Sn2 Free-Mo

Standards and Guidelines

1.0 Overview

The purpose of these guidelines is to establish an Sn2 standard for modules. The basis for the standards presented here are the HO Free-Mo standards. Unlike other modular standards that are designed to be setup in an "endless circle", Free-mo modular setups are "free-form" configurations that are linear in design. Resulting setups feature realistic point-point or point-loop operation. The modules can be viewed an operated from both sides.

This type of operations requires end points, typically in the form of stub end yards or reverse loops. A layout may then take on the form of an "out-and-back" or a "point-to-point". Other more complex formats are possible if "junction" modules are built; for example a why module could allow a branch line operation.

Between the end points of the layout are modules which carry the single track main line from one end to the other. Large modules may be assembled from small, easily transportable "sections" to create a large layout feature; for example a passing siding long enough for a full-length freight train could be created as a multi-section module.

For more information on the Sn2 Free-Mo standards, modules, participants & activities got to: http://www.narrowtracks.com/Sn2/Free-Mo/index.htm

This document is cloned from the Northern California Free-Mo Standards and Guidelines (http://www.geocities.com/NorCalFreemo/guidelines.pdf), which provides more detail to the HO Free-mo guidelines (http://www.free-mo.org). What modifications have been made are specific to the requirements of Sn2 and Maine Two-Foot Gauge modeling.

2.0 Definitions

MODULE:
Any layout component (or group of "sections") meant to be operated as a single unit in a fixed configuration. A module can have any number of sections. A module must have one or more end plates that comply with the Free-mo physical and electrical standards defined within this document. (Stub terminals have only one end plate, junction have 3 or more end plates).

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

ENDPLATE:
The standardized end surface of a module that joins with an adjacent module in a Free-mo layout. The physical aspects of the endplate are defined in the Frame Work description below.

FITTER RAILS:
The 2" long removable rails and joiners used to bridge the joints between adjacent modules or sections. Must be Code 70.

TRACK (POWER) BUS:
The continuous two wire bus feeding power and DCC command to the track.

ACCESSORY (POWER) BUS:
The continuous two wire bus powering electrical accessories such as turnout motors, structure lighting, animation, etc.

DCC NETWORK (DCC) BUS:
The continuous six-wire bus carrying DCC information among the DCC system components such as throttles, boosters, radio receivers, etc.

PIGTAIL:
Common name of any of the connector/wire assemblies used to connect the electrical busses together between modules.

EVENT:
An organized gathering (show, meet, convention, etc…) that includes the display of model railroads.

SETUP:
A collection of free-mo modules connected together to from a layout. There may be more than one setup at an event.

COORDINATOR:
Person(s) responsible for organizing the participants, selecting themes and securing space and utilities with event staff. Coordinator is also a participant.

PARTICIPANT:
A person who contributes to a setup by bringing module(s), rolling stock or other components.

3.0 Frame Work

"Frame work" refers to a module's structural frame including endplates, interior supports, legs, and braces. There are no requirements to use specific materials or construction methods; however, the basic trade-off is sturdiness versus weight.

Generally, dimensional lumber is discouraged due to warping issues.

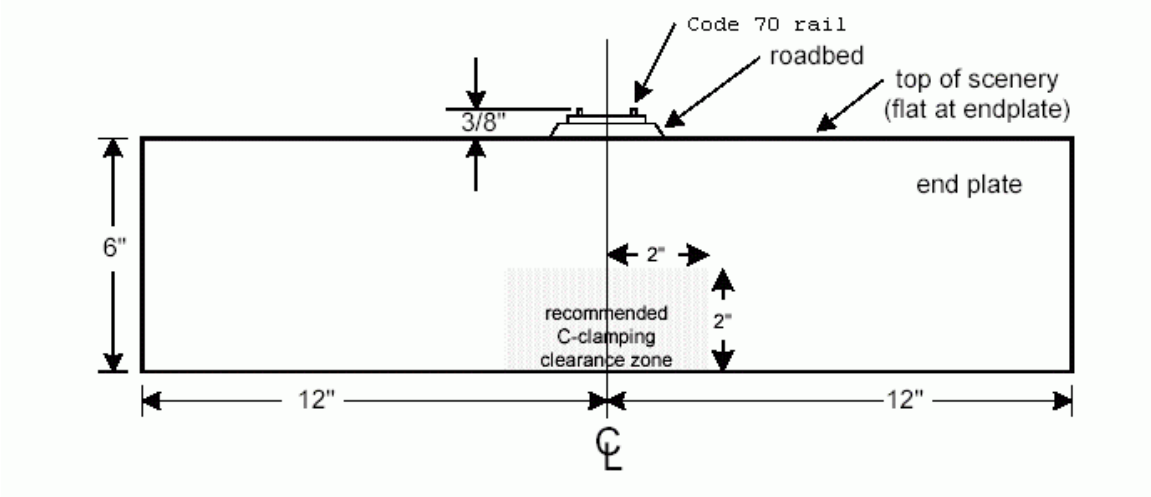
HEIGHT:
The nominal module height measured from **floor to top of rail** shall be **50"**, adjustable from 49" to 51" above the floor.

> Suggestion: the height adjustment range of 2" is minimum; a larger range is acceptable and recommended.

WIDTH, LENGTH, SHAPE:
See Endplate specifications (below); otherwise free.

> Suggestions:
> - Endplates should be parallel when making a straight (so called zero degree module). Slight angles could cause along "linear" setup not to be "linear"
> - When building curved or angled modules it is recommended that the degree of curvature be 90, 45, or 22.5 degrees. Using these common angles will make it easier for the coordinator.
> - modules over 6' long are difficult to move and transport.

