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

December 2005 Edition

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At **the 1 December meeting**, the History of Radio Astronomy will be discussed. We hope to have a guest speaker. 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 usual pre-meeting dining place has closed it doors. We will try for a **second time** 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.

SBMS Christmas get together.
Well, it's that time of the year again when we get together for the 3rd Annual SBMS Christmas on Saturday, December 10, 2005 at the Lab in Wilmington. The party will officially start at 12:00 P.M. and is a Pot Luck. For those bringing tables or chairs, please come early so we can set them up! Because the party is a pot-luck and was so successful last year, if you want to bring the same type of dish that you brought last time - that's OK!
For reminders, here is the list of things that everyone brought last year:
Main Dish - (Chicken Tetrazini and Meat Lasagna) - Dave - WA6CGR
Potatoes -(Mashed) - Chuck - WA6EXV, (Hot potato cheese dish) - N6CA
Vegetables - (Corn) - Pat N6RMJ, (Green Bean Casserole) - Dick - WB6JDH
Vegetables - (Green Beans) - W6DTA, (Candied Yams) KE6HPZ
Hor D'oeuvres - (Meat Balls) - WA6VHS and KG6EG (Deviled Eggs)
Salad - (Potato Salad) N9RIN, (Pasta Salad) K6HIJ, (Jell-O Salad) KN6VR
Green Salad - Mary - WA6MEM - XYL
Chips/Dip -(Salsa and chips) K6PTL, (Guacamole) K6JEY, (Chili) KH6WZ
Dessert - (Microwave Shaped Cookies) - WA6JBD, (cake) N6PPO
Dessert -(Pies) K6HLH, (cake) - Marge Hall (Dave's Mother-In-Law)
Drinks Hot - (coffee) WB6CWN, (Egg Nog) N6RMJ
Drinks - Cold -WB6DNX, WB6CWN
Knives, Forks, Spoons, Plates and Decorations - Marilyn - WB6OOM (Dave's Wife)

Chairs - Tables - 8 chairs - N6CA, chairs - W6DTA, 2 tables N6RMJ, WA6NIA, etc.
We hope the Pastor will let us use the parking lot to the south of the shop
******* NOTE - NOTE - NOTE *********
Remember we will be having a gift exchange - If you bring a gift you will get a gift. THERE WILL BE A SEPARATE GIFT EXCHANGE FOR THE SPOUSES (or significant other). Last year we decided to make it approx. $10 value, but everyone brought better stuff so whatever you decide!
The Lab is located at: 1646 N. Wilmington Blvd. Wilmington, CA 90744 1-310-549-6622
Directions:
Take the Harbor Freeway (110) South to Pacific Coast Highway. Turn left at the end of the off-ramp. The 2nd Signal light will be Wilmington Blvd. Turn left and go North about 3/4 mile and it is located on the right. I am working with the Church next door to gain permission to use their South parking lot.
We are looking forward to hosting the party and having a great time! Thanks, Dave - WA6CGR

Owens Valley Radio Observer Project
The 40 ft dish at the Owens Valley Radio Observatory has had good signals heard a round the world on 1296 MH in October. The moist air on 11 November shut down the 10 GHz TWT high voltage so the mapping of the moon plans have to be held off until a donated solid state amplifier arrives and is installed. There are plans for more operation in December and through out the coming year.

Scheduling.
5 January 2006- OVRO-SBMS Update and Report. Details of the Owens Valley Radio Observatory project with pictures and sound.
2 February 2006 - 1296Mhz 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

"Wants and Gots for sale"
Want manual for HP 8621B sweeper 100 MHz to 6 GHz Chuck WA6EXV 760-377-4972
Want 45 or 135-degree H-Bend of WR90 guide Jeff KN6VR 760-948-7227
Want 47 GHz waveguide switch Bob WA6VHS 310-534-8851
Want WR-42 90 degree H-Bend Dick K6HIJ 760-253-2477
Want 47 GHz waveguide switch Dave WA6CGR 310-977-0916
For sale HP-8559 Spec Analyzer Doug K6JEY for details 562-424-3737.

