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 2007 Edition

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At the **November 1 SBMS** meeting will be a talk by Chris, N9RIN about "LO's: What we have and what we need". 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.

Ken Halford, W6DTA passed away Friday evening. He had been having more and more problems as his cancer was spreading; along with his blood flow of around 12% was just too much. His daughter told me that he was in a lot more pain the last few days so it will be better this way. I am going to miss that guy a ton. I have 50 years of great memories to think of now, the tears are falling on my keyboard, got to go.
K6DYD

I received a very warm call from Bob W6SYA today regarding Ken W6DTA (SK) and the funeral arrangements. Ken was a great guy and operated VHF through the microwave bands for more than 30 years ...he will be missed but his memory and all he contributed to our community of hams will stay with us.
November 2nd at 11 AM
Burbank United Methodist Church 700 North Glen Oaks Burbank, CA
His home 9768 La Tuna Canyon Sun Valley CA 91352
73 Chip

Last meeting- Dick, K6HIJ talked about his successful manufacturing of 24 GHz waveguide switches. Our visitor was Richard K6SNO from Victorville. The 2 GHz and up was won by the Front Range group in Colorado. SBMS voted to host MUD coming up. Licensed spouses of members were voted to be members of SBMS with free badges. Bylaws are to be changed to reflect this. Auction off were a comet 1296 yagi hot pockets crispers make good attenuators. Welcome to Gordy, WA6ZKY retuning older member in Placerville CA. 30 people present.

OVRO trip on 27-28 December with teachers and students from LA area to do optical telescopes and science tour. Contact Doug K6JEY for more info.

Scheduling
Dec 6 TBD
Christmas party at the lab??
Jan 3, 2008 TBD

"Wants and Gots for sale".
For Sale- Programming sub-board for the Verticom and Stellex synthesizer. Assembled PCB, chip programmed for 11.880 GHz available from Chris N9RIN at: cshoaff@yahoo.com. SBMS member cost $6.00 not counting shipping.
Want- Qualcomm rectangular PLL board Chris N9RIN cshoaff@yahoo.com. 949-388-3121
Want 9 GHz brick Dick WB6DNX 714-529-2800
Want service manual for Motorola R2000A comm. Analyzer Dan W6DFW 714-776-7718
Want Xband omni antenna. Mel WA6JBD 951-212-8245
Want schematic of HP 5087A Distribution Amplifier Tom WB6UZZ 714-402-1280
For Sale 10w 10 GHz TWTA with working power supply $60 Joonho KG6MQS
Need test cable for HP141/8555a spectrum analyzer Dick K6HIJ 760-253-2477

Activities reported at October meeting – Doug K6JEY and Helen, KI6LQV went to Pinos and worked 4 bands 10, 24, 47, 78; Chuck, WA6EXV is working on multi-watt 10 and 24 GHz amp; Bill, WA6QYR worked Mexico from Frazier, first narrow band contacts on 24 GHz and is rebuilding 10 Ghz rig; Dennis, W6DQ has moved to new place; Howard WA6YGBorked on stressed parabolic; Kent, K6WCI WAS OUT WITH LOANER RIG WITH 10 CONTACTS: DAVE, N6TEBhad 4 hams with him on SS51; Jeff, KN6VR went to many sites; Dennis, ND7M is working on radio; Don, KF6QWC is working on DSP radio projects; Chris, N9RIN had marine layer problems; Paul, N6PN ran with N6TEB on 10 and 24 GHz; Gene K6BNW rebuilding the 10 GHz radio; Pat, N6RMJ had oscillation in rig; Mike, W6YLZ had 39 QSOs with KE6HPZ and lots of others 55 call signs; Rein W6SZ had fun roving with K6JEY; Jerry N7EME has 20 inch dish and building 10 GHz rig; Tom, WB6UZZ had rig problems; Mel, WA6JBD roved central valley with "QRP rig"; Joonho, KG6MQS had fist outing with 10 GHz rig and several contacts; Gary, KE6Eg went roving with KE6HPZ; Larry , K6HLH had 30 contacts and 20 calls from home, has Flex 5000 rig; Dick, K6HIJ had harmonic mixer work and has 47 GHz switch design; Dan W6DFW went to digital conference; Dick WB6DNX had a few 10 and 24 GHz contacts. Over ASTV net we had inputs from N6IFU, W6KGE.

