most common ways are described below.

COOKIE CAPTURE

As described above, a hacker, using Firesheep, can capture un-encrypted cookies when station users log into web sites, even if the log-ins are encrypted (https://www).



A hacker, after bringing up Firesheep, clicks the "Start Capturing" button to monitor all traffic.

When Firesheep sees un-encrypted cookies, it captures and displays them.

Now, the hacker can use one of the cookies to access that unsuspecting cookie owner's web site. For this discussion, assume that the hacker clicks Ian's Facebook icon. The hacker now becomes Ian on Facebook and can do anything that Ian can do.

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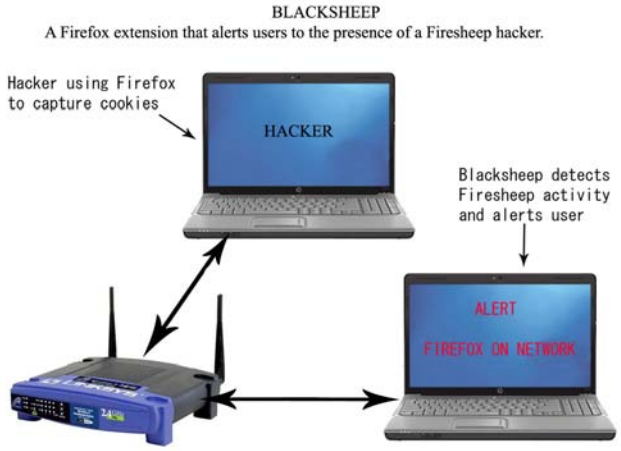
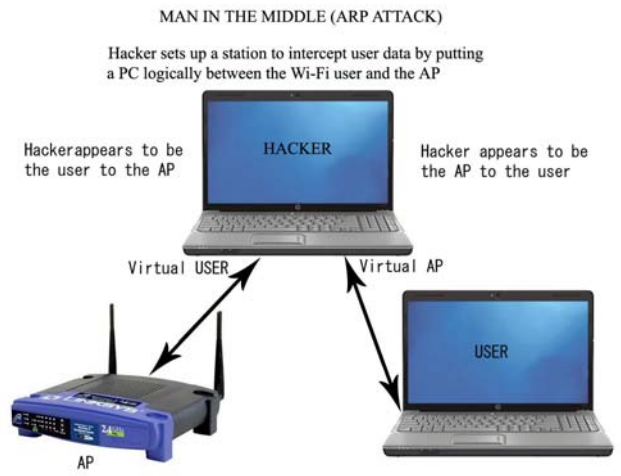
How does one combat Firesheep? Down load and install a free application called Blacksheep.



As shown above, Blacksheep detects and alerts the user that Firesheep is operating in the vicinity.

MAN IN THE MIDDLE

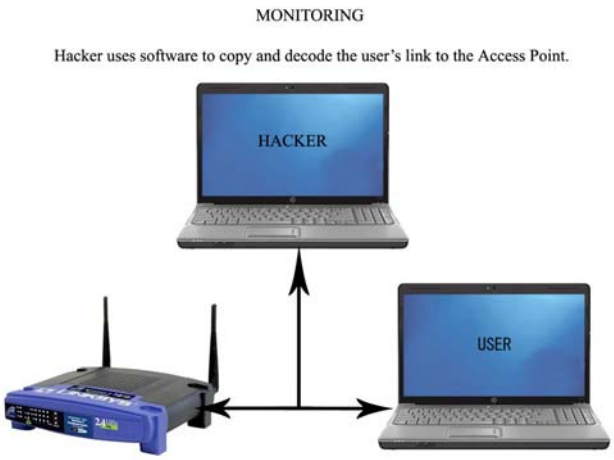
Another common hacker attack is called “Man in the Middle” which is also known as an “ARP Attack”. …The description of which is beyond the scope of this article.



