LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400216	-v1
Document No	**Rev.**

Date: 24 Apr 2014

Sheet 1 of 7

Title: aLIGO Installation Acceptance Document for L1 DAQ

This document covers the technical content for acceptance review of a subset of the Advanced LIGO (aLIGO) installation. See document M1300468 for an overview of the aLIGO acceptance process. Acceptance by Systems Engineering is to be indicated in the metadata for this document in the LIGO Document Control Center (DCC).

1   Installation Instance/Subset Definition

Insert a brief description of the subset of the aLIGO equipment which is covered under this installation acceptance document. Complete the entries in the following table. If elements of the table are not applicable, enter "not applicable".

This installation covers the DAQ system at LLO.

Interferometer [*L1 or H1*]:	**L1**
Building(s)/**Room**(s): [*e.g. corner/LVEA*]	**LVEA, CER, End-X, End-Y**
Electronics Rack Designation(s):	L1-ISC-C1, L1-ISC-C2, L1-ISC-C3, L1-ISC-C4, L1-SEI-C1, L1-ISC-R1, L1-ISC-R2, L1-ISC-R4.

2   Procedures

If there are any caveats or explanatory notes regarding the procedure documentation cited in the table below, then add these notes to the table entries.

System Documentation: *[enter linked DCC document #(s); found under E1200023]*	E1200645 is the top level DAQ system document. E1400085 is the top level document for aLIGO DAQ Installation.
As-Built/Installed Procedure(s) and Documents either: a) Enter hyperlinked DCC number for revised or red-lined baseline install procedure, and/or b) Enter hyperlinked DCC number for separate document with installation notes on deviations, changes in procedure, changes in tooling, etc., and/or c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline installation procedure	The following documents are relevant: T1100260: LLO CDS VLANs and Computer Names D1102217: LLO CDS Network Diagram D1400014: aLIGO L1 Front-End IO Chassis As-Built Drawings. E1400089: LLO aLIGO DAQ Racks

3   Drawings

Enter hyperlinked DCC document number(s) for each drawing in the table below. If elements of the table are not applicable, enter "not applicable". All chamber-level, assembly drawings can be found listed at E1200562 and found linked under D0901491.

Applicable Top-Level Drawing(s):	D1400014: aLIGO L1 Front-End IO Chassis As-

Title: aLIGO Installation Acceptance Document for L1 DAQ

	Built Drawings. See also "Related Files".
Electronics Rack Drawing(s):	All drawings for the racks can be found by navigating through G1001032.

4   Serial Number Records

Serial numbers are used to track a subset of the parts, particularly active elements (see M1000051) and electronics (with S-numbered documents; see T0900520). Enter the hyperlinked DCC document number(s), and name(s) for the highest level assembly(ies) covered by this installation acceptance document in the table below. Also enter the hyperlink to the ICS entry for the instance of this assembly in the Inventory Control System (ICS). If elements of the table are not applicable, enter "not applicable". If elements of the table are not available/missing, then enter "not available".

Assembly DCC D-Number	Assembly Name	ICS entry.
E1400089	LLO aLIGO DAQ Racks	Serial Numbers for DAQ installs are listed in "Related Documents".
E1200331	LLO Rack S numbers	Serial Numbers for all racks, and for components installed in said racks, can be found through this document.
E1400091	LLO aLIGO Timing Racks	Bookmark to racks where aLIGO timing equipment is installed at LLO

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400216   -v1

Document No   Rev.

Date: 24 Apr 2014

Sheet 3 of 7

Title: aLIGO Installation Acceptance Document for L1 DAQ

5   Testing

All post-installation, stand-alone, in situ, checkout/testing (phases 2 and 3 per M1000211) must be completed, be successful and be documented:

- *phase 2: pre-installed, post-storage, test results for the assembly (testable item)*
- *phase 3: stand-alone, in situ test results for the assembly (testable item)*

Note that integrated testing (phase 4 testing per M1000211) is covered under the system acceptance review, not this installation acceptance review. In the table below, enter hyperlinked DCC document number(s) for all of the relevant testing for the major subassemblies/subsystems covered within this installation instance/subset. If elements of the table are not applicable, enter "not applicable". If elements of the table are not available/missing, then enter "not available".

Subsystem	Testable Item	DCC document numbers
DAQ	Extensive testing was done for most if not all installed electronics.	These test results need to be collated into either a DCC document tree or an SVN repository or both. Software validation tests should also be linked.

6   Installation Completeness

If/as applicable, provide a hyperlink reference to a list of remaining tasks to be completed before the installation is finished (i.e. a 'punch' list).

Installation tasks remaining to be completed:	None – installation has been completed

Title: aLIGO Installation Acceptance Document for L1 DAQ

7   Installation/Integration Issues and ECRs

If/as applicable, provide a hyperlinked list of integration issues and Engineering Change Requests (ECRs) encountered during installation and which are relevant to the installation subset/instance covered by this acceptance document. See M1300323 for a description of the Integration Issue and ECR Tracker.

The format of the url for the bug tracker is as follows e.g.

***https://services.ligo-wa.caltech.edu/integrationissues/show_bug.cgi?id=826**

N.B.: Many of the issues/actions noted below relate to subsystem racks (not specifically DAQ racks). They are included here in case they were/are missed in the other separate installation instance reviews.

