

Introduction

Several years ago, a club I belong to determined that it was time to replace the modular layout that we had. It basically had several issues, some due to an experimental construction method and age. We had seen a Free-mo layout at a show and liked the concept. The club could have the basic elements of a layout for shows, and members could also build their own modules. If a member moved to another part of the country, they would probably be able to find a Free-mo group to join there. Free-mo standards help to guarantee interoperability between modules and the standards are already written - no reinventing the wheel.

Materials (for one module)

1 Sheet 1/2" Cabinet Grade Plywood

1/4 Sheet of 3/4" Cabinet Grade Plywood

Wire

14 Gauge for Track and Accessory Busses

22 Gauge for Track Feeders

Terminal Blocks

Anderson Power Pole connectors,

Free-mo does not indicate standard colors, but we use

Blue and White for Track Bus

Green for Booster Common

Red and Black for the Accessory Bus

Throttle Panels - Digitrax Compatible

PC Tie End Plates (BNM Hobbies)

Roadbed (Cascade Rail Supply Homasote recommended)

MDF Roadbed, 6 Inches at the ends of the module, recommended

Clothes pins

Screws

#4 x 3/4 for mounting terminal blocks

#4 x 1/2 for Clothes pins

Paint

Flat Black Paint for the side frames

"Birds Nest" or a similar latex brown for the top base paint

Miscellaneous Setup Stuff

Clamps - 3 or 4 inch C clamps recommended. When you setup with a group of Free-mo modules, they are typically secured to the other modules with C clamps.

BYOT - Bring Your Own Throttle. At Free-mo setups they don't provide throttles, so you will need to have your own. Free-mo standard is Digitrax. Our group has a large investment in NCE equipment, so when we setup by ourselves, we use that. I have found the OLD NCE panels will pass Digitrax signals through, but the Cab Bus cables are different. This is annoying because we have select the proper cables for the setup, but it does allow us some flexibility. If you have a choice, just use Digitrax.

Legs

You will of course need legs to support the module. Free-mo height at setups seems to vary from 42" to 50", the latter of which is Free-mo standard. You can make these however you feel like, but I plan to write another article about the legs we use.

Finding A Plan

I spoke with some people who organize Free-mo events and found that they encourage the construction of modules that are not straight. I started looking for a design to copy because I discovered that my wood working people did not have experience designing this kind of thing. I also found that people who had built corner or curved modules could not actually tell me *how* they did it. As I write this article, I see why: actually making the modules is easier than accurately describing that process. There was a *lot* of discussion between me and the guys with the better power tools that happened via text, call and in person. And the completed modules have a little variation, but they seem to work together as intended. So there you have it.

I set out to design a module that could be used as a default corner that could be either used as a single Free-mo module or a set to make the end of a big U-shape. So this meant that the module had to not only the minimum radius, but also have 6 inches of straight track at the ends. Since I was going for a double track module, the end plate had to come out to 26".

Another goal was for the modules to be no larger than they needed to be to accomplish these.

To help me figure out where things needed to be, I started by using the computer application Sketchup and drawing a circle, measuring and measuring some more. Eventually, it looked like I could make four module tops out of one sheet of plywood. The module doesn't actually need a solid top, but for proof of concept this was easier. So, I got a sheet of 1/2" (actually 15/32") cabinet grade plywood and drew out my lines, 22.5 Degrees on each end of the top. This makes a 45 degree module. The top ended up 23 1/64" side to side. I cut those tops out and laid them on the floor in the one-car garage of my condo. This only was to see if the angle was coming out and it was. I knew that each module would have 3/4" plywood ends, so the size was not going to be what the finished size would be. That's ok.

I also built a trammel to draw out the 42 and 44 inch radius on the top. My results showed that the radius was just a hair over those numbers and I like it.

You can see from the picture that the end plates are cut straight with the sides. That's not a necessary step. It does look better that way. But with the module painted black, they don't really become obvious. While these module were also put together with biscuits, that's not necessary either. It doesn't result in as rigid of a module, and you

should at least one other brace if you're not going to use biscuits in the assembly, or cut blocks for the corners. I will also add here that I try to put any leg pockets as close to the end of the module as I can. No matter the type of module. This makes leveling the module much easier. Trust me on this one.

