

UNSIGNED HARDCOPY  
NOT CONTROLLED



Instruction  
Hardware Engineering

No. LMS 1-5

**Subject:** Reference Designation Marking and Miscellaneous Coding

**APPROVED BY** Manager, Hardware Engineering

**STATUS** Maintenance Revision

**PURPOSE** Establish marking instructions for reference designations for electrical and electronic parts and assemblies. Miscellaneous coding such as hazard labels, terminal coding, etc., is also covered.

Exceptions - printed wiring boards. This instruction does not cover the marking requirements of reference designations, test points, and polarity markings shown on printed wiring board documentation. The marking requirements of these items shall be specified on the printed wiring board documentation.

L-3 Communications Corporation, Link Simulation & Training Division (hereafter referred to as Link) personnel shall follow these instructions for reference designation marking and miscellaneous coding on Link items except printed wiring boards.

**AFFECTED FUNCTIONS** Hardware Engineering  
Manufacturing

**REFERENCES** None

**DEFINITIONS**

Assembly. A number of basic parts or subassemblies, or any combination thereof, joined together to perform a specific function.

Basic part. One piece or two or more pieces joined together, which are not normally subject to disassembly without destruction of the designed use.

Reference designation. Letters or numbers, or both, used to identify and locate discrete units, portions thereof, and basic parts of a specific set.

Set. A unit or units and necessary assemblies, subassemblies, and basic parts connected or associated together to perform an operational function.

Unit. A major building block for a set or system, consisting of a combination of basic parts, subassemblies, and assemblies packaged together as a physically independent entity.

## INSTRUCTION

### 1. Requirements

1.1 Application. The required markings shall be applied in accordance with the method specified on the engineering drawing. When the engineering drawing does not specify the method of marking, the preferred method shall be ink stamp.

### 1.2 Location.

- a. When the engineering drawing indicates specific (dimensioned) marking locations and the markings will not be visible after assembly, an engineering change to the affected assembly shall be requested.
- b. When the engineering drawing indicates an approximate location (undimensioned) of markings, Manufacturing shall establish the location in accordance with the following criteria.

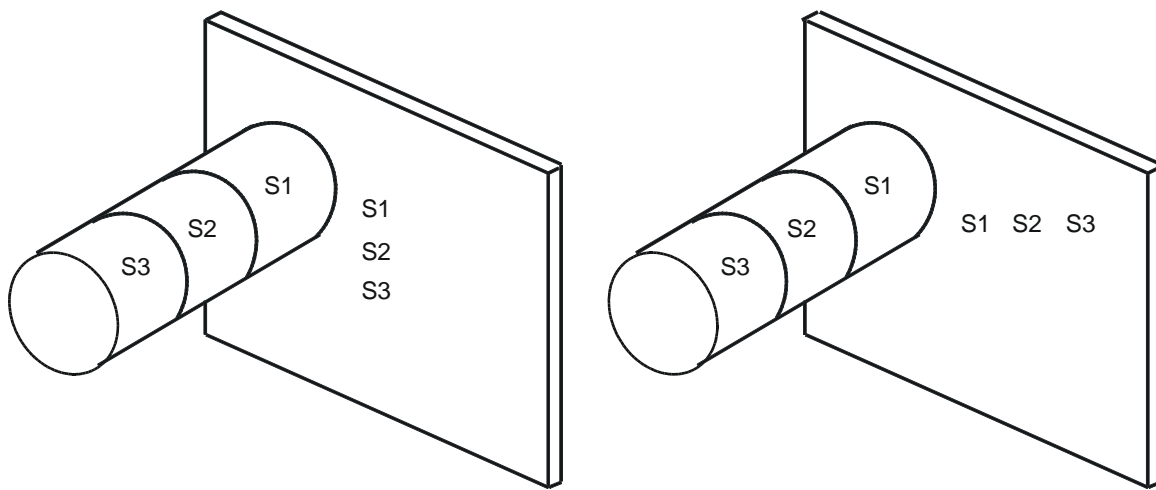
Reference designations shall be located adjacent to each subassembly or part, and shall be marked on the chassis, back of the front panel, on partitions, on insulating mounting strips, etc., as appropriate. Reference designations shall not be marked on parts and subassemblies which are subject to replacement if other means are feasible. (This does not preclude marking for parts within such subassemblies.) The reference designations shall be marked in such a position as to physically locate the parts and yet be readily visible for purposes of maintenance without removal of the part or other parts. The primary intent of this requirement is that removal of a part or subassembly shall not result in loss of the identification of the physical location of that part or subassembly.

- c. Markings on external surfaces which will adversely affect the general appearance of the finished item are prohibited.
- d. Marking of any item shall be accomplished in a manner which will not adversely affect the life and utility of the item.
- e. In cases where components are stacked one above the other on a mounting center, the electrical reference designation may read from left to right or from top to bottom. See Figure 1.

- (1) If listing is from top to bottom, the top designation applies to the component nearest the mounting surface. The second designation from the top applies to the component in second

position from the mounting surface, and so on through the series. See A (Top-to-Bottom Coding) Figure 1.

