



# *Chattanooga Modular Modelers, Inc.*

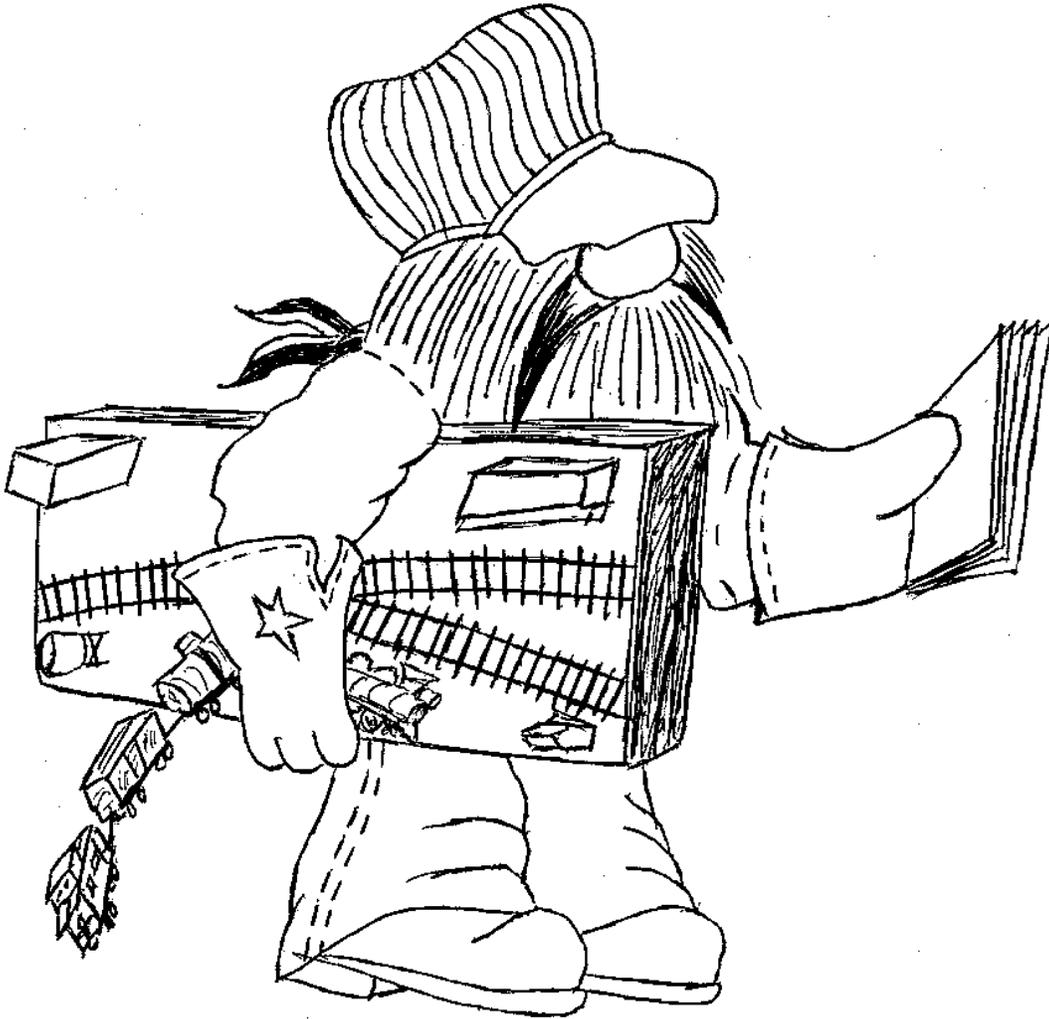
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## *MODULE STANDARDS FOR THE HO MODULAR RAILROAD*



### **Standards and recommended practices**

**Dimensions:**

- Width: 32.5" or 24" and an 8.5" extension
- Length: 2', 4', or 6'
- Height: 40" to the top of the mainline railhead utilizing adjustable legs

**Construction:**

Modules should consist of a butted grid of 3/4' x 3 .5" plywood with a strong and sound .5" top. All construction shall be screwed together. The construction must be square and plum with no irregularities at the interface. Use of a pocket hole jig and screw will add satiability to the unit but is not required.

Module fascia should be painted, "Grey" or equivalent.

The loop side of Velcro should be glued or stapled to the front and back fascia 1 inch from the tabletop. This is to allow curtains to be connected.

A connector for LocoNet (Digitrax or compatible) should be placed above the curtain line on both the front and back of any 4' or greater module.

