



NMRA Technical Note	
Next18 & Next18-S Decoder Interface	
Sep 10, 2020	TN-9.1.1.5 Draft

1 Introduction

Decoder interface standards exist in order to aid in installation of decoders into vehicle system boards. Installation can be performed by the vehicle manufacturer or separately by the individual modeler.

5 1.1 Served Use Cases

The intent is that any decoder which conforms to the standard, from any manufacturer, will operate with any vehicle system board which conforms to the standard, from any manufacturer. Operate is further defined as not to cause any permanent damage of the decoder or vehicle system board.

1.2 Unserved Use Cases

- 10 It is not the purpose of the standard to ensure that every decoder and vehicle system board implements all of the possible features defined by the standard. Operation is limited to the features supported by the decoder and/or vehicle system board, as documented by the respective manufacturers.

2 Annotations to the Standard

15 2.1 General

2.1.1 Introduction and Intended Use

2.1.2 References

Additional relevant references are found in S-9.1.1.5.

- S-9.1.1.5 Next18 and Next18-S Decoder Interface

20 2.1.3 Terminology

2.1.4 Requirements

It is important to note that a product is not required to implement all connections of the interface. A manufacturer may choose to omit certain features, for example the number of function outputs. It is incumbent on the manufacturer to document for users the supported features of their product(s).

25 2.2 Mechanical Properties

The mechanical properties are provided in general terms so as not to codify into the standard any limit to alternative sources. Proper connector sources will result in a “click” of the two mating socket and plug components. TI-9.1.1 contains a list of manufacturer and part numbers for connector sources that have been tested for conformance to the standard.

- 30 There are older revisions of RCN-118 and NEM 662 which define the Next18-S decoder width as 10.5 mm max. The Next18-S maximum width has been narrowed in order to better support North American narrow body diesel models in N scale. The NMRA Conformance and Inspection committee may allow exemptions up to 10.5 mm in width, at their discretion, depending on when

35 the decoder under test was originally designed. New designs are required to use 9.5 mm max width for the Next18-S.

2.2.1 Plug Specification

2.2.2 Socket Specifications

If a socket is provided that is terminated in wires, it is recommended that the wire colors follow the color codes defined in S-9.1.1.1.

40 2.2.3 Common Plug and Socket Specifications

Material (Informative)

These material characteristics are provided as an informative recommendation. Sources using other materials may also be used provided the specifications, which are normative, are still met.

45 Specification (Normative)

1. This is a minimum spec. Current carrying capacity greater than 0.5 A is also acceptable.
2. This is a minimum spec. Greater than 1000 MΩ and/or 500V DC is also acceptable.
3. This is a minimum spec. Greater than 150 Vrms AC and/or 0.5 mA and/or longer than 1 minute is also acceptable.
- 50 4. This is a maximum spec. Less than 50 mΩ is also acceptable.
5. This is a minimum spec. Wider ranges inclusive of this specification are also acceptable.
6. This specification only is informative and provides a suggestion for manufacturability.

2.3 Electrical Properties

55 The Next18 defines pins 7 and 16 as logic-level outputs while the Next18-S defines pins 7 and 16 as speaker outputs. Because a sound variant decoder or vehicle system board can be physically connected to a non-sound variant vehicle system board or decoder, it is incumbent on the manufacturer to provide protection against damage should such a combination be used by a modeler. The vehicle system board manufacturer is only responsible for protecting the vehicle system board, while the decoder manufacturer is only responsible for protecting the decoder.

60 The standard does not prescribe how a manufacturer implements the protection. However, here are some suggestions that may offer adequate protection:

Next18 + Vehicle System Board with Sound

- On decoder, do not implement functions AUX5 and AUX6, leave unconnected.
- On decoder, add series resistor in-line to AUX5 and AUX6.
- 65 • On decoder, test in software for low impedance path (speaker) connected between AUX5 and AUX6. Disable outputs AUX5 and AUX6 if a low impedance path is discovered.

Next18-S + Vehicle System Board without Sound

70 This use case is generally not a problem because the vehicle system board typically implements a high impedance transistor input to match AUX5 and AUX6 logic-level decoder outputs. Another option is for the system board to not implement AUX5 and AUX6 logic-level outputs.

2.3.1 Next18 Pin Assignment

Note that AUX5 and AUX6 logic-level outputs (pins 7 and 16) are defined for Next18 only. Next18-S uses these same pins for Speaker A and Speaker B connections.

2.3.2 Next18-S Pin Assignment

75 Note that Speaker A and Speaker B (pins 7 and 15) are defined for Next18-S only. Next18 uses these same pins for AUX5 and AUX6 logic-level outputs.

2.3.3 Description of Signals

80 V+ (pins 6 and 15 combined) is designed for a current rating of 1A. If a vehicle system board needs to consume more than 1A on V+, it may create its own version of V+ local to the vehicle system board. In the case that the vehicle system board does create its own version of V+, it is important that its local version not be connected to the interface V+ (pins 6 and 15). This could otherwise undermine the careful design of the decoder's own internal power management.

2.3.4 Use in Function Only Decoders

85 For the purpose of conformance, a function only decoder is a decoder which does not provide a motor control output on Motor + and Motor – (pins 2 and 11).

2.3.5 Use of Interface with SUSI

This is the scenario where the Next18 or Next18-S interface is used for connection between a SUSI slave device and another host decoder acting in the role of SUSI master.

2.3.6 Operation without a Decoder

90 3 Document History

Date	Description
Sep 10, 2020	First Revision

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