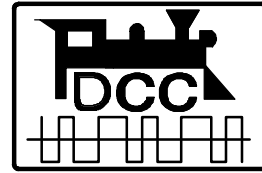


LOCOMOTIVE DECODER



Functional Test Report

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NMRA Conformance and Inspection Committee

Introduction

The purpose of this form is to document essential test results concerning functional tests of a DCC locomotive decoder as part of the conformance process. These test results will be kept on file by the NMRA as part of the conformance test process. The information contained on this form is triggered by the manufacturers submission or through independent observation and confirmed by independent observation. Checks are to the official Standards Recommended Practices, and current agreed to industry quality metrics. Deviations are noted on this form. This completed form together with the questionnaire and the results of other tests (such as the S-9.1 and S-9.2 packet tests) are sent to the DCC conformance subcommittee chair for resolution.

Functional tests on a decoder will be performed using a Conforming Command Station or packet generation device. The essence of these tests is to determine if the decoder's functionality is consistent with the NMRA DCC documentation. Where possible, the testing will also include conformation on

Basic Information

Please fill in the following information on the decoder manufacturer.

Company Name: _____

Manufacturer ID Code: _____

Please fill in the name of the person performing the actual tests.

Last Name: _____

First Name: _____

Middle Initial: _____

NMRA Number: _____

Please fill in the following information about the decoder tested.

Model Number: _____

Serial Number: _____

Hardware Revision: _____

Firmware Revision: _____

Manufacturer Date: _____

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Standards

This section documents functional test results for S-9.1 and S-9.2.

S9.1

The basic functional testing for S-9.1 is performed by default when the tests for other Standards and RPs are performed and by the bit/packet test. The only other additional tests is to check the decoder can withstand the maximum DCC voltage and continue to operate. This test is performed by placing applicable DCC voltage on the track and performing a basic functional test.

N- Scale and smaller decoders - 24 volts DCC _____
Decoders intended for Scales larger than N - 27 Volts DCC _____

S9.2

The basis S-9.2 tests are performed by the Bit/Package test. The functional tests should confirm that the decoder processes the packets correctly.

B: Baseline Packets - Test all 14 speed steps and emergency stop. Reset and Idle packets should either be independently tested or a command station that automatically generates these packets can be used.

Test Results: _____

Recommended Practices

This section provides functional test results that relates to the DCC recommended practices. Implementation of the features described in the following recommended practices is optional. However, the decoder must implement these optional features in conformance with the recommended practice in order to receive the conformance seal. These functional tests document that the decoder performs the functions correctly. Even if the decoder reports not to implement the function, the suitable commands should be sent to the decoder and the results observed.

RP9.1.1

Document and differences for the color code described in part **B: Color Code of Wiring?**

If the decoder support the connector described in part **C: Interface Electromechanical Specifications**, test the connector in a variety of installations and report any problems found.

Document any other possible problems, with the RP-9.1.1 requirements.

RP9.2.1

This section deals with test results dealing with the optional extended packet formats. Please check support each format and, any special considerations for the format that were provided by the manufacturer. Of particular importance is to note any deviations or anomalies found.

Check the decoders possible addresses to part **A: Address Partitions**. Also check and note any provided deviations. This should include observing results when the decoders base address to set to 0, to a random number between 1-127, to 127 and to a random number greater than 127.

If decoder supports 14 bit addresses check all the following functions for both 14 and 7 bit addresses. Check below if this was done.

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If the decoder supports part **B: Broadcast Command For Multi-function Digital Decoders** check this against all functions supported. Check any special considerations provided.

RP9.2.1 Commands Supported

The following table lists the possible RP9.2.1 extended packet commands. Please check the “Tested” box for all RP9.2.1 commands tested. Use the “Notes?” box for any special considerations associated with the command or with the test results.

Table 1: RP9.2.1 Commands Supported

Command	Description	Tested	Notes
0000CCCD	Decoder Control		
0001CCCC	Consist Control		
00111111	128 Speed Step Mode		
010DDDDD 011DDDDD	28 Speed Step Mode		
100DDDDD	Function Group 1		
1011DDDD	Function Group 2		
11110010	Short Form Acceleration		
11110011	Short Form Deceleration		
111001AA	Long Form Verify		
111011AA	Long Form Write		
111010AA	Long Form Bit Manipulation		

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RP9.2.2

This section deals with special information dealing with the configuration variables. To check this RP the following will be checked. Use the “Notes?” box for any observations associated with the configuration variable.

