
# Wasatch N-Scale

# Module Layout Guidelines

Revised 09/01/2020

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# Wasatch N Scale Introduction

Wasatch N Scale is made up of a group on N Scale enthusiasts who work together to promote and educate others in their enjoyment of model railroading.

The group participates in multiple train shows and exhibitions by setting up modules that are owned and maintained by individual members that can connect in multiple combinations allowing a layout to expand and contract.

Module design is largely based on standards established by NTRAK Modular Railroading Society, Inc. The website for this organization is www.ntrak.org. While similar to NTRAK, the standards established by Wasatch N Scale are slightly different.

Modules are designed to bring model railroading to the public at conventions, exhibits, and shopping malls. Modular layouts have the flexibility to be fitted into many different size and shape areas. They offer close-up viewing and maximum train action. Long trains passing each other are always attention getters and are a feature of the many configurations of our layouts.

The building of a module is not difficult. By building in modules, it allows the builder to complete an entire section at one time and capture all phases of module construction. So often the scenery does not get built or the track work is never made to work right, or some other building phase is neglected. Another advantage of building a module is that it can be turned on its side or upside down, making working on it much easier.

The goals of this group are simple:

1. Promote light weight, simple to build modules, especially for beginners or those with limited transport capability.
2. Provide an alternative to a permanent layout, that will allow everyone to build a section at their own pace and be brought together for lots of fun!
3. Provide a more prototypical operation which will involve main line and switching duties.
4. Create an environment that will allow different formations of modules and will allow easy expansion without having to alter anything already done.
5. Provide resources for both new and experienced builders and operators though sharing of knowledge, skills and experiences.

This document has been prepared to offer club members a guideline as to the standards that have been reviewed, discussed and approved for modules that can be used at club events.

Questions regarding these standards or suggestions for changes should be brought up before the club at a regular meeting. Any changes approved by the club will be incorporated into this document and the document date with the most current revision date will be posted in PDF on the club website at www.wasatchnscale.org

# Summary of Wasatch N Club Standards

| | |
|---|---|
| Standard width | 24" (Optional 6" to front and/or rear) |
| Standard side width construction | 1" x 4" or similar ¾" x 3.5" finish grade plywood |
| Minimum length | 24" |
| Maximum length | 96" |
| Height from floor to top of roadbed | 46", Feet able to adjust 1" up and down |
| Skyboard height | 14" |
| Facia color | Available through Club |
| Sky color | Available through Club |
| Track | Micro Engineering Code 55 |
| Switch | #6 or larger main lines<br>#4 or larger industries |
| Red Line<br>(Outside Main Line) | Track - 20" on center from standard rear position<br>Track Bus – Red/Black 16AWG stranded<br>Running - Right to left |
| Yellow Line<br>(Inside Main Line) | Track - 18.5" on center from standard rear position<br>Track Bus – Yellow/Black 16AWG stranded<br>Running - Right to left |
| Track Ends from Module Edge | 1.5" |
| Track Connectors | 3.0" Section of track |
| Signal Power Bus | White/Black stranded 18 AWG |
| Signal Data Bus | 4 wire data (Telephone) |
| Bus Connectors | Anderson PowerPole PP30 |
| Feeder Wire Size | 22 AWG minimum |
| 110 Volt Power Strips | Cord on Right |

# Design Development and Review

With an understanding of our goals and standards, the next step is to come up with a design that you would like to build.

The most basic modules would be a 2'x4' or even a 2'x6' design. The section following this outlines several basic shapes that are commonly used in our club.

Once you know what shape of module you would like to build, it is time to create a scale drawing. Some people have access to CAD programs specifically developed for laying out model railroads. While it may be tempting (and expensive) to get one of these programs, a simple sketch will usually make do. Make several copies of your scale module shape. Note on it where the inside and outside centerlines must enter and exit the module. From that point on, the creativity is up to you.

When planning your module keep in mind that when the club is operating a layout, the yellow line will run from right to left. The Red line will run left to right. This is helpful to keep in mind when you are planning your spurs or transitions from one main line to another.

## Submitting a Design for Review

Once you have a solid idea of what you would like to do, bring your sketch to a meeting and request input from other members. There is a lot of experience with the members and they will be able to offer suggestions and alternatives. Take the suggestions positively. The intent of this process is to make sure that you start with a solid design that will make your module build successful.

## Soliciting Build Assistance

Many of our builders have a wide degree of experience and they enjoy working on model railroads. Why not invite them to help during your build. Key build points could include:

- Module Construction
- Roadbed and Track Layout
- Wiring
- Scenery

Have fun and make it a group experience.

