



Basic HO Module Standards

Revised: 08 June 2021
Previous editions are obsolete

National Model Railroad Association (NMRA) Compliance

Except as described below, **MARRS** HO modules must conform to these applicable NMRA Module Standards (MS), Module Recommended Practices (MRP) and Recommended Practices (RPs):

- MS-1.0, Module Standards, Standard Gauges (01/1990)
- MRP-1.3, Recommended Practices, Standard Gauges, Modules (01/1990)
- MS-1.3, Electrical Standards for Modules, All Scales (01/1990)
- MRP-1.3, Electrical Recommended Practices, All Scales, Modules (01/1990)
- RP-2, Standards Gage (07/2019)
- RP-7/RP-7.1 Track Centers and Obstacle Clearances/Diagrams (Modern) (07/2017 & 01 2019)
- Reference: <https://www.nmra.org/standards>

Exceptions to MRP-1.0, MS-1.3, and MRP-1.3

The **MARRS** standard for the MINIMUM radius for curves on the mainline is 30”+. However, it is **HIGHLY RECOMMENDED** that members consult with the **MARRS** Modular Superintendent or their designate prior to installing mainline curve tracks, preferably during the initial design stage.

[Exception to NMRA MRP-1.0]

Module width will be 24" minimum, 36" maximum. Exceptions may be granted, however, it is **HIGHLY RECOMMENDED** that members consult with the **MARRS** Modular Superintendent or their designate during the initial design stage of their module to obtain a waiver. [Exception to NMRA MRP-1.0]

Minimum wire gauge for track power shall be 14 gauge for all mainline power, except for track power leads/drops under one foot in length which may be as small as 22 gauge. [Exception to NMRA MS-1.3]

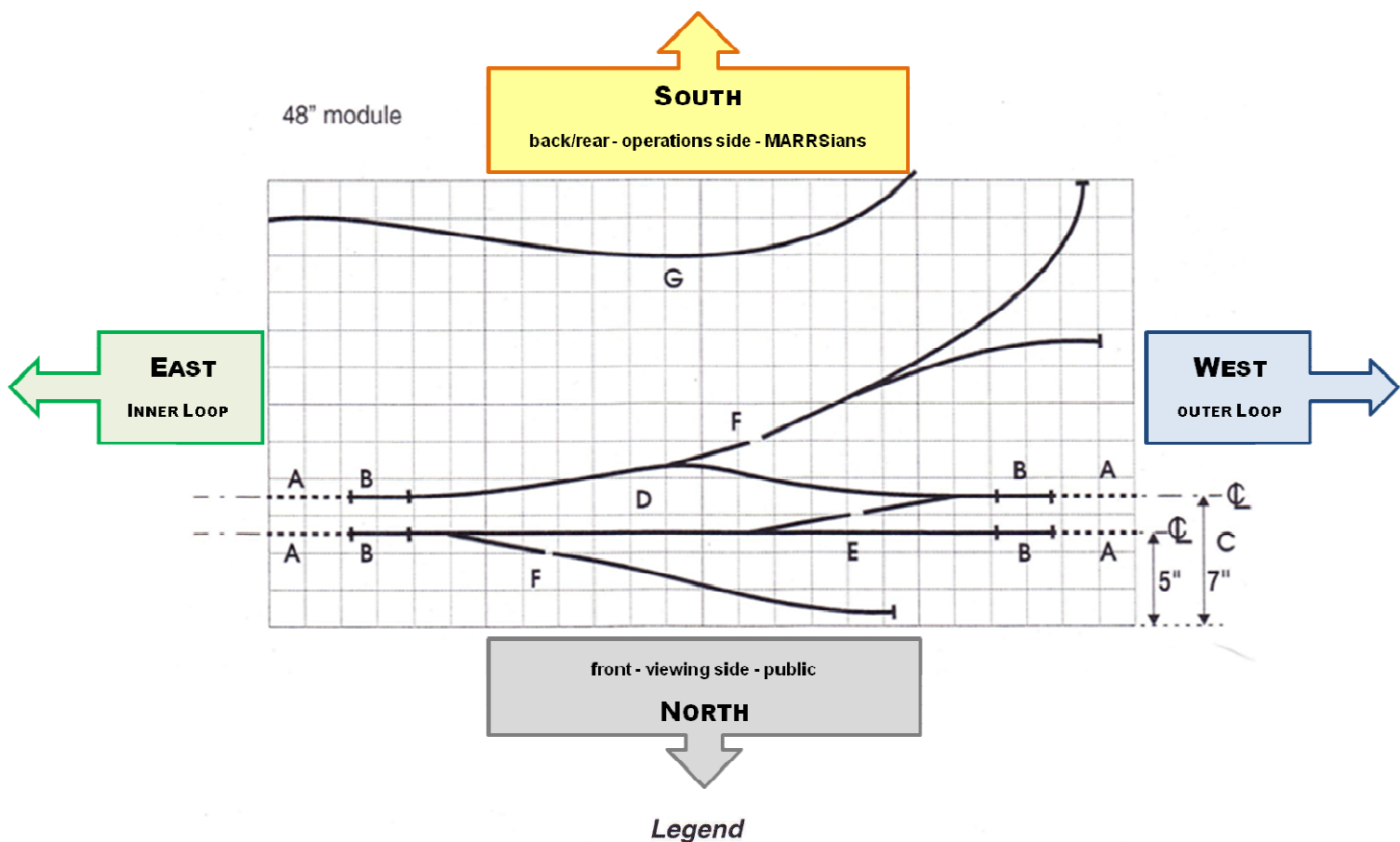
Anderson PowerPole (30-amp) connectors will be used (v. Cinch-Jones connectors). For a detailed description of PowerPole connectors and associated terminology see Appendix 5. [Exception to NMRA MRP-1.0 & MRP-1.3]

