SAN BERNARDINO MICROWAVE SOCIETY, Incorporated

FOUNDED IN 1955

A NON-PROFIT AMATEUR TECHNICAL ORGANIZATION DEDICATED TO THE ADVANCEMENT OF COMMUNICATIONS ABOVE 1000 MC.

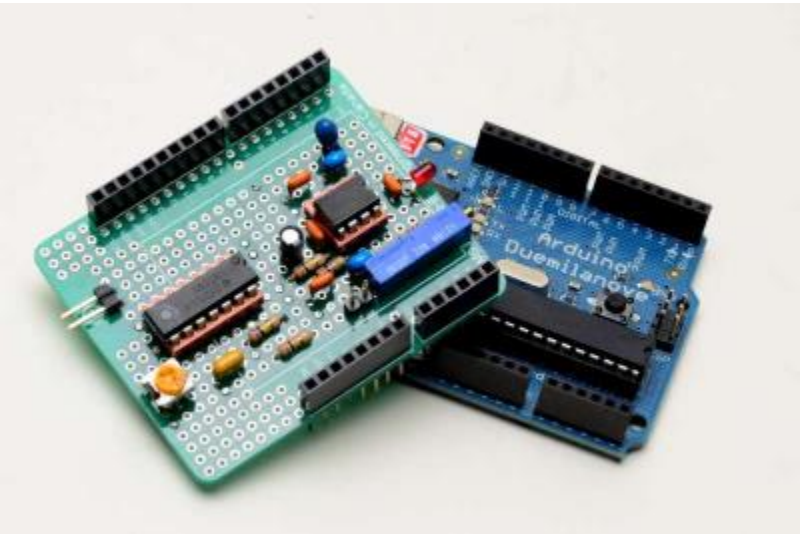
# September 2014 Newsletter on the Activities of the San Bernardino Microwave Society

**Walter Clark, Editor**

## Tech Talk for the September Meeting

Dennis Kidder, W6DQ

### "And you thought an Arduino was just a piece of hardware ..."




Arduino has become a ubiquitous solution for small projects requiring some type of automated control. Arduino comes in many flavors and can do many things. Learn about what Arduino REALLY is and find out about some of the "stuff" you can do with Arduino ... from controlling lights to wireless sensors and more.

Next month:

Courtney, N5BF "X-Banding Mars to Earth" DX-ing the hard way

# Activities at the August Meeting of the SBMS
**(that would be of interest to the General Ham Radio Community)**

**Presiding: Chris Shoaff (14 in attendance… 19 last month)**

## Guests:
- **none**

## Old Business (notes taken by Larry Johnston K6HLH)
- Marty Woll N6VI, got all the historical bank statements together and gave a copy to Jeff Forte, KN6VR
- Brian Thorson AF6NA, brought in the "Dick Kolby memorable 10GHz station" that he had rebuilt and got working.
- It was suggested that we get a plaque for it.
- Ed Munn, W6OYJ, will write a few lines about Dick to put on the plaque.
- Only four people with rigs showed up for the "Tune Up party".
- Since it costs $110 for the park, we probably will not do it next year.

# Upcoming Events Identified by Readers

September 12-14: ARRL Southwestern Division Convention, San Diego
(Marty Woll, N6VI)

September 20-21: ARRL 10 GHz & Up Contest (the 2nd weekend)
(Marty Woll, N6VI)

Oct 24-25, 2014 Microwave Update, Rochester, NY (Thank you Mark Casey, K1MAP)

**Anyone, (not just SBMS members) . . . if you know of any future 1 GHz and above amateur radio event, please send date and description to the editor: walterclark@roadrunner.com**

# What Our Members Are Working On
## (Notes taken by Larry Johnston)

- **Mel Swanberg WA6JBD Upland**
  - gave a talk about 10 GHz operating sites and showed many with the coverage that might be possible.
- **Marty Woll N6VI Chatsworth**
  - talked about H.R.4969, and said that everyone should go to the ARRL site to read the measure and then contact your Congressmen to sponsor the bill.
- **Activities this month concentrated on the 10 GHz Contest**
  - So they went around the room and everyone told where they would be operating.

