Free-mo N Scale (Free-moN) Modular Railroading

Raising the Bar for N Scale Modular Railroading

Standards and Recommendations

Revision 6

Overview

Free-mo N attempts to *raise-the-bar* for N scale modular railroading by specifying standards for bench work, track and digital control that promotes, and even forces, prototypical appearance and operational characteristics. This document contains standards that must be followed to the letter and *recommendations, in italics,* that have been gathered from various sources.

Definitions

MODULE:

Any component (or group of "sections") of bench work that is meant to be operated as a single unit in a fixed configuration. A module can have any number of sections. The ends of a module comply with the mechanical standards defined in the Framework description, below.

SECTION:

A component of a module, complete with bench work, track, scenery, etc. Except where otherwise noted, standards for module end interfaces do not apply to inter-section interfaces, as these are considered to be internal to the module.

ENDPLATE:

Endplates are the standardized end surfaces of a module, usually two, that join to another module.

Objectives

The Free-mo standard has the following objectives in mind:

- To promote and require **hi-fidelity prototypical** scale model railroading.
- To ensure reliable track and electrical operation.
- To encourage **visual continuity** between modules.
- To encourage a **loose** association among individuals free from club memberships, dues and titles.
- To keep the standard specifications to a **minimum** without compromising the previous objectives.

These are the goals that the standards presented here are attempting to achieve as they apply to N scale. Each standard set forth below must satisfy at least one of these goals.

Framework

Framework refers to a module's structural frame including end plates, legs, braces, decking, etc. Throughout this document common sense construction techniques should apply. Materials and joints should be flat, square and true.

Endplates

Endplates shall be constructed of 3/4 inch birch plywood or an equivalent material that resists warping and be 6 inches high and a minimum 12 inches wide. Module to module end plates shall be secured with C-clamps.

A 24 inch width is recommended for ease of transportation and continuity with other modules. Any deviation from this recommended width would result in cosmetic misalignment of the fascia with other modules. Avoid using dimensional lumber since it has a tendency to warp.

Legs & Bracing

Each module shall have legs that support the module free-standing. Each leg must be vertically adjustable plus and minus 1 inch to compensate for uneven floors. The bottoms of the legs shall have rubber tip or equivalent floor protection. Nominal and minimum height of rail head from the floor shall be 50 inches. On modules with grades the maximum height of the rail head shall be 62 inches above the floor and the elevation of the high end shall be some multiple of 3/4 inch above the low end.

Surface

Sub roadbed surface shall be sturdy enough to prevent sagging over the length of the module.

Fascia

Each side of a module shall have a fascia that fully covers the side. The top edge of the fascia shall be contoured to match the scenic topography of the module. The fascia shall be painted a semi-gloss, satin or equivalent black color.

Skirting

Both sides of a module shall have a black skirt. Each end of the skirt shall extend past the module end plate to overlap with adjacent module skirting. The bottom edge of the skirt shall be even with the bottom of the leg vertical member to prevent dragging on the floor.

Track

Main line track shall be code-55 nickel-silver flex or hand laid with prototypical tie dimensions and tie spacing. Minimum radius for the main line shall be 22 inches with at least 6 inches of straight track between reverse curves. Main line turnouts shall be at least #6. Main line maximum grade shall be 2.0 percent (1/4 inch per foot). Main line roadbed must be 1/8 inch cork or equivalent. At the endplates the track shall be centered on the width, perpendicular to the end, straight and level for at least 4 inches from the outside face of the endplate. Rail and track shall be cut flush with the outside face of the endplate. Modules will connect at the end-plates by clamping securely so that the rail-heads align without the use of rail joiners.

Wiring & Electrical

NMRA compatible digital command control (DCC) with LocoNet, by Digitrax or equivalent, shall be used for layout control.

Turnouts

Turnout frog, points and point rails shall be powered in a manner that does not rely solely on the contact between the points and the stock rails.

Main Line Track Bus

Track Bus wire shall be 12 gauge or heavier spanning the length of the module between the endplates. Track feeder wires shall be 24 gauge or heavier. The Track Bus wires shall terminate near the center of the end- plate(s), extending long enough to attach to the adjoining module, with a pair of 30 Amp Anderson Powerpole connectors stacked vertically (hood up, tongue down). The top Powerpole shall connect to the left rail, as you face the endplate, the bottom Powerpole shall connect to the right rail.

