

Background

There are currently 6 sockets being used in Large Scale locomotives. Large Scale manufacturers are using these sockets to provide a plug and play environment for adding sound, track powered DCC, and battery power with RC or DCC. The premise for this proposal is that a common socket rather than a continued proliferation of multiple different sockets benefits the large scale community. The charter for this effort is under the NMRA's DCC Manufacturers Working Group.

The link to the full set of active topics is

http://www.nmra.org/standards/DCC/WGpublic/discussion_topics.html

The following proposal is in its early stages and is based in large part to the socket used in the AristoCraft locomotives. Please note that this proposal is an addition to an existing Recommended Practice which included plugs and sockets for different scales as well as recommended color codes for wiring for the motors, the lights and the track pickups.

The complete existing RP can be found at

http://www.nmra.org/standards/DCC/standards_rps/RP-911.pdf

The first part which is included below describes the pin assignment for a possible socket. Two versions are provided one for low current and one for high current locomotives. This first part was generated by a small set of Large Scale locomotive manufacturers and after market manufacturers who support both DCC and RC markets. The proposal has just completed its first of many formal comment periods to a larger set of manufacturers within the NMRAs Manufacturers WG. This WG is has nearly 100 members and is composed of manufacturers and modelers world wide. Included are many large scale locomotive manufacturers, large scale sound manufacturers, large scale DCC manufacturers and large scale RC manufacturers. Based on the comments received from both the community at large and from the entire WG the subgroup working on the large scale plug/socket topic will be expanded to included additional large scale manufacturers and users and move on to its next stage.

From the start, the intention was to produce a socket that was usable for all communities. Currently there are two R/C with batteries, two DCC products and one sound for DC products that can plug into the proposed socket but to make it truly usable additional components need to be added.

The next part of the process is specify how the socket fits into a locomotive. Included in this effort will specifications on the switches and screw terminals needed by the RC with batteries markets and for use by existing products that do not use the native socket. These switches are often not included or are wired improperly in existing Large Scale locomotives so specifying these correctly is essential to the ultimate success of the entire effort.

There is a long way to go to achieve a free and open plug and play electronics platform for Large Scale and there are no guaranties that we will be able to accomplish our goals. Your comments are solicited.

Updates to the proposal will be published as the subgroup generates them. Version 3.x is not expected till late November Note: The following topic is a proposal only and is still in draft stage and subject to change as a result of the review process. This proposal has not been approved by the WG, the Technical Department or the NMRA.

Topic 0707092 Large Scale Plug/socket V2.3

Changes made since V2.2

High current option provided, pin specification changed to gold plated connectors, space requirements slightly changed to reflect current practice. Additional notes provided to provide more information of pins. RF suppression note removed until more understanding of new requirements is obtained. J2 reduced to 11 pins.

Changes made since V2.1

Table was changed to better correspond with the figure to make it easier to read. Additional specifications for reed switch and chuff/motion inputs, minor spelling fixed.

Changes made since V1.0:

Figure was inverted, Rail +/- changed to match convention, Numbering changed to include socket number, no other components in space statement added. Improved wording in footnotes for track polarity and minor spelling corrections.

