



# 1 General

## 1.1 Introduction and Intended Use (Informative)

This Technical Reference presents the preferred style to be used in preparing National Model Railroad Association (NMRA) Standards & Conformance (S&C) Department Documents. It is intended to be a supportive tool when preparing or revising an S&C document in accordance with NMRA TR-1-2020, S&C Documents and Formatting. New authors of NMRA S&C documents are especially encouraged to use this guide.

## 1.2 References

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

### 1.2.1 Normative

- None.

### 1.2.2 Informative

- TR-1-2020 S&C Documents and Formatting (with template)
- Institute of Electrical and Electronics Engineers (IEEE) Standards Association (SA) Standards Style Manual, 2024.
- Chicago Manual of Style, 2017.
- UNESCO Style Manual, 2004.

## 1.3 Terminology

Term	Definition
A	Amperes
I	Current
IEEE	Institute of Electrical and Electronic Engineers
$k_M$	Torque Constant
M	Torque
mNm	Milli-Newton-meters
NEMA	National Electrical Manufacturers Association
NMRA	National Model Railroad Association
Nm	Newton meter
S&C	Standards & Conformance Department of the NMRA
SA	Standards Association (of the IEEE)
SI	International Standard for Units

## Table of Contents

1	General .....	1
	1.1 Introduction and Intended Use (Informative) .....	1
	1.2 References .....	1
25	1.2.1 Normative .....	1
	1.2.2 Informative .....	1
	1.3 Terminology .....	1
2	Overview .....	2
	2.1 New Author Orientation .....	2
30	2.2 Returning Authors .....	3
	2.3 Document Style Continuity .....	3
	2.4 Using the Style Guide .....	3
3	Writing Style .....	3
	3.1 Perspective .....	4
35	3.2 Standard Language .....	4
	3.3 NMRA S&C Document Types .....	4
	3.4 Avoiding Bias and Stereotypes .....	5
4	Numbers, Units, and Equations .....	5
	4.1 Numbers .....	5
40	4.1.1 Base 10 Numbers .....	5
	4.1.2 Base Two and Hexadecimal Numbers .....	5
	4.1.3 Other Number Bases and Formats .....	6
	4.2 Units .....	6
	4.3 Equations .....	6
45	5 Figures and Tables .....	6
6	References .....	7
7	Document History .....	7

## 2 Overview

### 50 2.1 New Author Orientation

Preparing an S&C document involves several steps. There are administrative and procedural rules that must be followed to take the document from the draft stage all the way to the approved stage. The chair of the NMRA committee that is responsible for the document knows these rules and can help explain them. In addition, there is a template to use for preparing the S&C document. The template and instructions on how to use it can be found on the NMRA website, under Technical Reference TR-1-2020 S&C Documents and Formatting. This reference explains what must be included in an S&C document, and what the format is for preparing the document.

60 This style guide explains to the author how to write the S&C document from a style standpoint. Specifically, this guide explains what writing style and standard language to use, how to express numbers, units and equations, how to cite references and use acronyms and abbreviations, and how to include Figures and Tables in the document.

65 This guide is based significantly on the IEEE SA standards style guide. The IEEE is one of the largest professional engineering associations in the world. The IEEE SA maintains over 2,000 standards and projects (IEEE Standards Association, 2024). As a result, new authors who have standards writing experience in other organizations may find the rules included in this style guide very familiar. If an author has questions regarding style that this NMRA S&C style guide does not answer, the IEEE SA standards style guide may be able to provide some help that, upon review, will likely be considered appropriate. In addition, for questions on general writing styles, and also questions on grammar, consider reviewing *The Chicago Manual of Style* (The Chicago Manual of Style, 2017), and the *UNESCO Style Manual* (United Nations Educational, 2004). The latter includes a section on avoiding bias and stereotypes.

## 2.2 Returning Authors

75 This guide will assist returning authors by ensuring their next NMRA S&C document is prepared with the preferred style. Since the guide is based on existing industry doctrine, many of the rules presented below may be familiar to the returning author.

## 2.3 Document Style Continuity

80 When revising an existing S&C document, wherever possible, the style of the entire document should be revised to conform with this style guide. However, if the revision is not a significant part of the entire document, or if time does not permit it, it is acceptable to maintain the existing style in the revised section, to the extent necessary for continuity. This will reduce confusion and ensure the document remains readable.

## 2.4 Using the Style Guide

85 New authors should review this style guide to familiarize themselves with each preferred style rule needed to prepare a successful document. Each section of this guide addresses a different subject and can be reviewed separately, as needed for reference, by returning authors. Readers of this style guide will assess that the document targets new and inexperienced authors to encourage them to participate in the NMRA S&C document creation process.

## 90 3 Writing Style

The intended audience for NMRA S&C documents is predominantly the developers and manufacturers who create products for model railroaders. The purpose of each document is to inform the audience about factual requirements or relevant aspects of a particular technical topic in model railroading. This must be accomplished in an unambiguous way so the audience understands what must be done to bring a compliant product to market. Due to the factual and technical nature of the NMRA S&C documents, a formal technical writing style must be used to prepare them.

