LCLS Naming Conventions

Naming Conventions for Control System Devices

***Note** : this document is currently being updated. Notably, the examples are not yet finalized.*

Contents:

Current Device Names

Click Here for a list of currently named devices.

Previous Versions

Defining a **Naming Convention** for devices in the LCLS Control System has been an iterative process. The first version was a variation on the existing SLAC SLC Naming Scheme. With the LCLS and the addition of X-Ray transport lines and experimental halls, we decided to extend the Original LCLS scheme to what is described here.

Format Summary

Devices are named with a sequence of characters in the following format:

DeviceType : **Area** : **Position**

An example of a device name looks like this:

QUAD : **IN20** : **122**

There are functions and parameters associated with devices, which also need to be identified. An *Attribute* field provides that information:

DeviceType : **Area** : **Position** : **Attribute**

The *DeviceType* and *Position* fields also have optional characters. We can denote optional symbols with **[** and **]**, so the names can be described as:

[DeviceType **] DeviceDetail** : **Area** : **[** PositionPrefix **] Position** : **Attribute**

To summarize:

- A Device is named by 3 fields, separated by 2 colons.
- A function or parameter of a device, known internally to the Control System as a Process Variable (PV) is named by the 3-field device name followed by another colon, and the Attribute field.

Constraints

- All fields are required to be Upper Case characters the the exception of the Attribute field which is allowed to be mixed case with the following constraints.

    - There must be zero requirements for access to the PV from the SLC Control System (SCP). The SLC Control System is case insensitive and will be unable to read the mixed case PVs.
    - Is it strongly suggested that UpperCamelCase* be used for mixed case, however all uppercase still should be used as much as possible when creating new PV names. We realize that when we bring in support from other labs, the case may have a different format, but all PVs names that we create should either be all upper case or UpperCamelCase .
    - The attribute part of the name is the only part that is allowed to have mixed case, device, area, and unit number fields are still required to be all upper case.
    - It is not allowed to have different PVs which only differ in case.
- The entire name is currently restricted to 28 characters or less.
- The *DeviceType* is between 3 and 9 characters in length. The generic type of device is denoted by 3 or 4 characters, and may optionally be followed by an underscore with 3 or 4 more characters to indicate details of that device.
- The *Area* field is 4 characters in length, and describes one of the 21 areas currently in the LCLS Accelerator.
- The *Position* field can be up to 4 characters in length, which includes either an optional 1-character position prefix followed by 3 digits (for devices associated with the beam line) or 2-character prefix followed by an index for non-beam-line devices which are itemized.
- The *Attribute* field must be 12 characters or less.
- All PV names must be unique in the control system. This includes being unique across machines such as LCLS, SLC, FACET, FACET-II, and LCLS-II.

The optional fields are meant to accommodate the SLC-Aware IOC mechanism, which has even more restrictions placed on Device names. For more information, from the original Naming Convention plans, click here.

The Fields

The *DeviceType*, *Area* and *Position* fields together identify a specific, accessible device. The *Attribute* field identifies some function or parameter associated with that specific device. In general, all devices identified as type *DeviceType* will all have the same *Attribute* fields available.

Ideally, users will not have to type names into a computer system. The names can be selected from a list of options, or on a screen showing a representation of the device.

DeviceType

Device types are from 3 to 9 characters in length. The device type can be real or virtual, and describes only a general type of device, not a specific instance of a device. We often think of Device Types as large elements, such as Quadrupole magnets, BPMs, and so forth. These larger devices are typically accessed by Operators and Physicists, but they include smaller constituent devices which can also be accessed, perhaps for testing purposes.

These smaller components are not typically visible to the Operator. For example, ADC is a general device type which might have diagnostic information available. The ADC_SCAN refers to a more specific type of device, still with diagnostic information, but with perhaps more specialized functions.

Another category of *DeviceType* is **virtual**. This refers to a **compound** type of device that has no single piece of hardware associated with it. Instead, it is a value computed or derived from a set of other devices. The distinction between real or virtual device types are not typically represented in the name, but they are mentioned here for completeness.

Thus, *DeviceType* can represent either a **compound** or **component** device.

- **Compound** devices are typically made available to the Operator, and may be thought of as being *real* or *virtual*.
- **Component** devices are typically available to Engineers and technicians.

Any type of device can have more specific information associated with it. This information is a suffix which is appended to an underscore, after the base *DeviceType* field. For example, **ADC** indicates an ADC module, and **ADC_SCAN** represents a Scanning ADC. The name **ADC_PEAK** represents a Peak-sensing ADC.

