

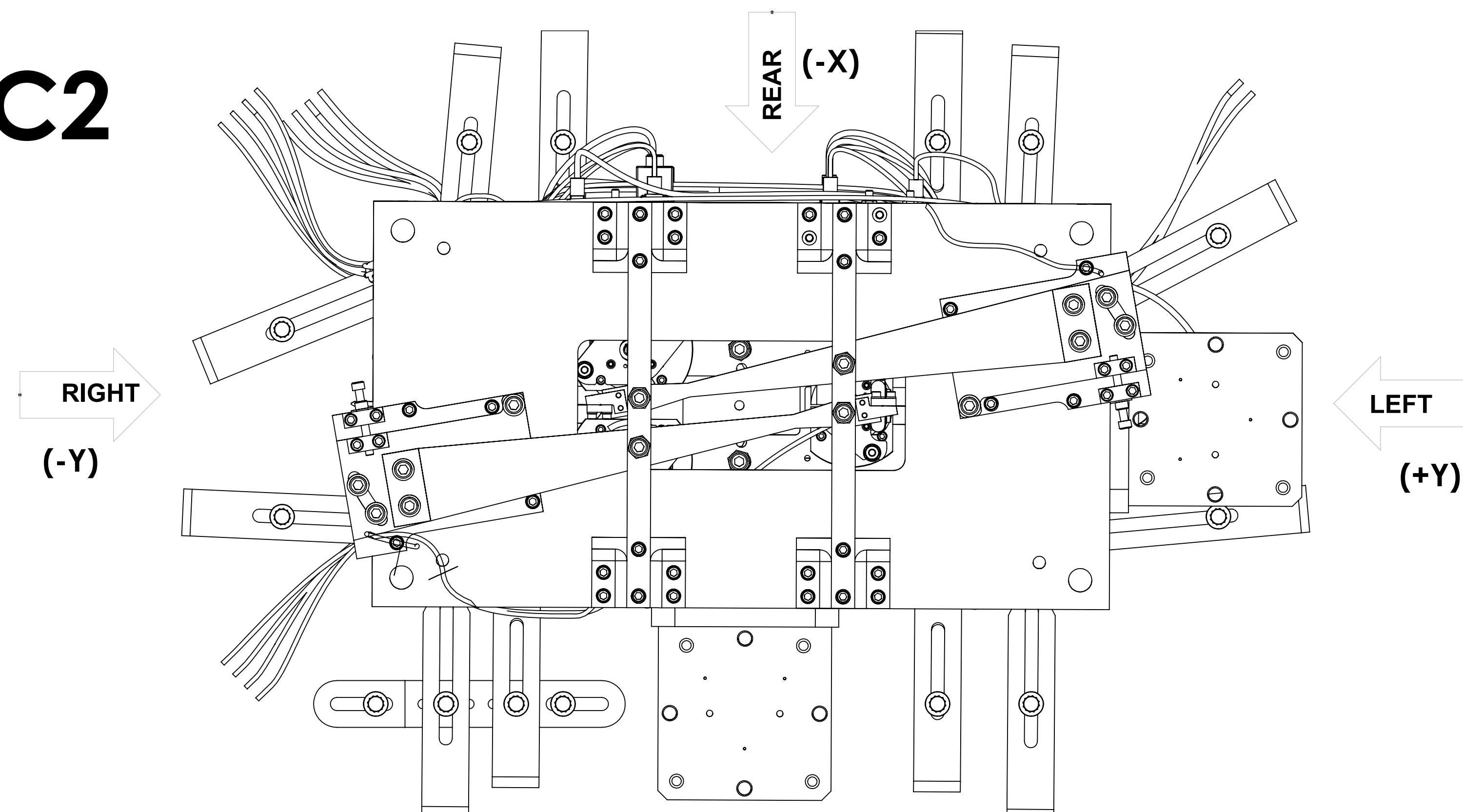
- ① REFERENCED DOCUMENTATION
- 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
 - 1.2 LIGO-D1101493, OSEM ORIENTATION.
 - 1.3 LIGO-D1101463, SYSTEM CABLING DIAGRAM.
 - 1.4 LIGO-D1002424, VIBRATION ABSORBER ORIENTATION.
 - 1.5 LIGO-E1100411, CABLE CLAMP TORQUE.
 - 1.6 LIGO-D1101296, HAM ISI HOLE TABLE.

2. SEE SHEETS 4,5,6,7, AND 8 FOR CABLE ROUTE DETAILS.

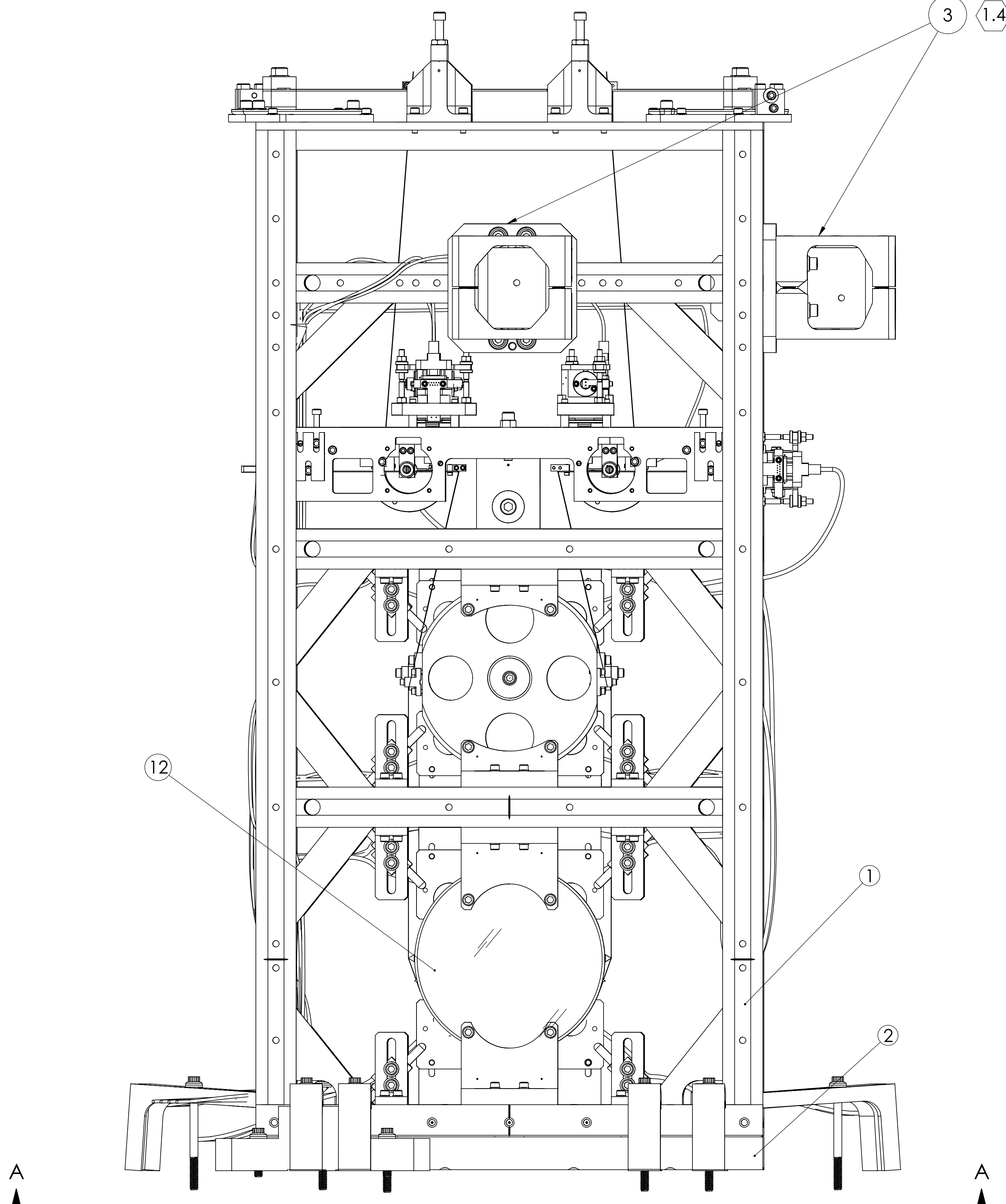
INSTALL CONFIGURATION (i.e.: IN CHAMBER - DOORS CLOSED)

REV.	DATE	DCN #	DRAWING TREE #
V1	25 APR 2012	-	-
V2	02 AUG 2012	E1200728-x	-
-	-	-	-

MC2



TOP VIEW
(SEE SHEET 3, FOR DOG CLAMP DETAILS)

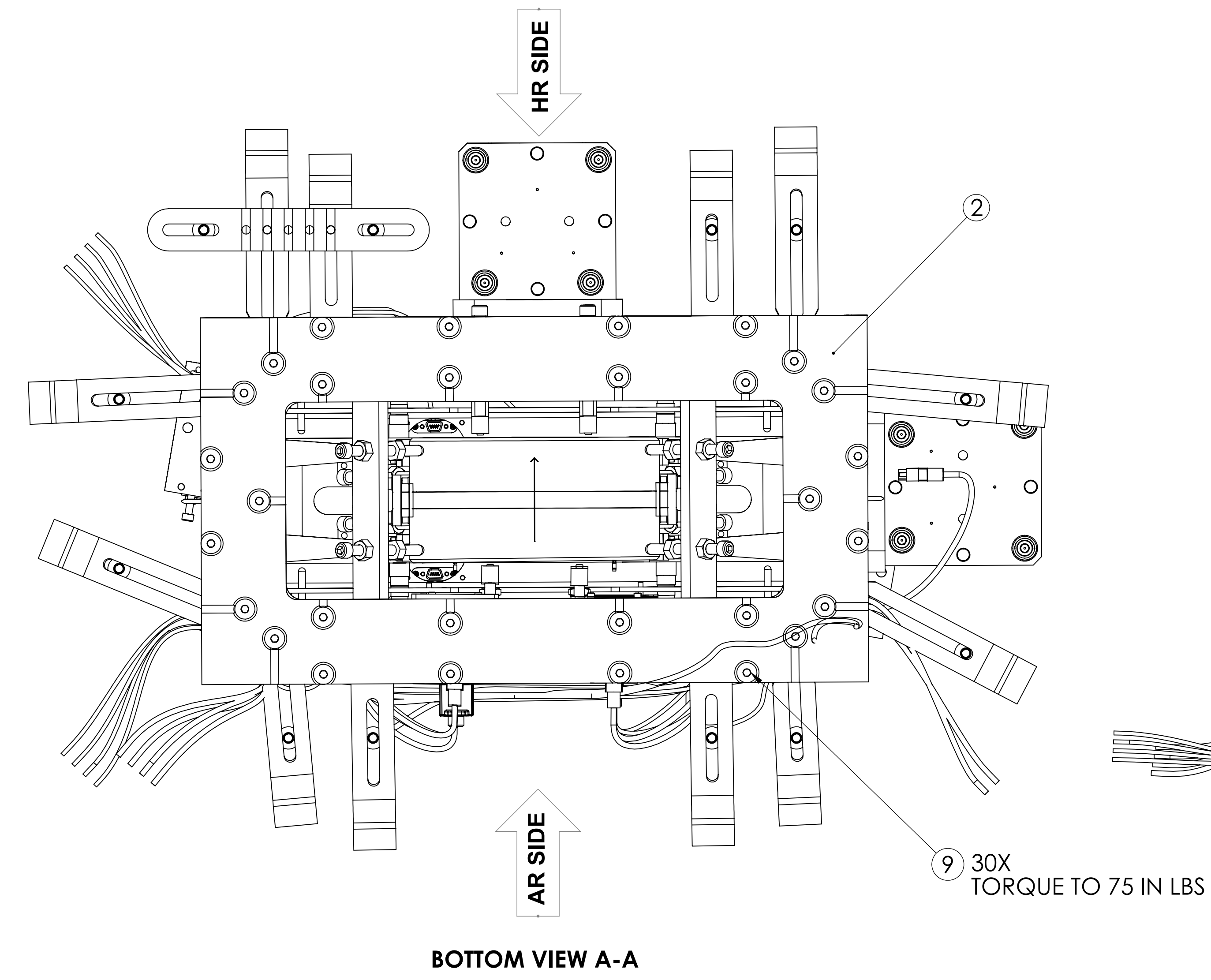


HR SIDE - FRONT

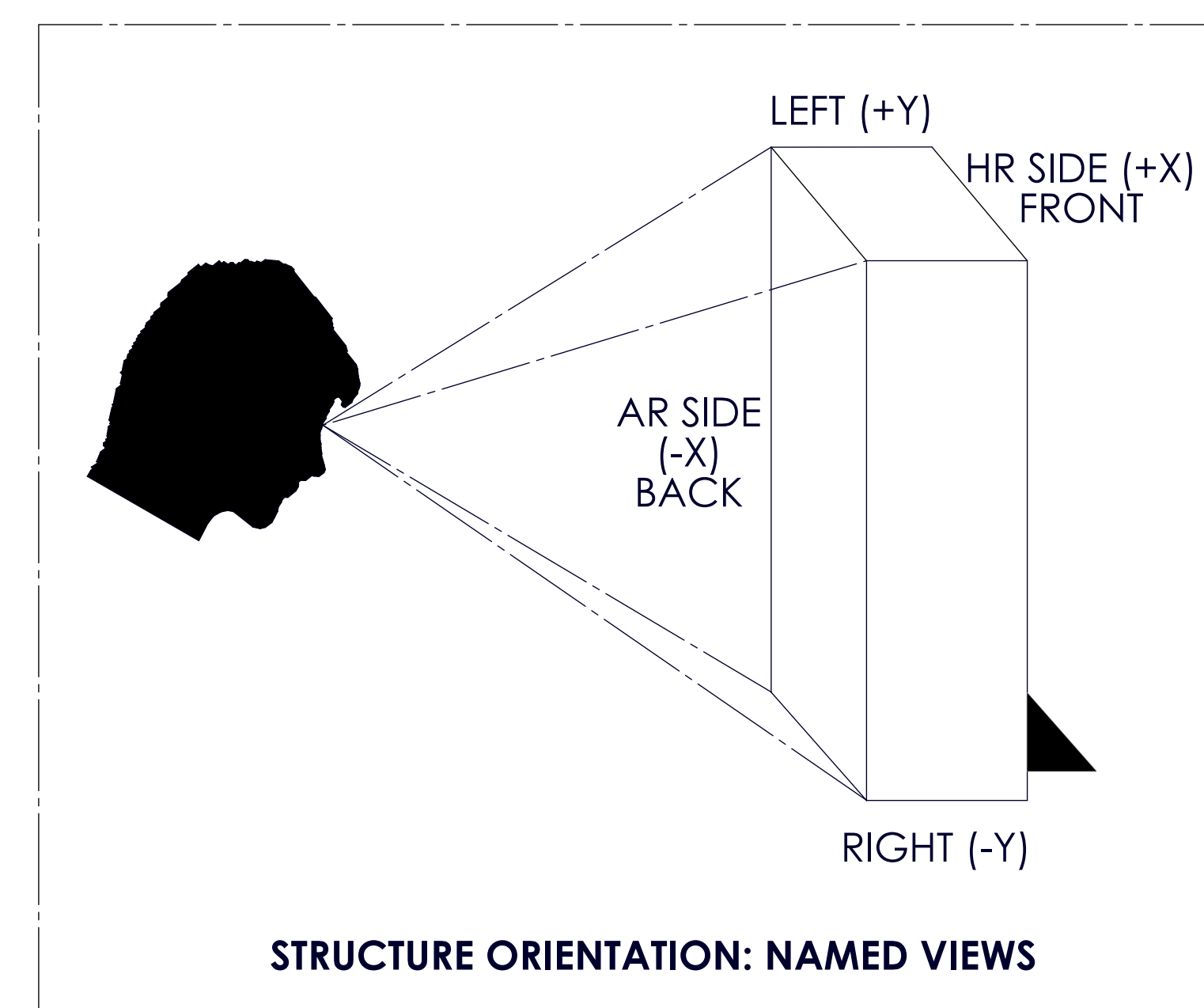
TABLE 1: HAM3-H1 MC2 CABLING SPECIFICATIONS, FROM/TO DES.

