



## SAN BERNARDINO MICROWAVE SOCIETY, Incorporated

FOUNDED IN 1955

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

### W6IFE Newsletter October 2010 Edition

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At the **October 7, 2010** SBMS meeting the "Tech Talk" will be by Doug, K6JEY preceded by a discussion of how things went during the ARRL 10 GHz and Up contest.  
The SBMS meets at the American Legion Hall 1024 Main Street (south of the 91 freeway) in Corona, CA at 1900 hours local time on the first Thursday of each month.

### REMINDER- NO PARKING IN THE CHURCH LOT

#### Scheduling:

**October 2-3 ARRL International EME competition [www.arrl.org/eme-contest](http://www.arrl.org/eme-contest)**

**October ARRL 10 GHz and Up contest Logs due.**

**November 4 SBMS meeting**

**December 2 SBMS meeting**

**December 11 SBMS Christmas Party at Dennis N6DQ QTH**

**January 7, 2011 SBMS meeting**

**Jan 22-24, 2011 ARRL January VHF Sweepstakes**

**June 11-13, 2011 ARRL June VHF QSO Party**

**July 16-17, 2011 CQ WW VHF contest**

**SBMS sponsored MUD 2010** October 21 to 24 Cerritos Sheraton Hotel. Website is microwaveupdate.org. Hotel info is on the web site. Thursday is the JPL Lab tour and surplus tour. Friday has talks and an evening swap meet. Saturday talks, noise figure measurements, banquet and speaker. The speaker is Dr. Kate Hutton, the media "earthquake lady" and Caltech Seismology Lab expert. Sunday is antenna measurements.

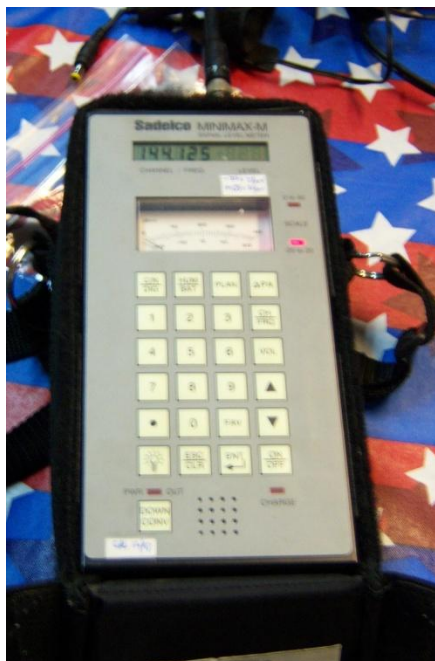
**Last meeting- Doug, K6JEY** presented at talk on "signal level meters" and their uses. They are used cable TV meters can be found on eBay or other places for some reasonable prices and some unreasonable prices. Most of what Doug covered was Sadelco hardware. The older analog Super 600 is a rechargeable battery powered 4.5 MHz to 600 MHz receiver with signal level analog meter, calibrator, and step attenuator, audio out speaker, and has a voltmeter and ohmmeter. It is sensitive

enough to pick up local AM and FM broadcast stations with a short antenna. Bill, WA6QYR measured his to -90dBm. It goes for around \$40. The next was a Sadelco MINMAX 800 that has a digital LCD display along with analog meter. It is auto ranging and has several functions that can be measured. These you can use the cable TV band plans or manually input a frequency. They had different frequency ranges depending upon specific model. Most you find will do the 5 MHz to 800 MHz range. They will also scan to some limited amount. Bill measured his unit down to the -90 dBm level. They go for around \$80. They both have a bandpass of around 125 KHz. They both have a padded case that helps protect them when climbing the tower and putting into the back of your truck. You can use a 24vdc wallwart to recharge the batteries over night. They both have indicators to know how long you have been on and where the battery voltage is. They have a half C size battery pack that lasts for several hours. You can replace the battery with 9v cell. Doug demonstrated a later unit Protek 3201 that has a spectrum analyzer from 100 KHz to 3 GHz and will read to 1 Hz and 0.1 dB levels. It also has an RS232 output. These range from about \$800-\$1K. Manuals can be found on line. Uses include antenna measurements, Signal Generator checking, and as a general use frequency checker. John, KJ6HZ opened the meeting. Our visitor was Don, AF6CV from Huntington Beach. The treasurer's report and Secretaries report were read and approved. MUD work is going well and information has been spread to several reflectors. SBMS members are to bring a working microwave thing to the next meeting for a MUD banquet table center piece. These are to be raffled off to the people sitting at the table. Tisza is taking care of the tee shirt orders and spouse program. The early bird registration prize is a set of Narda calibrated attenuators 3, 6, 10, 20 dB. The grand prize is an Agilent 9340B 3 GHz handheld spectrum analyzer. An amateur Agilent employee is to present the prize. There is an ARRL Ham fest in San Diego on 16-18 September. Ed W6OYJ won the 50-50 drawing for \$32. 27 people present.

