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I don't need no stinkin CNC

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Topic: I don't need no stinkin CNC (Read 5694 times)

Rosh

Moderator



Posts: 667

Josh Kugler

**I don't need no stinkin CNC**

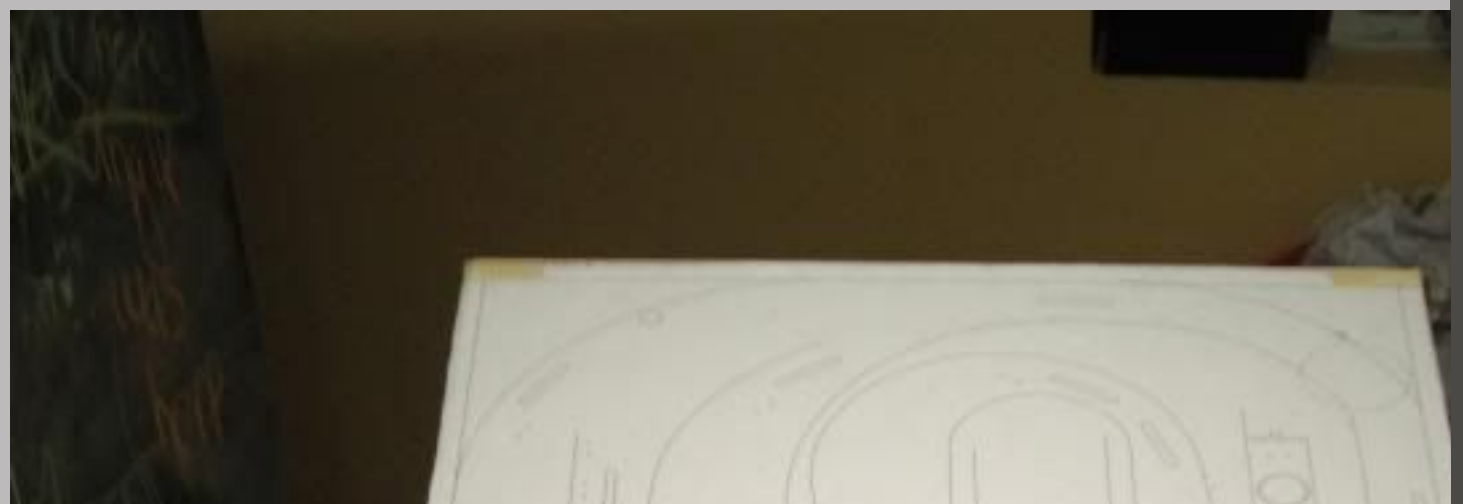
« on: July 10, 2013, 05:46:25 PM »

