# SINGLE PASS COLLIDER MEMO

SLAC-CN--273

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**TITLE:** SLC NOMENCLATURE FOR BEAMLINE COMPONENTS



## Introduction

The purpose of this report is to document the SLC nomenclature conventions for beamline components. Included are recent enhancements which should lead to a more consistant usage of the "unit number" part of beamline device names. A later report will document nomenclature conventions for support devices , i.e. non-beamline components such as large power supplies (LGPS), klystron stations (KLYS etc.

The conventions presented here refer strictly to the "formal names" for beamline devices and it should NOT be assumed that the existance of these names precludes the usage of other convenient "common names" such as "ALPHA MAGNET", "PM11-8", "VB121", etc. in addition to these formal names.

With these naming conventions, each device aquires a unique formal name. This contrasts with the historical usage of common names which are not necessarily unique site-wide and depend on context for interpretation. (For example, the name "SB-0" has had at least three different interpretations.)

The formal name for each beamline component indicates both the sort of device it is and the place in which it is located. The location designation indicates the local area in which a device can be found, but also, the ordering is such that its position relative to other components is made apparent.

In addition, the formal names have a uniform format which facilitates record keeping and control system applications by simplifying the sorting or selective grouping of tabulated component names. However, for some display applications the full formal name may appear lengthy. This problem can be diminished somewhat by putting a part of the device name in the headings on drawings, displays, etc.

The attached pages are divided into three sections. The first section is a brief summary for the general user. The second section is a more amplified description for those who need more detailed interpretations of device names. The third section contains a few notes for those who must generate device names for new components.

## INFORMATION FOR GENERAL USAGE OF NAMING CONVENTIONS

The formal name of a beamline element consists of three main parts. The first part is the "Class" or "Primary Name" (4 characters) which indicates the functional type for a given device. The second part is the "Zone" (4 characters) which indicates the "Region" (2 characters) and generalized "Sector" (2 characters) in which a device is located. The third part is the "Unit" number (4 characters) which indicates the generalized "Girder" (2 characters) and "Ordinal" position (2 characters) along the girder where a device can be found. (If the leading digit of the unit number is a zero, it is usually not displayed, that is, the unit number is shortened to three digits as the girder number becomes one digit.)

Example names:

**BPMO:DR01,1205**
(Ref. new common name: BPM1205; old common name: BPMQD13A)

BPMO indicates a beam position monitor,
DR01 indicates the "Zone",
DR indicates the Damping Rings Region,
01 indicates "sector 1" of the DR Region - i.e. SLTR,
1205 is the unit number,
12 indicates the girder,
05 indicates ordinal location "05" along the girder.

**QUAD:LI01,501**
(Ref. common name: QA1-5)

QUAD indicates a quadrupole magnet,
LI01 indicates the "Zone",
LI indicates the Linac Region,
01 indicates "sector 1" of the LI Region,
501 is the unit number,
5 indicates the girder,
01 indicates ordinal location "01" along the girder.

Unit numbers are ordered to make apparent the relative locations of beamline components. For example, it is made clear that YCOR:DR01,371 is somewhere between BEND:DR01,321 and BPMO:DR01,385 . Also, higher numbers are downstream of lower numbers in all areas except for the Positron Return Line.

(Note that the term "girder" refers to some other "natural" subdivision of a sector where there exist no physical girders.)

## INFORMATION FOR DETAILED USAGE OF NAMING CONVENTIONS

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The formal name of a beamline component is unique site-wide, i.e. no two components at SLAC share the same full name.
The full formal name of a beamline component consists of a device-class part and a device-location part.

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The device-class part of the name consists of a single field of four characters which is chosen for its mnemonic value to indicate the functional type to which a component belongs.

Example: QUAD:LI01,721
         ^^^^
         class

Some example device-classes are

| | |
|---|---|
| QUAD | for QUADrupole magnet |
| XCOR | for X-axis (horizontal) CORrector magnet |
| BPMO | for Beam Position MOnitor |
| PROF | for beam PROFile monitor |
| etc. | |

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In control system applications "device-class" is referred to as "PRIM" for "PRIMary name".

Example: QUAD:LI01,721
         ^^^^
         PRIM

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The device-location part of the name indicates the local area in which a beamline device is installed as well as its relative position in respect to other components within the local area.