Here is a picture of the analog Sadelco Super 600 receiver level device that Doug, K6JEY was talking about.



It covers 4.5 MHz to 600 MHz and is quite sensitive.



The Sadelco MINMAX 800 digital signal level receiver is shown here.

This is a sensitive receiver that is about 250 KHz bandwidth from the 5 MHz region to some where into the 800 MHz region. Different models have upper frequency limits in the 800 MHz to 1 GHz. Both the analog and digital receivers have battery power for working in the field. Your local cable guy had such a receiver in the past where he checked the levels coming into your home on the cable. They could check if you were getting all the channels you paid for. Depending upon what rate you were paying you received different numbers of channels (frequency limits).

Later gadgets the cable guy uses are more into the handheld spectrum analyzer type which still need to cover the lower frequency range, but some up in to the several GHz. Doug showed us his Protek 3201 which reached to 3 GHz.



Doug's Protek 3201

**Activity reports** from the September SBMS meeting- Doug, K6JEY went to the EME conference in Dallas, TX, has a sears Craftsman digital level 948285 \$25 for use on dish, has a Flex-radio 1500 on order, next EME conference will be in England; Pat, N6RMJ did some 1296 MHz work had 128 QSO's including Arizona on 10 GHz; Dave, WA6CGR has been sick, had 60 QSO's on 10 GHz, has new hardware for linking the 445 machine; Jeff, KN6VR was in Cajon Pass site for 10 GHz and did some work on his 1296 MHz antennas; Walt will give a polarization talk at MUD, demonstrated diffraction gratings with

zone plates and how some wood can make a magnifying lens at 10 GHz; Wayne, KH6WZ is moving; Chris, N9RIN did the 10 GHz contest and needs a 3456 amplifier and power supply; Ed, WX6DX talked about space at a workshop; Tisza traveled with Mel to Utah during the contest; Mel WA6JBD has a 30 w TWT on 10 GHz, Traveled to Brian Head UT and Blowhard UT, worked Robin WA6CDR mobile 10 GHz at 190km; Don KF6TWT made some digital devices for Las Vegas racers that alert drivers to passing, accident ahead; Gary W^KVC did a trip to Idaho; Wayne N6NB did the UHF contest; Rein W6SZ did the contest; Ed, W6OYJ brought in an article from the 1970 QST about rocklok, had 31 QSO's from Soledad some out to 378km; Kerry, N6IZW fixed some radios, had lots of new 10 GHz operators out on contest, will be talking at the San Diego ham fest; Mike, W6YLZ worked from Frazier on 10 GHz; Bill, WA6QYR was out on 10 GHz for a few hours on local hills; Chuck, WA6EXV did some more work on the .370 beacon; Dick, WB6DNX worked the contest from Chino Hills; John, KJ6HZ worked the contest from Cajon Pass and went to the EME conference; ATV check ins had K6HLH, WB6CWN, Gordy WA6ZKY, N1ED, K6BNN, KB6CJZ, and AF6HP.

