

**Building Suspension Subassemblies in ICS**

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Dwayne Giardina, David Shoemaker, Matthew Heintze, Bryan Smith, Bobby Moore, Janeen Romie, Derek Bridges	November 5, 2012	See LIGO DCC record status

1. Introduction

This document outlines the method of assigning names and serial numbers to parts and assemblies for use with LIGO's Inventory Control System (ICS). This document covers the naming and numbering conventions only for the Suspensions subsystem. The primary goal of these naming and numbering conventions is to establish a uniform system in ICS to be followed at all LIGO sites, so that communication and information sharing within a site and between sites is faster and simpler.

2. Why Follow Naming and Numbering Conventions?

It is critical that the physical aspects of the parts and assemblies match the virtual aspects in ICS. The locations of parts and assemblies and their clean/bake/assembly status should be accurately recorded in ICS at all times. It is the responsibility of everyone involved in handling parts to generate and maintain a correct, complete and consistent inventory of the parts in ICS.

The ICS system is not just for the convenience of everyone within LIGO; it is also designed to fulfill an NSF requirement for tracking of their purchases. LIGO has invested a large amount of time and money in the ICS system for this purpose. If an NSF auditor arrives at a site next week and asks research scientist "John Doe" to find a particular part in ICS and then locate and show them a part, John Doe should be able to do this without having to track down an Excel spreadsheet that contains data not stored in ICS. Accurate and timely updates of parts and assemblies and their status in ICS will ensure that LIGO meets these guidelines.

3. Naming and Numbering Guidelines

ICS uses the following fields to record information about a given part or assembly. The naming and numbering of the ICS records is defined for each field below.

- Assembly or Part Name – This is taken from the title block of the assembly or part drawing on the DCC.
- Assembly ID (for assemblies) or Drawing (for parts) – This is the drawing number of the assembly or part on the DCC; all drawing numbers start with the letter D.

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- **Serial #** – This is the serial number of a specific assembly or part; the serial number of an assembly comes from the serial number of a particular part in the assembly, as defined in the following tables
 - Note: Serial numbers of some top-level suspension assemblies (e.g., a Quadruple Pendulum Suspension) will not be taken from a part in the assembly; instead, the serial number will match the number used during assembly and testing (e.g., the second quad built at LLO is referred to as Quad 13 during assembly and testing, so the serial number will be 13). The serial number will be indicated on the actual assembly in a method TBD (inscribed stainless steel tags?). Other top-level suspension assemblies (e.g., HLTS and HSTS) will have the same serial number as the structure assembly and may be assembled and tested out of numerical order.

In some cases, it may not be possible to find the serial numbers of some parts after assembly. If the serial numbers of all of the parts in an assembly are known, but the exact position is not known, enter the part under the lowest-level assembly that is known. For example, in a Quad Suspension, part number D080167 belongs in the assembly with the Assembly ID of D080166 (with four parts and four assemblies for each Quad Suspension). If the serial numbers for the four D080167 parts are known, but the exact position is not, enter the D080167 parts under the assembly with the Assembly ID D060341 (which is also where the D080166 assemblies are entered).



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Table 1: Quadruple Pendulum (Quad) Suspension Subassemblies

Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
Quad Suspension Assembly	D0901346	N/A	Use the Build Number as the assembly serial number.
Tablecloth Assembly	D060310	D060312	
OSEM and ECD Adjuster	D060316	D060318	
OSEM Adjustment Plate	D060320	D060321	
Transverse OSEM Adjuster	D060322	D060323	
Blade Cartridge, Top Stage	D060324	D0901439	Assemblies can be split into 4 parts, one for each blade (i.e. 001A, 001B, 001C, 001D)
Penultimate Mass Assembly, Reaction Chain	D060341	D060342	
Pitch Mass Assembly, Penultimate Reaction Mass	D060352	D060353	
OSEM Can, Penultimate Reaction Mass	D080166	D080168 (ETM Only) D1002200 (ITM Only)	For D080166 in ITM suspensions, add 1000 to the serial number.
Dummy Test Mass Assembly, Main Chain	D060355	D060358	Each D060355 contains 2X D060358; use the lower serial number.
Dummy Test Mass Assembly, Reaction Chain	D060356	D060357	Each D060356 contains 2X D060357; use the lower serial number.
Upper Intermediate Mass Assembly, Main Chain	D060375	D060376	
Top Mass Assembly, Main Chain	D060403	D060430	
OSEM and ECD Unit	D060409	D060407	
Inner Lower Structure	D060454	D060434	Each D060454 contains 2X D060434; use the lower serial number.
Adjustable Pad Assembly, Long	D060446	D060447	
Adjustable Pad Assembly, Short	D060457	D060459	