Free-mo recommends at least 6" side frames and I would agree. For this design The side Frames *do* need to be cut at 22.5 degree angles or 67.5 degrees or 112.5, depending on which way you are doing the cutting. Hopefully, you can figure this which is right for you on your own, LOL. Anyway making these cuts makes a 12" miter saw practically a necessity... unless you're REALLY good with hand tools.





In **Figure 2**, the first completed frame is shown. When this was assembled, a little miscommunication occurred, where a previously cut end plate was used and then cut again to line up with the side frames. That left the plate a little on the short side. The hand holes were cut freehand with a router, which slipped during the process.

Because this is one of our corner modules, we can just live with that difference. You can make it look like this, but it will take more figuring. In our case, we mass produced a lot of 26" long, 3/4" endplates because we were going to be building 20 modules to start. It didn't occur to me at the time, that some would need angled ends. Oops.



Figure 3 is what I actually figured it would look like. Never mind the paint. Although this module was assembled with 3/4" side frames. That's not necessary but does make a rock solid module. Dimensions for this module are as follows:

Plywood top:
22 3/4 inches wide
33 5/16 short side
51 3/4 long side

Total Dimensions
Overall Width 24 3/16 inches
Long side 53 13/16 inches
Short side 34 inches

I hope to have the scenery done for the Train Show in Lynden, WA in October of this year (2019). We'll see. So far it's been a crazy year.

Now, of course it's not really necessary to fill in the whole top with plywood and in one of them I cut with out for the lake. I've thrown in a picture (**Figure 4, Below**) of the construction of the lake for reference. I drew the lake on the module top and cut it out with my jig saw. Then I attached some tempered hardboard on the bottom - just being "lazy" as the depth of the lake is the thickness of the 1/2" plywood.