The graphic above depicts a hacker, using an “ARP” attack, to become an AP to the station user and allowing the hacker to be the station user to the hotspot AP. Therefore, the hacker is logically between the user and the hotspot AP. The hacker can now intercept all traffic.

MONITORING

There are sophisticated applications that actually allow hackers to decode, monitor and record traffic between the user and the AP. As shown in the graphic below.



SHOULDER SURFING

An effective, and low tech method, used by hackers is over the shoulder surfing. The hacker basically stands behind the victim and observes the important key strokes. Sometimes the hacker will use a camcorder at a distance, zoom in on the user’s keyboard and record the keystrokes. Sometimes the hacker will sit near an unsuspecting user and use a Smartphone to video important keystrokes.

THE THUMB DRIVE

Hackers will sometimes leave a nice looking thumb drive lying in a hotspot location. The finder plugs the thumb drive into his station to see what is on it. He might find a few interesting innocent items on the thumb drive. However, unknown to the user the activation of the thumb drive loaded a keylogger or other malware onto the station.

Part 6 will discuss how to handle these security situations.

SOLAR UPDATE
Solar Flairs Light Up Northern Skies

X-FLARE: Departing sunspot 1402 unleashed an X2-class solar flare today, Jan. 27th, at 18:37 UT. The photo at the top of 6 shows the extreme ultraviolet flash recorded by NASA's Solar Dynamics Observatory.

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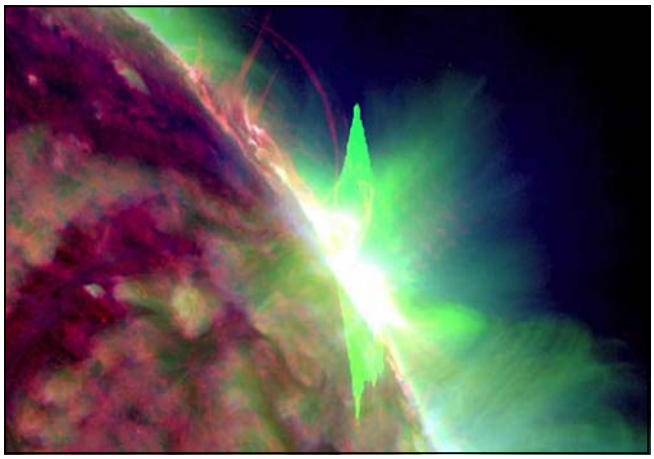
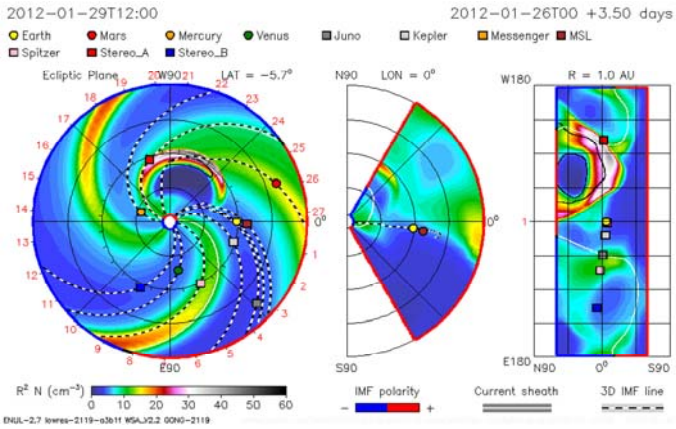


Sunspot 1402 is rotating onto the far side of the sun, so the blast site was not facing Earth. Nevertheless, energetic protons accelerated by the blast are now surrounding our planet, and an S2-class radiation storm is in progress.



The explosion also produced a spectacular coronal mass ejection (CME). Analysts at the Goddard Space Weather Lab say the cloud raced away from the sun at 2500 km/s or 5.6 million mph. The CME is not heading toward Earth, although it is too soon to rule out some kind of glancing blow on Jan. 28-29. Stay tuned for updates.