Black connectors will be used for the front rail of each mainline track, and red connectors will be used for the rear rail of each mainline track (Figures 4A and 4B). ("Front" is defined as the viewing side or public side of the module.) [Exception to NMRA MRP-1.0 & MRP-1.3]

No wiring carrying 110V power is permitted on the module.

Module Orientation and Track Placement

Figure 1



- A** 4½" open space to allow for 9" connecting tracks between modules.
- B** Minimum 3" straightaway. These three inches must not contain curves, turnouts, crossings, etc.
- C** Track center lines 5" and 7" from front edge of module.
- D** Main tracks (minimum of 2) may be straight or curved
- E** Crossovers must be gapped in both rails.
- F** Secondary tracks must be electrically isolated from Main tracks.
- G** Dummy tracks (not connected to other tracks) are permitted.

Module Lengths and Connections

Module lengths must be in 2' increments, with the following exception:

- **Combined Unit Modules:** Members may build a set of modules which must always be assembled as a unit (aka: combined unit modules). Sizes of the individual modules within the unit may vary HOWEVER; the total length of the combined unit when assembled must be in a 2' increment (e.g. 6', 8', 10' etc.). Additionally, connecting tracks between the modules within the assembly may be of varying lengths HOWEVER, both ends of the combined unit (where they meet other member's modules) must have specified 4.5" space for connector track as shown in **Figure 1, A**.

It is **HIGHLY RECOMMENDED** that metal C-clamps be used to physically connect modules (v. spring clamps, bar clamps, etc.) to ensure a secure, non-slip connection. Exception: **Combined Unit Modules** may be joined using nuts and bolts in dedicated pre-drilled holes.

Module Themes and Scenery

The **MARRS** HO modular layout includes a highly eclectic mix of themes and scenery. Members are encouraged to be creative and are not restricted to prototypical railroad themes. As a courtesy, it is suggested that members discuss their theme/scenery ideas with other **MARRS** members via the **MARRS** group e-mail and/or at a **MARRS** workshop.

Because the venues where **MARRS** operates are visited by patrons of all ages including children, the following restrictions apply:

- Module themes and scenery must be family friendly and in good taste.
- Module themes and scenery, including signage, must be non-political. **MARRS** and **MARRS**-related activities exist within a *politics-free-zone*.
- The **MARRS** Modular Superintendent may request changes to any module(s) that violate either of these restrictions.

Scenery Recommendations

Paint the sides of the rail before ballasting. Prototype rails are rusty rather than shiny. Floquil Grimy Black and/or Rail Brown or equivalent as appropriate.

Although the plastic crossties of prefab track will eventually collect a coat of dust and become less shiny, it is recommended that they be painted before ballasting. Floquil Grimy Black mixed with varying amounts of Roof Brown (or an equivalent black/brown mixture) will resemble creosoted ties of varying ages.

Use Woodland Scenics Gray ballast or equivalent on Main tracks, and Woodland Scenics Cinders or equivalent on sidings.

Use Woodland Scenics Green Blend ground foam or similar products for the basic grassy cover.