Last meeting We had the ATV link up to W6ATN network for the meeting thanks to Gary W6KVC and crew. Their web site is www.atn-tv.org. Lots of discussion on the MUD05 event took place with kudos to all who jumped in a helped. Everyone helping is what made it the big success that it was. Welcome back to previous member Rein Smit PA0ZN. Doug, K6JEY provided a video of the OVRO operation that was shown at MUD. Interesting what the 2.5 second delay can do to an over active operator trying to answer his echoes. 29 people present

Follow Up on MUD 2005 MUD 05 had some 150 people register for attendance and 150 people participated at the banquet. Both SBMS and WSWSS came out to the plus in funding so a good nest egg can be forwarded to the Ohio group that will be organizing MUD 06. The YL's did the extra jobs that brought sparkle to the whole event-THANK YOU YL's.
MUD05 parts info-
A number of prizes at MUD05 now have data sheets available at: http://www.microwaveupdate.org/IR
http://www.microwaveupdate.org/MACOM Thanks, Dave
The antenna measurement and amplifier measurements will be coming to that site soon. Chip, N6CA is collecting pictures of MUD 05 for the web site. Comments need to be filed with Pat, N6RMJ.

In the main hall of MUD 2005 were SBMS member rigs set up along the side so others could see what we have built. There were over 150 attendee's during the tech talks.

Phyllis Kolbly helps out a registrant.

WA6CGR's 24 GHz rig.

The YL's getting ready for a trip.

Dr. Doug, K6JEY talking about the OVRO Project.

The YL's getting ready for the Banquet.

Talk about a dish on a crank up tower, there was one at MUD.

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 3 November SBMS meeting- Chris, N9RIN is repairing his 10 GHZ rig; Doug, K6JEY is building a K6KWQ amplifier; Dave, WA6CGR helped fix N6RMJ and WA6MEM 24 GHz rigs; Larry, K6HLH is getting his 1296 rig on the air with a Russian GS15 tube and water cooling system; Mike, W6YLZ took his rig to MUD05 and reported that the ARRL 10 GHz and Up contest had a jump in 0,8 and 9 land activity but only 35 of the 50 CA logs were turned in; Peter, W6PTL went to MUD; Dick, K6HIJ did the 1957 SBMS handbook for MUD as well as headed up the registration area; Chip, N6CA is working on a High Potosi 10 GHz beacon to go up in the Spring; Larry KE6EG rebuilt his 10 GHz radio with more power; Wayne, KH6WZ went to MUD with rigs and tested a 10 GHz antenna; Paul, WA6PY worked 25 stations on 1296 EME; John KJ6HZ picked up parts at MUD; Bob WA6VHS got a 24 GHz amp at MUD; Pat, N6RMJ has a 24 GHz rig working with 1.2 dB NF, 2w into 31 dB horn all for $1500; David, KI6FF went to MUD; Dick, WB6JDH visited MUD; Dave, N6TEB picked up pats at MUD; Jeff, KN6VR went to MUD; Howard, WA6YGB is working on his 1296 MHz amp with new 7289 tubes; Ed, W6OYJ lead the MUD antenna party; Bill, WA6QYR went to MUD and picked up lots of parts; Chuck, WA6EXV went to MUD, fixed parts on the OVRO module and is planning on mapping the moon on 10 GHZ where there hasn't been any data before (all at military frequencies in X band); Dick, WB6DNX went to MUD and is tuning up a Nexwork amplifier; and Art, KC6UQH via ATV has been working on hardware at home.

Email reports-
Fellow uWavers-The San Diego 10 GHz beacon, operated by Chuck Houghton, WB6IGP/B, is temporarily off the air. The beacon is being physically moved about 500 feet east to another site on Mt. Miguel. Watch for the 'back on the air' notice sometime next week. Greg Bailey San Diego

Hiya, Here's an excellent tutorial on 10 GHz EME. Good detail on moon noise as well.
http://home.planet.nl/~alphe078/whatis.htm. A 4 foot dish should see only 15 K out of 210 K with a back ground noise temp of 10 K. Realistically it's going to be difficult to see any moon noise with a 4 footer; it's worse than I thought. 73 Chips

New Stuff
Since MUD05 and Paul Wade's, W1GHZ, presentation on "Antenna Ratiometry Measurements" there has been a number of developments.
Down East Microwave (www.downeastmicrowave.com) has introduced the "All Band Power Meter ABPM" kit for $75 that measures from 10 kHz to 10 GHz. It is based upon a similar paper by Paul at www.w1ghz.org/new/portable_powermeter.pdf. The power meter uses log detectors (an AD8307 for 10 KHz to 300 MHz and an LT5508 for up to 10 GHz) for input to a bar graph LED indicator or your meter outside.

Paul's Ratiometer used an Analog Devices AD8302 and Linear Technology LT5534 in the RF parts department. The LT5534 log detector will go up to 12 GHz and has a 60 dB dynamic range (-60 dbm to 0).