ROUTE NO.	FROM OSEM POSITION	TO CB FLOOR DES.	QP LEG DES.	CABLE PART NO.	NOM. CABLE LENGTH (IN)
1	M3-UL (S)	CB-4 (FIRST)	A	D1000234	60
	M3-LL (N)		B		
	M3-UR (N)		C		
	M3-LR (S)		D		
2	M2-UL (S)	CB-5 (FIRST)	A	D1000234	66
	M2-LL (N)		B		
	M2-UR (N)		C		
	M2-LR (S)		D		
3	M1-T1 (S)	CB-5 (SECOND)	A	D1000234	78
	M1-T2 (S)		B		
	M1-T3 (N)		C		
	M1-LF (N)		D		
4	M1-RT (S)	CB-2 (FIRST)	A	D1000234	96
	M1-SD (S)		B		

NOTE : ROUTE NO. 4 IS A SHARED CABLE, SEE D0901098 FOR QP LEGS 'C' AND 'D' ROUTING



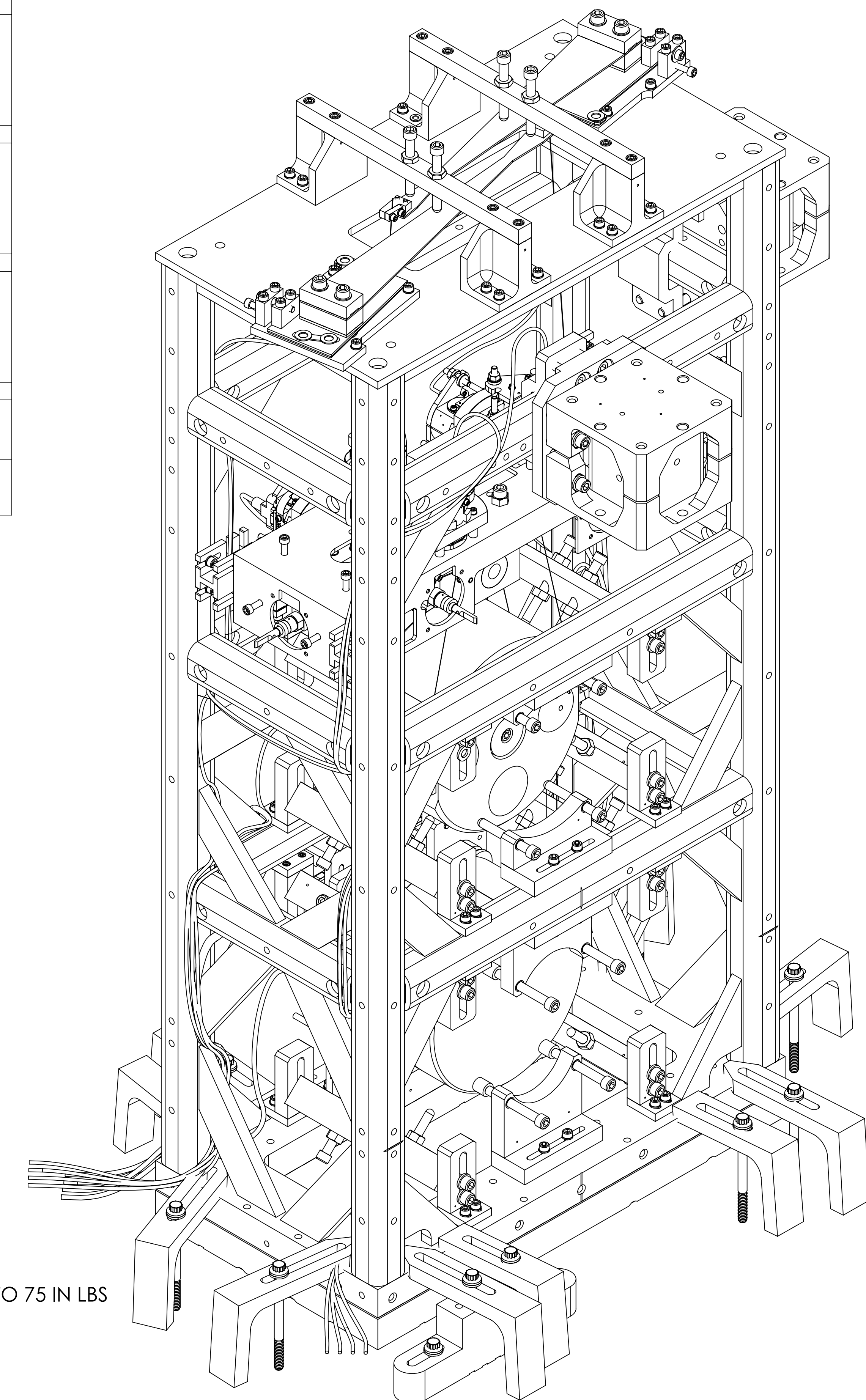
BOTTOM VIEW A-A



LOCAL COORDINATES - REFERENCE

General Table			
Xmm	Ymm	Zmm	YAW °
-2.5	487.5	-86.2	.23°

REFER TO DRAWING D1101252 FOR HAM3-H1 INSTALLATION PLATE LAYOUT



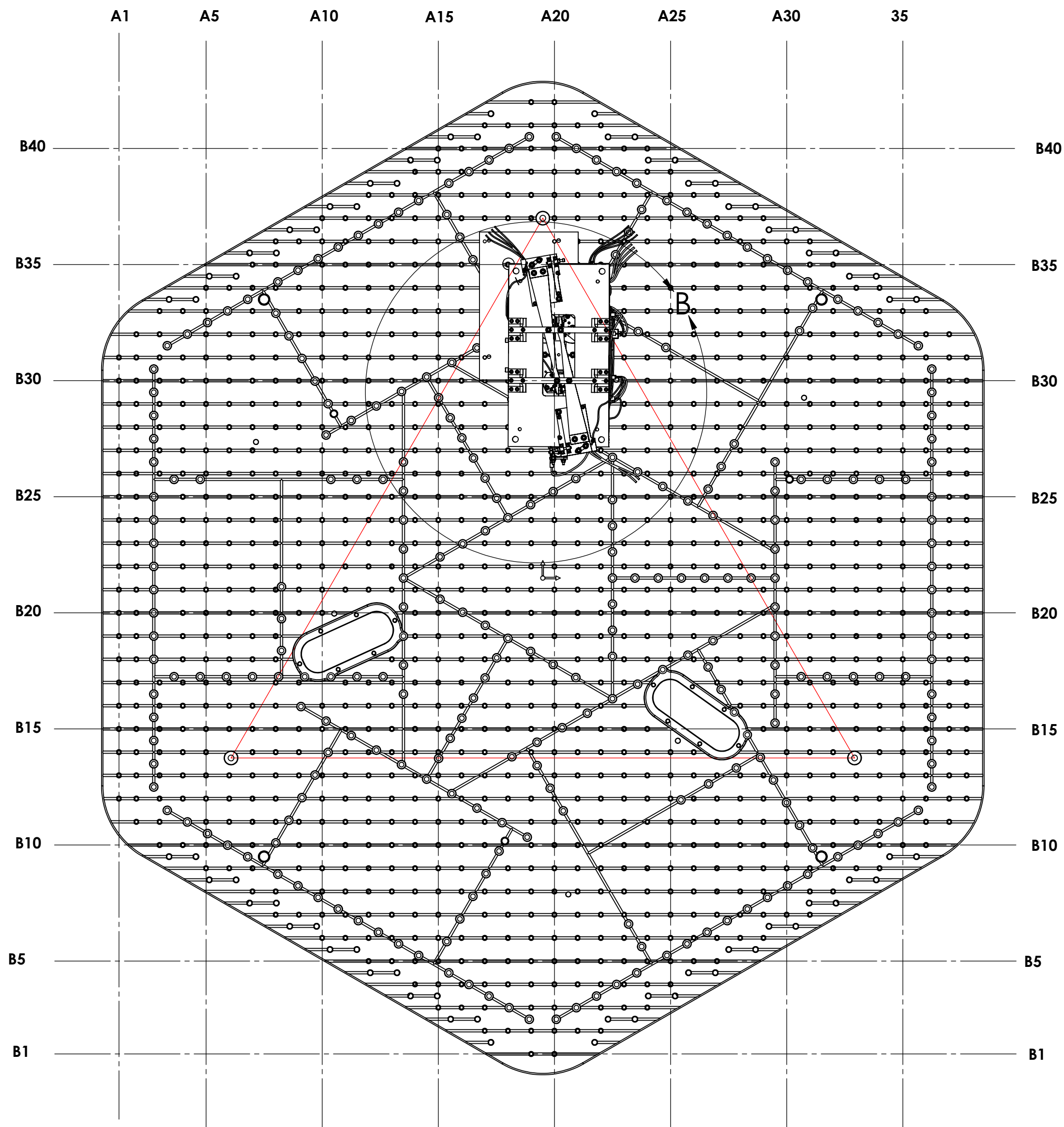
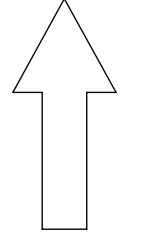
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
13	D0902462	CLAMP ASSY., UHV COMPATIBLE	N/A	1
12	D1101375	MC2 H1 OPTICS ASSEMBLY	N/A	1
11	2AL1.25-12SL	1/4-20 X 1.25 12PT BOLT	450 SSSL	4
10	2AL3.25-12SL	1/4-20 X 3.25 12PT BOLT	450 SSSL	10
9	FA-2024-NA	.25-20 X 1.5 FHSC SCREW UC COMPONENTS FA-2024-NA	18-8 SSSL	30
8	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	14
7	D1100641-09	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2L	304 SSSL	6
6	D1100641-08	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2M	304 SSSL	2
5	D1001376-08	AdvLIGO HAM Optics Table Dog Clamp 2.20M	304 SSSL	4
4	D1100191	gLIGO, DOG CLAMP SUPPORT HLTS-HSTS STRUCTURE	6061-T6 Al	1
3	D1002424	VIBRATION ABSORBER ASSEMBLY	N/A	2
2	D1100037	HSTS SUS STRUCTURE SPACER 25.9MM	6061-T6 Al	1
1	D020700	HSTS OVERALL ASSEMBLY	N/A	1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY		PART NAME AdvLIGO SUS HAM3-H1, XYZ Local CS for HSTS (MC2) Sub-Assy	
SYSTEM	ADVANCED LIGO	SUB-SYSTEM	SUS
DESIGNER	ESANCHEZ	DATE	25 APR 2012
DRAFTER	SEE DCC	CHECKER	SEE DCC
APPROVAL	SEE DCC	SCALE	1:2
MATERIAL	N/A	FINISH	N/A μinch
NEXT ASSY	D0901094	SIZE	DWG. NO. E D0901099
			REV. V2

MC2

+Y



TOP VIEW 1.6

REF. TRIANGLE: SEE D1000125 FOR ISI NAMING AND ORIENTATION CONVENTION

+X



HR SIDE

ATTACH SCREW AT LOCATION A17/B31

B35

B30

B25

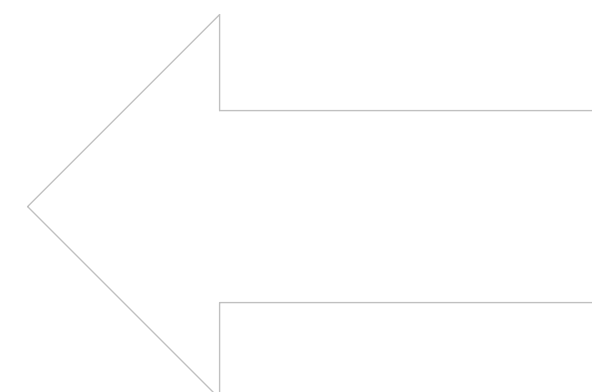
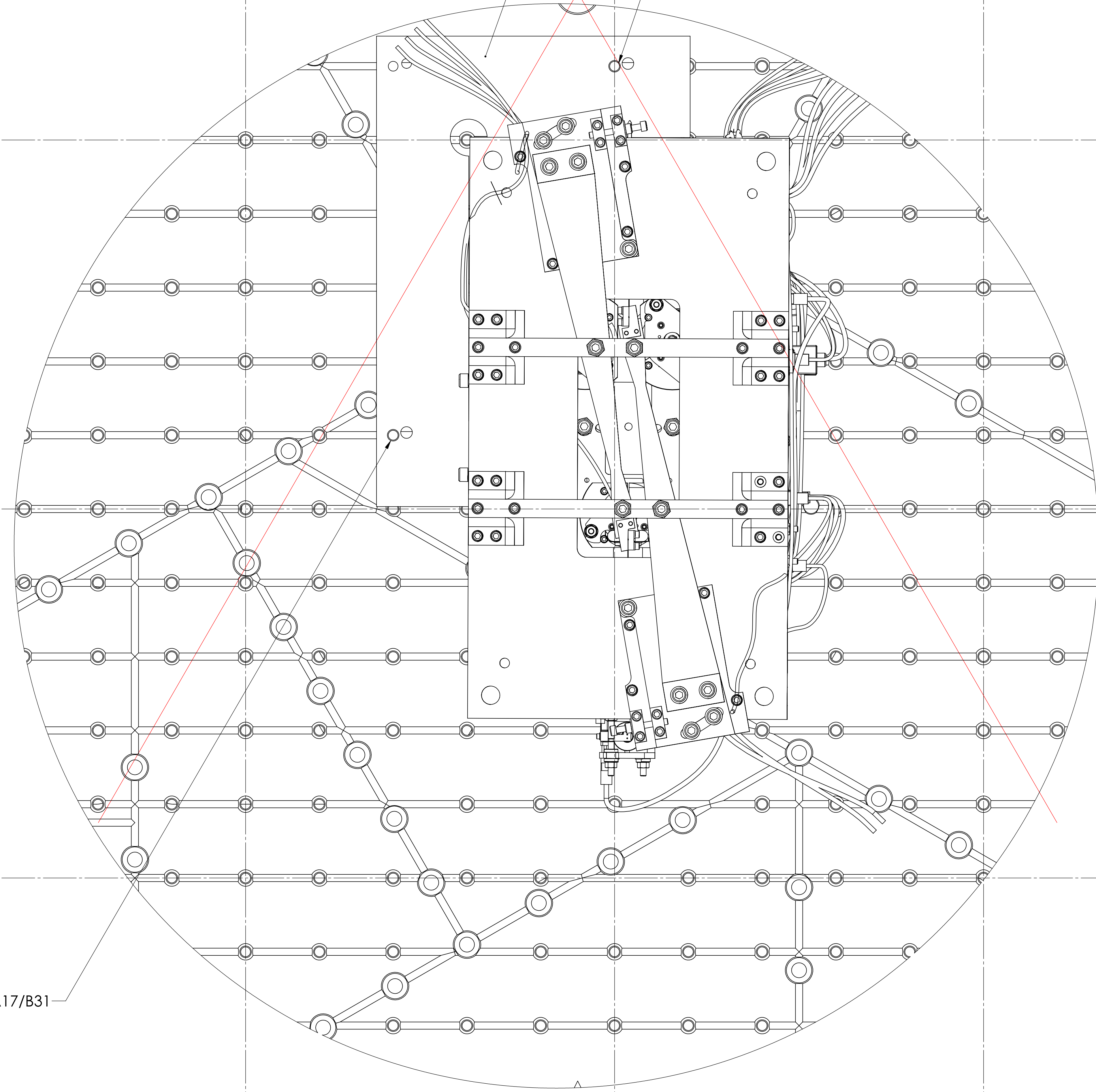
A15