Base Device Type

First, lets consider the base *DeviceType* values without the detail suffix.

The following table lists magnet and magnet power supply **Compound** *DeviceTypes*:

Table 1.0		
Value	**Device Type**	**Controllable**
BEND	Bend (Large Dipole) Magnet	Y
BTRM	Bend Magnet Trim Windings	Y
KICK	Kicker Magnet	Y
MGNT	General Magnet	N
QTRM	Quad Magnet Trim Windings	Y
QUAD	Quadrupole Magnet	Y
SOLN	Solenoid Magnet	Y

XCOR	Horizontal Steering Corrector Magnet	Y
YCOR	Vertical Steering Corrector Magnet	Y
USEG	Undulator Magnet Segment	Y
WIGG	Wiggler Magnet	Y

The following is a list of power supplies

Table 1.0.1		
Value	**Device Type**	**Controllable**
HVPS	High Voltage Power Supply	Y
LGPS	Large Power Supply	Y
SMPS	Small Power Supply	Y
PS	Generic Power Supply	Y

The following table lists RF system **Compound** *DeviceTypes*:

Table 1.1		
Value	**Device Type**	**Controllable**
ACCL	Accelerating Section	Y
KLYS	Klystron	Y
LLRF	Low Level RF	Y
PCAV	Beam Phasing Cavity	Y
TCAV	Transverse Deflecting Cavity	Y
REFS	Machine Parameters Set Points	Y

The following table lists vacuum **Compound** *DeviceTypes*:

Table 1.2		
Value	**Device Type**	**Controllable**
VGBA	Vacuum Gauge Baratron	N
VGCM	Vacuum Capacitance Manometer	Y
VGKL	Vacuum Gauge associated with a Klystron	N
VGPR	Vacuum Pirani Gauge	N
VGCC	Vacuum Cold Cathode Gauge	Y
VGEX	Vacuum Extractor Gauge	Y
VGTC	Vacuum ThermoCouple Gauge	N
VGCP	Vacuum Convection-enhanced Pirani Gauge	N
VGHF	Vacuum Hot Filament Gauge	Y
VGOS	Vacuum Overpressure Switch	N
VGXX	Combination Vacuum Gauge	N
VVKL	Vacuum Valve associated with a Klystron	Y
VVPG	Vacuum Pneumatic Gate Valve	Y
VVMG	Vacuum Manual Gate Valve	N
VVPR	Vacuum Pneumatic Roughing Valve	Y

VVMR	Vacuum Manual Roughing Valve	N
VVPF	Vacuum Pneumatic Fore Valve	Y
VVMF	Vacuum Manual Fore Valve	N
VVPV	Vacuum Pneumatic Vent Valve	Y
VVMV	Vacuum Manual Vent Valve	N
VVFS	Vacuum Valve Fast Shutter	Y
VVFV	Vacuum Valve Fast Valve	Y
VVFL	Vacuum (Mass) Flow Valve	Y
VPKL	Vacuum Pump associated with a Klystron	Y
VPDF	Diffusion Pump	N
VPCR	Cryo Pump	Y
VPIO	IOn Pump	Y
VPTM	TurboMolecular Pump	Y
VPTS	Ti Sublimation Pump	Y
VPNI	Vacuum Pump NEG Ion Combination	Y
VPNG	Vacuum Pump NEG (Non-Evaporable Getter)	sometimes Y
VPFO	Fore Pump	Y
VPRO	Roughing Pump	Y

The following table lists system **Compound** *DeviceTypes*:

Table 1.3

Value	Device Type	Controllable
AIR	Compressed Air System for Pneumatic Control	N
AMS	Air Monitoring System for measuring radiation levels from intake samples	N
NITR	Process Nitrogen Gas for Attenuator/Detector	Y
ARGO	Process Argon Gas for Attenuator/Detector	Y
BCS	Beam Containment System	N
HVAC	Heating, Ventilation, and AC System	N
LASR	Laser System	N
WATR	Water System	N
MPS	MPS (Machine Protection System)	N
PPS	PPS (Personel Protection System)	N

The following table lists **Compound** *DeviceTypes* for beam synchronous acquisition:

Table 1.4

Value	Device Type	Controllable
ARRY	Group of BSA Channels for SLC-Aware only	N
APD	Avalanche Photo Diode	N
BLEN	Bunch Length Monitor	N
BPMS	Beam Position Monitor	N
CAMR	Camera for Optics and Beam Profile	Y