AURORAS OVER THE USA: The geomagnetic storm of Jan. 24th died out before night fell over North America--or did it? According to reports still trickling in, auroras were reported not only in Canada, but also in some of the lower 48 US states. Shawn Malone of Marquette, Michigan, took this picture *(top right)* looking north from the shores of Lake Superior.

"I got to view a slice of the aurora through a tiny opening in an otherwise completely overcast sky," says Malone. "It appeared to be a pretty decent display."

Prompted by the CME warning, Mike Hollingshead of Nebraska drove 450 miles to the Badlands National Park of South Dakota hoping to catch a glimpse of the auroras. He got more than he bargained for: "While I waited for some sign of auroras, the most amazing fireball I've ever seen blasts down. It flashed brightly and illuminated the terrain around me." Later, the auroras made a belated appearance, turning the badland sky green.

Source: www.spaceweather.com

DISCIPLINE FOR A WALMART CLOCK

By Ed Mersich – WA6RZW

While working on my amateur digital TV project I acquired a non-working signal generator. This acquisition led me into an unexpected but totally interesting and rewarding line of electrical experimentation. So began the project to apply GPS discipline to a Walmart, $3.47, Chinese wall clock. Before I summarize the clock modifications let me tie the clock back to the broken signal generator. I repaired the signal generator but was sure the internal oscillator was not producing the 10MHz output required. I tried beating the generator oscillator with WWV, but a lot of experience and skill is required to achieve an accurate synchronization using this method. I then tried the Spectrum Lab software to develop a graphic representation of the beat signal. I wasn't pleased or confident in those results either. I abandoned the WWV approach and went for the hardware solution. I obtained a surplus rubidium based 10MHz reference oscillator and was able to directly compare and adjust the signal generator. But…, was the rubidium time base really 10MHz? "*A man with one clock knows what time it is. A man with two clocks is never sure"*. I needed another clock. I acquired a surplus GPS clock; I was happy; the rubidium reference and GPS clock agreed. *(photo top of page 7)*

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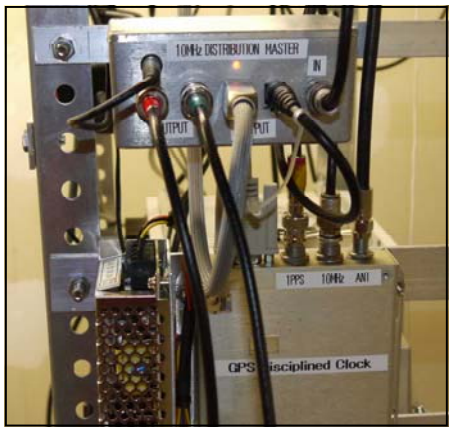
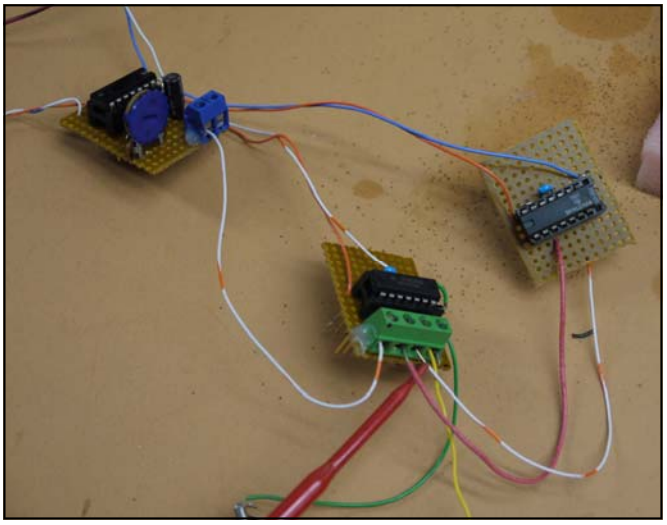