## San Diego Microwave Group **(as reported by Ed Munn W6OYJ)**

- Kerry Banke N6IZW continues to work on design and tests of a satellite ground station for the amateur radio TV station on the International Space Station.
- The San Diego Group normally meet 3rd Monday at Kerry Banke's home. Contact Ed Munn for directions: remunn@earthlink.net

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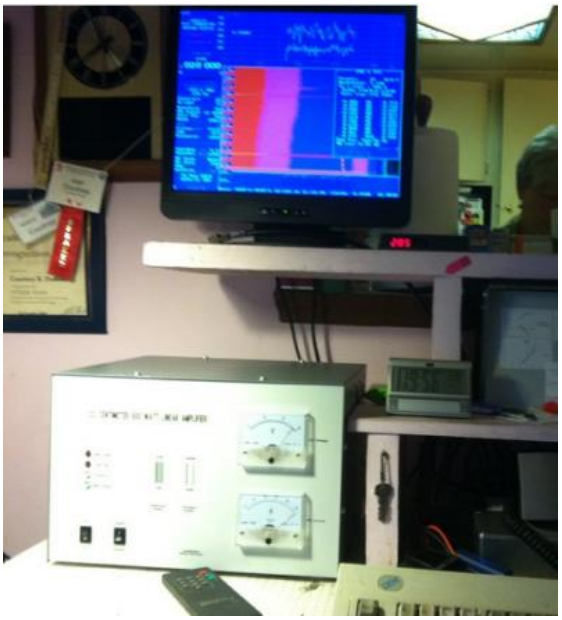
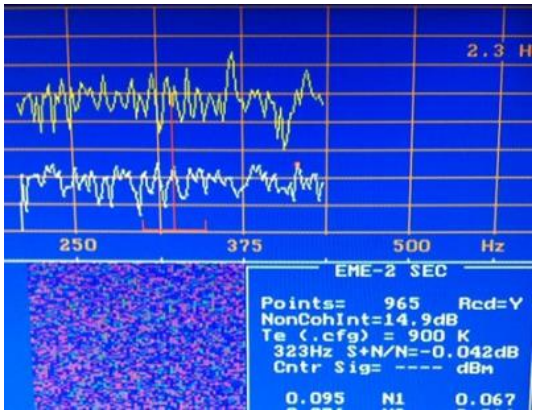
## Courtney's Activity Report for July/August (emailed in)

Ordered all the pieces needed (low loss cables, expensive relays, terminators, a 24 VDC power supply, etc.) to mast mount my Kuhne Electronics MKU LNA 132 AH 1296 MHz EME preamp and transmit/receive switch/sequence it appropriately and safely. The data sheet in the box says its noise figure is 0.43 dB and I'm trying to keep the total system noise figure (after all the relay and coax losses) down under 0.7 dB (50 Kelvin) when all is said and done. My current system has been measured at over 6 dB noise figure, so this is expected to be a big, moon bounce enabling improvement. I will have to modify my homebrew transverter (based on Paul Wade (W1GHZ) 1296 RSU parts) to have a separate receive input (as opposed to a switched transmit and receive) and will build all this up on the bench after I get back from Utah and get it working (September's activity report). After that the plan is to get it all mounted on the antenna outside and be active for the EME events this fall (October's activity report, perhaps with a picture or two).



The shack with the thing running, two seconds on, three off.




above, the non-detection on DSP-10.

# **Round Up of Affordable SDRs** based on the Realtek RTL2832U

http://www.rtl-sdr.com/roundup-software-defined-radios/

Here's sample of what's in the link above . . .

