

Building a Cajon: A First Foray into Acoustic Instrument Building

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Motivation:

The decision to build a Cajon was the product of many factors. The story begins very long ago, when I was a young child. From a very early age I was deeply interested in music, when I was three, my father and I would listen to his Stevie Ray Vaughn, Van Halen, and Queen records. Through my childhood, my dad would play guitar for me when I would go to bed. While growing up, I made a few unsuccessful attempts at learning the guitar (during ages 7-13 I had nowhere near enough patience) and eventually gave up. My love for music was as strong as ever, but I had decided that my role would forever be the one of the listener. Immersed in bands like the Beatles, the Who, Led Zeppelin, Pink Floyd, Rush, Van Halen, Tom Petty, CCR, and Queen, I entered high school.

My dad had always wanted me to learn to play guitar, but as I said previously, I lacked the patience. However, when I was 15 I received a Squire P-bass for Christmas. I loved the bass guitar. I used all of my free time to practice and play along with some of my favorite songs. My sister was at this time the first chair drummer in her school's jazz band (middle school jazz band, but she was a natural drummer) and as I have made clear, my father played the guitar. The three of us learned Fortunate Son (by Creedence Clearwater Revival) and I realized that playing music was an activity that I planned to pursue.

Jumping ahead to my junior year of high school, I was still playing bass all of the time. My friends, sister and I had formed a garage band (no gigs or anything) and I was more than proficient at playing "rock bass". By this point, I was completely obsessed with the Who and idolized John Entwistle. I decided to sit down and learn the bass solo from My Generation, and when I had completed it, something terrible happened. I realized that within the songs that I really loved, I had just learned one of the most difficult pieces on my instrument (obviously My Generation isn't the hardest classic rock bass part ever, but any song significantly more difficult, I didn't really like). By my senior year I had formed a new band with some other people and was content to coast on bass guitar. Then my dad and I saw Tommy Emmanuel play at the Virginia Theater. I was blown away. He did things on the guitar that I thought were impossible. That night I went home, stole my sister's ¾ size learning guitar, printed out a tab to Tommy's Here Comes the Sun finger-style arrangement, and locked myself in my room.

I found that finger style guitar came easily to me (because of my bass guitar background) and I learned the song much more quickly than I expected. I then set out to learn other pieces, but realized that I didn't really know how to play. I then dug an old Beatles Sheet Music collection from my dad's guitar books, permanently stole my sister's tiny guitar, and set about painstakingly learning chords. A few months later I had become somewhat proficient at playing the guitar and was allowed to play my dad's Strat. I learned a bit of this and that and had started to appreciate guitarists more than ever before. I bought myself an Epiphone Les Paul so that I wouldn't need to keep stealing my dad's guitar, and continued learning my favorite music.

When I moved into the dorms, my Les Paul stayed home (it is a very nice guitar and I don't have a hard shell case for it) and I took my sister's "baby guitar" with me. My roommate happened to also be a guitar player (and a damn good one at that) and like myself he mainly played electric guitar. Unlike myself, my roommate also had legitimate experience with acoustic guitar and had a beautiful Martin Rosewood solid top (it was un-lacquered and every time he opened the case, our room smelled amazing). The combination of being cut off from access to electric guitar and living with a budding acoustic singer songwriter began to slowly widen my 18 year developed taste, from being strictly confined to classic rock to include some new musicians. I discovered the Avett Brothers, Joe Pug, Death Cab for Cutie, Collin Hay, and Paul Simon (the last two are technically classic rock, but they were new discoveries to me). For a while I equally listened to newer, more "folksy" music and my old favorites, but eventually I began to favor the music that I could play. While I was still learning classic rock songs on my acoustic (my proudest being 99% of Sultans of Swing (there is one riff in the final solo that still gets me)) it never felt quite right. The scaled had been tipped and my tastes in music became more and more aimed at alternative and "folk".

I still appreciated classic rock music but I was playing in an acoustic outfit (I had a full sized guitar at this point) and I wanted to write music that was relevant to what we were playing. We played a few shows here in town and had gained some notice from venues (we were asked to play a free show with the now semi-famous Grandkids) when we decided that our sound was a bit thin (two acoustic guitars and vocals). I sent a video of one of our songs to my dad asking for suggestions on what to improve, and he immediately replied, "It needs percussion". The three of us agreed, and we began our search for an appropriate percussion instrument.

