SEITS
SouthEast Iowa Technical Society

The Technical Journal

JUNE 1997

Volume 10, No. 6 - Visit our World Wide Web site at http://www.seits.org

JUNE MEETING

The June meeting is Saturday, June 21, at 1:00 pm at Godfather's in Burlington, Iowa. Lunch precedes the meet- ing at noon. Topics will include the Modulation Meter and Keokuk Links projects.

Looking ahead, the July meeting is scheduled for Sunday, July 20, at the Machine Shed resturant in Davenport, Iowa. The regular times for eat and meet apply.

The August meeting is at the Cedar Rapids Hamfest, as usual. However the Hamfest itself has been moved to the Amana Colonies this year. We will have more info in the next newsletter on directions.

Also, Mary Beth Penne, N0IJP, as the treasurer for that organization, will be occupied at the Iowa Repeater Council table for this show. We therefore need some willing and able body to step forward and take over the SEITS table. MB and Michael will bring the banner and table cloths. If you want to volunteer, contact Mary Beth at marybeth@seits.org on email,N0IJP@KE0BX.#EIA.IA on packet, or by phone at 515-682-3825.

KE0BX

********** PRESIDENTIAL NOTES **********

by David Metz, WA0AUQ

This month work is quietly going on in the background on our two main projects. Now that summer is here, its hard for all of us to stay focused on experimental work so progress will be slow, I'm afraid.

MODULATION METER

We have divided the Modulation Meter project into sections with each section being done by a different individual. Jerry Cooper, WB0PLZ, from Iowa City has taken over the job of laying out the PC boards. He met with Russ Ralphs, WA6GUF, at the Princeton Hamfest where they discussed the design of the I.F. and metering section of the instrument.

Frank Apple, W0GWK, is proceeding with the PLL that generates the RF signal that is used for tuning the modulation meter to frequency. He has access to some excellent computer software that is allowing him to model mathematically the design of the Phase Locked Loop without building it. This is the way

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POWER MEASUREMENT AND A SIMPLE DUMMY LOAD / WATTMETER

Part 2

by David Metz, WA0AUQ

Getting back to the subject of tuning radios . . .

RESISTANCE

You may have noticed the number of times that I have referred to a dummy load as being 50 ohms NON-REAC-TIVE. What this means is that to have a low SWR and appear to the transmitter as a perfect load with no reflec-tions, the load must be as pure as resistance as possible. By reactance we are referring to any stray unwanted capacitance or inductance that may be part of the circuit.

Any stray capacitance or inductance in a dummy load makes it appear to be something other than 50 ohms resistive. The effects of stray reactance on the load worsen as frequency increases. Thus it is very easy to build a good low SWR load at HF frequencies and very hard at the microwave bands. Lucky for us that at our bands of interest, two meters and 70 cm, low-cost loads are possible.

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**** *PRESIDENTIAL NOTES* ****
(from pg.1)

almost all RF design work is done today.

All the electrical characteristics of the components are simulated in software. The designer is able to construct complete complex circuits as models that the design software "runs." The resulting output of the circuit is displayed by the software showing how the circuit would perform in real life without it ever being built.

This type of software is complex and expensive, or at least it was till the ARRL introduced a package called "RF DESIGNER." I have a copy. It is not easy to learn, but it does work and work well. It is fun to type in new parts values and see the operation of a circuit change on the screen. The wonderful part of this type of software is that you can design circuits much faster, understand them better, and do it almost for free. Since the parts only exist in software, you don't need to buy them! Nor do they go up in smoke when you make a mistake. I expect that we'll see software like this become very common in the next few years.

Dave Helton, KD0YU, is designing the interface for the meter. That is the circuit that allows you to enter the operating frequency into the meter. He's to the point where the design is complete and parts have been ordered for the prototype. We've found some cheap surplus keypads and LCD displays. The interesting thing here is that a microprocessor control is simpler and cheaper to build then thumb wheel switches!

