



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

November 2006 Edition

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At the **2 November 2006** meeting is to be Ed Jones describing his propagation studies and how they might apply to microwaves. Ed, AE4TM, will discuss some interesting phenomenon commonly observed in HF propagation. HF Doppler shifts recorded with Pactor will be presented that show splitting in the F-layer during the daytime as well as movement of the electrons in the Earth's magnetic field. These data imply that the electrons within the F-layer travel as unhomogeneous pockets originating from pulsations within the auroral ovals. Also included in this topic will be a discussion of the origin of HF backscatter as determined by Pactor and SuperDARN Over the Horizon Radar. Ed is a physician at the Loma Linda Veteran's Hospital and former PhD research physicist from the Oak Ridge National Laboratory where he published 30 scientific papers. 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.

Last meeting-VP John, KJ6HZ presided at the meeting where we had Frank, WB6CWN and John, KJ6HZ talk to Rain Scatter slides from an updated tech talk from Andy, K0SM at the 2005 Central States Convention. K0SM also has software to take data for the NOAA radars and give predictions of where to point and type of return is present. Welcome to new members Kent Savage K6WCI of Downy, Jack Davis K6YC of Sacramento, and John Foote, K1DOK of Garden Grove. We had a visit from Ed, K6ODV during the meeting. Pat, N6RMJ reported the winners of the 2 GHz and up contest being The Front Range Group in Colorado with 140K points. Second was SBMS with 50 K points, Northern Lights Group with 28K points and the San Diego Microwave Group with 25 K points.

Plaques will be in the mail soon. Frank, WB6CWN noted Mini-Circuits ZX60-3018GS amplifier with 2.7 dB NF up to about 2 GHz for \$50 and the Hittite X16 multiplier covering 650 MHz --- 10,368 MHz with about +7dBm output. The annual SBMS spouse's dinner in February or March was discussed. There were thoughts about changing some of the scoring of the 10 GHz and up contest. Discussion was thrown about on making a yearlong contest similar to Europeans with it being on each band and sponsored by Microwave Update. Dick, K6HIJ had purchased a wire bonding machine which maybe useful in the future. 26 people present.

Scheduling.

December will feature Chris, N9RIN showing PCB layout and manufacturing techniques.
January 2007 is still in the works.

Activity reported at the 5 October SBMS meeting- Doug, K6JEY has a working 1296 MHz amp and a 78 GHz source; John, KJ6HZ operated at OVRO and has a DB6NT 200mw 10 GHz rig; Mel, WA6JBD had fun in the contest and the most places that failed to make contacts at; Dave, WA6CGR had the "Torch" die, there were a lot better signals this year; Dick, WB6DNX was out on the contest; Chuck, WA6EXV adjusted the N9RIN 1296 MHz amp and worked on the N1JEZ GPS controlled oscillator; Bill, WA6QYR is working on two new 10 GHz Qualcomm transverters, picked up the two new GSGB microwave projects books and had the lowest contest score since it started; Frank WB6CWN had fun with new friends in Mexico, the hardest problem was working everyone- too many people out- Liked people being on frequency, tail ending others, people in groups; Kent, K6WCI was on Santa Ynez with loaner rig and is now building his own; Howard, WA6YGB had 6 meter contacts; Dave, N6TEB had fun during the contest; Pat N6RMJ broke his 24 GHz rig and had some new flexible number 4 wire to show; Ray, WA6OWM was out traveling; Chris N9RIN has a DB6NT rig and a RDR amplifier; Tom WB6UZZ complained about the number of people walking in front of his dish during contest; John, N6AX had his flex guide break and is now back on the air; Gary K6KVC has a 10 GHz receiver working; Chip, N6CA had 22 contacts with Mexico group from SJV; Larry, KG6EG had 64 stops and 221 Mexico Q's; Bob WA6VHS has a 47 GHz radio in work; Larry, K6HLH has 4ft dish on 50 ft tower with a 10 w amplifier; and Mike, W6YLZ is glad to have XE2 Licenses.



Bob, WA6VHS and his 78 GHz rig that he is starting to assemble.