Modules shall be constructed so that the front edges of all modules are in line.

Modules are to have space on each interface to accommodate two 3" or greater 'C' clamps for joining modules together.

**Mainline, Branch and Optional track specifications:**

Track shall follow NMRA module standards on all through track where it does not conflict with other CMM HO module standards.

All modules shall have inside mainline and outside mainline. Optional tracks shall follow the standards set forth.

The track spacing and arrangement at the edge of the module shall be as follows

1. Outside mainline - 5" on center from the front edge
2. Inside mainline - 7" " " " " "
3. Primary branch line\* - 25 1/2" " " " " "
4. Secondary branch line\* - 27 1/2" " " " " "

\* Denotes optional but recommended tracks.

Tunnels and bridges shall not be closer than 6" to either end of the module/cluster. Direct access to track inside the tunnel shall be provided if tunnels are longer than 18".

DCC Friendly Turnouts are required with positive point through and powered frogs. All mainline turnouts shall have a minimum (or equivalent) of a #6 frog (#8 recommended). All mainline crossovers shall be a #8 frog (or equivalent). Peco Insulfrog Turnouts are recommended. The points of a turnout should not be within 4.5" of the end of a cluster.

Track height will be 40" from the floor to the railhead. This will be used for all through track at the end plate.

Center line of the outside mainline track is 5" from the front edge at the end plate.  
Center line of the inside mainline track is 7" from the front edge at the end plate.  
This gives 2" between outside and inside mainline track centerlines on straight track.  
Track beyond 4.5" from the end plate should have the centerline 4" or more from the edge of the module.  
Anywhere that through track gets closer than 4" to the edge of the module a barrier of some type is recommended. Tracks may NEVER be less than 2" from the center of the track to the nearest module edge.

Through route tracks must be perpendicular, straight and level from both endplates for 4.5".

Tracks need not be parallel except at the end plate.

Rail shall be cut off 1" away from the endplate. The ties and ballast should continue to the module end. Ties shall be notched under the ends of the rails and to the module end. This provides clearance for bridge rail joiners and freedom of adjustment for bridge rails.  
To enable DCC power districts, your module must be able to accommodate insulated rail joiners at each endplate.

Ties where the bridge rails go over should be excavated slightly to accommodate any vertical irregularity in track alignment between adjacent modules.

There shall be a minimum of 9" of straight track between reverse curves.  
Code 100 nickel-silver rail must be used for ALL Mainline Module and mainline passing tracks.

Sidings, spurs and other tracks of a Mainline Module may be code 100, code 83, or smaller, but shall be no less than Code 40. Transition track should be used were needed between rail sizes.

The Minimum permitted curve radius on a through route of a Mainline Module is 33". A larger curve radius with easements is recommended. This includes through track sidings and other tracks where through traffic will run.

Minimum center-to-center spacing at the apex in mainline curves is to be 2 1/2". Spacing between tracks on curves of a Mainline Module shall allow for long cars to operate without fouling each other; observe NMRA Standards S-8 Track Centers for "Class Ia" equipment.

Curves on the through route of a mainline module shall be appropriate for mainline operation of contemporary long cars, see: Standard S-7 Clearances and the NMRA Gage, and NMRA Recommended Practices RP-11 Curvature and Rolling Stock.

Corner modules with curves of greater radius are permissible. These modules or cluster must be the equivalent of a square of 5' x 5' plus multiples of two', at the point where the modules, or module group mates to the adjacent modules. For example, the smallest 90-degree corner allowed is the equivalent of a five-foot square.

Super elevating curves is discouraged.

Mainline maximum permitted grade on the through route of a mainline module is 2.0 percent (approximately 1/4 inch per foot). Where this is most often used in transition from cork roadbed to the tabletop. Vertical easements are optional, but recommended.

## Electrical Standards:

Each modular shall provide though (bus) wiring of 14awg, or larger, for mainline, and branch line tracks. (EVEN IF THEY DO NOT HAVE BRANCH LINE TRACKS.) This is to continue power to the next cluster in the layout. (This becomes a bigger issue when we a doing point to point layouts or layouts using end loops. Since we are only making a power connection at one point on the layout, a long length of modules will cause more voltage drop because of the possibility of more equipment being run at the same time.)

Anderson Power Poles adapters to Radio Shack plugs #274-201 (male) & 274-202 (female) (or equivalent) may be needed for older modules for though track connections.