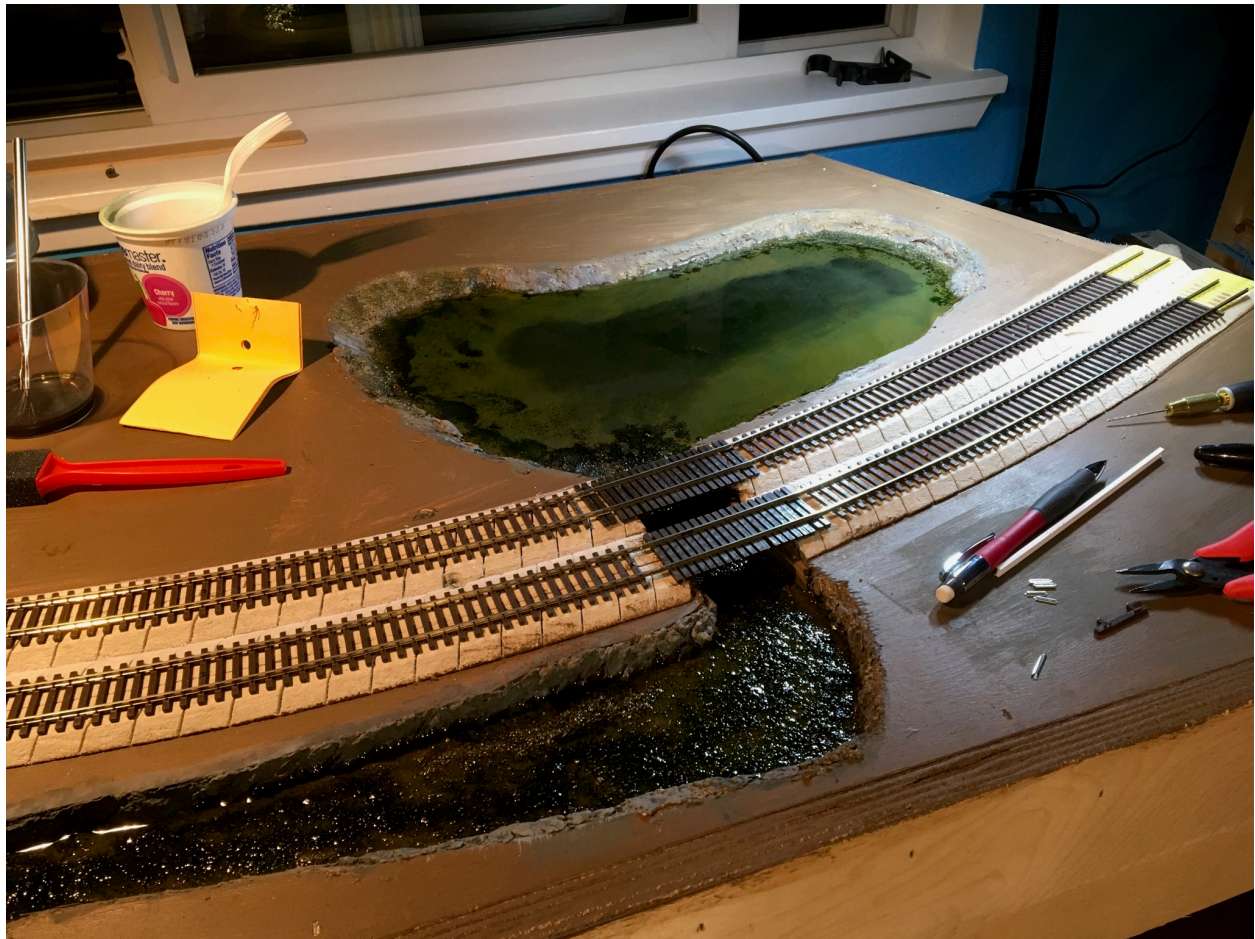




Figure 5 is a straight module, but it is the only picture I could find that shows the basic wiring harness we are now using for the modules. There are no feeders installed on this one yet (incase that's not obvious). We have Anderson PowerPole Connectors, 15amp, mounted on 14 gauge stranded wire. Note: 14 gauge works just fine for us. If you wish to discuss wire gauge with me, you will soon find you're talking to yourself, LOL. A European terminal strip does the duty on this module. Free-mo does not direct you to use specific colors for certain things. The TNW wiring is:

Track Bus: Blue and White
Accessory Bus: Red and Black

On a module like this, I would tuck the track feeders into the terminal strips at each end, providing feeders about every three feet. I do this on the corners as well. Some people solder the wires. I have nothing against that practice, but I really don't enjoy soldering.

On the yard modules there are two track busses - one each side of the yard. We are working on a creating separate circuit protection zones for the North and South yards.

Cab Bus

Free-mo groups use Digitrax DCC systems. Before the TNW went with Free-mo there was a bit of consternation about this, as many of the members had NCE equipment already and don't really like a Digitrax throttle. I did some research and found that the older style NCE UTP (Plug in panels) can pass through Digitrax signals just fine, but the bus wiring itself is different. I also tested this with a Digitrax system. I also know that most of the TNW members will likely not travel to Free-mo events, and those who do would just swap the wires out for the event and buy themselves a Digitrax throttle to use at those events. We will label the NCE bus to avoid confusion. And of course, if your group just uses the Free-mo standard Digitrax system, you don't have to deal with this silliness. <wink>

Digitrax also requires a "Booster Common" wire that is not seen in this picture. This is being added to modules for compatibility as we go along. It is a pass through and doesn't actually connect to anything on the module and therefore it doesn't need to be on each module immediately.



Securing the wires...

You might have spotted a clothes pin attached to the bottom of the module. I have been using these as a wire clamp for travel and so far I like it a bit better than the other solutions I've tried: cup hooks, velcro, and others. My advice here is that you should use what works for you. In my case, I've got modules that use cup hooks and clothes pins. The capacity of a clothes pin seems to be about 4 wires. Any more than that and it does not hold well. I drill a 9/64th hole in the clothes pin after twisting it just a little, push the #4 screw through it. I drill a 5/64th hole in the module to start the screw. With just one screw I can rotate the clothes pin as I tighten it down to the best position for the wires, or leave it loose if you like it to move around.

I hope you've enjoyed this article and maybe I'll see you at a Free-mo event some day. A friend of mine is chomping at the bit to go to Super Train in Calgary.... that's an 11 hour drive from home. But we'll probably do it someday because we're just that crazy. And it's fun - that's the overall goal.