CRAD	Cerenkov Radiator	N
FARC	Faraday Cup	N
FREQ	Frequency Counter	N
JMTR	Joule Meter (for Laser)	N
MDEF	SLC Measurement Definition	Y
EDEF	EPICS Event Measurement Definition	Y
OTRS	OTR screen	Y
PD	Photo Diode	N
PHOS	Phosphor screen	Y
PMT	Photo Multiplier Tube	N
TORO	Toroid	N
YAGS	YAG screen	Y
PATT	Timing Pattern	N
WPM	Wire Position Monitor	N

The following table lists other **Compound** *DeviceTypes*:

Table 1.5

Value	Device Type	Controllable
APC	All Purpose Controller (e.g. Beckhoff raw signals)	Y
BMLN	Beam Line	N
CAMW	Web Cam	N
CATH	Cathode	N
COLL	Collimator	Y
DIAG	Diagnostic	Y
DUMP	Beam Dump	N
ECAT	Ethercat	Y
EXPT	Experiment	Y
FAN	Fan	Y
FARC	Faraday Cup	N
FREQ	Frequency Counter	N
FOIL	Diagnostic Foils, Slotted Foil	N
GATT	Gas Attenuator	Y
GDET	Gas Detector	Y
GJET	Gas Jet	Y
GUN	Gun	Y
HLS	Hydrostatic Leveling Sensor	N
KMON	K-monochromator	Y

LHTR	Laser Heater	N
LION	Long ION chamber	N
LVDT	Linear Variable Differential Transformer	N
MASK	Mask	N
MIRR	Optical Mirror	Y
PICS	Protection Ion Chamber Signal	N
PICM	MPS Protection Ion Chamber Signal	N
PLIC	Panofsky Long Ion Chamber	N
PKLS	Pockels Cell (photon attenuation)	Y
RADF	RADFET (radiation dose sensor)	Y
RADM	Radiation dose sensor	Y
ROOM	Room, vault, or tunnel	N
RTD	Resistive temperature detector	N
SATT	Solid Attenuator	Y
SBST	Sub-Booster	Y
SBI	Sub-Booster Interface Chassis	Y
SHUT	Shutter (mechanical, optical shutter)	Y
SLIT	Slit (mechanical, 2- or 4-jaw)	Y
STPR	Beam Stopper	Y
SPLR	Beam Spoiler	Y
TRGT	Target	Y
TANK	Diagnostic Tank	Y
THZR	THz Radiator	Y
UTIC	Universal Time Interval Counter	Y
TIU	Tone Interrupt Unit (for MPS)	N
WIRE	Wire Scanner	Y
WKFL	Wakefield Shield	Y
XTAL	Crystal Monochromator	Y
BKHF	Beckhoff coupler	Y
SCTR	Beam Scatterer	Y

The following table lists what are currently considered **Component** *DeviceTypes* that are either controllers or control modules:

Table 1.6

Value	Device Type	Controllable
EIOC	Embedded Input/Output Controller	Y
MOC	Motor Controller	Y
MCOR	MCOR Controller	Y
PAC	Phase and Amplitude Controller	Y
PLC	Programmable Logic Controller	Y
PSC	Ethernet PS Controller	Y
VGC	Vacuum Gauge Controller	Y

VPC	Vacuum Pump Controller	Y
VVC	Vacuum Valve Controller	Y
VFC	Vacuum Flow Controller	Y

The following table lists **Component** *DeviceTypes* for control system modules and instruments:

Table 1.7

Value	Device Type	Controllable
ADC	Analog-to-Digital Conversion Module	N
AFG	Arbitrary Function Generator	Y
DAC	Digital-to-Analog Conversion Module	Y
BPMP	Beam Position Module	N
DTIZ	Digitizer	N
CHAS	Input/Output chassis	N
CRAT	Input/Output (VME) Crate	Y
CV	CrateVerifier Module (CAMAC)	Y
DI	Digital Input Module	N
DIAG	Diagnostics	N
DIO	Digital Input/Output Module	N
DO	Digital Output Module	N
DMM	Digital MultiMeter	Y
DVM	Digital Voltmeter	Y
IDIM	16-bit Digital Input Module (CAMAC)	Y
IDOM	16-bit Digital Ouput Module (CAMAC)	Y
LDIM	32-bit Digital Input Module (CAMAC)	Y
EVG	Event Generator for Timing	Y
EVR	Event Receiver for Timing	Y
MODU	Non-specific Module	Y
MPG	Master Pattern Generator	Y
PAD	Phase and Amplitude Detector	N
PDU	Pulsed Delay Unit Module (CAMAC)	Y
PMTR	Power Meter	Y
PMGR	Power Management Module	Y
PNET	Pnet Module	N
SAM	SmartAnalog Module (CAMAC)	Y
SCLR	Scaler Module	N
TRIG	Spare Timing Trigger	Y