My own portion of the design is the RF section. Much to my surprise, the preliminary work on the RF section is going well. I have the rest of the parts for the prototype on order. I have been pleasantly surprised how much easier this project (at least my part) has become in the last two years.

This is most attributed to some new components from Mini-Circuits. The newest RF amplifier IC's and attenuator modules from them have made my job a lot simpler (and the resulting monitor cheaper to build). Slowly, this whole thing is coming together.

The question has been asked, how much will the completed monitor cost? So far done of us in the team have sat down and worked on pricing. There is not much point to this till a final design is completed sometime this summer. What we do know is that the design is modular to a surprising degree. You can build just the portions that you feel that you need. The rest you can build any time you feel you need the increased capabilities.

KEOKUK LINK

The Keokuk link is coming along nicely too. We have the coax, all we will ever need for years it looks like. Beautiful 1/2" 70 ohm vinyl jacketed CATV hardline. Wonderful stuff! Mark Atherton, N0RXD, and I spent some time working on connectors for it. Ordinary 1/2" to 1/2" female to female copper pipe compression fittings allow you to attach a PL-259 connector to the hard line. The best part is that no modifications are required to the compression fitting.

"N" connectors are a little more difficult. These require some minor lathe work and soldering to convert a standard "N" connector to a 1/2" compression type for the hardline. In any case, the connectors are simple and cheap and ready to go. I'll have them for show and tell at the next meeting.

Hopefully at the next meeting we'll make plans for the installation of the antennas at Keokuk and maybe have a brief test of the simplex port there.

That's it for this month!

--73-- David WA0AUQ
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DISCUSSION GROUP

Are you on the Internet?? Do you want to get involved with one of the most fascinating discussion groups going? Do you want to know the workings behind SEITS and it's projects?

Then join the SEITS Listserver. Send an e-mail message to majordomo@ csx.net and in the body of the message put "subscribe seits". That's all there is to it.

We'll see you on the net!!

POWER etc from page 1

I had considered a 50 watt dummy load kit project for the club. It is based on the new Caddock non-reactive resistors mounted in a TO-220 power transistor type case. The special resistor and a real 50 watt heat sink costs out to about $25.00. Recently at hamfest a considerable number of 100 watt dummy loads designed for cell phone tower sites have come on the market. These are excellent microwave loads equipped with an "N" connector. I've seen them priced as low as $20.00. For that kind of money, you're silly to build your own load!

CONNECTORS

Most professional surplus loads you'll find at a hamfest will have "N" series connectors on them. Don't expect to find an SO-239 on a real dummy load! If the "N" connector bothers you, buy an adaptor for $2.00 to UHF or make up a jumper cable with an N on one end and a UHF on the other. You're going to need one anyway.

HAMFEST BARGAINS

Before you buy any hamfest dummy load, check it with an ohm meter. If the seller objects, walk away, if you're like me, you don't need another useless door stop. The load should read between 45 and 56 ohms. If it does not, chances are its been overheated and it is worthless.

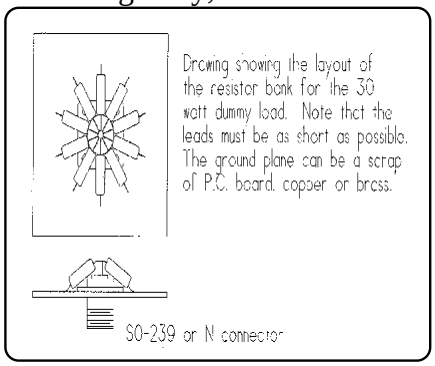
On rare occasion you'll see a device that looks like a dummy load but has TWO RF connectors on it. Look close at the builder's plate, and you just might have a power attenuator! Most I have seen surplus are in the range of 150 watt dissipation and are 20 dB units. What that means is that they have a total power dissipation of 150 watts. Since they are a 20 dB attenuator, if you apply a 100 watt signal to the input, you'll get one watt out.