D1000143 MC2 INSTALLATION PLATE

A20

ATTACH SCREW AT LOCATION A20/B36

A25

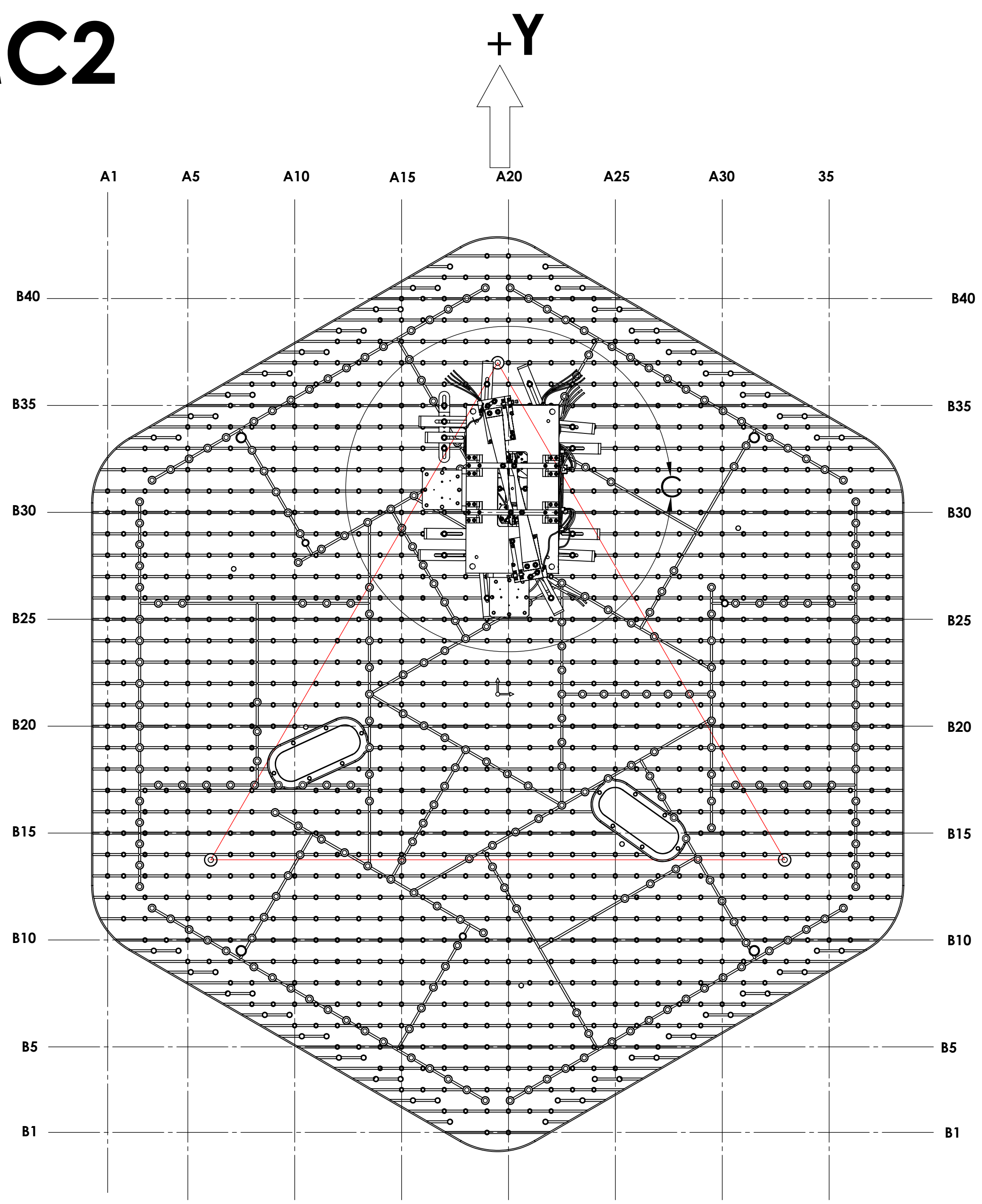


AR SIDE

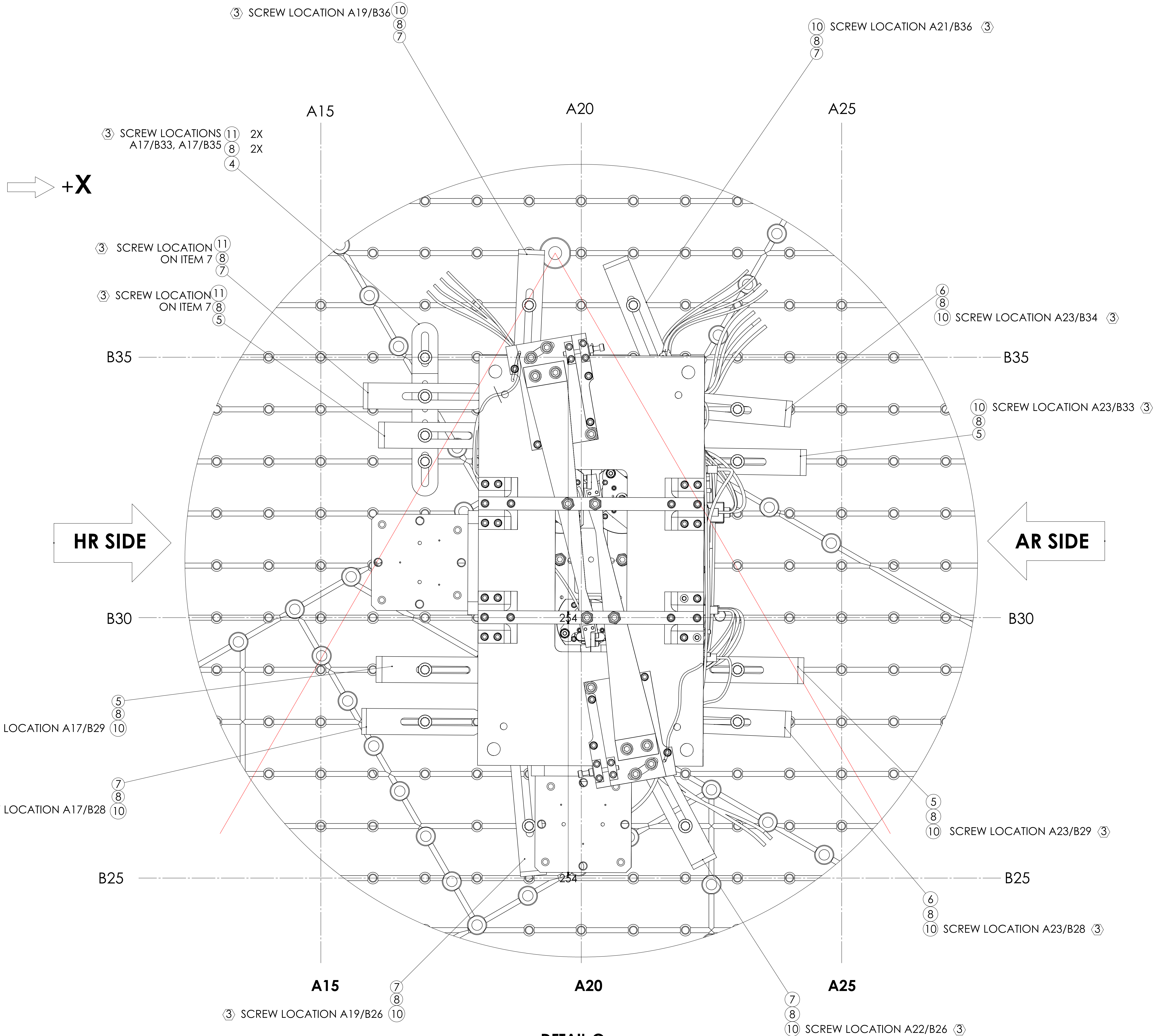
DETAIL B
SCALE 1 : 1.5
TOP VIEW SHOWING INSTALLATION PLATE LOCATION 1.6
OPTICAL TABLE SHOWN FOR STRUCTURE LOCATION AND ORIENTATION,
DOG CLAMPS VIBRATION ABSORBERS AND HARDWARE REMOVED FOR CLARITY

ALIGNMENT PLATE INSTALLATION / LOCATION

MC2



TOP VIEW 1.6
REF. TRIANGLE: SEE D1000125 FOR
ISI NAMING AND ORIENTATION CONVENTION



DETAIL C
SCALE 1 : 1.5

TOP VIEW 1.6

OPTICAL TABLE SHOWN FOR STRUCTURE LOCATION AND ORIENTATION ONLY.

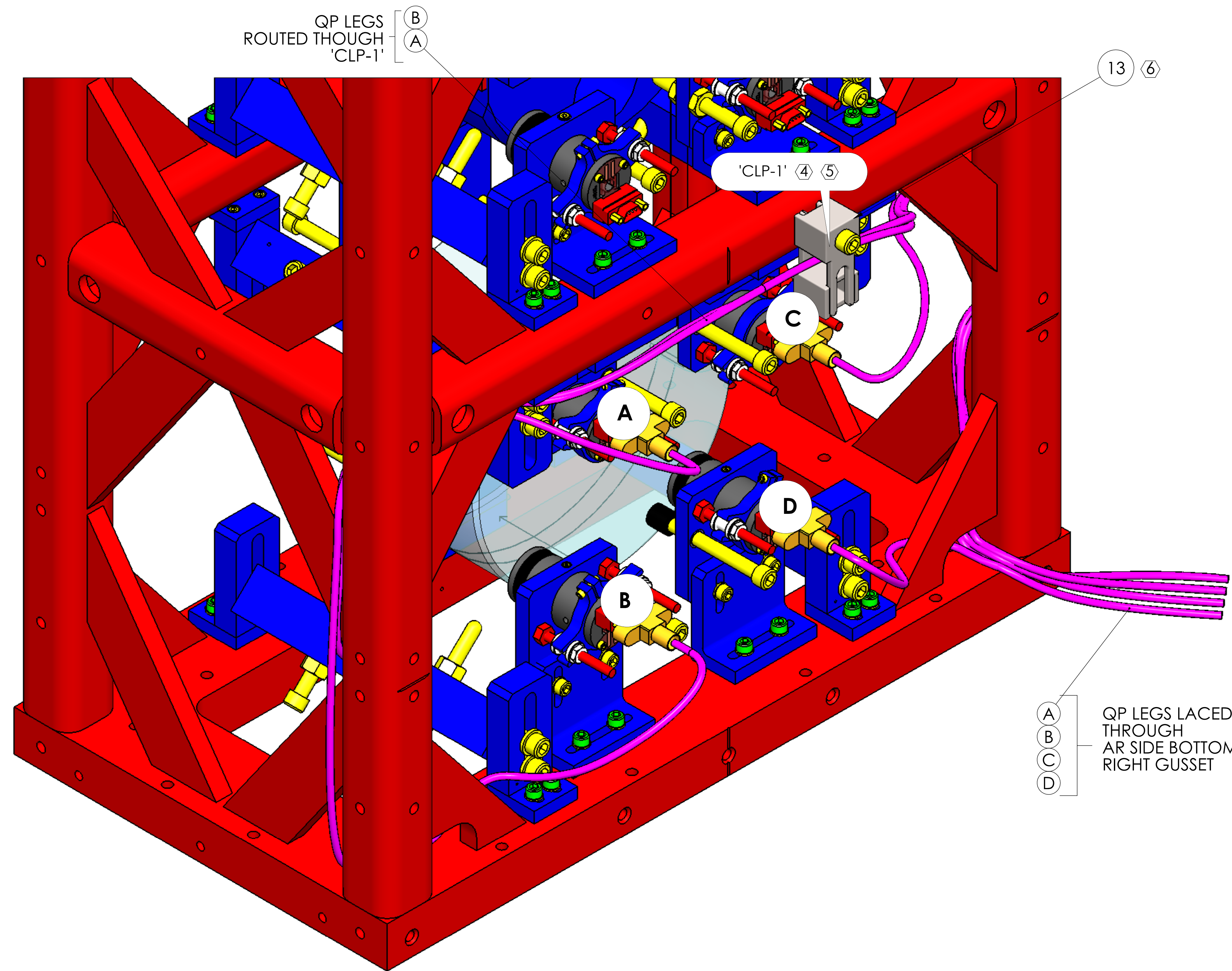
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
11	2AL1.25-12SL	1/4-20 X 1.25 12PT BOLT	450 SSSL	4
10	2AL3.25-12SL	1/4-20 X 3.25 12PT BOLT	450 SSSL	10
8	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	14
7	D1100641-09	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2L	304 SSSL	6
6	D1100641-08	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2M	304 SSSL	2
5	D1001376-08	AdvLIGO HAM Optics Table Dog Clamp 2.20M	304 SSSL	4
4	D1100191	aLIGO, DOG CLAMP SUPPORT HLTS-HSTS STRUCTURE	6061-T6 Al	1

PARTIAL BOM. SEE SHEET 1 FOR COMPLETE PARTS LIST

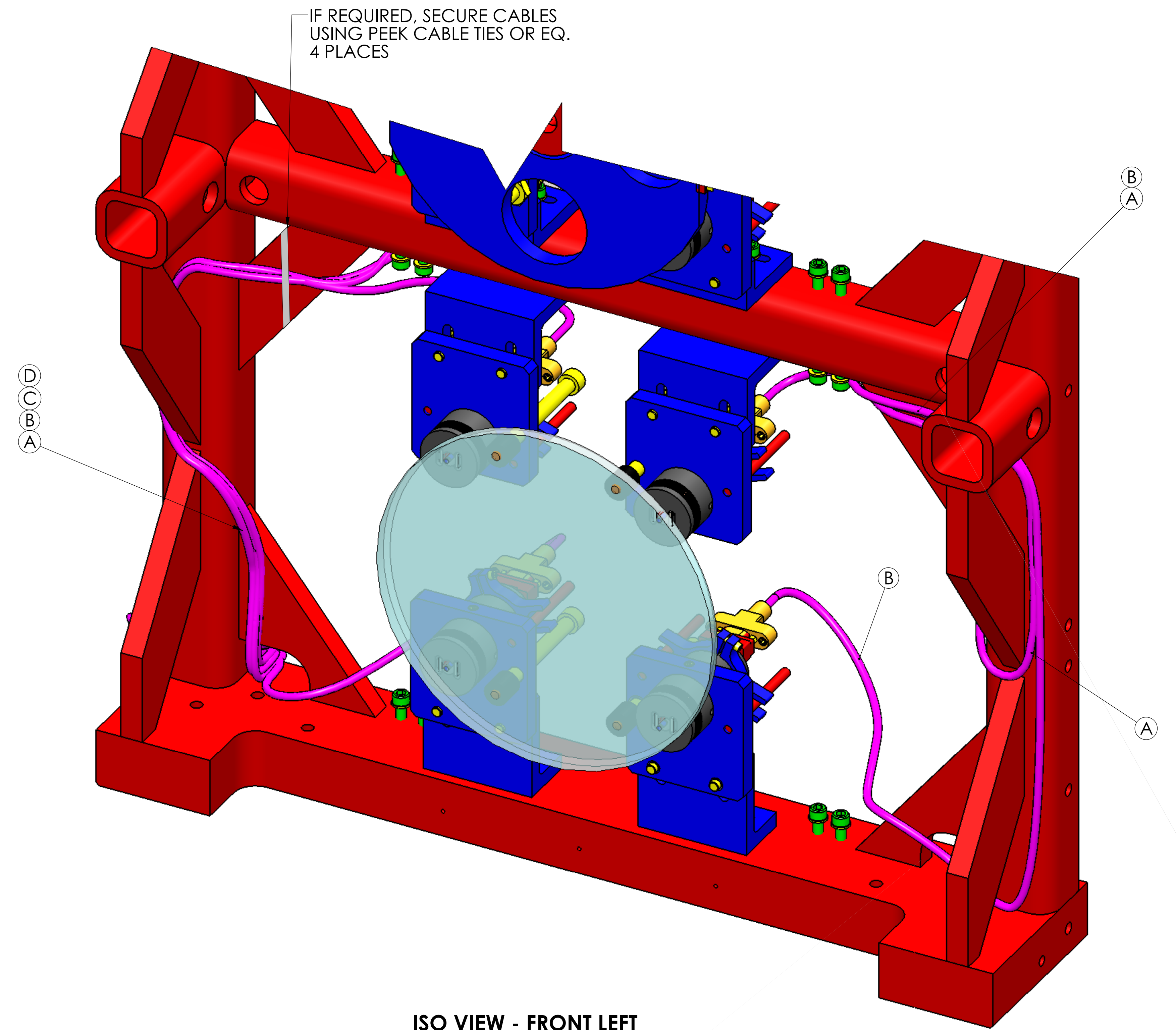
DOG CLAMP IDENTIFICATION / INSTALLATION

(3) TORQUE TO 100 IN LBS (USE STANDARD 12 PT SOCKET)

MC2



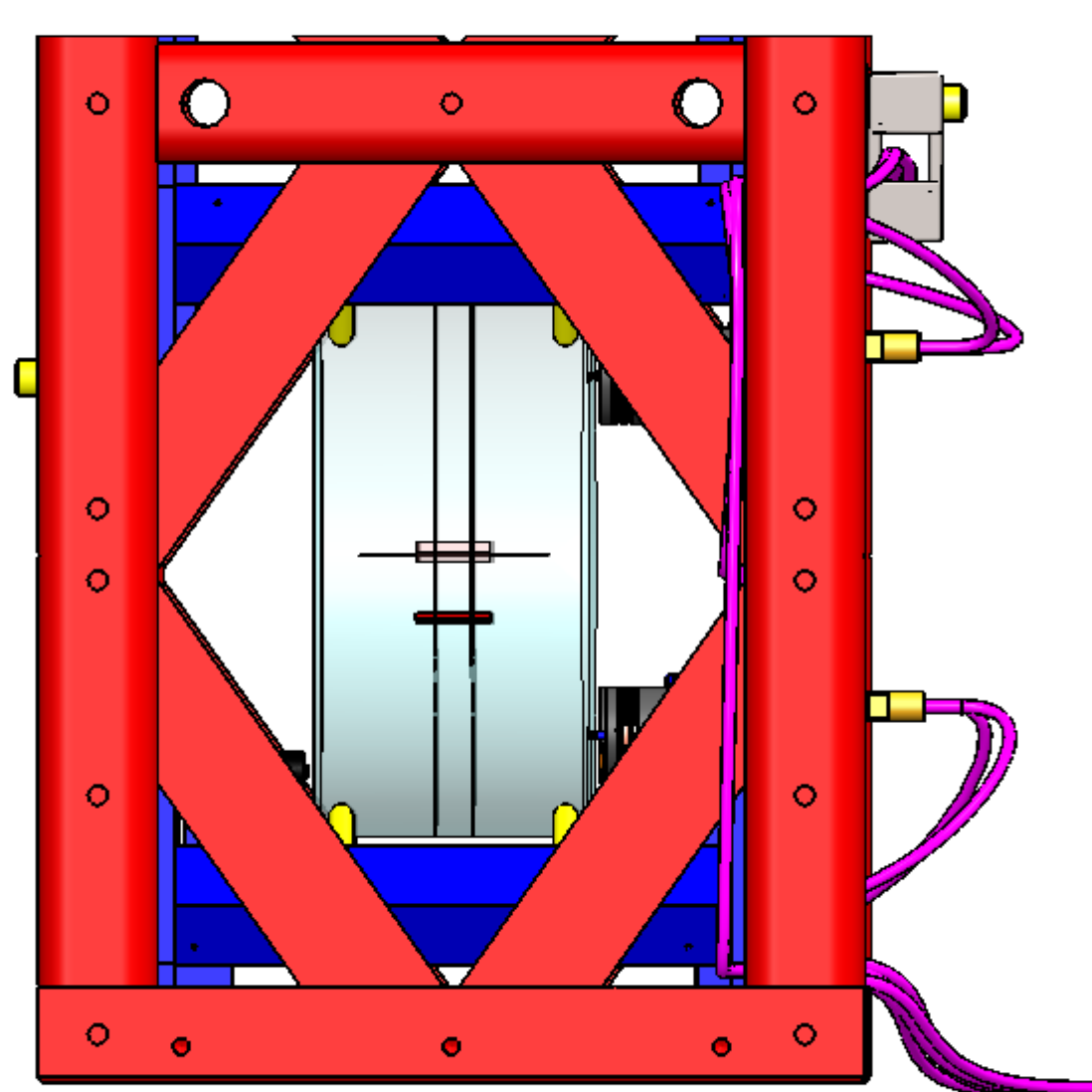
AR SIDE 1.5
ISO VIEW - REAR LEFT (-X)