*It is recommended that you use a pair of **red** connectors to distinquish them from those used for the Accessory bus.*

Applications that require an AC or DCC signal may utilize power directly from the bus.

Accessory Power Bus

AC Accessory Bus wire shall be 12 gauge or heavier spanning the length of the module between the endplates. Accessory Bus wires shall terminate near the center of the endplate(s), extending long enough to attach to the adjoining module, with a pair of 30 Amp Anderson Powerpole connectors stacked horizontally (tongue-to-tongue, hood-to-hood).

*It is recommended that you use a pair of **black** connectors to distinquish them from those used for the track bus.*

This two wire bus is used to power turnout motors that control track switches but it may also be used to power other accessories on modules such as structure lighting, signals, animation, and the like. It normally carries a DCC signal similar to that found on the Track Power bus (a separate booster is recommended to avoid robbing power from trains); however it may carry 16V AC as an alternate, lower cost implementation (but less flexible). Electrical accessories within modules can use the DCC power directly (e.g. to control and power stationary decoders), or rectify and regulate it to DC (e.g. to power lights or electronics). If 16V AC is on this bus it may be used directly or may be rectified and regulated to DC as well. One solution is to use a bridge rectifier like Radio Shack's 276-1146.

LocoNet Bus

Each module shall have a single 6-wire "RJ12" phone jack mounted on the underside, within six inches of the end plate, to connect the LocoNet between modules. Modules four feet or longer shall have a single or dual 6-wire "RJ12" phone jack mounted on each side of the module for hand-held DCC throttle connection.

*Inter-module connection is achieved with a simple 6-wire RJ12 cord. All of the Loconet connections require straight-through cables. Standard telephone cables are **not** wired straight through. Use color-coded wire matching the wire colors present in the phone jacks (white/green/yellow/black/ red/blue is most common). Use minimum 26 ga. solid core wire for sturdy connection to phone jack screw terminals. Add strain relief to the wires near their connections to the phone jacks.*

Single jack panels for the side connections are acceptable on modules with simple track arrangements (i.e. single main line with one spur). However it is strongly recommended to provide dual jack panels on modules with more complex track arrangements (i.e. passing sidings, yards, multi-track spurs) since more operators will be in those areas at any given time.

Scenery

Main line shall be ballasted with a fine light gray material and some form of scenery hiding the bench work. Scenery for the first 6 inches at the end plates shall have a flat profile roughly 1/4 inch below the top of the main line rail.

Landscaping along the module ends must be designed to flow smoothly into adjacent modules - avoid features such as roads, lakes, and so forth from running against the module ends. Use a generic grassy/sandy terrain. Avoid structures and other details that could obstruct your forearms when installing joiner rails between modules.

Equipment

Rolling stock wheels, trucks and weight shall meet or exceed NMRA Standards and Recommended Practices.

Miscellaneous

Crowd Control Barrier System

Each 8-foot length of module should have one barrier stand per side. A crowd control barrier system consists of stands and ropes. Ropes are 1/4 inch yellow nylon style (available at any hardware store). Stands consist of a base and upright designed for simple construction and setup, and which may be separated for efficient storage and transport. Stand bases are 12" square made from 1" plywood (or equivalent multiple plywood layers). Painting is optional. A hole is centered in the base to accommodate a 1/2 inch white PVC pipe end cap, used to receive the stand upright. Stand uprights press-fit into the base and are 36" tall 1/2 inch white PVC pipe with a PVC "T-junction" mounted on top, through which the nylon rope is threaded. Painting is not allowed - leave uprights white.

Revision History

- Rev 1, 14 Aug 2002, Initial Revision, created by Wesley Steiner.
- Rev 2, 12 Sep 2002, Upgraded track bus wiring minimums to meet DCC requirements.
- Rev 3, 30 Jul 2003, Increased feeder wire minimum from 22 to 24 gauge. Increased rail setback from 1/2" to 3/4".
- Rev 4, 08 Nov 2005, Powered frogs. Simplification and clarification. Anderson PowerPole bus connectors.
- Rev 5, 01 Aug 2010, Reformat as a PDF file and fix spelling errors.
- Rev 6, 02 Jul 2011, Replace rail set-back with "butt" joints.