ENDPLATES (SINGLE TRACK):



24” wide, 6” tall from bottom to scenery top surface; roadbed and track adds 3/8” to top of rail. The 24” width of end includes the thickness of fascia.

Endplates MUST perpendicular to track both vertically and horizontally. They must be as flat as possible (e.g. not bowed, twisted, etc.) Material must be solid and sturdy for C-clamping to adjoining modules.

A 2” high by 4” wide clamping zone centered under the track must be provided. The recommended clearance is 4” high.

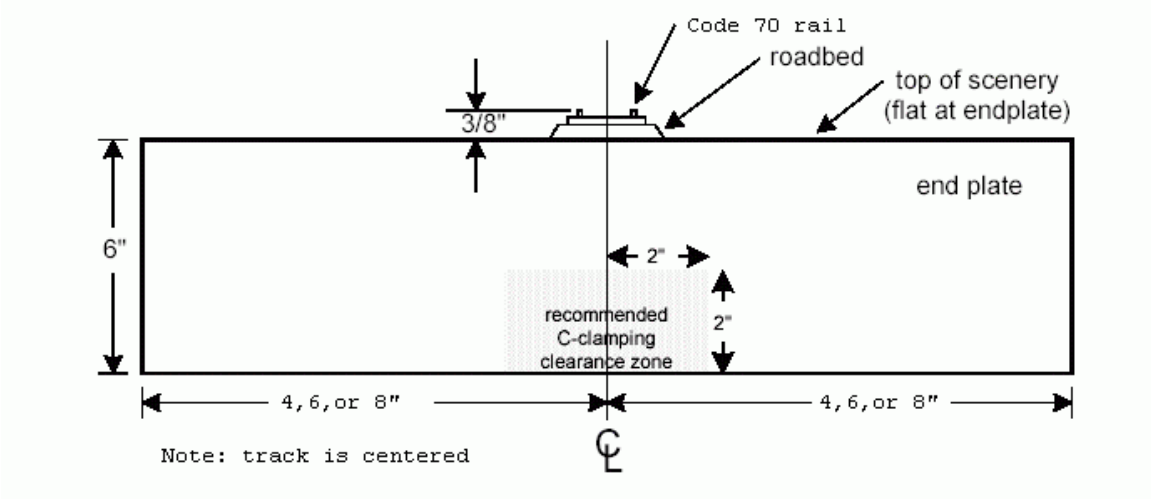
Suggestions:

- Make endplates from ¾” plywood or equivalent stable material to maintain flatness. Dimensional pine lumber is not recommended as it often warps over time.
- To allow room for C-clamps, keep inner surface of endplate clear of obstructions (electrical terminal blocks, DCC network connectors, etc.). Recommended clearance area is 2” high by 4” wide, centered at bottom edge of endplate inner surface.
- To limit damage, provide protection for electrical and mechanical objects near the endplate most specifically the clamping zone.
- Cut handholds into endplates to assist transporting and positioning the module.
- Paint endplates same as sides (see below)

ENDPLATES (DOUBLE TRACK):

Omitted, as none of the two-foot gauge railroads of Maine used double track. If a participant comes up with a reason for having double track, we will reconsider.

ENDPLATES (MINI-MO):



The Free-mo specification provides support for narrower modules. These modules are intended to be scenic spacers between switching sections.

8-16” wide, 6” tall from bottom to scenery top surface; roadbed and track adds 3/8” to top of rail. The 8-16” width of end includes the thickness of fascia.

Endplates MUST be perpendicular to track both vertically and horizontally. They must be as flat as possible (e.g. not bowed, twisted, etc.) Material must be solid and sturdy for C-clamping to adjoining modules.

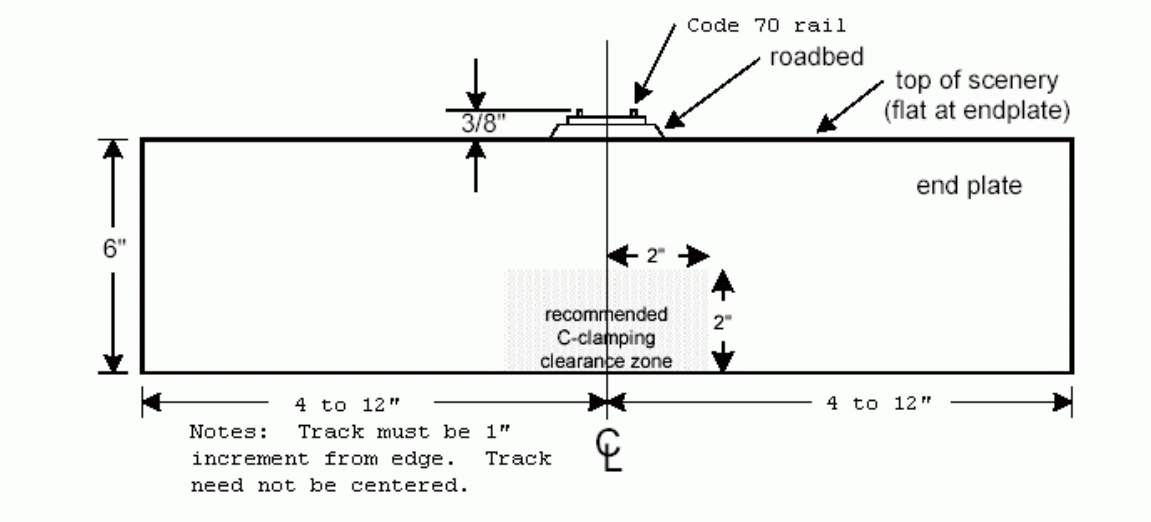
A 2” high by 4” wide clamping zone centered under the track must be provided. The recommended clearance is 4” high.