The following table lists **Component** *DeviceTypes* for the network:

Table 1.8

Value	Device Type	Controllable
ACSW	AC Switch	Y

CSWH	aTCA Carrier Switch	Y
GPIB	GPIB/LAN Gateway	Y
RTR	Router	N
SWH	Ethernet Switch	N
SCOP	Scope	N
TS	Terminal Server	Y
UPS	Uninterruptible Power Supply	N
WKUP	Walk-up ethernet connection	N
ICS	Intercom System	N
IOC	EPICS IOC	Y
PLC	Programmable Logic Controller	Y
PNA	Phase Noise Analyzer	Y
PSC	Power Supply Controller	Y
CAMR	Camera for Beam Line Optics	Y
CRAT	Intelligent VME Crates	Y
PC	Computer that is not an IOC	Y
WB	Wireless Bridge	N

Certain parameters or functions associated with a component device might be accessible from the compound device. For example, we might consider a water flow value as an independent, measurable quantity associated with a water line; it might be a transducer which produces pulses which are connected to a computer-readable counter. That value might be retrieved using a name like **SCLR** : **IN20** : **K701** : **COUNT** which indicates a scaler module in a VME crate in the klystron gallery at sector 20.

However, if the water is being used to dissipate heat from a Faraday Cup, then one would retrieve a value using a name like **FARC** : **IN20** : **IS998** : **FLOW**, which is a value based on the scaler measurement described above. The scaler must be accessible on its own since it might have some built-in diagnostic tests that are required for maintenance. The compound device will typically give the component's measurement in more appropriate engineering units.

Device Detail Code

The optional characters that come after the underscore provide detail. The following table lists the Detail Codes associated with specific device types.

Table 1.9	
DeviceType Name	**Purpose**
ADC_SCAN	Scanning ADC
ADC_PEAK	Peak-sensing ADC
ADC_CHRG	Charge Integrating ADC

The Area Field

The *Area* field is 4 characters in length. The following diagram and table lists the approved area names. A larger version of the diagram, can be found at the end of this page.

LCLS Areas

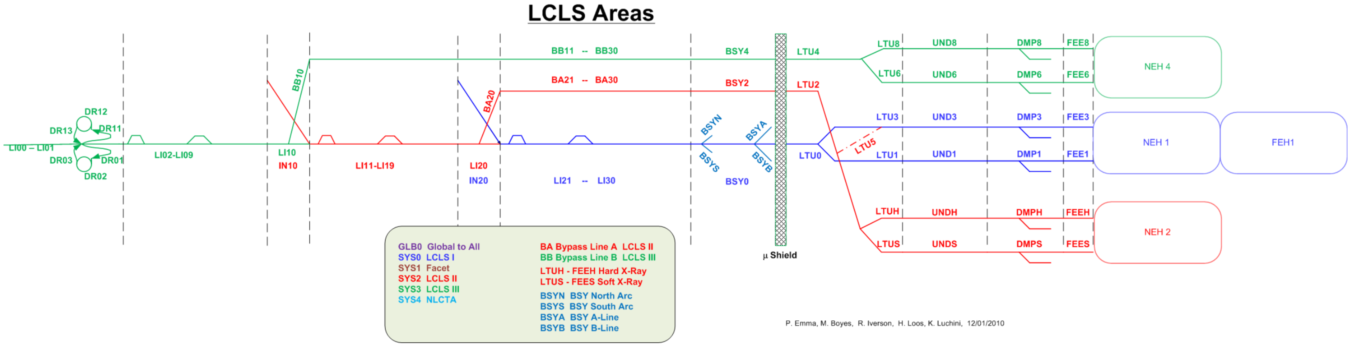

Table 1.10	
Area	**Physical Location**
Access Buildings	
ACR0	Accelerator Control Room (B052)
B005	Building 5
B24	Building 24 (development)
B25	Building 25 (development)
B34	Building 34 (development)
B44	Building 44 - Klystron Test Lab
B81	Building 81 - MMF
B106	Building 106
B106	Building 136
B911	Building 911
B911	Building 911
B911	Building 911
B921	Building 921
ASTA-UED Facility Area	
AS01	Accelerator Structure Test System
Injector Machine Areas	
LR10	FACET-II Laser Room (Upstairs, near sector 10)
LR20	LCLS Laser Room (Upstairs, near sector 20)
LA20	FACET Laser Room (Upstairs, near Sector 20)
IN10	FACET-II Injector
IN20	LCLS Injector
LINAC Areas	
LI00	LINAC Sector 0
LI20	LINAC Sector 20
LI21	LINAC Sector 21
LI22	LINAC Sector 22
LI23	LINAC Sector 23
LI24	LINAC Sector 24
LI25	LINAC Sector 25
LI26	LINAC Sector 26
LI27	LINAC Sector 27
LI28	LINAC Sector 28
LI29	LINAC Sector 29
LI30	LINAC Sector 30
Beam Switch Yard	