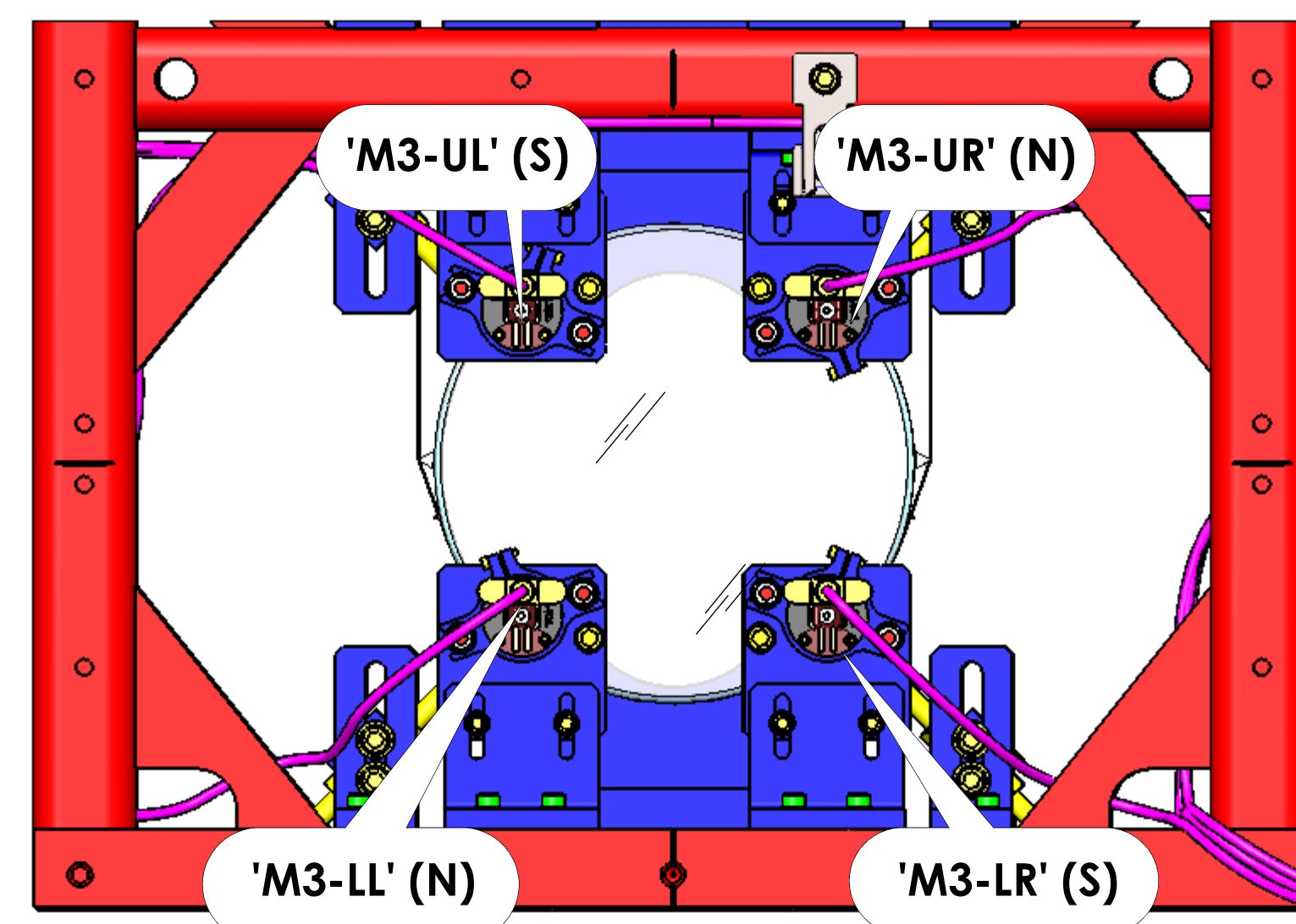
ISO VIEW - FRONT LEFT
BROKEN OUT SECTION
(AS VIEWED FROM INSIDE)



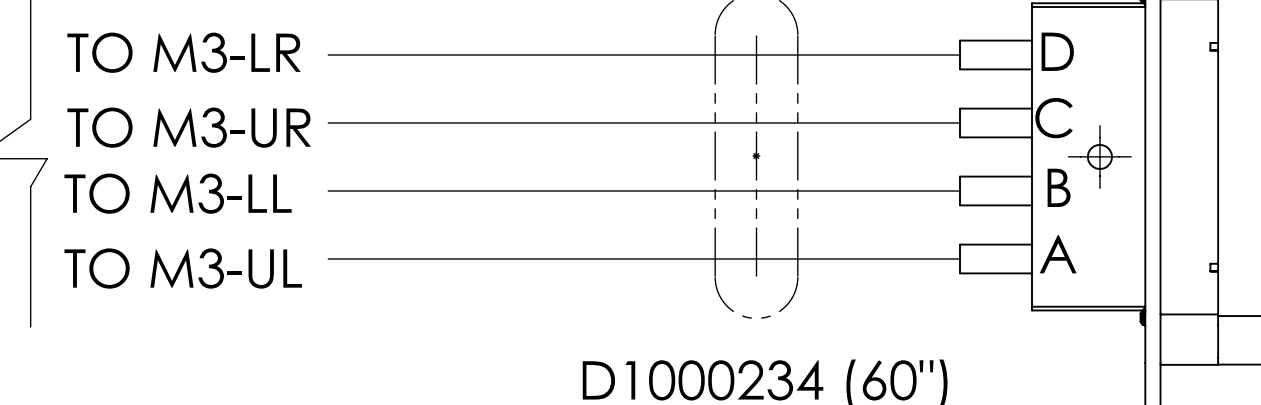
CABLE ROUTING:
ROUTE ALL CABLES IN ACCORDANCE WITH LIGO-T1200203 AND T1200318. CABLE ROUTES DEPICTED IN THIS DOCUMENT ARE NOT MANDATORY, BUT RATHER A CONSIDERED ROUTE AIMED TO CLEAR LASER BEAM PATHS. ALTERNATE ROUTES FOR PROBLEMATIC AREAS ARE ACCEPTABLE, BUT SHOULD BE HANDLED IN A CASE BY CASE SITUATION. IT IS IMPERATIVE TO CONSIDER THE LENGTH OF THE CABLE, THE LOCATION OF MATING CABLE BRACKET, AND LASER BEAM PATH PRIOR TO ROUTING / LACING VIA A NEW PATH.



LEFT SIDE (+Y)

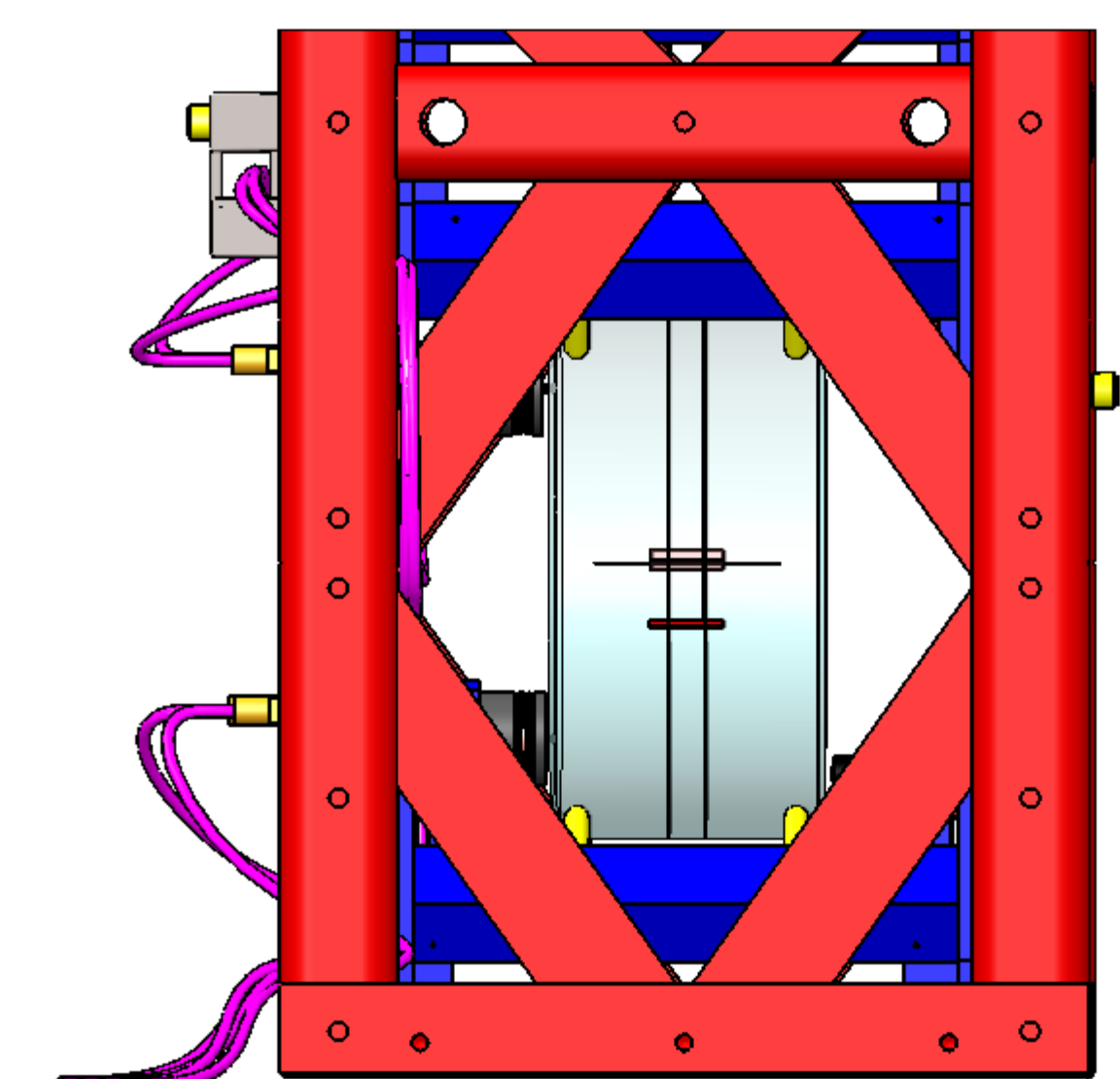
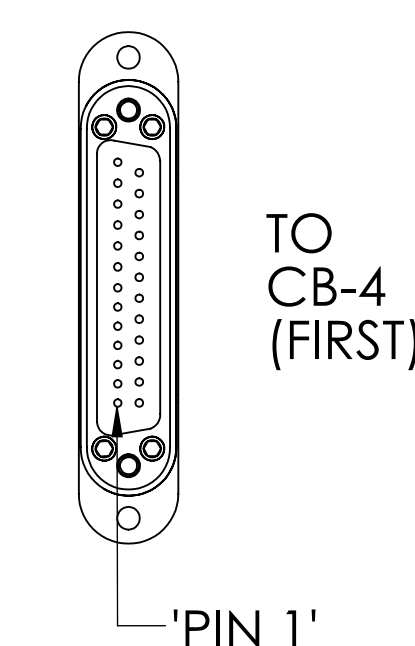


AR SIDE - REAR (-X) 1.1 1.2
(END CONNECTORS, NOT SHOWN FOR CLARITY)



TO M3-LR
TO M3-UR
TO M3-LL
TO M3-UL

D1000234 (60")



RIGHT SIDE (-Y)

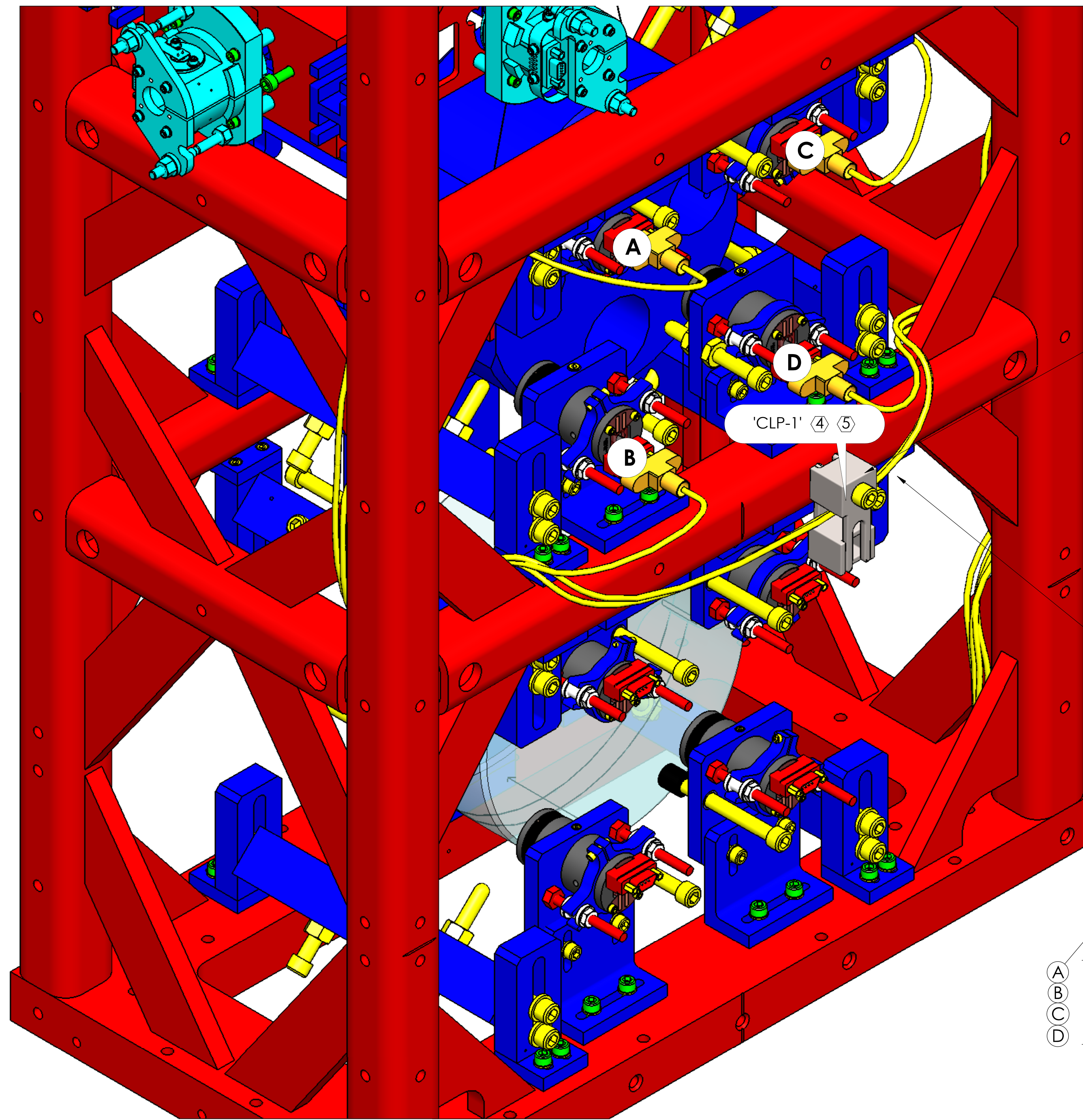
④ DO NOT CLAMP CABLES TIGHTLY. PROVIDE SUFFICIENT SPACE FOR THE CABLES TO RUN FREELY BETWEEN CLAMP JAWS.

⑤ SHORTING MAY OCCUR IN QP BOSEM & AOSEM TEFLON CABLES CLAMPED EXCESSIVELY TIGHT. THEREFORE, THE PEEK CLAMPS (i.e.: 'CLP-1' AND CABLE TIES) SHOULD SERVE ONLY AS A GUIDE FOR THE CABLES TO REACH THEIR DESTINATION, AND SHOULD NOT CLAMP THE CABLES IN PLACE.

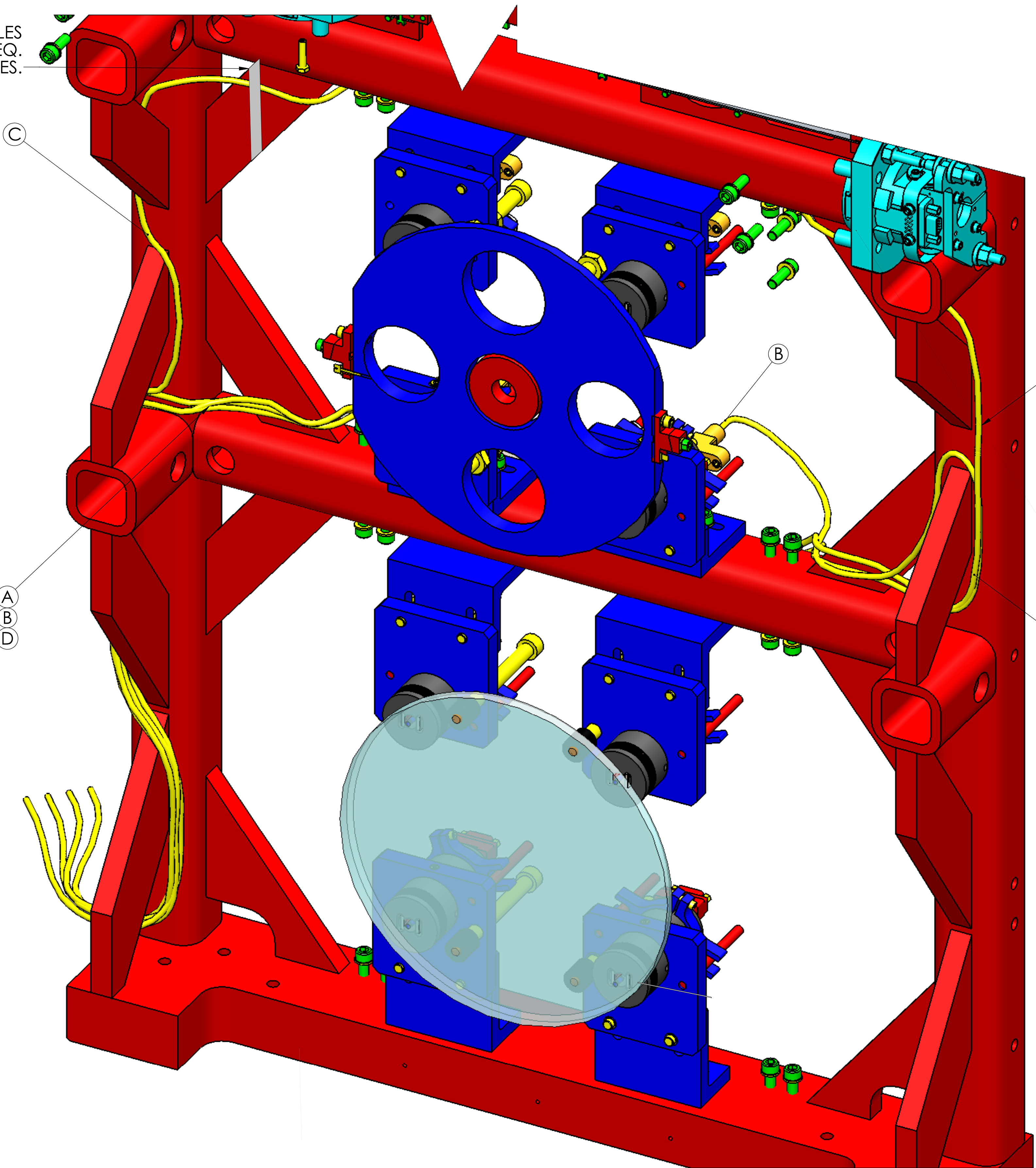
⑥ TORQUE TO APPROXIMATELY 20 IN/LBS.

