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

## January 2006 Edition

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At the **5 January 2006 meeting**, OVRO-SBMS Update and Report of December operation. The Tech Talk is on making Sun Noise Measurements. 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/.

**Pre-meeting dinner place.** The House of Ribs BBQ Restaurant at 451 Magnolia Ave Suite 103 in Corona CA. web site www.houseofbbqribs.com. Take the I-15 south of the 91 interchange to Magnolia Exit and travel on Magnolia until it crosses Ontario Ave. Then continue about a block and find the House of Ribs on your right.

**Owens Valley Radio Observer Project**

The 40 ft dish at the Owens Valley Radio Observatory has a gain of 54 dB at 1296 MHz and 71 dB at 10 GHz. ARRL web site has information on contacts. So far there have been 78 QSO's on 1296 MHz. QSL cards are starting to come in.

OVRO PROJECT **Update**

Here is some current info about the OVRO W6IFE project. We are in the process of making QSL cards and hope to send some out by the end of the month.

We are going to be operating on the 28th and 29th of Dec. We will be having an educational outreach on 23cm at about 1700z on Tuesday and would like only arranged for stations to be involved. We will be working on the 10Ghz side of things until we can consider it functional and have mapped the moon. After that we hope to workstations on 10ghz. We also hope to work some JA's at the end of the pass on 23cm if there is time left. We will be using direct email tome and the EME logger for real time updates at http://www.dxworld.com/emelog.html

We have been asked to do an article for CQ Japan and that has been done. We will be in the Feb. issue. We are writing other articles.

We are not sure of next year's schedule at this point. However, as soon as we know, we will publish it. We are hoping to be on for the DUBUS and ARRL contests an outreach and one operations weekend for 10Ghz and 23cm Qrp. Thanks for all the help that people have been giving to the project; most notably for the loan of a 10Ghz amplifier and the donation of a 100watt 23cm amp.

Use one of the calculators that are available such as fromF5SE, to see what your station might be capable of with OVRO. The figures you get from that program are a little optimistic, but useful. We have had tremendous echoes from the

Hello Microwavers,
We had a really great year this year. A successful Microwave Update, the addition of ATV to our regular meetings and the ongoing success (and trials) of OVRO are just some of the things that we did. I would like to thank everyone for their contributions for making this year a great year. Thanks to Dave (WA6CGR) for having a well-stocked lab for club to use and for those that have helped to make the lab what it is today. I look forward to seeing the projects that make use of the parts that are available. I would like to welcome our new club members, and say if you have questions, someone in club will have answers to help you out. We have a diverse group of people and a wide range of experience. As such, there are some interesting ideas and solutions to problems. So as we start this New Year, let's continue to come up with new ideas, new projects and have a lot of fun doing so.
Best Wishes and 73's,
Chris Shoaff n9rin

moon on 10GHz, but won't really know what we can do with other stations until we have done some more measurements. We should be able to talk to very small stations, though. You might want to set up Spectrum Lab with your rig to increase S/N ration. Also, start looking at the predictions for moon visibility and usability. The most meaningful numbers are the Doppler shift. You will want to operate split with your IF rig and leave your transmit frequency fixed while tuning around with the receiver. We are going to try the following. All stations will dial in the agreed on frequency on their radios for transmit. Doppler will shift the frequency differently for each station. The challenge is to tune around. and find the person you are supposed to talk to. Knowing the predicted Doppler will help you get close.

The next thing is to know your elevation. We are all pretty good at azimuth pointing, but you will have to be just as accurate on elevation. You can use a digital inclinometer, an analogue one, or a sensor from an RV that they use for showing the elevation of their dish antennas. Ebay, in a word. You will probably not be able to hear your own echo, so you will be pointing blind. Also know what frequency your radio is on. Listen to one of the local beacons and draw a graph of how your radio changes frequency over time. Knowing what frequency you are on, where to point your antenna and an idea of Doppler shift you have the best chance of working OVRO. If you are guessing at one of those factors, chances are you will not be able to work us.

Lastly, CW. At our power levels we will be using CW. We may use a digital mode later, but for now it is CW. 12 WPM or so is great. You might want to set up your memory keyer to send things likeW6IFE de your call three times and then repeat.

Here is a link to the normal operating procedures used in EME .http://www.nitehawk.com/rasmit/eme_proc.html. Depending on signal levels we have gone from rag chewing, with the big guys, to 3x repeats and short exchanges, to 2.5minute timed exchanges with really weak stations. You will know by how we are sending how well we are copying you.