Example: QUAD:LI01,721
              ^^^^^^^^
              location

The device-location part of the name consists of four fields: Region, Sector, Girder, Ordinal. ( Form -- ReSe,GiOr ).

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The first field consists of two alphabetic characters indicating the Region within SLAC that a component is to be found.

```
Example: QUAD:LI01,721
              ^^
           Region
```

Some example regions are

```
  LI      for LInac region --
            For example: QUAD:LI14,500

  DR      for Damping Rings region --
            For example: BEND:DR01,681 - (in SLTR of DR region)
                         BEND:DR02,231 - (in a ring of DR region)

  NP      for Nuclear Physics injector region --
            For example: LENS:NP25,109

  etc.
```

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The second field consists of two numeric characters indicating the generalized Sector within a given Region that a component is to be found.

```
Example: QUAD:LI01,721
                ^^
             Sector
```

The term "generalized sector" refers to any of the major beam line branches or any of the major regular subdivisions of a region. Higher numbered sectors are east and/or downstream of lower numbered sectors within a region, but there is no requirement that prohibits the skipping of sector numbers if it would have mnemonic value. (Refer to Note A below for interpretation of the term "east and/or downstream".)

Some example sectors are.

```
  01      for sector one --
            For example: QUAD:LI01,731 - Linac sector #1,
                         BEND:DR01,681 - DR sector #1 (SLTR)

  25      for sector 25 --
            For example: QUAD:LI25,441 - Linac sector #25,
                         XCOR:NP25,127 - NP sector #25 (the only
                                         sector in region NP)

  etc.
```

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In control system applications the Zone (Region + Sector) is referred to as "MICR" for "MICRocomputer name" due to the fact that each sector has its own Multibus microcomputer.

```
    Example: QUAD:LI01,721
                  ^^^^
                  MICR
```

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The third field consists of one or two numeric characters which indicate the generalized Girder within a given sector that a component is to be found. (Two digits are reserved for indication of the girder number, but the leading digit, if a zero, is not usually displayed -- 00,01,...,09 show as 0,1,...,9.)

```
    Examples: QUAD:LI01,721            YCOR:DR01,1015
                       ^                        ^^
                    Girder                   Girder
```

The term "generalized girder" refers to sector subdivisions which are associated with physical support girders, where they exist, or some equivalent "natural" division where there are no physical girders. (Refer to Note B below for more detail.)
Higher numbered girders are east and/or downstream of lower numbered girders within a sector, but there is no requirement that prohibits the skipping of girder numbers if it would have mnemonic value. (Refer to Note A below for interpretation of the term "east and/or downstream".)

Some example girders are

```
  03      for girder three --
            For example: QUAD:LI14,300 - girder #3 in LI14
                         Alternate display formats:
                         QUAD:LI14,0300
                         QUAD:LI14, 300

  10      for girder ten  --
            For example: XCOR:DR01,1081 - girder #10 in SLTR
                         BPMO:CA??,10?? - achromat #10 ("girder")
                                          in one of the Collider
                                          Arc sectors

  92      for girder #92  --
            For example: QUAD:LI08,9200 - "girder" #92, i.e. one
                                          of the parts of the
                                          Positron Return Line
                                          across from a Linac
                                          girder #2
  etc.
```

The fourth field consists of two numeric characters which indicate Ordinal position relative to all other beamline components on the girder.

Example: QUAD:LI01,721
^^
Ordinal

The exact derivation of these numbers is implementor dependent and may not be important to the user. However, the following rules apply:

1) Higher numbered devices are east and/or downstream of like devices of lower number on the same girder. (Ref. Note A.)
For example: QUAD:LI01,741 is east and downstream of
QUAD:LI01,731 .

2) Higher numbered devices are east and/or downstream of DISSIMILAR devices of lower number on the same girder. (Ref. Note A.)
For example: BPMO:DR01,695 is downstream of
BEND:DR01,681 .
(This the 2nd but last BPMO on girder 6, and the 4th but last BEND on girder 6. -- The name indicates the BPMO is downstream of the BEND.)
(Note: This convention, though sometimes previously followed, is a new general rule as of June, 1984.)

3) In many cases some of the available ordinal numbers may be skipped between adjacent beamline components. This allows for insertion of new components without rennumbering pre-existing components.
For example: BEND:DR01,681 is adjacent to
BPMO:DR01,695 but ordinal number 91, for example, is left unused and could be used for insertion of a new component if necessary.