ROUTE NO.1
SEE LIGO-T1200318
FOR STEP BY STEP CABLING GUIDE

MC2

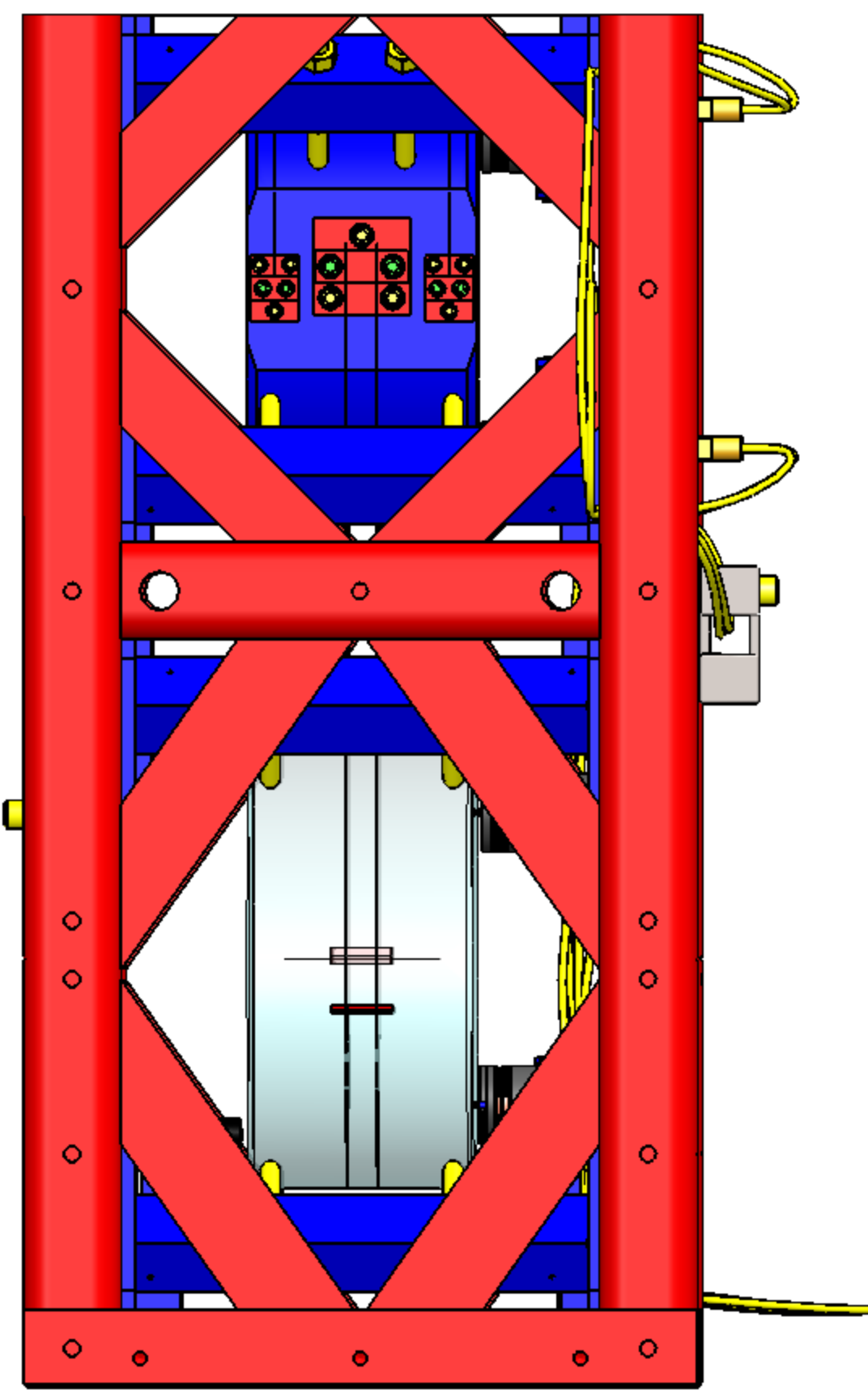


IF REQUIRED, SECURE CABLES USING PEEK CABLE TIES OR EQ. 4 PLACES.

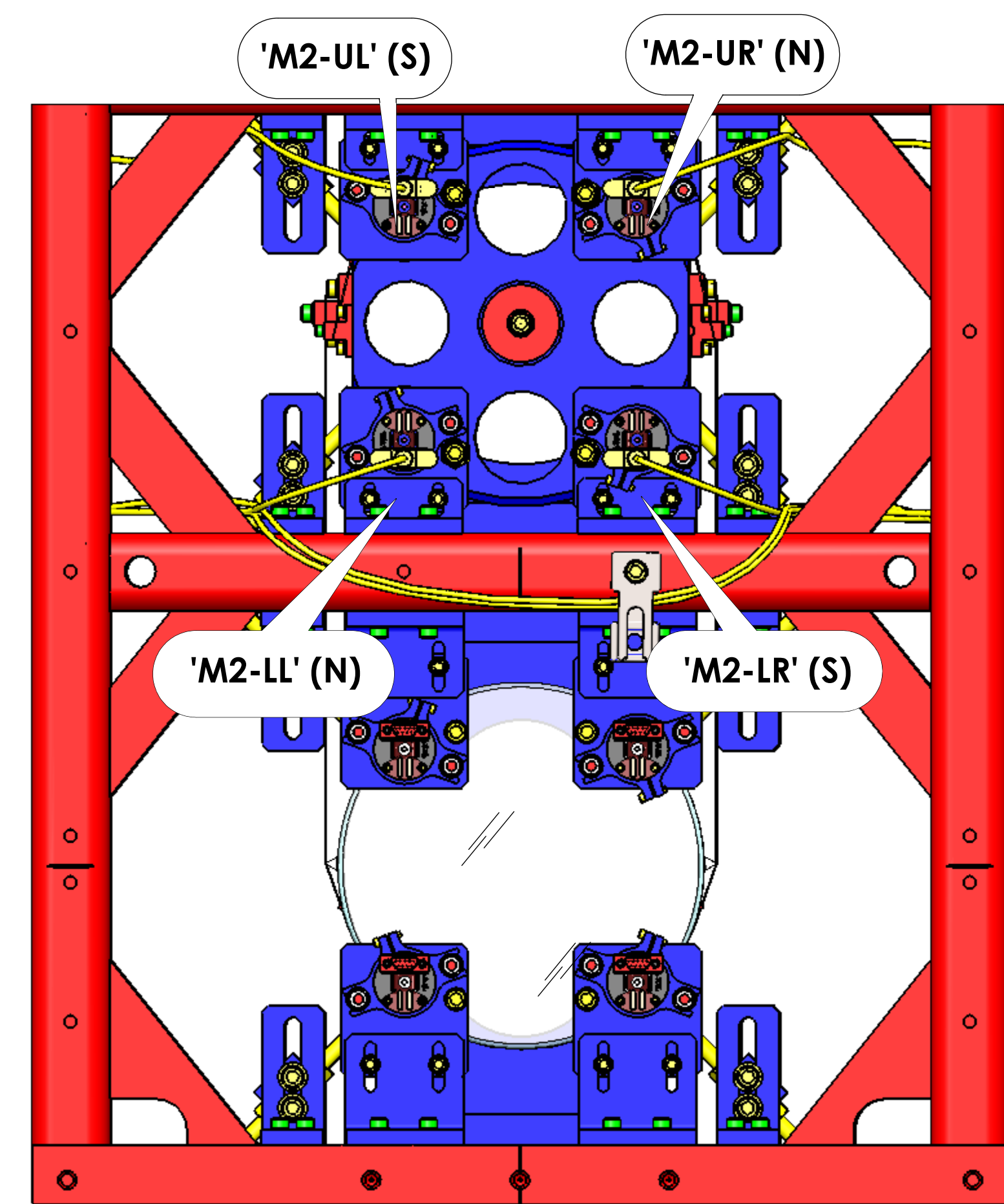


ISO VIEW - FRONT LEFT
BROKEN OUT SECTION
(AS VIEWED FROM INSIDE)

AR SIDE 1.5
ISO VIEW - REAR LEFT (-X)



LEFT SIDE (+Y)



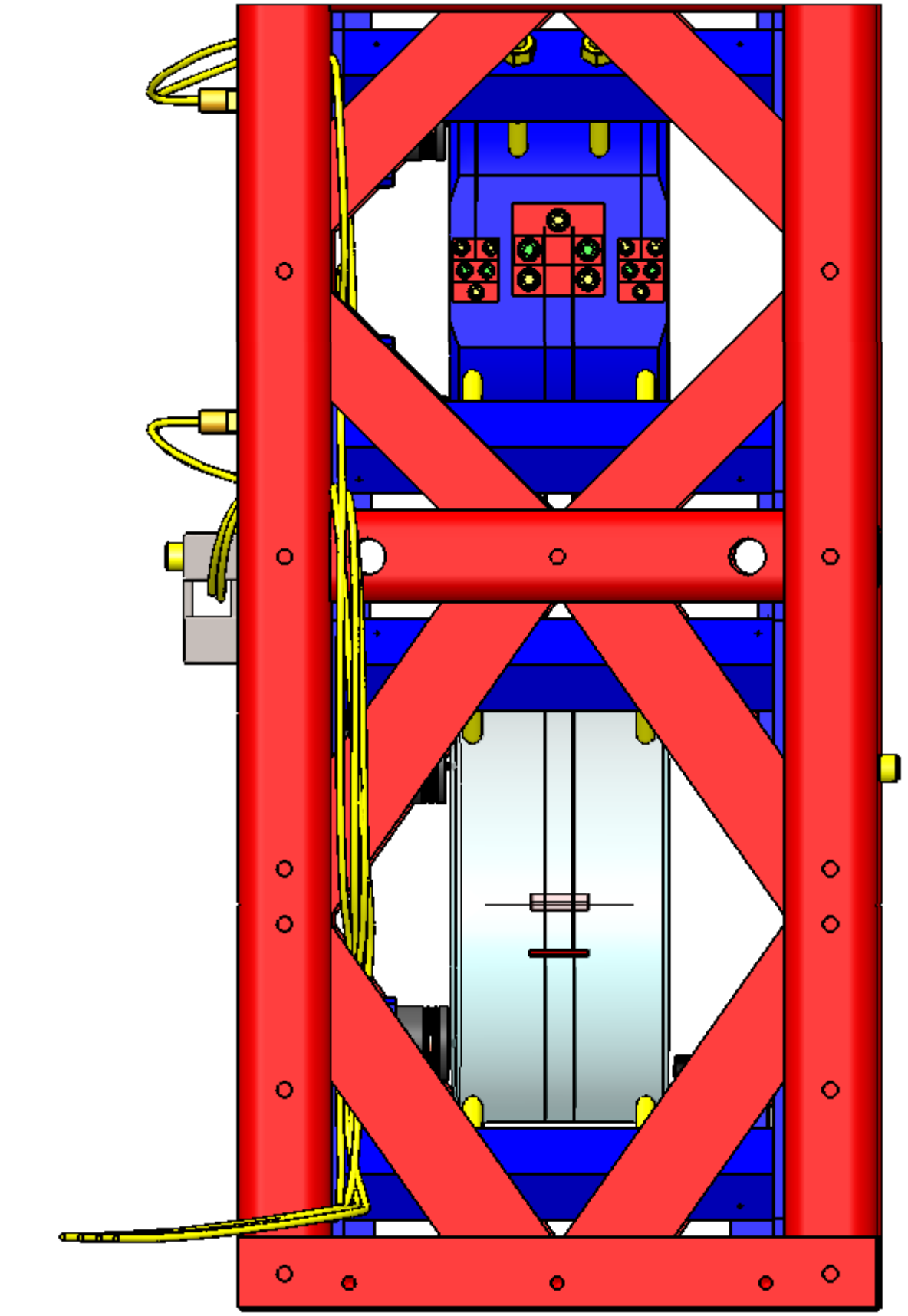
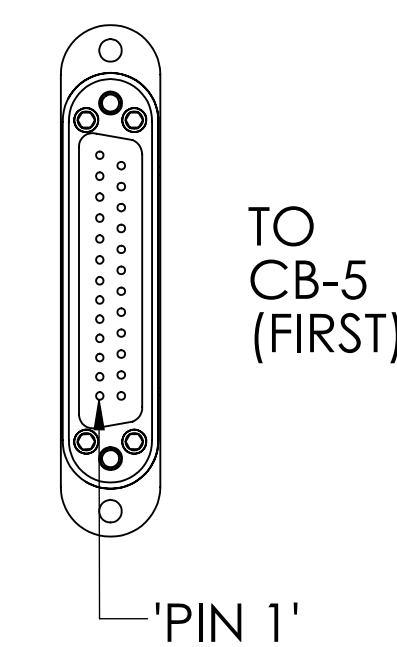
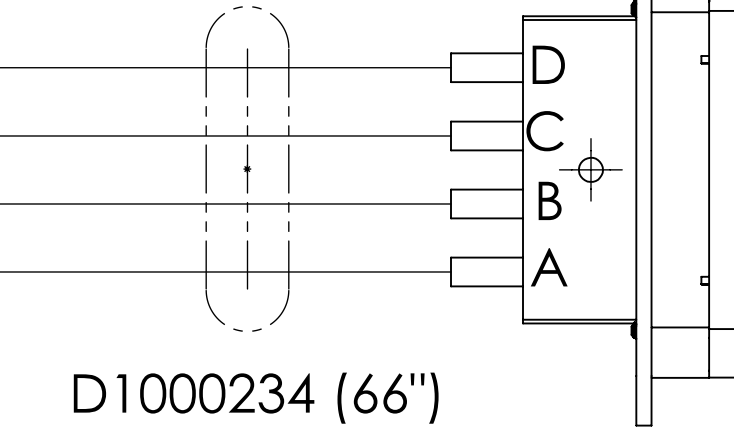
AR SIDE - REAR (-X) 1.1 1.2

(END CONNECTORS, NOT SHOWN FOR CLARITY)



CABLE ROUTING:
ROUTE ALL CABLES IN ACCORDANCE WITH LIGO-T1200203 AND T1200318. CABLE ROUTES DEPICTED IN THIS DOCUMENT ARE NOT MANDATORY, BUT RATHER A CONSIDERED ROUTE AIMED TO CLEAR LASER BEAM PATHS. ALTERNATE ROUTES FOR PROBLEMATIC AREAS ARE ACCEPTABLE, BUT SHOULD BE HANDLED IN A CASE BY CASE SITUATION. IT IS IMPERATIVE TO CONSIDER THE LENGTH OF THE CABLE, THE LOCATION OF MATING CABLE BRACKET, AND LASER BEAM PATH PRIOR TO ROUTING / LACING VIA A NEW PATH.

