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

April 2007 Edition

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At the **5 April** SBMS meeting someone will talk about something. 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. Check out the SBMS web site at http://www.ham-radio.com/sbms/.

REMINDER- NO PARKING IN THE CHURCH LOT UNTIL CLAIRIFICATION IS MADE.

2007-8 Officer elections will occur at the April meeting.

Welcome to new member **Tom Schrum K7NII** of Camp Verde, AZ. I missed the March meeting due to a broken water well, so there is no report of the March meeting other than Doug, K6JEY talked about 78 GHz.

"**Wants and Gots for sale.**

For Sale: 30W 1296 amplifier kit. Cost $45, plus $5 if sent by mail to cover cost of shipping and packaging. In So Cal, can arrange for pickup. Email 1296Amp@cox.net for more info. Chris Shoaff n9rin

For Sale- Traco 9-15vDC in and +/- 12v dc and 24 v dc out at over 400 ma $1 each Dick Bremer WB6DNX 714-529-2800

For Sale--Excess to my needs is a 2+ watt 24 GHz amplifier from W2PED. It has 56-db gain. I am asking $325.00 that is what I paid. Contact me off list if you are interested.73's Bob WA6VHS rhkendall@earthlink.net

For Sale: two 24-inch 24GHz dishes with feeds that I would like to sell for $50 each. Larry K6HLH

Email threads---

Forgot to mention the CMOS BBU pin 3: tie this to +3V from a Li batt, and the unit will acquire a lock a lot faster after powering up. It keep the on-board RTC running and maintains the ephemeris and almanac data.73 de Mike W5VSI

Thank you all for your suggestions on how I should proceed to get my Jupiter GPS unit functional. Mike, W5VSI, and James, G3RUH, gave me the solution to my problem. I needed to invert the serial output from the Jupiter GPS unit to correctly feed the RS232 port on my PC. With the inverter in place, The Jupiter board is successfully sending NMEA messages to the PC and getting displayed on the PC. I can now proceed to check out the rest of the Jupiter board capabilities.

The Jupiter pin connections that are working for me are as follows:

1,2 + 5v
5 Reset on occasion otherwise let float (1)
7,8 ground (2)
11 serial output (3)
13,16,17,18 ground (4)
19 1 pps output
20 10 KHz output

Notes

(1) It appears that I can let this pin float. But it would possibly be more reliable to tie this lead to +5v through a 4700-ohm resistor. Temporarily grounding this lead does reset the board.

(2) I have tied pin 8 to ground and have the board outputting the NMEA messages correctly. I have tied it to +5 volts without any observed difference in behavior.

(3) This is the serial output I inverted to get the PC terminal program to successfully monitor the Jupiter messages.

(4) On my unit, pins 10, 13, 16, 17 and 18 are tied together on the Jupiter board. I tied these pins together anyway.

I have two PCs with serial RS232 ports that accept input serial streams that are essentially TTL signal levels: 0 to +5 volts. The inverter that is connected to the output pin 11 and connected to my RS232 port is simply a grounded emitter NPN transistor with a series resistor to the base and a resistor from the collector to +5 volts. It does not get much simpler than this.

Don N0YE

Mike Manes manes@attglobal.net Tel: 303-979-4899

Hi, My aspiration for the Jupiter GPS receiver is to use it as a 10 KHz reference to discipline a 10 MHz reference oscillator. The 10 MHz oscillator will be used in two places. At home the 10 MHz oscillator will be the time base for counters, etc. When out roving, the 10 MHz oscillator will discipline the LOs for my microwave rigs.

It would be nice to have an LED driven by the Jupiter unit that when lit would indicate the GPS receiver is locked onto the satellites and is producing an accurate 10 KHz signal. Yes I could use a PC to read the NMEA messages. But a PC would be enormously cumbersome and would take my time to read the NMEA messages. Can the Jupiter unit be programmed to output a simple state transition on the second serial port when the unit is locked onto the satellites? An LED could then be attached to this pin. Another possibility is to take a simple single chip microprocessor and program it to detect the NMEA message(s) indicating the unit is locked onto the satellites. This microprocessor would drive the LED.

Has anyone developed a lock indicator for the Jupiter GPS unit?

