Capacitor Matching:

In designing the Ion Preamp it was found that two of the Capacitors of value 5pF (C1 and C2) must have the same value within 5%. Since the capacitors sent by the distributor cannot be dependably identical to this precision, we wanted to verify their values more exactly. Most of the meters that measure capacitance are not precise enough to detect a 5% difference in 5pF capacitors, so we used a very simple Wheatstone bridge to detect any variance between two capacitors.

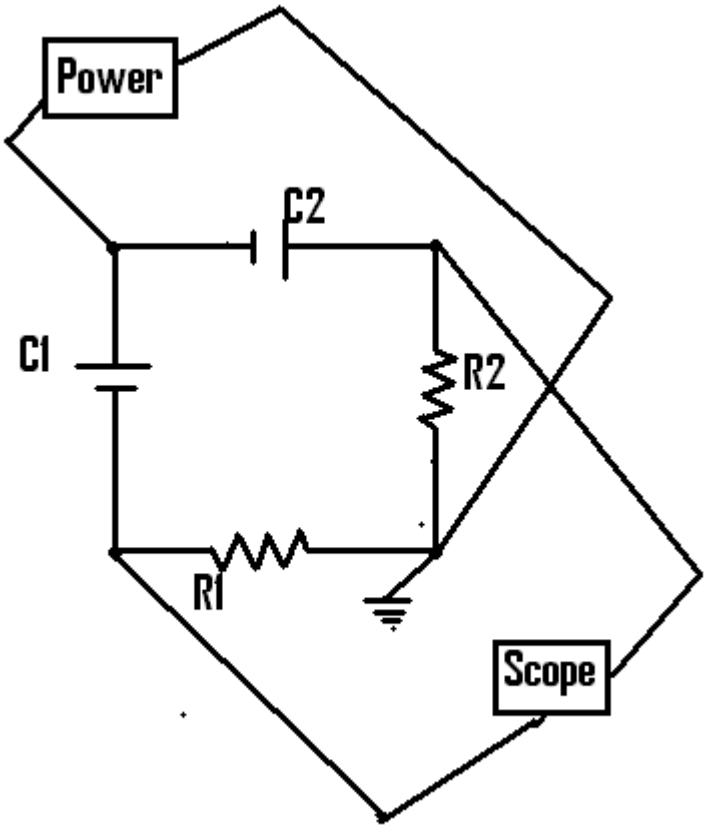

Fig. 1

Figure 1 is a very rough circuit diagram of the Wheatstone bridge we used. R1 and R2 must be identical, and can be measured using a Fluke meter. They should have values between 50k and 100k Ohms. If you need to test several sets of capacitors, it is recommended that you set up the circuit above in way that all components will move very little. We used tape to secure the resistors and capacitors to a base, and simply twisted the leads of the different components together until we were certain they were connected securely. Everything should be put on a non-conducting surface. A thick book works well for this. Fig. 2 is an example of the physical circuit we prepared to test the capacitors.

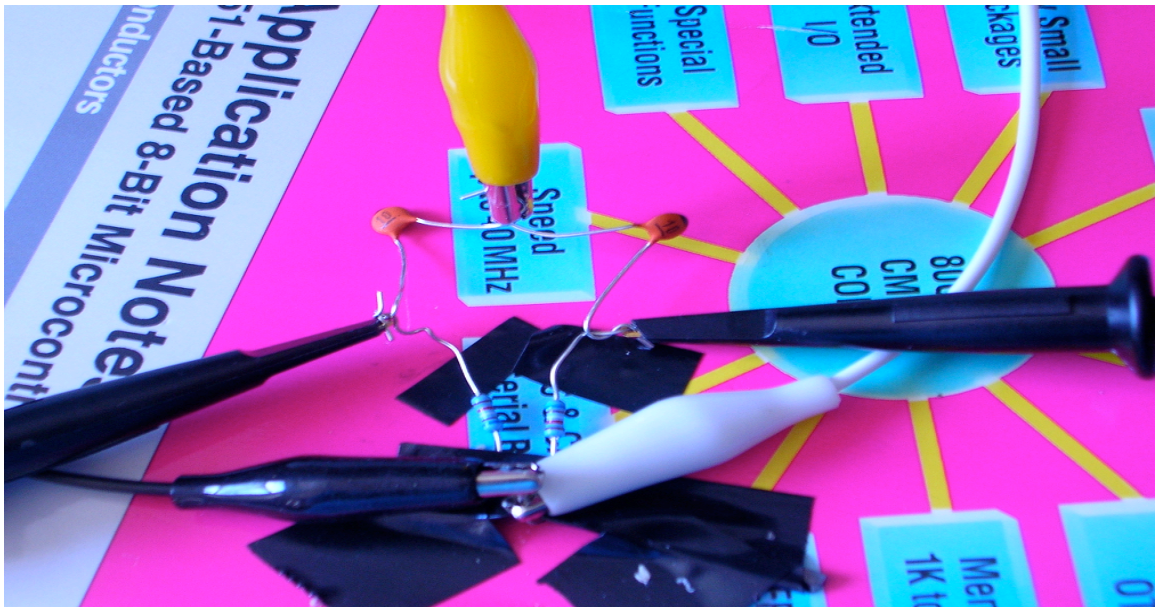

Fig. 2

The power source should be AC or a function generator. It worked best to use a function generator, and we used sin waves at 1M Hz. The frequency should be as close to 1M Hz in order to observe any significance difference between C1 and C2. The simplest Wheatstone bridges use a galvanometer to detect any variance between the capacitors, but we use a larger scope to make sure that the variance is within 5%. Fig. 3 is a picture of the function generator and scope we used. On most scopes, you can look at both outputs at the same time. Fig. 4 is an example of the screen with both outputs observable at the same time. If these two sin waves are identical within 5% of each other, the capacitors are also matching.