GPS Clock and 10MHz Distribution

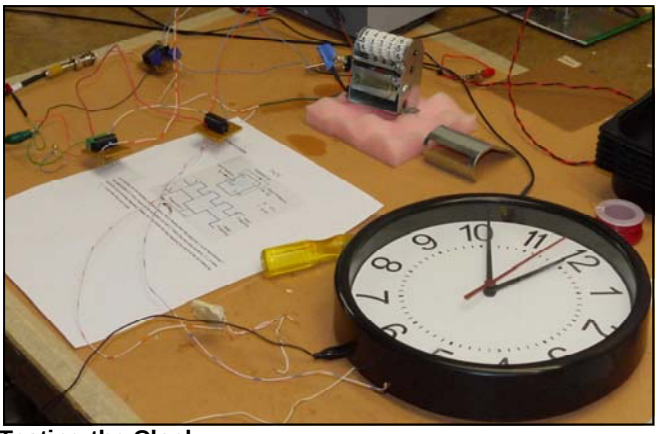
Aside from the 10MHz output the GPS clock is also connected to my radio station computer, for management purposes, and it conveniently provides the time of day on my computer screen as well. Now, I never expected my computer's internal clock to match the GPS clock, but I did expect my AC line powered Heathkit CG-1005 radio station Zulu reference clock to match GPS (UTC) time. It did not! No matter, I am sure we had a short power hit and momentarily lost sync with the 60Hz Western U.S. power grid. I reset the Heathkit time. The next day I found the Heathkit and GPS out of agreement again; by several seconds! I began to think about ways to discipline the Heathkit clock to the GPS standard. The Walmart wall clock is the proof-of-concept project.

Most of the electro-mechanical household quartz controlled clocks use an electro-magnetic device to power or turn the clockwork mechanisms. Since the GPS clock, in this case a Trimble Thunderbolt, manufactured in 2002 also provides a one-pulse-per-second (1PPS) output connector it seemed like a simple matter of driving the clock motor at the correct time interval. I soon discovered the 1PPS pulse from the GPS was only 10us (10 micro-seconds) in width, not nearly wide enough to power the wall clock. I needed to lengthen the 1PPS pulse without affecting the fundamental one second interval. The pulse stretching circuit was made with a 7474 TTL IC. This dual D-type flip flop provided a 150-250ms 1PPS pulse.



Pulse Stretcher and Driver

During testing, I discovered the 200ms pulse was much too long and the final circuit was modified to reduce the pulse width to the 10-15ms range. The clockwork is plastic encased and is easily opened; I wasn't sure exactly what I would find upon disassembly. I did find all the gears came loose, fortunately I snapped a picture of the gear placement before things got too far out of hand. The electronics of the clock was sealed with a glob of epoxy glue and the fine hair like wires from the motor coil were soldered to very small pads on the printed circuit board. I considered disconnecting these fine wires, but I don't think the wires would have survived once I started down that path. I soldered a couple 30AWG leads on top of the existing pad connections and hoped for the best. It turned out the connections worked, I could reinsert the "AA" battery, and the clock would work in the original quartz (undisciplined) mode. I reassembled the clock and connected the 1PPS circuit. The second hand would try to move and as I made changes to the wiring I occasionally could get the second hand to move forward or backward. Through experimentation, I discovered the clock motor required a bipolar pulse, positive one time, negative the next. My simple +5v supply and modest circuit was not capable of producing the required bipolar drive. There a numerous solutions to the problem, but this was a $3.47 clock and only an experiment.



Testing the Clock

I rummaged through the junk box and found a DPDT reed relay. The relay operates fine on 5v, and was more than fast enough. Driving the relay at the 1PPS produced the required clock pulse as the relay contacts reversed the polarity on each operation as required. The clock however was running too fast; advancing two seconds with each pulse. The over speed was caused by the 200ms pulse, when I reduced the pulse width to the 15ms range the clock worked perfectly. The clock was adjusted to WWV, and I left it running for two weeks with no loss or gain in time. GPS discipline has been achieved; my proof-of-concept goal satisfied. My thoughts returned to the Heathkit station clock, it needs discipline…

Why the Clocks Are Wrong

Since mid-July 2011, as a result of a Federal Energy Regulatory Commission authorized experiment, the U.S. electric grids have been allowed to drift in frequency.