### R820T RTL2832U a.k.a RTL-SDR

**Cost:** $10 – 22 USD
**Frequency Range:** approx. 24 MHz – 1766 MHz
**ADC Resolution:** 8 Bits
**Max Bandwidth:** 3.2 MHz / 2.4 or 2.8 MHz max stable
**TX/RX:** RX Only
**Preselectors:** None

The RTL-SDR is still the best 'bang for your buck' software defined radio out there. While it was never designed to be used as a general purpose SDR in the first place, its performance is still surprisingly good. If you're on a budget or are just starting out with SDR or radio this is the one to get. (Link)

### FunCube Dongle Pro+

**Cost:** $~210 USD
**Frequency Range:** 150 kHz - 260 MHz and 410 MHz - 2.05 GHz
**ADC Resolution:** 16 Bits
**Max Bandwidth:** 192 kHz
**TX/RX:** RX Only
**Preselectors:** Yes 11 switched SAW filters


The FunCube is one of the original 'dongle' based SDRs made for hobbyists. It has certain major advantages over a cheap RTL-SDR like its 16 Bit ADC resolution and 11 discrete sharp SAW hardware filters. These sharp preselector filters really help to reduce noise and images which can in some cases plague the RTL-SDR and other SDRs without filtering. However, a major disadvantage to the FunCube is that its bandwidth is small at only 192 kHz. (Link)

### Airspy

**Cost:** Unreleased (release imminent). Expected cost $100 – $200 USD.
**Frequency Range:** 24 MHz – 1.750 GHz
**ADC Resolution:** 12 Bits
**Max Bandwidth:** 10 MHz
**TX/RX:** RX Only
**Preselectors:** Yes, tracking RF filters

The Airspy is not for sale at the moment, but it's release is imminent having now entered production. This SDR is designed by the programmer of SDR#. Many people are seeing it as their upgrade to the RTL-SDR, with its wide 10 MHz bandwidth, 12 Bit ADC and higher precision clock (meaning less frequency offset). The Airspy code is open source and it also has a built in microprocessor which may be useful for many projects.

Airspy will likely be priced similarly to the FunCube at around $200 USD, but pricing is not yet confirmed. (Link)

**And 12 more.**

# Just as a review: What is RTL-SDR?

RTL-SDR is a very cheap software defined radio that uses a DVB-T TV tuner dongle based on the RTL2832U chipset. With the combined efforts of Antti Palosaari, Eric Fry and Osmocom it was found that the signal I/Q data could be accessed directly, which allowed the DVB-T TV tuner to be converted into a wideband software defined radio via a new software driver.

Essentially, this means that a cheap $20 TV tuner USB dongle with the RTL2832U chip can be used as a computer based radio scanner. This sort of scanner capability would have cost hundreds or even thousands just a few years ago. The RTL-SDR is also often referred to as RTL2832U, DVB-T SDR, or the "$20 Software Defined Radio".

There are many other software defined radios similar to the RTL-SDR, but they all come at a much higher price. The FunCube PRO+ is a good receiver similar to the RTL-SDR, priced at around $190 USD. There is also the soon to be released HackRF (~$300USD) and BladeRF SDRs ($420 and $650), which can both transmit and receive.
http://www.rtl-sdr.com/about-rtl-sdr/

On the same Round Up are several individuals who are selling ***modified RTL-SDR dongles*** that utilize the direct sampling mod or a built in upconverter to receive HF frequencies.

**Marty KN0CK Upconverting Receiver**

**Cost:** $75 USD
**Frequency Range:** 500 kHz – 54 MHz
**Preselectors:** Low pass filter

This modded RTL-SDR receiver uses a miniature upconverter that is small enough to fit inside the dongle casing. Also has a MAR-8 preamp and 5-pole low pass filter. (Link)

**Marty KN0CK Direct Sampling Receiver**

**Cost:** $60 USD
**Frequency Range:** 500 kHz – 54 MHz
**Preselectors:** Low pass filter

This second version from Marty KN0CK uses the direct sampling mod for HF reception instead. Also has the built in MAR-8 preamp and 5-pole low pass filter. (Link)

**Chinese Direct Sampling Receiver**

**Cost:** $60 USD
**Frequency Range:** 100 kHz – 1.7 GHz
**Preselectors:** Low pass filter

A prebuilt direct sampling receiver by someone from China. Appears to be decent, but you probably won't get any support for it if something is wrong. Can be found on Ebay.

