



SEATTLE PACIFIC & EASTERN RAILROAD

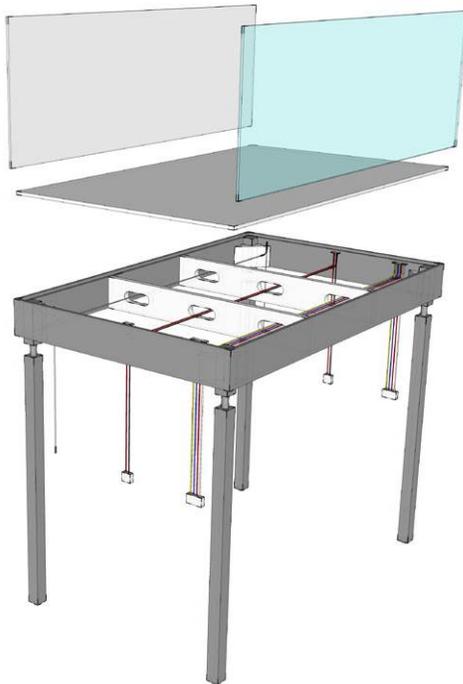


CONSTRUCTION STANDARDS ATTACHMENT (To 4D HO Modular Group Policy)

Introduction.

THE PRIMARY OBJECTIVE OF THESE STANDARDS IS TO MINIMIZE OPERATIONAL PROBLEMS AND ENHANCE APPEARANCE WHEN MODULES ARE ASSEMBLED INTO A LAYOUT.

There are different approaches to module construction as well as materials available. Members are encouraged to develop his or her approach to construction but nonetheless to achieve the result of trouble free operation in the layout. It is therefore recommended that members avail themselves of the experience and knowledge of other members and consult with them during the planning and construction of any modules. It is suggested that before construction is started, the plan of each module be submitted to the Executive Committee for review and comment in order avoid common mistakes. All of the standards described here must be met in order for a module to be used in a Group layout, except that a standard that is designated “recommended practice” is not required but members are urged to incorporate it into the module.



In this document the front, back and sides of a module are determined standing at the public viewing side.

The configuration of a module is illustrated in the adjacent diagram (not to scale) that was done by Al Rathbun.

NMRA Standards.

NMRA module standards and recommended are incorporated here after being edited to eliminate inconsistencies with the Group standards and practices that supersede and govern any inconsistent NMRA standards or practices. NMRA standards and practices are found at <http://www.NMRA.org/index-nmra-standards-and-recommended-practices>

Standards in Other Group Publications.

Any and all standards and procedures which may appear in other Group publications, such as the Policy and Attachments are also incorporated into, superseded and governed by this document.

A. Module Design and Construction.

1. A module shall be rectangular and 30 inches deep and 48 inches wide.
2. A module may be 36 inches deep if its front aligns with 30 inches deep modules.
3. If building a set of more than one module, the width of each module in the set should not be less than 48 inches and the total width of the set should be divisible by 48 inches.
4. Module dimensions may vary from this standard if the variation is approved in advance of construction by the Executive Committee.
5. The corners of the module shall be square.
6. Legs from 2 inch by 2 inch lumber or 1 3/4 inch round legs shall be provided at all four corners.
7. Legs shall each be an adjustable length in order that the height of the top of roadbed at the side of the module can be between 38½ inches to 40½ inches above the floor. Recommended practice: An adjustment in leg length that involves dividing the leg into two parts and installing a screw device between the two parts of the leg
8. Each leg shall have a flat bottom floor glide.
9. The frame for top of the module shall be made from (a) top quality straight 1 inch by 4 inch lumber or (b) quality 3/4 inch plywood ripped to 3 3/4 or 4 inch strips. Recommended practice: If using tortoise switch machines, 4 inch frame material will protect them.
10. Track and scenery support shall be attached to the frame using materials and bracing in a manner so that the frame and top do not flex, sag, bend or warp.
11. Design and construction should be able to withstand damage from module handling.