“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

Want WR-22 waveguide and flanges John N6AX 714-9930435

Want- WR22 pieces and parts for 47 GHz. Wayne KH6WZ 310-357-2396.kh6kine@earthlink.net

Want or loan of manual or schematic for Gould 1604 or 1602 digital oscilloscope and Airtech 75 noise figure meter Tom Curlee WB6UZZ 714-871-0337.

Want Siemens RWN 320 power supply for RW 2135 TWT frank WB6CWN

Want a pair of climber “hooks” or “spurs” for climbing telephone poles Dick Kolbly K6HIJ 760-253-5127 or 253-2477

Owens Valley Radio Observatory Project

Project is in stand-by for a time now waiting for other project to clear site.

If you are interested in **more power on 10 GHz** you might want to try rdr-electronics or rfextra on ebay. Wayne had purchased some of the rdr units, which put out 1 to 3 w. Wayne, KH6WZ wrote them up in the 2005 MUD Proceedings. They MIGHT be snow-flaked to tune for more power, or you can adjust the minus bias voltage slowly and from minus 4V to minus 2V to see power go up. They have about 20 dB gain. Bill WA6QYR

1296AMP Update #3
November 13, 2006

Dear 1296AMP Kit Builder:

Many of the kit builders that are writing us have attached photographs of their finished amplifiers-

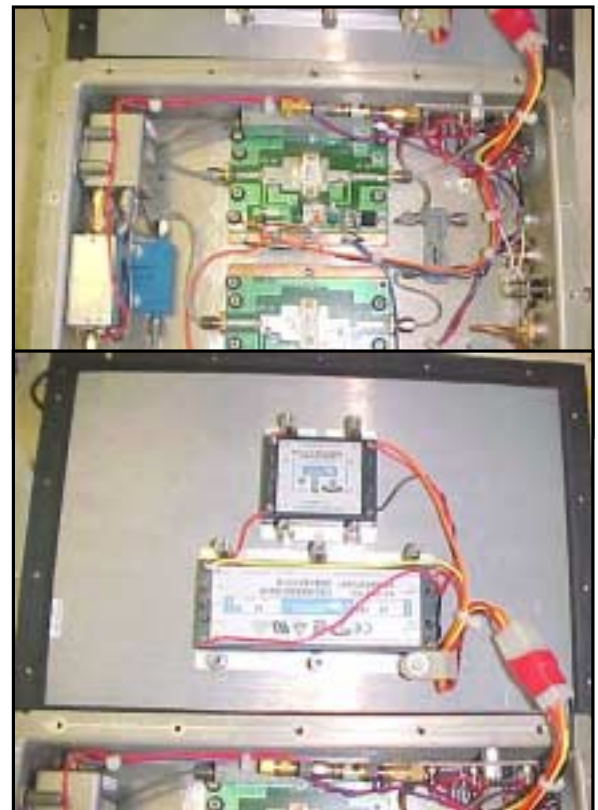
Joe Ruggieri, KI4NPV, provided us with the photographs shown right. What? . . . You do not recognize his ‘street name’ Joe Ruggieri? Well how about his E-Bay ID- ‘Pyrojoseph’. Joe is the first person to combine two amplifiers as shown by the supplied pictures. Joe’s technical skills in the area of microwave RF have been a great help to us via his feedback e-mail. AND- it is obvious from these pictures that he can ‘throw the solder’ and make a very nice 60W afterburner.

Joe’s notes:

I took the past two days to assemble a tower mounted 1296 60W amp using two of the 1296 Kit amps. The results are very good using 90-degree hybrid couplers. Note that the output coupler has a remote 50W chassis mounted 50 ohm load.

I did not see a need to use an isolator at the output since the LDMOS fets can handle a mismatch of 10:1 by design and the hybrid load will take any unbalance between the amps.

Result is 4.5W at the input yields 60W at the output. I always use transfer switches so the disconnected port is always terminated into 50 ohms. These particular switches take over 100MA at 12V to operate because they are 100W DC to18GHz with very fast switching times.



I also have a 100W 20dB coupler to monitor the output power. I added another 10dB attenuator and a positive output detector and voltage follower op-amp. I do this in all my transverters and in this case tower mounted amplifier. The band switch box in the shack has a meter to display the power.

I standardized on a 12.6V 30amp tower supply for all tower mounted transverters and amps so in this case I had to use a 12V and a 5V DC to DC stacked with the input 12.6v to get to 29.6V. for the amp. Boards as shown in the second photo.

