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

July 2006 Edition

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At the **6 July 2006** meeting, - Chip, N6CA will be discussing directional couplers. 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.

It is truly a humbling experience being elected President of SBMS. When I think about the accomplishments of our members of the past fifty years, it really gives one pause to reflect on just what this club is all about. SBMS members have been pushing the frontiers of the shorter wavelengths – both in their employment *and* enjoyment. I see a club of enthusiastic newcomers and old timers, alike. Becoming radioactive on microwaves is unlike any other aspect of Amateur Radio that I can think of. You just can't go down to the candy store and buy your rig. Each and every one is handcrafted and, not unlike their owners, unique. But as unique as we each are, we share a common purpose and goal, to further Amateur Radio activities above 1000 MHz.

The past year has seen some amazing things happen in the club. MUD 2005 was a total success. We have witnessed the generosity of manufacturers and members alike in making resources available to members to construct, test and operate their radios. We have seen an explosion of activity on the bands above 10 GHz. The SBMS-sponsored, "2 GHz and Up Contest," grows in participation each year. And our members are pushing the extremes of what we call "radio."

I would also like to extend "Thanks," to the officers of the previous year: Chris, N9RIN, Doug, K6JEY, and have course, the ubiquitous Mel, WA6JBD, and Dick, K6HIJ. A job well done!

I am proud to be a part of this. And I do pause and reflect every now and then about what has preceded us to this point. I suggest that each and every one of you do the same. It truly is and will continue to be, an amazing organization.

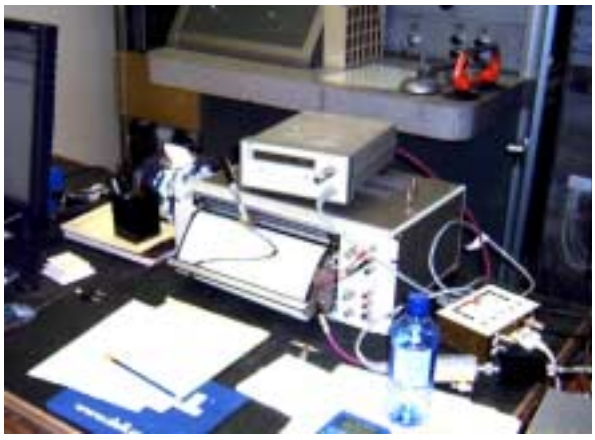
73 – Dennis WA6NIA

2006 President San Bernardino Microwave Society

Last meeting-. Thanks to all who carried in their 24 GHz rigs to show and tell. Wayne and Gary W6MEM did some video for a show and tell on various 24 GHz rigs. Welcome to new members Don Golding KF6QWC; Maurice Greeson K6YNH of Long Beach and Christopher Williams, W6NOB of LA. Frank Kelly WB6CWN was awarded Senior Membership certificate number 16. Richard KG6JKJ announced that there would be an amateur radio booth at the LA Fair 9 September to 1 October on every weekend. Ben Wallace from St Paul MN was our visitor, welcome. 23 people present.

OVRO report-The ARRL sent us an award for First Place in the 2005 EME Contest, multi operator, on 1296mhz. The award mentions K6JEY, WA6NIA, WA6EXV, KJ6KO, KG6JKJ, SP5CJT, and KN6VR. Thanks to all who made it happen! Doug K6JEY

On 17 –18 June SBMS sponsored part of the Cal Tech outreach education program by bringing four Ridgecrest Boy Scouts and their leaders and nine youth along with 8 parents from Duarte, CA to the big dish. Cal Tech's Dr. Mark Hodges demonstrated some fun things one can do with liquid nitrogen on pennies, bananas, and balloons. In the evening several telescopes and binoculars by SBMS members netted views of Jupiter and its moons, Saturn and rings, various other items in space. 5 man-made satellites zoomed overhead including the ISS. Saturday morning had students talking and hearing their echoes off the moon on 1296 MHz. Plots of the suns radiation were made on chart recorders. SBMS members present were Dan Welch, W6DWF; Doug Millar, K6JEY; Dennis Kidder, W6DQ; Bill Burns WA6QYR; Rich Whited, KG6JKJ and Jeff Fort KN6VR.



