

The
Broadcasters' Desktop Resource

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... edited by Barry Mishkind - the Eclectic Engineer

Tools You Can Use

by Alan Alsobrook



Road Testing the PowerAIM 120

[March 2009]

After reading Jack Sellmeyer's nice article in the March-April 2008 issue of **Radio Guide** about the PowerAim 120 from Array Solutions - and then getting to see it in action at the **Radio Guide AM Transmission Seminar** - I just knew I had to have one of these critters for myself. So I finally bit the bullet and ordered one in January. Not long after, my new toy arrived.



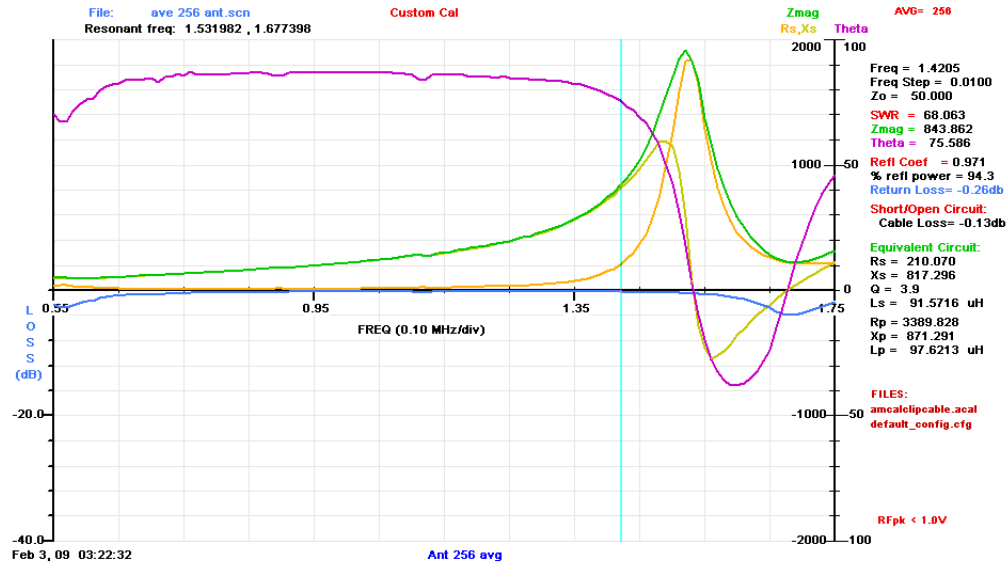
The PowerAIM 120

PUTTING IT RIGHT TO WORK

Of course, once I had it in my hands I had to figure out what kinds of diagnostic displays it could produce. The result? After doing a few test sweeps, I determined my OIB is going to be getting a great deal of rest. Being able to sweep the entire AM band in two minutes – and see the results – is something that would have taken an entire night with a bridge.

It also does not seem to get squirrely when you get into high-Z loads like an OIB will.

After getting used to it in the shop, the time had come to do some real work. A diplexer I maintain had been getting a bit flaky of late, so I put the AIM to the task of figuring out what exactly was going on. The first screen shot is a broad sweep of the 380-foot skirted antenna, used for stations on 1240 and 1420 kHz.