Don N0YE

http://www.qslnet.de/member/on4iy/roverbox.html

that link has a nice neat solution Don - adds more than just a lock using a simple easy connected board rdgs Simon Dl4PLM

For more information on a GPS lock indicator or readout for the Jupiter board go to this link.

http://wa6vhs.com/GPS/

Bob WA6VHS

The bias voltage for the preamp is supplied independently thru pin 1. It's rated at 0 to +12V and 100 mA max; leave it open if your antenna is passive with a DC path to ground! Pin 2 is +5 input for the GPS engine. 73 de Mike W5VSI

Forgot to mention the CMOS BBU pin 3: tie this to +3V from a Li bat, and the unit will acquire a lock a lot faster after powering up. It keeps the on-board RTC running and maintains the ephemeris and almanac data. The bias voltage for the preamp is supplied independently thru pin 1. It's rated at 0 to +12V and 100 mA max; leave it open if your antenna is passive with a DC path to ground! Pin 2 is +5 input for the GPS engine. 73 de Mike W5VSI

At 12:13 PM 2/25/2007, Jerry Kleker wrote: Hi Loren, under separate email I have sent you chapters 6.3A and 6.4A of "The W1GHZ Online Microwave Antenna Book". The "Magic Number" of energy at the edge of the dish is -10 DB. More later, 73, Jerry W7QX

Jerry, Good deal and I'm sure Loren appreciates your effort. I have one comment about the "magic number": -10 dB is desirable for maximum dish gain, but for best low-noise reception lower levels than -15 dB are more desirable. Radio astronomers classically used something around -20 dB resulting in low dish efficiencies of the order of 40%. I understand that modern RA dish designers are able to achieve higher efficiencies keeping edge illumination low. For EME the problem is balancing the feed design parameters between best gain (Tx) and low-noise (Rx) so maybe something around -13 dB is optimum? At 23cm-up sky noise is so low (<10K) that good dish design for low-noise performance is an important consideration. If the design is for terrestrial dishes pointed on the horizon then dish sky-temperature is much higher (~150K) and one may as well choose max gain designs. 73,Ed - KL7UW

South Eastern VHF conference-
HOTEL INFO for 2007 Conference: Marriott Atlanta Century Center
2000 Century Boulevard NE Atlanta, GA 30345
Direct telephone# 404-325-0000 Fax # 404-325-4920
http://marriott.com/property/propertypage/ATLNE
Group room rate $109
Cut off date for making room reservations: April 6, 2007
This is a super nice hotel and will be a great location for our conference. As always, it is recommended to call the hotel direct for your reservations.
2007 Conference Registration: <------ Now available!!
www.svhfs.org/downloads/07_full_packet.pdf
Mini-Circuits-SVHFS Design Award competition is ON for our 2007 conference!
Circuit designs vhf and above will be judged at the conference and are in
competition for a $1000 cash prize or a $2,500 gift certificate for
Mini-Circuit parts. The competition rules used are on our Mini-Circuits-SVHFS Design Award page. If you have any questions or have a project that you might like to submit, please contact Design Award Chair - Charles Osborne, K4CSO cosborne@pari.edu
CALL FOR PAPERS - We are looking for submissions for the proceedings and for presenters. Please see the full text of the Program Chairman's Call for Papers below.
11th Annual Southeastern VHF Society Conference April 27th and 28th, 2007 Atlanta, Georgia
The Southeastern VHF Society is calling for the submission of papers and presentations for the upcoming 11th Annual Southeastern VHF Society Conference to be held in Atlanta, Georgia on April 27th and 28th, 2007. Papers and presentations are solicited on both the technical and operational aspects of VHF, UHF and Microwave weak signal amateur radio. Some suggested areas of interest are:

- Transmitters
- Receivers
- Transverters
- RF Power Amplifiers
- RF Low Noise Pre Amplifiers
- Antennas
- Construction Projects

Test Equipment And Station Accessories
Station Design And Construction
Contesting
Roving
DXpeditions
EME
Propagation (Sporadic E, Meteor Scatter, Troposphere Ducting, etc.)
Digital Modes (WSJT, etc.)
Digital Signal Processing (DSP)
Software Defined Radio (SDR)
Amateur Satellites
Amateur Television

In general papers and presentations on non-weak signal related topics such as FM repeaters and packet will not be accepted but exceptions may be made if the topic is related to weak signal. For example, a paper or presentation, on the use of APRS to track rovers during contests would be considered.
The deadline for the submission of papers and presentations is March 9, 2007. All submissions should be in Microsoft Word (.doc) or alternatively Adobe Acrobat (.pdf) files. Pages are 8 and 1/2 by 11 inches with a 1-inch margin on the bottom and 3/4-inch margin on the other three sides. All text, drawings, photos, etc. should be black and white only (no color). Please indicate when you submit your paper or presentation if you plan to attend the conference and present there or if you are submitting just for publication. Papers and presentations will be published in bound proceedings by the ARRL. Send all questions, comments and submissions to the program chair, Jim Worsham, W4KXY at w4kxy@bellsouth.net. For further information about the conference please go to http://www.svhfs.org.