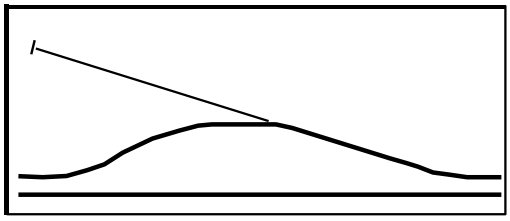
# Module Construction

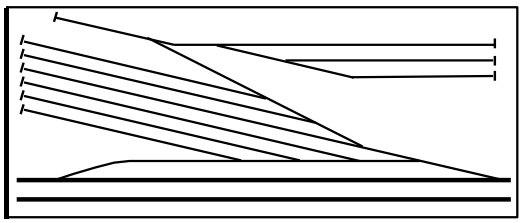
The standards for Wasatch N Scale provide a great deal of flexibility with respect to the shape and size of modules. While creativity is always welcome, there are two basic shapes that are commonly provided by the members and a third shape that is typically a club module.

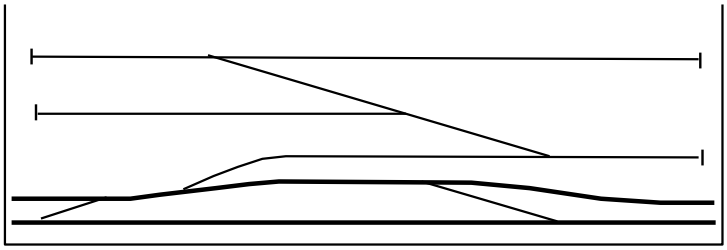
## Basic Modules

A module can be constructed in any length with the minimum length being 2' and the maximum length being 8'. Several units may be combined together to form a group of "dedicated" modules making a module set up of up to 12' long. The height of a module shall be 46" from the floor to the top of the rail. The minimum depth of the module is 24". Up to 6" may be added to both the front and rear of the module.

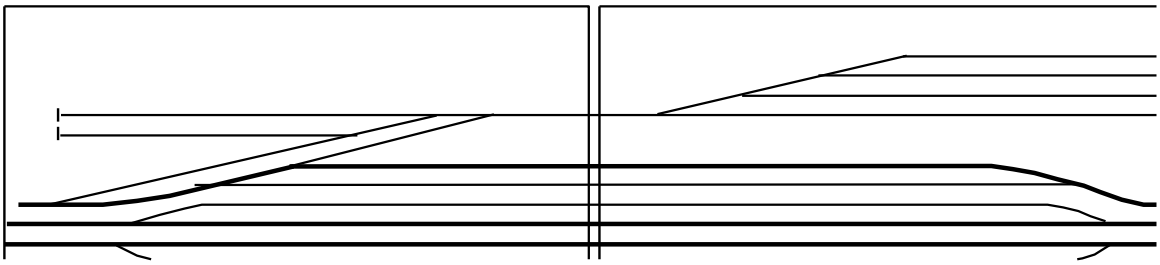
Below are some examples of things that can be done with basic modules. If the guidelines for track spacing and placement are met, the scene is wide open for the member to imagine and create.





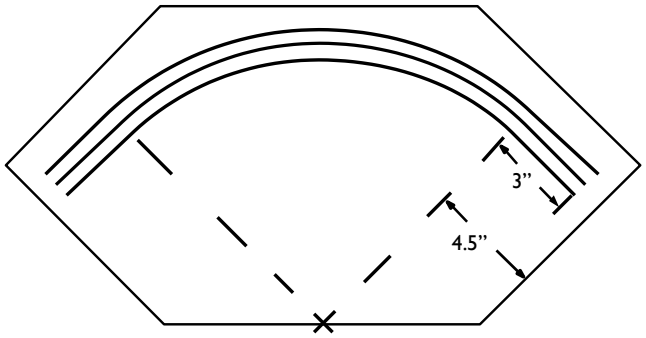


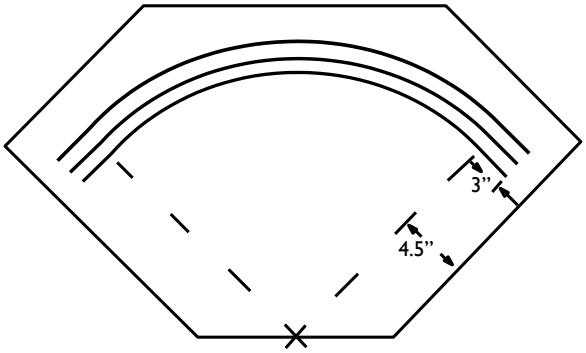
It is not unusual for a member to want to create a larger scene by building two or more modules that work only with each other. The assembled modules must meet the club standards on the left and right edges, but creative liberty can be taken when an assembly of modules will always be used together. An example is shown below.



## Corner Modules

Corner modules are used to transition the layout in a different direction. The diagrams below show some basic corner module designs.