Email news-
At 09:01 PM 10/11/07, Dave Calvert wrote:
Hello to ALL, I have a Siemens RW-289 that I understand is built for 6 GHz. but will
operate on the 5.7 and 10 GHz. bands. Soooo, my question is if this TWTA has been sitting for 20 + years can it be brought back to life? A friend of mine has baked one of these and when it was finished baking, put on the test bench and applied power and it popped the circuit breakers. Pretty sure the switching power supply is bad and we do not have any schematics on this. Should we be baking the whole TWTA (tube and supplies) or separate the tube and then bake? Is there any source for a schematic on this TWTA? I would like to ask everyone that responds to this to keep it on the List as there are others that will need to see this too, please. Thanks in advance!
73,Dave - KB0PE

There is no need to accelerate the death of the electrolytics by exposing them to external heat.
Switch mode power supplies have a short enough life from internal heating of the electrolytic capacitors. Typically the 'bean counters' force the cheapening of a product. I fast way to lower the cost to build an item is to use cheaper parts. A switch mode supply should use capacitors rated for pulse duty, few do. The capacitor heats up, raising the pressure in the can, venting some electrolyte, causing the capacitor to get hotter due to the rise in ESR. This causes further heating until the capacitor goes total failure.
If you have baked the supply, I would suggest that all electrolytic capacitors be replaced with good, pulse rated, 105 degree C capacitors. This will probably fix the supply.
73GlennWB4UIV
Dave,

These recommendations are general for TWT amplifier, not just the Siemens unit.
Aside from cleaning everything, doing a thorough visual inspection of everything particularly the wiring, even more particularly any high voltage wiring that may be exposed while the equipment is running (Step 1) and checking the power supply on a resistive load before hooking it up to the tube (Step 2), the next thing I would recommend would be to run the heater voltage only, for a while (at least a couple of hours) before applying the beam voltage. That may refresh the cathode a little (Step 3).
Some of these amplifiers have an adjustable anode voltage. This would be very useful. If so, start with the anode voltage set at the lowest setting. It will reduce the beam current and reduce the risk of severe damage to the tube. Once you have checked everything else, you can increase the anode voltage to bring the cathode current in specification (there should be a test point for that too if you have an anode voltage control.)
Once the beam voltage is up, check the helix current (the power supply should have a test point for that) and if it's not very low (like if it's more than 1/4 of the max allowed, or a 1/4 of the helix current trip point of the power supply if you do not have the tube specification, or more than 2-3 mA if you don't have anything else to refer to) run the tube without RF until the current goes back down to such value. That may take 12 hours or more (Step 4). If it does not drop, the tube might still be usable, but you may not be able to run at saturation.
At that point, if the helix current is good (low and stable), you can apply RF. Check the helix current as you apply RF. If the helix current increases and causes the power supply to trip before you reach saturation, reduce the drive to a point such that the helix current is 50% or so below the trip point and run the tube for a while at that level until the helix current goes down (if it does). That may take hours. If you are lucky, you might be able to get back to the point when you can saturate the tube (output power stops increasing as you increase the drive) before the helix current trips.
In any case, be very careful not to tweak the voltages, unless they are wrong, which you should have identified in Step 2. TWTs typically focus best (lowest helix current) at their operating voltage and the helix current will RISE, possibly up to the point of destruction if you lower the cathode voltage. The worst spot (most likely to kill the tube) is typically around 70% of the nominal voltage. Adjustment of +/- 100 or maybe +/-200V may be possible to optimize operation at the frequency of interest, but may result in oscillations and/or increased helix current.
Also do not blindly rely on the helix current protection to actually protect the tube under all circumstances. Many tubes have died on otherwise perfectly working power supplies. There is a large degree of magic in making TWTs, and if the vendors don't tell you everything, it's not just that they protect their secrets; they simply do not know everything... Sometimes tubes just die.
I would very strongly recommend against baking anything unless the equipment is obviously water damaged, in which case you may want to clean it first. Baking without cleaning is a sure way to make sure that whatever crud has accumulated will stay where it is. Also, equipment that was made 20 years ago or more may not have been designed for wholesale water cleaning.
Of course, you can always just plug it and see what happens :-) It would save a lot of time and might even be fun :-) This is best done if you have a spare and safety glasses, and you wanted to go solid-state anyhow...Be careful around high voltage. That stuff can kill you.
Didier KO4BB
IMPORTANT NOTE: in the TWT, the helix is connected to the body of the TWT.
You always want to make sure the body of the TWT is well grounded to a safety ground (for obvious safety reasons). Therefore, you cannot measure the helix current by putting a current meter in the ground lead of the TWT (don't even think about it). So the only way to measure the helix current is through a test point on

