

rails on wheels

Recommended Practices for HO Gauge Modules

Published by:

Rails on Wheels, Inc.
525 E. Michigan Ave, Suite 151
Saline, MI 48176

January 2010

List of Effective Documents

Number	Title	Version	Effective Date
G1	Glossary of terms	2.0	March 2001
E1	Minimum Equipment for Module Setup	2.1	January 2010
E2	Rolling Stock, Interchangeable	2.1	January 2010
E3	Rolling Stock, Non-Interchangeable	2.0	March 2001
M1	Module compatibility	3.0	January 2010
M2	MLS Module compatibility	Retired	
M3	Interface alignment fixture	1.0	January 2010
T1	Module track work	3.0	January 2010
W1	Electrical Wiring (DC)	Retired	
W2	Electrical Wiring (DCC)	3.0	January 2010
W3	Modular Connectors	2.0	January 2010

HO Gauge Module Recommended Practices

Sponsor:

Rails on Wheels, Inc.
525 E. Michigan Ave, Suite 151
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Category:

General

Number & Title:

G1 – Glossary of terms

Version:

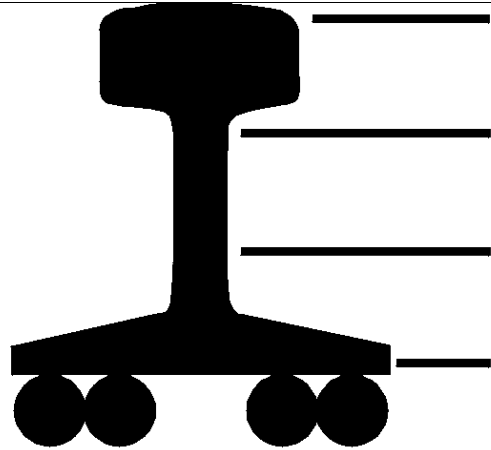
2.0

Issue Date:

March 2001

Purpose:

Establish a standardized list of terms used throughout recommended practices prepared by Rails on Wheels.



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Normative Text:

“Bridge track” – Removable section of track that is used to join the tracks of one module to another.

“East end” – This is the left-hand end of the module as seen from the front (the normal viewing side).

“Interface” – This is the end of the module where it connects to another module. An interface must be uniform to allow secure connections of the module benchwork, tracks, and electrical wiring.

“Married set” – Any group of modules in which the individual modules cannot be used separately for some reason. Married sets typically consist of modules that carry a singular theme over more than one module and do not have a standard interface between them, but conform to the interface standards at both ends of the set.

“West end” – This is the right-hand end of the module as seen from the front (the normal viewing side).

Comments:

HO Gauge Module Recommended Practices

Sponsor:

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Category:

Equipment – Module Setup

Number & Title:

E1 – Minimum Equipment for Module Setup

Version:

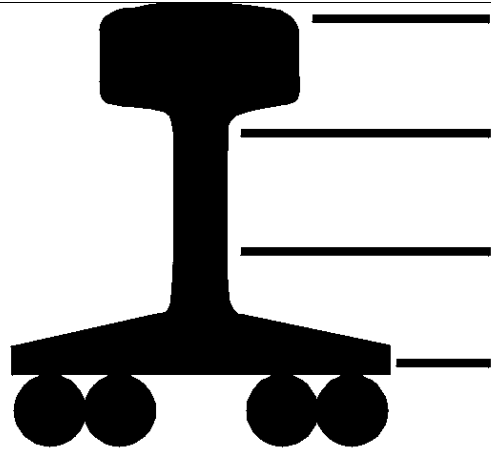
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Issue Date:

January 2010

Purpose:

Establish minimum guidelines for equipment that must be provided by module owners for their modules at a standard set-up.