There is also a 25dB LNA in the box for the receive operation.



Win, DK9IP/KH7CD, from Karlsruhe, Germany, sent us the photographs below. A 120/240 to 28VDC switching power supply located in the bottom portion of his aluminum box powers his kit.

Notice that he has bored an opening in the lid of the box to allow the PCB to mount directly to the heat sink.

Shown is his 1296 Kit Amp used to drive his (2X 2C39 water cooled) final amp in the recent IARU-Region 1 UHF/Microwave contest last weekend. He made 145 QSOs and 48.600 km (335km/208miles average).

You may view addition pictures of this amp at the following WWW site: <http://dk9ip.ba-karlsruhe.de/bilder/oct06/index.html>

Additional pictures will be shared as they are sent to us. 73s Chris N9RIN, and Greg K6QPV



Email stuff

Thread- how do I get the air-cooling heat sink off the 2C39 type tubes so I can put on a water-cooling system?

I have been using two wrenches in opposite directions. The wrenches are the type that uses a rubber band around a handle to grip a pipe. They don't mar the tube and pop them right off. Doug K6JEY

Hi Mike, What I have found here is to use a big vise and 2 short 2x4 wood pieces. In the 2x4 pieces clamped together in the vise, in the seam of the 2 pieces (2 inch) vertical, drill using a 1-inch (1.00) hole saw a hole through the vertical length of the 2 pieces. A rough finish hole in the 2 pieces is good for gripping the tube in a big vise below the fins. The tubes are slightly larger than the 1" hole, be careful when clamping the tube in the jig with the vise, the clamping needs to be firm to grip the tube. Most tubes there has been some loctite in the thread

stud that is a problem. "BIG" set of pliers on the heat sink; slowly unscrew the heat sink fin assembly counter clockwise.

Be aware there are some tubes that also have a pin in the heat sink, difficult to see, these are not to be unscrewed in the best I have attempted, the tubes break.

K2TXB (Russ) has put those tubes in a lathe and gently cut the fins with including the steel pin off the tube stud very successfully.

There are difference in the size of the heat sink stud, EIMAC tubes a usually larger than other make and require different size water jackets. Using this 2x4 jig has removed many tubes and fin with little problems. Hope this helps.

PS:

I have found that the HV + for EIMAC 3CX100A5 to be about 1200 to 1250 loaded, any more than that is usually destroyed tubes.

7289 tubes will run at 1450 or so HV, in my 4 tube unit I run 1800v + no load and there are about 1450 at 800 ma loaded for 500+ watts out.

Also use a G3SEK triode board as they are on the edge of destruction at this level. Board does save them if installed correctly.

Tom W2DRZ

Mike & the Learned group... I found that you have to make something like an Oil Filter removing tool to do this. These Finned-cooling elements are sometimes VERY hard to get off...

Then to water cool them. I chose to solder a manifold to the outside ring of the Anode. I know there is a method that uses the threaded section to secure a manifold against a waterproof seal but I personally did not like that design because I felt the cooling is not as good as a soldered manifold as per below....

Here's what I did...

Firstly my mods were to the Siemens 2C39BA. Once the removable Cooling fin unit is "off" ... then you are left with the Anode collar/metalwork that has a rolled/flared edge & a threaded section underside that is "pinched off" for vacuum sealing as part of the manufacturing process.

All I did was sit the Tube on top a modified length (3-4 Inches) of Copper (water) pipe & basically solder the Anode Collar to the pipe. I think the 7289 needs a 1 Inch ID & the 2C39BA needs about 1 1/8 Inch

ID to solder onto the Lip of the Anode...

Then for the water in/out. Simply drill one hole about 3/8 or better still 1/2 Inch in Diameter in the sidewall towards the lower extremely of the pipe. This will be the "warm" water Outlet.

Next you need to make a suitable sized copper/brass disc to fit (solder) over the bottom aperture of the pipe. Then drill a 1/2 Inch hole in the center of this Disc. This will be the "cold" water Inlet.

Once you have completed making this part... to complete the Water Manifold you need to fit (solder) the 2 pieces of copper tube each about 3-4 inches long into these Inlet & Outlet holes. Make sure these copper pipes are nice & clean & bright for ease of soldering.