the power supply. Because the helix current is a very important indicator of the health of the TWT, all TWT power supplies have an helix current monitor. On these supplies, I believe it is a pin on the multi-pin connector used to control the power supply. The pin-out may be on a label on the power supply. If not, you are in for some reverse engineering.
PS: I think I may have one of these amplifiers. Mine has probably not been used for 15 years either...
PPS: I have been designing TWT amplifiers since 1980, so I have some experience in it...
Dave,

I have played around quite a bit with this series of TWTAs and repaired many (~15) power supplies. I have found that the 10GHz units can be coaxed down to 5.7GHz using external magnets, but never had luck moving the 6 GHz units to 10GHz. When using these tubes in narrow band service (CW or SSB) expect a 3db gain over their rating in broadband service. I had a RW2135 system that made 55W output on 10GHz!
About the power supplies; first, the power supplies suffer from failure of electrolytic capacitors on the regulator boards. They dry up and short. Putting them in an oven is the worse thing you can do for the power supply. The second most common failure is the zener diode that references the primary power pass transistor that powers the control circuits. This usually results in the destruction of the pass transistor. I can send you a short paper (I'm at home but I have it on computer at work) that outlines what components go bad and the cross from the transistors and diodes to NTE replacements.

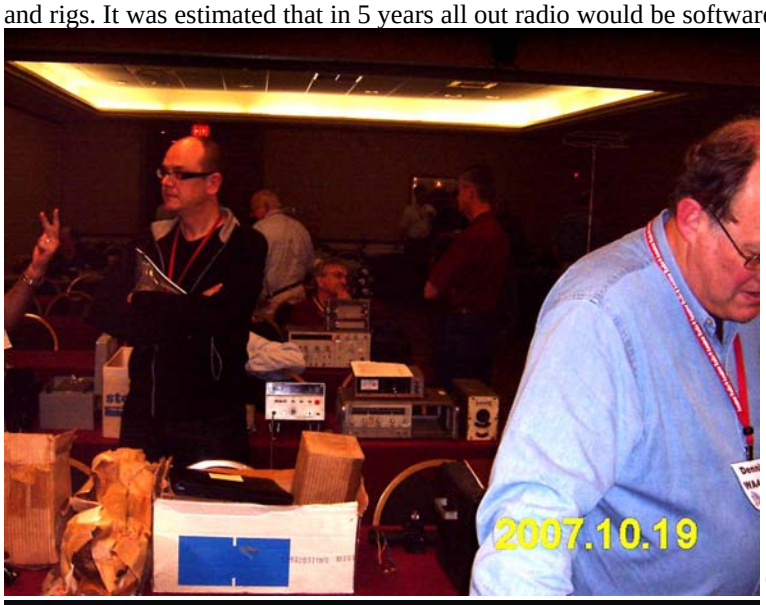
Now for the bad news - it is nearly impossible to repair and align these supplies without a metered Siemens TWT Power Supply dummy load. I had bought one off of eBay (paid $650) and used it for quite a few years before getting rid of it a few years ago when I sold off all my TWTA stuff. They are very rare. If you do go inside the PS with the power on be very careful, there are lethal voltages inside. It can kill you!