RP-9.1.1 changes

Change Section

E. Controller Color Code of Wiring

To

G. Controller Color Code of Wiring

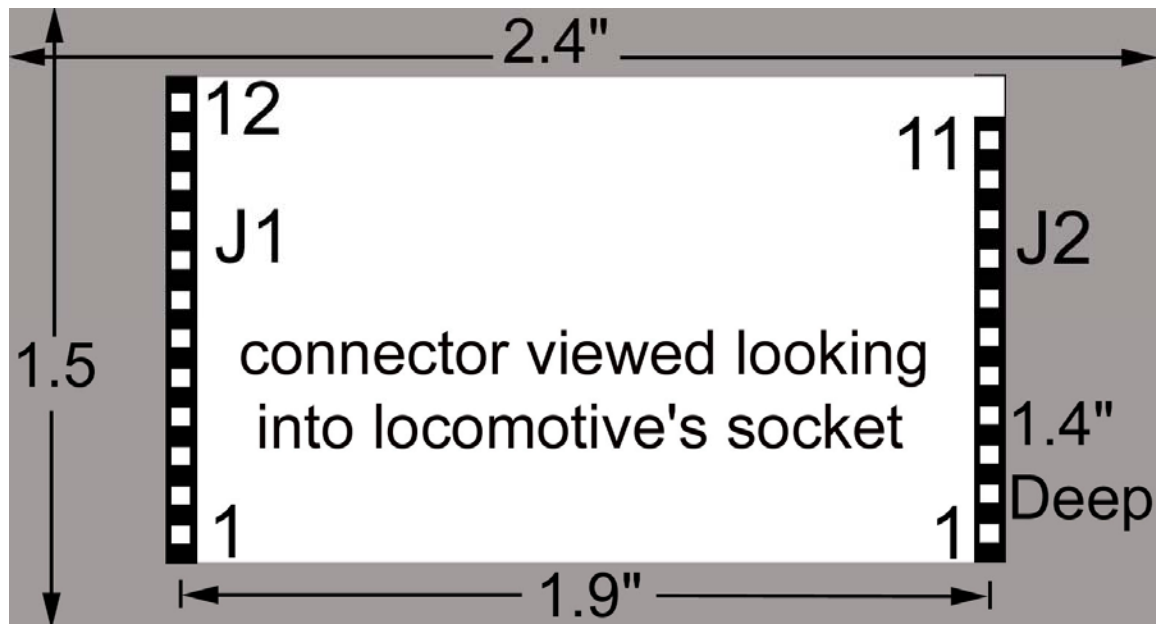
(note new section E being reserved for Topic 0707091)

Add new Section F

F: Optional Locomotive Interface Electromechanical Specifications for Large Scale

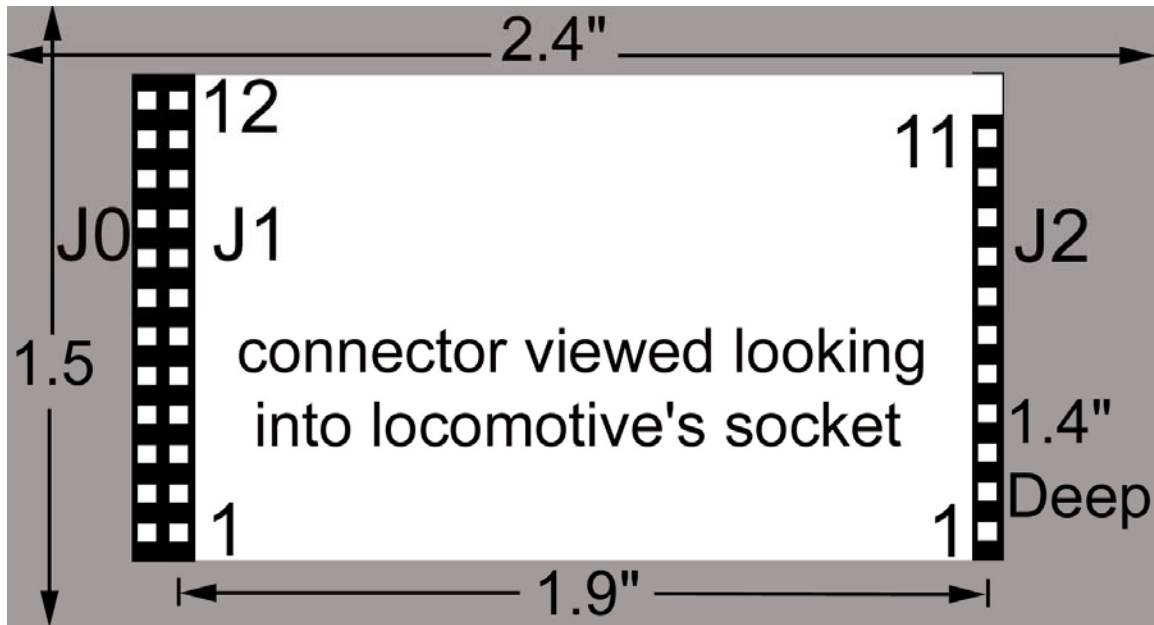
The following electromechanical interface is provided to promote interchange of electronics within a Large Scale locomotive. In addition to the interface a volume of space must be provided in the locomotive to accommodate a variety of devices to be plugged in. The interface comes in two styles depending on the amperage required (standard amperage or hi amperage). The standard amperage socket is intended for use in locomotives that consume up to 4 amps motor/8 amps total. The high amperage socket is intended for locomotives that consume 8 amps motor/12 amps total. Motor amperage in this case is defined as the wheel slip amperage at 20 volts DC.