## End Loops

Our club uses special end loop units to allow for continuous operation and provide more flexibility in the layout design and set up. End loops should be club property but can be provided by members. The minimum radius for end loops is 18” and a skyboard is not required.

## Construction

Since modules are built by different owners, construction techniques will vary. Keep in mind that this is a modular layout and that you do not need to build something that a tank can roll over and not crush. You want to keep your construction lightweight but strong. The use of construction adhesive and screws is recommended. Nailing pieces together is not recommended.

Materials commonly used for module construction include

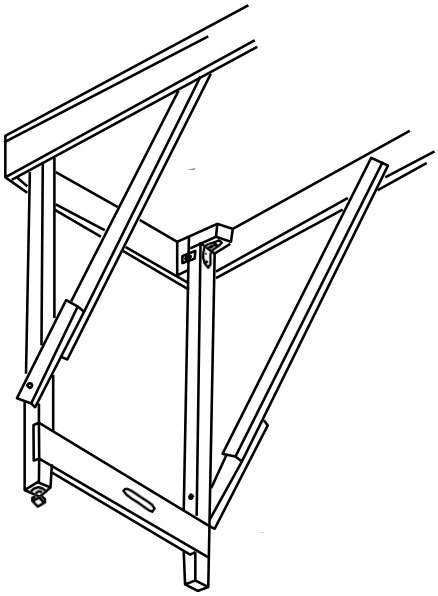
Plywood – Finish grade, 3/8" or 1/2" is sufficient, but larger sizes can be used. This is probably the heaviest piece of construction material.

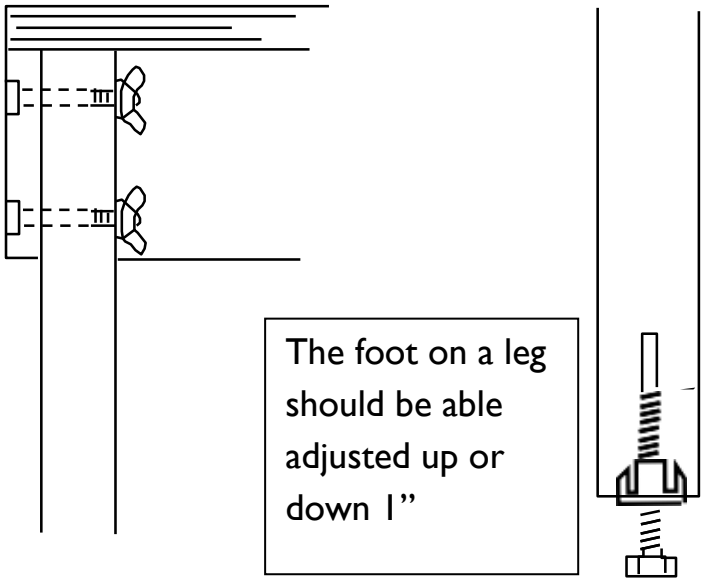
1x4 – Used for constructing the box frame end face to support the layout base. The front and rear (long sides) of the frame can be of different construction materials to support the module design, but it is important to have the 1x4 dimensions on the sides so that they can be mated with the adjacent module and clamped.

Extruded Foam – Commonly available in 1" and 2" widths and available in 2' wide sheets at your local big box home store. Many people will use this as their layout base to save on weight. Extruded foam is usually pink or blue. Do not try to use white foam. It is not as strong and is very messy to work with.

Legs – Several different approaches can be made with legs. Check out the various leg construction techniques from our members at a train show.

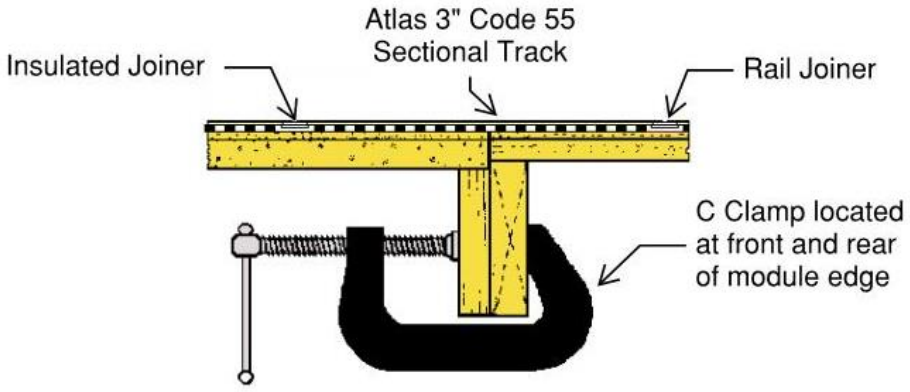
Legs on modules must have a leveling bolt of some kind to allow adjustment an inch above and below the 46" normal height. Each module should have its own set of legs and be able to stand on its own. Legs should be securely fastened to the frame and may be removeable or folding.