It will be a challenge for nearly everyone to make a 10GHz EME contact, but it is very exciting and worth it.

Finally, we are working on our DC communications. At this point in early December, it looks like the EME Logger will be the best bet for real time updates of what is going on during operations times. The logger is here: http://www.dxworld.com/emelog.html

If you have any questions or need help, don't be afraid to ask. Once we get going and know more about the path, we should be able to contact lots of people and it will be interesting to see how small a station we can work. We are running about 20watts and about 72db gain. NF is 2db. (Limited by the moon)

Good luck, hope to hear you via the moon.

Doug, Dennis and Chuck

OVRO-SBMS Project

**Last meeting** our speaker was Bill Klipstein from Jet Propulsion Laboratory, who spoke on atomic clocks which have accuracies of 10^-15. The ones that stays in sync to within one second in 30 million years. There was lots of pictures and discussion on the different types of atomic clocks and measurements. Treasurer Dick, K6HIJ will be mailing out the back collection of new member badges. 23 people present

**MUD2006** will be held 19-22 October 2006 in Dayton, Ohio. The hotel will be the Holiday Inn North Wagner Ford exit I-75 $75. The plan is for Surplus tour on Thursday, Flea Market Friday and Banquet on Saturday. Tom Holmes N8ZM will be the host.

**Activity reported** at the December meeting- Chris, N9RIN had a board built up that provides 21 w out for 4 w input on 1296 MHz; Dick, WB6DNX cleaned out his garage some more, noting the big pile of stuff in boxes at the meeting; Bill WA6QYR built an NBS standard dual dipole feed for 1296 MHz; Jeff, KN6VR ventured to OVRO operations; Dennis, WA6NIA went to OVRO operation; Pat, N6RMJ built his 5 GHz rig and has the 24 GHz rig on the air; Howard, WA6YGB built a 220 MHz amp; Rich, KG6JKJ had pictures of OVRO; Gary K6KVC did some ATV work; Ray , WA6OWM has a working 1296 rig; Gene K6BNN did some 10 GHz work; Wayne, KH6WZ did some work on his 24 GHz Pcom and provided some CW learning kits to N9RIN and N6RMJ; Bob, WA6VHS collected some parts for 47 and 76 GHz; Ed, W6OYJ is collecting the W6IFE QSL cards and sending them to Mel, WA6JBD to get the W6IFE responses out and is updating the Pcom 24 GHz documentation on the web site; Dick, K6HIJ is finishing some more of the 24 GHz switches; Larry, KG6EG helped clean up the “Lab” for the up coming party; Juno, KG6MOS has a 10 GHz DRO and LNA; Larry, K6HLH worked on his 1296 MHz rig and amplifiers; Doug, K6JEY has a GS15 amp that provided 350 w output; Art, KC6UQH checked in on ATV link. .

**“Wants and Gots for sale”**

For Sale 2ft dish and a dichlguide feed for 10 GHz and one for 24 GHz new (NW1B antenna) prefer not to ship Wayne KH6WZ 310-252-7726 KH6WZ@arrl.net

For Sale 10 MHz ocxo made by CEPE Pilote, not tested $30 Wayne KH6WZ 310-252-7726 KH6WZ@arrl.net

**Scheduling.**
Feb.- High Power Amplifiers. Members will share their projects and results. Want to build an amp? Join us for a presentation by those who have had experience building them. Both solid state and Tubes. Solid State 10GHz amplifiers, 23cm Amplifiers solid state and tube, 24GHz power amplifiers. Tech talk: amplifier operation classes and what to use.

March- Tech talk on 325 GHz SIS receivers and mmwave reception techniques.

April- Network Analysis theory and clinic. We need to ask Mel and have him bring his nice analyzer

May-Basics of noise figure measurement and measurement clinic. Need a presenter. Tech talk on noise figure and noise temperature.

June- 24 GHz rig progress. Members share their 24 GHz rigs and I've a tech talk on details of construction and challenges.

