



Document	LIGO-M1900207-v1
Date:	19 December 2019
Title:	RODA: A+ Viewports Procurement
To the Attention of:	Garilynn Billingsley, Mike Zucker, and Dennis Coyne
cc:	Alena Ananyeva, Robert Schofield
From/signatories:	<p><u>From:</u> Name: Danielle Petterson Name: Betsy Weaver <u>Signatories:</u> Name/Title: Lisa Barsotti (A+ ISC) Name/Title: GariLynn Billingsley (A+ COC) Name/Title: Calum Torrie (A+ SYS) Name/Title: Chandra Romel (A+ VAC) <i>See the LIGO Document Control Center (DCC) for electronic approvals</i></p>
System(s) affected:	A+ Upgrade
Nature/Scope:	Requirements/Specs Decision; Working Agreement between Groups
Subsystem(s) affected	SYS, ISC, VAC
Primary Contacts	Danielle Petterson (dpeters@caltech.edu)
Reference Documents:	LIGO-E1900336 : A+ Viewports Inventory and Layout LIGO-D1101006 : aLIGO, High Quality, Non-Wedged, 6" Viewport, Optic LIGO-E1100267 : 6" Vacuum Viewport Window Spec

DECISION/AGREEMENT STATEMENT:

This document is inclusive of all the viewports needed for A+, their placement and positioning, the buy list for the parts and spares, and the specs for the glass. The numbers referenced below are the viewport numberings in E1900336 (also shown below).

Already Existing Ports (per site):

- 2 Septum windows (#1 and #2)
- 6 Gate valves with no glass (#3, #4, #6, #9, #11, and #13)
- 1 TSC port using existing (#10)
- 1 TMDS port using existing flange and no glass (#17)

New ports (not shown):

- 2 Locker access ports at the bottom of each new HAM door (+Y HAM7 & -Y HAM8)

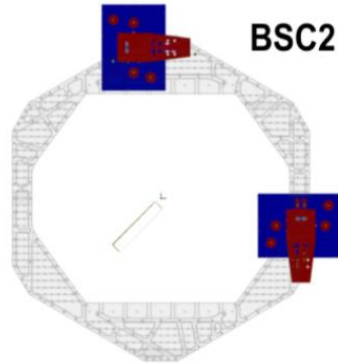
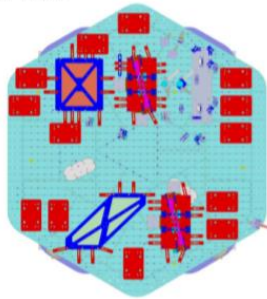
Viewports Needed for Purchase (per site):

- 2 Camera viewports with AR1064/532nm coated glass (#5 and #12)
- 2 Illuminator viewports with uncoated glass (#15 and #16)
- 3 High quality glass viewports with AR1064/532nm coated glass (#7, #8, and #14)
- 3 General access ports with a clear view of the HSTS optic (#18, #19, and #20)

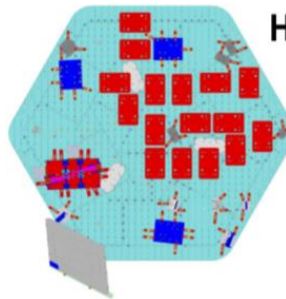
E1900336-v7

<https://dcc.ligo.org/LIGO-M1900207>

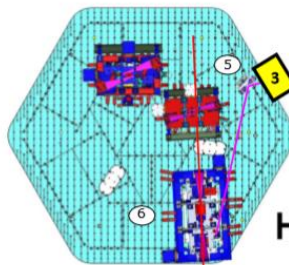
HAM3



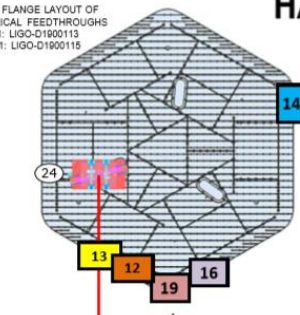
BSC2



HAM4



HAM5

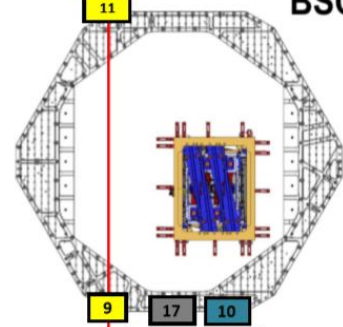


HAM8

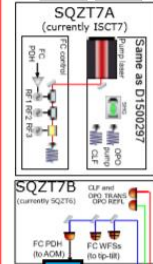
HAM8 FLANGE LAYOUT OF ELECTRICAL FEEDTHROUGHS
L1: LIGO-D1900113
H1: LIGO-D1900115

Note: Placement of ports on this layout is a rough estimate. More detailed positioning will be provided in further documentation.

