

# Excalibur Mark I: How I Spent My Summer

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My friend Patrick Patin called one Summer day and ask if I wanted a set of pool table slates. The slates were from a dilapidated old table that had seen much better days. I told him, sure, bring 'em over. A few hours later he showed up towing a trailer with the slates and a few parts of the old table. The slates sat in my storage room for almost a year while the parts from the old table continued to disintegrate.

My dearest companion, Linda, having desired a pool table of our own for many years suggested that we buy one. I reminded her that I had this set of slates and someday would construct a table. She suggested that this was the day. So I began by going to my old friend, the Internet.

The Internet, I figured, has everything, including detailed plans for a pool table. Not so. But I did find a vague reference to an article appearing in a magazine called Fine Woodworking. I had once subscribed and immediately went to my shop to find the relevant issue. Unfortunately my subscription had lapsed about a year before the article appeared.

Then I turned to my next resource: the local wood workers club of which I was a member. Did anyone have a copy of the March/April 1979 issue of Fine Woodworking, I ask? Indeed, a fine old gentleman of vast experience had it and loaned me the issue. “The distinctive crack of the break,...” was Paul Bowman’s beginning in his Fine Woodworking Magazine article, “Building a Pool Table”. This article is the most thorough I’ve seen and is indispensable if you decide to build a table. But after reading the article several times, I was not inspired. Mr. Bowman obviously has much more wood working skill (and time) than I and I didn’t want to start the process of building a pool table but for fate. The article can now be seen at <http://www.bestbilliard.com/resources>.



Olhausen Southern

According to Mr. Bowman's article, the slates were the most expensive part of a pool table — some \$800 worth of Italian slate would be exactly what I needed to get started and those I already had! But the design and the complex parts I would have to build with my meager wood working skills and tools prevented me from being an aggressive starter on this quest.

But then a business meeting brought me to northern California. On the way to the meeting from the San Jose, CA airport I spotted a large firm in the business of selling and repairing pool tables. Coming back on the way to the airport, I stopped and chatted with the manager. Told him straight away that I wasn’t there to buy a table but would like to look around. He said go right ahead. I spent the

next 45 minutes carefully inspecting the various tables, crawling under them, making notes and sketches of how they were built. I then asked him if they restored or repaired tables and he graciously invited to the back where I saw workmen covering tables. Hmm... I could do this. (By the way, if you find yourself in Northern California and need a pool table or supplies, stop at Len's Billiard Supply, 3321 Stevens Creek Blvd., San Jose, CA 95117, (408) 246-2696 and visit with the nice staff).

Back home I eyed the slates, made some measurements and then went to my local home supply center to pick up some 3/4" x 6" x 4' poplar. Many commercial pool table slates have what is called a slate liner. These are simply boards glued to the underside of the slates and used to attach the 'felt' covering of the table as well as providing additional support for the brittle slate. Poplar (also known as tulip wood) is often used because of its resistance to changes in dimension when exposed to various levels of humidity. The liner has to be positioned and attached such that it comes no closer than 1/16th inch to the edge of the inside edges of the slates. Despite the dimensional stability of poplar, some movement does take place and thus this small gap is required.

Re-reading the plans from the Fine Woodworking article and going over my notes from the trip, I finally decided that I could do this. Fortunately for me, another friend was contemplating the removal of a large red oak tree from his yard. The 90 year old tree was nearly fifty inches across at some twenty feet up and very straight. I suggested that together, we pay to have it felled and milled into lumber. This was done and the resulting 1,700 board feet of oak was stacked, 'sticked' and left to air dry behind his workshop under cover. Eight months later and a couple of visits to the stack to turn it during the drying process, the Spring inspired me to go back to the plans and begin the process of building a table.

The Billiards Congress of America (BCA — [www.bca.com](http://www.bca.com)) is an organization devoted to American pool playing. They set the official U.S. rules of play for games such as 8-ball, 9-ball, straight pool, etc. They also specify for commercial builders of tables, the parameters that must be followed when the tables are constructed including the size, height, degree of level, size and weight of cues, balls, etc. It was from these specifications I started to form a plan.

According to the BCA, the height of a proper pool table can be from 29-1/4 inches to 30-1/4 inches. Its playing area must be 88 inches by 44 inches. The levelness of the table can deviate no more than 10-100ths of an inch across and 20-100ths of an inch down its length. The slates can deviate no more than 5 thousandths of an inch between slates.

Bowman's article states that he started on Memorial Day and finished on Labor Day working on weekends. This sounded right to me so the serious planning began.