#### **Wants and Gots for sale.**

**For Sale** 4 ft spun Aluminum dish with 2 WR90 feeds \$50 pick up Long Beach 562-810-3989 Doug K6JEY

**For Sale** 30w 1296 MHz kit \$50 + \$5 for US shipping Chris Shoaff cshoff@yahoo.com

**For Sale** TS-403 2-4 GHz signal generator \$10 Bill WA6QYR bburns@ridgenet.net

**For Sale** 10 GHz slotted waveguide antennas \$60 kit, \$85 assembled plus shipping Dan W6DFW [W6DFW@apex-scientific.com](mailto:W6DFW@apex-scientific.com)

#### **Martlesham Microwave Round Table in UK invitation.**

I wonder if anyone in the North America, Europe, and rest of the world is planning to join us at the Martlesham Microwave Round Table in November?

The Round Table runs 13 and 14th November. Details are on the web page <http://mmrt.homedns.org/> Each year the Martlesham Radio Society organizes and runs this popular two-day microwave event. This is the 31st year of the MMRT. If you haven't been to the MMRT previously you will experience an event with an attendance of about the same size as the annual MUD events. There is a talk's programme, flea market (with some bits you don't see in the USA) and surplus prices that are still reasonable! There will not be a formal tour this year. We want to leave that until the next event (probably in April 2011).

The 'microwave' dinner (banquet) is on the Saturday evening.

The UK prices are at their lowest in November and flights are also cheap in November. We have arranged really good accommodation prices at the hotel and best of all, there are no registration fees for MMRT. We've always been a free event. If you are thinking of coming to EME 2012, Martlesham is just about 1 hour away from Cambridge, so this would be a good chance to have an early look around Cambridge, during the week. There is lots to see and do in Cambridge. The Martlesham/Ipswich area has lots to see as well!

It would be great to see more visitors from overseas to our premier Microwave event in the UK.

If anyone wants more details of what to see and do in this area in November, drop me an e-mail at [sam@g4ddk.com](mailto:sam@g4ddk.com)

73 de Sam, G4DDK, for the Martlesham Radio Society

MMRT Supported by the UK Microwave Group

#### **An Email thread**

Is there any advantage to powering down a 10 GHz receive preamp during the transmit cycle. The t/r relay should have the necessary isolation but should I also remove the dc power during transmit? Will this give any addition protection to the preamp? 73's Jack W4EFZ

Hello, this is a difficult question... When U ask the question to a well known microwave equipment manufacturer in Europe , he replies : " I don't know" , so I feel nothing is very clear , the pro and con arguers can't really prove their arguments , so???

73 Dom/F6DRO

I'm of the opinion that the transistor will survive better with power applied. That the normal negative gate bias will allow the gate to stand more RF voltage without reaching breakdown. The counter argument is that the gain of the device can let the drain swing into voltage breakdown.

Which destructive action happens first will depend on the exact device and the circuit. A lower gain circuit with resistive loading on the drain to keep down parasitic oscillations will be less prone to excess voltage swing on the drain. I'm sure preamps are run both ways.

Another counter argument to keeping power on is that during relay switching the preamp will be unterminated which might lead to oscillation that can be damaging to the device.

What might be optimum would be to hold the gate bias at the normal level while removing the drain supply, so the gate has maximum protection while with no drain voltage there is no gain and so no matter the terminations there can't be oscillation. 73, Jerry, K0CQ

The theory of "power on improves survival" "applies only to certain semicon technologies, of which hemt is one. Practical on bench tests (deliberately to destruction) resulted in "no measurable difference". Graham F5VHX

Folks, As a purveyor of many preamps for 23, 13 and 9cm I would like to provide my input. My own preamps are powered in parallel with the antenna changeover relay in both my terrestrial and EME systems. The advantage of this system is that as long as the preamp is powered, the relay is in the receive position. If for any reason the preamp powering fails, the relay drops out and the transmit power is directed to the antenna. By incorporating a small switch in the lead from the preamp to the relay it is possible to temporarily drop the relay out and terminate the preamp into 50R for testing (290k versus about 170k, which is quite detectable) as a self check.