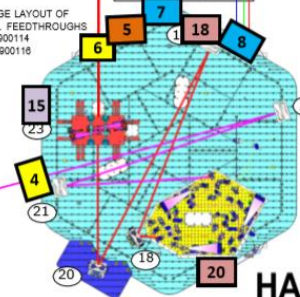
~300m long filter cavity



BSC3



HAM7 FLANGE LAYOUT OF ELECTRICAL FEEDTHROUGHS
L1: LIGO-D1900114
H1: LIGO-D1900116



HAM7

A+ CONCEPTUAL DESIGN

Partial A+ integrated layout
(planned for observing run 04)

DETAILS:

HAM3

BSC2

HAM4

HAM5

- ⑤ ZM6 (TIP-TILT, SQUEEZER-WITH ECD BRACKET)
- ⑥ LOW LOSS FARADAY ISOLATOR

HAM6

HAM7

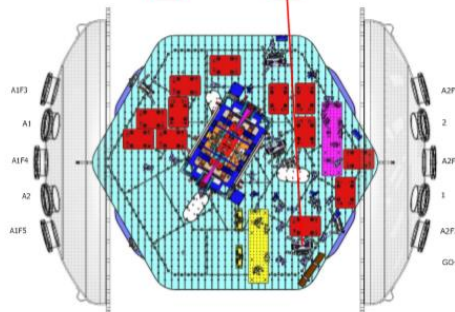
- ⑱ ZM1 (TIP-TILT, SQUEEZER-WITH ECD BRACKET)
- ⑲ ZM2 (HDS + SAMS)
- ⑳ ZM3 (TIP-TILT, SQUEEZER)
- ㉑ ZM4 (HDS + SAMS)
- ㉒ ZM5 (HDS + SAMS)
- ㉓ FC1 (HSTS TRIPLE, FILTER CAVITY)

HAM8

- ㉔ FC2 (HSTS TRIPLE, FILTER CAVITY)

VIEWPORT LAYOUT LEGEND

- Existing Septum Windows (D1101005)
Total=2
- High Quality Viewport Optic D1101006-1 (type 1) in assembly D1100999
Total=3
- Glass for Cameras
Total=2
- Gate Valve (No glass)
Total=6
- General Access Port
Total=3
- TCS Port (existing glass)
Total=1
- TMDS Port (Existing, no glass)
Total=1
- Illuminator Port (Uncoated glass)
Total=2



HAM6

GO-D0901812

FURTHER EXPLANATIONS

Existing Ports:

Some of the ports called out in the above layout photo already exist and don't need to be purchased. This includes the 2 septum plates, the TCS port, and the TMDS port. The septum plates are part of the O5 effort and won't really be paid close attention to right now, but they do exist and will probably not need new parts. The TCS port will use existing parts and glass but will just need to be moved from its current positioning. The TMDS port will use an existing flange but will not require any glass and therefore is not part of the buy list.

Also, not called out in the layout photo above, are an illuminator port and a camera port on the BSC3 Chamber. These ports already exist as well and don't need to be on any purchase list.

New Purchases:

Per site, 2 camera ports will need to be purchased, as well as 2 illuminator ports and 3 high quality viewports (D1100999).

The camera viewports will be purchased off the shelf from either MDC or Nor-Cal and will need AR1064/532nm coated glass.

The illuminator ports will also be purchased off the shelf from these same two vendors but will not require any coating on the glass.

The high quality viewports will be custom made using the drawing D1100999 and the glass will be D1101006-T1 which is AR1064/532nm coated. Two of these high quality viewports will be used for the vacuum-to-air (and vice versa) beams between HAM7 and the Squeezer Table and the remaining high quality viewport will be used on a vacuum-to-air beam between HAM8 and the Trans Table.

Spares:

The "general access" ports called out in the drawing are from the original request from Lisa and Robert for a port that has a clear view of the HSTS optic. These ports don't really have a specific purpose right now other than for general viewing of the HSTS and HAM table, but will require off-the-shelf uncoated glass. Since these ports aren't a true priority right now, they will come from the spares we have on hand at the sites or any spares we plan to purchase.

Locker Access

Each new HAM door (+Y HAM7 door and -Y HAM8 door) will have 2 ports near the bottom of the door for locker access. These will allow access to the HAM ISI table lockers without having to take off the whole door. These ports will require blanks which we already have spares of.

BUY LISTS:

The purchases for A+ viewports will be made in 3 different orders:

- Off-the-shelf full assembly viewports including the glass for cameras and illuminators. The vendors we'll going to for quote are Nor-Cal and MDC
- High quality viewports (D1100999) metal components will be quoted by Huntington and Anderson
- High quality viewport glass (D1101006-T1) will be quoted by ATF and FiveNine Optics

Type of Viewport for A+	Count (Per Site)	Count (Both Sites)	Glass	Coating	Glass/ Coating Spec.	Metal Vendor (SOW)	Glass Vendor (SOW)	Full Assembly Vendor
Camera	2	4	Off the shelf	AR 1064/532	*See below			Nor-Cal & MDC
High Quality Viewport D1100999	3	6	D1101006 Type 1	AR 1064/532	E1100267 (coating spec also listed in drawing D1101006)	Huntington & Anderson	ATF** FiveNine, & CVI	
Illuminator	2	4	Off the shelf	None	*See below			Nor-Cal & MDC

*Coating spec information was pulled from an old RFQ email from Calum Torrie referenced in [C1401199](#). This email we believe was originally referencing [T1000022](#).

**Originally we were going to get quotes from Precision Photonics and ATF but they have since merged and so we will now be request quotes from the merged vendor ATF, FiveNine Optics, and CVI.

Also Note: O-rings are normally purchased from Parker by whichever vendor we purchase the metal components from. Although we do not have specs for these o-rings, there are notes on the viewport assembly drawings (see [D1100999](#) for example) of what we expect for the purchase of these o-rings.