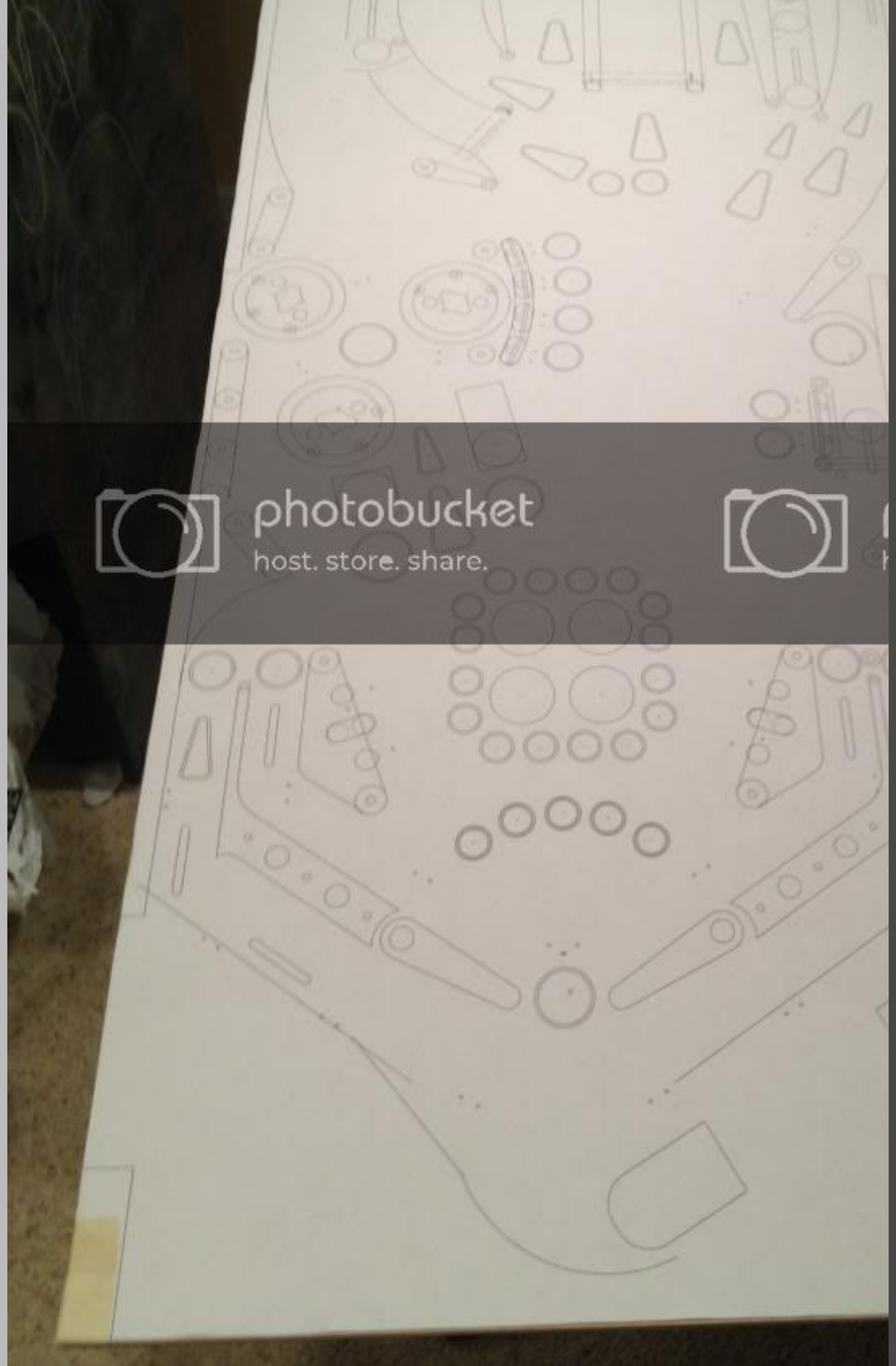
Been a while since I have posted with an update on my 'family themed' pin. And while I have written an update on game rules that I need to post, it needs some images to go with it. However, a week or two ago I started on the second whitewood, so I figured I would post info on that while it is top of mind and soon I will do an update on the code/game rules (gee, like I haven't said that before) -- of course I've already started to tear down the first whitewood, so hard to take photos :-)

While I would love to have a CNC, it is hard to justify the cost, effort and space. My initial attempts at finding one I could use have been unsuccessful and since I was ready to start on a second white wood, I decided to stick to using old-fashioned tools and techniques.

I am basically using two approaches, one for circular inserts and one for square and arrow/triangle shaped.

Before I get into how I do the cutting, I should take one step back and explain that I have created my playfield in DraftSight, with the hopes of a CNC, so without it, what I did was go to FedExOffice and have it printed full size (< \$10). I then used 3M Spray adhesive to glue it to the plywood. I did add 'centering marks' to the oval inserts so I could get the right alignment for the holes.





Doing circular inserts is pretty straightforward. I am using a very old drill that mounts into a 'drill press' stand. I have the drill is rotated 180 degrees from its normal position so I can drill anywhere on the playfield. I use a heavy weight to hold it in position and stable.

I then use two forstner bits for each insert. The first is the wider opening that is the same size as the insert, and I drill that to the appropriate depth of the insert. The second bit, which is typically 1/16 of an inch smaller, is then used to drilled the

through hole. This then gives me the 1/32 'lip' for the insert to sit on. Since the forstner bit has a centering point there is a natural centering hole for the second bit, so pretty easy to get it lined up right. I then drill this just short of going through, and then complete the hole from the other side (using a standard cordless drill). Needless to say, I don't do the three steps in order per hole, but the first step for a bunch of holes, then the second for those holes, etc.