95 The NMRA S&C documents use a formal technical writing style that has varying levels of restriction and verbosity depending on the type of document. The differences are discussed below.

### 3.1 Perspective

100 All NMRA S&C documents are written in third-person perspective to ensure the focus of each sentence is on the technical content being conveyed and not on the audience or author. First person pronouns including ‘we’ and second-person pronouns including ‘you’ are avoided when writing in the third-person perspective so the focus remains on the topic.

### 3.2 Standard Language

105 It is important that all NMRA S&C documents use similar, standard language. This homogeneity minimizes confusion and ambiguity and reduces the time needed by the audience to understand the content of each document. It also bestows a perceived (and justified) level of professionalism and quality on the documents by the audience. To achieve this homogeneity, sentence structure, wording, and terminology should not be varied from topic to topic but should be repeated to convey  
110 similar levels of permission or restriction. It is very common in preparing these types of documents to copy and paste entire paragraphs, changing only an individual descriptor or number to identify a separate topic or fact. The successful author will review published NMRA S&C documents and become familiar with the standard language used in them before starting an NMRA S&C document draft.

### 115 3.3 NMRA S&C Document Types

There are seven S&C document types: Standards, Recommended Practices, Technical Notes, Technical Information, Technical Procedures, Technical Equipment, and Technical References. The most restrictive document type that an NMRA S &C document author can prepare is a Standard. This type of document includes specific requirements that are to be followed exactly as written. As  
120 such, the writing style and language are usually very restrictive. If a sentence in an NMRA S&C Standard conveys a requirement, then the modal verb ‘shall’ is used in the sentence to express the restriction. The modal verb ‘must’ is not usually used as an alternative to ‘shall’. Exceptions to this prohibition can occur when presenting an unavoidable situation that ‘must’ be addressed by a requirement in a Standard.

125 When presenting a less restrictive recommendation, or recommended practice, in a Standard, or other type of NMRA S&C document, the modal verb ‘should’ is used. The intent when using ‘should’ is to guide the audience toward using a specific option when multiple options are available. If, however, an option is being presented then the modal verb ‘may’ is used. It is the least restrictive modal verb when comparing ‘shall’, ‘should’, and ‘may’.

130 When preparing another document type but referencing a requirement from an NMRA S&C Standard, it is proper to restate the requirement with the restrictive modal verb ‘shall’. The referenced Standard must be cited or called out in the narrative of the less restrictive document.

Another feature of the preferred writing style that varies with the type of NMRA S&C document, is writing verbosity. An NMRA S&C Standard is written with austerity to ensure only the intended  
135 requirement, recommendation or option is conveyed and to minimize the chance for ambiguity. The statements in a Standard are usually provided with the minimal explanation necessary to convey the intent of the topic. The NMRA S&C Recommended Practice document type should be similarly austere. However, the remaining five types of NMRA S&C Technical document types should be prepared with as much narrative and graphics as is deemed necessary to fully explore the  
140 topic.

It is now recommended that all NMRA S &C Standards be prepared with a matching NMRA S&C Technical document. This pairing permits the Standard to remain austere and precise in its content,

while simultaneously providing supportive documentation to explain the intent and purpose of the Standard in detail, through the matching Technical document.

### 145 **3.4 Avoiding Bias and Stereotypes**

When preparing an NMRA S&C Document, care must be taken to avoid using unnecessary bias or stereotypes. Areas of concern can address age, cultural diversity, disability, and gender. The prepared text of any NMRA S&C Document should be reviewed with a focus on avoiding giving offense to any group of persons.

150 An avoidance example that is prudent to review when discussing communication protocols, like the NMRA Digital Command Control Standard, is the use of the non-inclusive terms ‘master’ and ‘slave’ to identify hierarchical entities. Several substitutes are actively used to avoid using these culturally offensive terms. The IEEE Editorial Style Manual (a separate document from the SA style manual) provides several solutions with ‘main’ and ‘secondary’ being the preferred terms. The  
155 popular software repository GitHub has also replaced master with ‘main’. Additionally, the global telecommunication standards organization, 3GPP, has proposed using the terms ‘primary’, ‘controller’, or ‘main’ for master, and ‘secondary’ or ‘standby’ for slave. In the electronics industry, the Open-Source Hardware Association has proposed changing master to ‘controller’ and slave to ‘peripheral’, and both the Mobile Industry Processor Interface (MIPI) Alliance and NXP, the  
160 custodian of the I2C protocol, have changed to using ‘controller’ and ‘target’. While the NMRA has not officially adopted a particular set of inclusive terms for this example, authors of NMRA S&C Documents are encouraged to avoid using any non-inclusive terms.

## **4 Numbers, Units, and Equations**

165 Numbers, units, and equations require special attention to maintain homogeneity within the document and between different documents.