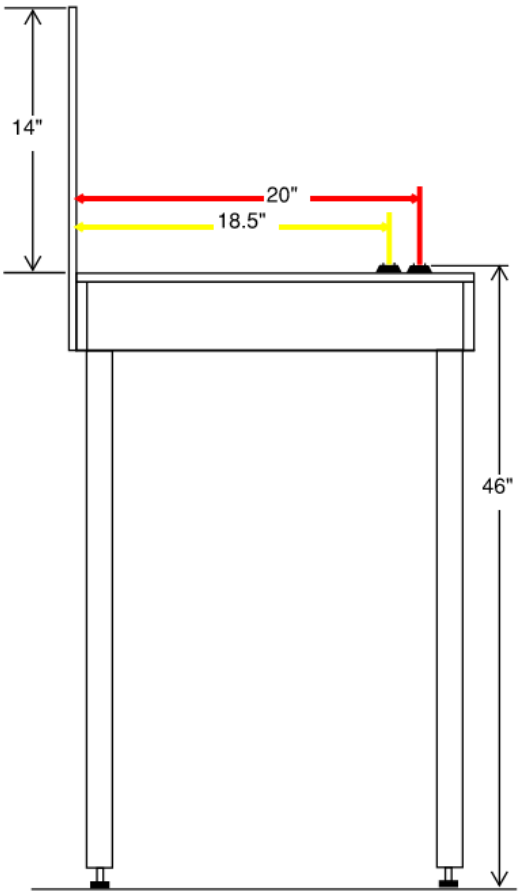

The illustration below indicates how modules are connected together at a show. Modules are connected together by means of common 3" C-clamps. Once a module is assembled and

brought to a proper height of 46”to the top of the roadbed, the modules are clamped to each other.




# Trackwork

For reliability reasons the club standard for track is Micro Engineering Code 55 flex track. Micro Engineering #6 turnouts, Atlas code 55 turnouts or hand laid turnouts are recommended. The minimum radius for curves on mainline tracks is 24” with no grade. When planning a crossover it is important to ensure that the crossover on each rail is completely insulated from the adjoining main line rail.




## Roadbed

The mainline tracks are always laid on roadbed. The roadbed should be extended to the end of the module. While multiple roadbed materials are available, the most common is cork roadbed. Roadbed on sidings and yards is often not used.

## Main Line Tracks

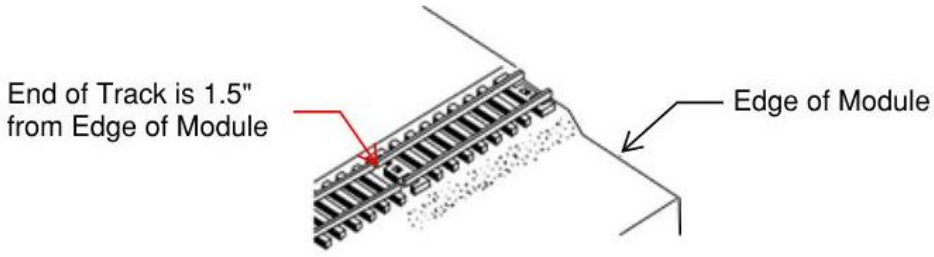
All modules will have two main lines. We refer to the outside mainline as the "Red Line" and it will be 20" (to center) from the skyboard. The inside main line commonly referred to as the "Yellow Line" will be 18.5" (to center) from the skyboard. Track spacing is 1.5" at the ends and may be as close as 1.25" elsewhere.

## Optional Branch Line

The branch line track is commonly called the "Blue Line" and is located 17" at most from the skyboard. The minimum radius for the branch line is 18" and a 2% grade is allowed. THIS LINE IS NOT REQUIRED. If your module has a branch line, there will be limited locations to put it and still use the branch tracks.

## Connecting Tracks

To allow for flexibility, tracks must end 1.5" from the module face. The roadbed should extend to the edge of the module.



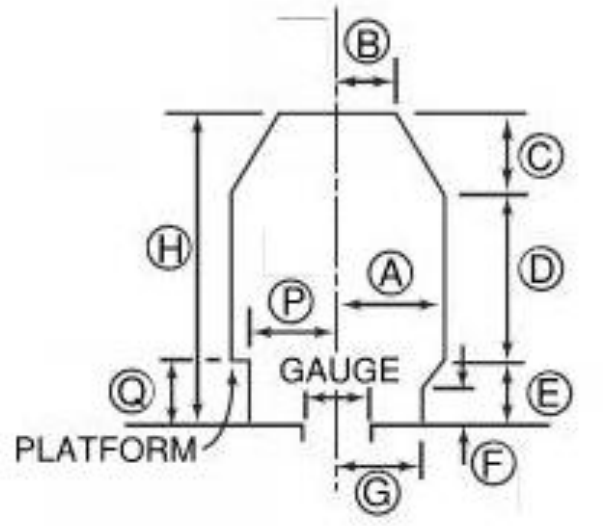

Use a square to accurately measure and cut track. Tracks must be straight and perpendicular for 3" from the module edge. After the sections are clamped together a 3" Atlas sectional code 55 track will be inserted to join the modules together. If a member has two modules that must be together because of special trackage, the tracks may be laid to the edge of the module where the modules meet.