For creating a non-circular insert I use a router with a template and 'bushing guide'. Creating the template is the hard part, but once you have that, it is relatively easy to route the holes for the inserts. This is a "two step" process similar to the circular inserts. As with the circular inserts, first I create the 'wider' opening. This is done by clamping the template to the playfield and then routing the opening. I first drill a

couple of holes in the center of the insert so there is less to route, this also helps if I am test fitting the insert and need to pop it back out (since hopefully it is tight fit). This is also helpful when doing the second step, of cutting out the inner opening, that is slightly smaller than the insert opening, since the router bit can start in one of the holes and not have to be plunged into the wood. This second routing is done without a template, since the insert opening can act as the template. I use a straight router bit using a 'bushing' to create the desired 'lip'. At this point I have found the best success with a 3/16 bit and a 5/16 bushing/guide, which gives a lip of 1/16, a little bigger than I have for the circular inserts.





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Here are some photos, of the playfield with the insert holes created and the inserts glued in. Image quality not great since taken with my phone, I'll try to post some better quality ones.





Now time to sand . . .



 Logged

FPGA_testers



Posts: 434

Steve Shoyer



< **Reply #1 on:** July 10, 2013, 10:31:45

PM >

Very nice. For your inserts, are you using standard inserts, or have you created custom shapes (another good use for a CNC machine, or a laser cutter...)?

Logged

bonnevil69

P3 Developers



Posts: 698

Matthew Bonnema



Re: I don't need no stinkin CNC

< **Reply #2 on:** July 10, 2013, 11:04:34

PM >

Yes it appears that you dont need a cnc lol. Yes using the forestner bits makes the round one a breeze

Logged

DeadPin and Doom

Steven

Wizard



Posts: 467



Re: I don't need no stinkin CNC

< **Reply #3 on:** July 11, 2013, 04:01:58

AM >

Great job!

Logged

epthegeek

Wizard



Posts: 428



Re: I don't need no stinkin CNC

< **Reply #4 on:** July 11, 2013, 08:25:27

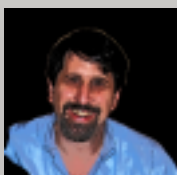
AM >

Nice work Josh! Looks fantastic.

Logged

Rosh

Moderator



Posts: 667

Josh Kugler



Re: I don't need no stinkin CNC

< **Reply #5 on:** July 11, 2013, 09:50:19

AM >

Inserts are standard inserts. So far that has probably been the most frustrating part of this project, finding inserts. My first whitewood I used circles of pretty much two sizes since that is what I could find and had not really decided what I wanted. Then I started to search and adjust based on what I could find (e.g. changing colors of the stand-ups to match the colors of the inserts I could locate). Got lucky recently and located a large stash with a really nice variety. One thing was I thought a bunch of the 3/4 inch were Red, but once I put a bright light under them saw they were Amber, which is a little close to the Orange, but I can live with it.

Logged

Steve S

FPGA_testers



Re: I don't need no stinkin CNC

< **Reply #6 on:** July 11, 2013, 02:19:51

PM >

Posts: 434

Steve Shoyer



When I was starting with my playfield, I picked up a couple of sample bags of inserts from [The Pinball Resource](#), just to get an idea of sizes and types. Eventually I'll look for specific types/shapes/colors, but the sample bag has been helpful, especially with the playfields that I know are just for testing. At \$10/bag, it seemed like a good deal.

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Rosh

Moderator



Posts: 667

Josh Kugler



Re: I don't need no stinkin CNC

« **Reply #7 on:** July 11, 2013, 02:53:11

PM »

Since Pinball Resource is more focused on EMs, there selection is pretty old school as far as mostly opaque inserts which while great for a first cut, probably not what you want. I did pick up some blue and clear transparent starbursts from Steve, but ended up finding a different source that had a slightly different color, but more important had the same style/color in the other sizes which I needed. It is a challenge, since it is not like there is a huge market for inserts, so the various suppliers don't really have large selections. In reality, there are only a dozen or so of us crazy enough to be doing games with custom playfields. As I said, I found someone with a large stash, but had to go sift through them to find what I wanted, lucky they were less than an hour away from me.