Selecting some wide straight red oak boards from the stack at my friends shop, we used his surface planer to run them down to about an inch and a quarter thick, mostly to remove the milling marks. While there I also dimensioned them on his large table saw to 12 inches wide and about 9 feet long. I transported them back to my home and put them in the room where the table would be constructed and located when finished. The idea was that the boards would dry a bit more in this environment and stabilize to the conditions there. Indeed, after a month or so, one of the boards became quite cupped and unusable. I had to go back and get another to have sufficient lumber to complete the job.



Trial Assembly — Fitting the Sides

The first consideration was the height of the table. It has to be no more than 30-1/4 inches from the top of the slate to the floor according to the BCA. Working backward, I determined each of the thickness of the finished lumber, leg height, side height, various support pieces, etc. to arrive at the desired height. This had to accommodate the feet, leg height, table frame height, slate frame height, slate liner and the slate itself. As the sides are slanted fifteen degrees, I also had to drag out of my head what little I remembered about Pathagorus' Theorem to determine all of the height dimensions.

Pool table legs can come in many forms from elaborately carved to simple classic boxes. You can purchase pool table legs from various suppliers but I wanted to build the whole thing so decided to construct my own legs. The legs I constructed were simple mitered boxes of 1 inch red oak with a rabbet cut inside both the top and bottom. Inside the rabbet goes a piece of one inch plywood, called a spline, also rabbetted on one side to fit the rabbet in the box. Into the top, I

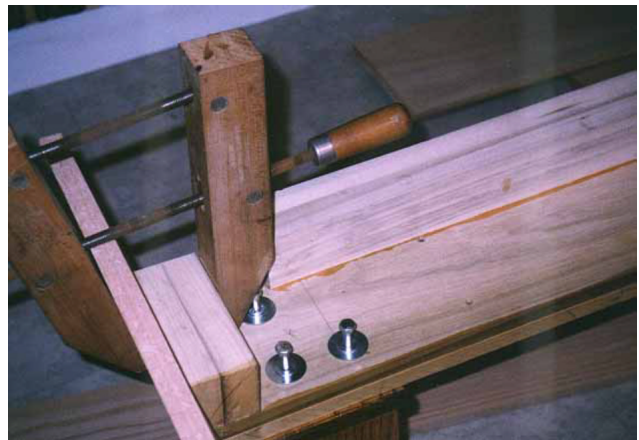


Table Frame Detail



Side and Frame Glue-up

determine how the sides are attached. They were constructed out of three layers of poplar and consisted of 3/4" x 8" boards with a 4" x 4" block screwed and glued to the top side. I then ran the whole assembly's outside edges through my bandsaw at a fifteen degree angle to achieve the bevel needed to form the sides of the table. I could have done this on a table saw, but mine is very old and has a tilt table, making the handling of very long pieces difficult.

The first task was to decide what general style of table I wanted. There are two basic types: classic and modern. The classic style typically has a fifteen degree slant to the sides of the table and exposed pockets. The modern design generally has straight sides with the pockets on the inside of the rails. This modern design style is what you typically see at billiard halls. I decided on the classic slant-sided design.

inserted T-nuts from the bottom surface of the spline in which bolts would be inserted. The bolts secure the legs to the table frame. On the bottom, a foot was attached that actually sits on the floor. The foot is a piece of 5/4 oak with its sides tapered to 15 degrees and slightly smaller in dimension compared to the bottom spline.

Next came what is called the table frame. These assemblies are what hold the tapered sides together and their length and height



Cross Rail Detail

through the side rails. Each of the cross members sits in a pocket made of poplar that was screwed and glued into the inside surface of the sides. The pocket not only supports the cross pieces but



Table and Slate Frame Detail

below. Between the two top layers I used playing cards for fine shimming to get the whole assembly as level as possible using as many 4' carpenter levels as I had or could borrow. Next came the slates.

With the promise of a few beers and a good time, I invited some friends over to help move the slates to the table. After about 30 minutes of discussion among a professional historian, a newspaper man and two computer professionals, the first 6-pack was gone and we decided it was now time to think about moving the slates. The slates are 32" x 56" and 1 inch thick and each weigh in at about 250 lbs. We carried them using a dolly and lifted them onto the table while discussing the historical, social and technological significance of each. These slates, by the way, turned out to be diamond honed, matched and registered and came from Italy.