- (2) If listing is from left to right, the first designation on the left applies to the component nearest the mounting surface. The second designation from the left applies to the component in second position from the mounting surface, and so on through the series. See B (Left-to-Right Coding) in Figure 1.



A. Top-to-Bottom Coding

B. Left-to-Right Coding

Viewed From the Wiring Side

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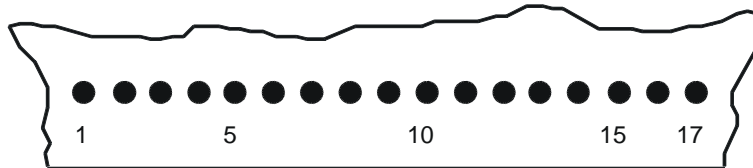
### Figure 1 Marking of Stacked Components

- 1.3 Size.
- All lettering shall be clear and legible.
  - When size is not defined on the engineering drawing, the size of stamping or markings shall be compatible with the size of the part or assembly to be marked.
- 1.4 Processes. The ink stamp process may be done by either the ink stamp pad method or a lettering system method (such as the Merlin Express lettering system, etc.); the lettering system is preferred. The ink stamp pad method should be used where the lettering system method is incompatible, such as porous metal castings, soft plastics, rubber, etc.

- a. Surfaces to be marked shall be free from oil or grease.
- b. When applying markings with a rubber stamp, use a clean, freshly-inked stamp. Use a light, even pressure and rock the stamp slightly to insure overall contact with the surface that is being marked.
- c. The color of all markings shall be black except when applied to surfaces on which contrast is not adequate. White shall then be used unless otherwise specified on the engineering drawing.

1.5 Terminal or contact identification. Unless otherwise defined on the engineering drawing, whenever a series of terminals or contacts is used (for example: terminal strips), the marking and identification shall conform to the following:

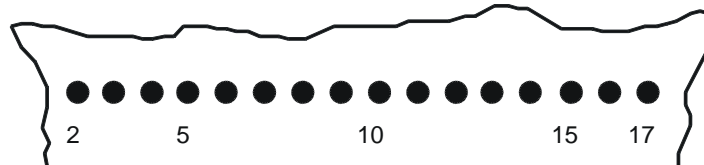
- a. When the series of terminals or contacts begins with the first terminal designated as number 1, this terminal, the fifth terminal, every additional fifth terminal, and the last terminal shall be marked. (See Figure 2.)



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**Figure 2 Terminal or Contact Marking**

- b. When the series of terminals or contacts begins with the first terminal designated number 2, 3, or 4, this terminal shall be marked, terminal number 5, every fifth terminal thereafter, and the last terminal shall be marked. (See Figure 3.)

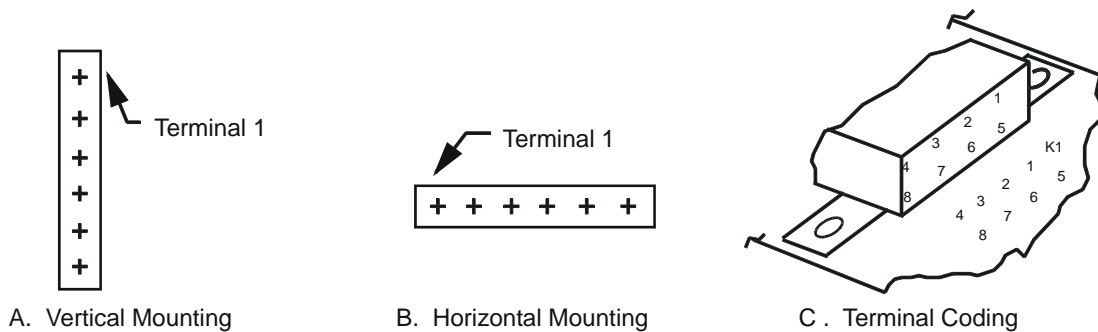


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**Figure 3 Terminal or Contact Marking**

- c. When the series of terminals or contacts has less than five terminals, the first and last terminals shall be marked.