Within the week our lead singer had ordered a cheap cajon online. The sound fit really well into our style and was immediately part of all of our songs. I remember being amazed at the sound quality and was surprised to find that it was essentially a wooden box. A few months passed and our band disbanded (our singer went to Colorado and our other guitarist to South Africa). I continued playing solo acoustic guitar and writing the occasional song.

Jump to now, my current girlfriend has a good singing voice and I've wanted to start a band with her for a while. When this semester began I was intending to build my own distortion pedal for my project in this class. However, I realized that while my electric is now with me, I have grown to prefer acoustic guitar. I felt that sinking ~ \$80-150 in parts and a whole semester's worth of time into building an electric guitar accessory would not be worthwhile. It didn't take long for me to jump to my next idea: I was going to build a guitar. I had been harboring an interest in homemade instruments ever since my roommate showed me his Starcaster-turned-Stratocaster (new pickups, new bridge / headstock, new pretty much everything but the body (which had been sanded into a nice unfinished natural tone)) and I decided that I wanted to build a guitar from the ground up.

It took me about thirty seconds of looking at a guitar to really appreciate the amount of precision and craftsmanship that went into building even the lowest quality guitars. Realizing, that in my twenty-one years of life, all of my experience with woodworking was limited to making pinewood derby cars in elementary school, I decided to search for a less daunting undertaking. That's when (once again) the cajon

came to the rescue. It was perfect, a relatively simple acoustic instrument that would make the perfect addition to the aforementioned band I had hoped to form.

Searching For Information/Schematics:

I began my search by “shopping” for cajons online. This activity allowed me to explore and learn about all of the different types of cajon. There was a standard cajon (basically just a box), a snare cajon (basically the same as a standard, but with a snare near the top, this is the most common variety), an adjustable snare cajon (the snare inside had adjustable tightness to allow for a variety of style), a two faced cajon (built with two striking faces, usually to include two different cajon types, e.g. one side is standard and the other has a snare), and the two tone cajon (the basic type that I chose, it has a divider inside the body to isolate the snare from the bass).

Once I had decided upon a style, I began my search for schematics. This was a very discouraging search as the only instructions available were for snare cajons (and many sources were vague and hard to follow). I decided that the structure of the two-tone cajon was similar enough to that of the snare cajon that I would be able to alter the plans myself. With this decision, I settled on the instructions from

<http://www.thecajondrumshop.com/index.php?page=How-To-Build-A-Cajon>.

Next I began researching tone woods. The information that I was able to find was very scattered (and I can't seem to find any of the sites that I used) but I eventually found what I was looking for. I was deciding between using bright sounding maple or warm mahogany when a thought occurred to me: I could use different woods for the different chambers.

Everything was in place and I was about to begin ordering supplies, when I decided to add a bit of flair. I planned to mount an acoustic guitar bridge at the base of my cajon, and tuning pegs near the top. This way, I could tune a set of strings to an open chord and get a nice, tonal hum when playing.

Materials:

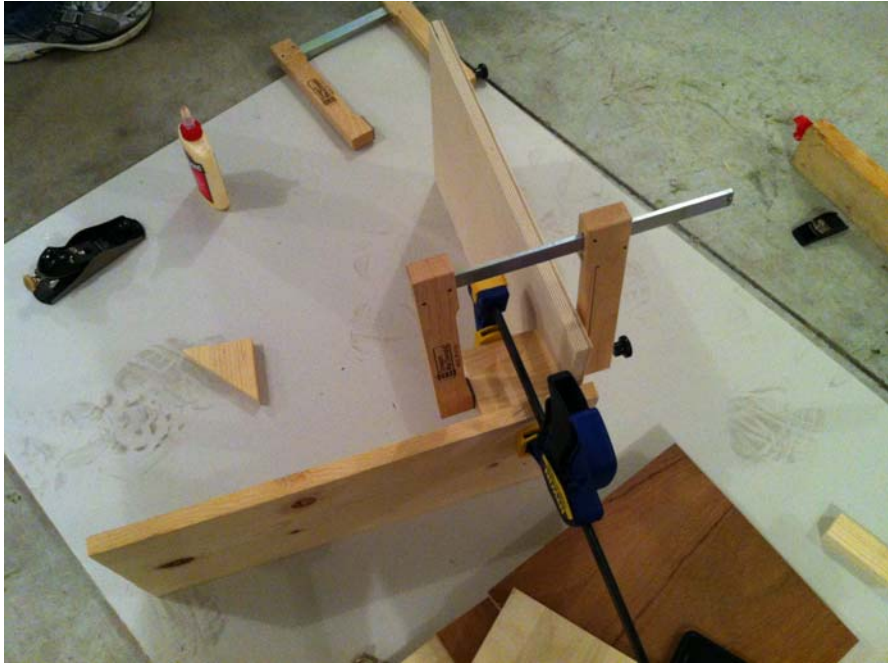
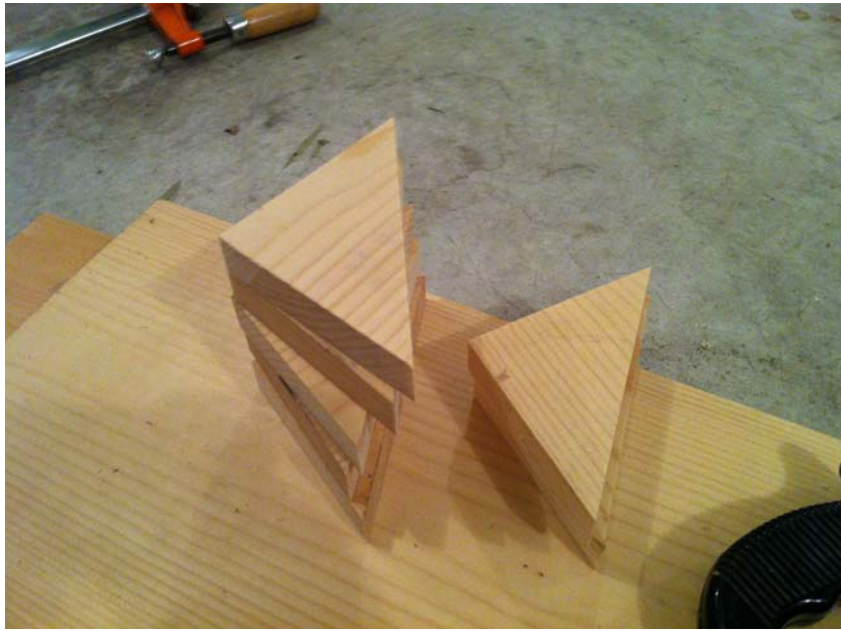
First and foremost, I needed a wood supplier. I was shocked by how difficult it was to find a plywood distributor that sold sheets of plywood that were big enough, thin/thick enough, or even the right type of wood. I eventually came across the site <http://www.dndhardwoodsonline.com/products>. This website was fantastic and very well stocked. I ordered the necessary sheets of plywood (I can't seem to find my specific order receipt): a 2mm thick sheet each of maple and mahogany for the striking face, a 4mm thick sheet of maple for the back face, 12mm thick mahogany ply for the top and bottom faces and the internal divider, and 14mm thick Baltic birch plywood for the side supports (the baltic birch was on sale). Other than the specialty plywood, I also used some chopped up scrap wood to build supports (but more on that later). I also ordered a drum snare, a guitar bridge, tuning pegs, and bridge pins. My total materials cost was ~\$80.

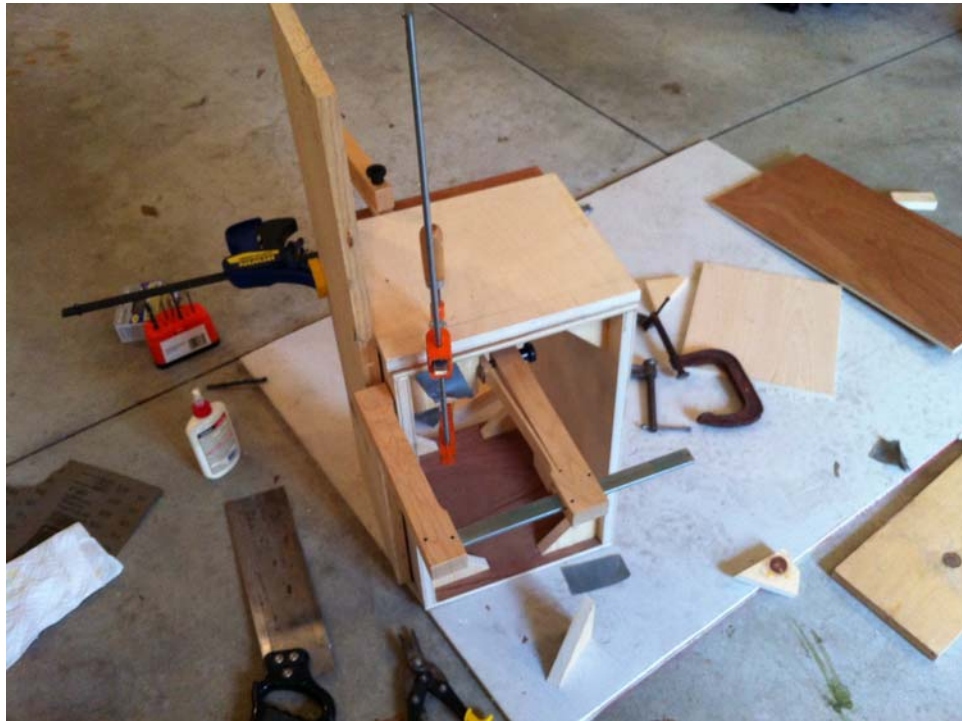
Tools and the Building process:

I followed the online instructions to the letter when cutting and building the basic structure, but the support system I used varies slightly from the directions. Due to my limited access to certain tools (i.e. large enough clamps) I was forced to improvise when it came to constructing the frame.



As you can see, the directions instructed the use of long rectangular supports glued into the corners and the whole box clamped with a belt clamp. My method was a bit different.





I started by cutting some 45-45-90 triangles off of a sheet of scrap wood I found in my garage. I then used two clamps to secure each triangle to my side supporting sheets of plywood. For each support, I would clamp two triangles put together in a square, to keep my clamping force evenly distributed and to keep the supports secure. I then attached the bottom face to one “triangled” sheet of Baltic birch. Continuing in this manner, I attached all of the triangle supports and connected the side supports and the top and bottom faces. The only significant difficulty I had during this stage was that one of my sidepieces was warped slightly outward and I had to very tightly press and over-clamp the final joint to complete the rectangle.

Having completed the essential structure, I proceeded to measure, cut, and affix the internal divider. A simple square of mahogany ply was fitted with triangles and secured within the box.



As a short digression, I added some rectangular blocks to the joints and middle of the edges of the top and bottom faces. I added these so that I would be able to secure my structure with screws, and I mention it here because this is the picture in which they are most visible.

Once I had completed the box shape, complete with divider, I carefully began to measure the cuts that I would need for my striking faces. It was a disappointing realization, but I was required to abandon the idea of using two different tone woods for the striking face. The divider was going to be much too thin to adequately support a seam between the two woods on the striking face, so I was forced to use only mahogany for the entire face. My clamps weren't large enough to successfully clamp the striking face to the body during the gluing process, so I used very tiny nails to secure the front. These nails gave me a few scares (some were bent and started to break through the sides) but for the most part they worked very well.

Affixing the snare was possibly the hardest part. First I had to cut the drum snare in half (string by string with wire cutters),



Then, I used scrap two by four to cut a block for the snare to be screwed to. I then took that block and held it sideways, attaching two perpendicular support legs with wood glue. I next had to glue my snare contraption to the top face of the divider. This was a very difficult process, because the instructions were vague at best (this is a trial and error process) and it was difficult to simultaneously hold the snare in place and strike the striking face. Eventually I settled on an angle and glued the snares in place.



I, in the end, felt that I had made the snares too tightly pressed against the strike face. However, they still produce the desired buzz, but only when the striking face is struck really hard. After the inside was complete, I measured and cut the final piece: the back face. I then measured where the divider would sit and I drilled some sound holes above and below the divider.



My sound holes were a bit smaller than I had hoped, due to not having a bigger drill bit, but I just added more to help open up the face as necessary. Once all of the holes were drilled, I attached the back face in the same manner as I attached the front. Once the back face was secure, I attached the guitar bridge to the bottom of the back face.



When the time came to attach the tuning pegs, I discovered that the shape of the pegs was not going to work with my current design (Professor Errede has since recommended dulcimer tuning pegs which I plan on looking into). Since I would have to postpone the strings, my cajon was (after an INSANE amount of sanding) temporarily complete.



The tools I used were the often-pictured clamps, the yellow black and Decker drill that is shown two pictures ago, a table saw (pictured a little ways back), a chop saw.



And a power sander.



Conclusions:

I am extremely pleased with how the cajon turned out. The snares are a tiny bit tighter than I would have liked, but other than that, I think things went much better than I expected. Like I said much earlier, I have virtually no woodworking experience, so I was very excited to have created a working cajon with the structural integrity to be sat upon. The whole process took approximately 10 hours of elapsed work time, most of which was spent performing an obscene amount of sanding. Using the power sander sped things up, but certain things had to be sanded by hand (a few of the supports weren't quite square and didn't line up with the two necessary faces). I have already begun plans for a new project which will be bigger (three chambers and three sets of guitar strings), and I still plan to add strings, paint, and finish this cajon. I had a great time building this and I already love using it.