TO M2-LR
TO M2-UR
TO M2-LL
TO M2-UL

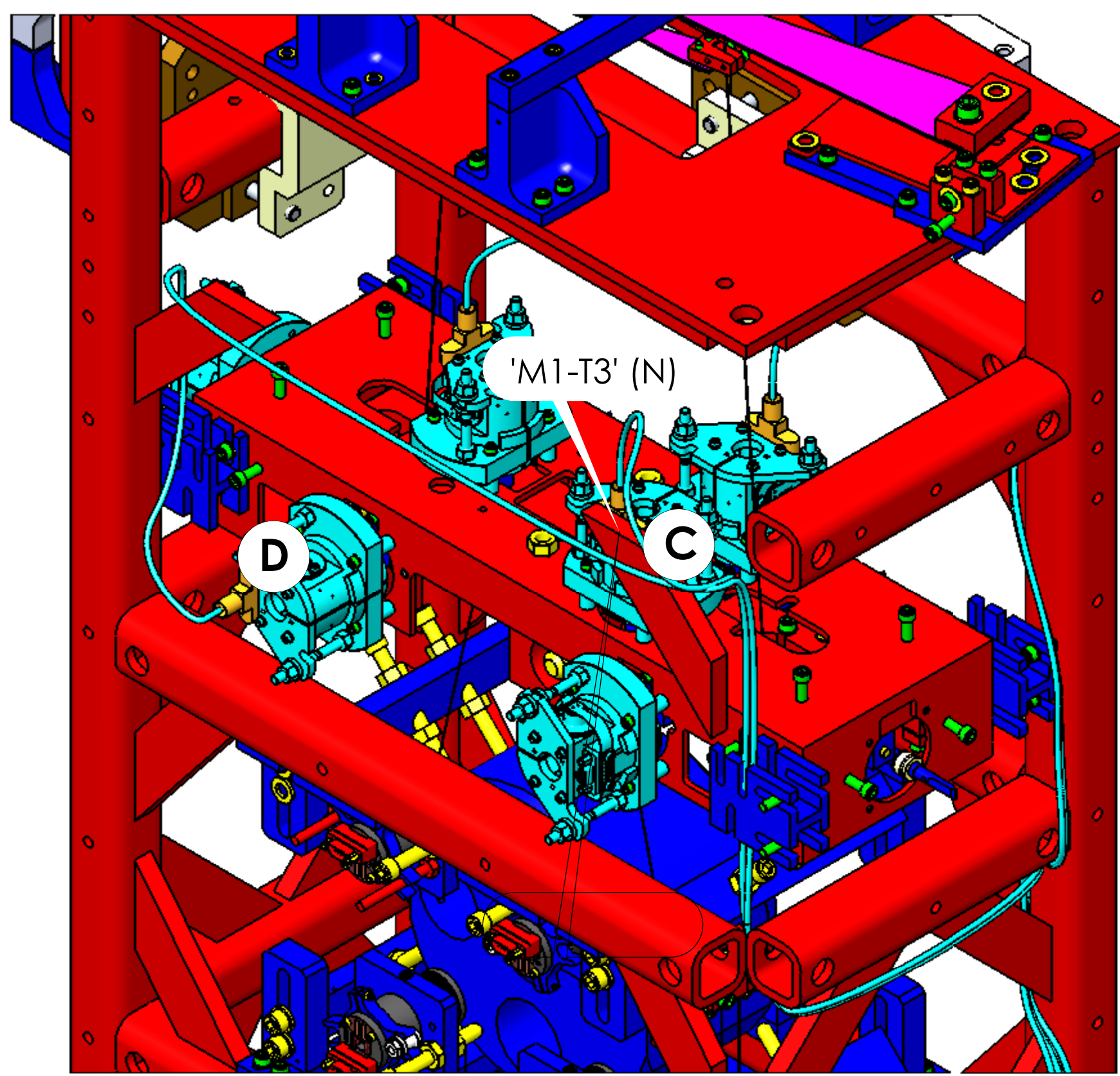


RIGHT SIDE (-Y)

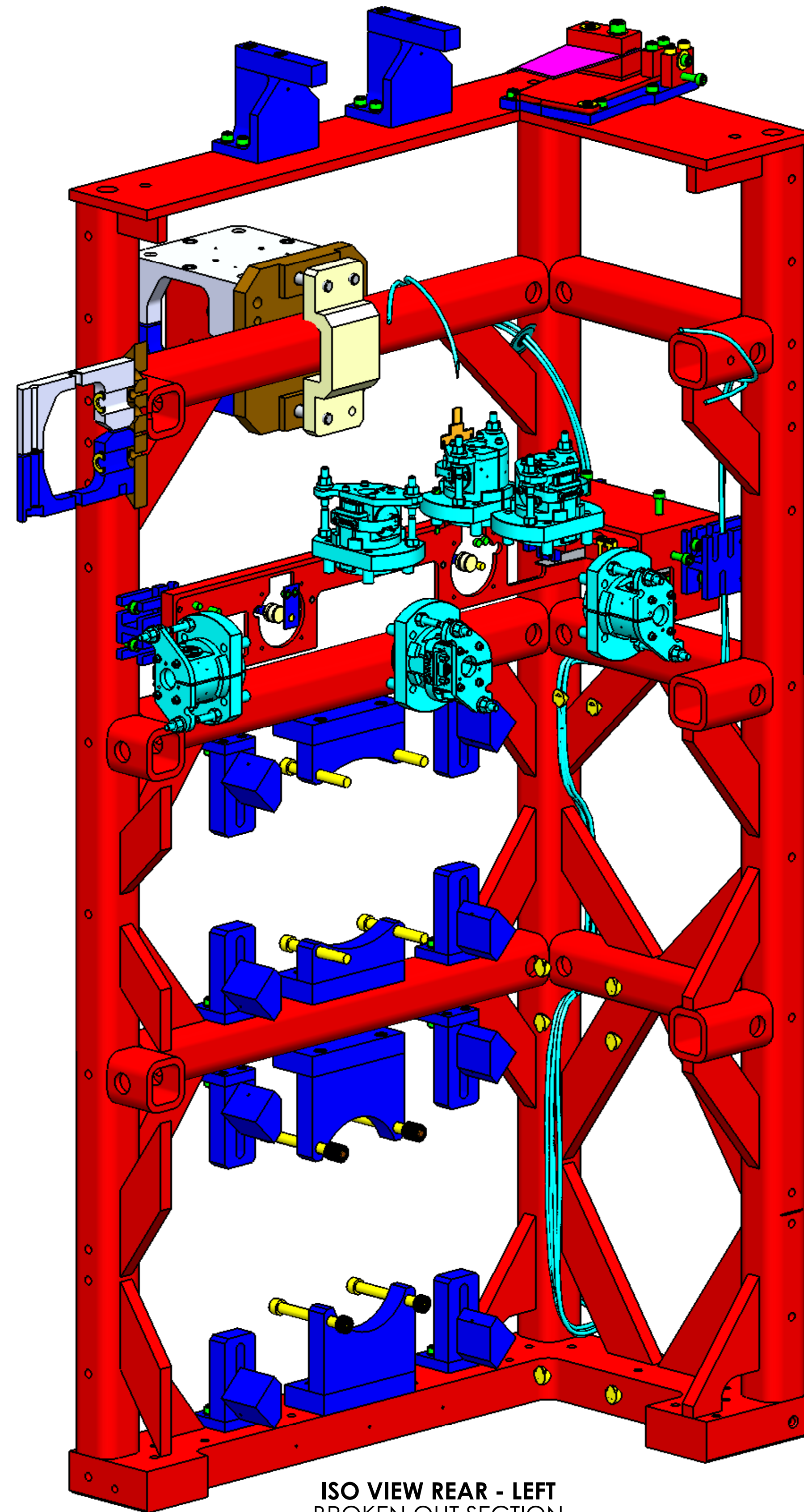
ROUTE NO.2

SEE LIGO-T1200318
FOR STEP BY STEP CABLING GUIDE

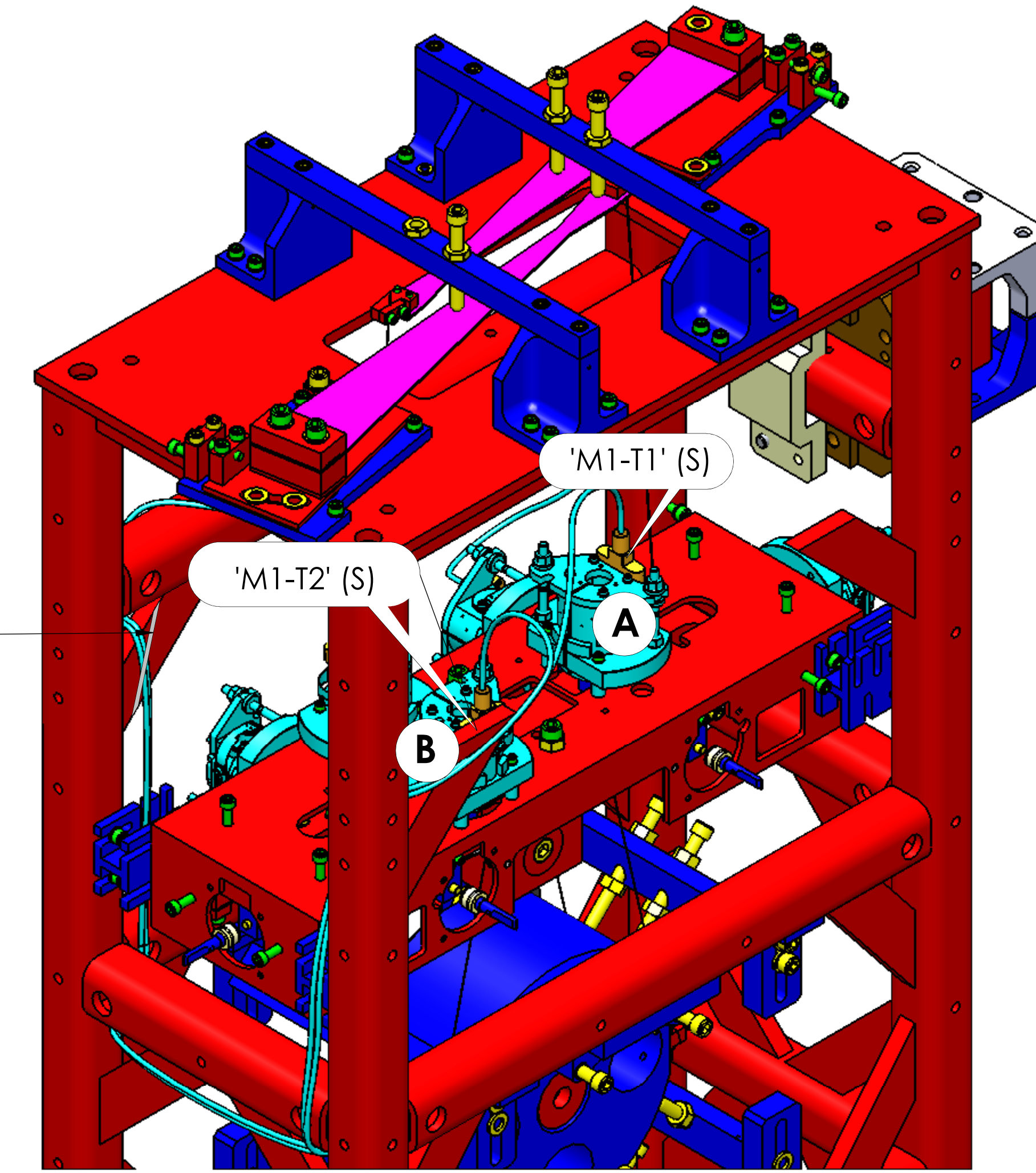
MC2



AR SIDE 1.1 1.2
ISO VIEW, REAR - RIGHT (-X)

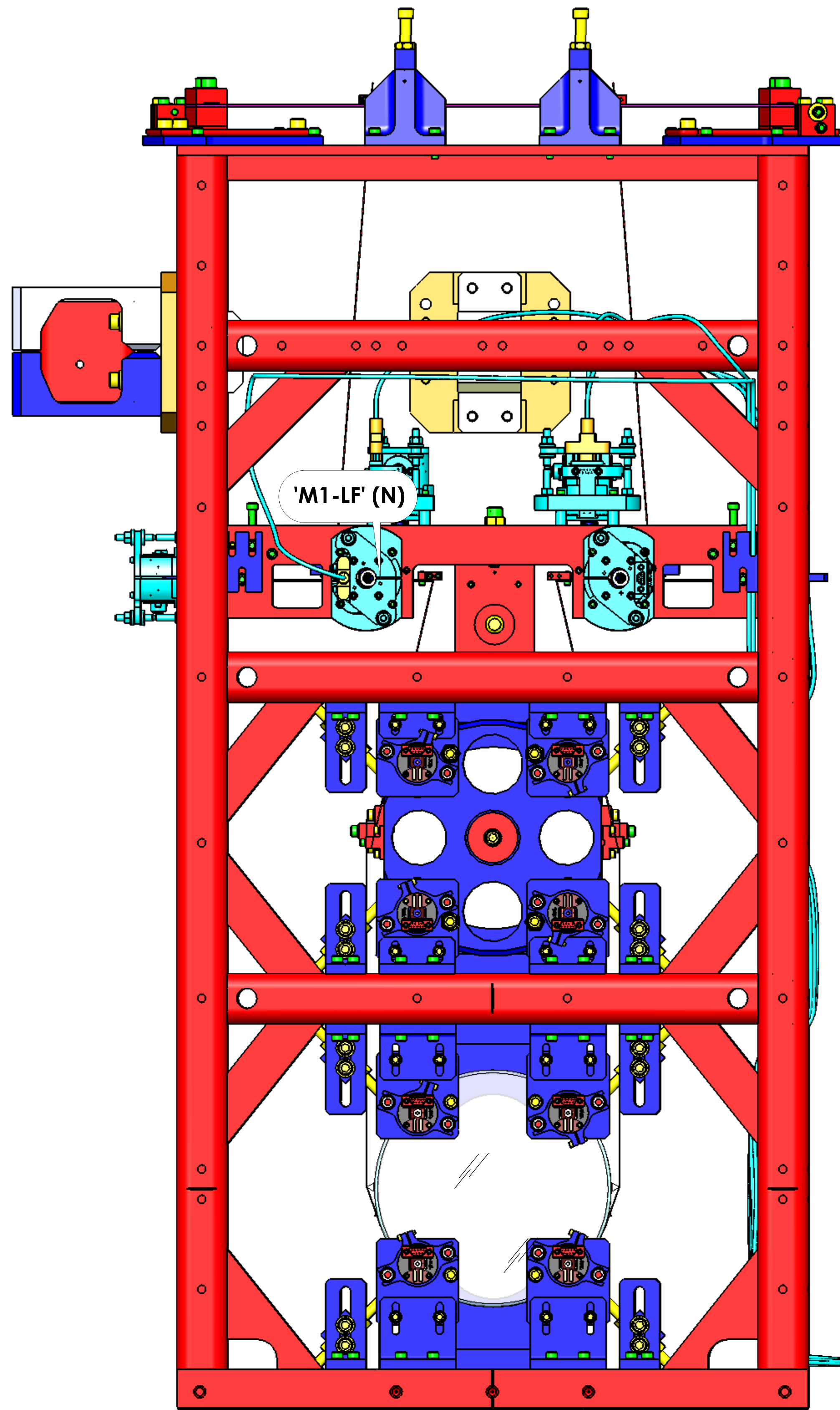


ISO VIEW REAR - LEFT
BROKEN OUT SECTION
(AS VIEWED FROM INSIDE)

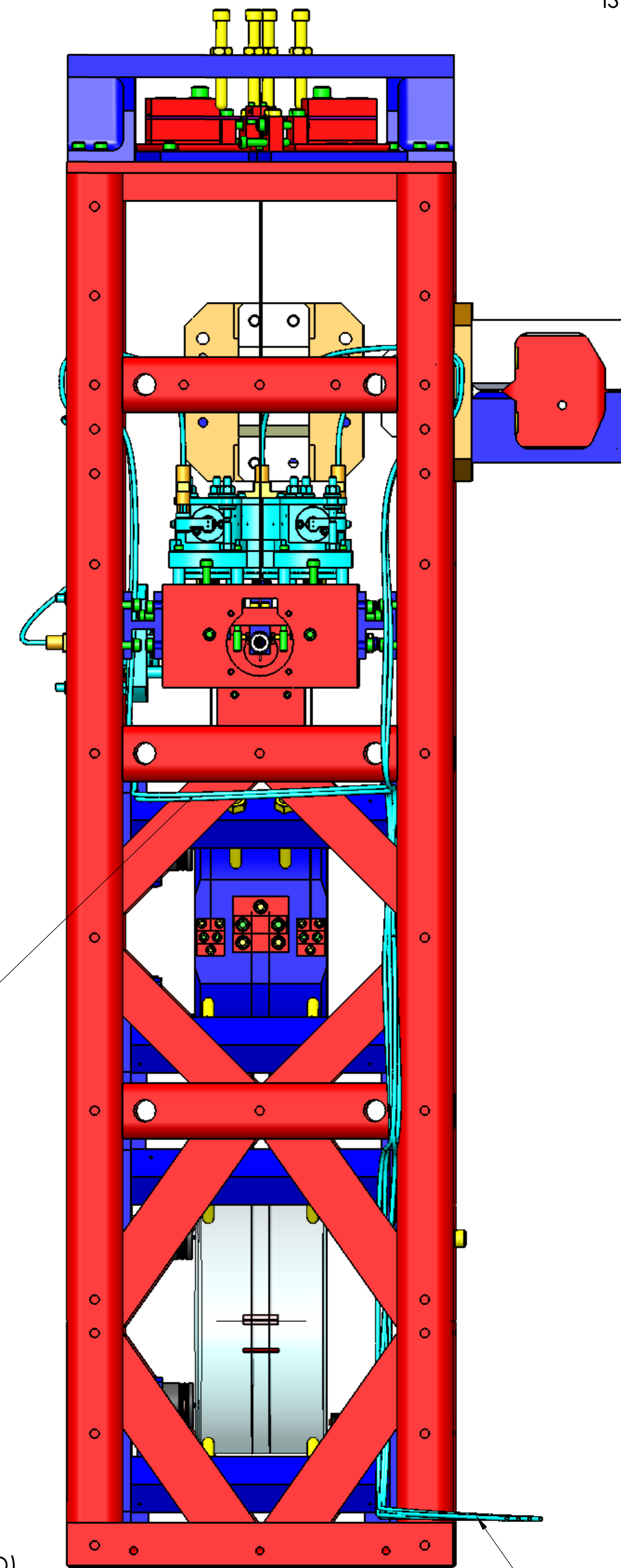


HR SIDE 1.1 1.2
ISO VIEW, FRONT-RIGHT(+X)

