NMRA STANDARDS
S-1 Overview of Scales Track & Wheel Relationships

The primary purposes of **NMRA STANDARDS** are to establish the broadest correlated set of limiting dimensions, electrical parameters, and communications parameters within which interchange may be assured. This definition includes the intricacies involved in the Track-Wheel relationship for each scale defined. It is not the specific purpose of the **NMRA STANDARDS** to set production dimensions or tolerances but rather to set limits which manufacturers can use when setting their tolerances. When used to determine manufacturing tolerances care must be taken to ensure that the production dimensions are not at the extreme edge of the range specified. Specific NMRA Tech Notes supplement the standards to provide additional guidance.

The scale names, proportions and track gauges are provided in S-1. S-2 provides standards for couplers. S-3 and S-4 provide the critical wheel and track dimensions to ensure reliable operation

S1, S3, and S4 are subdivided into three classes: Proto Scales, Standard Scales, and Scales with Deep Flanges. The purpose of this division is to provide standards for the three general classes of scale model railroading.

To ensure interchange and reliable performance, **NMRA STANDARDS** S-3 and S-4 are designed so that Track and Wheels constructed within prescribed limits will meet the following related conditions. These conditions closely parallel prototype practices. Many of the various dimensions provided are strongly related to each other and care must be taken to meet each of the specifications provided.

1. TRACK GAGE (G in S-3) is the distance between railheads of two Stock (running) Rails of a length of Track.

a. Straight (tangent) track should be laid as close to the minimum limit of Track Gauge as practical.

b. Curved track may increase Track Gauge as curve sharpness increases, with such increase applied with care lest the wheel is inadequately supported by the railhead, and side sway of equipment is exaggerated.

c. Three-point track gages should be constructed so as to fulfill these requirements.

d. For turnout construction**,** the track should be laid as close to the minimum gauge as possible between the point of the frog and the running rails.

2. TRACK CHECK GAGE (C in S-3) is the distance from the flange side of a Guard Rail to the flange side of the Frog it guards. **WHEEL CHECK CAGE** (K in S-4) is the distance from the Back of the flange of one wheel to the tread-side of the flange of the other wheel of a wheelset.

a. Maximum Wheel Check Gage should not exceed the minimum Track Check Gage so that Guard rails will protect the Frog. See Fig. 1.

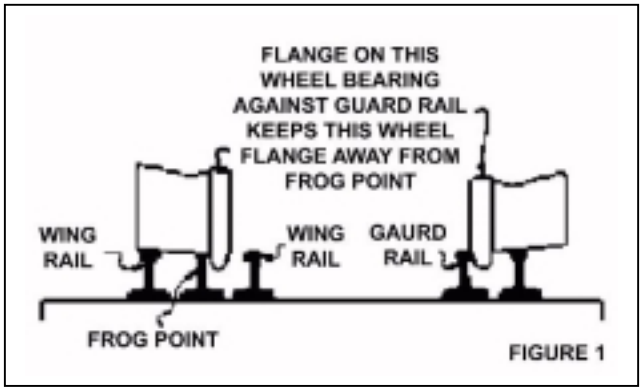


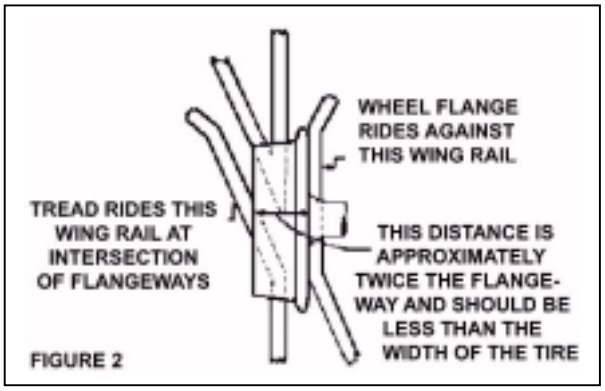
FIGURE 1

3. SPAN (S in S-3) is the distance between flange sides of the Guard and Wing Rails at the guarded Frog.
BACK-to-BACK (B in S-4) is the distance between the Backs of the wheel flanges in a wheelset at railhead height.

a. Maximum Span should be less than the minimum Back-to-Back distance.

4. FLANGEWAY WIDTH (F in S-3) is the distance between flange sides of the Wing and Frog Rails. **TIRE WIDTH** (N in S-4) is the distance between the Back of the wheel flange at railhead height and the outer edge of the wheel tread.

a. Maximum Flangeway Width at the point of the Frog should be less than half the minimum Tire Width to ensure the wheel tread riding the Wing Rail across the intersection of the flangeways until it is supported by the Frog Point Rail. See Fig. 2.
b. Guard Rail Flangeway Width is limited at its maximum only by Track Gage and Check Cauge (G and C).
c. Guard Rail Flangeway Width is limited at its minimum only by the Span and Check Gauge (C and S). Optimal operation is obtained by keeping the flangeway F close to its maximum.



5. FLANGE CLEARANCE (H in S-3) is the vertical distance from the railhead to the highest obstruction below it.
FLANGE DEPTH (D in S-4) is the vertical distance from the root of the flange to its outer edge.
a. Minimum Flange Clearance should not be less than the maximum Flange Depth.

6. SWITCH POINT SPREAD (P in S-3) is the distance from the Gage Line of the closed Point Rail to the outside of the open Point Rail. See Fig 3.
a. Maximum Spread (mechanical) should not exceed the sum of minimum Back-to-Back plus minimum Flange Width (Bmin + Tmin) to prevent interference. This is specified as P (mechanical)
b. For best operation the Point rail and the Stock rail should always have the same polarity as this prevents electrical hort circuits within the turnout. For turnouts where the Point and Stock rails may have opposite polarities a Maximum Spread (electrical) is provided. The Maximum Spread (electrical) is normally 6.a. above minus 0.005“.