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Normative Text:

The following equipment must be furnished by each module owner for each module they bring to a club setup:

- 1 four (4) inch “C” clamp for attaching adjoining modules
- A UL/CSA listed 110-volt extension cord, at least the length of the module plus one foot.
- A UL/CSA listed power strip if necessary to power accessories on the module
- Any power supplies needed to power accessories on the module. These should be UL/CSA listed, and may have to be UL/CSA listed to meet fire codes at some setup locations.
- Any unique connectors or accessory equipment

Comments:

HO Gauge Module Recommended Practices

Sponsor:

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Category:

Equipment - Rolling Stock

Number & Title:

E2 – Rolling Stock, Interchangeable

Version:

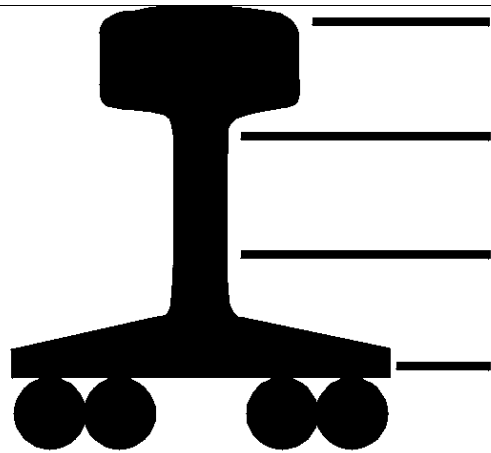
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Issue Date:

January 2010

Purpose:

Establish minimum guidelines for rolling stock that is intended to be freely co-mingled on club modules during a standard set-up.



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Normative Text:

Identification – Any piece of rolling stock, including locomotives, placed on club modules for use not under the direct and constant supervision of the owner must be identifiable by a unique mark on the piece of equipment. The layout coordinator or yardmaster must be informed of the marking method.

Wheel gauge and contour – All wheels shall conform to the NMRA Mark III or Mark IV standards gauge in all critical dimensions as defined by NMRA specification RP.25.

Weight – All cars shall be sufficiently weighted to track well. Appropriate weight may be determined by the NMRA recommended practice:

One (1) ounce, plus one half ($\frac{1}{2}$) ounce for every inch of car length

or:

One (1) ounce for each ten (10) scale feet of car length

Couplers – Standard knuckle couplers (Kadee and compatibles) shall be installed and conform to the Kadee height gauge for height (when knuckle is relaxed). Vertical knuckle play shall not exceed $\frac{1}{4}$ the height of the knuckle. Trip pins (when installed) shall clear the bottom plate of the height gauge. The coupler must open properly, and not stick open.

Comments:

Identification – Typical marking methods include the use of a commercial paint marker such as from Testors®. Members place their club member number in an inconspicuous location on the undercarriage of the car or engine. Alternatively single or multiple color dots or bands may be placed in selected areas of the frame, axle, or truck screw. New members should inquire what colors/patterns are not in use before committing to a mark or their number.

Couplers – Body mounted couplers are preferable. Draft gear housings must be securely attached to the car, preferably by screws rather than an adhesive.

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Category:

Equipment - Rolling Stock

Number & Title:

E3 – Rolling Stock, Non-Interchangeable

Version:

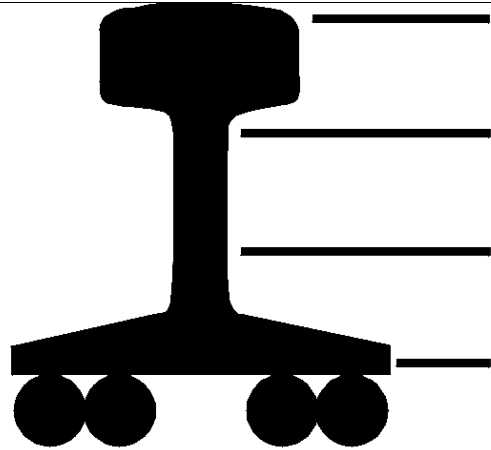
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Issue Date:

March 2001

Purpose:

Establish minimum guidelines for rolling stock that may be run on club modules during a standard set-up.



rails on wheels

Normative Text:

Identification – Any piece of rolling stock, including locomotives, which will be under the direct and constant supervision of the owner while on club modules need not be identifiable by a unique mark.

Wheel gauge and contour – All wheels should conform to the NMRA specification RP.25. Wheels not complying may not cause interference with operations, such as electrical shorting or repeated derailing.

Couplers – Horn-hook (X2F) couplers may be used. Coupler trip pins shall clear all track work if not removed.

Excess height, excess width, and non-standard cars will be permitted if they clear all obstructions on the mainline portion of the layout set-up as established. The owner is responsible to check clearances prior to the start of a session so as not to interrupt an operating session.