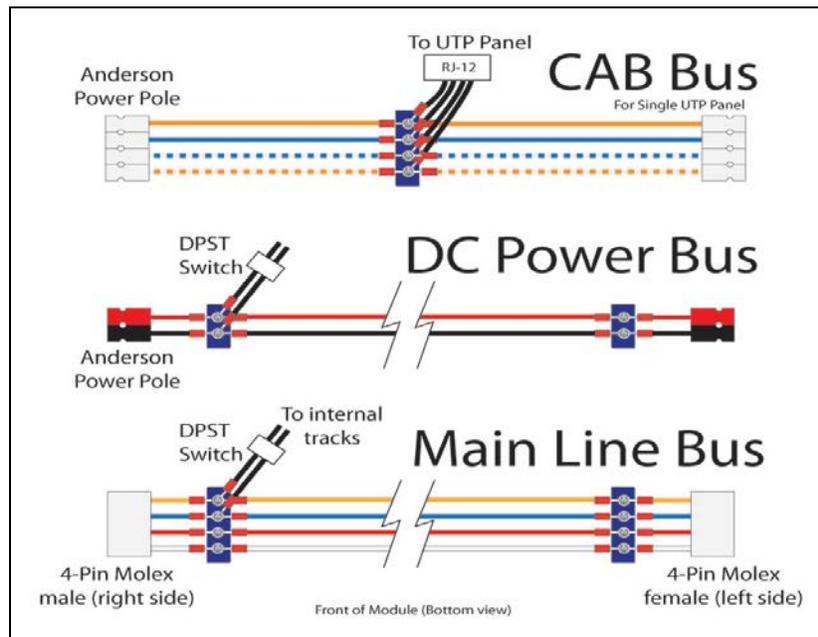
B. Track and Turnouts.

1. Main line track shall be Code 100.
2. Turnouts on main lines shall be Peco medium or larger or Number 6 or larger. Recommended practice: Number 8 turnouts.
3. Track center on curves shall be 2½ inches
4. Provide two main line tracks which are to connect to other member modules, one of which is on 5 inch track center from front of module at end of the line, and one of which is on 7 inch track center from front of module at end of the line
5. Recommended practice: Add a siding on 2 inch center parallel to either or both main lines with at least one entrance to each siding from a main line.
6. Each main line track and siding parallel to main lines that is intended to connect with adjacent modules shall each end 4½ inches from the side edges of the module.

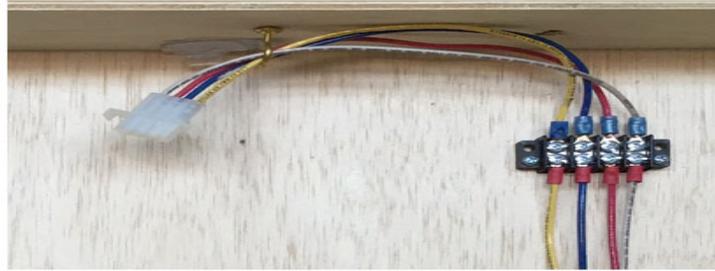
7. Main line track shall be straight without grade change or turnout for two inches from the end of the track.
8. Recommended practice: Provide turnout crossovers between the main lines.
9. Provide one standard 9 inch straight tracks for each main line and optional siding that can be connect to another module at each side of the module. Track connectors shall be soldered at one end of each 9 inch straight track.
10. No curve of a main line shall be less than 30 inches in radius.

C. Electrical.

The following is a schematic diagram of module basic wiring with a single UTC panel done by AI R. This is a view from underneath the module:



1. Main line track power (main line bus) shall be 14 gage or larger wire. (NMRA MS-1.3)
2. Recommended practice: Purchase wiring and Molex connectors for main line bus from the Group.
3. The main line bus shall be firmly attached to toward the front of each module and terminate at each end in a terminal block. (NMRA MS-1)
4. Connection from the line bus to rail and other module requirements shall be through terminal blocks. (NMRA MS-1.3)
5. Terminal blocks shall be within 6 inches of side of the module.
6. The wires for the main line bus shall be four wires and coded WHITE connected to first main rail from the public viewing side, RED connected to the second main rail, BLUE connected to the third main rail and YELLOW connected to the fourth main rail. (Modified NMRA) One end of the main bus connector wiring is illustrated in following photograph:



Main Power Bus Terminal Block and Connector

(Red/White wires are to be connected to a separate power district from the power district to which the Blue/Yellow wires are to be connected. No wiring shall connect the districts.)

7. Track in front of the main lines shall be connected at a terminal block to the Red/White wires with the White wire connected to the rail closest to the front and with the Red wire connected to the next rail.

8. Track in behind the main lines shall be connected at the terminal block to the Blue/Yellow wires with the Blue wire connected to the rail closest to the main lines and the Yellow wire connected to the rail away from the main lines.