Suggestions:

- Minimum width is 8”, as Free-mo requires no tracks be closer than 4” from the edge of a module. That said, the wider the better for stability, so it is best to make mini-mo sections 12” wide.
- Suggestion is to make module an inch width divisible by 2 (ie…8, 10, 12, 14, 16”) to improve the chances that an adjacent mini-mo will meet with a smooth flowing fascia. The width of end includes the thickness of fascia.
- Make endplates from ¾” plywood or equivalent stable material to maintain flatness. Dimensional pine lumber is not recommended as it often warps over time.
- To allow room for C-clamps, keep inner surface of endplate clear of obstructions (electrical terminal blocks, DCC network connectors, etc.). Recommended clearance area is 2” high by 4” wide, centered at bottom edge of endplate inner surface.
- To limit damage, provide protection for electrical and mechanical objects near the endplate most specifically the clamping zone.
- Cut handholds into endplates to assist transporting and positioning the module.

- Paint endplates same as sides (see below)

ENDPLATES (SINGLE TRACK – NON-CENTERED):



The Free-mo specification requires that all modules have the rails centered on the track. That said, some modelers may have reason to make modules with non-centered rails. This construction is not recommended, but could be accepted for some setups.

8-24” wide, 6” tall from bottom to scenery top surface; roadbed and track adds 3/8” to top of rail. The track center will be no less than 4” from any side, and no more than 12” from any side. The 8-24” width of end includes the thickness of fascia.

Endplates MUST be perpendicular to track both vertically and horizontally. They must be as flat as possible (e.g. not bowed, twisted, etc.) Material must be solid and sturdy for C-clamping to adjoining modules.

A 2” high by 4” wide clamping zone centered under the track must be provided. The recommended clearance is 4” high.

Suggestions:

- Minimum width is 8”, as Free-mo requires no tracks be closer than 4” from the edge of a module. That said, the wider the better for stability, so it is best to make endplates 12” wide or greater.
- Since module must be freestanding and stable, it is recommended that one or both leg sets be 16” or wider.
- One desire of free-mo is to have smooth fascia between modules. That said, a non-centered module is not likely to provide a smooth fascia transition to adjacent modules. If a non-centered free-mo module is built, it is seen if better light, if the track is 12” from one side. Like mini-mo sections, designers are encouraged to locate the track at even 1” increments from the sides.
- Make endplates from ¾” plywood or equivalent stable material to maintain flatness. Dimensional pine lumber is not recommended as it often warps over time.

- To allow room for C-clamps, keep inner surface of endplate clear of obstructions (electrical terminal blocks, DCC network connectors, etc.).
- To limit damage, provide protection for electrical and mechanical objects near the endplate most specifically the clamping zone.
- Cut handholds into endplates to assist transporting and positioning the module.
- Paint endplates same as sides (see below)

Why would a modeler use a non-centered module?

- They want to reuse the module in their home layout, and the space is required for wall, isle, or other parts of railroad.
- The prototype scene has dramatic scenery near the endplate. Since free-mo requires endplate profiles to be level, it is not possible to represent a riverbed or mountain at the end of the profile. Since making the scenery level may not represent the prototype, it might be better to reduce the width of the module.

<u>MODULE-TO-MODULE ATTACHMENT:</u>

C-clamps are used at the endplates, positioned near the endplate center (directly below the tracks).

Suggestion:

- Use “deep-throat” C-clamps to apply pressure closer to module top and draw track ends together.

SIDES AND FASCIA:

Fascias must be smooth and made of a solid, sturdy material (plywood, hard board, Masonite, etc.). Fascia should be curved to meet the profile of the module terrain. Terrain should not be modified to meet a flat profile.

Suggestions:

- It is recommended that all controls be completely recessed in the fascia. Non-recessed controls tend to get broken during transport and operation. This goes for electrical plates, toggle switches, etc.
- Color recommendations are to use natural colors associated with the scene. Earth (matching ballast) or light green to match ground foam colors. Black is not recommended, as it is too much of a contrast with the scene.
    - Several builders of Sn2 Free-Mo modules going to Portland 2007 are using the following for fasica and earth scenery color. This is available from Home Depot:

- Use “flat” colors to reduce the impact of the fascia on the scene.
- Label module sides with name of module.
    - One recommendation is Chartpak Dry Transfer Lettering “Franklin Gothic” 36 point (#00220)
- Label electrical switches and other operational items.
    - One recommendation is Chartpak Dry Transfer Lettering “Franklin Gothic” 18 point (#00200)
- See http://www.narrowtracks.com/Sn2/free-mo/modules.htm to view and read what other module builders are doing. Also share your ideas on the Sn2_Trains email list. Consider using the same colors or styles that they are using, as that will increase the uniformity of displays.

LEGS AND LONGITUDINAL BRACING:

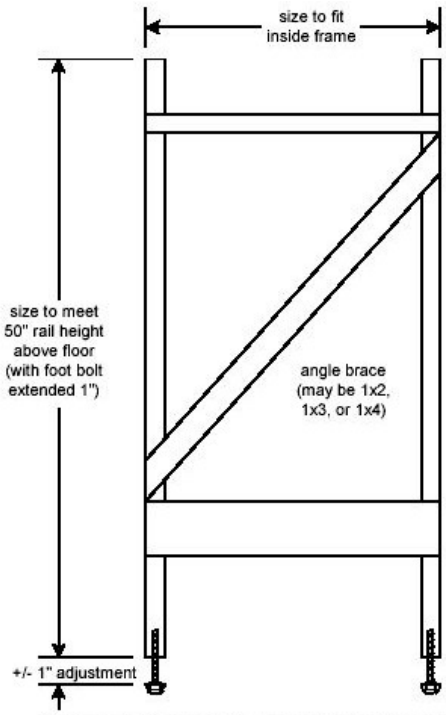
Each module must have legs that support the module freestanding. A module must stand secure and level independent of other modules. Each leg must include vertical adjustment of plus and minus 1" minimum to compensate for uneven floors (e.g. rail top height above the floor must be adjustable minimum of 49" to 51"). Module feet must be rubber, nylon or plastic, not metal or exposed bolt heads. Painting legs is optional.