USEFUL STUFF

As your RF test bench grows, you'll find these attenuators very useful for a variety of off the air testing. For example using two in series, I can connect a 100 watt transmitter directly to my spectrum analyzer and eliminate a lot of hand effects and haywire on my test bench. These power attenuators can also be used as dummy loads as well.

BUILD YOUR OWN

Lacking a hamfest bargain or the special order Cadwell RF resistors, you can still homebrew a small useful dummy load. The one presented here is made from ten three-watt metal oxide film resistors. These are available from Digi-Key, ten sell for



$2.30 and will make a 30 watt load. All you need extra is a RF connector and a scrap of PC board or brass to mount the resistors on. Note that ten 510 ohm resistors in parallel equals 51 ohms.

Obviously the schematic for ten resistors in parallel with a connector is very simple. The key to getting the load to work correctly is its layout. The shorter the leads, the lower the inductive reactance of the load and the SWR will be in the VHF/UHF range. To do this, mount the connector in the center of a metal plate as shown in the drawing. The resistors are than mounted in a star pattern symmetrically around the connector with as short as leads as possible.

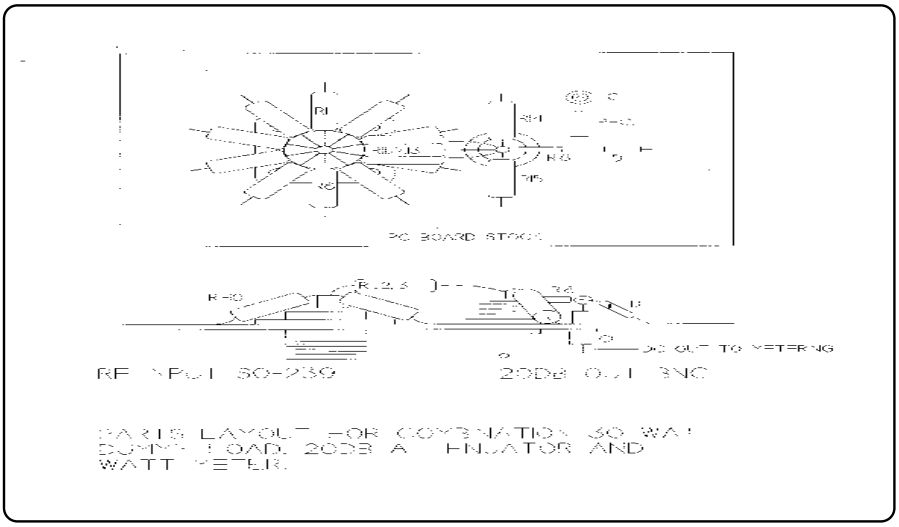
The load will be able to dissipate up to 30 watts continuously and maybe up to 50 watts for short periods without damage. You can increase the loads power handling by immersing the resistors in oil. Ordinary drug store mineral oil will work perfectly in this application. The resistors have to be completely submerged in the oil (at least a pint) to give sufficient cooling. This is the principle used by Heath on their very popular "Cantenna."

When you finish the load, check the resistance with your ohm meter and log the value you measure. If the resistance climbs above 55 to 60 ohms, you've damaged the resistors by over heating. Considering that it costs only $2.30 to repair the load, damage is not much of a problem.

With a little more effort you can make your dummy load a

wattmeter. Figure 2. shows a -20 dB resistive attenuator used as a load. For example, a 25 watt signal applied to the attenuator comes out as .25 watts. This signal is further attenuated by the 10 K resistor and then detected by the diode. The resulting DC current is displayed on the micro-ampmeter.

Note that the response of a diode detector is logarithmic. Thus, the wattage cannot be read direct off the linear scale of the meter. Probably simplest solution to this problem is to calibrate your home brew wattmeter against a known meter such as a friend's Bird 43. You could then make a chart to convert the readings of your meter to watts. If you're really ambitious, you could scan your meter face and make a new logarithmic scale for it. In any case the result would be very affordable wattmeter suitable for tuning or setting power output for most amateur transmitters up to 70 cm.



NEXT MONTH: More on power measurement, SWR and antennas.