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Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
Earthquake Stop Assembly #1, Upper Intermediate Mass, Main Chain	D070540	D070545	
Earthquake Stop Assembly #1, Upper Intermediate Mass, Reaction Chain	D070541	D070546	
Earthquake Stop Assembly #2, Upper Intermediate Mass, Reaction Chain	D070542	D070547	
Earthquake Stop Assembly #2, Upper Intermediate Mass, Main Chain	D070543	D070544	
Upper Structure Weldment	D060492	D060492	There are parts with the part number D060492; these should be placed in an assembly with same number.
Top Mass Assembly, Reaction Chain	D0902031	D060430	
Dummy Penultimate Mass Assembly, Main Chain	D0902075	D060358	Each D0902075 contains 2X D060358; use the lower serial number.
Upper Intermediate Mass Assembly, Reaction Chain	D0902233	D060376	
Dummy Thin Compensator Plate, Reaction Chain	D1002204	D1002205	Each D1002204 contains 2X D1002205; use the lower serial number.
Main Chain Wire Assemblies	D1100041	N/A	Use the Build Number prefixed by Q as the assembly serial number (i.e. Q11).
Top Wire Assembly	D0902643	D060390	
Middle Wire Assembly	D0902644	D060395	
Bottom/Final Wire Assembly	D0902645	D060426	
Reaction Chain Wire Assemblies	D1100042	N/A	Use the Build Number prefixed by Q as the assembly serial number (i.e. Q11).

**Building Suspension Subassemblies in ICS****Table 2: Beamsplitter/Folding Mirror (BS/FM) Subassemblies**

Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
Beamsplitter/Folding Mirror Main Assembly	D1000392	N/A	Use the Build Number as the assembly serial number.
Top Mass Assembly	D070435	D070422	
OSEM and ECD Unit	D060409	D060407	
Pitch Adjuster and Mass, Top Mass	D070424	D070423	
Blade Clamp Assembly #1, Top Mass	D080042	D070418	
Blade Clamp Assembly #2, Top Mass	D080043	D070421	
Lower Structure	D080005	D080006	
Top Stage	D080080	D080081	
Blade Clamp Assembly, Top Stage	D080082	D080086	
Top Tablecloth	D080105	D080106	
OSEM and ECD Adjuster	D060316	D060318	
OSEM Adjustment Plate	D060320	D060321	
Transverse OSEM Adjuster	D060322	D060323	
Bottom Tablecloth	D080111	D080112	
Penultimate Mass	D080368	D080369	
Upper Structure	D080501	D080504	
Top Wire Assembly	D1100039	D080087/D080088	
Blade Wire Clamp Assembly, Top Stage	D080087	D080088	
Middle/Lower Wire Assembly	D1100040	D080559/D080560	Each D1100040 contains 2X D080559; use the lower serial number.
Modified D Penultimate Mass Clamp	D080559	D080560	
Test Mass Dummy	D1100249	D080369	