Hello, I have been talking with Gary, AD6FP, about getting together for a QSO party on 47 and 78ghz. He and several others from up North would like to get together with us to talk on these two bands. We will set a date and locations later, but now we need to see who can get on the air in the Southern half of California. Below is a list of potential participants from up North. (We need to get building!). Let me know if you are interested in participating. Even if you just want to come along and help/observe. My guess is sometime in May. So. Email about what stage you are in
47ghz Are you operational? Details: Are you in Process? Details: Can you finish by May 1?
78ghz Operational? Details: In Process? Details Can you finish by May 1?
Do you want to come along to help, log, drive, observe?
If you need help to finish, please ask! We have lots of resources.
Ok. Please let me know so we can set dates, organize, etc.
Doug K6JEY
Here's a list of active Northerner's
AA6IW, Lars: 47 & 79: AD6IW, Goran: 79: W6QI, Frank: 47: AD6FP, Gary: 47 & 79: W0EOM, Will: 47 & 79: KF6KVG, Bob: 47 & 79: KB8VAO, Steve: 47 & 79: W6BY, Brian: 47& 79

78GHz Things appear to be coming together on this band. I have the LO Mixer working, the switching and IF circuits. I have done a test and received a signal at 79.8GHz from across the street. I have two upgrades waiting to go on. The first is low side injection and the second is a fundament mixer. I have all the parts, but need to get time to put them in and test the unit as a whole.
47GHz as you can see from the picture, I have a 6" dish with WR22 feed. I am using a fundamental Phillips mixer. I will be CTI DRO oscillator at 12.2240GHz. The IF will be 10.368GHz. At that point I am going to use my DB6NT transverter as an IF stage. That should work out nicely, but I need to get the pieces together and test the unit. The nice thing about the units is that nearly everything works on +12v and is relatively insensitive to voltage changes. I will have to have regulated voltages for mixer bias and that's about all. More pictures and info on my website K6JEY.com. Doug K6JEY

For you who are working on the 24ghz radios that come with a DRO oscillator- I have a DRO by the same company and same general model but use an external reference. I did some measuring of some of the parameters of my DRO. The measurements probably apply to all the DRO's in the series. I have a 13.2 GHz version with an external reference input. I found that the DRO would tune from 13.136 to 13.7 GHz. It draws about 280 ma. If the voltage went below 13.15v the oscillator would not lock

with a 0dbm reference at 25 MHz, the DRO would lock every 25mhz through the range. Other reference frequencies can be used to make it lock on your favorite frequency. I did not test it below 20 MHz. Frequency stability was excellent. When locked, the frequency did not drift more than 1hz from initial lock to over 5 minutes. (I used separate standards- an hp8642A locked to a GPS stabilized source [Odetics 325] to generate the reference signal and an EIP548 counter locked to a CDMA stabilized rubidium source [Symmetricom 2700] to measure the DRO output. Both are essentially GPS referenced but separately disciplined and in comparison measurements show differences in parts in 10-12th.)
I did not measure phase noise. The output was 18mw and did not vary with input voltage.
There were no spurs or harmonics visible on the analyzer. Looks like a pretty good oscillator, easy to use and easy to light up. Doug K6JEY

Hi All, I am checking with my supplier of the CTI DRO's as to whether he has any 11.8 GHz models. At 11.880 GHz with a 20 or 40 MHz reference, you should have the correct frequency for low side injection and a 432 MHz IF. I'll post any info. Doug