Tracker # [hyperlinked]	Title/description
#7 closed	AI chassis outputs mislabel on front panel
#17	PSL/ISC racks very close
#26 closed	LLO End Station Rack layout missing ISC rack
#28 closed	End Station EtherCAT Chassis Modification for TCS
#29 closed	EtherCAT chassis End 2 changed
#33	Lack of drawings for timing diagnostics/cesium clock replacement
#34 closed	ECR: Add PEM, timing chassis to end-station TCS Remote racks
#35 closed	ECR: Add Beckhoff, Dolphin equipment to end-station DAQ racks
#36 closed	D1200136 Rear Panel D-number is wrong
#37 closed	D1200136 24V Connector is non-standard
#38 closed	D1200136 has no ON/OFF switch and does not do its own power regulation
#39 closed	Ring Heater Chassis: Part Numbers are wrong, Documentation is not correct
#40 closed	Need housing, power, network for rotation stage Beckhoff modules
#41	Add PSL environmental sensors, EtherCat chassis to L1
#42	ECR: Install SSD RAID in DAQ for raw minute trend files
#43 closed	ECR: Add second DAQ adapter to data concentrator
#50 closed	Communication error in the Dolphin -> Tripped the 3 BSCs
#58 closed	Retrieval of second trend data in control-room too slow

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400216   -v1
Document No   Rev.

Date: 24 Apr 2014

Sheet 5 of 7

Title: aLIGO Installation Acceptance Document for L1 DAQ

#59 closed	need ethernet cable to HEPI pumps
#60 closed	DC Power Monitoring System
#65	Migrate TCS corner-station readout to OAF chassis
#78 closed	SUS Electronics Missing/Incomplete/Out-of-date Drawings
#85	procedure(s), safe-guards and cautions for safe/proper use and diagnosis of equipment
#91 closed	ECR - Adding Coil Driver Monitor Signals to Frames
#92 closed	ports misidentified on End 2 EtherCAT chassis
#96 closed	ALS COMM/DIFF signals missing
#97	Add direct wire connection between RT and EtherCAT systems
#139 closed	H1 PSL tripped due to Beckhoff remote client 'glitching'
#142	PEM monitoring channels need to be set up
#143	EtherCAT channels freeze
#216 closed	QPD OMC_A/B electronics chain missing
#217 closed	BSC ISI coil driver over-temp warning periodically going off
#332	RF phase shifts when cables moved
#375 closed	Migrate the ISI Checker Script functions to the frontend code
#385 closed	create science frame channels for the SEI models
#441 closed	Cable plan for 5-way coax cables
#463	AA Filter Chassis Power Regulator Board Has Potential Short Circuit on -15V Rail
#445 closed	ECR: Update the SAFE level for the BSC and HEPI model watchdog
#465 closed	Need for additional amplification on the 135MHz signal chain
#469	ECR: New naming scheme for OMC channels
#482	ECR: ODC changes in SUS, SEI, HPI and PSL
#483	ECR: ODC Master Implementation
#484	ECR: Adding h1psl0 to the Dolphin network
#487 closed	Remove ISI IPC links which come from SUS offload
#489 closed	Duplicate cable number in end station wiring diagram

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400216   -v1

Document No   Rev.

Date: 24 Apr 2014

Sheet 6 of 7

Title: aLIGO Installation Acceptance Document for L1 DAQ

#490 closed	ECR for DAQ frame file name change
#491 closed	ECR - PSL channels in the science frame
#500 closed	ECR: HEPI MEDM Update
#530 closed	update to the HEPI master model and related MEDM screens
#552 closed	Change the Data rate for the Watchdog State channel in the science frame (duplicate of #650).
#556	TCS End Station EtherCAT chassis design modifications
#557	Lack of Baffle Photo-diode Readback
#562 closed	Readbacks for arm cavity baffle photodiodes (Duplicate of #557)
#569	Modulator uses DB15 for RF connector
#598	SMA connectors on demod chassis
#599	EPICS gateways
#600	medm screen editing
#644	checking electronics modules without visible over-current protection
#657	upgrade IOP software watchdogs to use targeted dackill
#658 closed	mislabeled outputs on D1100680
#662	Use of GE FANUC RFM cards on end-station SEI, SUS front-ends
#664	5V regulator failing on Timing Comparators
#665 closed	LSC model running too long for RFM to end-stations
#668	DC Switch Breaker Box Install in Pier Pod and TCS ISS Power cords.
#672 closed	Enable Guardian to exceed limit on EPICS enumerated strings
#705	Adding frequency readbacks for some RF modulation signals
#713	AA/AI placement in End Station Remote rack
#714	Move the 79.2MHz doubler to ISC-R4
#716	Add a relay switch for ALS laser noise eater
#720	Modification of SUS User Watchdog to Reduce False Alarm Rate
#721	Replace the custom cartesian-bias-ramping code with cdsFiltCtrl2 parts
#722	Adding Independent ASC IPC Paths for Dither Alignment to Most SUS
#746	ECR: store suspension mis/alignment values separately in EPICS database

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400216 -v1

Document No   Rev.

Date: 24 Apr 2014

Sheet 7 of 7

Title: aLIGO Installation Acceptance Document for L1 DAQ

#760	CDS Real-time System Parameter Configuration Control
#762	Increase drive range for the ETM UIM actuators
#764	Second trend readback is slow
#779	HAM 2&3 and ITMX, BS & ITMY (ISI and HEPI) local models slightly differ from documentation (ADC/DAC numbering)