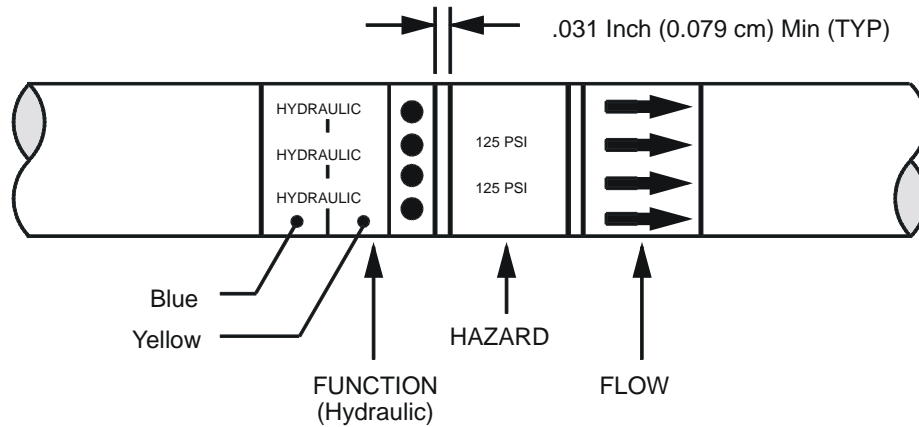
- d. When the terminal device has molded-in, printed-on, or etched-in identification conforming to the above, no additional markings will be required.
- e. Where the orientation of terminal No. 1 (or the lowest numbered terminal) is not otherwise specified on the engineering drawing, the terminal device shall be oriented as shown in A (Vertical Mounting) and B (Horizontal Mounting) in Figure 4, when viewed from the wiring side of the device:
- f. Marking of terminal or contact identification for items, such as relays, shall be in accordance with the engineering drawing. The terminal/contact coding shall be marked near the item as viewed from the wiring side of the item. An example of this marking is shown in C (Terminal Coding) in Figure 4.



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**Figure 4 Terminal Device Orientation/Coding**

- 1.6 Marking for hose, pipe, and tube lines. Identifying tapes of the kind specified on the applicable engineering drawing shall be placed on both ends of a line 24 inches (60.96 cm) and longer, as near the ends as practical. Only one identification group is required on these lines. Identification within a group shall be minimum of .031 inch (0.079 cm) apart. One group shall be placed immediately adjacent to all operating accessories such as valves, regulators, flow-checks, strainers, clean outs, vents, etc. Where visibility is unrestricted over a one-piece line of considerable length, identification need be placed only at necessary intervals to insure that at least one such identification is visible and recognizable from any observation point along the line. An identification group consists of all the markings necessary and sufficient for positive identification of a line. For example, see Figure 5.



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**Figure 5 Hose, Pipe and Tube Line Tape Placement**

1.7 Other product markings.

- a. Final product; unit labels. Unit labels which apply to each unit-level assembly of the final product shall be labeled with its electrical reference designation (unit number) and such additional labeling (bay designation, etc.) as may be specified on the top assembly drawing. At the option of Manufacturing, temporary labels may be installed for product test, and the permanent labels may be applied after simulator tear-down (prior to packing for shipment) after touch-up of paint and finishes are complete.
  1. Location. Unless otherwise specified by the engineering drawing, the location of unit labels shall be as defined below. Label location shall be consistent throughout all units of similar appearance in the final product. Label location shall not detract from the appearance of the unit or cause confusion with any other markings applied to the units. Reference designation labels shall not be applied to the front surface of control panels. Specific location instructions are as follows:
    - a) Cabinet and cabinet-type enclosures. Whether the unit is a single- or multiple-bay enclosure, reference designation labels shall, as nearly as practical, be centered at the top of the unit on the framework above the maintenance access doors. When units are arranged in row configuration, both sides of the unit shall be labeled.

- b) Instructor consoles. Unit labels shall be applied above the maintenance access doors at the rear of the unit.
  - c) Cockpit. Unit labels shall be placed at the rear of the cockpit enclosure on an exterior surface adjacent to a maintenance access panel or above the entry door.
  - d) Miscellaneous equipment. For air compressors, hydraulic compressors, motorized equipment, and other items not contained in unit enclosures, labels shall be placed on or adjacent to the unit electrical service entrance or disconnect. If a reference designation is assigned to a motion platform, the label shall be applied along the peripheral edge of the platform structure in an area normally visible during maintenance and operation. Peripheral equipment (Teletype, card reader, etc.) labels shall be applied in locations where the label will be clearly visible during maintenance operations.
- b. Oversized labels. Labels which are oversized for the area to which they are to be applied may be trimmed to fit at assembly. Trimmed labels shall maintain a minimum border of .25 inch (0.635 cm) from the edge of the label to the edge of the lettering marked on the label. If a minimum border width cannot be maintained, Manufacturing shall request engineering to specify a new label of suitable size.
  - c. Hazard labels. Except as defined in paragraph 1.6, hazard and warning labels are a product safety requirement and shall be located and installed in accordance with the specific instructions of the engineering assembly drawing. Hazard labels are not a Manufacturing option.
  - d. Electrical receptacle connectors (120 volts only). Also called convenience outlet, receptacle outlet, power receptacle, etc., these items shall be marked, as specified on the engineering drawing, with their voltage, phase, and frequency characteristics in the following manner:

120V,1 PH,60 HZ

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The location of the markings shall be readily visible and readable in the operating position of the device. Manufacturing shall mark electrical receptacle connectors (120 V) at the final assembly level, with the exception of those located internally in chassis assemblies and cabinet assemblies, which shall be marked at bench or cabinet assembly level.

NOTE: The marking instructions above are for 120-volt electrical receptacle connectors only. Directions for marking receptacles having other voltages shall be rendered on the engineering drawing.

2. Quality Assurance Provisions
  - 2.1 Legibility. Each letter, number, and character shall be clearly legible. Illegibility shall be cause for rejection.
3. Preparation for Delivery (Not Applicable)