



NMRA Standard	
Six & Eight Pin Decoder Interface	
Sep 10, 2020	S-9.1.1.1 Draft

1 General

1.1 Introduction and Intended Use (Informative)

This Standard defines a multi-pole interface for locomotives and cars. It is suitable for non-sound decoders in most scales. These interface connectors are not recommended for new designs. An extensive population exist in older equipment. The Small (6 pin) connector provides connections for power pickup from two rails, motor control and two lighting outputs (usually forward and rear headlights). The Medium (8 pin) interface provides one additional output that can be used for additional lighting or other accessories so long as the current capacity is not exceeded.

When an extended service interface socket (or plug) is built-into a locomotive or car by a manufacturer, the manufacturer shall document very clearly which connection is wired to which built-in equipment. The extended service socket (or plug) should be made in such a way that it is possible to insert a basic service plug (or socket) only in those socket holes (plug pins) corresponding to the basic service socket (plug).

Two interface designs (Small and Medium) are specified for different size and power applications. Their mechanical characteristics are specified in Table 2.1, while the assignment of their connections is given in Table 3.1. Figures 3.1 and 3.2 illustrate the Medium interface socket and the Small interface socket, and the numbering of the connections on each.

1.2 References

This standard should be interpreted in the context of the following NMRA Standards, Technical Notes, and Technical Information.

1.2.1 Normative

- S-9.1.1 DCC Interfaces, which specifies general DCC interface requirements

1.2.2 Informative

- TN-9.1.1 DCC Interfaces, which provides commentary on general DCC interface requirements
- TI-9.1.1 Sources for Connectors for DCC, which provides a list of manufacturer part numbers for DCC interface connectors

1.3 Terminology

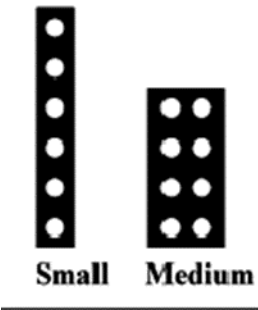
Term	Definition
Vehicle	Mobile model railroad device. This includes locomotives and other rolling stock.
Decoder	DCC receiver for controlling vehicle animation.

30 **1.4 Requirements**

To meet this Standard all mechanical and electrical values mentioned must be met and respected, unless otherwise noted. It is not necessary to implement all connections of the interface. The pins with unimplemented features must remain unconnected. This applies to vehicles as well as for other devices that use this interface.

35 **2 Mechanical Properties**

	Small	Medium
Connections (layout)	6 (1x6)	8 (2x4)
Part in Locomotive/car	female	female
Pitch	0.050"	0.100"
Pin Section	circular(1)	circular(1)
Pin Length	0.118"	0.155"
Tolerance	0.001"	0.010"
Pin Diameter	0.017"	0.022"
Tolerance	0.002"	0.002"
Current Rating	0.50A	1.50A
Peak Current Rating	0.75A	3.00A
Suitable for Scales	N or larger	HO or larger



40 (1) Pins with a square or rectangular section are an acceptable alternative provided they offer similar power rating and physical contact quality as pins with a circular section.

Locomotives or cars that have a built-in interface (socket or plug) shall be identified as having one of the specified designs by using the appropriate pictogram as shown in Figure 2.1. The same pictograms shall be used to identify the interface plug or socket design that is on the controller.

45 These pictograms shall be clearly visible on the locomotive, car or controller packaging.

For Medium Interface designs, a minimum distance of 0.180" (is required for decoder clearance above the socket.

3 Electrical Properties

3.1 Pin Assignment

Table 3.1: Interface Six Pin Socket

Pin	Small	Color
1	Motor (+)	Orange
2	Motor (-)	Gray
3	Right Rail	Red
4	Left Rail	Black
5	Front Headlight	White
6	Rear Headlight	Yellow

Table 3.2: Interface Eight Pin Socket

Pin	Medium	Color
1	Motor (+)	Orange
2	Rear Headlight	Yellow
3	(1)	Green
4	Left Rail	Black
5	Motor (-)	Gray
6	Front Headlight	White
7	Common (V+)	Blue
8	Right Rail	Red

(1) This connection on the socket (in the locomotive) may be left unconnected or may be connected to an accessory. If connected to an accessory, the accessory must be protected by a diode, if it is polarity sensitive, to avoid any damage in case the plug is inserted the wrong way into the socket. On the plug, this connection may be left unconnected or may be connected to connection 7 or may be connected to a decoder's function output. In all cases, the use of this connection must be documented by the manufacturer.

For the Small and Medium designs, connection pin 1 shall be identified clearly on both parts of the interface. In Figures 3.1 and 3.2 a small triangle is used to identify pin 1, but other symbols may be used. It is recommended that these connections be identified either with their number or their corresponding wire color.

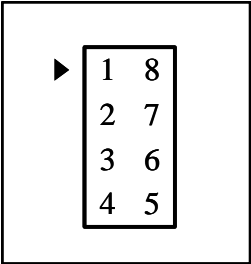


Figure 3.1: Top View Medium Interface

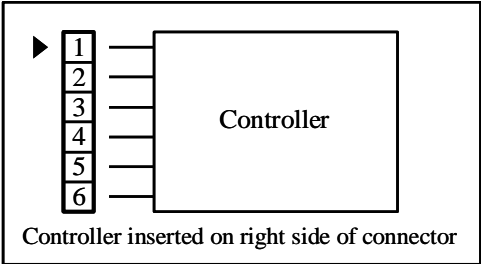


Figure 3.2 Top View Small Interface

Note: There must be no electrical connection on the locomotive side of the interface between either of the motor leads and either of the track leads or vehicle frame. In addition, a direct connection must not be made between pins 3 and 7 on the locomotive side of the interface for the medium plug. Either type of connection can lead to decoder damage.

3.2 Color Code of Wiring

Wiring of this interface must conform to the color code for wiring in S-9.1.1.

4 Document History

Date	Description
Sep 10, 2020	Six & Eight pin decoder interface connectors split out from S-9.1.1 as a separate Standard. Recommended neither be used in new designs. Changed to new template. Corrected various errors.

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