Emails Last Monday night 12 June Kerry Banke -N6IZW- and Lee Scheppmann -KD0IF- attempted an optical QSO by bouncing a 1W IR (750 nm) laser off of Mt. San Miguel. The total path distance was approximately 10 miles. A photograph of IZW's set up can be seen at http://kahuna.sdsu.edu/~mechtron/hamshack/Kerry/KerryIR.jpg The picture was taken in almost total darkness. however, with a little re-touching via Photoshop, you can see Kerry using his 2M handheld while talking to Lee. Three tripods are visible: one for the transmit laser, another is the receiver (black foreground), and the third is holding the work table/laptop. Unfortunately, the contact was not successful, but the participants are looking forward to trying again.

SDMC has also installed a red laser beacon on Miguel that operates five LEDs running 1 watt each. Modulated at approx 750 Hz, the beacon can easily be seen by the naked eye at four miles. Greg Bailey

At 0308, W6OYJ and myself worked KH6HME on 144.170!!! Probably the best thrill of my Ham career!!!! WOW!!!! Wa6mhz.

The **annual SBMS Microwave Tune Up Party** will be held July 22 from 9:00 AM - 1:00 PM. Bring out your rigs and make sure they are ready for the contest. The place is same as last year in Fairview Park, Costa Mesa CA. We have reservations for the picnic shelter at the south end of the parking area. The San Diego guys will provide the test gear and can test for ERP and MDS on 10 and 24 GHz. If anyone has 47 GHz gear, let Kerry N6IZW or me know and he can bring some limited gear to check it too. We could use a few people to get there early to help hold our space and some help taking data. More info on the test methods and results from previous years are at http://www.ham-radio.com/sbms/sd/mdserpindx.htm
Directions from the 405 freeway are: South on Harbor, West on Adams and South on Placentia. Turn right into the park at the light and go to the southern end of the parking area.
http://maps.google.com/maps?f=q&hl=en&q=33.6613N,+117.9385W&ie=UTF8&t=h&
om=1&ll=33.662184, -117.936763&spn=0.006304,0.013475
Thanks, John Oppen, KJ6HZ

"**Wants and Gots for sale.**
Want- YO Yagi Optimization I would like to check a 3 element design. Dick Kolbly K6HIJ 760-253-2977
Want Kenwood 1296 xcvr like TM 531 Fred Bongard W6JLL 310-971-0815.
For Sale Astron 70 amp power supply with meters. Great shape. Good to power your whole shack of radios and amps. $175. Very heavy, 48 lbs. Prefer pick up. Whistler 1000watt 1200-watt peak mobile power inverter. New old stuff, still in the box, Great for Rovers who need AC power for rotors, laptops etc. $100. Ameritron's AL-811 Amplifier, 600 watts on HF. Little use. $425.00 Kenwood TM 631A 2-meter 222Mhz mobile radio. With duplexer. $350. Dave, N6TEB 562 644 3943
For Sale ICOM IC-275h 144Mhz All Mode Transceiver, CW / FM / USB / LSB, with pll and data, no band pass tuning modification has been done, comes with original box HM-23 Touch Tone mic, power cord, Instruction Manual and Service Manual, Radio is in perfect working condition, a few minor scratches on the top and a few very minor ware marks on the front and turning knob from many hours of use with no trouble, 500.00 AND I PAY SHIPPING. Kenwood TS-790A, 2m, 70cm 1.2ghz all mode, satellite radio, has tone, 1.2ghz module Power cord, Manual and Service Manual, asking 975.00 I PAY FOR SHIPPING Pat N6RMJ