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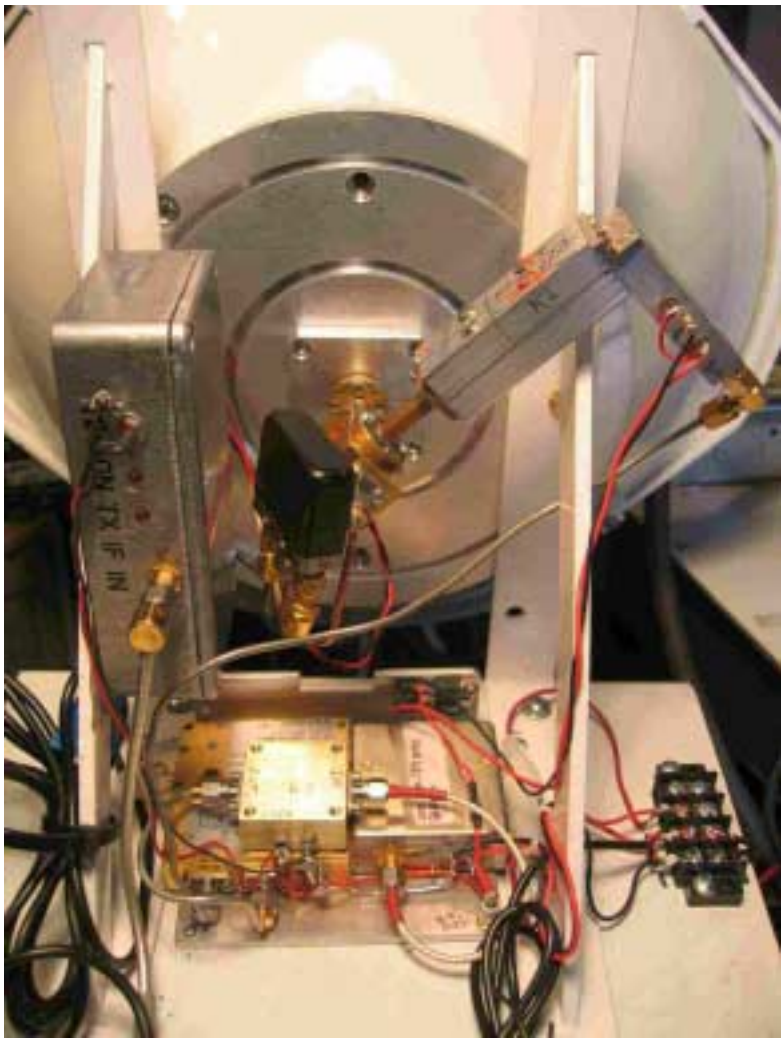
MARK YOUR CALENDARS AND REGISTER NOW
HOTEL ACCEPTING RESERVATIONS
Full info and registration at www.microwaveupdate.org Abstracts, papers and presentations may be sent to W2PED pdrexler@hotmail.com or N2UO lu6dw@yahoo.com
Thursday sightseeing or possible surplus tour
Conference Fri & Sat; Flea Market Fri night
Vendors on site; Banquet Sat night; Door prizes and raffles
Hosted by the Pack Rats--Mt Airy VHF Radio Club
Spouses, friends and family invited; hospitality room Alternative family/spouse programs available
$79 early-bird registration until 9/1 includes Conference, proceedings, and banquet.
$89 from 9/1-10/1; $99 thereafter. Extra banquet Tickets $39. Special hotel rate $92 per night
Questions to chairpersons K3TUF Phil@k3tuf.com or KB3HCL@arrl.net

78 and 47Ghz Progress at K6JEY

78Ghz- Well, the engineering and construction are done. Just testing is next. I was able to do two things that improved the rig substantially. I was able to get a DRO to lock on 13.375Ghz, which gives me a 450Mhz high side IF. The DRO is quite small and runs on +12v. In fact the whole rig does except for the multiplier. It draws 500 mills and seems to be very insensitive to voltage changes. I also got a fundamental mixer for 78GHz. That should give me perhaps a 15dB improvement over a sub-harmonic mixer. The dish is one foot and tested to be about 42dB gain. Here are two pictures. I'll add a 6x30 finder scope later.

The rig from the operating end. The DRO and Osc. Are on the bottom. The multipliers are at an angle;

Close up of the RF part:



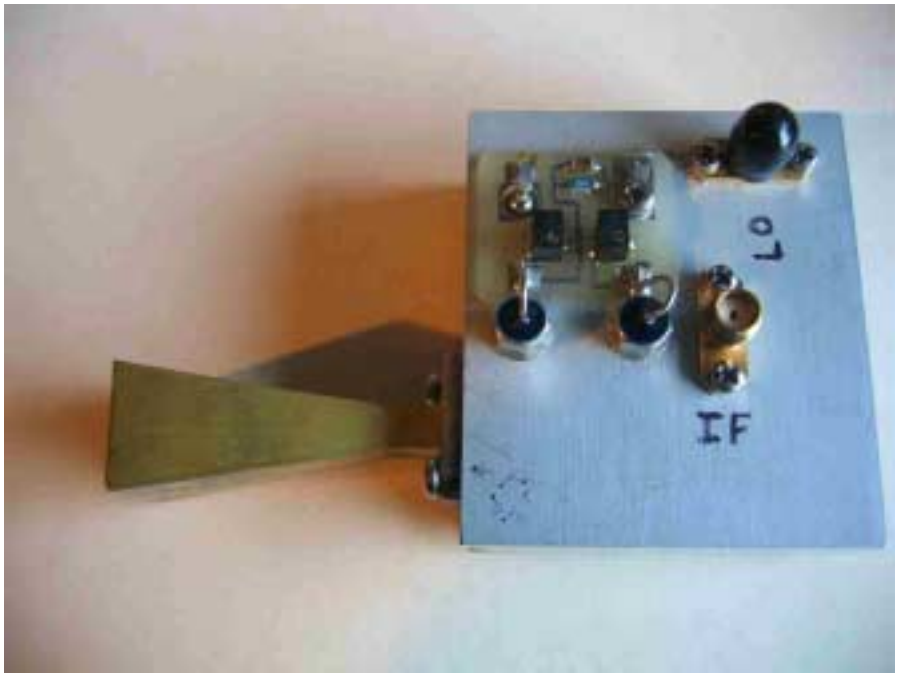
I really like how small the Oscillator is, and that it locks at 13GHz. I may replace the .080 coax to the multiplier. There is an active 13-39 GHz multiplier and a passive 39 to 78GHz multiplier. The mixer is at an angle because of my piece of WR10 is a twist. WR12 is ideal for this band but REALLY scarce. The mixer is a WR10 type and the rest is mostly WR15. The experts say it doesn't matter. They all work on 78GHz.

