

Instruction  
Hardware Engineering

No. LMS 1-15

**Subject:** Dimensions

**APPROVED BY** Manager, Hardware Engineering

**STATUS** Maintenance Revision

**PURPOSE** Establishes the requirements for interpretation of dimensional callouts on engineering drawings. L-3 Communications Corporation, Link Simulation & Training Division (hereafter referred to as Link) personnel involved in the manufacture of items defined on Raytheon Corporation engineering drawings shall utilize this instruction for interpretation of dimensional callouts.

**AFFECTED FUNCTIONS** Hardware Engineering  
Manufacturing

**REFERENCES** **LMS 9-1** Painting

**DEFINITIONS**

Basic dimension. A numerical value used to describe the theoretically exact size, profile, orientation, or location of a feature or datum target. It is the basis from which permissible variations are established by tolerances.

Datum. A theoretically exact point, axis, or plane derived from the true geometric counterpart of a specified datum feature. A datum is the origin from which the location or geometric characteristics of features of a part are established.

Datum feature. An actual feature of a part that is used to establish a datum.

Datum target. A specified point, line, or area on a part used to establish a datum.

Dimension. A numerical value expressed in appropriate units of measure and indicated on a drawing and in other documents along with lines, symbols, and notes to define the size or geometric characteristic, or both, of a part or part feature.

Feature. The general term applied to a physical portion of a part, such as a surface, hole, or slot.










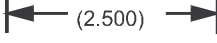















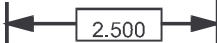


True position. The theoretically exact location of a feature established by basic dimensions.

## INSTRUCTION

### 1. Requirements.

Unless otherwise specified on the drawing the following dimensional rules shall govern.

- 1.1 Effect of Surface Coatings. Dimensions shall include the plating or coating; i.e., the dimensions shall reflect the finished part. (“Coating”, as used herein, does not include organic finishes such as lacquer, enamel, etc. Refer to **LMS 9-1** for paint finish requirements.)
- 1.2 Dimensional Limits. All limits on dimensions are considered to be absolute. Dimensional limits, regardless of the number of decimal places, are to be used as if they continued with zeros.
- 1.3 Reference Dimension. A reference dimension without tolerance is for information purposes and does not govern production or inspection operations.
- 1.4 Surface Roughness. On surfaces that are to be plated, the surface roughness requirements shall be considered to apply to the surface after plating.
- 1.5 Symbols. Dimensioning and tolerancing symbols used on engineering documents are shown in Figure 1.
- 1.6 Equally spaced dimensions. When repetitive, equally spaced features or dimensions are specified on the drawing, the tolerances are not cumulative.
- 1.7 Material tolerances. Unless otherwise specified on the drawing, tolerances applicable to raw material thickness and tolerances applicable to the stock size dimensions of materials such as angle, channel, etc., shall be governed by the military or industry raw material specification identified on the drawing.

SYMBOL	INTERPRETATION	EXAMPLE
	Diameter. Used in conjunction with linear size dimensions. Formerly shown as DIA.	
	Spherical Diameter. Used in conjunction with linear size dimensions.	
	Radius. May be used alone or with linear size dimensions.	
	Spherical Radius. Used in conjunction with linear dimensions.	
	Reference. Used in conjunction with linear dimensions. Formerly shown as REF.	
	Arc Length. Used in conjunction with linear dimensions.	
	Square. Used in conjunction with linear dimensions. Formerly shown as SQ or SQUARE.	
	Dimension Origin. Used in conjunction with linear dimensions.	
	Dimension not to scale. Used in conjunction with linear dimensions. Formerly shown as 	
	Placed or times. Used in conjunction with a dimension. Formerly shown as 2 HOLES, 2 PLACES, etc.	<p>For places or times, use.  2X R</p> <p>For "BY", use.  2 X 4</p>
	Conical Taper. Used in conjunction with linear dimensions.	
	Basic Dimension. Used with linear or angular dimensions. Formerly BASIC.	
	Slope. Used in conjunction with linear dimensions.	

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**Figure 1 Drawing Symbols**

**UNSIGNED HARDCOPY  
NOT CONTROLLED**



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- 1.8 True radius. Where a radius is dimensioned in a view that does not show the true shape of the radius, “TRUE R” is added before the radius dimension.