The power to the preamp is provided over the receiver coax cable. A simple choke within the G4DDK VLNA preamp extracts the dc to the feed through capacitor where it can be picked up to connect (via the aforementioned switch) to the relay (with protection back EMF diode). The only mod needed is to change the regulator input 10uF capacitor, in the preamp, to a 35V working type.

I can honestly say that with the various relays I have used in the masthead preamp and the protection relay in the EME system (OK1DFC septum polarizer

Feed) I have yet to lose a preamp or detect any degradation in noise figure.

The most common repair I have to do for customers is to replace the ATF54143 in the second stage where RF has been transmitted up the back end of the preamp.

Single coax systems are a liability!

The main problem with keeping power on the preamp on receive is that the inevitable high level signal at the preamp input is further amplified and MAY damage downstream second stages or mixers. An ATF54143, driven into compression, can easily produce mixer damaging levels!

I don't think this is a good idea at all.

Of course this is not 3cm, but I do the same thing in my 10GHz terrestrial systems and intend to do the same in my 10GHz EME system, as it has proven so reliable.

73 de Sam, G4DDK

g4ddk vlna2 preamps...

Was a device post mortem possible? Was there any difference in failure mode between power on and power off? Or were the devices always melted to a 3 lead junction? Was there a condition that led to degradation, e.g. lowered gain or raised NF without complete destruction? Did power on or power off affect that damage threshold?

I suppose there are some bipolar MMIC that have useful NF for second stages, but is there anything else than GaAs FET or HEMT for really low noise preamps at microwave? 73, Jerry, K0CQ

Sam and all, the current state of preamp development has rendered the term VLNA obsolete now. We should be using ULNA instead. Who would have ever thought we would see home built preamps with a NF below .2 dB at 23cm?!

73, Gerald K5GW

I have read some of the pros and cons of this practice and have stayed with powering off my GasFets with success (so far). Most sequencers are set up for doing it that way. I am curious to find out what kind of power feed thru will result from my septum feed horn (typ. 2-24 dB isolation). Running 300w would imply 1-3w at the Preamp. Of course the use of a SMA relay should lower this by at minimum of another 30-dB (1-4mw). Although most running septum's on 23cm are using a simple coax relay to switch out the input to the preamp, I am considering using a cross-over SMA relay that will terminate both the horn probe and the input of the preamp with sma 50-ohm terminations. That would preclude the build-up of RF voltage on un-terminated lines. But I have not tested the relay insertion loss so that will certainly be an important factor for NF.

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Side note: I decided to check sun noise on 432 this morning. The sun was nearly in the same location of the sky as the Moon was last night.

I found that elevated to 42 deg cold sky gave an S3 reading while peaked on the Sun I got S5+. Definite indication with very crude measurement methodology. From experience calibrating my FT-847 s-meter, this would indicate about 6 to 8 dB rise (FT-847 s-meter is very non-linear). Yes, I know this is a compromised way to measure sun noise, but I was not willing to spend a lot of time setting up for more precise measurements this morning. I wish the FT-847 had an IF breakout so that I could use my SDR-IQ for making these observations. I can use it on 144 and 1296-MHz since I am standardizing my IF to 28-MHz for those bands (when my new xvtrs arrive).

The window the Sun was sitting is bracketed by trees, so I suspect some thermal pickup from side lobes. I pointed the dish back to AZ=93 directly into the "big" birch tree (30x30-deg. apparent blockage Angle) and could not measure any significant thermal noise? That was a surprise. The Sun was sitting at AZ=112, el=22 and the tree line runs below that elevation by only a few degrees. My theoretical 432 beam width is about 12-deg. wide for 24-dbi gain from the 4.9m dish.

This is the same sun/CS results I saw back last spring looking at clear sky with no trees.

73, Ed - KL7UW, WD2XSH/45

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BP40IQ 500 KHz - 10-GHz [www.kl7uw.com](http://www.kl7uw.com)

EME: 144-QRT\*, 432-100w, 1296-QRT\*, 3400-fall 2010

DUBUS Magazine USA Rep [dubususa@hotmail.com](mailto:dubususa@hotmail.com)

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Hi Jack, I power them down because the total gain of the transmit amps and RX amps can be greater than the relay isolation - the whole thing can oscillate. Of course, you could leave the preamp powered and the other RX amps.