For the entire beam switch yard area spanning from the wooden door to the Muon Shield, the device positions shall range from 100-999, consistently across all beam lines, such that the unit numbers match up in Z-position across all beam lines.	
MCC0	Main Control Center (B005) OBSOLETE. Replaced with ACR0
CLTH	Copper LINAC to Hard Line
CLTS	Copper LINAC to Soft Line
BSYH	Beam Switch Yard Hard Line
BSYS	Beam Switch Yard Soft Line
BSYA	Beam Switch Yard A-Line
SLTH	Superconducting LINAC to Hard Line
SLTS	Superconducting LINAC to Soft Line
SLTD	Superconducting LINAC to Dump Line
BSYS	Beam Switch Yard South Arc
LINAC to Undulator Machine Areas	
LTU0	LINAC-to Undulator directly after BSY
LTU1	LINAC-to-Undulator Line 1
Undulator	
UND1	Undulator on Line 1
Dump	
DMP1	Beam Dump on Line 1
Photon Areas	
FEE1	Front End Enclosure on Line 1
NEH1	Near Experimental Hall on Line 1
XRT1	X-Ray Tunnel on Line 1
FEH1	Far Experimental Hall on Line 1
XTA Facility Area	
XT01	X-Band Test Area
Global Areas	
SYS0	LCLS-I System
SYS1	FACET and FACET-II System
SYS2	LCLS-II System
SYS3	LCLS-III System
SYS4	NLCTA System
SYS5	SPEAR Systems
SYS6	X-Band Test Area
SYS7	ASTA Test Area
SYS8	Klystron Test Lab (B44)
SYS9	Site - HE Cryo Test Facility (IR4, etc.) and Radiation Monitoring outside gate
SYSW	Global System West
SYSE	Global System East

SITE	Remote SLAC Location, not associated with a service building
GBL0	Global to multiple Machines (decommissioned)

Special IN20 and BSY area Alarm Summary names   * **Please note that these areas are special for alarms ONLY and not for general use.***

The Position Field for Devices associated with the Beam Line

The *Position* Field contains an optional 1-character *Position Prefix*, followed by a 3-digit *Position Code*. The Prefix designates a major location within the device's area, and the Code indicates a sub-location within that Area. An example of a Position Field might be K120.

Position Prefix

Examples of *Position Prefixes* for the LCLS Injector area are B for Beam Line, K for Klystron Gallery, or L for Laser Room. An example of a Position Code is 900, which might indicate an instance of a device that is approximately 90% along the distance of the associated area.

If the prefix is missing, it is assumed to be B, which indicates Beam Line. Thus, a Position Field of 420 is identical to B420. This works to support the SLC-Aware IOC, since the *Position Prefix* is not sent from the SLC Control System.

Each Area has its own set of *Position Prefixes*. For example, there is no Klystron Gallery associated with the Undulator area. The following table indicates *Position Prefix Codes* for each of the LCLS Areas.

For the X-ray areas, the prefix is a digit representing the _branch _ line, ie, a situation where the beam line has two or more forks in the X direction; typically it is the final or primary destination Hutch number. Then, the leading digit in the 3-digit position in the Near and Far Experimental Halls is rounded to 1..6 to represent Hutch 1..6, respectively. Note that on the path to a final destination, a branch can pass through other Hutches. Also, the "through" line eventually disappears at the last branch point.

Table 1.11		
Area	**Position Prefix Codes**	**Physical Position**
LR20	L	Laser Room (Upstairs, near sector 20)
IN20	B	Beam Line
	K	Klystron Gallery
	W	Waveguide
	R	RF Equipment Hut
	L	Laser Line
	M	Manifold
LI20	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI21	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI22	B	Beam Line

	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI23	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI24	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI25	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI26	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI27	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI28	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold

	E	Instrumentation Equipment Alcove
LI29	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
LI30	B	Beam Line
	W	Waveguide
	K	Klystron Gallery
	M	Manifold
	E	Instrumentation Equipment Alcove
BSY0	B	Beam Line
	E	Surface Equipment Building (Bldg 136, 106, 106, 5)
	P	BSY Pump Station (P0, P1, P2, P3, P5)
BSYA	B	Beam Line
	E	Surface Equipment Building (Bldg 136, 106, 106, 5)
	P	BSY Pump Station (P0, P1, P2, P3, P5)
BSYB	B	Beam Line
	E	Surface Equipment Building (Bldg 136, 106, 106, 5)
	P	BSY Pump Station (P0, P1, P2, P3, P5)
BSYN	B	Beam Line
	E	Surface Equipment Building (Bldg 136, 106, 106, 5)
	P	BSY Pump Station (P0, P1, P2, P3, P5)
BSYS	B	Beam Line
	E	Surface Equipment Building (Bldg 136, 106, 106, 5)
	P	BSY Pump Station (P0, P1, P2, P3, P5)
LTU0	B	Beam Line
	E	Surface Equipment Building (Bldg 5 or 911)

LTU1	B	Beam Line
	E	Surface Equipment Building (Bldg 105 or Bldg 406 or
	P	Pump Line
		Bldg 911 or Bldg 912 or Bldg 913)
MCC0	E	Equipment Rack Area (Bldg 5) OBSOLETE
	C	Control Room
UND1	B	Beam Line
	E	Surface Equipment Building (Bldg 913,921)
DMP1	B	Beam Line
	E	Surface Equipment Building (Bldg B921)
FEE1	B	Beam Line
		Hard (High-energy) through Branch (South) to Hutch 3 and beyond
	1	Soft (Low-energy) Branch (North) to Hutch 1
	2	Soft (Low-energy) Branch (Middle) to Hutch 2
	E	Equipment Rack Alcove or Surface Equipment Building (Bldg 940)
NEH1	B	Beam Line
		Hard (High-energy) Branch (South) to Hutch 3 and beyond
	1	Soft (Low-energy) Branch (North) to Hutch 1
	2	Soft (Low-energy) Branch (Middle) to Hutch 2
	E	Surface Equipment Building (Bldg 950)
XRT1	B	Beam Line
		Through Branch
	4	North Branch to Hutch 4
	5	Middle Branch to Hutch 5
	6	South Branch to Hutch 6
	E	Surface Equipment Building (Bldg 960)
FEH1	B	Beam Line
	4	North Branch to Hutch 4
	5	Middle Branch to Hutch 5
	6	South Branch to Hutch 6
	E	Surface Equipment Building (Bldg 999)

XT01	B	Beam Line
		Surface Equipment Building (Bldb 062)
SYS0		LCLS-I System
SYS1		FACET and FACET-II System
SYS2		LCLS-II System
SYS3		LCLS-III System
SYS4		NLCTA System
SYS5		SPEAR System
SYS6		X-Band Test Area
SYS7		ASTA Test Area
SYS8		Klystron Test Lab (B44)
SYS9		Site - HE Cryo Test Facility (IR4,etc), Radiation Monitoring outside gate
SYSW		Global System West
SYSE		Global System East
GLB0		Global to all Machines

Position Code

The *Position Code* is intended to provide a quick locator of the instance of a given device type. The code is 3 digits representing a relative index of the device's location. A *Position Code* of 100 means that the associated device is roughly positioned in the first 10% of its *Area*. Likewise, a code of 900 indicates the device is near the end of its Area, roughly 90% along.

Some general notes:

- As one might expect, the *Position Code_s must be unique for the given _DeviceType* in the given *Area*. For instance, if there are 2 Quadrupole magnets in the Injection area beamline, they might be named **QUAD** : **IN20** : **600** and **QUAD** : **IN20** : **605** respectively.
- The *Position Code* is sequential if relating to a device in a Beam Line area. Larger numbers indicate they are physically further along in the area. There are exceptions to this rule with some legacy equipment, but the rule is always followed for new equipment. Furthermore, the code must be consistent with other devices sharing that same area. For example, the Quadrupole magnets from the previous example had *Position* fields of **600** and **605**. If there was a Toroid to be positioned between them, it would have a *Position* field of **601** to **604**. In situations where there is too much equipment in a small area, the numbers are allowed to overlap. So, it would be acceptable if the toroid was named **TORO** : **IN20** : **600**; the *Position Code* is intended to give an indication of the position, not an exact location. This is not necessarily the case for devices in Surface Buildings, the Klystron Gallery, or other areas. In those cases, many devices may be colocated in adjacent rack space, with no indication of the start or end of the area.
- Numbering in certain *Position Codes* might follow other conventions as well. For instance, a vacuum pump located on a waveguide in Sector 23 might be named **VPIO** : LI**23** : **W420**. This indicates that it is associated with the waveguide for Klystron 4, and is located roughly 20% of the way along that waveguide, measured from the Klystron. In this example, one could find the vacuum pump upstairs near Klystron 4, in sector 23. If the name was **VPIO** : LI**23** : **W480**, then the pump is located on the same klystron's waveguide, but at roughly 80% the distance from the klystron. Thus, the last 2 digits would indicate whether the pump is on the upstairs or downstairs runs of the waveguide.
- **Note** that using the Klystron number in this example is reasonable, since it is numerically close to the position as a percentage of the area length. Since each Linac sector has 8 klystron, using the digit 4 to indicate Klystron 4 is easier to remember than using the digit 5 to indicate 50% of the distance, which equates to the 4th klystron.