Comments:

Some older or European equipment may run satisfactorily on the layout, but must be checked for operation. These checks must be made prior to starting a public operating session so there is no interruption in the public “show”. Any equipment not performing reliably, i.e. repeated derail, or shorting of other equipment on the layout, must be removed promptly.

Known clearance problems may limit use of excess height cars when certain modules are included in a layout set-up. Excess length car owners are responsible to check for “ski-jumps” prior to an operating session.

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Category:

Module construction

Number & Title:

M1 – Module compatibility

Version:

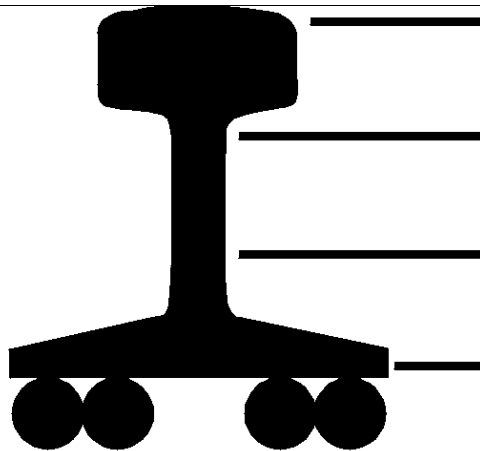
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Issue Date:

January 2010

Purpose:

Establish minimum criteria for module bench work so that multiple modules may be combined with other modules to form a working layout.



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Normative Text:

Module height – The base of the rail should nominally be at 40 inches. It is desirable that this dimension be adjustable by a tolerance of plus/minus one (1) inch.

Module length – Modules intended for inclusion in closed loop configured set-ups shall be constructed with lengths in even multiples of two (2) feet, typically 4 or 6 feet. Married sets of varying lengths will be acceptable if the total length of modules provided by an individual owner is an even dimension.

Interface – The connecting end or “interface” of a module should present a square edge for the width of the module, and three and one half (3 ½) in height. The back facing should not have any components attached which would prevent installation of “C” clamps in suitable locations for securing connection of one module to the next. A bolt hole ½ inches in diameter shall be drilled centered between the two main tracks and 2 ¼ inches below the rail. There should be a spline or wood base under the entire mainline track, but shall not be less than the last 12 inches of track perpendicular to the interface edge.

Skirting – Modules intended for public show set-ups shall be configured for installation of skirting. Hook and loop fastener (Velcro®) should be securely attached to the front and back bottom edge (or side if the face is deeper than 3 ½ inches) of the bench work. The hook portion should be mounted to the module, the loop portion to the skirting. Skirting material should be treated with a fire-retardant to comply with fire codes in effect at most public set-up locations. Optionally, the hook fastener should extend six (6) inches in on each end of the interface edge.

Backdrops – Modules may be equipped with scenic backdrops if they do not exceed 14 inches in height above the basic module for a total height of 54 inches.

Completion – Modules shall be considered complete for public show inclusion if they comply with this standard, T1 for track work, and W2 for electrical compatibility. Additionally the track shall be ballasted and appropriate scenery applied so that any foam or other base material is not visible. Totally complete modules will also have the rail painted an appropriate color.

Comments:

The club furnished interface alignment fixture should be used for location of the hole in the interface.

Ideally, modules should be interchangeable end-for-end.

Module width is typically 24 or 30 inches. Other widths may be used, but may not be suitable for certain set-ups or storage in the club trailer.

Any modules with installed uncoupling devices may cause mechanical problems that would not be suitable in a public show, and could be excluded from such set-ups.

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Category:

Module construction

Number & Title:

M3 – Interface alignment fixture

Version:

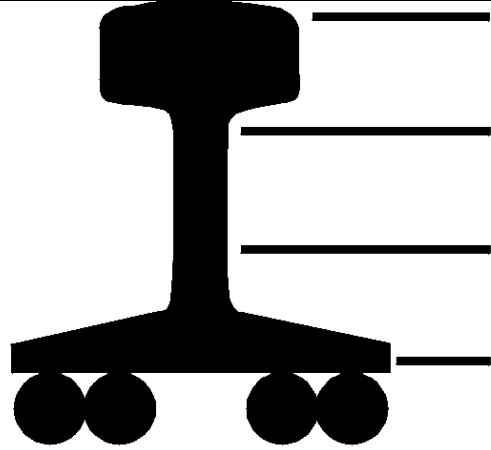
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Issue Date:

January 2010

Purpose:

Establish minimum criteria for a fixturing tool to use during module construction to assure proper alignment of track and bolt connecting holes.