Linear Technology also has an interesting 800 MHz to 2.7 GHz RF Measuring Receiver chip that might be worth looking into for lab or field uses. It has a 75 dB dynamic range.

Analog Devices (www.analog.com/logdetectors) has introduced the AD8317/18/19 chips that measure power up to 10 GHz (50, 60, and 40 dB dynamic range).
The only problem for these devices is they are very small and trying to hand soldering them will be a challenge.

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Phone: 908-996-3584 (Voice) 908-996-3702 (Fax) http://www.downeastmicrowave.com

DEM ABPM
All Band Power Meter

10 KHz to 10 GHz low level power meter

PREFACE:

The DEM ABPM is the all band, portable power meter developed by W1GHZ and described on his web site at www.w1ghz.org/new/portable_powermeter.pdf. It is recommended reading before you start assembly of this kit. The paper titled "Portable RF Sniffer and Power Meter" discusses the compilation of designs by W7ZOI, W7PUA, WW2R, and W1GHZ then explains the evolution of the final product. The web page explains the circuits in detail providing individual test data of the power detector circuits. The page also discuses the methods of calibration, and the final use of the circuit when complete. Be sure to review the references at the end of the web page for further technical information and data sheets of the power detector chips. Other circuit designs are available at that site that will compliment is kit. Feel free to browse around for other ideas.

CIRCUIT DESCRIPTION:

Now called the DEM ABPM in the Down East Microwave Inc. catalog, is actually two individual power detection circuits combined through a simple switch connected to a bar graph voltage meter. It is all neatly place in an enclosure with a self contained battery to make a complete portable RF power detecting device that fits in your pocket. The ABPM has two individual inputs (SMA connectors) that are limited by the frequency response of the detector chips they are connected too. The Bar graph display can be operated as a running bar graph or as individual ascending / descending segments to conserve battery power. The ABPM also has an external meter connection so that more precise "measurements of change" device may be used by connecting a digital or analog voltmeter directly to the detector circuits. One of the references on W1GHZ's web site describes an audio tone indicator and how it can be used with this device.

As for the kit in general, all components, hardware, connectors, and assembly instructions are the responsibility of Down East Microwave Inc. Please call us if you find any components missing, broken, or incorrect. Please reframe from contacting W1GHZ with complaints such as fit and form or missing or damaged components. He is not employed by DEMI and has no control of company functions. DEMI has agreed to compile and distribute this kit with the original circuit board and components available from the DEMI standard inventory. If you wish to discuss circuit functions, modifications, or further uses of the circuit, Paul will be happy to, If contacted through his website at www.w1ghz.org. with any details concerning these maters. You may also drop him a line in regard to how you enjoyed this kit or any concerns on how DEMI is managing the distribution of this kit to the armature radio public.

CIRCUIT BOARD ASSEMBLY:

The circuit board assembly is basic and straightforward but some hints and special notes are worth paying attention too. Use only the schematic and component placement supplied with this kit for best results. Some designators and placements have been changed from the details provided on the W1GHZ web site to accommodate the components actually used in this kit. Please review all of the following notes and read this document through before starting assembly.

Circuit Board:

1. Screen printing for U2 is backwards on circuit board. Follow the component placements used in this kit only!
2. Surface mount versions are used for C4 and C5. Their polarity is indicated on the component placement. The leaded version positions of both will be vacant when assembly is complete.
3. Connectors or header pins are not used for J3 and J4.
4. R3, C7 and C9 are mounted on the bottom side of the PCB. U3 is shown on the bottom side placement for orientation of those components. U3 is mounted on the topside.
5. The bar graph is installed on the bottom side. Examine the display carefully. One corner is slightly chamfered to indicate pin one. The chamfer is shown on both components placements (top and bottom). The screening on the PCB does not indicate it.
6. U1, the LTC5508, will be the most difficult part to assemble in this kit. It is found in a foil bag. It has six leads. The lettering on it is most difficult to read but is imperative that you do for proper alignment. Once the IC is heated with any flux during soldering, the marking is removed making it next to impossible to verify. You get one shot at aligning it correctly.

Actual Assembly:

Use the component list with both top and bottom component placement diagrams.