## Checking for Gauge and Clearance

Using the N Scale Standards Gauge designed and developed by the NMRA (National Model Railroad Association) Engineering committee, will enable you to check all important dimensions on your track and rolling stock as follows:

Gauge of track and turnouts
Flangeway depth and check gauge
Clearance
Height of loading platform
All track

Detailed instructions on how to use the gauge are included with the purchase of the stainless-



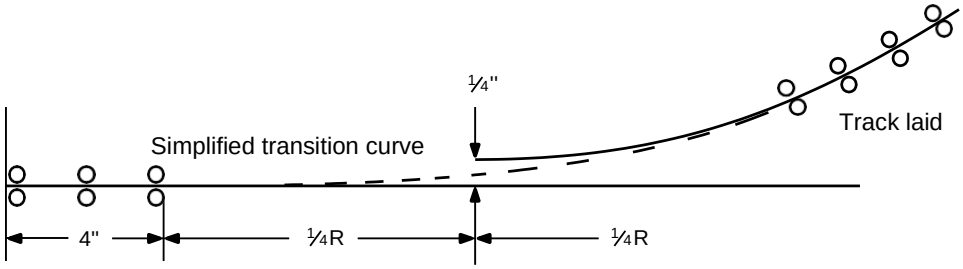

| Modern Era | | |
|---|---|---|
| **Clearance Gauge Dimensions** | | |
| | **Standard Gauge** | |
| | Proto | N Scale |
| A | 9’-0” | 11/16” |
| B | 4’-0” | 5/16” |
| C | 6’-0” | 7/16” |
| D | 12’-0” | 29/32” |
| E | 4’-0” | 5/16” |
| F | 2’-6” | 3/16” |
| G | 6’-9” | 15/32” |
| H | 23’-0” | 1-23/32” |
| P | 6’-9” | 15-32” |
| Q | 4’-0” | 5/16” |

steel gauge available from almost all railroad modeling resources. There are also multiple you-tube videos that demonstrate the proper use of this very important tool.

## Curve Transitions

A transition curve is needed where a curved length of track meets a tangent (straight) track. The transition will avoid the misalignment of the ends of longer cars as they pass from the curve to the tangent track. Superelevation (banked curves) are not recommended. Longer trains can be run with flat curves that can be run with superelevation.

A smooth transition at the ends of a curve can be laid out by using flex track as a “bent stick”, as shown below.



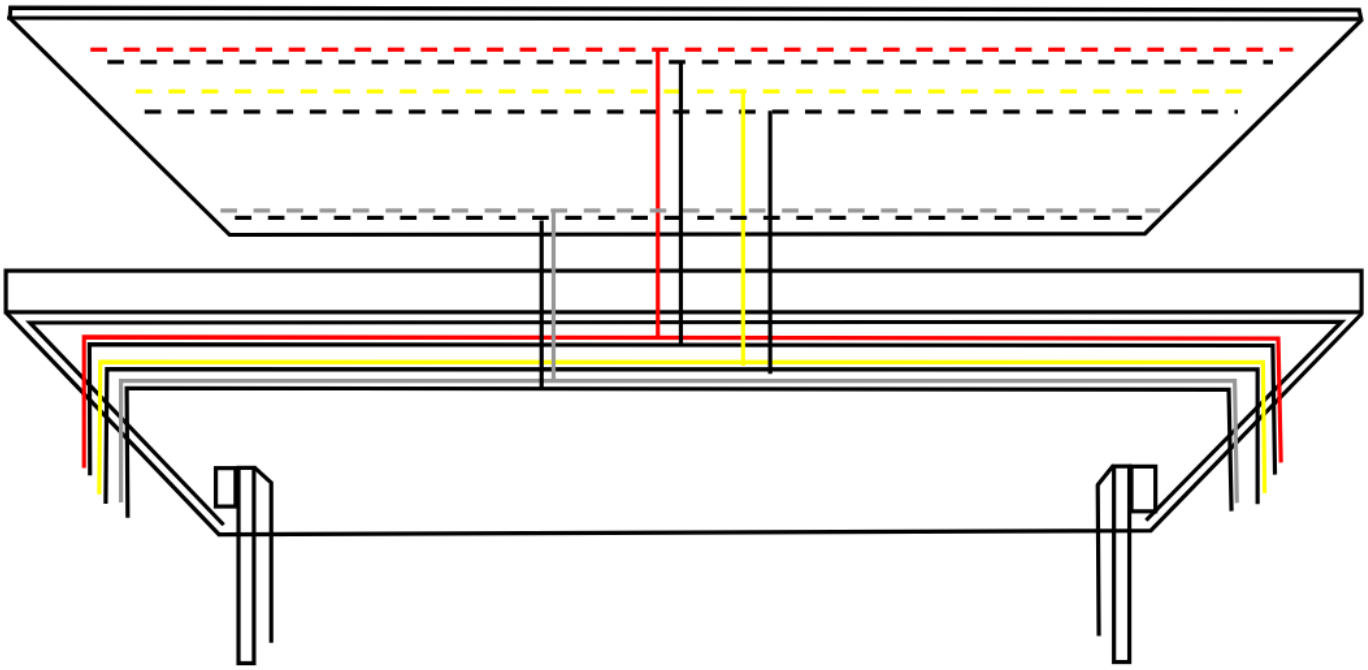
The first 3" of track must be straight from the edge of the module. This includes the 1.5" that will be used for the connection piece and another 1.5" to meet the connection piece squarely. It is suggested that track be extended to or beyond the module edge and then trimmed to length after the laying of the transition curve is completed. This will make it easier to keep the 1.5" length straight. The track is restrained by pins or nails at the points marked with small circles. Check it out by pushing several long passenger cars through the transition. If the ends of the long cars stay aligned coming out of the curve, without relative motion side to side, then the transition is good. If not adjust the track and recheck. Avoid sharp kinks in the rails.