Track feeders shall be firmly attached to the underside of each module, and shall have at least one connection from feeder to its track on each module. This connection is called a drop, and is to be no smaller than 22 gauge. The length of the drop shall be kept to a minimum. The feed line ends shall be able to extend one foot (12") past the end of each module. Feeders shall pass through, not under, any cross members under a module.

Color of Anderson Power Pole plugs for DCC power districts; (black to inside rail)

Red/Black	Outside mainline. If more than one they should be numbered from front of module.
Yellow/Black	Inside mainline. If more than one they should be numbered from front of module.
Blue/Black	Any tracks between inside main and primary branch line. If more than one they should be numbered from front (mainline side) of module
Green/Black	Primary Branch line(s). If more than one they should be numbered from front of module.
White/Black	Secondary Branch line(s). If more than one they should be numbered from front of module.

Additionally an optional 12-volt bus (2 pole universal trailer connector) for lights may be used.

A method for securing the ends of the feeders under the module for transport shall be provided. (i.e. safety hook-up, Velcro, sting, ties, etc....)

Rail Electrical Gaps; insulating material shall be used to fill rail gaps. **NO OPEN AIR GAPS ARE ALLOWED!!**

All electrical connections shall be; soldered and taped (or otherwise insulated), terminal strips of the barrier type, wire nuts, or crimp connectors.

## Examples and Photos:

### Helpful Hints:

#### Frame building

If you cut strips 4" wide, you will only get 11 strips (44") with ~4 ½" of waste if you are using a saw blade with a 1/8" kerf. If you cut 3 ½" strips, you will get 13 strips (45 ½") and will only have 7/8" of waste if you are using a saw blade with a 1/8" kerf.

Some leeway to this may be allowed to smooth transition between modules. Refer to module examples for more information but it is suggested that a method of fine adjustments of plus or minus 1 inch be used. (legs?)

Centerline of any mainline is a minimum of 5" from the backside of the cluster at the end plate. Please refer to module examples for more information but this gives the normal minimum width of a through track module of 1 foot.

The centerline of all the tracks should be 4" or more from the sides of the module at all times. Anywhere that through track gets closer than 4" to the side of the module we strongly suggest a barrier of some type to keep a model from going over the side. There are two reasons for this: (1) To protect models. If something was to happen and a train derailed, we do not want the cars or engine to fall to the ground. It will be bad enough to have them on their sides. (2) For scenic looks. It looks better if there is scenery between the track and the edge of the module. Tracks may NEVER be less than 2" from the center of the track to the nearest module edge.

Laying the rail to the edge of the module does have the advantage of allowing a nicer scenery transition to the end of the module, but there are some problems with the design. The first and most important is that the rail at the edge of the module is frequently damaged in transport and set up, requiring immediate repair at set up time. This is not that easy to do and seldom results in the track looking or performing as well as it did before the repair. The second major problem is getting the tracks to properly align. Using a 2-inch piece of rail allows for slight mismatches to be smoothed out. Having the rail end at the module sometimes results in a kink (horizontal mismatch) or what is called a "ski jump" - a vertical mismatch of rails. Both conditions may be moderated by the addition of fitter rails.

Additional info:

### Transport:

How the modules or clusters get to a show or location of setup is up to the owner! Care should always be used to make sure that no damage to the scene or structure occurs. One way to guard the module from damage is boxing boards. In this method two modules of the same size and shape face each other with their scene to the inside with boards bolted (or screwed) to the fascia and endplates. This allows for a sealed box so that nothing from the outside will damage the scene. One should take care to make sure something does not come lose from the scene and then damage other parts of the scene. We generally use 3/8" carriage bolts with washers and wing nuts to secure the boxing boards to the modules. Many of our

owners have additional shipping containers to carry their scenery. During setup the scenery is removed from the containers and placed on their module at the specified location for that scenery. By using additional containers it is possible for the module transport boxes to be much smaller because they may be able to be closer together when made for transport. This takes time and needs to be factored in to the setup process. Anything that safely reduces the time and work needed to setup at a show is encouraged.

#### #Exceptions

Modules built prior to the acceptance of these standards will be exempt from these standards. However, if non-conforming modules are to interface with conforming modules, a transition module and/or connections will be required to accommodate any difference in trackage, electrical, etc.

“Special length” and/or shaped module(s) will be allowed to fill odd gaps and make fitting possible for some configurations. Each time this is used it should come back to make the overall length of the cluster divisible by 2 foot.