Suggestions:

- Design and construct legs as part of the frame, making them an integral part of a module structure.
- Install cross- and angle-bracing on legs for added stability.
- Permanently attach legs to module frame and have them fold up for transport. This method allows speedy setup/teardown, simplifies transport and storage, and eliminates loose hardware, etc.
- Add angled longitudinal braces to prevent module from swaying parallel to the track. This stabilizes the module for fine adjustments during setups, and when working on the module during construction.
- Use T-nuts and machine bolts in bottom of legs for height adjustment. Install rubber or nylon caps on bottom bolt heads to prevent damaging floor surfaces.

Exceptions:

- Free-mo allows for mini-mo modules not to stand on their own, which is being extended here to include small non-centered modules. A module 16" or less wide and less than four square feet in area need not require legs at all, if it is to be setup between two freestanding modules.
- Mini-mo modules 16" or less wide and more than four square feet require legs, but they do not need to stand on their own. In most instances this would be a module set consisting of several sections. There should be a let to support each internal joint.
- Where multiple mini-mo's are connected together, a leg should be placed under each internal joint.



1x2 top horizontal (place to support bottom of end plate)

2x2 verticals

bottom horizontal (may be 1x2, 1x3, or 1x4)

height adjustment bolts in T-nuts, with protective caps

One possible leg design using dimensional lumber. T-nuts are mounted in the bottom for the height-adjustment bolts.

Visit Lee Valley Hardware at www.leevalley.com/hardware/

Folding brackets like these from Lee Valley (#00T16.01) can be used to build permanently attached fold-up legs. They lock into position both open and closed.

T-nuts like these may be used in the bottom of legs to hold height-adjustment bolts. Lee Valley #00N23.01 (item H above) are 1/4" Propell Nuts designed for end-grain installment.

Another option for height-adjustment hardware. Lee Valley #01S04.05 bracket and #01S06.03 (3" tall) or #01S06.04 (4" tall) leveler feet. These can be adjusted with a screwdriver from above, avoiding crawling around on the floor during setups.

4.0 Track Work

GENERAL:
All HOn3 NMRA standards must be meet. HO clearance standards must be met (the full profile of gauge for clearances)

SUB-ROADBED:
Sub-roadbed construction and materials are free, but must be built to prevent sagging or flexing, and must be installed to comply with the endplate requirements (see section 3.0 "Frame Work"). Track MUST be perpendicular to the endplate both horizontally and vertically!

Suggestions:

- Modules may use plywood, MDF, homosote and foam insulation board. The main trade-off is rigidity versus weight
- Choose proper support to ensure sub-roadbed does not sag.
- If foam board is used, run interior wood track support parallel to the grack to provide maximum support for foam, resulting in a flat track profile.

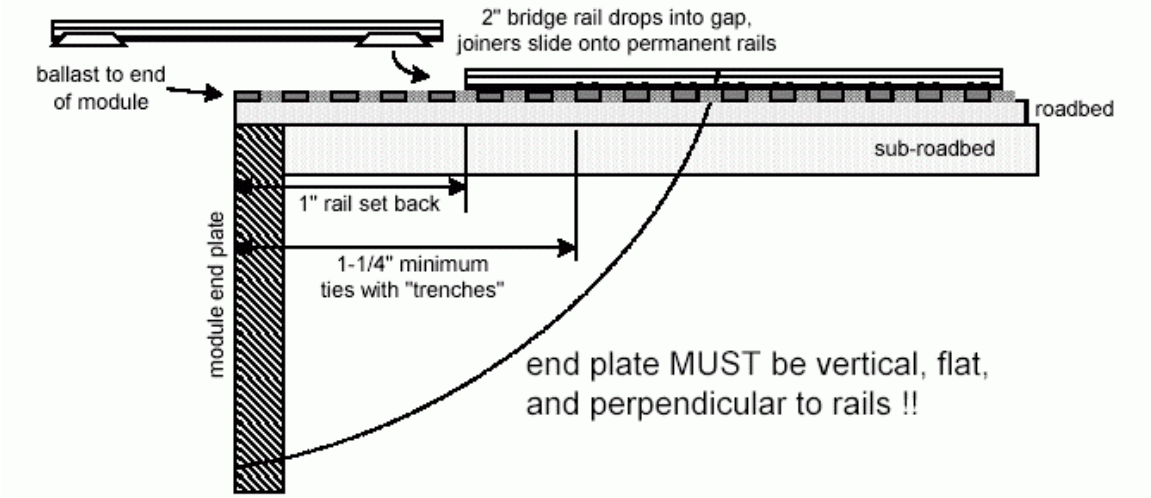
ROADBED:
Material is free, but must comply with the 3/8" standard for top of scenery to rail-top dimension (see section 3.0 "Frame Work").

Suggestion:

- Use HOn3/Sn2 homabed (http://www.homabed.com) for roadbed. It's nominal height of .218" (~7/32") along with 5" high ties (.078" ~5/64") and code 70 rail (.078") results in a height of rail being .366". Considering that some modelers may use HOn3 flex track or code 55 rail, the rail height standard is being set as: Min: 11/32" Max: 3/8" above endplate.

