



POWAY STATION
ALL SCALE MODEL RAILROAD CLUB
a California 501c3 Non-Profit Corporation
www.powystation.org



ELECTRICAL STANDARDS FOR DC OPERATION¹

Poway Station All Scale Model Railroad Club (Poway Station) subscribes to all National Model Railroad Association (NMRA) Standards and Recommended Practices (RPs). Specific exceptions and additions to NMRA Standards and RPs are noted below. Unless otherwise indicated, NMRA RPs are Poway Station minimum standards. In the event that a Poway Station member desires to connect his or her module to other NMRA standard modules at a function of the NMRA, or other public show not sponsored by Poway Station, that member will be responsible for providing appropriate transition between the modules. Likewise, Poway Station members who wish to construct modules strictly to NMRA standards may do so, but will be required to provide appropriate transition to Poway Station modules at the frontier². Questions on these standards should be directed to the Poway Station Standards Committee, who will make a recommendation to the Board for final action regarding any deviations from these standards.

NMRA Standards and RPs have not been reproduced here, but are available at the NMRA web page, <http://www.nmra.org/standards/>. Printed copies of the NMRA Standards and RPs will be available for review at most Poway Station club meetings.

In addition, the majority of NMRA and Poway Station standards are based on the Ntrak Standards, developed by Ntrak, Inc., and published in *The Ntrak Module "How To" Book*, a copy of which will be available for review at most Poway Station club meetings.

Non-conforming modules owned by new or prospective members will be evaluated by the Standards Committee, and an accommodation will be negotiated. Non-members wishing to operate their modules with Poway Station must provide suitable transition to Poway Station modules.

I. STANDARDS

A. GENERAL

1. These Standards are required only for common-use tracks. They are recommended (but not required) for other tracks.

¹ Poway Station is developing DCC standards. DCC is not operated at this time.

² "Frontier" is defined as the interface between two modules owned by different members, or by a member and Poway Station.



2. For reference, each module has a front (the normal viewing side) a back (the skyboard side) and a left and right end, when viewed from the front. Refer to the module diagram in the National Model Railroad Association (NMRA) Introduction to Module Standards and Recommended Practices, on the Internet at http://www.nmra.org/standards/ms_intro.html. To avoid confusion, when constructing a reversible module, the “front” will be the edge closest to Track 1.
3. The mainline closest to the front at the module frontier shall be Track 1. The next track towards the rear shall be Track 2 etc. If there is another track, such as a siding, between the first mainline and the viewing edge of the module, it shall be Track 0.

A mainline track that has been relocated to be closer to the front edge of the module **shall not** be re-numbered. In this case, no Track 0 will be possible.

B. INTERCONNECTION CABLE AND CONNECTORS

1. WIRING HARNESSSES (buss)
 - a. Wiring harnesses consist of at least # 16 gauge stranded wire. The wire in the harnesses (buss) shall be color coded as per Table 1, below.
 - b. Cinch Jones, series 300, two pin, plugs and sockets (or compatible) are used to connect the harnesses between modules at the frontier. Poway Station has a supply of the appropriate connectors that can be purchased by club members.
 - 1). Cinch Jones, series 300, two pin, cable clamp (male) plug (p/n P-302-CCT) on the right side of the module. A minimum pigtail of twelve inches must be provided below the module edge on the (male) right end.
 - 2) Cinch Jones, series 300, two pin, panel mount (female) socket (p/n S-302-AB) or Cinch Jones, series 300, two pin cable mount (female) socket (p/n S-302-CCT) on the left side of the module. A minimum pigtail of six inches must be provided below the module edge on the (female) left end if using the cable mount socket. If using a panel mount socket, see Recommended Practice II.B.1., below.
 - c. For each connector and the track associated with it, wiring shall be consistent among modules to provide electrical continuity.