If you would like to degas the tubes prior to operation you can run the tube with filament voltage only by applying filament voltage from an external power supply for 24 hours or so. The Siemens data book on my web site has the pin out data for the tube and power supply connectors. Out of all the Siemens TWTA of this vintage that I acquired, 95% had power supply problems. Usually the tubes are in good condition, but I have had a couple of duds along the way too.

My old web site is still up on QSL.net, I have the complete 260 pages TWTA Siemens data book from 1987
posted there for download. Follow this link to go to it -
http://www.qsl.net/n3fti/TWTAs%20and%20Other%20High%20Power%20Amplifiers.htm
I think I may still have the schematics for the power supplies somewhere in a .pdf file but they were very poor quality due to being scanned from an old manual. I will check and get back to you. 73 Steve Kerns, N3FTI
The blue and yellow 'lytics used in the Siemens supplies were made by the German manufacturer FRAKO. I replaced all of them in my TWT supplies when they started to fail one by one some years back. FRAKOs were good in their day, but they have proven to have a finite life.
The best commercially priced and available electroytics today are the Japanese brands.....Nichicon, United Chemicon, Panasonic and Rubycon. The Japanese have mastered the art and science of manufacturing the etched aluminum foil which they use in their own brands and sell to the second tier of capacitor manufacturers in Asia and the US. The third tier and lowest quality parts come from the many Chinese and Taiwan brands that use poorer quality foil and construction. These are the parts to avoid.
The simplest and easiest way to predict an electrolytic capacitor's reliability is to measure its leakage current at its rated voltage or above. That's literally a measurement of the current draw of the part once the capacitor has charged with full voltage applied. I have consistently found that the Japanese parts pull less current with the applied voltage even 10-20% beyond their rating, over time and at elevated temperatures, and even with revered polarity.
Frank WB6CWN

Microwave Update 2007 notes

The MUD07 was attended by Larry, K6HLH and Linda; Bill, WA6QYR and Judy, KC6UTH; Wayne KH6WZ; Gordy, WA6KZY and Joanne; Dick, K6HIJ and Phyllis; Doug, K6JEY and Helen KI6LQV from California and a few members from other states. As usual there was the surplus tour, flea market, talks and banquet. There were 3 talks on various phases of the Software Defined Radio, the new mode of operation and rigs. It was estimated that in 5 years all out radio would be software run with a computer.