The standard amperage socket in the locomotive consists of two rows of sockets (labeled J1 and J2) each with .025" (0.64MM) square post header centerline: .100" (2.54MM) J1 has 12 pins and J2 11 pins. The two rows are parallel to each other and separated 49mm (1.9") apart. An example part number for the male plug that goes on the decoder is Samtec TSW-112-07-L-S for J1 and TSW-111-07-L-S for J2. An example part number for the female socket that goes in the locomotive is Samtec SSW-112-01-F-S for J1 or SSW-111-01-F-S for J2



For the high amperage socket a third row of pins (J0) is added adjacent to J1 (see diagram), An An example part number for the J0-J1 male plug that goes on the decoder is Samtec TSW-112-07-L-D. An example part number for the female J0-J1 socket that goes in the locomotive is Samtec SSW-112-01-F-D.

The following diagram shows the high amperage socket in the locomotive as viewed from the device to be plugged in.



For both the standard and high amperage versions, J1:Pin #1 should be clearly identified. In order to ensure that there is sufficient space for electronics to be inserted in the socket a volume of space 2.6" (66mm) long x 1.4" (36mm) wide x 1.4" (36mm) high shall be provided with the socket centered at the bottom of this space. The sockets J1 and J2 are the only components in this space when nothing is plugged into the socket.

The socket in the locomotive can be oriented in any direction including so that the device that plugs in is upside down. The locomotive side of the connector must have sockets for all pins. For mechanical reasons any device that plugs into this socket must have some pins in both sockets even if there are no electrical connections to these pins. At a minimum, pins J1:1, J1:2, J1:11, J1:12, J2:1 and J2:10 shall be on all boards designed to plug into this socket.

Following are the pin assignments for the standard amperage plug/socket

Pin number J1	Purpose	Pin Number J2	Purpose
12	Rail 2 +		
11	Rail 2 +	11	Auxiliary Power Activation Ground = on
10	Motor +	10	Function Output 1 Ground = on

9	Rear Light Ground = on	9	Function Output 2 Ground = on
8	Smoke Function Ground = on	8	Function Output 3 Ground = on
7	Decoder Ground	7	Function Output 4 Ground = on
6	Decoder Positive	6	Function Output 5 Ground = on
5	Chuff/Motion/Sensor Input On contact voltage high	5	Train Bus -
4	Front Headlight Ground = on	4	Train Bus +
3	Motor -	3	Speaker -
2	Rail 1 -	2	Reed Switch Input Connect to ground active
1	Rail 1 -	1	Speaker +

Following are the pin assignments for J0/J1 for the Hi-Amperage plug/socket, J2 assignments remain the same as in the standard amperage socket.

Pin number J0	Purpose	Pin number J1	Purpose
12	Rail 2 +	12	Rail 2 +
11	Rail 2 +	11	Rail 2 +
10	Motor +	10	No Connection
9	Motor +	9	Rear Light Ground
8	Decoder Ground	8	Smoke Function Ground
7	Decoder Ground	7	Decoder Ground
6	Decoder Positive	6	Decoder Positive
5	Decoder Positive	5	Chuff/Motion/Sensor Input On contact voltage high
4	Motor -	4	Front Headlight Ground
3	Motor -	3	No Connection
2	Rail 1 -	2	Rail 1 -
1	Rail 1 -	1	Rail 1 -

Notes:

1. When Motor + is connected to a positive DC voltage locomotive moves forward.
2. When used with a Right Rail positive locomotive, Rail 2 + connects to the right rail. When used with a Left Rail positive locomotive, Rail 2 + connects to the Left Rail. Locomotives labeled as "G" typically use a Left Rail Positive convention while #1 Scale and other Large Scales typically use a Right Rail positive convention. Locomotives intended to be used with either convention typically have a switch for the rail polarity.
3. Ideally all the power for the locomotive goes through the socket. This means that ideally the dummy plug would have the required rectifier
4. Sockets not needed for the particular locomotive should not have any connection to the socket pin #. However it is always good that unused sockets go to a

convenient solder pad or screw terminal so that the user can make an easy connection to these sockets for after market purposes.

5. Legacy sockets build prior to this RP do not have socket J2:11 or a key in J2:12 and may have unpredicted connections to socket #s J1:5, J1:7, J2:4, J2:5, J2:6, J2:7, J2:8, and J2:9,
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