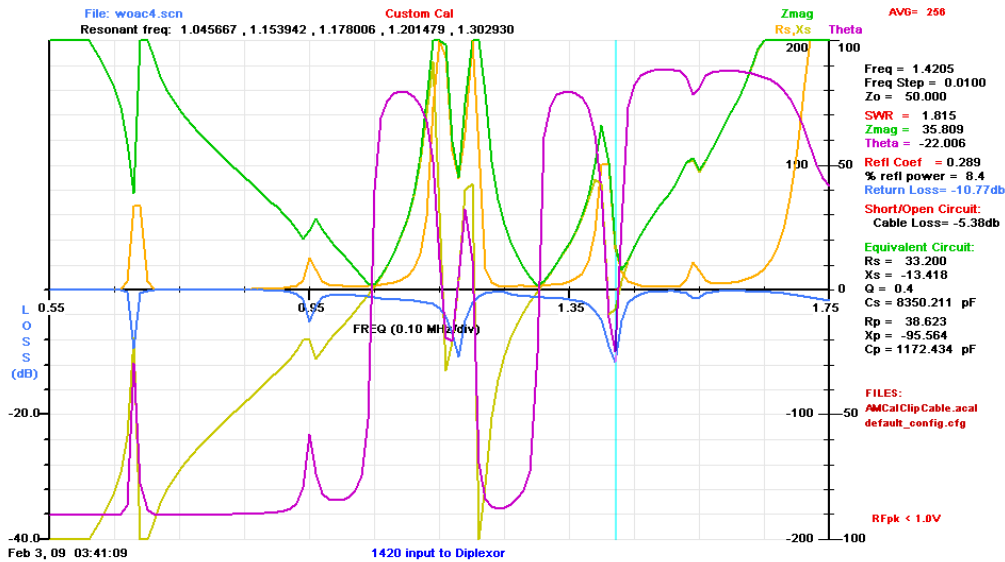


An initial sweep of the antenna

From this I was able to see for the first time exactly how the antenna was reacting across the entire band. From the graph you can easily tell that the upper frequency carrier of 1.42 MHz is riding on the slippery up-slope heading was 210 Ohms, with a reactance of +817 Ohms, something is quite difficult to read on my OIB but clear on the screen.

CHECKING THE ATU INPUT

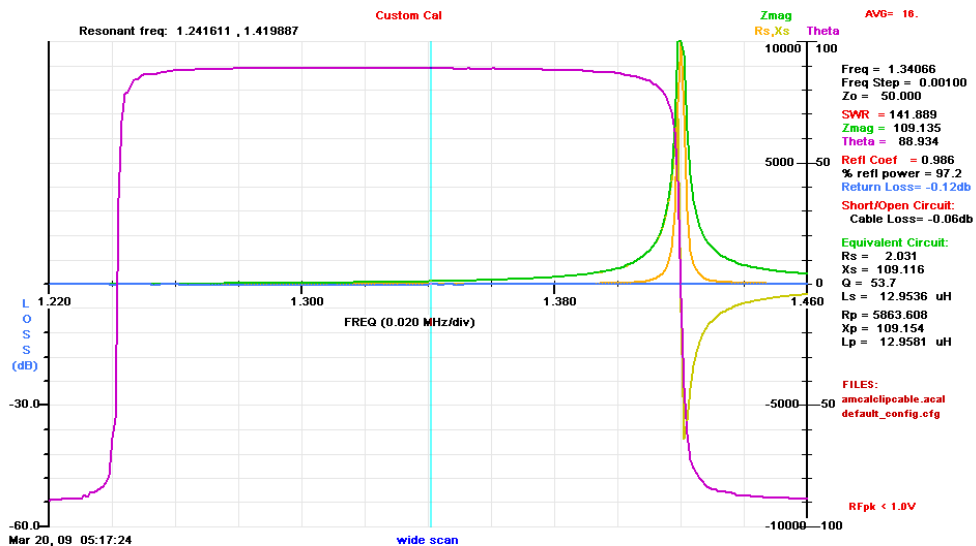
The next think I looked at was the input to the ATU, and here I observed a rather interesting mess. Instead of 50 j 0, the transmission line was matching into 33 -j 13 Ohms.



Looking into the ATU, a very interesting wideband sweep

I also noticed that this messy display changed drastically on the carrier frequency when I opened the J-plug leading to the far side filters. That little tidbit let me know I had troubles in the far side filters. So I had a task: to figure out exactly what was causing the problem. The PowerAIM 120 was helpful.

Measuring the series filter, I saw that the reject frequency had moved about 15 kHz from where it was supposed to be set. When you think about how much energy would have been passing through that filter and then dumped by the shunt filter, it makes me wonder how I was even getting a signal on the air. On the Power AIM display, an easy way to determine the resonate frequencies is to look and see where the theta (phase shift) crosses zero.



The purple line shows the resonance at both operating frequencies

DYNAMIC ADJUSTMENTS

Of course you can look at other things such as where the signal peaked or dipped, depending on which side of the trap you were looking. With a few other tweaks and adjustments – verified by another quick

sweep – and the diplexer was once again operating nicely. A quick check with the FIM showed that the signal strength had increased as well.

This experience made me realize that if you are running combined stations, it is probably a good idea to double check the tuning networks once or twice a year to make sure they have not drifted, causing a serious signal loss. A quick check could save a lot of lost listeners.

I also can see many applications where the PowerAIM can be useful aside from antennas. Transmitter PA work comes to mind. Testing caps (for value) is another item you can do quickly; doing this over a wide frequency range seems to give a good indication of hidden troubles, not to mention the ease of tuning of an ATU match point to any desired value.