MAINLINE LOCATION:
The mainline must cross the module end centered on the width (unless a non-centered module); it MUST be perpendicular to the endplates both horizontally and vertically! The mainline must run straight and level for at least 5" from each endplate. Otherwise its location is free (within limits of standards for curves and turnouts). This guideline ensures there is at least 10" of straight track between reverse curves (10" is sufficiently long contain the longest prototype equipment)

JOINING TRACK BETWEEN MODULES:



Rails end 1" from end of module (outer surface of the endplates). Ties and ballast continue to end of module. The ties within 1.25" (minimum) must accommodate installation of fitter rails with accompanying rail joiners, which are slid onto the module's fixed rail ends (typically these ties have a small "trench" where the spikes normally are not found). Modules are connected with 2" fitter rails and rail joiners, which are dropped into the rail gaps and joined to the module rail ends. Fitter rails should be micro engineering code 70 rail and accommodate code 70 ME joiners. Spikes (or other means) are not to be used to hold fitter rails in place.

Suggestions:

- Use weathered code 70 rail for fitters (clean bottoms and bottom edges at the ends to conduct electricity to the fitter)
- Joiner should be lightly weathered on outside, but should not inhibit flow of electricity to rail fitter.
- If a module uses code 55 (not recommended), then the owner is responsible for a smooth transition to the code 70 fitter. One suggestion is for owner to provide code 55 to code 70 ME rail joiners to complete the transition. *(Tests need to be completed to ensure that such a transition is smooth enough for operation of Forney locomotives, remember operation is a prime objective of these standards!)*
- If a module uses code 70 flex track, owner need to remove spike heads for joiners.
- If two adjacent modules use code 55 rail, then it is ok to use a code 55 fitter rail *(Test need to be completed to ensure that code 55 fitter rails operate reliably. The risk being that the 2" section of code 55 may flex too much, causing derailments).* Spikes should never be put into end ties to hold fitter rails in place. It is important that ties remain pristine/smooth for future setups.

RAIL:
All track must be nickel-silver commercial or hand laid. Module owner is responsible for making sure that ends of module mate with the code 70 fitter rails. Code 70 or code 55 rail may be used internal to the module, but must permit reliable travel by rolling stick stock with NMRA HOn3 compatible flanges. All active rails must be clean and flangeways clear.

Suggestion: clean rails and clear flangeways before each operating event.

CURVES:
Minimum radius is 32" for mainline. There must be at least 10" of straight track between reverse curves.

Suggestions:

- Whenever possible use the largest radius possible. 36" Radius or larger is encouraged, locomotives and rolling stock will operate better and look better.
- Use of less than 32" radius is legal on sidings and spurs, but not recommended. If sub mainline radius curves are used on a module, please indicate the sub 32" radius curves on the module fascia.
- Easements are recommended for all curves and highly recommended for curves less than 36" radius; an article for creating easements can be found on the Internet at http://www.trains.com/Content/Dynamic/Articles/000/000/001/647dsuww.asp

GAUGE:
The NMRA HOn3 track gauge standards are to be used for Sn2. This is a compromise, as HOn3 is 26.5" gauge in S-scale. This group is not attempting to do Proto:64 Two-foot modeling on correct 3/8" gauge rails. Being apart of these standards is accepting this discrepancy.

SUPER-ELEVATION:
To the knowledge of this group, no prototype Maine two-foot gauge railroad intentionally had super-elevated curves. Thus, thus modelers should avoid super-elevation.

END-END GRADES
The free-mo standard provides for grades on the mainline, where a module is some increment of ¾" different from end to end. At present, this group does not have knowledge of any free-mo implementation of grades and modules with adjustable heights up to 64". For now, this standard does not permit end-to-end grades. This issue should be address when the first modeler wants to have grades and actually builds module with grades. The allowance of end-end grades will be at the discrepancy of the setup coordinator. The maximum grade allowed will be two percent on the mainline. The track must be level for 5" from each end of module.

INTERNAL GRADES

Modules are allowed to have internal grades of two percent on the mainline. The track must be level for 5" from each end of module. The net grade elevation change across the module must be zero. Spurs may have grades up to 4 percent.

> Suggestion: when constructing track that includes vertical curves as described above, use a straight edge of at least 12" laid on top of the rail to measure the rate of change of the rail height. Measure each rail separately. The space between rail top and straight edge should not exceed 1/4" within 12" of run (for 2 percent).

TURNOUTS:

Minimum #8 for mainline and sidings, and #7 for industrial trackage. All mainline turnouts are controlled locally or through DCC. Point throw must reliably and completely close the point rails against the stock rails (should stub turnouts be used, they must align rail reliably) Method of throw (powered or manual) is free. Frogs must be power routed from stock rails (relying on the contact between point and stock rails to conduct power through points into the frog is to be avoided). Gaps must be cut in the rails after the frog to prevent causing shorts through to other modules. Turnout control must be controllable from both sides of module.

> Suggestion: The following web sight has good information pertaining to wiring and gapping turnouts for reliable control:
> http://www.wiringfordcc.com/switches.htm

> Note: DCC accessory decoders are allowed for turnout control as long as there is at least one other method available to throw the turnout (fascia buttons, hand throw, etc). DCC decoder addresses must be registered on the Sn2_Trains yahoo groups list.

CLEARANCES:

All clearances (curves, structures, etc.) must meet NMRA HO standards. The center-to-center distance between straight tracks from mainline and sidings should not be less than 2" in straights and 2.5" on curves. Industrial and yard trackage may have distances of less than 2", as long as standard prototype cars pass freely.

5.0 Electrical

Two simple electrical "busses" run through each module and connect them together. Power to the track is routed over Track Power bus, and layout control is routed over the DCC network bus. Each bus uses a unique connector style to prevent accidental cross wiring from one module to the next.

Suggestions:

- Tie all wiring to module frame to prevent damage during transport and setup, especially near endplates where C-clamping occurs.
- Construct wiring to be "modular" for easy debugging and repair; i.e. use terminal blocks, connectors, etc. wherever possible.