Some folks believe that a preamp is less susceptible to burnout when powered.

If you don't have a good sequencer, it won't matter 73Paul w1ghz

Yes, there are devious non-catastrophic degradations. If the LNA is ON, the leaked Tx power (due to finite relay isolation) will conceivably push up the gate current from the quiescent value. In an 800 um GaAs pHEMT LNA, the rise in gate current is significant for RF input above 0 dBm. This is likely to shorten device life because metal migration is proportional to DC current (J. Rogers and C. Plett, "Current Handling in Metal Lines," Radio Frequency Integrated Circuit Design, Artech House, Norwood, MA, 2003, Ch. 5.6.).

Additionally, FETs driven by large RF signals may also exhibit time-dependent degradations in output power (R. J. Trew, D. S. Green, and J. B. Shealy, "AlGaIn/GaN HFET Reliability," IEEE Microwave Magazine, June 2009) and third-order output intercept point. Although the LNAs appeared to recover after the overdrive is removed, they become more susceptible to subsequent overdrive.

So, from the reliability standpoint, it is better to power off the LNA.

Chin-Leong, 9W2LC.

Having made the first sequencer back in the early 1980s I wondered the same thing. I ran numerous destructive tests and decided it was safer to leave all preamplifiers powered 100% of time for best survivability. A slight edge was noticed but it was dependant on the input matching. It was therefore decided to leave that aspect out of sequencing. Unfortunately a W4 took it upon himself to add that to his version of the sequencer and many copies thereafter have unfortunately included it. 73 Chip N6CA DM03ut 127 DXCC 50 MHz countries World Records 2.3, 3.4 & 5.7 GHz <http://n6ca.com>

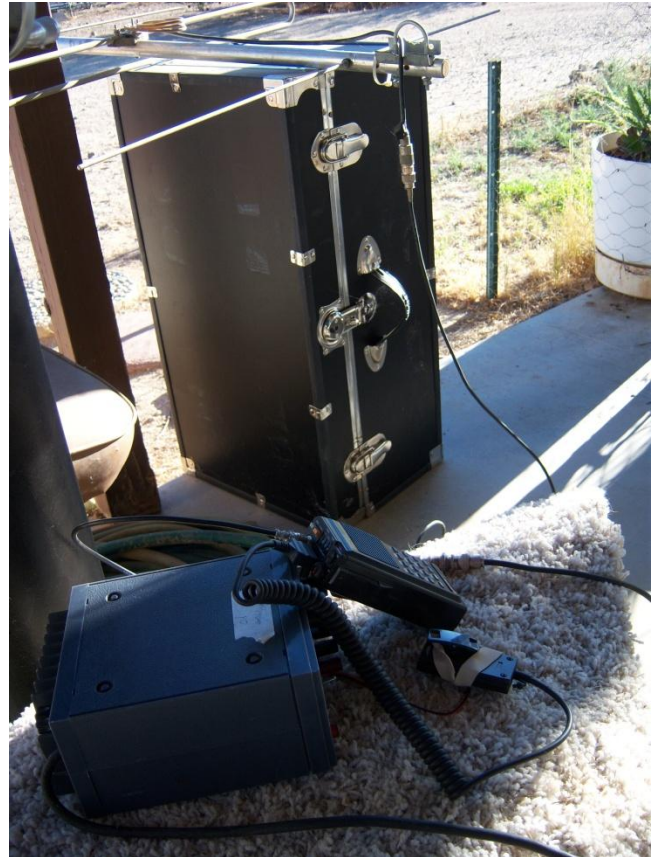
### **My antenna testing on 144 MHz.**

I am building an antenna array with some leftover equipment that has collected at my house. The end is to have 4 old Cuscraft 11 element 2 meter yagis in a 2x2 array on top of a tower. I wanted to check them out to see if they were working and how similar they were to each other.