The Position Field for Itemized Control System Devices

For itemized control system devices such as IOCs, crates, and network switches, the *Position* Field contains a 2-character *Subsystem Prefix*, followed by a 2-digit *Index* from 01 to 99. (A description of the IOC naming convention is available here.) The Prefix designates a subsystem of the control system as follows in Table 1.12. The format of the control system devices is **<ioc type>:<area>:<subsystem prefix>##** The definition for each of the above field can be found in able 1.12.1.

For the S20-30 linac upgrade, some CAMAC modules (which have fixed slot location) have been give the Position <cratenumber><2-digit slot number>. For example, crate 1 slot 2 would have a Position value of 102.

For the entire beam switch yard area, spanning from the wooden door to the Muon Shield, the device positions shall range from 100-999, consistently across all beam lines, such that the unit numbers match up in Z-position across all beam lines.

Table 1.12			
Subsystem Prefix for Standard IOC	**Alarm IOC**	**Subsystem Prefix for Network Display and Alarm Config Filenames**	**Subsystem Description**
CD			Controls Department, for development only!!
LS	sioc-<area>-lasr00	lasr	Laser Steering
PM	sioc-<area>-prof00	prof	Profile Monitor
ID	n/a	id	Insertion Device
IM	sioc-<area>-gadc00	toro	Toroid
BL	n/a	blen	Bunch Length Monitor
BP	sioc-<area>-gadc00	bpm	Beam Position Monitor
MC	mc	mc	Motion Control
CV	sioc-<area>-rf00	camac	
AM	n/a	align	Alignment Mirror
MG	sioc-<area>-mgnt00	mgnt	Magnet
EV	sioc-<area>-evnt00	evnt	Event (Timing) System
RF	sioc-<area>-rf00		Low-Level RF Master
RP	sioc-<area>-rf00		Low-Level RF PLL
RC	sioc-<area>-rf00		Low-Level RF PAC
RD	sioc-<area>-rf00		Low-Level RF PAD
KY	sioc-<area>-rf00	klys	High Power RF (Klystron Solenoid PS and Modulator).
MP	sioc-<area>-mps00	mps	Machine Protection System
ML	n/a		Matlab IOC with Generic PVs
NW	sioc-<area>-ntwk00	ntwk	Network Device, terminal servers, switches routers, scopes, function generators, ...
PP	sioc-<area>-pps00	pps	Personnel Protection System
BC	sioc-<area>-bcs00	bcs	Beam Containment System
SP	n/a	sp	Shared platform
TM	sioc-<area>-temp	temp	Temperature Monitor
TR	sioc-<area>-fbck00		Fast Feedback Controller
VA	sioc-<area>-vac00	vac	Vacuum
WA	sioc-<area>-util00	watr,hvac,air,coll	Water, HVAC, Smoke Alarms, Air, scraper
WS	sioc-<area>-ws00	ws	Wire Scanner
FB	sioc-<area>-fbck00	fbck	Feedback
AD	n/a	align	Alignment Diagnostic System (Wire Position Monitors + Hydrostatic Leveling Sensors)
EX	n/a	n/a	Experimental Support.
UC		n/a	Undulator Motion Control
DU		n/a	Delta Undulator (Should be merged in to undulator control application)

Table 1.12.1	
IOC type	**Description**
eioc	Embedded IOCs
ioc	Hard IOCs
sioc	Soft IOCs running on linux
vioc	Soft IOCs running on linuxRT - new standard shall use sioc as of June 2017
Area	IN20,LI20-LI30,BSY0,LTU0,LTU1,UND1,DMP1

System	Two character abbreviation for subsystem previx, see Table 1.12
##	Two digits, 01-99

The Attribute Field

The *Attribute* field consists of 12 or less alphanumeric symbols, which identify a function or parameter associated with a device.