And five more. (Here it is again: http://www.rtl-sdr.com/roundup-software-defined-radios/)

## The software of choice for the RTL based SDRs seems to be SDR sharp (free download at: http://sdrsharp.com/) But Rein Smit prefers HDSDR at (http://www.hdsdr.de)

# RTL-SDR Tutorial: Receiving NOAA Weather Satellite Images

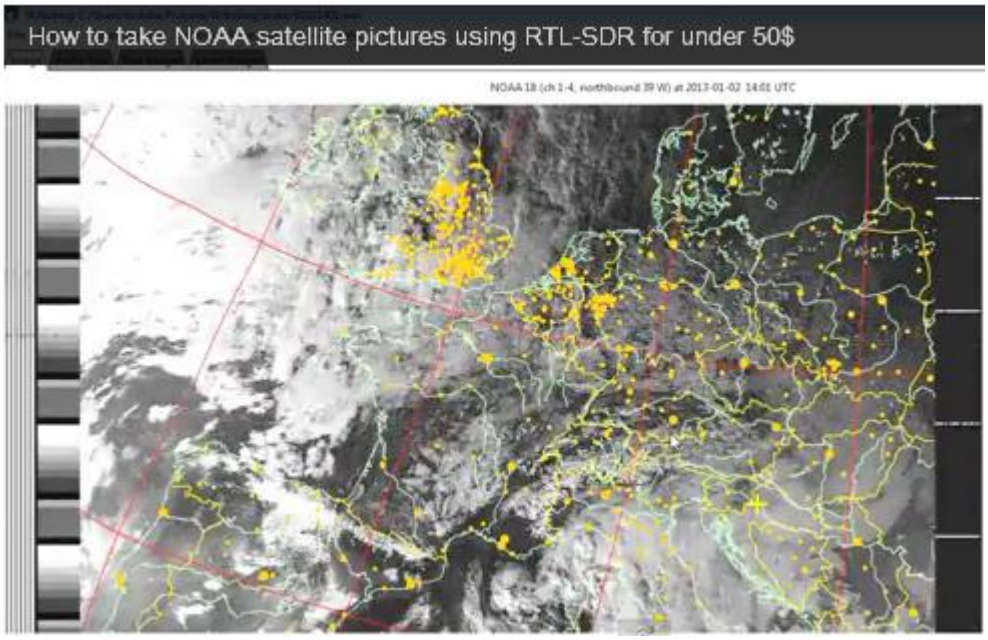
http://www.rtl-sdr.com/rtl-sdr-tutorial-receiving-noaa-weather-satellite-images/

Every day multiple NOAA weather satellites pass above you. Each NOAA weather satellite broadcasts an Automatic Picture Transmission (APT) signal, which contains a live weather image of your area. The rtl-sdr dongle combined with a good antenna, SDRSharp and a decoding program can be used to download and display these live images several times a day.

This tutorial will show you how to set up a NOAA weather satellite receiving station, which will allow you to gather several live weather satellite images each day. Most parts of this tutorial are also applicable to other software radios, such as the funcube dongle and HackRF, but the rtl-sdr is the cheapest option. Hardware radio scanners can also work, provided the radio has a large IF bandwidth (30 KHz +) and a discriminator tap.

Here's a link to an incredible youTube video (mentioned in the above tutorial) on making a NOAA receiving station for under $50

https://www.youtube.com/watch?feature=player_embedded&v=fopnIkYnFPI




## Orbitron Tutorial

It is not entirely necessary for these NOAA satellites, but if you want the Doppler effect to be automatically adjusted for in SDRSharp, you can use free a program called Orbitron, which with the aid of a plugin, will interface with SDRSharp.