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The free running grid frequency affects all clocks and timing circuits synchronized to the 60Hz power grid. This includes my Heathkit station clock. While there are some back and forth (slow/fast) natural day-night load fluctuations affecting the frequency of the grid, it tends to be slow during the day and faster at night. It is expected the Eastern grid will gain 20 minutes, the West will gain 8 minutes, and Texas gain 2 minutes over the course of the year long experiment. I have found daily errors as high as 7 seconds day to day. You can monitor the national grid frequencies in near real-time at: http://fnetpublic.utk.edu/gradientmap.html *V 1.1.5*

SO HOW DO THEY DO THAT?

COUNTING SUN SPOT NUMERS REVEALED

By Dr. Tony Phillips © 2012

Scientists track solar cycles by counting sunspots -- cool planet-sized areas on the Sun where intense magnetic loops poke through the star's visible surface. Counting sunspots is not as straightforward as it sounds. Suppose you looked at the Sun through a pair of (properly filtered) low power binoculars -- you might be able to see two or three large spots. An observer peering through a high-powered telescope might see 10 or 20. A powerful space-based observatory could see even more -- say, 50 to 100. Which is the correct sunspot number?

There are two official sunspot numbers in common use. The first, the daily "Boulder Sunspot Number," is computed by the NOAA Space Environment Center using a formula devised by Rudolph Wolf in 1848: $R=k\,(10g+s)$, where R is the sunspot number; g is the number of sunspot groups on the solar disk; s is the total number of individual spots in all the groups; and k is a variable scaling factor (usually <1) that accounts for observing conditions and the type of telescope (binoculars, space telescopes, etc.). Scientists combine data from lots of observatories -- each with its own k factor -- to arrive at a daily value.

The Boulder number (reported daily on SpaceWeather.com) is usually about 25% higher than the second official index, the "International Sunspot Number," published daily by the Sunspot Index Data Center in Belgium. Both the Boulder and the International numbers are calculated from the same basic formula, but they incorporate data from different observatories.

As a rule of thumb, if you divide either of the official sunspot numbers by 15, you'll get the approximate number of individual sunspots visible on the solar disk if you look at the Sun by projecting its image on a paper plate with a small telescope.

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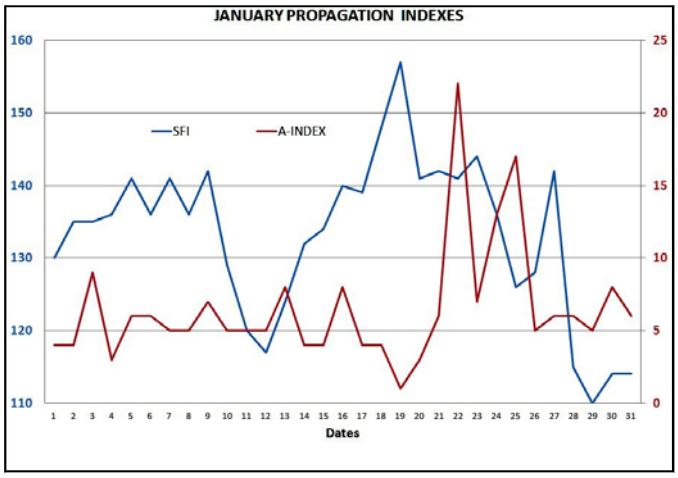
PAST & FUTURE PROPAGATION CONDITIONS