9. Connectors of the main line bus to other modules shall be by a 12 inch length of 14 gage stranded wire with a four pin female Molex connector on the left and a male Molex four pin connector on the right when viewed from the public viewing side. The order of pin connections are in order from flat side of Molex connector yellow wire, blue wire, red wire, white wire to pointed side of Molex connector. (Modified NMRA)

10. All wires shall have screw or spade lugs at terminal blocks

11. Recommended practice: Use strain relief clamps for connector wiring.

12. All electrical connections shall be soldered and taped or otherwise insulated.

13. No section of mainlines or parallel passing tracks shall depend on power being fed through a bridge track. (NMRA MS-1.3)

14. Insulating material shall be used to fill rail gaps. Air gaps are not allowed.

15. Crossovers between main lines and tracks leading switches from main lines to other tracks on the module shall have both rails gapped (insulated).

16. All tracks gapped for block control shall have both rails gapped (insulated). (NMRA MS-1.3)

17. All power from the main line bus to other tracks than the two main line tracks on the module shall be controlled through a toggle switch (DPST or DPDT)

18. If an optional siding is laid parallel to the main lines without a through track connection to tracks on other adjacent modules at both sides, that siding is a part of the other tracks on the module and its power must be connected through the toggle switch. If such a siding has a through track connection, that siding is a part of the main line tracks, and power for each rail of the siding should be connected directly to each rail of the adjacent main line track.

19. A cab bus with connectors, other wiring connected to the cab bus and terminal strip for recommended UTP panels must be purchased from the Group. The cab bus is installed near the rear of the module. Recommended practice: For each single module and for each set of modules, install one UTP panel to the cab bus in the front or back of the module or two UTP panels one at each location.

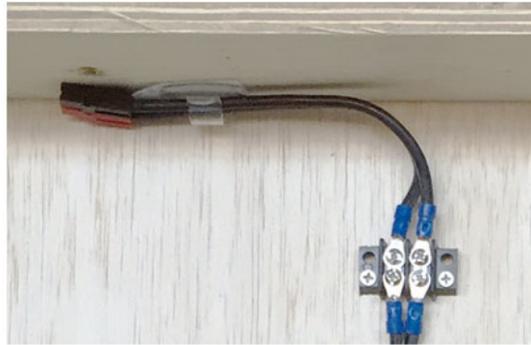
20. UTP panels shall be installed with the indicator light down.

21. A two wire 14 gage 12 volt DC bus must be installed so that the connections can be made to the next modules with Anderson power pole connectors, stranded wire, and terminal strips.

22. Wires and Anderson power pole connectors shall be RED positive and BLACK negative or common.

23. 12 volt power for use on the module must be made through the terminal strips and a toggle switch (DPST or DPDT).

The following photograph illustrates an end of a 12 volt bus connection.



12 Volt Power Bus Terminal Block and Connector

25. Adequate space shall be provided between bus wiring and module corners to allow for clamps.

26. Use 22 or 24 gage wire soldered to the outside of rails for power feed connections to track wire leads below the sub-roadbed. Use as many power feeds as needed.

26. Any rails with joiners and rails with turnouts must have a separate power feed.

27. Rail joiners and wire connectors shall be soldered.

D. Backboard.

1. Provide a backboard that is either 10 inches or 16 inches high from the top of the module and that is affixed along the back of the module.

2. A diagram that is in form approved by the Executive Committee and that contains a diagram of the track, switches and the location of industries on the module, and contains instructions on how the switches and electrical connections are operated shall be posted on the backboard. The diagram shall be centered top to bottom on the backboard.

3. This diagram and instruction shall be sufficient so that a person not familiar with the module can operate switches and electrical connections and can plan operations on the module.

E. Plexiglas.

1. Provide and affix a Plexiglas shield (3/16ths or 1/4 inch) at least 12 inches wide along the entire front frame of each module. When mounted, the top of the shield shall be 8 1/4 inches above the top of the module. Recommended practice: Secure Plexiglas to module with Velcro.

2. Apply Velcro hook to front of Plexiglas so that the bottom of the Velcro is 3 3/4 inches below the top of the module. (The purpose is to attach the Group skirt that is available at each show.)

3. Provide a skirt if the top of the front of module goes below the top of the side of module,
4. Recommended practice: Purchase commercial grade Velcro from Group.
5. If UTP panel is provided on front of module, the Plexiglas must have a cut-out to accommodate the panel.