Here is an update on some of the activity here in the **Front Range of Colorado.**
Colorado Weak signal Test: On 6-6-06 I conducted the first 'real world' test of my weak signal system. It was from DM79JX in Louisville CO to DN81AB just south of I 80 in Nebraska (near Pine Bluff, CO). The test was done on 5.7Ghz. It was 1030 hrs. In the morning and conditions were poor. Signals on the 433.1mhz liaison were difficult and the signal on 5.7ghz was barely audible at times (Lots of QSB) above the noise. Communication would not have been possible, even using CW. With the system, in 3 minutes I had a perfect copy from K0RZ. Bill (K0RZ) had a copy of W6HCC in about 5 min.
The system uses radiometer techniques and is synchronized to a GPS for message timing. The input filter is 10hz wide. The signal from the filter is integrated for one second and then the di_bits (10 = dit, 01 = dah, 11 = space, message text is in Morse code) are decoded and displayed to the operator.
No special mods are needed in the microwave system. Receiver audio is fed to the system from the headphone jack and keying is done using the normal CW key input. The combined short-term stability of transmitter and receiver systems must be on the order of 3x10e-9.
73 Phil, W6HCC

Scheduling.
August is the usual contest preparation.
August 5 - 6 ARRL UHF Contest
August 19 - 20 ARRL 10 GHz and Up Contest
September 9 - 11 ARRL September VHF QSO Party
September 16 - 17 ARRL 10 GHz and Up Contest

Activity reported at the 4 May meeting- Dave, WA6CGR helped out at the lab; Larry K6HLH now has 10w in and 300w out of his 1296 amplifier; Dick, K6HIJ worked with MUD 2006; Jeff, KN6VR worked on a 1296 power divider; Rein PA0ZN has a IC7000; Charles K6PIP did some software for antennas; Chuck, N6EQ rebuilt his 10 GHz rig; Gene, K6YLT did some IR work; Kurt K6RRA did lots of machine work on 10 GHz stuff; Chris N9RIN

did some work at the lab; Rich, KG6JKJ did some photo work; Doug, K6JEY did some 1296 work; Tom WB6UZZ did some Frequency West brick work and repaired an 8569 spectrum analyzer; Bill, WA6QYR built a low voltage drop out circuit; Ed W6OYJ had some 24 GHz contacts;, updated Pcom on web site, and did some work with W2AUV GPS Jupiter system; Frank, WB6CWN did some rain scatter over the past few months; Dick WB6DNX did some 24 GHz bread boarding; Mel, WA6JBD did some work on Cactus links; John KJ6HZ did some HF antennas.


Ed W6OYJ with his 24 GHz Pcom.


Doug, K6JEY with his 24 GHz rig.


Dennis, W6DQ and his 24 GHz Pcom.

Bill, WA6QYR with his Celetech 24 GHz rig.

From Dick's, K6HIJ Noise talk in May.

Y-Factor Notes

Dick Kolbly, K6HIJ January 31, 2006

The "dreaded" Y-factor is the difference, in decibels between two conditions. In our application, the Y-factor is the change in total noise power out of a receiver system under two different conditions.
Normally, we express noise performance as noise figure in decibels; however, it is equally valid to express noise performance in equivalent degrees Kelvin, which states the noise output of the system will be the same as a noiseless system with an input load of the temperature T_e K°. Also, note that for convenience is referenced to a nominal ambient temperature of 17° C, or 290° K.
Some conversion factors:
Noise Temperature (T) = 290*(10^(Noise Figure/10)-1) ° K
Noise Figure (NF) = 10*log (Noise Factor) dB
Temperature (° K) = Temperature (° C) + 273

Noise Factor is the expression of Noise Figure as a Power Ratio.
Now if we want to measure the noise figure of our system by the Y-Factor method, we measure the output ratio with the receiver terminated in a hot load and a cold load.
The Y factor is:
Y = (Tsys + Th)/(Tsys + Tc); expressed as a power ratio, where Tsys is the system temperature, and Th and Tc are the physical temperatures of the hot and cold loads, expressed in ° K.
The first thing to do is convert the Y-Factor into a ratio:

Y = 10^(Ydb/10)

A little algebra:
Y(Tsys + Tc) = Tsys + Th ;
or:
Tsys = (Th - Y*Tc)/(Y - 1)
and:
N = (Tsys/290) + 1 and; NF = 10*log(N) … be sure to use common log (base 10).