Then I attached the sides with a combination of glue and six inch stainless screws into the table frame assembly. I counter-sunk the screw heads and later covered them with plugs cut from oak scrap. It was critical to get each of the sides the same distance from the floor to their top edge. Some planing and scraping did the trick. I then installed two oak cross rails across the short side positioned in the middle where the joints of the slate would meet. This gives great rigidity and strength to the table frame. These pieces, also cut on their ends to fifteen degrees, are glued and screwed prevents them from moving from side to side as the weight of the slate is applied.

The next step is the slate frame. This frame is what the slate sits on and to which it is attached. The slate frame must be very level so to avoid a lot of shimming of the slate pieces after they are installed. This frame was built of 3/4" x 6" x 4' and 3/4" x 8" x 4' in three layers. The first layer is screwed to the top of the table frame and subsequent layers are screwed to the one



Completed Frame Assemblies

About this time I started researching what pockets I would use, the color of the felt and the other assorted pieces I might need. I found most of what I needed on the Internet: Best Billiards has a web site and supplies felt, rubber cushions (K-66 type) and some good advise on how to cover the table. It turned out that they also sell pockets of the type I had in mind. At \$250 a set, the pockets were the



Cat Holding Down Mounted Slate

a cushion must be  $1-13/32$ " from the top of the slate (according to the BCA) and cut at exactly the precise angle for the top of the cushion to be flat in relation to the slate. As all of this exceeded the ability of my wood working equipment and skill, I bought them. With everything ordered and on its way, I went back to what was the most demanding task: leveling the slate.

single most expensive item I purchased. Fortunately Best Billiards sells a table covering kit that consists of the felt, glue, shims, bumpers, etc. In addition, a fellow wood worker loaned me a catalog that contained pool table legs and other parts. It was the other parts I needed. These were the subrails onto which the cushions are attached. The subrails have to be cut at very precise angles to get the correct height of the cushions. For example, the tip of

There are no 'field' rules in pool table design. The specifications of pool tables are very exact and consistent. The most exact are the specifications regarding a level table. The table, as mentioned before has to be very level in order to have a professional grade surface. So I began leveling the slates by using the shims supplied in the covering kit I purchased. This task consists of crawling under the table and tapping shims between the underside of the slate liner and the top of the slate frame until the slates are perfectly level. I used as many four foot carpenter levels as I had. I spent a Saturday doing this, ended up removing all the shims and doing it all over again on Sunday. The problem was that I could get the slates level but the entire set of slates were setting on shims instead of the slate frame and not as stable as desired. The problem turned out to be the floor.

The room in which the table lives was once an outside patio with the resulting slope of the floor to maintain proper drainage. Because the room is 20' x 20', you don't notice the slop unless you happen



Cloth Covered Slate

to lay down a carpenters level. I ended up shimming the table frame enough so that the slate frame was close enough to use just a few shims under the slate. Leveling finally achieved, I carefully ran long screws through the pre-drilled holes in the slate and into the slate frame. This was not to hold down the slates — they are not going to slide off the table — but to prevent someone from bumping into the table and ruining the careful leveling job.

propane torch to melt the wax into the seems and scrape off the excess with a razor blade.

When I ordered the table covering kit, I told them the size of the table but the cloth I got seemed way too small and I was not going to have enough to cover the rail cushions. So a call and an email to



Best Billiards brought an answer within hours. The felt stretches — a great deal! Their web site also has lots of good information on how to cover a table, including excellent instructions on how to attach the felt.

The felt, which is actually a blend of 75% wool and 25% nylon, comes in a great variety of colors. I chose a dark green as it contrasted well with the medium color of the oak. There are various ways to attach felt to a pool table: it can be glued, stapled or taped.

#### Pocket Detail

This later suggestion came from a friend who's job once was working in a pool hall. He said that because they had to recover the tables at fairly frequent intervals, they used duct tape to hold the felt onto the bottom of the slate. Gluing the felt onto the edges is also used when you don't have a slate liner. But the recommended method is using staples through the felt into the slate liner.

You must get the felt stretched very tightly to avoid those unsightly wrinkles on the top of the playing surface. It takes two or more people to get this done. You start by stapling from the center of one of the long sides and work your way to the ends making sure that the 'playing' side of the felt will be up. You then bring the felt over the slate and staple from the center out to the ends. The key here is to pull the felt as tight as you possibly can as you staple. This was a knuckle busting task. When this is accomplished, you do the same with the ends. At the pockets, you must cut into the felt at several angles to be able to shape the felt into the pocket wells. My wife's old sewing skills came into play as she deftly made exactly the right cuts. Then, with small strips cut from the remaining felt, I lined

the edge of the slate and liner to get a smooth appearance.



At this point, the household cats began taking a serious interest in sharpening their claws on the felt. A carefully aimed water pistol will generally reduce this possibility to a minimum. I also decided to invest in pool table cover.