Where two pieces of track must be joined on a curve, solder the rail joiners in place with the track straight and then form the curve.

There is not enough room for a full transition on the three-foot corner but, easing can be done to make problems with long cars minimal on these corners.

## Electrical – Track

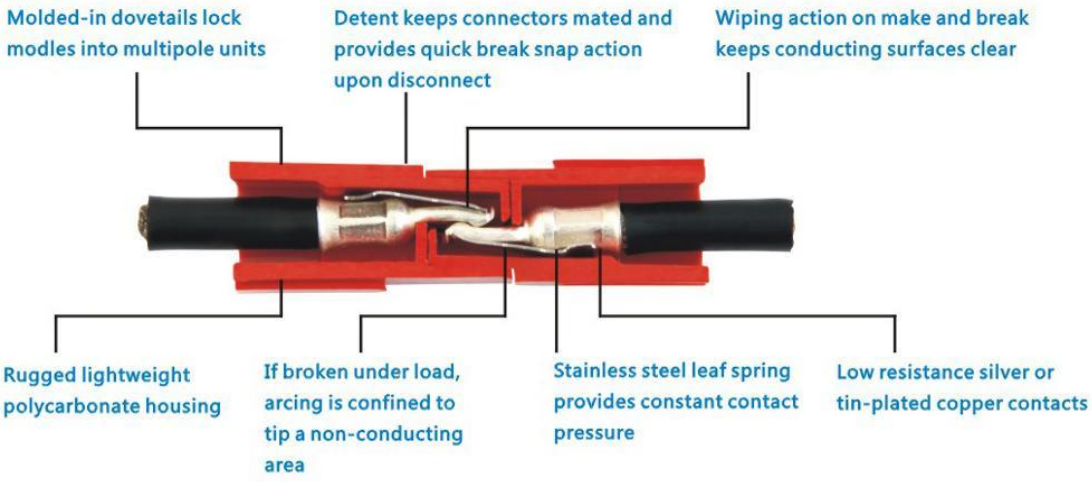
We use red/black for the red line (outer main line). Yellow/black for the yellow line (inner main line) and blue/black for the blue line (optional branch line). We have standardized on 16 AWG wire gauge.



The “Track Power Bus” (Red, Yellow) and the Signal Power Bus (white (shown as gray)) are connected between modules using powerpole connectors at each end of the module.

Track power bus connections between modules are made using the Anderson PP30 series 30 Powerpole at each end of the module. We have found that these connectors work best when soldered, crimping is not suggested unless using a tool specifically made for crimping these connectors. Two excellent sources for this product are Amazon and Powerwerx (www.powerwerx.com).

The design of the Powerpole connector allows them to be stacked using dovetails molded into the housing. The housings come in various colors.




### Left End

Anderson PP30 Red/Black set – The two connector housings are stacked vertically, hood up, tongue down, black over red using the molded-in dovetails provided. On the left side of the module the track color should always be stacked under the black.


### Right End

Anderson PP30 Red/Black set – The two connector housings are stacked vertically, hood up, tongue down, red over black using the molded-in dovetails provided (memory aid: "Red-Right"). On the right side of the module the track color should always be stacked over black.

The graphic above indicates what is required for the red line. The same set up would apply for the yellow and blue line by substituting the yellow or blue for the red connector.