TRACK POWER BUS:

The track bus is a reversible two-wire bus that jumpers the mainline track power from one module to the next. Each connection uses two 30amp Anderson Power Pole connectors (one Red and one Black). The connections are wired to allow a module to be rotated (reversed) and still maintain correct track polarity. These connectors are left disconnected where an electrical gap between blocks is desired (insulated rail joiners must also be used at one end of the 2" fitter rails to avoid shorting one block to the next).

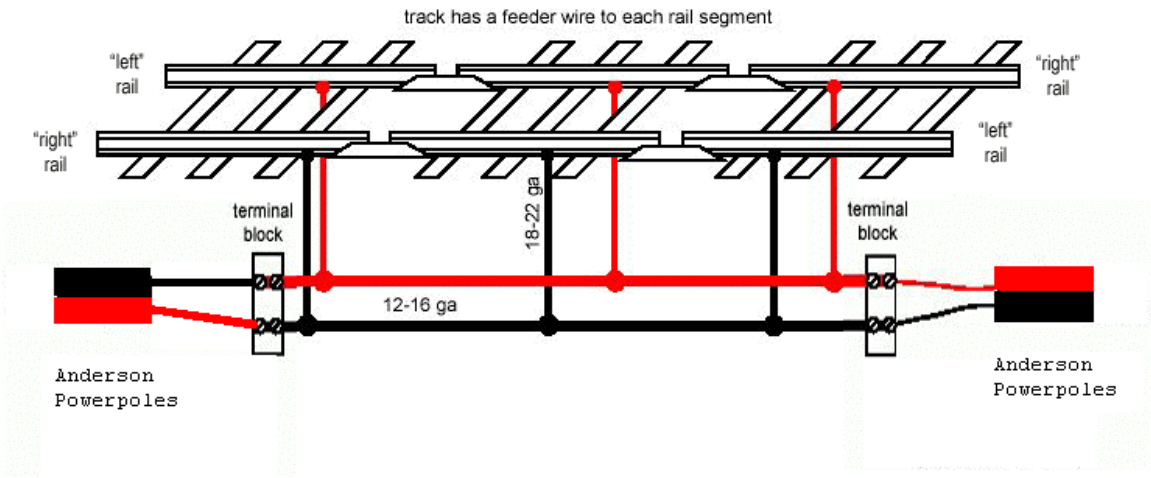
The 30amp Anderson Powerpoles are available through the web and better electrical supply houses. One web source is http://www.powerwerx.com/. Be sure to order the 30amp Powerpoles (other values are available, but are not compatible) and they must be red and black. Red and Black coloring is required to simplify visual checking for compatibility on the modules.

It is best to put the connectors on pigtail should connections need to be modified. The "pigtails" must be 12" long minimum and terminate within 6" of module endplates. See the sketch below. The connectors have mail and female pins.

The pair of 30 Amp Anderson Powerpole connectors are stacked vertically (hood up, tongue down). The top (black) Powerpole shall connect to the left rail, as you face the endplate, the bottom (Red) Powerpole shall connect to the right rail (the trick to remembering is the "**R**" in **R**ed and **R**ight).

The main bus must be continuous 12-16 gauge stranded wire between the two connector pigtails. The bus is connected to the track with 18-22 gauge stranded feeder wires. This method allows the bus to carry high current throughout the layout without voltage drop, and avoids relying on rail joiners to carry power from one rail segment to the next. Stranded wire is required as it is more flexible and will withstand the rigors of travel on maintenance. It is good practice to install a terminal block at each end of the module; tie the internal track bus wires to one side and the connector pigtails to the other side.

The track power bus is not DC or DCC specific. The bus can handle either. A setup coordinator may specify DC or DCC operation. Neither DC nor DCC power supplies may be permanently part of the module track bus. DCC track power boosters must be inserted into the bus between two plugs (or at one end of the bus). Likewise for DC operation a power pack must be inserted between two plugs (or at the end of the bus).



DCC NETWORK BUS

Module owners are not required to implement a DCC network bus. Radio control throttles are recommended and supported on all of the major DCC systems (Digitrax, Lenz/Atlas, CVP, & NCE), so a network bus is not required.

Some participants will prefer to utilize tethered throttles, or want them on the modules for home use, so the following suggestions are recommended for DCC module owners.

Suggestions for DCC module owners:

- Module owners install the Proprietary DCC throttle panels of their choice. The panels should be placed on both sides of modules. These panels will be used during setups employing that manufactures DCC system.
- DCC system specific network cables should be brought to the setup. These cables will be strung under the modules to connect the panels. The cables will be plugged directly into the panels and will be strung on the wire hangers (see below in the standard). At a setup, a range of cables should be provide (10, 20, 30....feet)
- DCC owners supplying the system for a setup are encourage to bring moveable panels to attach to other modules. These panels can be distributed about the setup to improve operation. Before clamping a panel to another participants module, ask permission. The following link is an example of one such movable throttle panel:
  <http://www.trainweb.org/freemoslo/Modules/Tips-and-Techniques/movable_throttle_mount.htm>

ACCESSORY POWER BUS:

The accessory bus has been eliminated from the Sn2 Free-Mo specification. It was decided that it would be easier for individual members to supply their own power supplies. Individuals may develop their own internal bus internal to their module sets.

PERSONAL BUS WIRING:

Members or sub groups are permitted to develop their own standards for additional wiring (such as an accessory power bus, 120V power) but they are not permitted to use the same connectors as specified for the track power bus or the DCC network bus. Bus connectors may need to be connected and disconnected to debug wiring problems. To eliminate confusion the required bus connectors may not be used for other connections. This limitation goes for connections internal to module set too, as a layout owner may not be present to re-assemble the connections.