1. Start by installing U1. Use a magnifying lens to verify lead placement on the PCB and the marking on the LTC5508 for alignment. Position and solder one outside leg only. Re-verify placement of leads on pads then solder opposite leg of IC. Be sure of placement then solder other four leads. Use solder wick to remove excess solder that may bridge or bulge over. Clean with flux remover and test with ohmmeter for shorts. If you have a short try solder wick again. If you are required to remove the IC from the PCB to repair, it most likely will not survive. Call DEMI for a replacement.
2. Next, install the topside surface mount components.
3. Install U2-U4. Remember that the screening for U2 is backwards.
4. Install C8 with a 1 turn 3/16” loop in the lead that is installed in the pad that C7 and R3 are connected to. The loop is L1.
5. Install all other leaded components including VR1 and VR2.
6. Install bottom side surface mount components.
7. Install bar graph on bottom side. Remember the chamfer is pin 1.
8. Trial fit the SMA connectors before soldering (found in the hardware bag). You will need to trim the center pin length and modify the ground pins slightly. You will also need to remove some solder mask from the ground plane before soldering. Push the flange of the SMA up against the PCB as close as possible or the board assembly will not fit in the enclosure.

COMPONENTS LIST

Component Bag: Resistors values are in Ohms and are ¼W leaded unless otherwise specified. “POT” = Potentiometer. "ELECTR" = Electrolytic. “Chip” is surface mount components.

C1	8.2ρF 50mil ATC	C11	0.1μF leaded	R7	1.8KΩ
C2	100ρF Chip (0805)	C12	100 μF ELECTR	R8	1.8KΩ
C3	0.1μF Chip (0805)	C13	0.1μF leaded	VR1	10KΩ Pot
C4	1.0μF Tant Chip	C14	0.1μF leaded	VR2	500Ω Pot
C5	1.0μF Tant Chip	R1	10KΩ	BAR 1	Bar graph display
C6	0.1μF Chip (0805)	R2	51Ω Chip (1206)	IC1	LM3914
C7	15ρF Chip (1206)	R3	470Ω Chip (1206)	U1	LTC5508
C8	1000ρF leaded	R4	10Ω	U2	78L05 reg
C9	0.1μF Chip (0805)	R5	18KΩ	U3	AD8307
C10	0.1μF Chip (0805)	R6	470Ω	One	ABPM Circuit Board

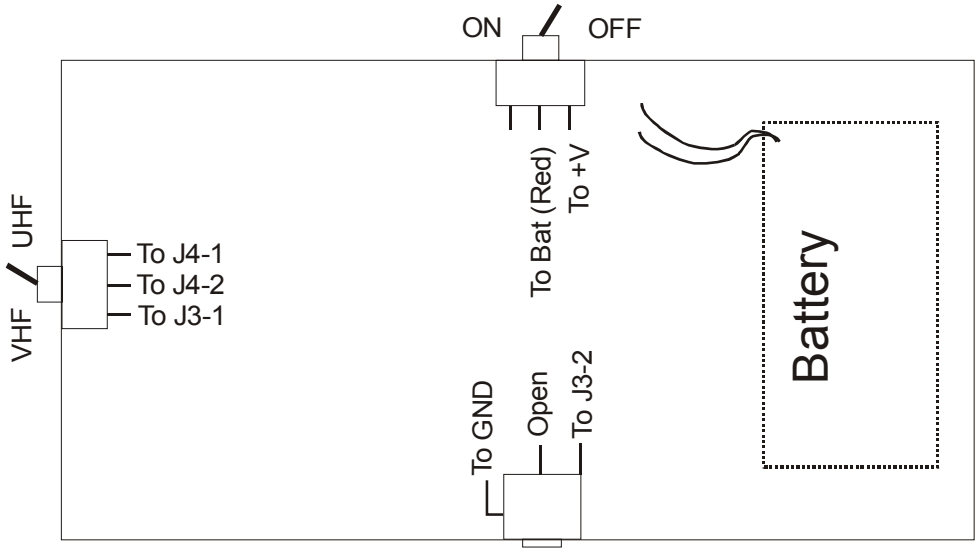
Enclosure Assembly

Start by wiring the PC board using the wire chart provided below. Cut and tin all wires to length then attach them to the “From” positions on the circuit board. All wiring is done on the topside of the circuit board. There will be Red, Black, and some other color wire that is designated “odd”. (Something other than red or black) Pins #1 of the J3 and J4 connectors are the holes on the circuit board in the square pads. Pins #2 are the round pads. For the GND connection, scrape some solder mask off the circuit board above the WW2R logo and attach it by soldering. Check all connections and trim excess wire off from the bottom.