Each "Track Power Bus" pigtail should extend 12-" beyond the right end of the module. The housings should be correctly color coded as defined by the club standards or the wires can be color coded with tape or paint of the appropriate color (Red, Yellow, Blue, White).

Use 22 AWG to 24 AWG SOLID wire soldered to the outside of rails for connection to track power leads. Feeders on the outer rails (the ones closest to the front) of the mainlines are connected to the red or yellow bus respectfully and feeders on the inner rails are connected to the proper black bus. Terminal strips make it easy to trouble shoot connection points. Use as many power feeds per track as needed.

**DO NOT** use "**COMMON RAIL**" wiring. There should be not electrical connection between any rail on the main lines.

If the module includes any branch line tracks, it is recommended to install a SPST switch that is easily accessible behind the facia that allow for power to be switched off to those tracks.

Layout operation is from the front and any operational controls should be mounted so that they are accessible from the front of the module.

### Turnouts

All pointwork should have power routing applied to the frog therefore eliminating the need to rely on the switching blade to make contact and carry the current.

## Electrical – 110 VAC Convenience Outlets

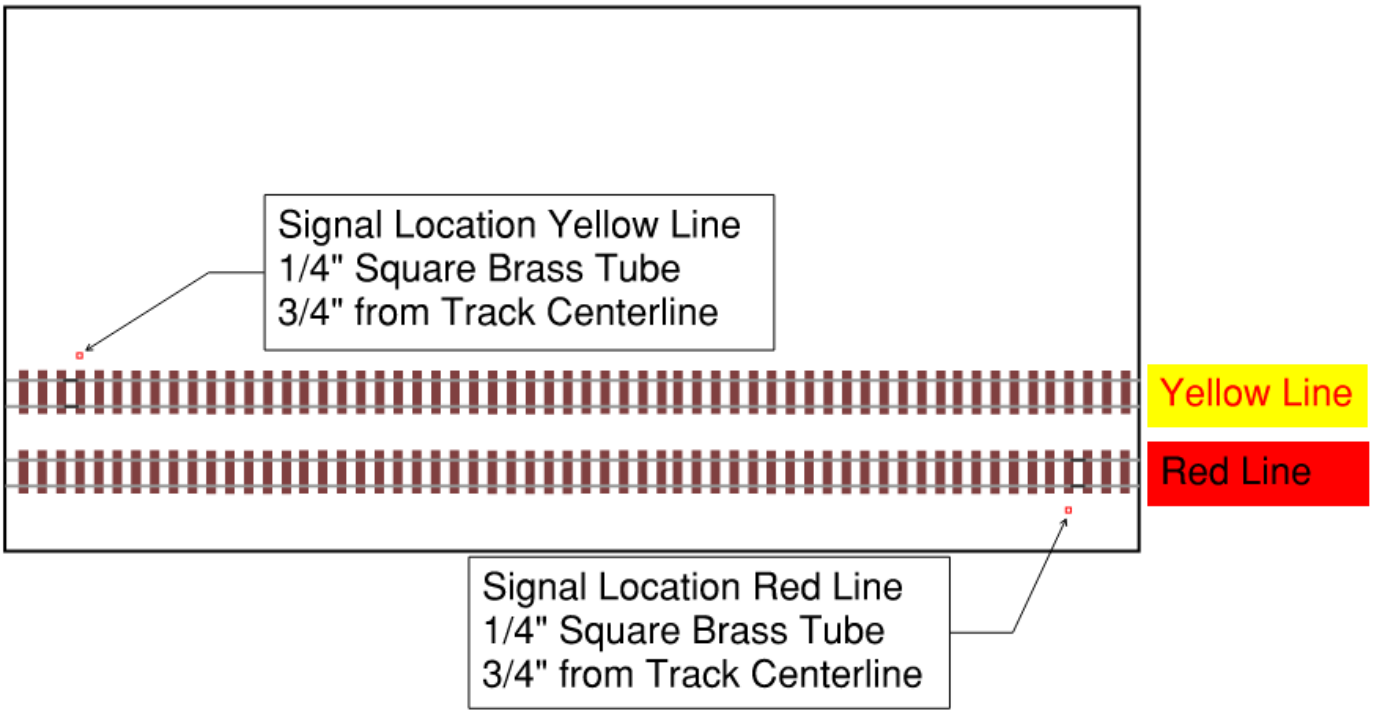
110 VAC wiring should be installed using power strips with the outlets on the left and the cord and plug on the right. A power strip should be installed on each module and the length of the cord should extend beyond the edge of the module to allow it to connect to the next module. Power strips should not be "Daisy Chained" together throughout the entire layout. They should be connected to a wall outlet at least every 3 or 4 strips. Romex wire in handy boxes is not acceptable for 110-volt layout wiring.