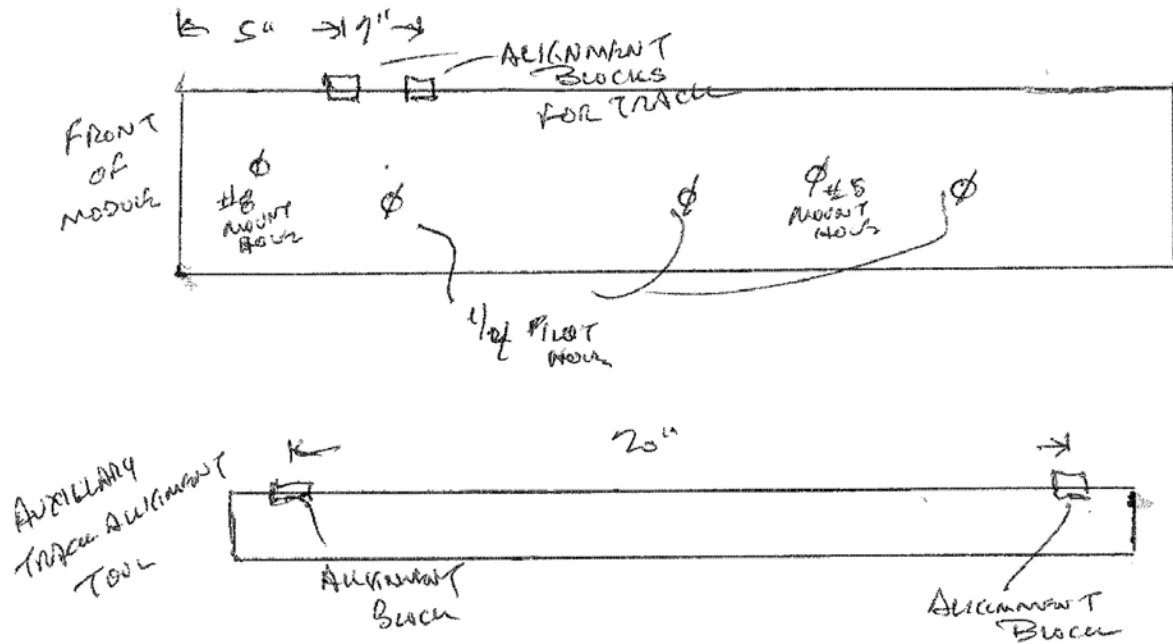


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Normative Text:

The club shall have constructed an interface alignment fixture to allow for the proper placement of the mainline track on two (2) inch centers at the interface. The fixture shall assist in placement of the 1/2 inch hole centered under the track for attachment hardware (1/4 - 20 bolt and nut). An auxiliary fixture shall provide for the proper placement of a branchline track on a module with the two mainline tracks.

Fixture design:



Comments:

Fixture will be made available to club members for the construction phase of module building.

RP M2 is retired.

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Sponsor:

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Category:

Track work

Number & Title:

T1 – Module track work

Version:

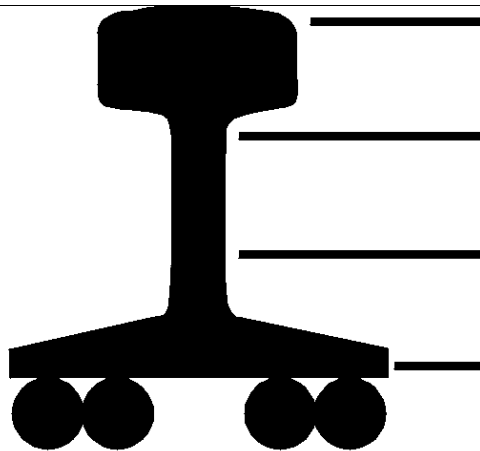
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Issue Date:

January 2010

Purpose:

Establish standardized guidelines for track work on modules to allow compatible connection of modules.