July- Directional coupler design and use.
How about a field trip to Cal Tech to their receiver lab? We have been invited. Tune up party
Aug. Get ready session for 10GHz and up contest

**Email reports**-
Hi all, I'd like to claim what should be a new world DX record for the 134GHz band as well as a possible "first-on-band" for the USA. This QSO was between W2SZ/4 and W4WWQ/4. Band: 134GHz
Date: Dec 8th, 2005 Time: 02:43z
W4WWQ/4 (WA4RTS assisting) 36-59-28N 79-20-41W FM06hx
W2SZ/4 (WA1ZMS operator) 37-31-00N 79-30-35W FM07fm
Distance: 60.1km
W2SZ/4 WX: Temp: -6.7C Dew Point: -16C RH: 45% Baro: 882mb Atmos Loss: 0.185dB/km
W4WWQ/4 WX: No data taken.
The former 134GHz DX record was held by JA1KVN & JA1ELVat 56.4km. The signal margin on both ends of our QSO was a few dB so there is a chance we could better our DX. But first, I must investigate why one of the station's Gunn sources will not properly phase lock with good phase noise. Of course, you only find this out after you take the equipment into the field!
The equipment runs 5mW of TX power into a 30cm dish with a Cassegrain feed and a dual-mode horn. Receive function uses a sub-harmonic mixer. Both TX and RX functions get their LO power from a phase locked 69GHz Gunn source. The Gunn signal is frequency doubled when in TX mode. The operating mode was FSK-CW. The RX IF radio was an ICOM R-7000 on both ends.
I'd like to thank Geep, WA4RTS for helping Pete, and W4WWQ during the QSO.
NOTE: As of last year, the 134GHz band has replaced the former 145GHz Amateur band. The 145GHz allocation has been removed from the Amateur Radio Service world wide, with the USA being the last country to make the change.
73, Brian, WA1ZMS/4

**Left-over from MUD05**
All of the info is just about available on the MUD web site, except the antenna stuff which W6OYJ mailed to me and I lost it! I should have a new copy by tomorrow. We will be putting up the pointers on the main page this weekend. The presentations can be found at: http://www.microwaveupdate.org/2005presos
The International Rectifier parts can be found at: http://www.microwaveupdate.org/IR
The M/A-Com parts can be found at: http://www.microwaveupdate.org/MACOM
The Power Supply diagram can be found at: http://www.microwaveupdate.org/PS/BiasSupply.jpg"
The Goldstone Tour and all photos van be found at: "http://www.microwaveupdate.org/2005photos"
Thanks, Dave - WA6CGR

**Information** taken from the New York Times News Service-
Marvin Chodorow, an applied physicist and administrator at Stanford who helped refine the use of microwave tubes in improving radar, telecommunications, cancer treatments, and other applications, died Oct 17th at his home in Stanford. He was 92.

In the 1940s, when microwave technology was in its infancy, Dr. Chodorow began his work on tubes known as klystrons, which generate and amplify high frequency of microwaves. The tubes were developed at Stanford in the 1930s and later became essential in television transmission, missile guidance systems and satellite communications. They are also used in linear accelerators to create beams of radiation to treat cancers.

Dr. Chodorow helped increase the power of klystrons and contributed to the theory of the reflex klystron tube. From 1959 to 1978, he directed the microwave laboratory at Stanford, where he also served as founding chairman of the Department of Applied Physics.

In the 1970s, Dr. Chodorow and others experimented with acoustics microwaves and developed an acoustic microscope. A collaborator on the project, Calvin F. Quate, an emeritus professor of engineering at Stanford, said the microscope examined the acoustic properties of surfaces and was commonly used to test the integrity of coverings around semiconductor chips.

Marvin Chodorow was born in Buffalo and received his undergraduate degree from the University of Buffalo and a doctorate in physics from the Massachusetts Institute of Technology in 1939.

He taught at the City College of New York and Pennsylvania State University before joining Stanford in 1947. He was named a professor of physics and electrical engineering in 1954. He then served as executive head of Stanford's Division of Applied Physics from 1962 to 1968. In 1964, Dr. Chodorow and Charles Susskind published a text entitled "Fundamentals of Microwave Electronics" (McGraw-Hill).
Greg Bailey K6QPV San Diego

Here are 2 images of my latest 10GHz rig, "Ms. June." The name comes from how long it took to build: All in the month of June.

Featuring a 10GHz DB6NT transverter, and stabilized with a Qualcomm "rectangular board" synthesizer, injecting 2556MHz into the DB6NT just before the x4 multiplier and filter.

There are two amplifiers in this rig: A small Harris-Farinon 2W unit (described in a paper in the MUD 2005 Proceedings), and a larger 10W amp. In case one amp fails, a substitution can be done within 5 minutes in the field.