An Example:
Judy Ham wants to measure the noise figure of her X-band radio. For a cold load, she will point his dish at the celestial pole, which she assumes be an 18° K source.
For a hot load, she will terminate the receiver in a matched termination, with a measured temperature of 71° F.
First, she converts the ambient temperature to degrees Kelvin:
T° C = 5*(T(°F) - 32)/9; 5*(71-32)/9 = 21.67° C
Th = 21.67° C + 273 = 294.67° K
Judy measures the Y factor to be 3.3 dB.
Converting to a ratio:

Y = 10^(3.3/10) = 10^(0.33) = 2.138

Calculating System Temperature:

Tsys = (Th - Y*Tc)/(Y-1) = (294.67 - 18*2.138)/(1.138 - 1) = 225° K

N = (Tsys/290) + 1 = (225/290) + 1 = 1.7763 (Noise Factor)

Noise Figure = 10*log(1.7763) = 10*0.2495 = 2.495 dB

Note that this noise figure includes the losses in the antenna and feed system, including any sidelobes noise from nearby "hot" sources. Assuming the "cold" sky is 18° K, it is an accurate representation of the actual system performance in receiving weak signals.

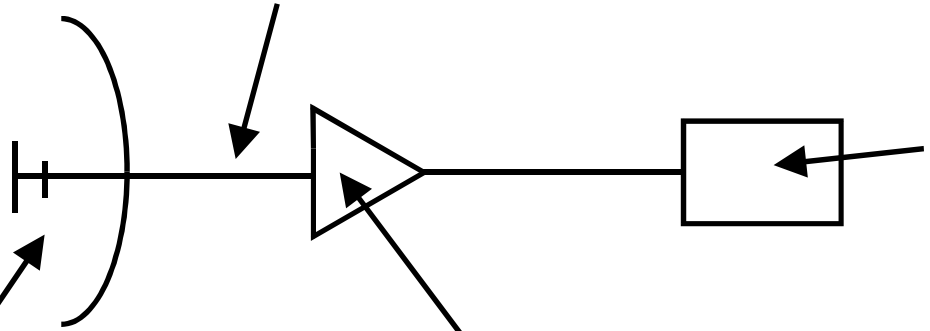
FACTORS AFFECTING SYSTEM TEMPERATURE

ENVIIRONMENT:

SKY TEMPERATURE
GROUND TEMPERATURE
SPURIOUS SIGNALS

FEEDLINE:

LOSSES
MISMATCH



RECEIVER SYSTEM:

SPURIOUS SIGNALS
MULTIPLE RESPONSES

ANTENNA:

ANTENNA PATTERN
SIDELOBES
ANTENNA LOSSES

LOW-NOISE AMPLIFIER (LNA):