Similar to the track bus and network bus, any personal bus must have provisions for module sets to be reversed. Also note, a setup coordinator is not required to ensure that all modules built by an owner or group are adjacent during a setup as the coordinator must consider space and operation too.

DC CAB WIRING:

Members are allowed to add DC block control for use during DC setups or as part of home layout. If a DC CAB bus is added, it must not use the same connects as specified for the track power bus or DCC network bus. Additionally, the block control must be the following requirements to ensure safe and reliable DCC operation.

Requirements for DCC setup:

- No DC power may be hooked up to module that could in anyway result in DC power being applied to the rails or track bus, during a DCC setup. To ensure the safety isolate accessory power and DCC cab power from the track bus.
- If toggle switches are used for block control, then the up (“on”) position must be DCC (track bus). The down position must act as off or DCC (track bus). It is preferred that both toggle positions map to DCC, so that trains do not come to a stop should a member or visitor throw a toggle the wrong way. If toggles are mounted left to right, both positions must supply DCC power.
- If rotary switches are used, all positions should deliver DCC power to the rails.

WIRE HANGERS:

Every Module must have wire hangers to support the routing of extension cords and other external wiring under the Sn2 Free-Mo layout. The hangers must be of sufficient size to route/hold two extension cords. One hanger must be within 12" of each end plate. The hangers must be 36-38" in height and centered under the track (within 3" of center).
To prevent droop along the length of a module hangers should be no more than 3 feet apart.

Suggestions:

- Crossbars on module legs can serve as hanger. Top of cross bar must be 36-38” off the ground.
- Do not use a hanger that attaches to wires. Wires and cords must be free to slide in hanger.
- Paint hangers yellow and label "WIRE HANGER" for easy use.

TURNOUTS:

Refer to the comments and suggestions in the “TURNOUTS” portion of section “4.0 Trackwork”

6.0 Scenery

SCENERY STYLE, MATERIALS, TECHNIQUES:

Scenery must allow hand cleaning of all tracks using "track eraser" type cleaner. (Note, track erasers such as bright boys are not recommended, instead paper products such as homosote or masonite are recommended to prevent the pitting of rails). Materials and techniques are free.

BALLAST:

Free

Suggestion:

- **Maine 2-Foot Modelers**: In general ballast should be earth (dirt) and gravel. To the knowledge of those establishing the Sn2 standards, all Maine two-foot gauge railroads, the Gilpin, and most industrial railroads used regional earth (dirt) and gravel (with the exception that the Monson had some slate ballast). Considering that all known American prototypes used earth, it is recommended that modelers to the same. Typical model railroad ballast materials such as Limestone, Coal, etc. are not recommended.

  Recommendation: Smith and Son 8100 Fine Dirt; 8101 Medium Dirt; and/or 8102 Coarse Dirt

  Smith and Son
  13630 GAR HWY
  Chardon, OH 44024
  440-286-4890 (after 6pm EST)

END PROFILE AND LANDSCAPE:

A flat horizontal scenery profile is used at module ends. Scenic "ground level" at modules ends is nominally 3/8" below top of rails (see sketch in Section 3.0). Landscaping along the module ends must be designed to smoothing flow into adjacent modules – avoid features such as roads, lakes, and so forth from running against the module ends (see INTER-MODULE JOINT TREATMENT, below)

Note: Scenic contours within a module between the flat end profiles are free (i.e. entire module does not have to be flat; in fact table-top flat modules are discouraged).

INTER-MODULE JOINT TREETMENT:

Polyfiber covered with fine ground foam (i.e. Woodland Scenics "turf" material) to simulate undergrowth "thickets" is temporarily placed over joints during Sn2 Free-mo setup, in random patterns, shapes, and colors. This technique hides the joints and transitions scenery from module to module. Polyfiber thickets must be placed clear of the track right-of-way.

BACKDROP:

No backdrop is allowed as modules are viewed from either side and are also meant to be reversible.

7.0 Public Displays

SKIRTING:

Both sides of all modules must have a skirt for use at public displays. Each end of skirt extends 2" past the module endplate to ensure adequate coverage and no "gaps" at module joints. Bottom edge of skirt is even with bottom of leg vertical member (i.e. at the level of the T-nut) to prevent dragging on the floor regardless of the module height setting. Skirting is to be attached to bottom of module so that there are not gaps between skirting and module bottom. Either fold skirting to attack to bottom or tuck skirting into frame. Another option is to attach skirting to legs.

Suggestion:

- Skirting Fabic should be fire retardant (discuss with group). Anyone have suggestions for fire retardant fabrics?
- Skirting colors and or fabrics should be consistent. The group should decide propose recommended colors and fabrics. Some free-mo groups are using vinyl.
- Some free-mo groups are using Velcro to attach skirting. Velcro may be pulled from module transport, loading, and packing if it attached an exposed location.

CROWD CONTROL BARRIER SYSTEM:

Each module that is 5' or longer must provide two barriers stands for every 5' of length. For modules less than 5' must supply a single barrier stand. Barrier stands consist of bases and uprights designed for simple construction and setup, and which may be separated for more efficient storage and transport. ¼" yellow nylon style ropes (available at any hardware store) and threaded through the stands as a barrier.

Stand bases are 12" square made from 1.5" plywood (or equivalent multiple plywood layers). Painting, white or yellow, is optional. A hole is centered in the base to accommodate a ½" white PVC pipe end cap, firmly wedged into the hole and used to receive the stand upright. Stand uprights press-fit into the base and are 36" tall ½" white PVC pipe with a PVC "T-junction" mounted on top, through which the nylon rope is threaded. Point is not allowed – leave uprights white.

PLEXIGLAS SHEILD:

Free, but should be easily removed for access to track for cleaning. Must not inhibit the operation of trains (coupling/uncoupling) of cars on the module. In general shields are not recommended.