Wire Connection Table

WIRE	SIZE	FROM	TO
#24 Red Teflon	3”	+V on PCB	ON/OFF switch
#24 odd Teflon	3"	J4-1	VHF/UHF switch
#24 odd Teflon	2"	J3-1	VHF/UHF switch
#24 odd Teflon	3"	J3-2	Jack
#24 Black Teflon	3"	GND	Jack
#24 odd Teflon	3”	J4-2	VHF/UHF switch
Black from Battery Clip	NA		-V on PCB
Red from Battery Clip	NA		ON/OFF switch

Find the half of the enclosure that has the battery compartment in it. It will also have three round holes on three different sides. Install the two switches and jack as shown. Then install the battery clip leads through a hole in the battery compartment side (not a top hole!) closest to the ON/OFF switch. Position the enclosure as shown on your workbench. Place the circuit board on the bench on the ON/OFF switch side of the enclosure with the wires up and the SMA connectors pointing in the same direction as the VHF/UHF switch. Do not install the circuit board in the other half as of yet. Connect the wires from the circuit board to the switches, jack, and from the battery clip as shown below. After wiring is complete, check all connections and verify all circuits by eye for shorts or wire clipping debris. If circuit board looks ready, attach it in the other half of the enclosure by aligning the SMA connectors with the holes in the enclosure then inserting the circuit board in place. Check to see that the bar graph display is correctly positioned in the machined hole of the enclosure. There is some play in the screw holes so the display could be misaligned. Attach the board with four sheet metal screws keeping the bar graph positioned correctly.



Battery Compartment Half

Hardware Bag Component list:

(4) #4 Sheet Screw	(2) SPDT switch	(3") Black Teflon wire
(2) 1-Hole PCB Mount SMA	(1) Battery Clip	(3") RED Teflon wire
(1) 2.5mm Plug	(1) 2.5mm Jack	(15") #24 Odd Color Teflon wire
(1) Machined Enclosure		

Testing and Operation:

If all connections are correctly made and a battery is connected, it should come to life. With the switch on, verify that the 5 VDC regulator is operating. Then follow the setup instructions as published by W1GHZ on his website. The only incorrect statement below is the J4 jumper. It is labeled JP1 on the circuit board.

The bar graph indicator is handy as a quick, no thinking required, indicator. Many times, that's all you need. Since the sensitivity curves in Figure 8 are so different, some compromise is required for the LED bar graph to make sense for both detectors. The output of the AD8307 may be loaded down, by R5 in the schematic to adjust the slope of the response. I found that an 18K resistor gave similar full-scale readings for both detectors. I set the "ZERO" pot so that the first bar on the high-frequency side is lit, to provide a free pilot light, and set the "FULL SCALE" pot to light at +10 dBm. Then I measured the response of both sides at 144 MHz, shown in this Table:

