

The DIY Subwoofer: a Subwoofer made from Formatube and a Peerless 10" Driver

By Allan Clarke, June 2002
<http://diysubwoofer.info>

Introduction

I would like to make it quite clear that I didn't know anything about subwoofers until only recently, when I decided to add a subwoofer to my existing home theatre system. My main speakers are Mission 782s with centre and rear speakers connected to a Yamaha RX-V620 receiver, which I might add are very good.

After looking at various commercial subwoofers and their prices, I decided to browse the web and came across DIY Subwoofer articles that appealed to me and I thought - I can do that! Of the various articles that impressed me the most were **Ron Stimpson's DIY Project #11** and **Russ Button's Subwoofer Project**. They made it look so simple and the tubular design seemed very practical.

I set my sights on the new range of Xtra Long Stroke (XLS) drivers from Peerless and decided on the 10" SWR 269 Subwoofer driver (order number 830452) and powered it with a Jaycar 240 watts RMS into 8 ohms Amplifier module with remote control.

The Enclosure

For my design, I used a 616mm or 24.25" (height) piece of 455mm or 18" (diameter) "Formatube". Here in Australia we don't have "Sonatube" but "Formatube" which is the same thing and can be purchased through Boral dealers and building and construction suppliers. I was lucky to have a supplier not too far away from where I live and picked up an off cut 455mm in diameter and 2 metres in length for \$10 AUS. This tube is super-dense and 9mm thick.

To be able to cut the tube square to the ends I wrapped some paper around the tube until it overlapped and was parallel. Then, using the paper as a template, I marked the ends and carefully cut the tube square using an ordinary wood saw.

The enclosure size was decided by the height that I would need to make the subwoofer look like a table. My intention was to make the end caps from MDF Board and use 2 pieces each of 18mm or ¾" in thickness to give a total width of 36mm or 1 ½" at each end. This gave me a volume of 88.5 litres or 3.12 cubic feet.

The final top, which was to be 20mm thick Pinewood, was 50mm or 2" larger than the diameter of the tube. I removed one inside layer of the lining so as to remove the sticky waxy surface to enable the End Caps to be glued and the Speaker Damping material to be affixed.

After fitting the top End Cap (see making the End Caps), I sprayed the lining with automotive sound deadener, then added Speaker Damping material to the insides using a spray on craft glue. In addition, I added some Velcro tape to the End Cap to make sure the damping material would hold.



Making the End Caps

The End Caps were made from 18mm thick MDF sheets, which I purchased from the local hardware store. These are very hard to cut into perfect circles, and as I don't have a Router I marked out the outside diameter of the circle to be cut using the outside of the tube as a template and roughly cut to size using a Jig Saw. I took the 4 circles together with the cut Formatube to a local cabinet maker who cut the End Caps to the inside diameter size - so they were a perfect fit for only \$50 AUS. Cheaper than hiring a Router and making a Circle Jig.

Using Ron Stimpson's idea, I laid out the 10" woofer and ports onto one End Cap. I then marked out the hole for the driver and the two ports, which are 90mm OD each, and cut them out using my Jig Saw. I drilled out a slot for the Binding Posts and then used that as a template for the next End Cap, thus making sure both were exactly the same. Once that was completed, I glued the End Caps together making sure that everything lined up.



The Ports

Now that the volume of my enclosure was known, I only had to work out the length of the ports. I was looking for a tuning frequency of 23Hz. This was done using winISD software and based on the fact that I was using 90mm OD (86mm ID) PVC pipe. So armed with this

information, I was able to calculate that the ports had to be 668mm long each. To fit them into the enclosure, I used 4 PVC elbows to give the ports a 'J' shape which would face the Speaker driver. I glued the elbows to the pipe using PVC glue and then glued the pipes into the End Cap with wood glue. I finished them off with a silicone sealant around the ports. To finish, I sprayed the ports with an automotive sound deadener.

With the ports finished and glued into place with wood glue and sealed with silicone sealant, I sprayed the outside of the enclosure black. I had already fitted the binding posts and short length of speaker wire for the speaker, so the only thing left was to fit the wires to the speaker and install the speaker. I used double-sided 6mm foam tape to ensure that the speaker was seated correctly and sealed soundly. I also used screws to hold the speaker in place and put some silicone sealant around the edge as well. Below is the view of the bottom of the speaker with and without the legs.



The Legs

I bought three 152mm or 6" legs from a hardware store and cut them in half to give 75mm or 3" legs. The legs were screwed into small metal leg plates, which I had screwed into the End caps. I pre-drilled the holes first and used 25mm screws.



How does it Sound?

Well, this subwoofer project turned out to be far better than I imagined. I have never done anything like this before. The bass sounded very good with a variety of music and when I tried it out with the movie 'Jurassic Park 3' on DVD, the sound was tremendous. The floors shake and the cocktail cabinet hums when at 30% volume. I decided to do some tests and got hold of some bass test disks and found that I could hear bass down to 25Hz, but at present, I am unable to verify down to 20Hz - so my tuning setting of 23Hz seems perfectly okay.

Why don't you give this project a try?

Some more photos....