The receiver NF is about 1.2dB, with just over 12dB of gain. A converted LNB (modification done by Mel WA6JBD) is used in the RX path. The antenna is a 24-inch M/A Com dish.

The meters have KH6WZ-customized faces, the one on the left monitors transverter operation, while the second meter checks the amplifier output.

Other things worth mentioning: The FT-817 IF radio, 12V to 24V DC-DC converter, and JWM sequencer form a "Universal IF section" compatible with my other band set-ups. A micro switch mounted at the bottom right on the plywood panel is used for hand-sending CW, and a locking toggle switch is used to send a "beacon" or "carrier tone" when looking for contacts. A night-light (auto map light) comes in handy when it gets dark. Wayne KH6WZ

From email at http://homepages.ihug.co.nz/~jpsl/a_simple_3.htm

# A Simple 2.4 GHz Signal Source

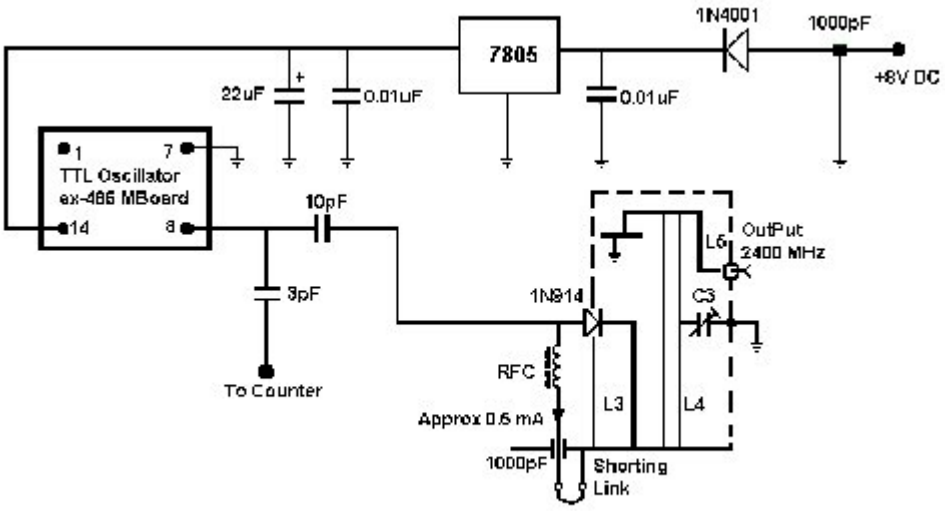
An essential item for Mode S development is a reliable signal source. One that does not require either a receiver on 2.4 GHz or special test equipment to align. Of course the easiest is to obtain something already tested and working, or a reliable kitset. The G0MRF unit from AMSAT-UK seemed the best answer but at the stage of greatest need it was being redeveloped and would not be available for some time. Consequently sources were checked for a fail-proof design. What evolved and is presented here proved to be excellent with plenty of signal and the additional advantage of output on most of the VHF/UHF/SHF amateur bands. (Check G0MRF Signal Source for a report on the AMSAT-UK kitset.)

The best idea came up on the AMSAT-BB under the title "$2 S-band signal source." This used the TTL oscillator from an old "486" Motherboard feeding a diode multiplier to a 2.4 GHz tuned line. Performance is entirely satisfactory. I am using a 24 MHz and a 20 MHz oscillator listening (respectively) to the 100th and 120th harmonic.