SOME MINOR GRUMBLES

Now that I have discussed good side of the PowerAIM 120, let me mention a few things I did not like about it. (And of course, you just know I had to set about correcting what I saw as deficiencies as quick as I could.)

First of all, everything arrived mounted in a big Pelican case. In of itself, it was not bad. It was laid out to house and protect the PowerAIM 120 along with a laptop computer, both power supplies, pockets for cables and adaptors. Unfortunately, the case size in particular made this a setup that I will likely never use.

Furthermore, I was really depressed to find there were no test leads nor computer cables are included as part of the package - you will need to provide your own RS-232 to whichever cable that you might need in order to interface the PowerAIM with your laptop.

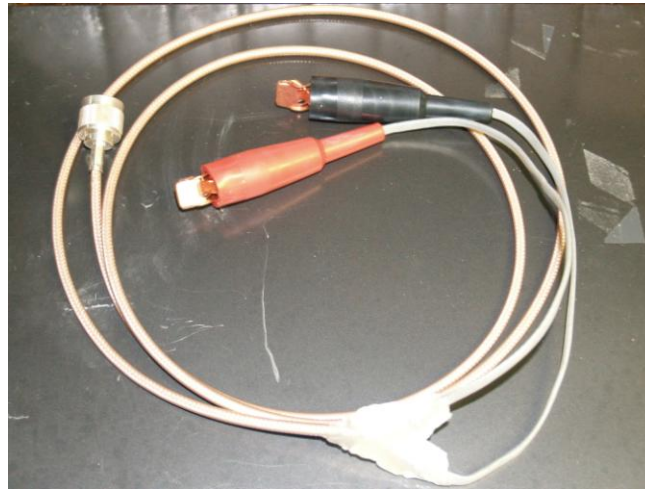


The PowerAIM 120 package

The final items that made me grumble a bit were the calibration loads, which were not very accurate at the higher end of the PowerAim 120's operating range.

MAKING IT ALAN-READY

To get the gear ready for use in the field in a way that I prefer, I quickly made a test cable, using some RG-400 along with 1/4-inch flat braid and some 40 Amp clips.



Then, I borrowed the precision OSL from an Anritsu Site Master to do several calibrations and save them for future use.

Next up was to put the Pelican case in storage.

I then nicely fitted the AIM and battery into a small camera bag, complete with an RS-232 cable already attached and the battery all hooked up. Now when I go to deploy on a test all I need to do is connect the test cable to the front and plug the RS-232 cable to my laptop.

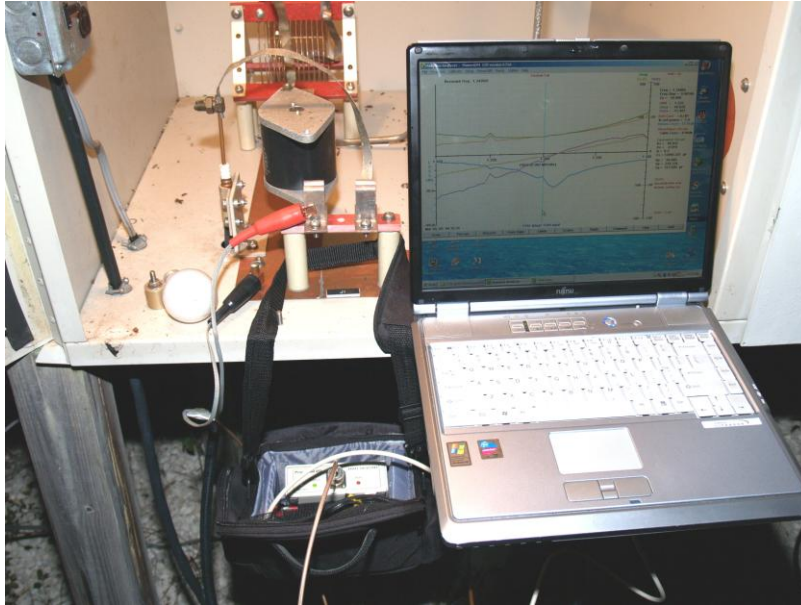


The Alsobrook Custom Bag, now ready for action!

FAST, EASY MEASUREMENTS

Before I made these modifications, I had been out to try the PowerAIM 120 and it was taking me 15 to 20 minutes to get set up and make a measurement.

After moving everything over to the camera bag, I could pull up to a site, make the measurements, and be back in my vehicle in five minutes. If I have to make a minor adjustment, who knows, it might be as much as ten minutes before I am ready to depart!



Drive right in, hook right up, and sweep the ATU

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