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Normative Text:

Mainline – Track considered mainline shall be either Code 83 or Code 100 nickel-silver rail.

Double track – Tangent sets of track on two (2) inch centers. This is a critical dimension and considered the standard for any module to be considered for inclusion in a standard closed loop set-up. Minimum curve radius shall be 42 inches. Crossovers shall be a minimum #8 turnout. Diverging routes such as passing sidings and branch lines shall be a minimum #6 turnout. A tighter turnout may be used if the mainline traffic will not use the diverging route (i.e. industrial spurs). Preferred location is five (5) inches and seven (7) inches on center set in from the front (viewing) face of the module. Any connection between outside, inside, and branchline tracks must be insulated on both rails to keep electrical blocks isolated.

Single track – Minimum curve radius shall be 30 inches. Diverging mainline routes should use a minimum #6 turnout.

Branchline – A single track module or a third track on a module with the standard two mainline tracks may be considered a branchline. Alignment of a third track should be on a 20 inch center from the inside mainline track at the module interface. Branchline and other tracks on a module may be Code 70, 83 or 100 nickel-silver rail. There is no limit to the number of tracks running between modules as long as any tangent track is a minimum of two (2) inches on center.

Grades – Mainline grades shall not exceed three percent (3%), that is, a three (3) inch rise (drop) over 100 inches of travel. Start of grades shall be set back a minimum of six (6) inches from a standard interface.

Clearance – All structures and scenery should be installed to clear an NMRA standard gauge including “hi-cube” and “double-stack” cars. No uncoupling devices may be installed on any mainline or passing track.

Ties should be continued up to the interface, with the rail cut back at one (1) inch. Ties at that point shall be undercut to allow installation of a rail joiner. A two (2) inch rail shall be used to bridge the gap.

Comments:

Bridge tracks are generally not used on Rails on Wheels modules. Anyone using bridge tracks is responsible for providing suitable bridge tracks/joining rail for any set-ups. The last two inches of rail at a standard interface must be Code 83, regardless of the rail size used throughout the module.

Common choice of mainline ballast color is Woodland Scenics™ light gray ballast. Size is medium. Rail and “PC” ties used to secure the rail end should be painted a suitable color.

The club furnished interface alignment fixture shall be used to establish the two (2) inch track center at the interface. Spacing inside the module can be determined using the MLR parallel track tool.

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Sponsor:

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Category:

Wiring

Number & Title:

W2 – Electrical Wiring (DCC)

Version:

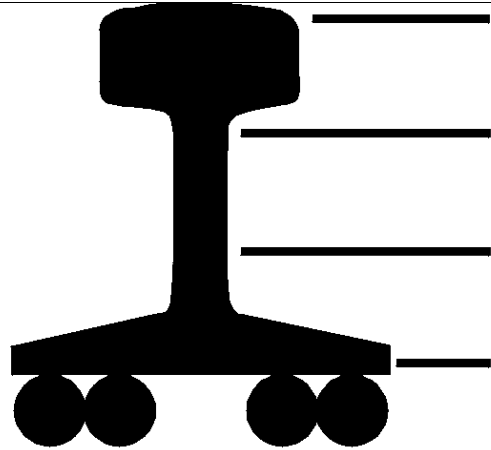
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Issue Date:

January 2010

Purpose:

Establish minimum guidelines for the electrical wiring on a standard module designed for use of DCC. This will also allow the use of DC if desired.



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Normative Text:

Electrical Bus – An electrical bus shall be used to carry power from one end of the module to the other. Bus wires shall be 12-gauge stranded, running the length of the module as pairs.

Cab control bus – Two (2) pair of wires, one “red” cab, one “yellow” cab. The pairs must be appropriately color-coded. It is desired that the red cab be the outermost positioned pair, and the yellow cab positioned in the innermost mounting position at the interfaces.

Track feed bus – Two (2) pair of wires, one for the “outside” main feeders, one for the “inside” main feeders. Typically these pairs may be color-coded blue for the outside and green for the inside. These pairs should be positioned appropriately between the cab lines, outside next to the red cab, and inside next to the yellow cab. Additional tracks shall have appropriately color coded buses as necessary.