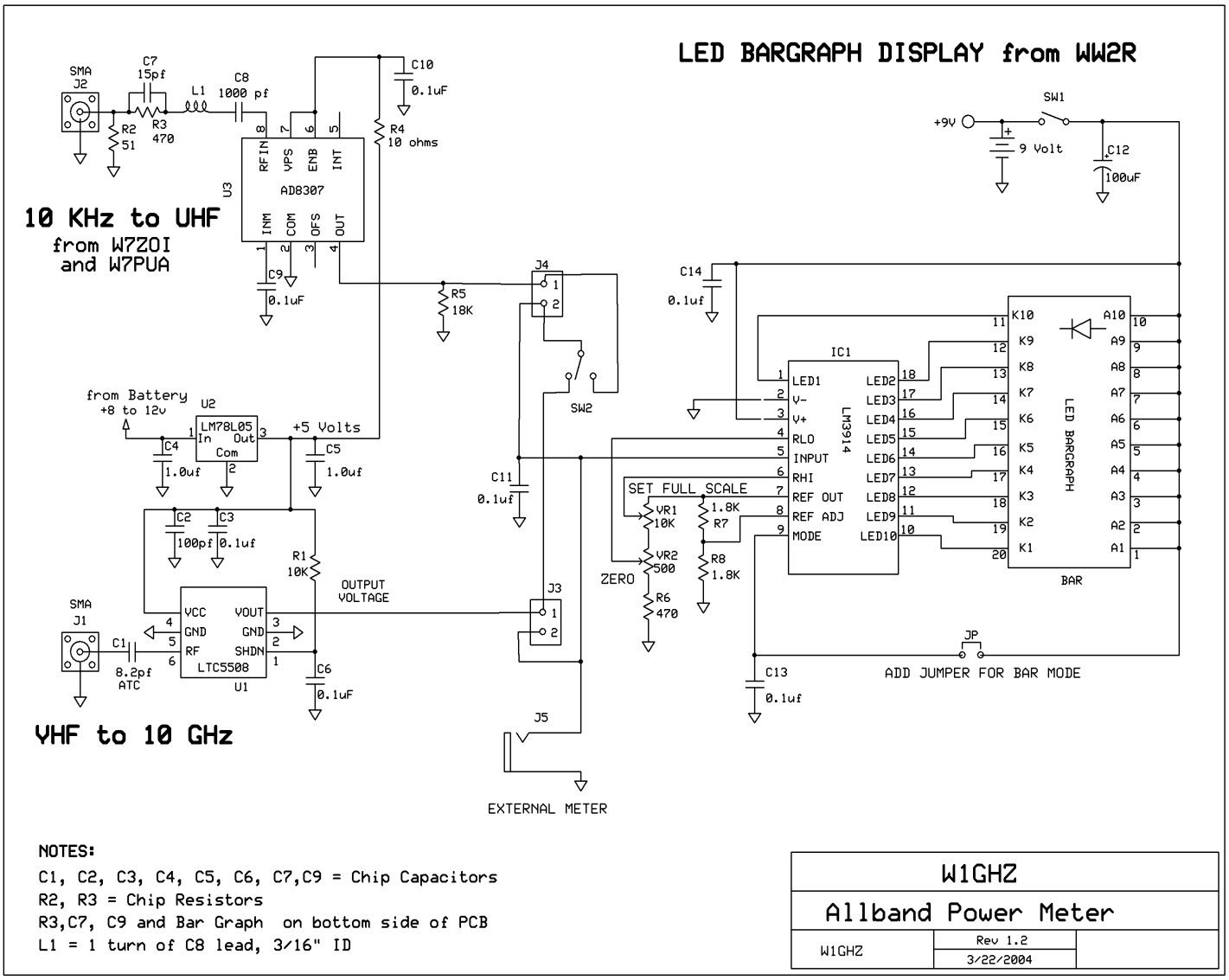
BARS	Low Frequency	High Frequency
1	-70 dBm	—
2	-59	-15 dBm
3	-51	-10
4	-43	-5
5	-35	0
6	-26	+3
7	-18	+6
8	-10	+7
9	-2	+9
10	+5	+10

The LED indicator may be operated as a bargraph or as a series of dots, with only one LED on at time. Since each LED draws about 20 mA., battery life will be much longer in dot mode. The mode is selected by a jumper, J4, on the board.

Practical ABPM Use :

As you use this versatile power indication device, you will find many uses for it during your portable operations or at home. It can be used to check low-level transverter port output power or used to measure low-level microwave transverter output. It may be used at higher levels with the proper attenuation installed on the SMA connectors. With a "sniffer" type antennae installed on the RF ports, it can detect transmit power radiating from an antenna system. You will find it to be most sensitive to any RF environment it is used in from 10 KHz to 10 GHz.

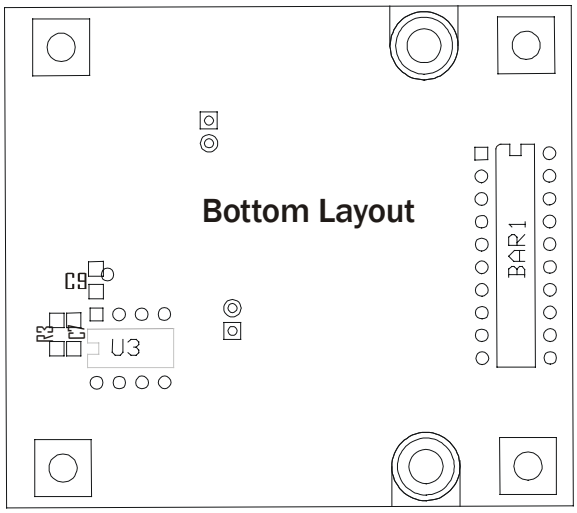
We hope you have fun assembling and testing this kit and hope you have continued fun with its use. Good Luck on the bands.



NOTES:

C1, C2, C3, C4, C5, C6, C7,C9 = Chip Capacitors
R2, R3 = Chip Resistors
R3,C7, C9 and Bar Graph on bottom side of PCB
L1 = 1 turn of C8 lead, 3/16" ID

W1GHZ		
Allband Power Meter		
W1GHZ	Rev 1.2 3/22/2004	



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