In the slate's surface are several holes: pocket cutouts, slate mounting holes and larger holes

Can Be Played

with which to mount the subrails. To attach the subrails I temporarily clamped them to the felt covered slate and through the mounting holes, marked the undersides. I bored holes through the subrails at these points and countersunk a shallow larger hole to accommodate a large diameter fender washer. I had tapped the inside of the washer to take a 3/8" threaded rod as well as bored three equally spaced holes in the washers. These smaller holes were used to attach the washer inside the countersunk cutout. The rods would then be screwed into the washers, thus pulling the subrails tight to the playing surface. There are likely many better ways of doing this but it seemed to be the easiest way to accomplish this at the time. Later, I thought that I could have just used appropriate length carriage bolts directly screwed into the subrails. This would have save me lots of time tapping and cutting holes in the washers. From under the table's edge, I screwed the threaded rod into the washers then, using another washer and hexhead nut, secured the subrails to the slate to see how they would fit the table. The real advantage of this is that you can remove the rails should you need to repair or replace the felt.

After cutting the subrails to dimension, I mounted the cap rails. These were made from my red oak though you can also purchase them when you buy the subrails. The caps simply set in a cutout area on top of the subrails and are blind attached from below using wood screws.

The pockets come in a set of four corner and two side pockets. The pockets have 'ears' with a tapped hole on each side. To mount them, you bore a hole into the end of the subrail and another hole through the bottom of the subrail. Into the end hole, you insert the ear of the pocket. The other hole from the bottom, needs to have a countersunk hole to accommodate a hexhead bolt. The bolt goes up through the bottom the hole and into the tapped hole in the pocket ear to secure the pocket into the subrail.

The subrails have attached to them the cushions and these are covered with felt. First I glued the cushions to the subrail using contact cement then stretched and stapled the felt. The subrail and cushions are trimmed to the correct angle and the excess felt glued down and trimmed. When gluing the felt I used a spray-on contact cement as this dries very fast and works well with the felt. It's also a product you want to use in a well ventilated area and wear at least an OSHA resperator mask.



3/4 View of Completed Table

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You assemble the rails and pockets upside down then flip the whole structure and set it on the table. From under the table's edge, I screwed the threaded rod into the washers and, using another washer and hexhead nut, secured the rails to the covered slate. At this point, I had a working pool table. It was Labor Day and Linda and I had a bottle of 1986 Mon-

davi Reserve Cabernet Sauvignon to celebrate the occasion. We also played some pool!



Dr. Linda "Sharkey" Brannon, at Play

The final touch to this table and what makes all classic designs look good, are the blinds that cover the exposed slate liner and attachment points of the felt and rails. The oak that I had was much too thick to use in this application and I decided to use my bandsaw to cut (resaw) thinner boards. Once accomplished I purchased some oak quarter-round to be attached to the bottom of the blind to ease its appearance. This assembly was screwed and glued to the edge of the rails with counter-sunk holes to accommodate oak plugs and give a nice finish.

Lots of possible finishes were available: clear, stained and variations of final finish. Despite my not using much polyurethane on other wood projects (I mostly use so-called natural finishes such as tung oil, shellacs or blend my own lacquers), I wanted a very durable and low maintenance surface. The red oak was really too red and I wanted to achieve a more golden look so used a light golden oak stain of two coats. Next I applied four coats of polyurethane to all of the exposed surfaces and two coats to everything else.

There were some final things to do, but not to the table. I had purchased four maple two piece pool cues, a set of balls, a box of chalk, a table brush and a ball rack. But I needed a place to put these things other than against one wall. So I designed and built a cue rack with enough space for the cues, chalk and brush. The balls stay in the pockets when not in use and the ball rack sits on a close at hand bookshelf. The cue rack was made of two pieces of mahogany scrape I had, each about 20" inches long. I counter-sunk holes in the bottom piece to hold the butts of the cues and cut a slot in the top piece to hold the shafts. I lined the slots with some of the left over felt and used clear Watco oil as the finish. The two pieces were screwed to a paneled wall. As a finishing touch for the table itself, I had a small brass plaque made showing its name and year of construction.



The entire project cost about \$1,000. It would have been \$500 to \$800 more had I needed to buy the slates and buy the oak at retail. The look of the table was derived from an Olhausen design — a beautiful \$5,000 table. My insurance agent put it at a replacement value of \$7,000. The one thing I don't like so far is playing all my friends who come over who promptly beat me at every game. It turns out that I'm a pretty good wood worker.