I had an old Kenwood TH21 FM transceiver that the batteries had long gone away. I wired dc power into the unit. I had a speaker mike that would fit the connectors, so I used it to provide a key down condition with a big rubber band. It would provide a small signal for measurements. I used an old 4 element yagi for the source antenna on my porch.



My acreage is covered with stuff and I didn't want to spend a bunch of time making a temporary tower to get a clearer view between antennas. I figured it would give good enough results for what I wanted.



The view in the direction to where I could set up a support for the antennas I wished to test. Yes there are multiple metal scatterers along the path but I wasn't going to be a purist about beam widths or gain. I just wanted some general results. Two meters takes a lot of space to get into the far field for antennas of any size and a range that is free of reflectors is big. I had my flatbed trailer parked out several hundred feet from the porch so I put up an old MACOM dish mount that had a tire base. It was tall enough to get above the creasote bushes and yet let me put the antennas loosely on it without a big effort. As you can see I used one of the Sadelco MINMAX digital signal; level meters to get a feel of what the main beam gain was and I could move the beam side to side and get an idea of what the 3 db sidelobes were at what angle. I had 6 antennas in various states of use to check. I had to repair a couple of them with new feed components and tried to weather proof the repairs with a



silicone sealer and heat shrink. Most of the yagis gave similar results in main beam signal numbers and the 3 db points were about what the original manufacturer quoted. The couple of repaired yagis had a lower front signal level by 15 db so I suspected something in the repair was causing the lower signal level. I scraped off the silicon sealer and the gain came back up to be within a dB for the other antennas. Now I had a group of antennas to work with in building an array. I found several sources of information on spacing of yagis in arrays. Directional Systems had some application notes and antenna descriptions for their products. The current ARRL Antenna Book has some discussion of spacing of arrayed yagis, which previous editions lacked. I talked with several amateurs about their experiences in building arrays for moon bounce and the like. I had a lot of 2 inch aluminum antenna pipe so I went with a 9 ft spacing to see what would happen. I made 4 2 wavelength phasing lines out of Belden 9913. I had a divide by 4 power splitter with N connectors on all ports. Naturally the yagis had UHF connectors pressed into the feeds. I took the lines and the divider to Chuck's (WA6EXV) lab to measure how well I had constructed the lines. They were



within a couple of degrees and a tenth of a dB of each other. I also measured the power splitter to see how well it was constructed. It too was matched well on all ports. I mounted pairs of the yagis to the pipe and tried to get them off the ground to get a feel of performance. The beamwidths had reduced by about 50% but the gain was less than I expected.



I tried to raise the antennas to get them off the ground and away from the trailer, but they were just too wide and wobbly to hold and I didn't have any other fixtures to put them on. So I will have to wait until I get more ideas or hardware to hold them up. You can see the multi-section crank up tower in the background that the array will go on to some time in the future. We get some strong winds here in the desert so lots of guying, clamps and bolts are going into the project. Bill WA6QYR

For those interested, Al Ward, W5LUA has extra copies of the 2010 EME Conference proceedings available for a \$26 check made out to the North Texas Microwave Society. Al's address is 2306 Forest Grove Estates Road Allen, TX 75002. This is a big book some one and eight inches thick with all kinds of data of interest to hams in the upper frequency range.



**Doug, K6JEY** with one of the Sadelco MINMAX signal level meters at the September SBMS meeting.

The San Bernardino Microwave Society is a technical amateur radio club affiliated with the ARRL having a membership of over 90 amateurs from Hawaii and Alaska to the east coast and beyond. Dues are \$15 per year, which includes a badge and monthly newsletter. Your mail label indicates your call followed by when your dues are due. Dues can be sent to the treasurer as listed in the banner on the front page. If you have material you would like in the newsletter, please send it to Bill, WA6QYR at 247 Rebel Road Ridgecrest, CA 93555 or, [bburns@ridgenet.net](mailto:bburns@ridgenet.net), or phone 760-375-8566. The newsletter is generated about the 15<sup>th</sup> of the month and put into the mail at least the week prior to the meeting. This is your newsletter. SBMS Newsletter material can be copied as long as SBMS is identified as source.

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