78Ghz- here is some notes of what I used and what I did along the way.

I fell into all the pieces pretty easily and for that reason jumped from 47 to 78.
Dish- $135 with tested feed WR12
Mixer- $200 with Tripler- DB6NT board, Japanese enclosure from Will W0EOM tested.
Oscillator-100mhz Bliley OCXO. Very stable +12v
CTI brick Tuned up and ready. +15 volts input. (Dead at 12v) so used a dc-dc converter to +24v and a +15v regulator**.**
DEMI TC switcher.
Original operating frequency was 77.32Ghz. (Changed with above revision and addition of a DRO Osc)

47Ghz- Not much progress. I have a good Phillips Mixer, a Pcom dish and LO waiting. So have all the parts but have not integrated them. I particularly want to note the Phillips Up converter box (Square type). These act as spectrum analyzer mixers, counter front ends and pretty good radios at both 47 and 78ghz. I suspect it is the finline input that makes it broadband enough to allow it to operate over a wide range of

frequencies. I have found that most mixers that operate on 24ghz do quite well at much higher frequencies. With the WR22 horn, this one works very well up through 78Ghz. I don't even bias it. They can be had from Will, W0EOM.



Here are some choices a person needs to consider: If you transmit CW through a regular mixer you loose power from the LO and IF through the mixer -6db and because of the DSB signal it produces -3db. There are other losses that put you above 10db loss. By having a separate LO for transmit, you can just multiply up to the frequency and get at least a 10db better signal.

However, with a switch able amplifier, you get an improvement in noise figure and gain as well as transmit output, so two serious problems are solved for the added expense of a baseball switch and amplifier. The latter seems to be the way most SBMS stations are looking at it.

However another gain in performance can be had by using a fundamental mixer instead of a sub harmonic mixer like the DB6NT. On both RX and TX you could lower losses by as much as 15db by using a fundamental mixer, That would also mean that you would have to put a doubler on the end of the tripler to feed 79ghz straight into the mixer. An amplifier after that setup could make a first rate rig.

Others have found impatt amplifiers and are using them on transmit.

Here are some other observations:

Testing needs to be done to see what the phase noise difference is between the traditional bricks and the new synthesizers (usually a YIG) as well as to how they do in the field.

Having a counter that goes to 78 GHz is good; having a spectrum analyzer that goes to 78GHz and reads frequency and power accurately is fantastic. No guesswork.

Who is active Locally?

As far as I know there are three groups of stations getting ready for 78 in the area

The 50mhz and up group. About four operators. Most have their rigs on standby as they have all talked to each other, but are willing to get them out and talk with us on any frequency.

SBMS- two to 4 stations in the process. One almost done.

San Diego Group- Two or more stations in process but proceeding slowly. I am sure that they will quicken their pace, as others get closer to being on the air.

Marker Brick-

I ended up with a CTI 8ghz brick that I tuned to the appropriate frequency so that it multiplied up to 77.232Ghz. I drive it with a GPS sourced signal generator at 107mhz so the frequency is rock stable. I put a Mixer on the output and get a pretty good signal at 78Ghz. It runs on +15v. Very handy to have.

The Picture below shows the gray colored CTI brick sitting on an old blue one, a WR15 multiplier and one of Dick Kolbly's fine 20db horns. (The horn works great).

Doug, K6JEY

The Annual SBMS Dinner from one end of the table.

The **Annual SBMS Dinner** was held at the Fullerton Sizzler with about 30 people in attendance.

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 under 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, bburns@ridgecrest.ca.us, or phone 760-375-8566. The newsletter is generated about the 15th 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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