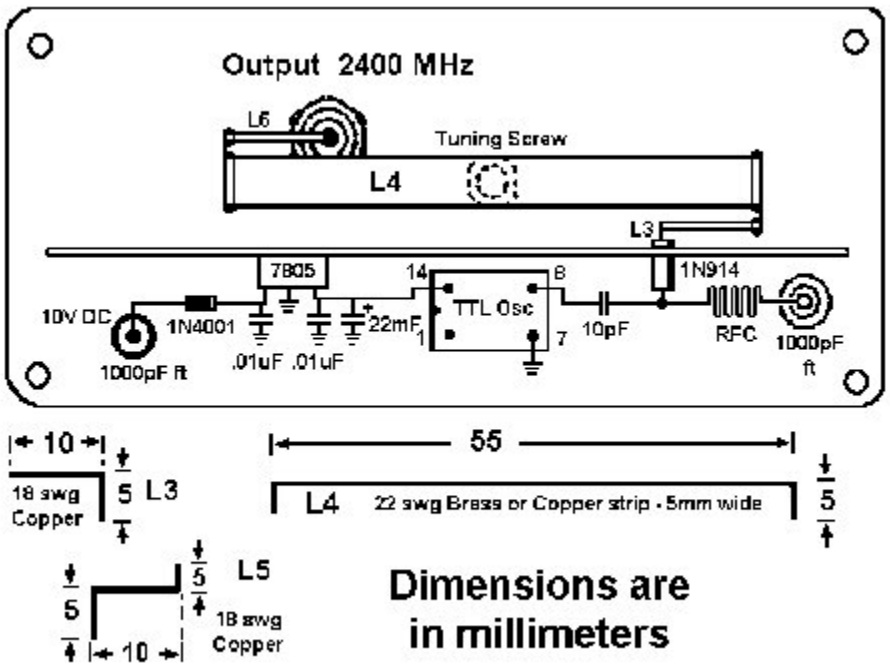
Look for the TTL oscillator on an old 486 MB. It will be marked with its frequency, 20, 24, 25, 33, 50 or even 80 MHz. Supply this with 5 volts. Solder a short length of wire on the output terminal and you have your 24000.00 MHz test signal. It may not be exactly on frequency, but it will be close.

Note: The actual oscillator frequency is non-critical, however the higher the better. Ensure the 7805 is bypassed at the IC, any lead lengths can give rise to destructive oscillation.

Most components were recovered from the same 486 MB. The low power 5-volt regulator (78L05) is suitable and low cost.1000 uF feed-through capacitors are available at the Auckland VHF group trading table.



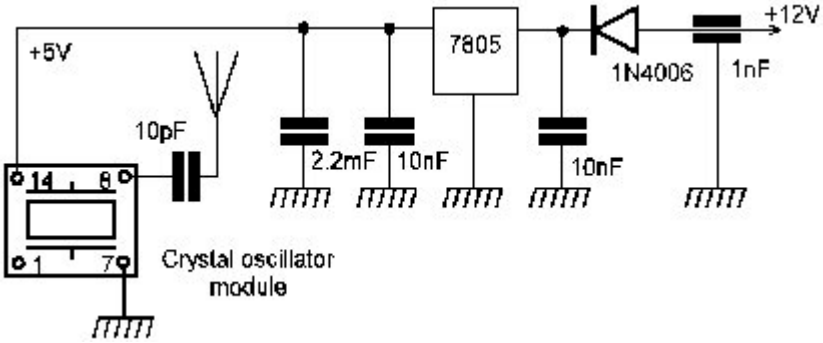

This circuit can be viewed at source:-
http://www.haviland.com/homepages/gregwycoff/SOURCE.JPG
http://www.haviland.com/homepages/gregwycoff/IMG009.JPG
A suitable container can be fabricated from PC board or just use an old small tin. The output connector is not necessary, a dipole constructed from a short length of coax pigtailed out is more than adequate. I made one using coax and a short length of brass tube. Pick a tube that will slide neatly over the coax once the braid and outer insulation are removed.



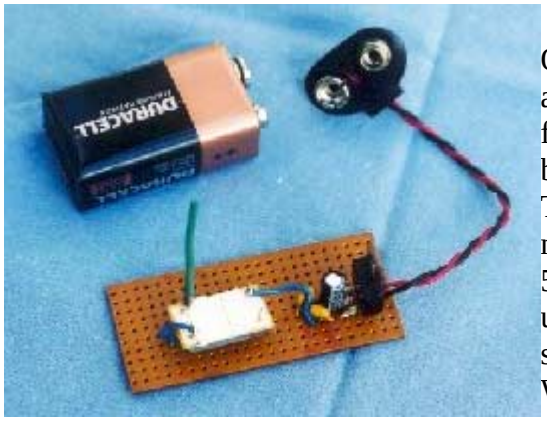

RFC is 3.5 turns on a ferrite bead. Almost any small signal silicon diode can be substituted for the 1N914 - a 1N4148 gives plenty of output. Spacing L3-L4 and L4-L5 is about 3 mm.

Testing. A strong signal should be heard on harmonics of the TTL oscillator frequency replacing the shorting link with a millimeter should give about .5 milliamps. If you have a 2.4GHz receiver adjust C3 (4BA screw) for maximum signal.
NOTE: This adjustment may be very broad and is unnecessary for output - it's just a nice touch! Good earthing of the lid to the case is essential for peaking C3. For most folk, only the 7805 will need to be bought. It's likely that many will have even this in there spares' draw so cost should be minimal.