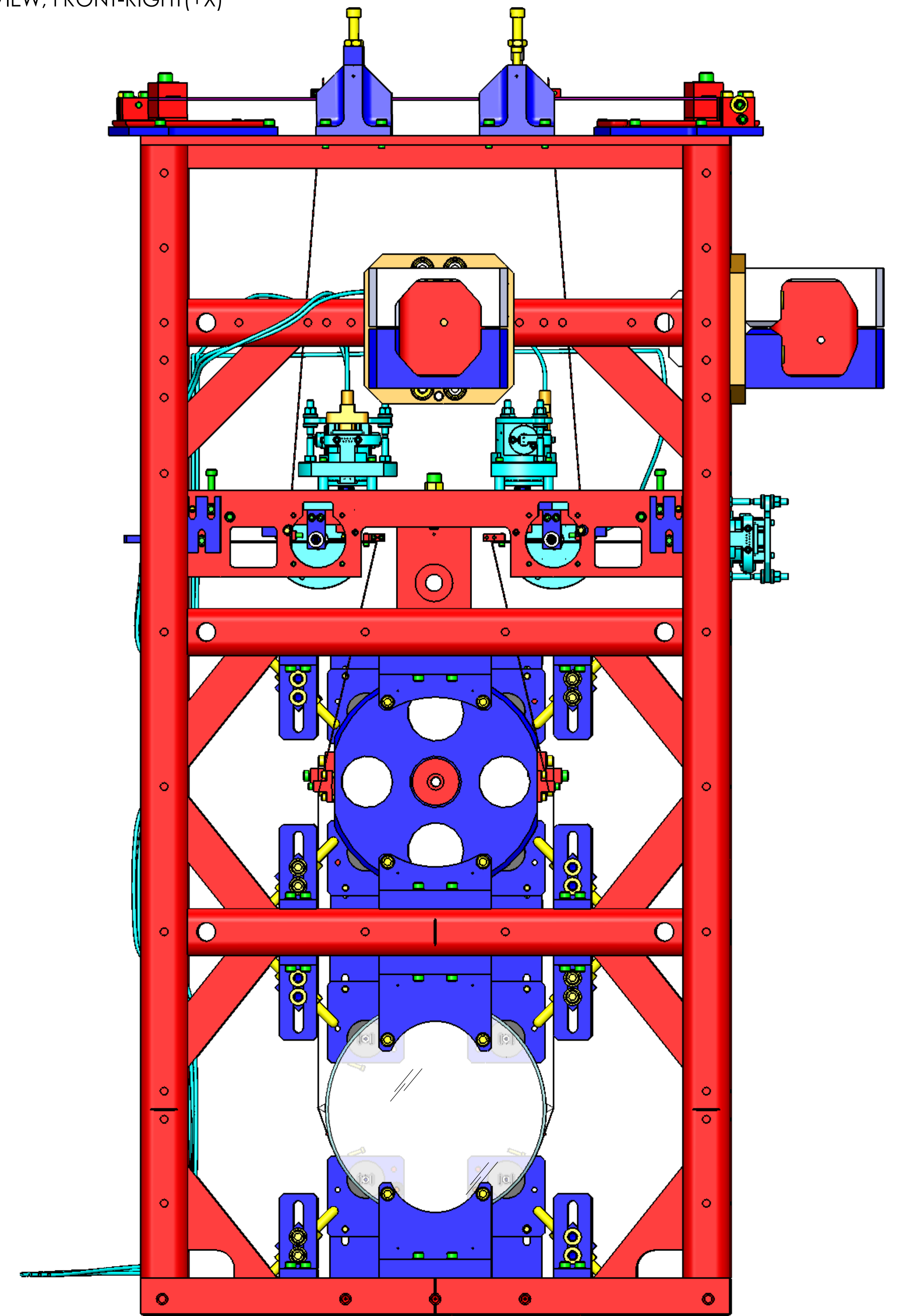
IF REQUIRED,
SECURE CABLES
USING PEEK CABLE TIES
OR EQ.



AR SIDE - REAR (-X) 1.1 1.2
(END CONNECTORS, NOT SHOWN FOR CLARITY)



RIGHT SIDE (-Y)

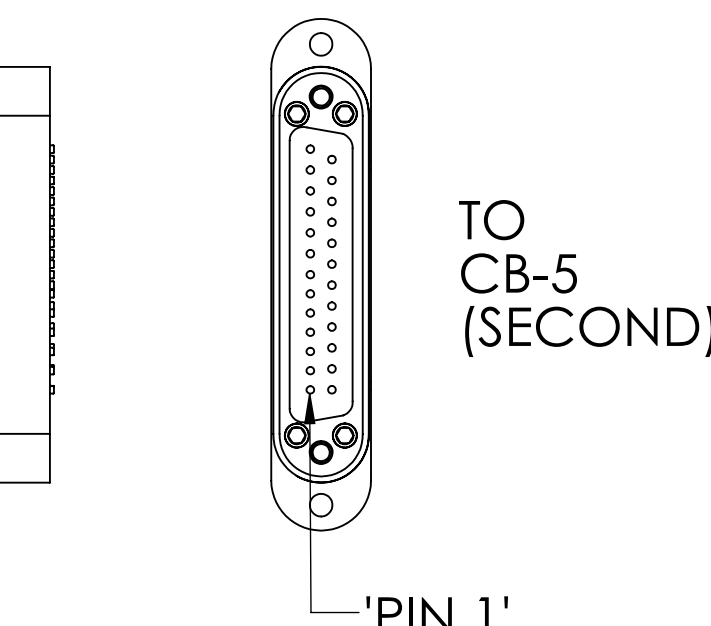
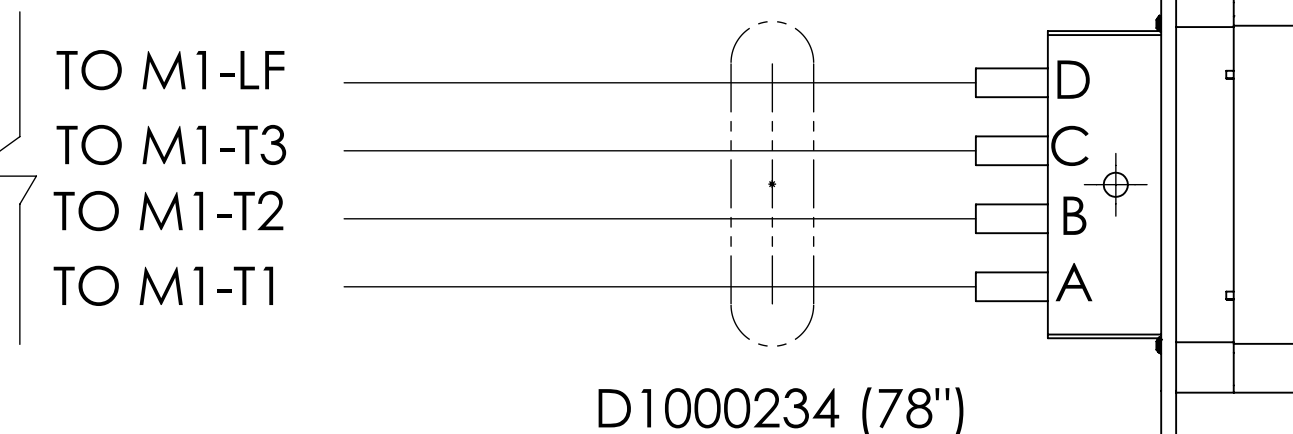


HR SIDE - FRONT (+X)
(END CONNECTORS, NOT SHOWN FOR CLARITY)



WARNING

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WITH LIGO-T1200203 AND T1200318.
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IN THIS DOCUMENT ARE NOT MANDATORY, BUT
RATHER A CONSIDERED ROUTE AIMED TO
CLEAR LASER BEAM PATHS.
ALTERNATE ROUTES FOR PROBLEMATIC AREAS
ARE ACCEPTABLE, BUT SHOULD BE HANDLED
IN A CASE BY CASE SITUATION. IT IS IMPERATIVE
TO CONSIDER THE LENGTH OF THE CABLE,
THE LOCATION OF MATING CABLE BRACKET,
AND LASER BEAM PATH PRIOR TO
ROUTING / LACING VIA A NEW PATH.



ROUTE NO.3
SEE LIGO-T1200318
FOR STEP BY STEP CABLING GUIDE

A
B
C
D
QP LEGS LACED
THROUGH
RIGHT SIDE BOTTOM
RIGHT GUSSET

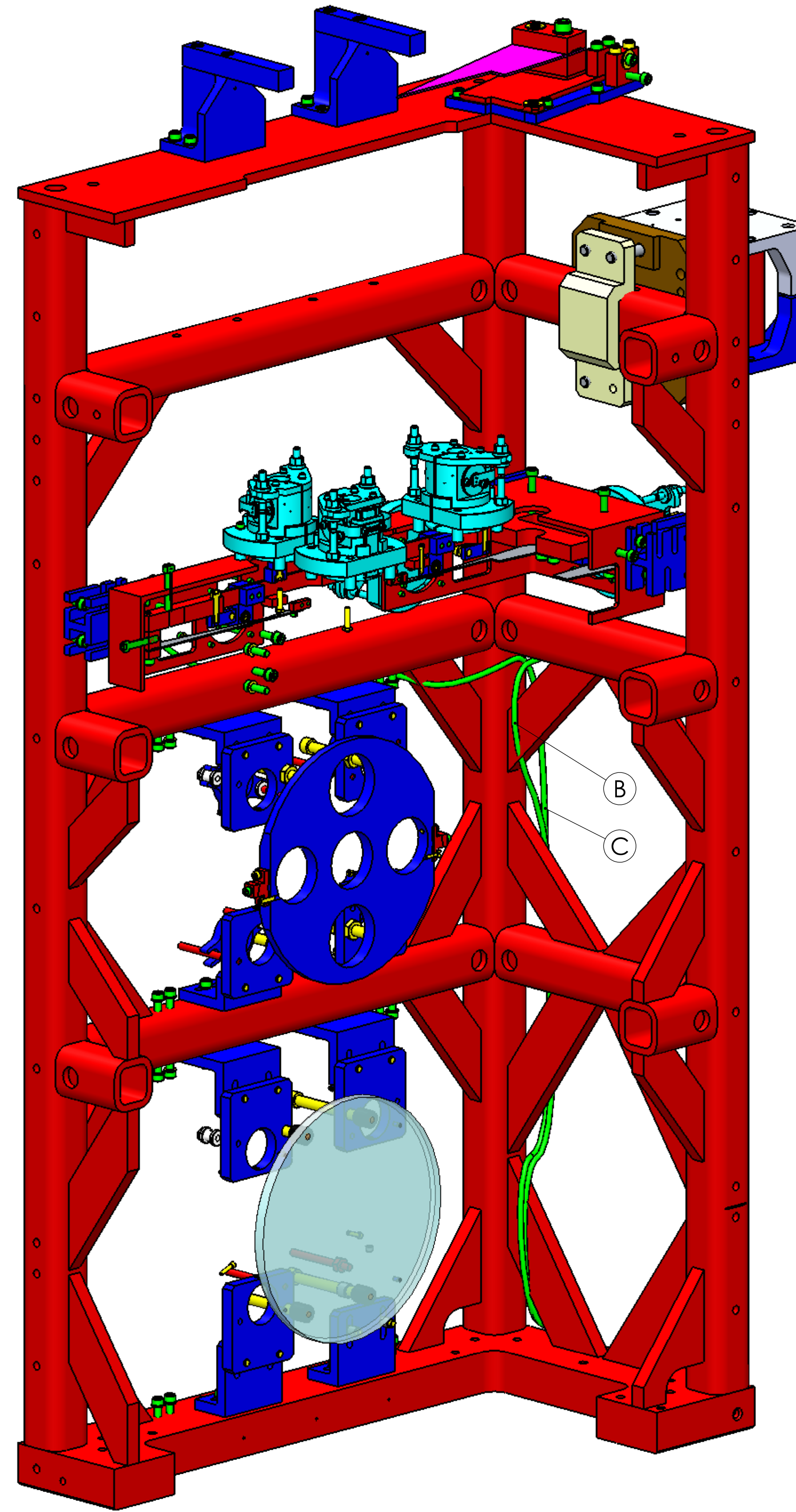
MC2

(SHARED)