Logged

T-800

Sr. Member



Posts: 87



Re: I don't need no stinkin CNC

« **Reply #8 on:** July 13, 2013, 11:08:11

PM »

Awesome job and patience with your router. I imagine you've got a good chunk of time into making those templates perfect and then not mucking them up when you use them. Looking forward to seeing more of your build.

Logged

JoeShabadu2000

Wizard



Posts: 118



Re: I don't need no stinkin CNC

« **Reply #9 on:** July 15, 2013, 02:36:51

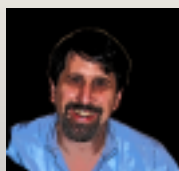
PM »

Rosh, you are truly an inspiration, I never would have thought that somebody could do a complete playfield by hand but you've definitely proved me wrong. Or at least proved me lazy, because I gave up on that a long time ago! Looks great, keep it up and I can't wait to see more.

Logged

Rosh

Moderator



Posts: 667

Josh Kugler



Re: I don't need no stinkin CNC

« **Reply #10 on:** July 15, 2013, 04:24:18

PM »

you will notice on the templates a little bit of black duct tape, that was used to make a very slight adjustment. Creating the templates was a little quicker than I expected, just got lucky. The thing I will do better next time is getting the depths consistent and accurate. Had a few too shallow and a few too deep, so then lost a lot of time working to fix that with the insert. Had more of an issue with the circles since I did those first and was not quite as focused on it and at one point I think I realized they were a touch high and over compensated. Also, in some cases the



activity of fixing it resulted in minor damage to the surface of the playfield). Like anything on these projects a small mistake can add a lot of time.

I will say it is a high risk, high reward kind of thing doing it manually, it is a ton of work, and you never know when some mistake could just destroy it all. I did very, very little free hand, almost always used a template or at least temporary guides, on both sides of the bearing. What I've done since this photo was the routing of the shooter lane, which was trickier than I expected, but pretty pleased with the result, but I was pretty nervous about screwing that up. I think in the future I would start with that :-)

Logged

Rosh

Moderator



Posts: 667

Josh Kugler



Re: I don't need no stinkin CNC

« **Reply #11 on:** August 05, 2013,

01:04:56 PM »

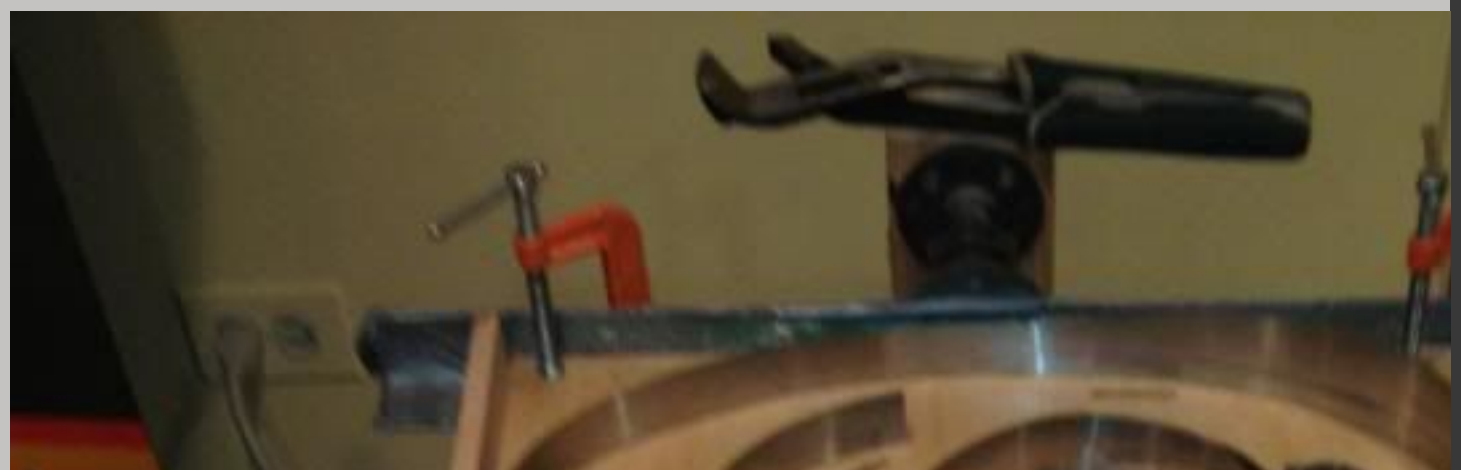
here is just a random (blurry) photo of progress on migrating the parts from the first white wood to the second. A few comments . . . not surprisingly still finding some 'issues' with my design where items really need to be moved slightly (e.g. a couple of inserts need to be slightly lower). Also did not drill some holes that were on the CAD drawing since wanted to be sure they were correct as other parts were mounted, but since I've removed the diagram that was glued on, hard to be sure if I ended up putting them where planned or not, will have to break out the ruler at some point. Given this a moving target, sort of know a few things I would want to 'fit on site'.