Track feeders – Each section of rail shall be connected to the appropriate track feed bus preferably by 18-gauge stranded wires, but no less than 20-gauge stranded wire. Mainline track shall have two feeder wire connections for each section of rail.

Interface termination – Each bus pair shall be terminated at the standard interface with a two conductor Anderson Power Pole connector assembly. These connectors should be on “pig-tails” extending a minimum of five inches beyond the interface. Wire connection shall be as contained in RP W3.

DCC Control – Each module shall be equipped to carry the LOCONET cable from one end to the other. This cable shall have six wires (3 pair) and terminate in an RJ11 jack on each end. This may be accomplished by installing the Digitrax® UP5 or equivalent. The position of these jacks should be between 6 and 12 inches from each end of the left side of the module fascia (when viewing the fascia sides).

Track Isolation – For the purpose of power distribution in multiple blocks, the outside, inside, branchline or other set of rails must be electrically isolated from the others. Common rail shall not be allowed. Block boundaries shall be gapped on both rails.

Comments:

For best operation, turnout frogs, and points should be powered with feeder wires, and not rely on carrying power through the points.

RP W1 for DC wiring is retired.

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Category:

Wiring

Number & Title:

W3 – Modular Connectors

Version:

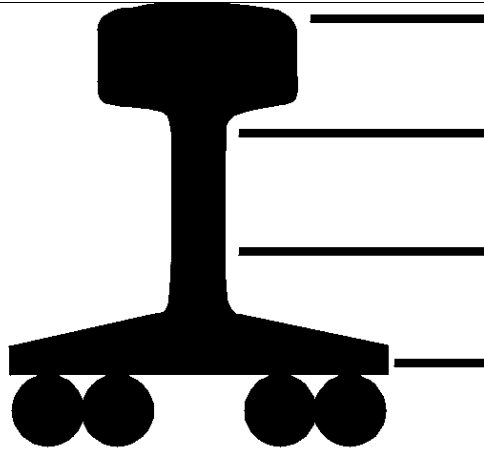
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Issue Date:

January 2010

Purpose:

Establish minimum guidelines for the electrical wiring connections between modules using Anderson Powerpole® Modular Connector Assemblies.



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Normative Text:

Interface termination using Anderson Powerpole® Modular Connectors provides a convenient and reliable connection between modules that is easily color-coded.

Each bus pair shall be terminated at the standard interface with a two module Powerpole® connector assembly comprising a black housing and a color-coded housing. At the **east** end the colored housing shall be assembled on the **top** side of the black housing when viewing the hood and tongue end of the connector (hood on top, tongue on bottom). At the **west** end the colored housing shall be assembled on the **bottom** side of the black housing when viewing the hood and tongue end of the connector. Wire connection shall be as follows:

Red Cab color-coded with a Red connector.

Outside main track color-coded with a Blue connector.

Inside main track color-coded with a Green connector.

Yellow Cab color-coded with a Yellow connector.

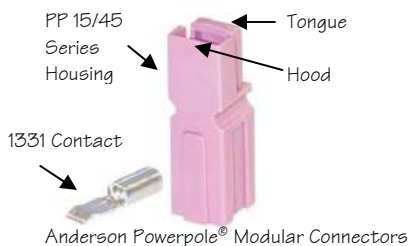
The polarity connection shall be the same for all tracks. The outside rail (rail nearest the outside edge of the module) in the colored housing, the inside rail (away from the outside) in the Black housing.

Terminal block mounting should have the Red bus in the outermost mounting position followed by the Blue bus, Green bus and Yellow bus in that order moving to the inside mounting position.

Modules having a branch line or third track bus shall use a Gray housing for color-coding and be connected the same as for the mainline tracks.

Colored and black housings will mate to the same color in each normal configuration connection. When a module is turned end-for-end the proper polarity will be maintained for the now reversed "inside and outside" tracks, with the colored housing connecting to the black housing.

Comments:



Color	Housing P/N	1330 Series set P/N
Black	1327G6	1330G4
Red	1327	1330
Blue	1327G8	1330G12
Green	1327G5	1330G2
Yellow	1327G16	1330G11
Gray	1327G18	1330G14

30 Amp Contact P/N 1331 (for 12-gauge wire)