NOISE FIGURE
MISMATCH
GAIN

MEASUREMENT OF SYSTEM TEMPERATURE

I. COMPARISON METHOD

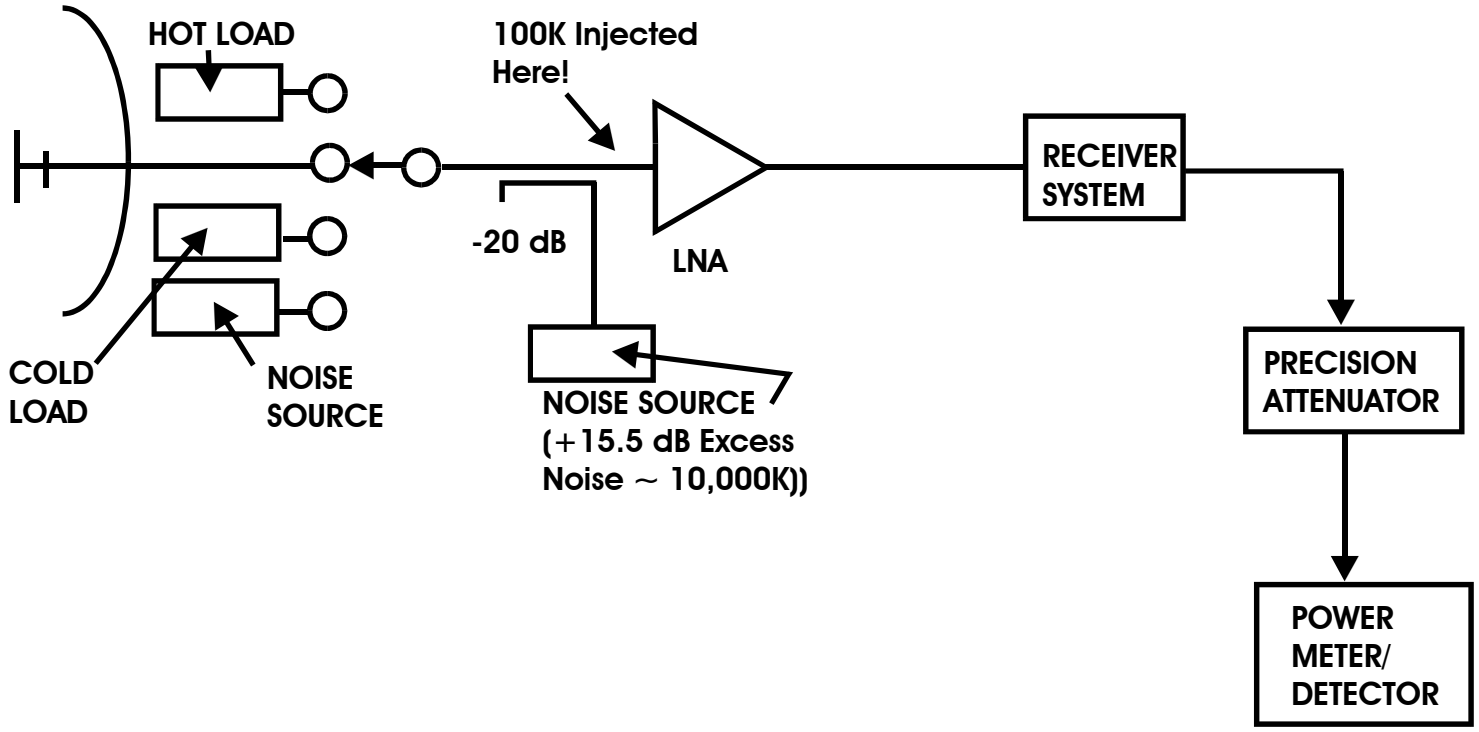
- This measures the difference between noise power outputs with two or more terminations (different temperatures) at the input of the system under test.
- Most Automatic Noise Figure Meters operate on this principle.
- One termination is generally at ambient temperature (~290K); the other termination should be very hot (~500 - 1000K or more) or very cold (10 - 100K) for good accuracy.
- Commercial Noise sources can have noise temperature of up to 10,000K, but calibration is an issue.