- 1) the wide plug/socket shall be connected to the front rail,
 - 2) the narrow plug/socket shall be connected to the back rail.
 - 3) for the DC buss (White/Black line), if used,
 - a) the white wire shall be connected to the wide plug/socket, and carry the positive (+) DC
 - b) the black wire shall be connected to the narrow plug/socket, and carry the negative (-) DC
- d. Both male and female connector ends shall be color-coded for easy identification and connection during set up
- 1) Track 1 shall be RED
 - 2) Track 2 shall be YELLOW
 - 3) Track 3 (if used) shall be BLUE
 - 4) Other local tracks shall be orange or green (or other colors as needed, provided they do not conflict with colors already assigned)
 - 5) DC buss (if used) shall be white.

Track/Rail	Gauge	Wire Color	Connect or Color	HO
1 front	16	Red	Red	Track 1
1 rear	16	Brown		
2 front	16	Yellow	Yellow	Track 2
2 rear	16	Violet		
3 front	16	Blue	Blue	Track 3 - Optional
3 rear	16	Gray		
0/4 front/local	16	Orange	Orange	Other tracks - Optional
0/4 rear/local	16	Green		
DC +	16	White	White	Optional
DC -	16	Black		

Table 1



Coloring may be effected by painting, or wrapping appropriately colored tape around connectors.

- e. The wiring harnesses shall have a barrier type terminal strip mounted near the center of the module, for connecting the buss to the feeder wires. (See Recommended practice II.B.2, below.)
- f. Feeder wires (20 to 24 gage wire) shall be soldered to the track and connected to the buss at the barrier terminal strip.

C. GENERAL WIRING PRACTICES

1. NMRA Electrical Standard S-9 shall apply.
2. On all electrical connections use Rosin-core solder ONLY.
3. All rail joiners shall be soldered, or the rail joint shall be connected with jumpers soldered to each rail. The exception is if it is an insulating rail joiner at a required electrical gap.
4. No section of common-use track shall depend on power being fed through bridge track.
5. All non-common-use (local) track shall be capable of being electrically isolated from common-use trackage and be able to operate under its own power.
6. Powering of local tracks, switch machines, building lights, etc is the responsibility of the individual builder. A separate power source must be provided.

D. GAPPING AND POWERING OF RAILS

1. No air gaps are allowed: use insulated rail joiners or other insulating material.
2. Both common-use rails shall be gapped at the following locations (there is no NMRA standard).
 - Between turnouts located frog-to-frog
 - Between turnout frogs in opposite rails
 - Between turnouts when frogs in same rail
 - Gap behind turnouts for independent control of power to siding and at each end of double-ended sidings
 - Gap a scissors crossover at eight places: all rails between points, frogs, and at crossing



3. Feed power from point ends of turnouts
4. Feed power from middle of common trackage without turnouts

II. RECOMMENDED PRACTICES

A. GENERAL

Recommended practices below are intended to facilitate set up, operation, and trouble-shooting of modules. While not required, most members should strongly consider implementing these practices.

B. INTERCONNECTION CABLE AND CONNECTORS

1. If using the panel mount socket, a metal bracket should be fabricated that will fasten to the module and hold the connector. (The club has a limited number of these brackets, having three holes, available for sale. We are attempting to locate a source for replacements, with provision for more holes.)
2. European-style terminal barrier strips are recommended to connect the harnesses to the barrier strip. These do not require the use of fork-type terminal connectors. Fork-type terminal connectors are required if European-style terminal strips are not used.
3. Harnesses and feeder wires should be supported on each module. Use "P" clips, insulated staples, or other suitable hanger.
4. Harnesses (and other wiring, if present) should be bundled using zip ties or other suitable binders.
5. Local power should not be drawn from the DC (White/Black) buss. The buss, if present, should be reserved for future use in powering throttles and block detectors. Existing modules that do not currently comply with this Recommended Practice are automatically granted an exemption until such time as the HO scale group develops the block detection system.

C. GENERAL WIRING PRACTICES

1. Wire for feeders should be stranded

D. GAPPING AND POWERING OF RAILS

Where possible, location of gaps before (in the direction of the points) turnout frogs should allow a minimum distance between the gap and the points to



accommodate the longest locomotive that will be operated through the turnout, and a distance to accommodate the locomotive and at least one car is preferred.