WARNING 1. - On the 2C39BA & maybe other tube types. Make sure you put some waterproof sealant like Silastic or similar on the bottom part of this pinched off Anode threaded section. This to stop corrosion of this thinnish metalwork and causing catastrophic tube failure.

WARNING 2. - I used ordinary Tap water with Glycol Coolant (Anti fungal) in it because it was cheaper but beware. The water will be at Anode Volts potential. Sure you can use De-Iodized? (Probably Distilled) water in your sealed pumping arrangement - I just chose not to bother.

Now - Fit the Inlet pipe first & make it so that the "cold" water is pumped directly to the bottom threaded section. So... fit this pipe such that you leave say 1/8 Inch gap between the top of this pipe & the threaded section.

Next fit the Outlet pipe such that the end of the pipe protrudes minimally into the chamber.

HINT: I simultaneously use a soft gas flame to heat all the bits up to "near" solder temperature then use a decent soldering iron to flow the solder around the joints. If it gets too cool then another burst of the gas flame brings the temperature back up...

Naturally all these steps should be done prior to soldering the manifold to the base (Anode) of the tube.

Now there will always be those Amateurs who want to run their Tubes at higher Anode Volts (power levels) than is

recommended. There are some who run their tubes @ 1350 Volts on the Anode & sometimes more!!! Then they wonder why the damn thing only lasts one season and requires all the work for replacement!! It's because the Cathode gets stripped due to the heavy current flow.

Well. I deliberately choose NOT to run my Tubes to the point of destroying themselves. I run a pair of water-cooled units with only 1000 Volts on the Anodes & they have provided great service (175-200 Watts CW) for several years...Go to it! Cheers,
Alan - VK3XPD

Mike, Some of the tubes use Allen screws so this doesn't apply here. You have to be careful although I never broke a tube doing it this way...Place duct tape or something else very sticky around the anode of the tube so you can hang onto it without slipping too much, it usually slips as a "not too tight" indicator. A small hose clamp may also assist to carefully grab the anode over the duct tape.

Pinch the heat radiator in a vise so it won't turn.

Grab the hose clamp/tape with pliers or vise grips just barely grabbing the tape and anode. Use minimal pressure. Carefully unscrew the tube from the radiator.

Happy water-cooling! 73 Chip N6CA

Hi Mike, I now have a collection of about 50 of these tubes. So far I have found three different thread sizes inside, 3/8-16, 7/16-14 and 12M1.75. And also the ones that have no threads and are clamped on. For those you will have to solder the water jackets. See all four here: http://www.cworthy.net/kl6m/1296/amp/IMG_1435.JPG

I found the 3/8" threads the most common, and easiest to get off. The best way I have found to get them off is to use two lathe chucks. Preferably the self-centering type. Not something that everyone has in the tool kit, unfortunately. But they do the least damage to the tubes. I have a couple pictures of that too:

http://www.cworthy.net/kl6m/1296/amp/IMG_1432.JPG

http://www.cworthy.net/kl6m/1296/amp/IMG_1433.JPG

some of them have to be cranked very hard to get them off. I found the metric threaded ones to be the hardest, and they seemed to have bimetal corrosion inside that kind of locks them up. I had to rock the radiator back and forth a few dozen times before they finally came loose. The one in the picture just popped right loose.

I thought about rigging up some kind of special tool to get these off,

like the tool used to get oil filters off your auto. Like a band that tightens as you apply pressure. But I have two chucks so I never got around to fabbing a special tool. You just need to be careful and get as much surface area contact with what ever tool you use to do the least damage.

Good luck. Mike, KL6M BP51dc <http://www.qsl.net/kl6m>



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Application for Membership

Name _____
Last first middle

Address _____ City _____ zip _____

Phone _____ Call Sign _____

Email Address _____

Reason for joining Society

Technical Advancement _____ Social Activities _____
Amateur Radio Operating _____ Other _____

Recommended by/ through _____

I will abide by rules and regulations set forth in the Society's charter and by-laws.

Signed: _____

Date: _____

Membership annual Dues: \$15.00

Approved by:

_____ office _____ date _____

_____ office _____ date _____

_____ office _____ date _____

12-11-2002 wab



.Larry, KG6EG and Bob, WA6VHS look over the start of Bob's 78 GHz rig at the October 2006 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 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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