Pre-Show Module Inspection

As a courtesy, it is suggested that the Module and DDC Superintendents, or their designate, should inspect all new modules before they are included in the **MARRS** layout to ensure interoperability. Use **MARRS** Form 1, “Module Inspection Checklist” to ensure all applicable standards are met.

Note: For new curve modules or specialty modules such as wedges, wyes, stand alone yards, etc., it is **HIGHLY RECOMMENDED** that members consult with the **MARRS** Modular Superintendent or their designate during the **initial design stage** to ensure all applicable standards will be met.

Appendix 1

NMRA MS-1.0, HO Module Standards - Standard Gauges (NMRA Revised: 1-90)

Height from Floor to Top of Rail	Hand Laid or Commercial Rail Code	Track Clearances H=Horiz V=Vertical	Interface Track Center Lines from Module Front	Track Setback From End of Module	Center Lines on Curves	Track Centers for Parallel Tracks
40" (1016mm)	100	H=1-1/32" (26.2mm) V=3" (76.2mm)	5" (127mm) 7" (177.8mm)	4-1/2" (114.3mm)	2-1/2" (63.5mm)	2" (50.8mm)

***Two through tracks required, Mainline. Others optional.

Appendix 2

NMRA MRP-1.0, Recommended Practices (HO) - Standard Gauges, Modules (NMRA revised: 1-90)

Minimum Parallel Tangent Track Length ¹	Maximum Mainline Grade	Minimum Mainline Turnout	Minimum Mainline Radius ²	Minimum Industrial Radius ³
3" (76.2mm)	3%	#6	Use MARRS standard	30" (762.0mm)

¹Tangent track length is the distance from the end of the bridge track at the interface to the first deviation in mainline, i.e., a switch, curve, crossover, etc.

²This is the minimum radius (NMRA-32" for HO) according to Standard S-8, Class 1-A. NMRA suggests a larger radius be used.

³Sometimes referred to as "Short Line" or "Secondary" which allow for shorter radii curves including complete helix (loops) where the locomotive passes over the rear of its own train.

- All trackage behind the mainlines shall be insulated from mainlines.
- All trackage behind the mainlines should have its own power source, separate from mainline power source.
- A maximum mainline grade according to MRP-1 for each scale/gauge may be used if proper care is given to the construction of sub-roadbed and grading back to 0° elevation; it should be noted that the use of grades may restrict the length of trains and require the use of more locomotives or power units.
- All trackage behind the mainlines is not covered by NMRA Module Standards and is left to the discretion of the individual or group, with the exception of S-7 Standards pertaining to mainline clearances.
- If sky boards are used, recommended range is 8" to 18"; (optimum 14") scenery dividers are optional.
- Recommended roadbed can be cork, wood or Homosote.
- Construction of module should be of either 1/2" plywood or L-girder top.
- Forward extension modules, i.e., those protruding toward the public viewing side rather than inward toward the back of module, will mark the "front edge of module" reference point as the point at which the front edge would be located if it were not extended outward. This is the point of reference for center lines of mains.
- Refer to **Figure 1** for more details.

Appendix 3

NMRA MS-1.3, Electrical Standards for Modules

TRACK GAPS (INSULATED): Insulating material shall be used to fill rail gaps. No air gaps are allowed. Crossovers between mainlines and tracks leading from mainlines to other trackage on the module shall have both rails gapped (insulated). All tracks gapped for block control shall have both rails gapped (insulated).

Appendix 4

NMRA MRP-1.3, Electrical, Modules

Powering of local tracks, switch machines, building lights, etc., is the responsibility of the individual builder and should be separate from circuits which interface with other modules in a layout.

Modular layouts may be easily divided into control blocks for multi-train operations. Blocks will normally be used to control trains on your own module or group of modules. To insert a block, place insulated rail joiners at one end of each bridge track and unplug the connectors at each end of break.

Block control of mainlines must be approved by all module participants.

Use #22 to #24 ga **solid** wire soldered to the outside of rails for connection to track power leads. "Solder terminal Strips" make an easy to trouble shoot connection point. Use as many power feeds per tracks as needed.

NOTE: A single large power supply is used with the many throttles on large layouts. The three tracks **MUST NOT** have any common connection. **DO NOT** use "COMMON RAIL" wiring. Gaps must be used on both rails on any crossover tracks. If the three main tracks are part of a yard, it must be possible to isolate them electrically.