Usually, all of the capacitors from the distributor are matching within 5%.

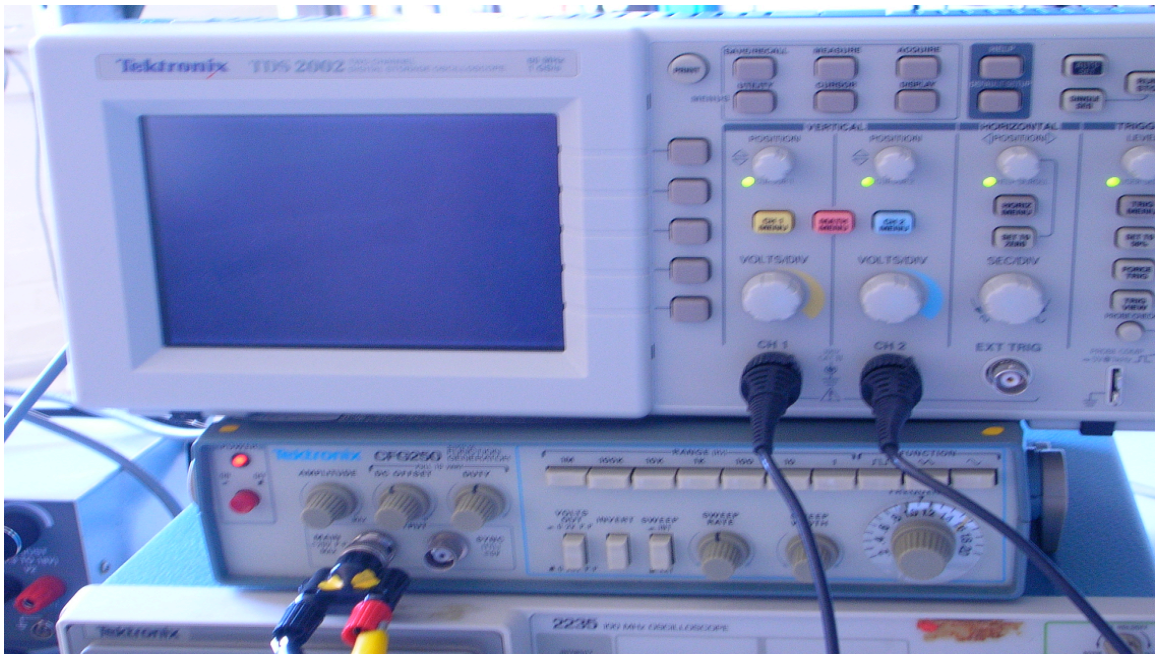

Fig. 3

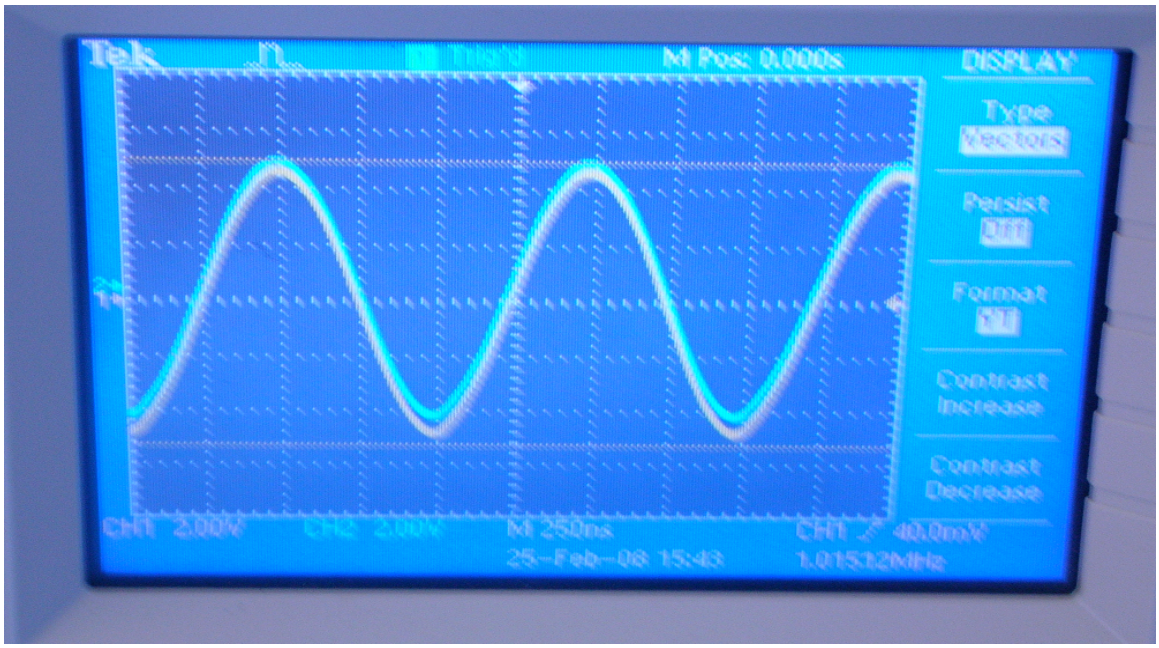

Fig. 4

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