- 1) using table 1, check to see that the required CVs are supported.

Table 3: Required CVs Supported

CV	Description	Tests & Notes
1	Primary Address	
7	Manufacturer Version Number	
8	Manufacturer <u>ID</u>	
29	Configuration Data 1	

- 2) using table 1 check to see that the uniform implementations are followed for all CVs supported.

Table 4: Uniform SPec CVs Supported

CV	Description	Supported	Tests & Notes
1	Primary Address		
8	Manufacturer <u>ID</u>		
12	Power Source Conversion		
13	Analog Mode Function Status		
17/18	Extended Address		
19	Consist Address		
21	Consist Address Active for F1-F8		
22	Consist address Active for FL		
23	Acceleration Adjustment		
24	Deceleration Adjustment		
25	Speed Table/Nid Range Cab Speed Step		
29	Configuration Data #1		

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CV	Description	Supported	Tests & Notes
30	error Information		
31	Configuration Data #2		
32	Configuration Data #3		
33-42	Output Location Function Map		

3) Check to ensure that the read only CVs can not be modified.

Table 5: Read Only CVs

CV	Description	Tests & Notes
8	Manufacturer <u>ID</u>	

4) For the remainder of the CVs check that the overall intent of the CV is consistent with the intent of the RP, note any discrepancies.

Table 6: Other RP9.2.2 Configuration Variables Supported

CV	Bit	Description	Supported?	Notes?
2	-	Vstart		
3	-	Acceleration Rate		
4	-	Deceleration Rate		
5	-	Vhigh		
6	-	Vmid		
9	-	Total PWM Period		
10	-	EMF Feedback Cutout		
11	-	Packet Time-Out Value		
65	-	Kick Start		
66	-	Forward Trim		
67-94	-	Speed Table		
95	-	Reverse Trim		
105	-	User Identifier #1		
106	-	User Identifier #2		

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Manufacturer Specific Configuration Variables Supported

The following table tests the manufacturer specific configuration variables. Please describe the configuration variable in the "Description" box. Use the "Notes?" box for any special considerations observed associated with the configuration variable.

Table 3: Manufacturer Specific Configuration Variables Supported

CV	Bit	Description	Notes?

RP9.2.3

This section deals with special information dealing with the optional service mode commands. Refer to section F for instructions on what features are required for decoders that implement this RP. Ideally this part should be tested using the packet script program. In the interim checking this out with multiple conforming command stations is acceptable.

C: Entry to and Exit from Service Mode Check out any special considerations provided. Send service mode packets to the decoder while the decoder is in operations mode and check to see that the decoder does not act on these service mode instructions. Run service mode exit script and ensure that the decoder properly exists service mode. Note results.

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Check that the decoder supports the **Basic Acknowledgment Mechanism** of part **D**. Check any special considerations provided. Check this out with at least two different conforming command stations to ensure that the acknowledgment is large enough to be read. Note results.

If the decoder supports **Service Mode Instruction Packets for Direct Mode** check to see that if functions properly . Also check any special considerations provided.

If **Service Mode Instructions for Address-Only Mode** are supported, test that if the address is set, the decoder responds to that address. Check this also when the decoder is in extended address, consist address, and consist and extended addressing if these modes are supported. Note results.

If **Service Mode Instruction Packets for Physical Register Addressing** are supported, test each of the fundamental 8 registers can be accessed. Pay special attention to registers 1, 5, 7, and 8.

If the **Service Mode Instruction Packets for Paged CV Addressing** mechanism of is supported check to see that it functions as per the RP.. Also check any special considerations provided.

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RP9.2.4

This section deals with special information dealing with the optional fail-safe characteristics. Please indicate if you support each characteristic and, if so, any special considerations for the format.

Check the decoder support for part **A: Initialization of the DCC system**. This is tested by connecting the decoder to an active DCC track that is not sending packets to the decoders address. The locomotive should not move. Test any special considerations provided by the manufacturer and report results.

Check the decoder support for part **B: Converting Between Different Power Modes**. This is tested by operating a locomotive from a digital track to an analog track and back to a digital track. The second digital track should not be sending packets to the particular locomotive's address. Note results and Check any special considerations provided by the manufacturer.

Check the decoder support for part **C: Occurrence of Error Conditions**. This checks out the packet time out value if provided. This is tested by seting the packet timeout value and then stop sending packets to the locomotive. Check any special considerations provided.