Appendix 5

Anderson PowerPoles

An Anderson PowerPole connector is a single-conductor connector, made up of a metal contact wiper surrounded by a plastic shell. The shells are available in various colors.

Each connector has a C-shaped "hood" and a rectangular "peg" molded into it. By convention, the hood is the "top" of the connector and the peg is the "bottom." An electrical connection is made by turning one PowerPole upside-down relative to another and pushing them together end-to-end; therefore, there are no "male" or "female" PowerPoles. (Figure 2)

PowerPole connectors are available in different amperage ratings, based on the size of wire they are designed to accept. For example, 15-amp PowerPoles accept 18-22 gauge wire; 30-amp PowerPoles accept 12-16 gauge wire (Note: for MARRS HO modules, 14 gauge wire is HIGHLY recommended). The 15-, 30-, and 45-amp versions use the same shell, and can be freely intermixed. Higher-rated connectors are progressively larger, and cannot be intermixed.

See Figures 2, 3, 4A and 4B for proper

assembly and configuration.

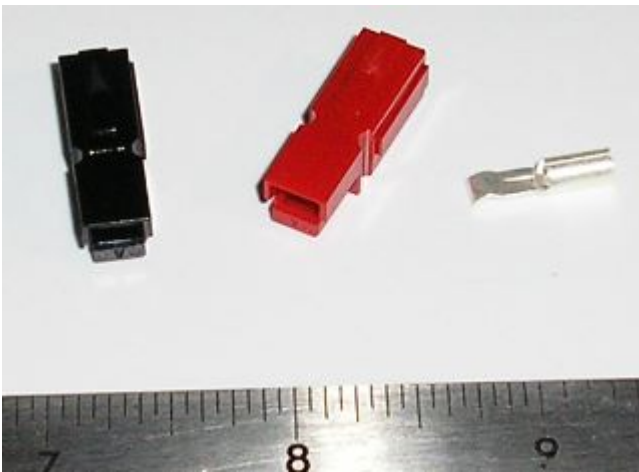


Figure 2: Red and black PowerPole shells, and a contact wiper.
Note the "hood" and "peg" on each shell.



Figure 3: PowerPoles joined "red over black."
Note the hood and peg positions.

The connectors are keyed so that they may be interlocked, either vertically or horizontally, to form multi-connector "blocks." For connectors joined vertically, they may be described as being one "over" the other. For example, a pair of PowerPoles "joined red over black" would refer to a red connector, attached to the top of a black connector. Note: "over" refers *only* to how the connectors are joined to each other. If a "red over black" pair is turned upside down as a unit, it's still a "red over black" pair. (Figure 3)

Figure 4A - Track wiring and PowerPole configuration viewed from above

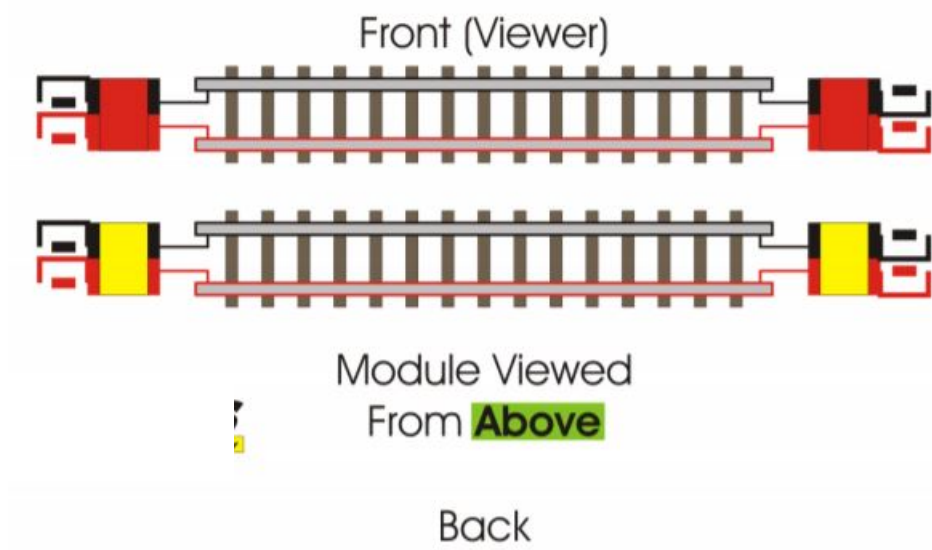


Figure 4B - Track wiring and PowerPole configuration viewed from beneath

