What is the problem we are trying to address in securely fastening the rail at the end of a module or module section?

The problem is the rail is exposed, and we want to minimize possible damage during that exposure by securing the rail as best we can manage.

Why do rails need to be securely fastened at the end plate of a module or section of a module?

Even before butt joints (bringing the rail flush with the end plate), the rail could “unzip" out of the ties. Damage can occur despite our best efforts. No solution is perfect, but limiting the damage can greatly improve the survivability and minimize downtime or the effort to repair. The “spikes” in the track’s ties are not substantial and cannot withstand any moderate force applied other than down into the tie. The “spikes” will give up the rail, and it is difficult, if not impossible, to reinsert the rail under the “spikes.” It may be possible to slide in a new rail from the end should the “spikes” and ties be in good shape.

When is this damage occurring?

It is not always known. During setup and tear down, the ends of modules or module sections are likely exposed, and there is a lot of movement in and around them. When adjusting modules is also likely, there can be an unfortunately substantial amount of energy captured in a connection when clamping sections together. During transportation or storage, we hope not, but it is also possible to damage the track; we try to protect the ends, more on that later. Also, based on how the rail is secured at the end plate, it may be just with time, the way in which the rail is attached begins to fail due to any number of factors - deterioration of adhesives, temperature cycles, handling and movement, and rmore.

How do we fasten the rails at the end plate?

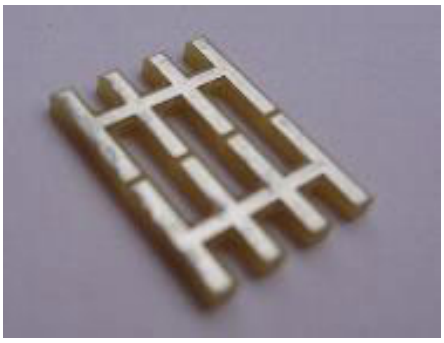
The rail being metal - and just a small narrow bit of metal the strongest method of attachment has been solder. Solder is great because we can rework this connection with an iron, and a stronger joint probably does not exist in these circumstances. Between the rail and the endplate (3/4” plywood), the connection will fail at the weakest part of that connection.

Printed Circuit Board (PCB) Ties

PCB Tie Strips

PCB Ties have been a popular choice but have their limits. PCB ties are familiar to most and, in implementation, may appear to be less complicated - but maybe not. The limits of their strength is rooted in the strength of the copper being bonded to the fiberglass that makes up the PCB. There is not a great deal of surface area in a PCB tie - there are some products that work to improve this by having the PCB ties make up several ties and continue under the rail. (See Gap Masters or similar). The PCB tie(s) are embedded in epoxy, and that epoxy is attached to the wood. These bonds are not the strongest and have seen failures. Additionally, during installation, the track has to transition from the plastic ties to PCB ties - they are not the same thickness; many times, this leads to the track having an undesirable change in elevation. In trying to improve the strength of the attachment, a piece of wood is typically used in place of the cork roadbed at the end plate. This, too, creates challenges in keeping the rail at the same height. Further, I have even made the endplate with the roadbed profile in the endplate. Again it is difficult to get the rail at the same height - there is some ability to adjust by floating more or less solder between the trail and PCB ties. The use of different adhesives also impacts the end result. Gorilla glue appears to give up over time, and epoxy bonding to the edge of the plywood of the end plate is not perfect either.

Gap Master



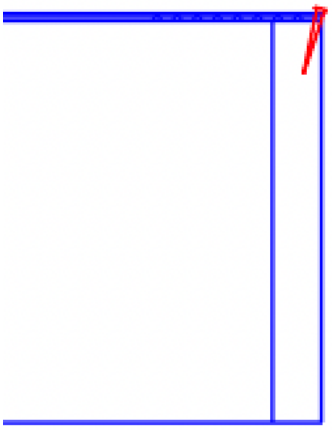
Brass Screws

SNUG Fasteners 100 Qty #4 x 1 Flat Solid Brass Phillips Head Wood Screws (SNG101)

Wood accepts mechanical fasteners like screws quite well. Brass solders to model rail quite well. This is by no means a new concept. A few goals in implementation - maximize strength and make it aesthetically pleasing. If we can position the screw directly under the rail we will not see the screw. Driving the screw next to the rail might be an option in retrofitting? The screw needs to be surrounded by the material (wood) it is driven into - avoid splitting and firmly grasp the screw. We want the screw at the very end of the rail at the endplate. T**he result is to drive the screws at an angle directly under where the rail will lie.**

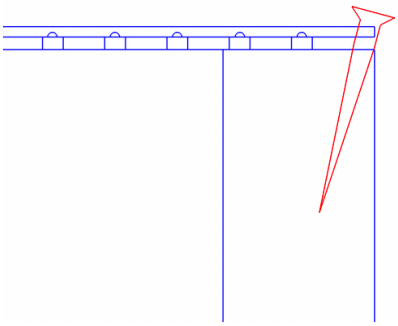
Brass is soft - so pre-drilling the hole for the screw is a necessity - choose a size hole no smaller than the minor tread diameter.

The head of a screw is not the optimal surface to solder the rail. Drive the screw to a practical depth and then

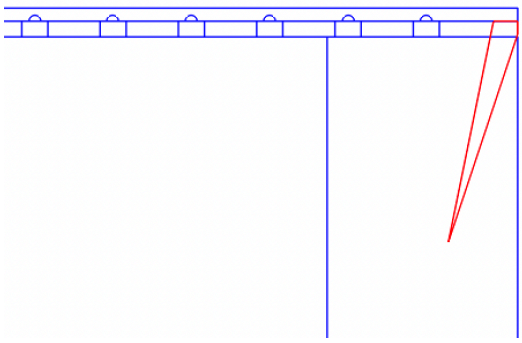


Screw in endplate at 15 degrees

remove material from the screw so that it is first flush with the vertical surface of the endplate (as the rail should also be) and remove material from the screw vertically so it is flush with the end plate.
Drill and drive the screw at a good angle to be attached firmly and provide sufficient material for attachment to the rail.
Driving the screws by hand is suggested to avoid stripping the heads. Brass is really soft.
Remove material from the top of the screw in the horizontal plane so that it will allow the rail to pass over without deflecting the rail - then remove a touch more to allow for solder flow under/between the screw and rail. Run a file along the endplate into the material of the screw until the screw is flush. It may be desirable to file each side of the screw to the width of the rail so the screw is not visible beyond the width of the rail.
This method allows for the cork roadbed and plastic ties to come right up the end plate - reducing the effort and difficulty in keeping the rail flat.
Have a piece of track on hand with a tie removed from the end to gauge your material remove progress.



Close up of screw at 15 degrees.



Screw filed flush

Wood roadbed used here as the decision to use screws was made later.

File screws flat to end plate

Filing screws flat

End Plates with reliefs (dado) where tracks would contact the travel plate.

Other measures

What is not protected? The rail may still be bent or smashed, and the head of the rail may split from the base of the rail - tearing the web; in these situations, the rail is likely still prevented from “zipping” out of the ties and can be trimmed back, bent back and successfully repaired.

Ideally, modules should be packed, stored, and transported with end plates attached to the benchwork endplate. It is a good practice to make a relief where the rail would come in contact with the “travel plates.”