Most devices have values which can be measured, but not all devices have values which can be controlled. Certain attributes are in place because of the SLC-Aware IOC, because the SLC Control System will transmit these attributes.

Table 1.13		
Attribute	**Function Affected or Parameter Described**	**Controllable**
VOLT or V or VACT	Actual Voltage	N
VOLTSETPT or VSETPT	Voltage Setpoint	Y
VOLTRBCK or VRBCK	Voltage Setpoint Readback	N
VDES	Desired Voltage	Y
I or IACT	Current Readback	N
ISETPT	Current Setpoint	Y
IDES	Desired Current	Y
B or BACT	Magnetic Field Readback	N
BDES	Desired Magnetic Field	Y
AMPL or AACT	Amplitude Readback	N
AMPLSETPT	Amplitude Setpoint	Y
ADES	Desired Amplitude	Y
PHASE or PACT	Phase Readbask	N
PHASESETPT	Phase Setpoint	Y
PDES	Desired Phase	Y
MAD	Mad Name	N
Z	Z-Position	N
PRESS or P	Pressure, such as Vacuum	N
PRESSSETPT or PSETPT	Pressure, such as Vacuum	N
TEMP	Temperature	N
TEMPSETPT	Temperature	N
TMIT or Q	Bunch Charge	N
FLOW	Flow Rate	N
FLOWSETPT	Flow Rate	N
SPEED	Speed	N
RAMPRATE	Ramp Rate	N
LOSSRATE	Loss Rate	N
WIDTH	Pulse Width	N
WIDTHSETPT	Pulse Width	Y
DELAY	Pulse Delay	N
DELAYSETPT	Pulse Delay	Y

TDES	Pulse Delay	Y
TABS	Absolute Time	N
TIME	Delta Time	N
TIMESETPT	Delta Time	Y
TOD	Time-of-Day	N
COUNT or CNT	Count	N
COUNTSETPT or CNTSETPT	Count	Y
CENTER or CTR	Center	N
CENTERSETPT or CTRSETPT	Center	Y
ID or IDENT	Unique (Integer) Identifier	N
IDENTSETPT	Unique (Integer) Identifier	Y
NAME	Unique (String) Identifier	N
ENERGY	Energy	N
ENERGYSETPT	Energy	Y
POWER	Power	N
POWERSETPT	Power	Y
FREQ	Frequency	N
FREQSETPT	Frequency	Y
ANGLE	Angle	N
ANGLESETPT	Angle	Y
POSN	Position	N
POSNSETPT	Position	Y
GAP	Gap	N
GAPSETPT	Gap	Y
XAVG	Horizontal Value	N
YAVG	Vertical Value	N
ZAVG	Longitudinal Value	N
UAVG	Diagonal Value	N
SAVG	Beamline Position Value	N
XRMS	Horizontal Value	N
YRMS	Vertical Value	N
ZRMS	Longitudinal Value	N
URMS	Diagonal Value	N
SRMS	Beamline Position Value	N
XHIGH	Horizontal Value	N
YHIGH	Vertical Value	N
ZHIGH	Longitudinal Value	N
UHIGH	Diagonal Value	N
SHIGH	Beamline Position Value	N
XLOW	Horizontal Value	N
YLOW	Vertical Value	N

ZLOW	Longitudinal Value	N
ULOW	Diagonal Value	N
SLOW	Beamline Position Value	N
XSETPT	Horizontal Value	Y
YSETPT	Vertical Value	Y
ZSETPT	Longitudinal Value	Y
USETPT	Diagonal Value	Y
SSETPT	Beamline Position Value	Y
XHIST	Horizontal Value	N
YHIST	Vertical Value	N
ZHIST	Longitudinal Value	N
UHIST	Diagonal Value	N
SHIST	Beamline Position Value	N
CHECK	Check	Y
CTRL	Do a Specific Action	Y
GO	Do an Action	Y
RESET	Reset	Y
RESTART	Restart (stop and go)	Y
STOP	Stop doing an Action	Y

Examples

Here are a few examples of device names.

- **VVPG:IN20:155** Vacuum valve, pneumatic gate, near the start of the injection area beamline.
- **XCOR:IN20:811** X-axis corrector magnet, near the end of the Gun Spectrometer beamline.
- **YCOR:IN20:812** Y-axis corrector magnet, close to the X-axis corrector.
- **BPMS:IN20:821** Beam Position Monitor, near the end of the Gun Spectrometer beamline, and downstream of the Corrector magnets in the previous example.
- **BEND:IN20:931** Bending dipole magnet near the end of the injection area, in the Injection Spectrometer beam line.

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