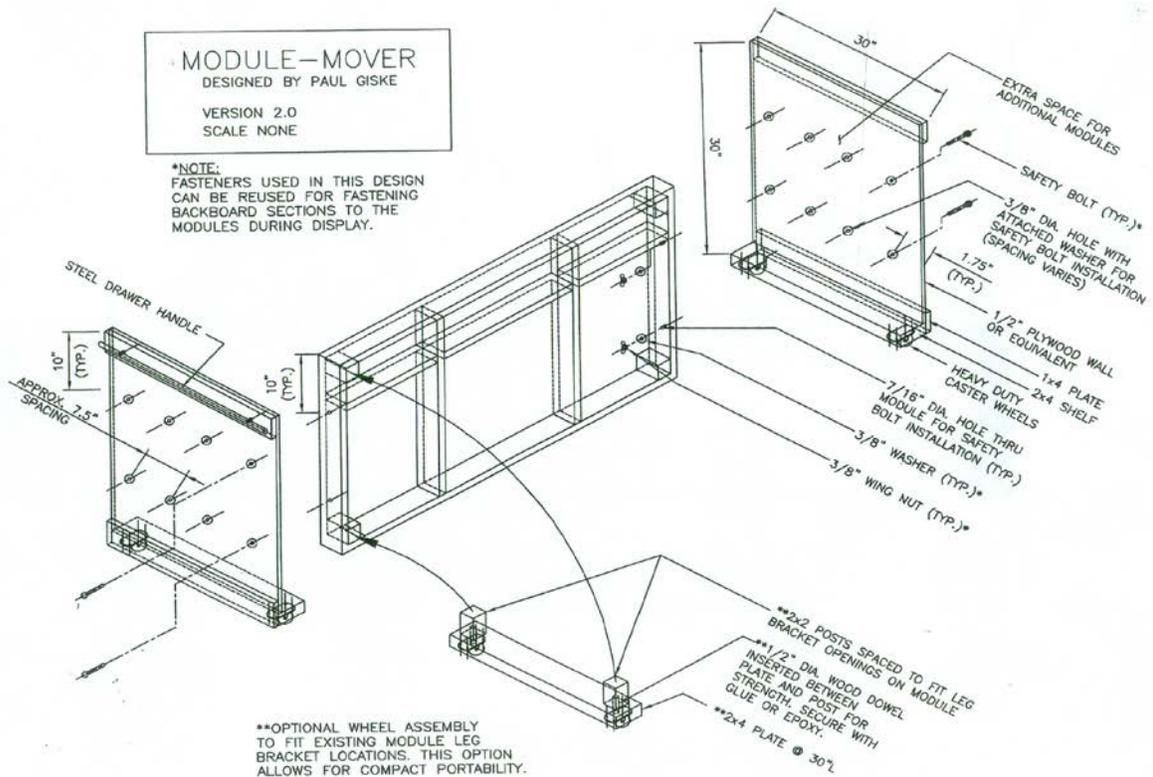
F. Painting.

1. Paint shall be next gloss finish that is closest to flat finish and that depending on supplier is variously referred to as matte, eggshell or satin finish.
2. Module frame and legs shall be painted black.
3. Front of backboard shall have a primary coat of Group blue. The back and edges of the backboard shall be painted black.
4. Other visible module bare wood and plywood shall be painted black or earth color compatible with module theme.
5. Recommended practice: Paint the inside of the bottom of the module a light color to aid seeing wiring.

G. Track Ballast. The following eight steps are recommended practice for applying ballast to tracks. Follow steps in order.

1. Provide cork roadbed. Remove and smooth broken edge of cork before applying. Glue roadbed to sub grade and check level of applied roadbed with straight edge and correct as required.
2. Paint roadbed with latex that is same color of ballast.
3. Glue and nail track to road bed. Super elevate curves.
4. Test track at show before proceeding further. Watch for horizontal and vertical straightness.
5. Weather track.
6. Apply ballast to both side slopes first using latex paint on road bed up to end of ties as glue in short (12 to 18 inches) sections at a time. Dump off excess ballast for reuse.
7. Apply ballast to between tracks.
8. Fine spray undiluted alcohol to whole project, a section at a time, and then apply a mixture of 30% matte medium or high quality glue and 70% water.

H. Suggestions for Handling Modules This is not a part of module construction requirements.



January 21, 2015