4) Two or more devices on a given girder may share the same Ordinal number if they share the same location.
For example: XCOR:NP25,127 and
YCOR:NP25,127 share the same location.

5) Two or more devices on a given girder may share the same Ordinal number if they are closely clustered together and are the only such devices on the girder. Each device in such a cluster has the Ordinal number "00".
For example: QUAD:LI23,600 ,
XCOR:LI23,600 ,
YCOR:LI23,600 , and
BPMO:LI23,600 are closely clustered together and are the only QUAD, XCOR, YCOR, and BPMO associated with girder 6.
(The "00" serves merely as a placeholder and should not be used when the girder number is also "0".)

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It is standard practice to refer to the combination (Girder + Ordinal) as "UNIT" or "UNIT number".

Example: QUAD:LI01,721
^^^
UNIT

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NOTE A :

In the above text, the term "east and/or downstream" has the following meanings:

1) East and downstream:
Designated numbers in the Linac line itself increase in the DOWNSTREAM direction. This is approximately EAST.

2) Downstream:
In beam lines which do not follow the straight west to east direction of the Linac, the designated numbers increase in the DOWNSTREAM direction. (Example: the Linac-to-Ring lines and the rings themselves curve away from the west to east direction.)

3) East:
The designated numbers of the straight part of the Positron Return Line increase in the (approx.) EAST direction (as in the Linac line itself) and are therefore decreasing in the "returning" direction. However, this means, in contrast with numbering in other areas, numbers DECREASE in the direction which is downstream for the positrons in the Positron Return Line. (This convention was adopted in part because the components of the straight part of the P.R.L. are not controlled as a separate system, but are handled within the Linac sector system. For example, the micro in LI14 handles both a part of the Linac beam line and a part of the Positron Return Line.) Designated numbers of the P.R.L. match those of adjacent Linac locations except the "girder" designations for the P.R.L. are distinguished by numbers 91 to 99 for locations across from Linac girders 1 to 9 respectively.

NOTE B :

In the above text, the term "generalized girder" refers to any beamline installation associated with:

1) Any physical beamline girder (a long concrete, or aluminum, etc. support) where such exist; or

2) Any member of a chain of repeating segments within a sector (such as an achromat of the Collider Arcs) in areas where physical girders do not exist; or

3) Any generally agreed upon and clearly marked subsector segment which is chosen for its mnemonic value in the few areas where there exist no obvious repeating beamline sections; or

4) Any one section of a physical girder when such a girder crosses a sector boundary.

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## INFORMATION FOR IMPLEMENTATION OF NEW NAMES

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This section contains a few notes for those who must generate device names for new beamline components. (Refer to the previous sections.)

1) New "device-class" designations:
The "device-class" part of a name is usually associated with an identical "primary name" in the SLC database and applications programs. For this reason, the creation of new "device-class" names must be coordinated with the SLC Software Group. Also, it would be advisable to check with the Accelerator Operations Department to avoid potential conflict with pre-existing terms or abbreviations or to review for mnemonic value.

2) New Region and Sector designations:
Although the Region and Sector fields of the formal name exist primarily to indicate device location, they exactly correspond to the associated control system MICRO name ( -- Multibus microcomputer name). For this reason, the creation of new Region or Sector designations must be coordinated with individuals of the Instrumentation and Control Department concerned with hardware and software of the SLC micro systems.
The conventions presented here refer strictly to the formal names for Regions/Sectors and it should NOT be assumed that the existance of these names precludes the usage of other convenient "common names" such as "SLTR", "SAT", "INJECTOR", etc. in addition to these somewhat codified names on drawings and displays.

3) New Ordinal numbers:
No single increment of length was found universally appropriate as a unit for designating ordinal position on a girder. The implementer is free to decide what increment is appropriate for a given area. Any increment can be chosen (such as feet, odd-numbered decimeters, or even varying length) as long as the five conditions above are not violated. (See section on Ordinal numbers in "Information for Detailed Usage of Naming Conventions".) These conditions are important in preserving the order of beamline devices.
Numbers should spaced enough so that new components can be inserted without renumbering existing components. Also, most users would appreciate it if any natural periodicity of the optical components is reflected in the periodicity of Ordinal numbers.

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