Download and install Orbiton from their website here: http://www.stoff.pl/

# Marty Woll's Observations of "Weekend One" of the ARRL 10 GHz and Up Contest

Thanks to everyone who got on for the contest and especially those who went considerable distances for portable and roving operation. We had surprisingly good conditions to the north late Saturday night and early Sunday morning. Joel KD6W got the "Iron Butt" award for continuing his Saturday night rove until almost 1:00 in the morning to take maximum advantage of the propagation. The second most amazing thing I saw on Frazier was all the gear and operators - it seemed like a moving van full piling out of Brian Thorson's (AF6NA) van. What was the most amazing thing, you ask? Watching them fit it all back in when they left.

The biggest thrill was snagging CN80, Mt. Shasta, for a new personal DX record of over 700 km.

It was great to see/hear newer operators on (Jim, Ben, Mohammed, etc.) and kudos to the experienced operators who facilitated their activity. Sunday morning started well, completing a contact with Gary WA6MEM, whom I heard getting a lot of "too weak to copy" reports on CACTUS. We used CW, and it was a piece of cake. I left Frazier mid-afternoon because I sensed (correctly, as it turns out) that I would not be awake enough to drive home safely if I waited much longer. The last few miles were a challenge.

I'll be somewhere else for the second weekend, most likely roving using the run-and-gun style that is possible when you have practically no set-up time (just park, point and call). Meanwhile, I hope to see some of you at the ARRL Southwestern Division Convention Sept. 12-14 in San Diego (click on the website below). Also, please remember to get your letter in to your Congressional representative asking him or her to co-sponsor HR 4969.

Convention: http://sandarc.net/~convention2014~/index.php
The ARRL's position on AR 4969: http://www.arrl.org/hr-4969

73, Marty N6VI

# Pictures from the ARRL 10 GHz and Up Contest


Above, Rein Smit and Brian Thorson.  Below Marty Woll's view from Frazier.

# Gary Heston's ATV Mobile Studio

Not only can you watch our meetings live (well delayed by 240 milliseconds) You chat to other viewers about what you are watching (or anything else.) Enter the chat room by clicking on the white space on the right of the website described below.

**Just as a reminder, this is how you watch SBMS meetings from home:**
**http://www.batc.tv/ch_live.php?ch=2&id=139**

Better yet memorize the following
Keywords: BATC TV
and use Google
The TV part is easy to remember. Think of the BATC as batch without the h. It's a British website (that's the B) Once you are there, on the left, you have to pick a stream. The stream to choose is:
**W6ATN.**
Memorize W6ATN as ATN in California. W6ATN is the club call sign for six ATV repeaters that are a part of the Amateur Television Network in Southern California. (ATN-CA)
Gary Heston's mobile studio beams its signal to the ATN repeater on Santiago Peak which is provided by: Roland Hoffman, KC6JPG


- The newsletter is to keep member informed on current activities of the "active" members; the members that come to the meetings or use ATV to report in.
- The website is for articles and all activities of the past.
- But questions or even bragging is for the SBMS Reflector. Send your email message to: sbms@ham-radio.com. More than 80 people will see your question or your bragging. (To sign up go to: http://lists.altadena.net/mailman/listinfo/sbms.)

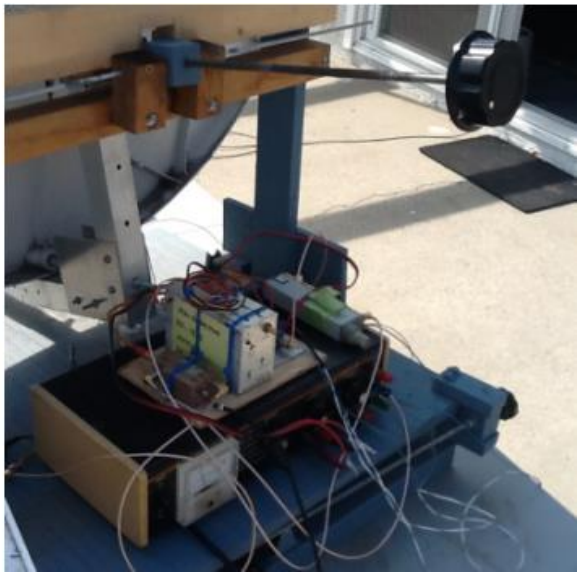
# Rein Smit's S-Band SDR Project (Lunar Flyby)

Just about 2 weeks ago I started to read about ISEE-s in a more serious way and soon there after was wondering whether I could set up a receiving site using my 1.2 m offset dish mainly used for 10 GHz. work. My real interest is in 8.4 GHz DSN amateur DSN and still trying ot find a cheap solution for a good sub 1.0 dB NF.