### **4.1 Numbers**

When presenting numbers in an NMRA S&C Document, the type of number dictates the format. In the narrative, integer numbers without units and of value less than ten should be spelled out. All other numbers with and without units are written as numbers.

#### 170 **4.1.1 Base 10 Numbers**

A comma is placed between groups of three digits in the integer part of base ten numbers to distinguish thousands from millions, etc. The number of digits used to convey the decimal part of a number should match the required precision of the application. When numbers are expressed with powers of ten engineering notation should be used.

#### 175 **4.1.2 Base Two and Hexadecimal Numbers**

Base two numbers should be grouped in nibbles (groups of four bits) or bytes (groups of eight bits) with spaces or dashes in between groups.

180 Hexadecimal numbers are written with capital letters and may be presented as single characters, double characters or groups of four characters. Larger hexadecimal numbers use smaller groups a single space or dash in between.

### 4.1.3 Other Number Bases and Formats

For any other number base or format, e.g., time, date, or position, industry standards may be applied. Variable numbers may be expressed using upper or lower case single or multiple letters and letter-number combinations.

## 185 4.2 Units

In general, numbers with units should present the number, then a space, then the unit abbreviation.

190 With a few exceptions, the metric system is used for units in NMRA S&C Documents. When using the metric system, unless there is an industry standard or common-practice unit for a specific application, the International System of Units (SI) units are used. As an example of where SI units may not be used is in expressing hobby motor torque, where the milli-Newton-meter (mNm) may be used instead of the SI unit Newton-meter (Nm).

195 There are several exceptions to using only the metric system that may be appropriate depending on the specific situation. For example, if it desired to present both imperial units and metric units for a specific number, e.g., scale locomotive speed, then the metric unit number is presented in parenthesis after the imperial unit number. In the case of tables with a large quantity of dimensions or measurements, one side of the page shall be imperial units and the opposite side of the page metric units.

200 As another exception, trade sizes are usually expressed in their common-practice or industry standard units in NMRA S&C Documents. Small metric fasteners use millimeters (not an SI unit), but imperial size fasteners, such as 0-80 (80 threads per inch) are also acceptable units. Similarly, imperial units are often used for motor sizes where a National Electrical Manufacturer’s Association (NEMA) 17 motor is a motor with a 1.7” diameter mounting flange. In another example, the American Wire Gauge (AWG) system is often used for wire sizes in the United States and is an acceptable unit, usually expressed with the unit abbreviation AWG.

## 205 4.3 Equations

All equations should be numbered and identified first in the narrative by number, before presentation. The equations are numbered sequentially from the start of document and the numbers are presented in parentheses, to the right of the equation at the right margin. Equations that appear in an appendix to an NMRA S&C Document restart their numbers at ‘1’ in each appendix and have the appendix letter appear in front of the equation number, without a space separating the letter from the number. When introducing new terms and units in an equation they are immediately identified after the equation by using the adverb ‘where’ as shown in the example below:

“The motor torque is expressed, using Equation (7), as:

$$M = k_M I \quad (7)$$

215 where M is the torque given in mNm, I is the current in Amperes (A), and  $k_M$  is the torque constant given in mNm/A.”

## 5 Figures and Tables

220 Figures are presented as center-justified with a numbered caption below the figure, also center-justified. The figure number must be referenced in the narrative prior to the presentation of the figure. Figures are numbered sequentially from the start of the document, like equations. Figures must be scaled so all text in the figure is legible. Free drawing tools such as Google Drawings are preferred for creating graphics so that the graphic can be easily modified.

Tables are presented as center-justified with a numbered caption above the table, also center-justified. The table number must be referenced in the narrative prior to the presentation of the table. Tables are numbered sequentially from the start of the document, like equations. Tables must be scaled so all text in the table is legible. The table feature in Microsoft Word should be used to create all tables. The acceptable table style is to use black text on a white background with simple black grid lines, and without color or shading in the table cells, except that the header row may be a light gray.

## 230 **6 References**

In NMRA S&C Documents references serve several purposes. In Section 1.2 of each NMRA S&C Document, two types of references are presented that impact how the content of the document is to be interpreted. In Section 1.2.1, Normative references are presented. The normative references are those references that are foundational and required for understanding the content of the document.

In Section 1.2.2, information references are presented. These references provide helpful and supportive information for understanding the content of the document. In addition, classic citations for supporting documents are included in the informative references. In traditional technical report writing, a combined normative and informative reference section is usually presented at the end of the document. However, when preparing Standards and related technical documents, the importance of both normative and informative references is elevated and they are therefore presented separately in the front matter of the document. Citing NMRA S&C Documents and Rail Community Documents can use a limited format that presents only the title and document number. All other references should follow industry standard citing rules such as those of the IEEE or the American Psychological Association (APA).

## 245 **7 Document History**

Date	Description
Jan 10, 2025	First Version

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