Corner clusters with curves of greater radius are permissible. Cluster must be the equivalent of a square of 5' x 5' plus multiples of two', at the point where the modules, or module group mates to the adjacent modules. For example, the smallest 90-degree corner allowed is the equivalent of a five-foot square.

Any sets of modules that are "dedicated" to being joined in a single configuration are acceptable, as long as the final mating edges match the pattern configuration of standard modules. This is henceforth called a "cluster". For the purpose of clarity in this document any non-divisible scene (whether one or multiple modules) will be called a cluster.

Clusters may have endplates at any angle to each other as long as care is taken to make sure that a traditional closed-loop can be set-up. Having another cluster that matches or mirrors the angles so that a closed-loop may be joined may do this. This requirement may not be needed when end-loops are used but end-loops may limit the length of scale rolling stock.

Note: Other track spacing is up to the module owner(s) but is not recommended to connect between clusters. Exceptions would be a lead track or expansion modules for the yard. Module owners may make agreements between two or more parties for other track spacing. This grouping of modules would then be called a super-cluster.

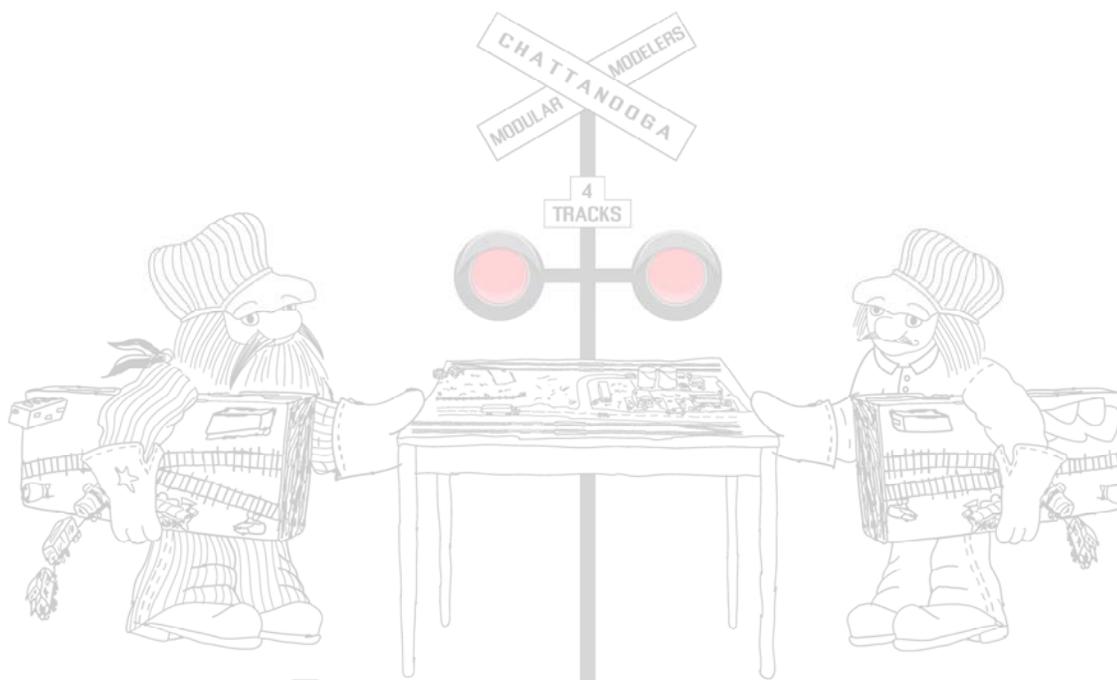
Exception would be end loops where the main line loops back to the branch line track.

Legs shall be made of 2x2 lumber with a 1/4"-20 tee-nut attached to the bottom with a 1/4-20 x 3" eyebolt for height adjustment. (37 1/2" is the recommended length for the 2x2 legs) Leg pockets should allow for lose fitting insertion of the 2x2 legs. Cutting a 4x4 in half can easily do this.

An effort is underway to find a better way for legs. This may be PVC pipe with connectors on the module that will allow the legs to fold up and remain connected during transport. If the owner would like and is able to accommodate in a module, leg holders that fold, they should be locking and strong enough as to not allow the risk of collapse.

Some leeway to this may be allowed to smooth transition between modules. Refer to module examples for more information but it is suggested that a method of fine adjustments of plus or minus 1 inch be used.

Spacing between tracks on curves of a Mainline Module shall allow for long cars to operate without fouling each other; observe NMRA Standards S-8 Track Centers for "Class Ia" equipment.



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