Talking to some friends, I was fortunate to get hardware support for the S-band project and managed almost to get ready for the Lunar fly-by event of Aug 10 2014.

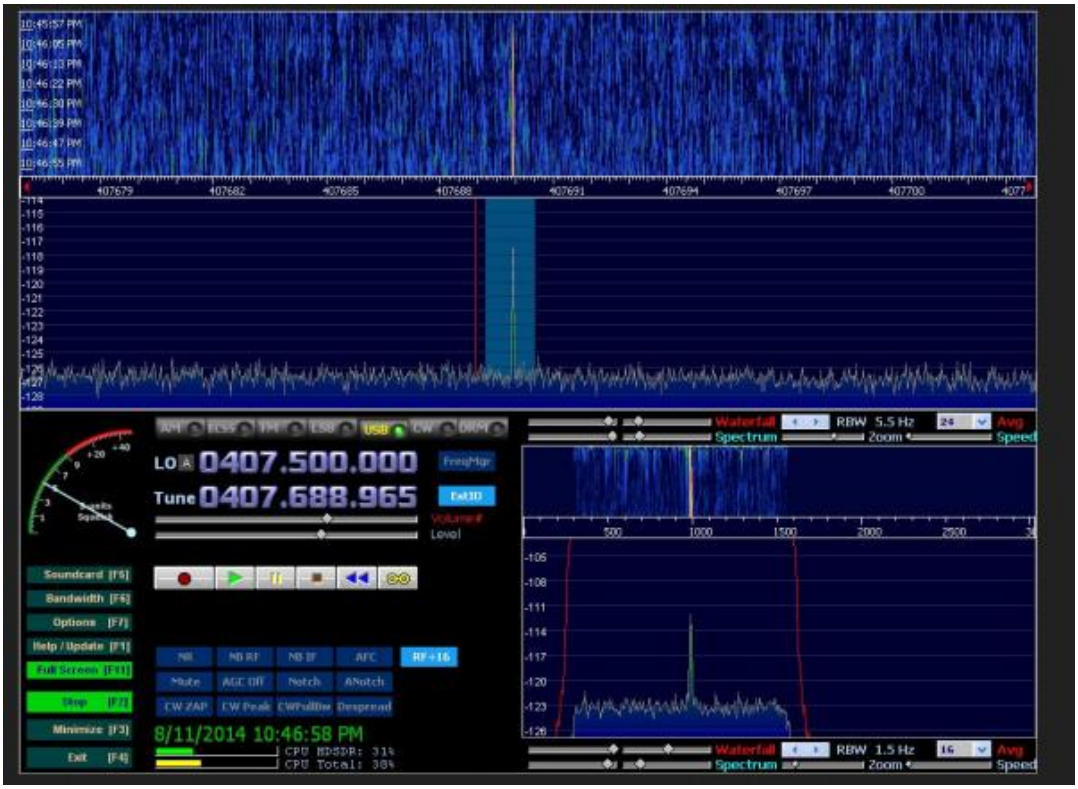
Here are some pictures of my receiver setup. Basically a 2.2 GHz converter with 1.810 GHz Brick LO. An amplifier to bring the converter to a decent NF level. There is also a 1.2 dB Demi 13 cm LNA.

As receiver I use a 10 USD RTL-SDR Dongle with HDSDR as software.