Also made a change to one part of the playfield and still working on tweaks to that. Hopefully I will be happy with the change once I am able to see how it 'plays' in game play.

One difference is there are a lot more lamps to be done in this second iteration as well as a 10 new switches, so that added some time to the transition. Still need four switches were I'm upgrading from leaf to micro. Also a few lamps moved slightly which meant existing wiring was not always going to work.

Of course finding some parts I need and don't have, which is always annoying, but have plenty of other stuff to work on, so not like it is a huge show stopper.

With the first white wood out of the cabinet, I've moved the cabinet (a whitewater) to the garage where I can make some changes. For example, there is a set of wood rails in the cabinet that need to be moved lower to get the slides to work correctly with my design (vs what Whitewater required). Took me awhile to realize that those wood pieces are not always in the same spot across games. Will also change the mounting board (and hole in cabinet) for the subwoofer I'll be installing (working on finalizing design of the sound system vs the whole boom box and speakers I have been using so far). Once that work is done, I'll repaint the cabinet. Will likely just be a solid color for Expo, not sure I'll get to side art before then.





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Rosh

Moderator



Re: I don't need no stinkin CNC

« **Reply #12 on:** August 30, 2013,

11:50:44 AM »

Some updated photos. Second whitewood is now in the freshly painted cabinet (no



Posts: 667

Josh Kugler



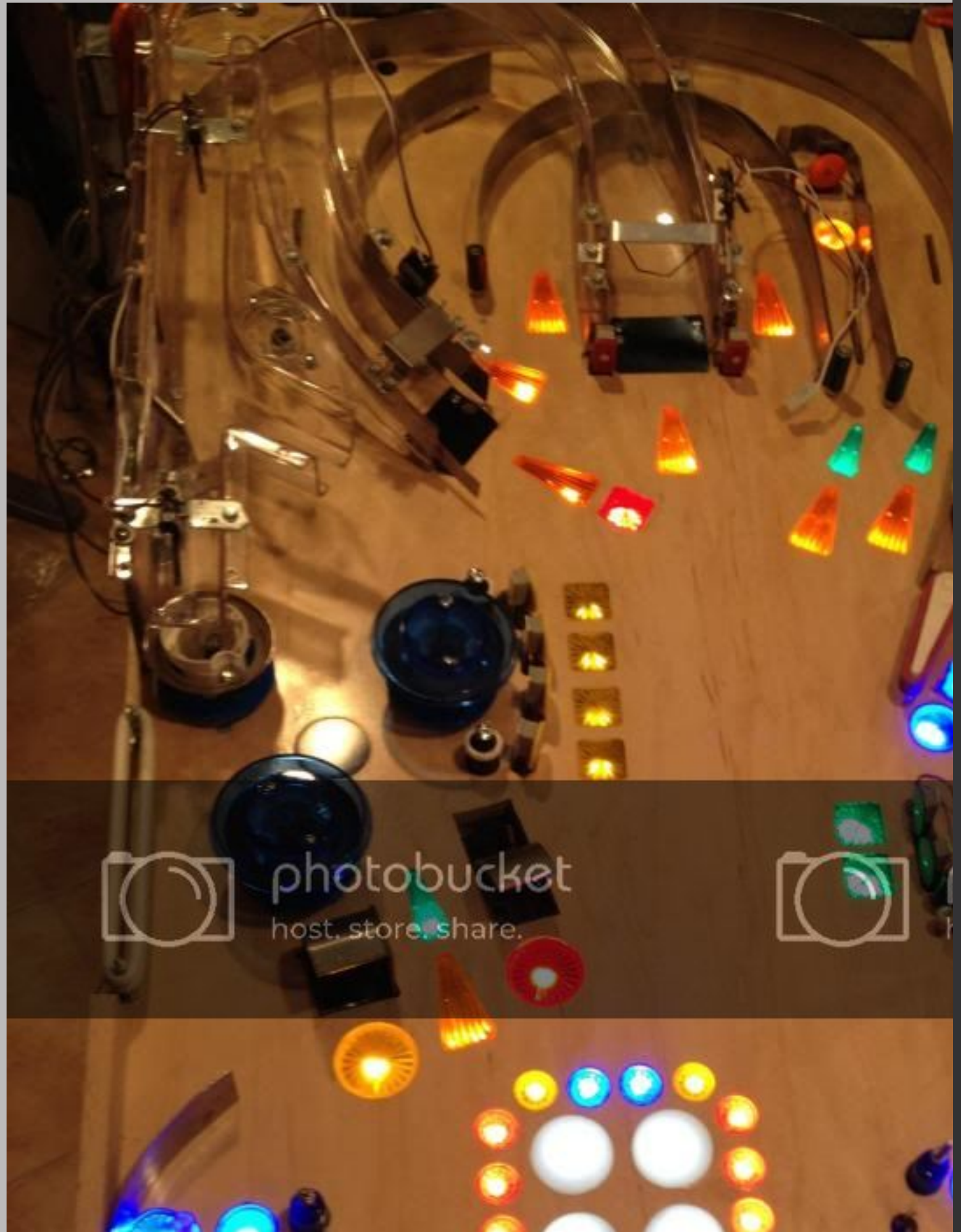
side art yet), and although not pictured here, the speaker panel (wpc95 style) is now in with the new speakers. Sound system is probably over kill, just like my CPU, but, it should sound great. Using a 4 x 100 amp board, two 5.25 coaxial speakers in the back box (was able to get the second 5.25 bracket from Terry at pinball life who had a spare) and an 8in woofer in the cabinet (photo below). Sounds really good, hope to leverage having stereo with some of the sounds. It should sound even better when I throw a crossover on it (which somehow I forgot to order).