8.0 Locomotives and Rolling stock

WHEELS:

- Metal
- Clean
- Back-to-back spacing meets NMRA HOn3 gauge
- Flange contours need to meet NMRA HOn3 requirements
- Semi-scale wheel treads are allowed

ROLLING QUALITY:

- Cars roll freely down a 3% grade

TRUCKS:

- Pivot freely
- Slight lateral rock on at least one end (three-point mount)
- Able to negotiate a #6 turnout
- Able to negotiate a 28" radius curve
- Able to negotiate vertical rail curves as specified in Section 4.0 TRACK WORK standards.

COUPLERS:

- Kadee HOn3 714 couplers; no substitute brands allowed.
- Mounted so as centered between the rails.
- Centering springs working freely.
- Mounted flushly on the bottom of car. Where bottom of car is a scale 18-19" from the rails (9/32"-19/64")
- Couplers are to be mounted with screws not glue, for reliable operation.
- Trip pins clipped to ensure clearance above the rails
- Able to negotiate vertical rail curves as specified in Section 4.0 TRACK WORK standards.
- Centering springs working freely

WEIGHT:

- If track and trucks are built to meet the quality standards, the weight is not a significant issue.
- Suggestion is for cars to be within +10%, -5% of NMRA HO specification (1oz + ½ oz for each inch of car length).

ELECTRONICS:

- If track and trucks are built to meet the quality standards, the weight is not a significant issue
- Locomotives equipped with DCC decoders compatible with NMRA DCC compliant systems
- Locomotives use 4 digit address – first 2 digits are owners ID number and second 2 digits are locomotive number (ID numbers to be tracked on Sn2_trains yahoogroups list). 4 digit addressing is to be used because many members may use the same locomotive.

9.0 Setup Checklist

COORDINATION:

Any individual wishing to organize an Sn2 Free-Mo setup may do so. As coordinator, that person is expected to communicate with event staff to secure space, utilities, etc… The coordinator is also expected to communicate with participants, informing them of requirements of the setup.

Actions:

- Define criteria for participation in setup – Such as blending requirements (themes, scenery, etc…), electrical requirements, rolling stock requirements, etc… A template document, Sn2Free-Mo_SetupSpecification.txt, has been posted to the Free-Mo directory of the Sn2_Trains file section. The template is available to assist in communication to participants.
- Secure space at the event and utilities at the event.
- Identify deadlines for participation.
- Select Participants – Selection may be based on any criteria (best friends, common railroad, scenery styles, space available, etc…)
- Establish trackplan for the setup and share criteria used for the trackplan with the participants.

Note: It is possible to have more than one Sn2 Free-Mo setup at an event. This may occur if there is not sufficient space for all of the modules or if the coordinators have different setup requirements. For example one setup could be a SR&RL theme and another could be a Gilpin theme.

PARTICIPATION:

A participant is expected to supply module(s) or rolling stock that comply with the requirements established for the setup. To ensure that both participant and coordinator are not disappointed the participant should disclose details modules and rolling stock at to the coordinator.

Actions:

- Express interest
- Provide coordinator with details of module or rolling stock (compliance with physical standards, themes, scenery, etc…). A template document, Sn2Free-Mo_ModuleAttributes.txt, has been posted to the Free-Mo directory of the Sn2_Trains file section. The document is to aid participants in communicating with coordinators. Additionally images can be posted to the Sn2_Trains yahoogroup and/or to the Sn2 Home Page (contact web administrator).
- Bring required items below
- Arrive on a timely manor with all required items (listed below). Late arrival could result in not being able to participate or delayed participation, as setup could have to be modified to adjust for time.

- Partake in the setup of modules, most specifically participant's own module and all adjacent modules.
- Encouraged to assist in the operation layout during event

Note: Any would be participant who does not like the requirements as defined by the coordinator is welcome to encourage the coordinator to make adjustments. The coordinator is not required to make adjustments.

REQUIRED ITEMS:

In addition to the obvious items to bring to a Sn2 Free-mo setup such as modules, legs and rolling stock, the following items are required for each module:

- Minimum of two 2" filler rails with joiners at both ends to join main line across module joints. Additional fitter rails are always welcome. Bring additional fitter rails and joiners to connect any additional tracks that cross module joints (i.e. yard extension modules).
- Minimum of one large C-clamp to hold module ends together. Deep-throated clamps are best.
- Minimum of one 24" six conductor phone cable with RJ12 clip plugs on both ends, wired straight through, to connect the DCC network across module joints.
- Minimum of one set of polyfiber/ground foam "thickets" to cover one inter-module joint on both sides of main line.

SUGGESTED ITEMS:

Other items suggested to bring, but not required

- AC power extension cords and outlet expanders or strips to extend wall power throughout the layout.
- DCC throttles – the more throttles available, the more people can run trains at once.
- Tools including rail cutters, files, wood glue, levels, wrenches, screwdrivers, tape measures, pliers, wire cutters and strippers, multi-meter, soldering iron, track gauges, track cleaner, etc. These help resolve problem that may crop up and to repair minor damage that may occur while transporting modules.
- Model tools including coupler height gauge, small screwdrivers, ACC and styrene glues, tweezers, files, etc. These help repair or adjust rolling stock and track to keep things running smoothing.
- Folding chair or stool.

Document Revision History

Date	Author	Description
07-Nov-04	David Keith	Initial draft of document published to Sn2_Trains
13-Nov-04	David Keith	Additions for coordination and participation
19-Nov-04	David Keith	Cleanup pass on 3.0 Framework
28-Nov-04	David Keith	Section 5.0 wiring: Eliminated accessory bus, track power bus for new plugs, added guidelines for CAB control, personal bus comments, wire hangers.