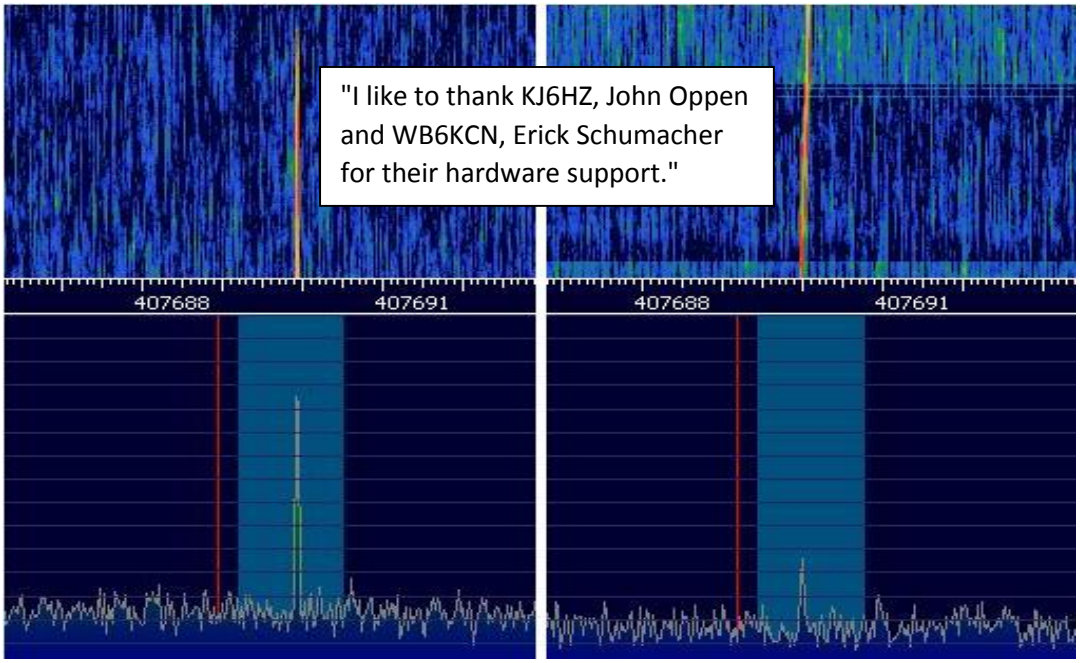
**Left:** 1.2 meter Offset dish with dual polarity Helix feeds LH and RH, switching by turning correct Polarity Helix towards dish surface.
**Right:** 2.2 GHz receiver, pre-amp at feed, pre-mixer amplifier - 2.2 GHz mixer/ converter. The back end has an RTL-SDR Dongle and the computer with HDSDR software is inside the house

.




**Above:** Trace as detected by RTL-SDR Dongle, and the HDSDR (http://www.hdsdr.de/) software running in I/Q mode (frequency scale not adapted to 2.2 GHz frequency band)

**Below right:** Loss of Spacecraft signal when dish is pointed away.



# Microwave Mystery Gizmo of the Month

**The prize?**
To show off how smart you are. (That's all we live for anyway, isn't it?)

If you think you know what it is or want to discuss it, go to SBMS Reflector… (sbms@ham-radio.com)

The correct answer will not be posted here. (It's not that I don't want you to know. It's that I don't know. --ed)

# Needs, Wants and For Sale

- **For Sale from Chris Shoaff**: N9RIN cshoaff@yahoo.com
  - 30w 1296 MHz PA kit $50 + $5 for US shipping
- **For Sale from Bill Burns:** Bill will only rarely come to the meetings, so if you want any of this, please contact him by email at . . . bburns@mediacombb.net)
  His address is: 247 Rebel Road Ridgecrest CA 93555 and phone: 760-375-8566
  - 8 watt 5 GHz TWT's with power supplies $50 each
  - copper wire enamel coated #14 many feet coils $10 each
  - Bencher BY1 Iambic paddle key $90
- **For Sale from Doug Millar (drzarkof56@yahoo.com):**
  - a Rohde and Schwarz 309 10-18GHz Signal Generator in perfect shape. It is digitally synthesized and has a pull out instruction card. It has internal modulation and will also sweep. Will accept $900.