2. INJECTION METHOD

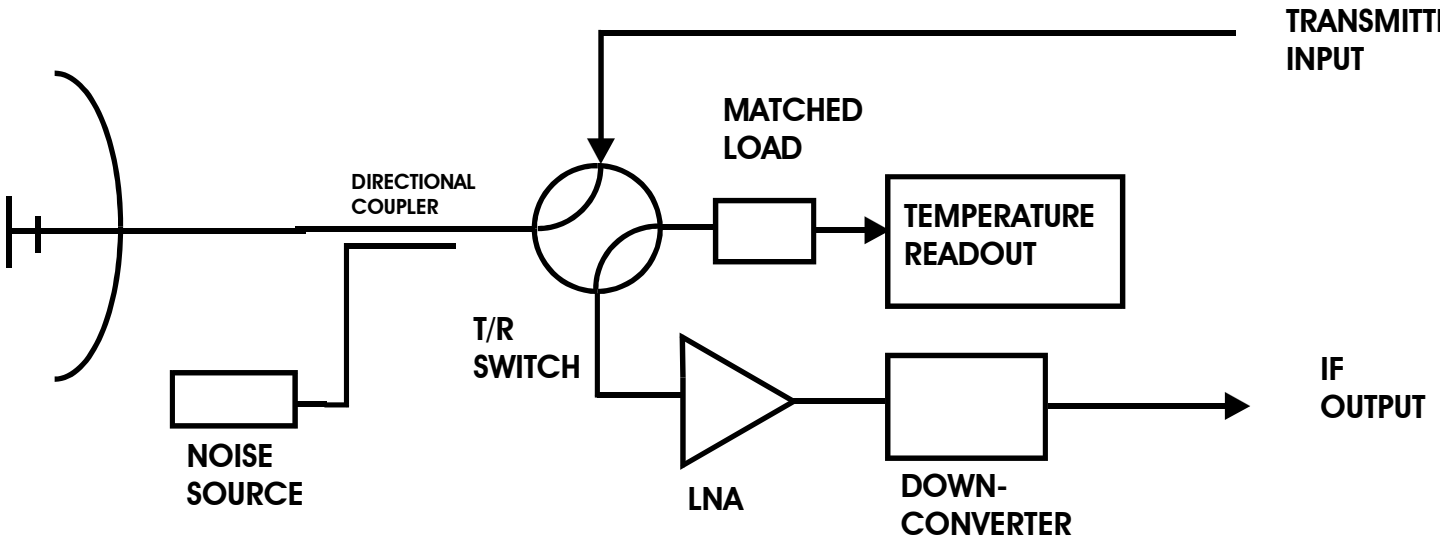
- A noise (or other) signal of known temperature is injected into the system under test.
- Use of broadband noise eliminates the need for accurate knowledge of the noise bandwidth.
- This method can be used to monitor the performance of an operating system.

MEASUREMENT OF SYSTEM TEMPERATURE

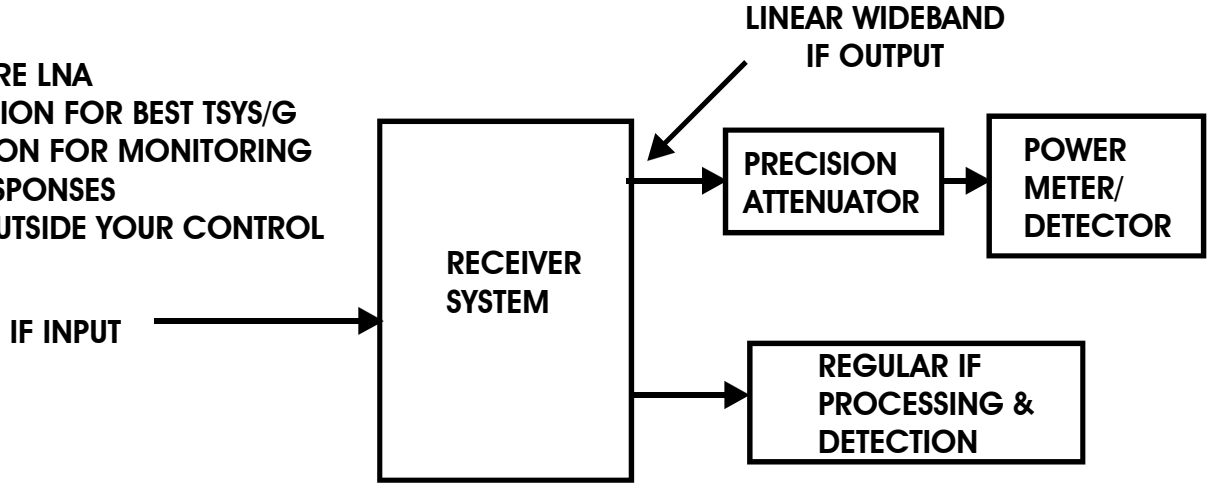
(CONTINUED)



DESIGNING FOR MINIMUM SYSTEM TEMPERATURE



1. MINIMIZE LOSSES BEFORE LNA
2. ADJUST DISH ILLUMINATION FOR BEST TSYS/G
3. INCORPORATE PROVISION FOR MONITORING
4. MINIMIZE SPURIOUS RESPONSES
5. CONSIDER FACTORS OUTSIDE YOUR CONTROL



Dave, WA6CGR talking about his 24 GHz rig at the June 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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