Been fun getting to play it again. Finding a few issues with the changes I made and will have to some tweaks to the playfield and the code.



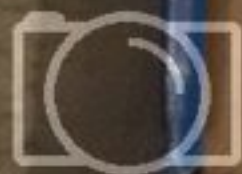


Was very cool to see it lit up the first time (some playfield parts missing in this photo). The upper set of yellow LEDs I got are not nearly as strong as the first ones I bought for the lower area, so I'll end up replacing to have a consistent look) . . .






a little difference between the old subwoofer that was in the cabinet and the new one . . .



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captaincatalyst

Sr. Member



Posts: 66



Re: I don't need no stinkin CNC

« **Reply #13 on:** September 04, 2013,
07:35:13 PM »

Thanks for sharing your method and proving that we don't need CNC machines! While I've got one, I certainly don't have one that's big enough for playfields. I could use it to make templates though! I'll end up having to approach a lot of the actually playfield cutting the way you've shown. Thanks for the inspiration!

 Logged

Rosh

Moderator



Posts: 667

Josh Kugler



Re: I don't need no stinkin CNC

« **Reply #14 on:** September 04, 2013,
10:30:12 PM »

you could create templates that cover a section of the playfield. That would get you better accuracy in relative placement, less moving and re-clamping and also make it easier to get the right depths, since you would be doing multiple inserts at the same time. The middle section of my playfield would really benefit from something like that, to get the alignment right.

The next time around I will use two routers, one that is locked in at the perfect depth and the other where I am adjusting it to do the multiple passes. Or who knows, maybe I'll find a CNC I can use.

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