  - I also have an HP432 power meter, cable and head (478) in working order for $100

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# Member Ads

## Sixty North Electronics

### Kits Made by member KL7UW

**Let Ed Cole assemble your Down East Microwave kit. For kits in stock, he can deliver an assembled unit to your custom design preferences within 30-days of a paid order. His prices are the same as you pay DEMI for an assembled transverter, but much quicker delivery time. And comes with 90-day written warrantee on labor (guaranteed to work)!**
**Shipping for a transverter is typically that of medium-size flat-rate Priority Mail anywhere in the USA.**

**For examples of his work click on… http://www.kl7uw.com/kits.htm**
**Contact him at kl7uw@acsalaska.net**

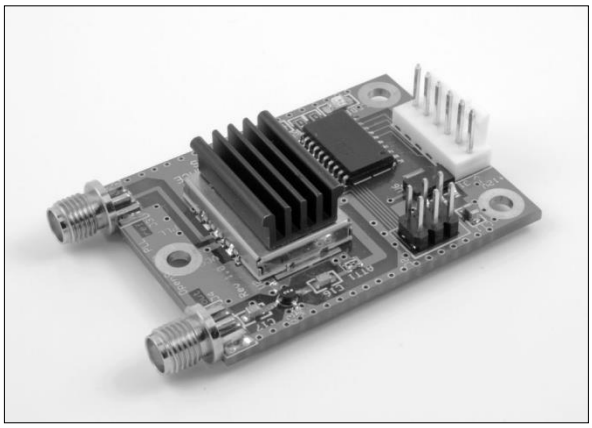
# Member Ads Continued

REACTANCE LABS

Introducing the **OpenSynth** line of frequency synthesizer kits. Available in standard frequencies of 2556, 2952, 2160, 1152, 3312, 3006 MHz, also available from 400 MHz to 3500 MHz.

- Low phase noise, Buffered output
- Ultra low noise voltage regulators
- Open Source code and design, made to be modified
- 2" x 1.5", 12V @ 140 mA typical

**Available at** http://reactancelabs.com



If you are a member you can have a picture ad here yourself.
For the time being this service is free.
eMail editor at: WalterClark@roadrunner.com

# About SBMS

The San Bernardino Microwave Society is a technical amateur radio club affiliated with the ARRL having a membership of over 90 amateurs. The focus of the club is microwave activities in the Southern California. ***Our sister club is San Diego Microwave Group (SDMG). At least one meeting a year are joint meetings.*** SBMS dues are $15 per year, which includes a badge and that's about it. The dues are more in the way of a donation to pay for outreach things such as video portals, a bank account, and rent for the building. When to pay is not a matter of remembering. The Corresponding Secretary will contact you by email and will then hound you like your own personal PBS telethon. Dues can be handed to the treasurer at the meeting, or mailed to the address of the treasurer listed in the banner below.

Meetings are first Thursday of the month, 7:00 PM at the American Legion Hall, Corona. For carpooling from North Orange County call Walter Clark @ 714 882-9647

***The Reflector (SBMS Group Email)***

The most active method of information exchange is our group email called the SBMS Reflector. You don't need to be an SBMS member to participate. To subscribe fill out the form at the website: http://lists.altadena.net/mailman/listinfo/sbms (If you are getting email on the SBMS Reflector now, and you want to write your own message, pull up a recently received message, click on "Reply to List." Don't forget to change the subject line and delete all previous text as appropriate.)

**The SBMS Website and Newsletter**

The SBMS Reflector is ephemeral. There's no record kept. The Newsletter has a slightly longer life. It is sent to members and past issues are recorded in the website. It's URL is: http://www.ham-radio.com/sbms/ You don't have to memorize that or write it down, just enter SBMS into any internet search engine.

**Newsletter: Walter Clark**: walterClark@roadrunner.com
**Website: Rein Smit**: rein0zn@ix.netcom.com

The newsletter is created about the middle of the month and broadcast as a link inside an eMail letter to the members. This is mailed to you on the weekend prior to each meeting. SBMS Newsletter and website material can be copied as long as SBMS is identified as source.

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