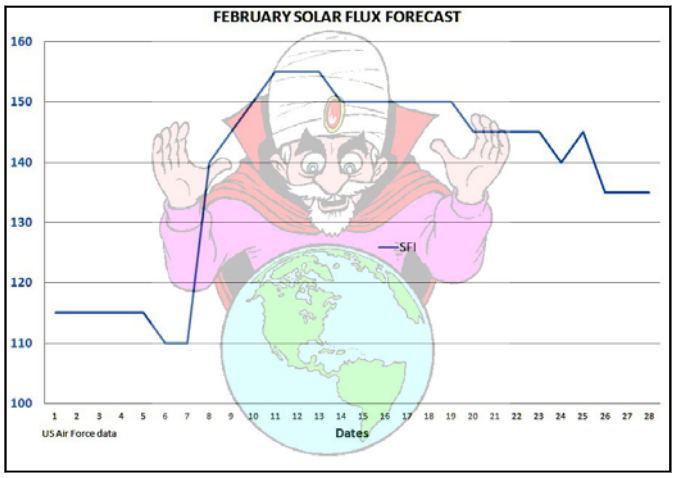
By Bill – W6OAV

This article provides two charts: the propagation conditions for last month and a forecast of next month's propagation conditions.

USING THE PROPAGATION INDEX CHART

Note two things on the chart: the trend of the SFI and A indexes and the date of largest SFI peak. The trend of the SFI shows the progress of the solar cycle during the past month. The SFI peak allows the rough forecasting of the reoccurrence of SFI peak in the next month. In order to "forecast" the next SFI peak, note the date when the SFI peak occurred and project out to about 28 days. Due to the sun's 28 day rotation, the SFI peak will often reoccur in about 28 days. The reason is because the sun spots causing the SFI peak move with the sun's rotation and face the earth every 28 days. This 28 day repetition will become more pronounced as the solar cycle improves. Refer to the September 2010 *Roundtable* for more complete information





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***Right**: Rudolf Wolf devised the basic formula for calculating sunspots in 1848. Today, Wolf sunspot counts continue, since no other index of the sun's activity reaches into the past as far and as continuously. An avid astronomical historian and an unrivaled expert on sunspot lore, Wolf confirmed the existence of a cycle in sunspot numbers. He also more accurately determined the cycle's length to be 11.1 years by using early historical records.*

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.

February 12 – ARA Swapfest
Adams County Fairgrounds, Brighton, CO
February 21 – ATV Lunch Meeting
To confirm Time & Place contact by email
steve.cohan@jctfcolorado.org
April 7 – Longmont ARC, LarcFest
Boulder County Fairgrounds Longmont, CO
June 23-24 – ARRL Field Day
More information later.
August 19 – DRC HAMfest
More information later.

> The cost of freedom is always high, but Americans have always paid it. And one path we shall never choose, and that is the path of surrender, or submission.
>
> John F. Kennedy

February 2012

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 National Freedom Day 	2 Ground Hog Day 	3	4
5	6	7 Full Moon	8 *Learning Net* 7:30pm	9	10	11
12 ARA Swapfest	13 *ARRL* School Club Roundup Begins 1300U	14 Valentine's Day  Last Quarter	15 *DRC Meeting* Elmer 6:30pm General 7:30pm	16	17 *ARRL* School Club Roundup Ends 2359U	18 *ARRL Int'l CW DX Contest* Begins 0000U
19 *ARRL Int'l CW DX Contest* Ends 2400U	20  President's Day	21 *ATV Lunch Meeting* See note in Up Coming Events New Moon	22 *Learning Net* 7:30pm	23	24	25
26	27	28	29 *Learning Net* 7:30pm Leap Day First Quarter			

Check www.ARRL.org for Contests and Rules!

DRC Board of Directors

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Secretary	WW0LF	Orlen Wolf	303-279-6264	owolf@mines.edu
Treasurer	K0TOR	Jim Beall	303-798-2351	K0TOR@arrl.net
Board Member	WG0N	Dave Baysinger	303-987-0246	WG0N@arrl.net
Board Member	K0HTX	Dave Gillespie	303-880-1938	K0HTX@comcast.net
Board Member	KD0CXX	Paul Meenach	720-746-1488	elmer@w0tx.org
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)	
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	**NE Area Remote Does Not TX a PL!**
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.**

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**