SIMPLICITY




An even simpler circuit soon appeared. The diode multiplier is unnecessary. The TTL oscillator alone into a short bit of wire gives a good signal on 2.4 GHz. If you have a good 5-volt supply, even the regulator can be eliminated. For slightly improved results using this simple idea try making a quarter wave 2.4 GHz whip for the output or even a half-wave dipole. A 9-volt battery permits the signal source to be moved a distance away for antenna checking. This circuit is ideal for checking other bands and frequencies.




Odd and even harmonics of the oscillator will be heard above its fundamental. Just multiply the marked frequency to find its harmonic. Strong signals should be heard well beyond 2.4 GHz. If you find one of these TTL oscillators on 24 MHz you are in luck. This gives markers at 144, 432, 1296, 2400, and in the 9cm and 5cm bands. The above-described units are in constant use for antenna comparison & tuning, and as weak signal sources for checking receive performance. While the output is around -105 dBm, that will produce a signal 35 dB above the noise in a reasonably good converter. If the output from any of these sources cannot be heard with both the source and converter on the bench a short distance apart with just a few cm of wire in the antenna then the receive system will not hear AO-40 without a huge antenna - perhaps a 20 metre dish!

"Check out NZART's **Break In** magazine of November/December 2001 for a comprehensive article on 2.4 GHz signal sources."


A picture of the 2005 SBMS Christmas Party at the “Lab”. Picture by Phyllis Kolbly.

# ESTONIA

CQ 15 ITU 29
WW LOC KO28 wa

# ES6RQ


**Ants Randmaa**
RITSU, 68608
P.O. Box 88
Valgamaa, ESTONIA


TNX FB EME QSO!

Ants
VY 73 Ants

TO RADIO: W6IFE

CONFIRMING OUR TWO WAY CW QSO

VIA TR○ AU○ MS○ ES○ F2○ EME⊗ ○

DATE: 23.10.2005 UTC: 09.26

QRG: 50 144 432 (1296) MHz BAND

UR RPRT: 579 ANT: 4,5m dish

RIG: TJ2000 +HM TRX TX: 300W at feed

⊗ PSE QSL ○ TNX QSL

via BUREAU or direct

# JA8IAD

EME

## TO RADIO W6IFE

CONFIRMING OUR TWO WAY QSO
DATE 12 NOV 2005, 0630 UTC
BAND 1296MHz
MODE A1
REPORT 579
TX IC-970/YD1300 300W
RX IC-756PRO/DB6NT CONV
ANT 5mDISH OK1DFC Septum Feed
REMARKS TNX FR FB EME QSO

Michi

MICHINORI NARUMI
2-12 11-11
TUKISAMU-HIGASHI TOYOHIRA-KU
SAPPORO JAPAN 062-0052

# HB9Q DX group HB9CRQ

QTH: **JN47cg** Reinach, Kanton Aargau, Switzerland

RIG:

| | |
|---|---|
| 1296 MHz: | 15.28m dish (f/d: 0.53), IMU-horn, 0.4 dB NF, 7/8" sucofeed, TH 308, IC 756, LT 23, DSP 599zx, WSJT |
| 432 MHz: | 15.28m dish (f/d: 0.53), double-dipol (RX h/v, TX circular), 0.4 dB NF, 7/8" sucofeed, 2 x 8874, IC 756, LT 70 MKII, DSP 599zx, WSJT |
| 144 MHz: | 8x19xxx (by m2), 0.2 dB NF, 7/8" hardline, 8877, IC 756, LT 2 MKII, DSP 599zx, WSJT |
| 50 MHz: | 11 element yagi by m2 (2.5wl, 23m above ground), and ringo (6m above ground), IC-756, DSP 599zx, WSJT |
| 28 MHz: | 7 element yagi by m2 (19m above ground), Alpha 87A, IC-781, DSP 59+ |

**HB9Q** confirms two-way QSO with **W6IFE**

| | | |
|---|---|---|
| **Date:** 13.11.05 | **UT:** 02.08 | **Propagation:** EME |
| **Band:** 1296.03 | **Mode:** CW | **RST:** 569 |

**Many thanks for nice QSO!**

Vy 73 es happy DXing

*Dan* HB9CRQ / KT6Q

**PSE QSL**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From the table at the SBMS Christmas Party at the “Lab”. Thanks Phyllis Kolbly.

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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