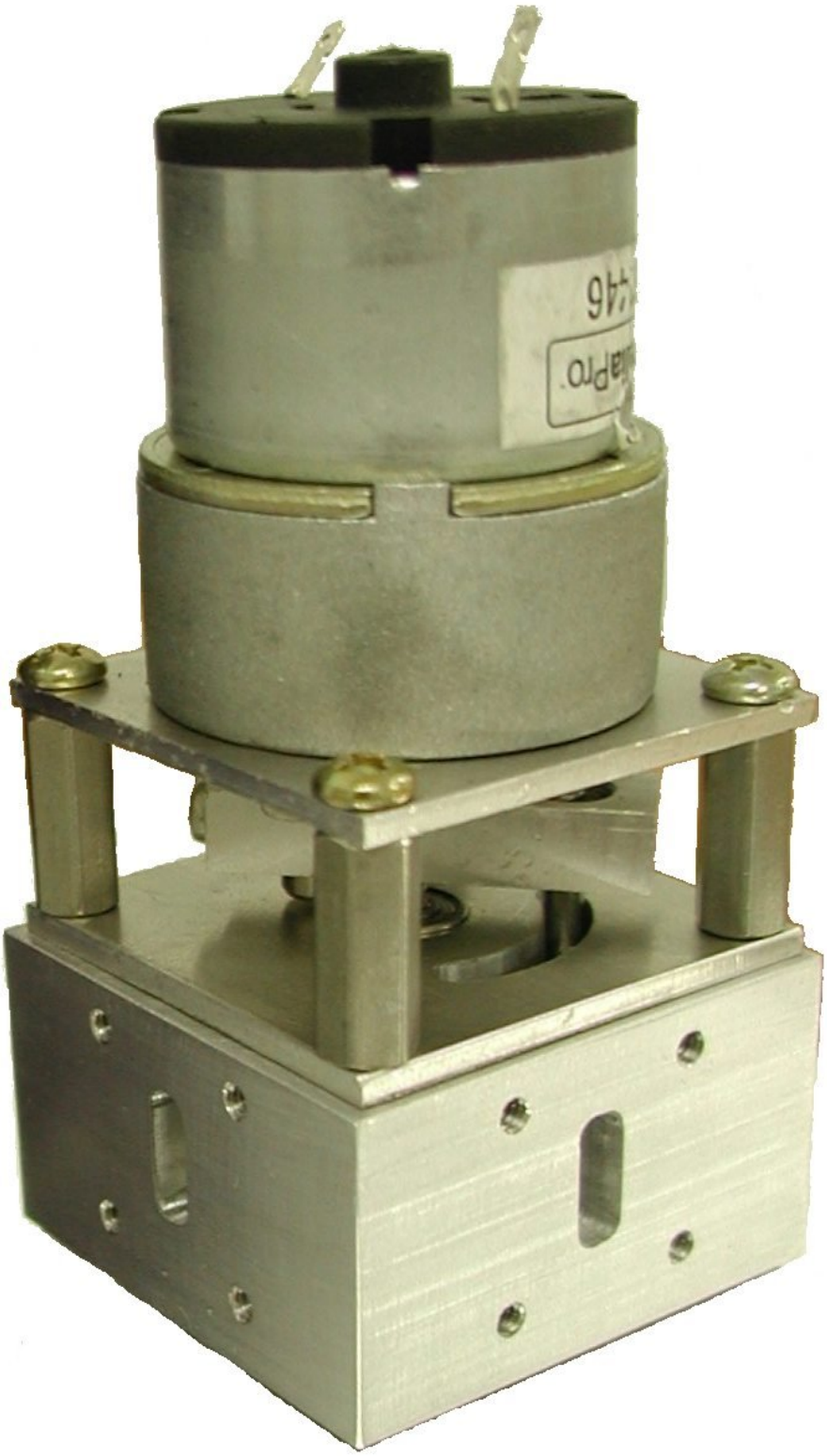
The busy flea market.

Dick, K6HIJ, Phyllis, Linda and Larry K6HLH

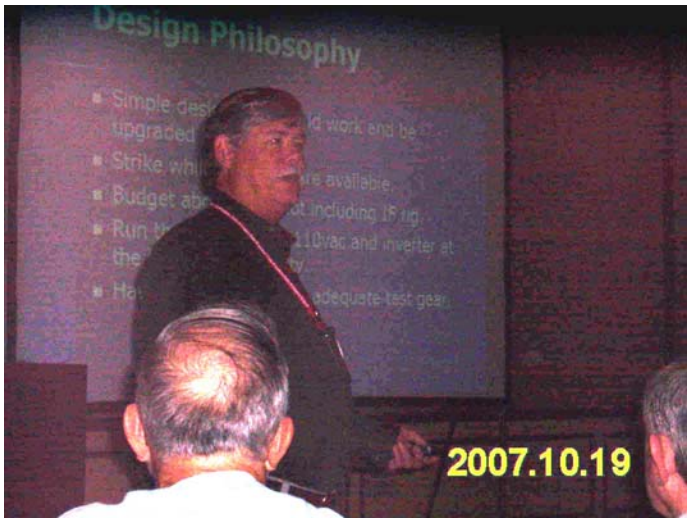
Wayne KH6WZ, Doug K6JEY and Helen KI6LQV.

Center Judy, KC6UTF, Bill, WA6QYR, Dick K6HIJ

The banquet talk was by Dr. Joe Taylor, K1JT Nobel Laureate, Pulsar explorer, WSJT developer and long time amateur operator. There were representatives from Japan, Belgium, Australia, England and Canada present.



The 24 GHz waveguide switch by Dick Kolbly K6HIJ that was a prize at MUD07 is available via email dick@eventhorizons.com. A “little” brother at 47 GHz will be coming soon.



Doug, K6JEY 47 and 78 GHz spoke at MUD 07 along with many other great speakers.

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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