**Building Suspension Subassemblies in ICS****Table 3: HAM Large Triple Suspension (HLTS) Subassemblies**

Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
HLTS Overall Assembly	D070447	D070442	
Mounting Pad Assembly, HLTS	D0900626	D070374	
Rotational Adjuster, HLTS	D070326	D070328	
Upper Wire Assembly, HLTS	D070340	D020652	
Upper Mass Assembly, HLTS	D070335	D020605	
Intermediate Wire Assembly, HLTS	D070393	D030149	
Intermediate Mass Assembly, HLTS	D070334	D070336	
Lower Loop Wire Assembly, HLTS	D070438	D030148	Each D070438 contains 2X of D030148; use the lower serial number of the 2.
Bottom Mass Assembly, HLTS	D070337	D070338	
Top Blade Guard Assembly, HLTS	D070308	D070310	
Earthquake Stop Assembly, Bottom Mass, Upper, HLTS	D080728	D070354	
Earthquake Stop Assembly, Bottom Mass, Lower, HLTS	D1002821	D1002823	
Earthquake Stop Assembly, Bridge, Upper, HLTS	D1102071	D070321	
Coil Holder Assembly, HLTS	D080677	D070449	
Mounting Bracket, Coil Holder, HLTS	D1002133	D1002135	
Upper AOSEM Alignment Assembly, Intermediate Mass, HLTS	D0902024	D0901492	
Lower AOSEM Alignment Assembly, Intermediate Mass, HLTS	D0901551	D0901492	
Upper AOSEM Alignment Assembly, Bottom Mass, HLTS	D0901552	D0901549	
Lower AOSEM Alignment Assembly, Bottom Mass, HLTS	D0901553	D0901549	



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Table 4: HAM Small Triple Suspension (HSTS) Subassemblies

Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
HSTS Overall Assembly	D020700	D020023	
Rotational Adjuster Assembly, HSTS	D1000045	D030447	
Upper Wire Assembly, HSTS	D0901854	D020481	
Upper Mass Assembly, HSTS	D020534	D020134	
Intermediate Wire Assembly, HSTS	D0901905	D0901904	
Intermediate Mass Assembly, HSTS	D0901873	D0901792	
Lower Wire Assembly, HSTS	D0901902	D020202 (previous design) D1200108 (current design)	Each D0901902 contains two of D020202 or D1200108; use the lower serial number of the two.
Metal Lower Mass Assembly (MC), HSTS	D0901791	D020234	
Metal Lower Mass Assembly (PR/SR), HSTS	D0902333	D0902332	
Metal Lower Mass Assembly (SRM), HSTS	D1200886	D1200846	
Top Blade Guard Assembly, HSTS	D0901934	D0901935	
Face Earthquake Stop Assembly, Intermediate Mass, HSTS	D0902413	D0901923	
Barrel Earthquake Stop Assembly, Intermediate Wire, HSTS	D0902203	D0901925	
Barrel Earthquake Stop Bracket Assembly, HSTS	D0902007	D0902008	
Barrel Earthquake Stop Assembly, Lower Wire, HSTS	D0902201	D0902202	
Face Earthquake Stop Assembly, Lower Mass, HSTS	D0902205	D0901923	
Upper Mass and Coil Holder Assembly, HSTS	D020535	D020239	
AOSEM Alignment Assembly, Intermediate Mass, HSTS	D0901924	D0902414	



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Upper AOSEM Alignment Assembly, Lower Mass, HSTS	D0902207	D0902417	
Lower AOSEM Alignment Assembly, Lower Mass, HSTS	D0902208	D0902417	

**Building Suspension Subassemblies in ICS****Table 5: Output Mode Cleaner Suspension (OMC SUS) Subassemblies**

Assembly Name	Assembly ID	Part Number Used for Assembly Serial Number	Notes
OMC Overall Assembly	D0900295	N/A	Top-level assembly serial number is to match number used during assembly and testing.
Structural Weldment Assembly, OMC	D0900655	D0900308	
Rotational Adjuster Assembly, OMC	D030451	D030447	
Upper Wire Assembly, OMC	D060536	D070030	
Upper Mass Assembly, OMC	D060502	D060491	
Lower Wire Assembly, OMC	D060537	D020132	
Metal Bench Assembly, OMC	D070035	D070027	
Top Blade Guard Assembly, OMC	D070145	D070146	
Coil Holder Assembly, OMC	D1201213	D060530	
Upper Earthquake Stop Assembly, Optical Bench, OMC	D1201214	D070049	
Side Earthquake Stop Assembly, Optical Bench, OMC	D1201215	D070484	
Lower Earthquake Stop Assembly, Optical Bench, OMC	D1201216	D070050	