# Signaling

Many of the club modules have been "Prepped" for signaling.

Signals and supporting electronics are provided by the club. Preparing your module for signals involves the following steps.

Signals are located as indicated on the adjacent diagram.



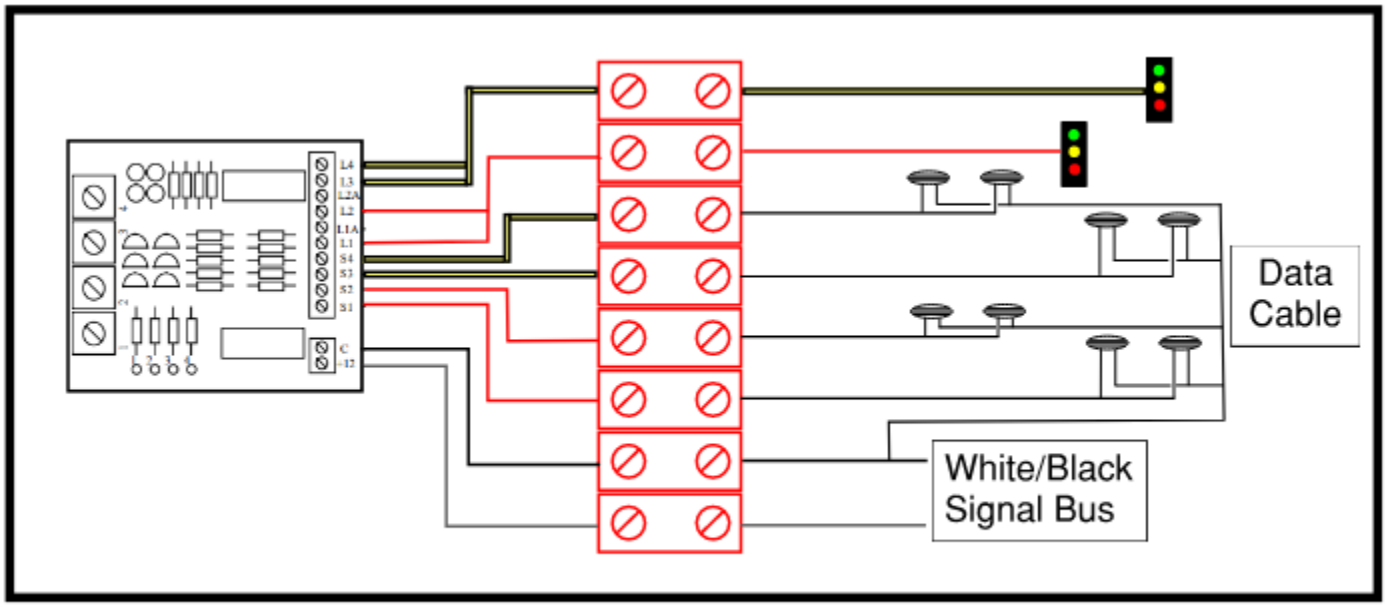

At the right end of a module set there will be a ¼" square brass tube installed that is ¾" from the centerline of the red track toward the front and opposite the joint of the connector track. Likewise, on the left end there will be a ¼" square tube installed that is ¾" from the centerline of the yellow track toward the back and opposite the joint of the connector track. The top of the tubes should be between the top of the rail and the top of the ties.

The club will provide signals, sensors and detector module. The detector module is a Green Steam GSP-1B with an extra set of GSP-13 optical sensors. The detector module should be mounted so that it is easy to adjust the sensitivity of the detector when necessary.

Each mainline will receive 4 GSP-13 sensors. The sensors for the red line will be connected back to inputs S1 and S2 on the detector module. The sensors for the yellow line will be

connected back to inputs S3 and S4 on the detector module. The sensors should be connected via 22 AWG wire to a terminals strip that serves the signal system

Outputs L1 and L2 on the detector module are connected together along with the red wire for the data cable. Outputs L3 and L4 on the detector module are connected together along with the red wire for the data cable.




Signal System Wiring Diagram

# Scenery

## Skyboard

Skyboards or vertical scenery flats (backboards) are required. Skyboard height is 14". If extra depth is added to the rear of the module the skyboard shall still come forward in some manner to the standard position. This will ensure that all skyboards match up at the ends. The club officers can provide paint that is shared amongst the group for the skyboard. Using the same color as a base for the skyboard helps blend the modules together.

## Facia

The sides of modules are generally painted with the similar color to help blend modules together. If you have added extra depth to the front of your module, it should be painted to match the standard facia color which can be provided by a club officer.

## Lighting

Many of the venues that we operate at do not provide enough lighting to properly bring out the detail associated with N scale track, scenery and equipment. Most module owners provide supplemental lighting for their module by adding lighting that can be easily supported by the skyboard and plugged into the power strip that is located on the underside of the module.