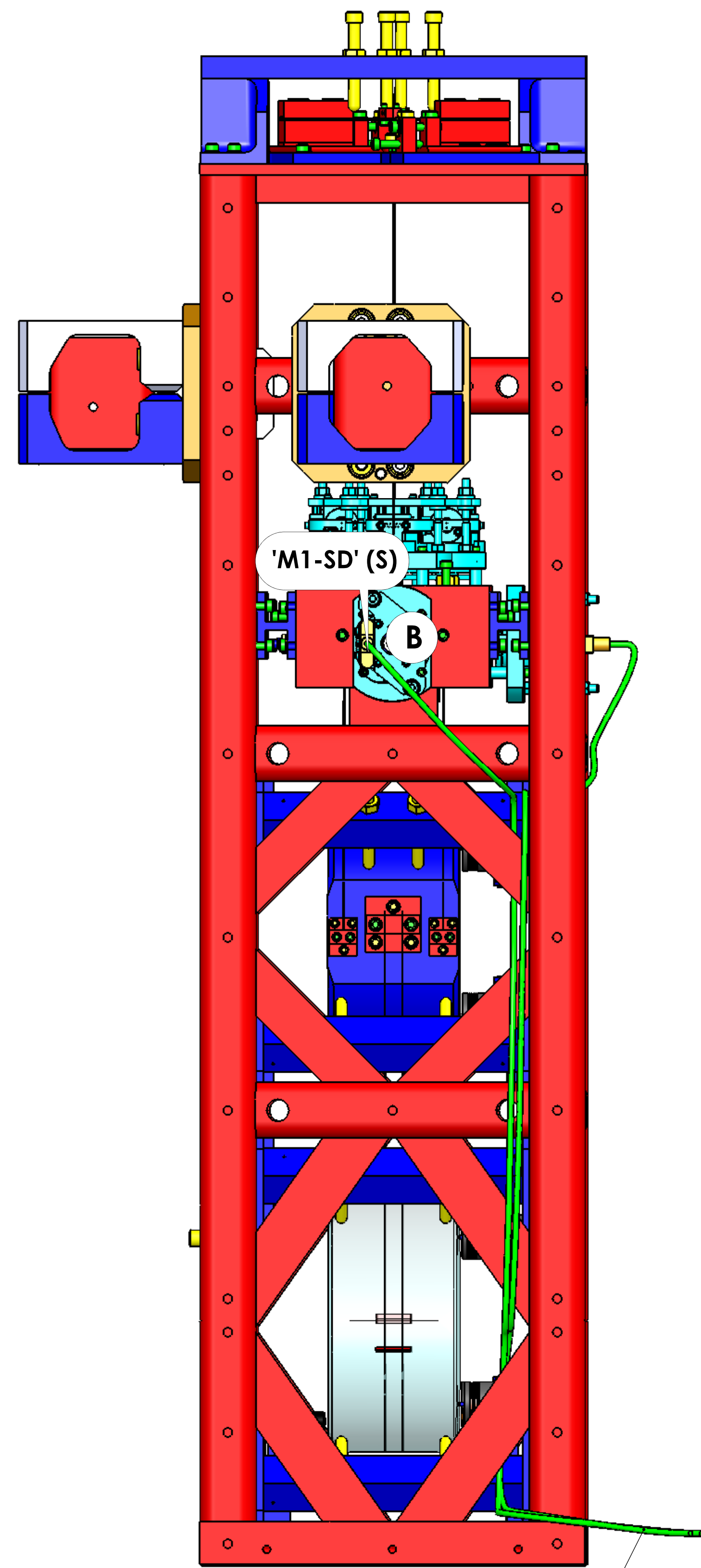


WARNING

CABLE ROUTING:
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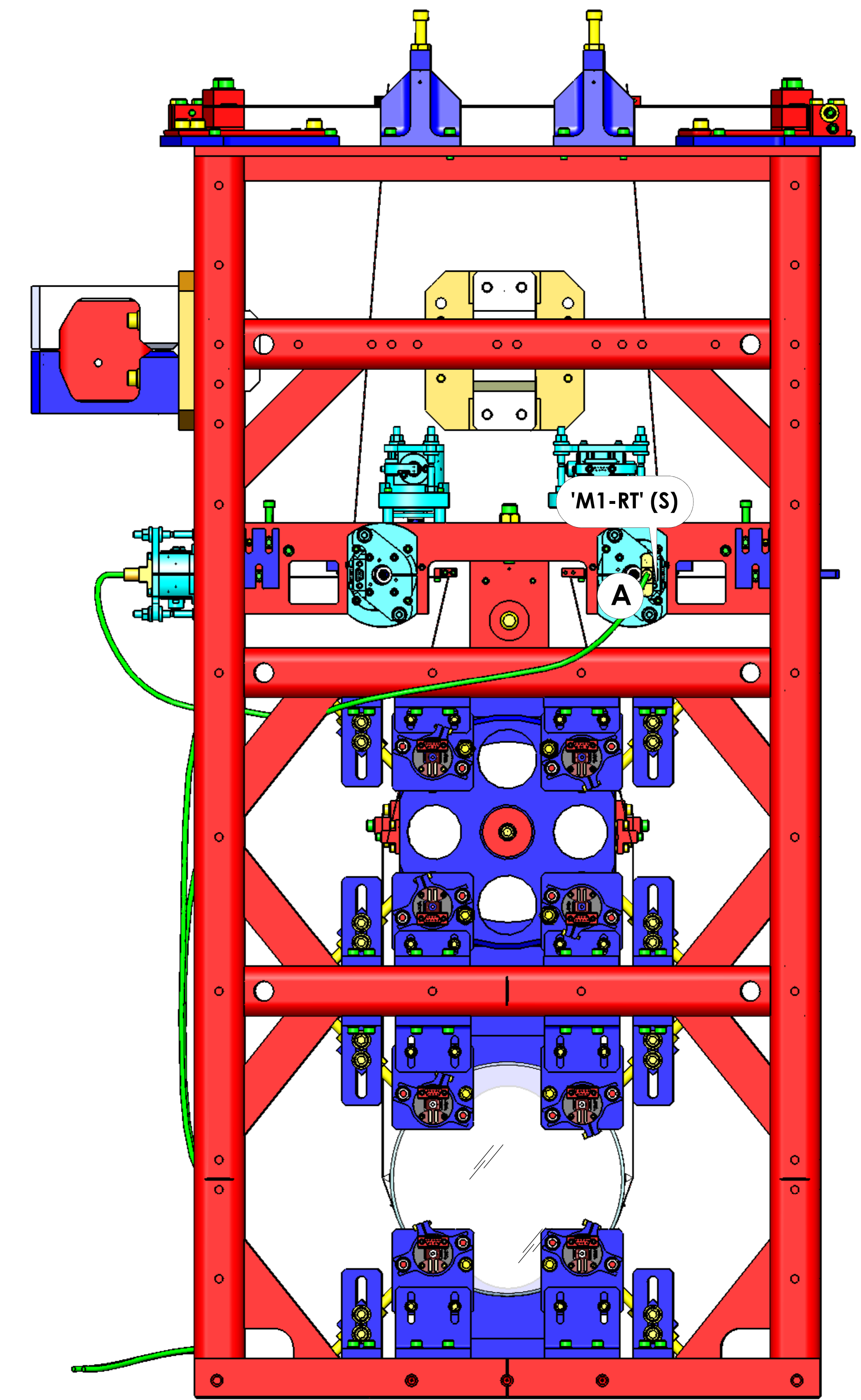
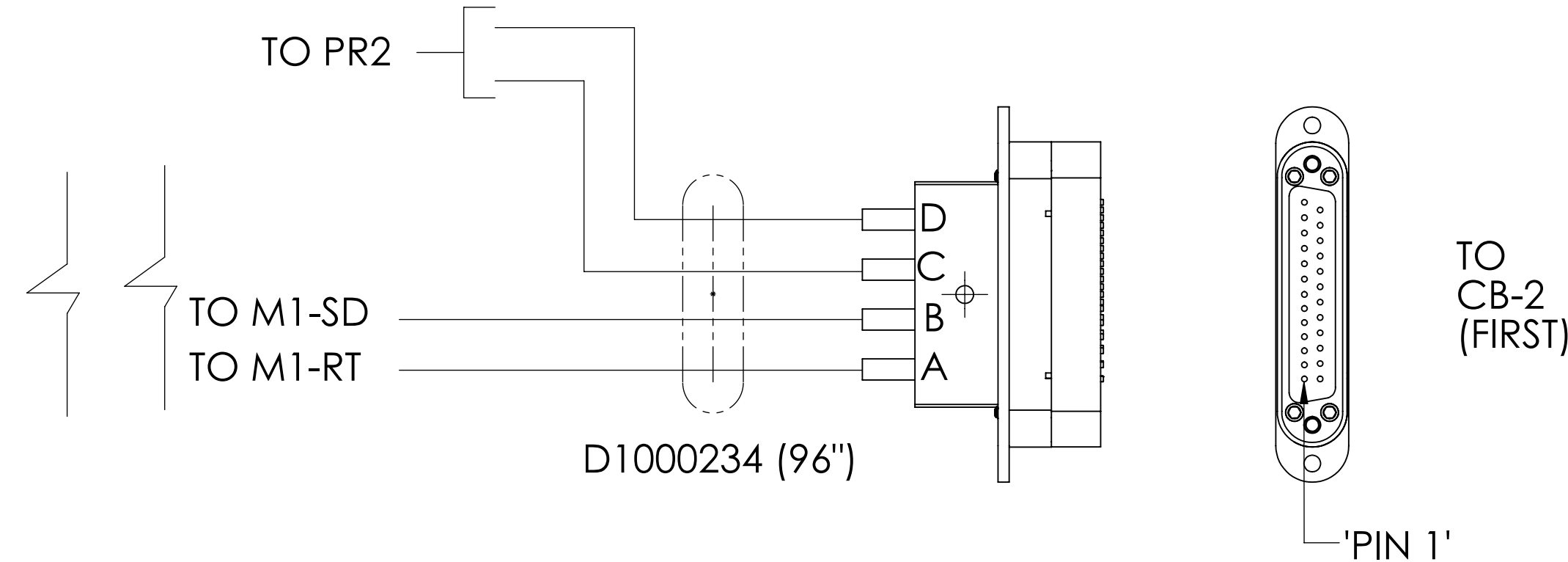


ISO VIEW FRONT - RHGT
 BROKEN OUT SECTION
 (AS VIEWED FROM INSIDE)



LEFT SIDE (+Y) (1.1) (1.2)

A QP LEGS LACED THROUGH LEFT SIDE BOTTOM RIGHT GUSSET
 B
 C
 D



AR SIDE - REAR (-X) (1.1) (1.2)

(END CONNECTORS, NOT SHOWN FOR CLARITY)

ROUTE NO.4
 SEE LIGO T1200318
 FOR STEP BY STEP CABLING GUIDE

MC2

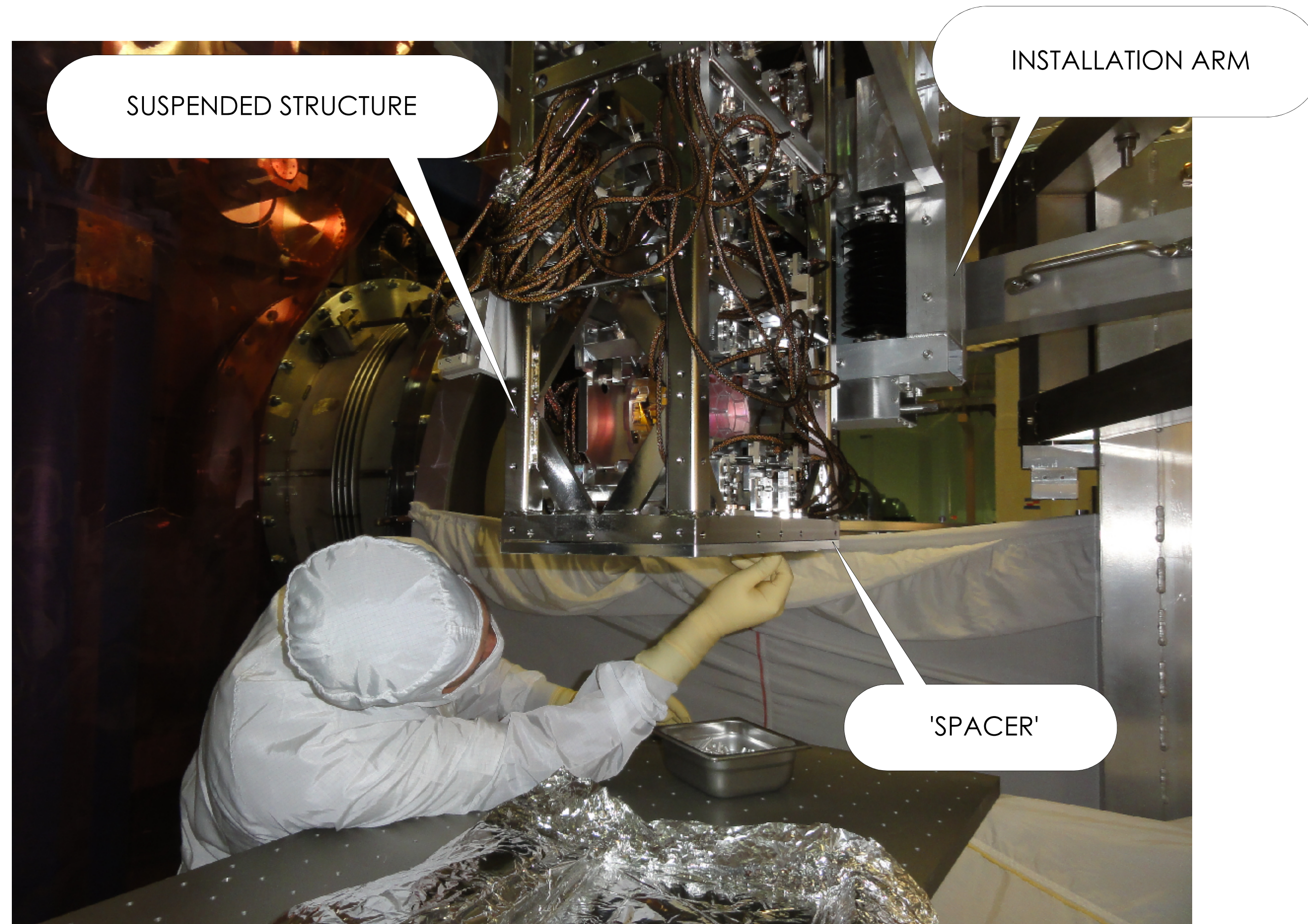
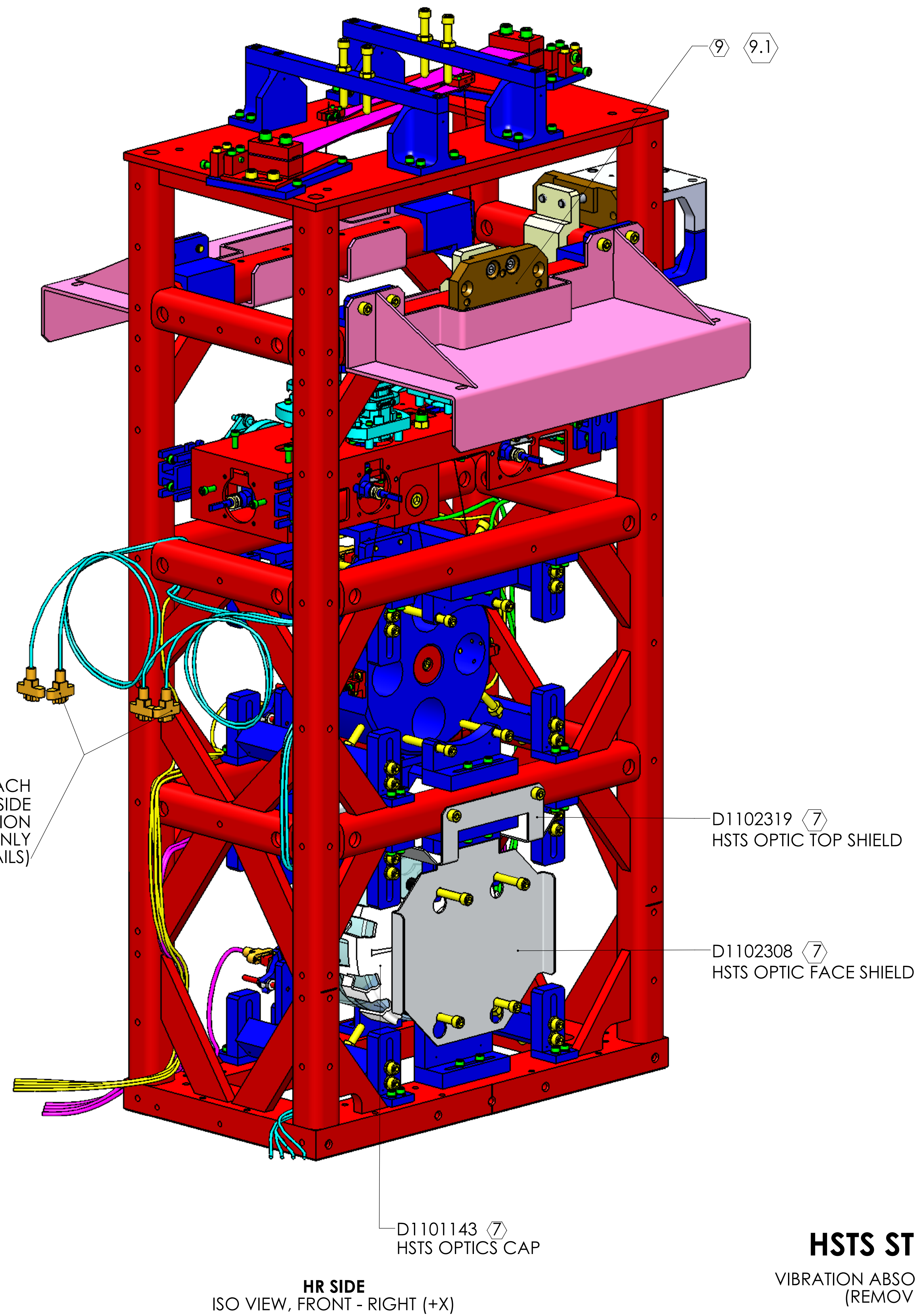
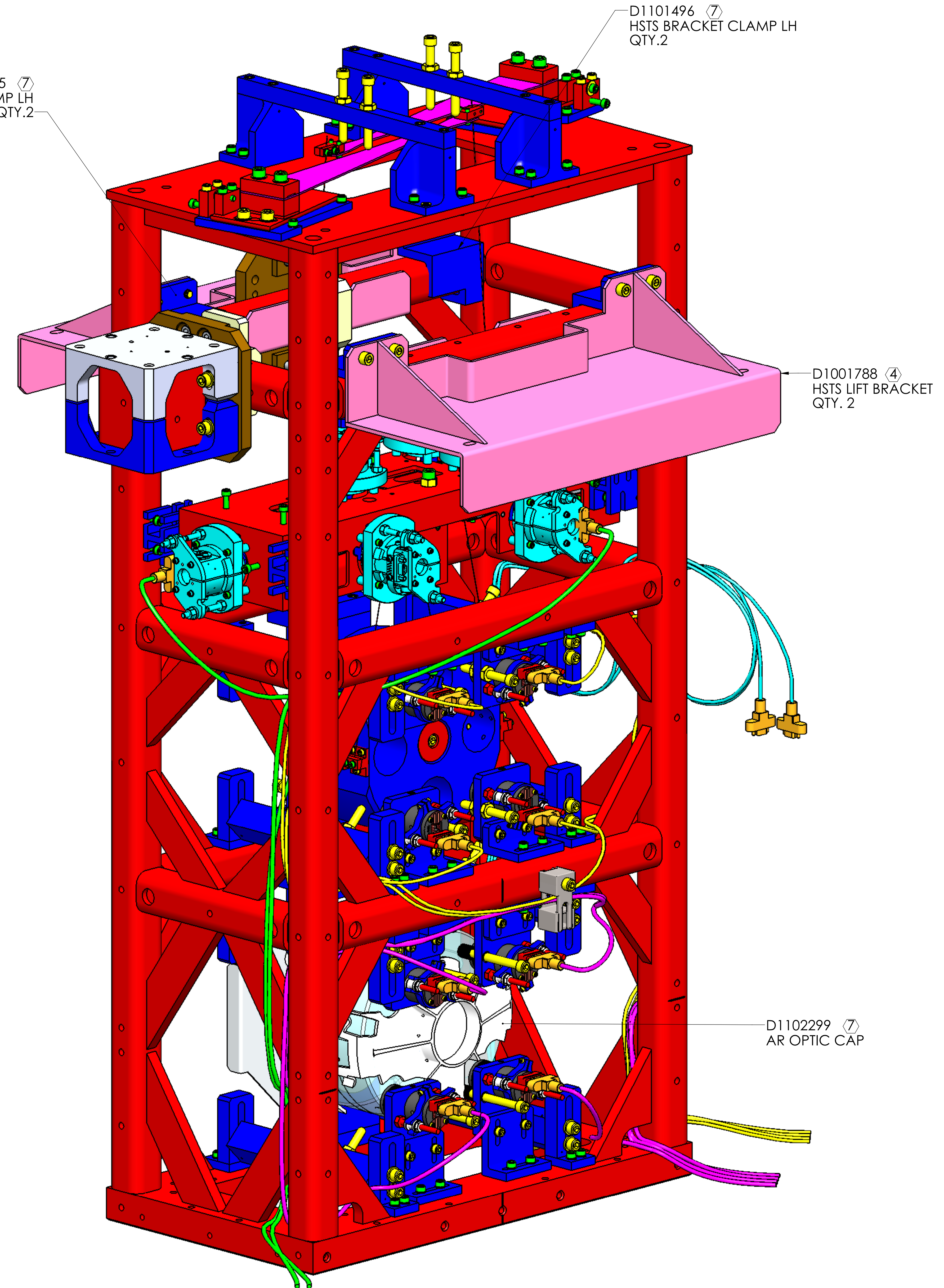


FIG 1.0: SPACER INSTALLATION 10

- 7 INDICATED ITEMS FOR TRANSPORTATION PURPOSES ONLY. AND ARE NOT PART OF FINISHED ASSEMBLY. SEE D1101674 FOR REFERENCE.
- 8 REMOVE INDICATED ITEMS FOR TRANSPORTATION PURPOSES. BUNDLE CABLES AS SHOWN.
- 9 REMOVE VIBRATION ABSORBER ON FRONT SIDE TO AVOID INTERFERENCE WITH BRACKET.
9.1 LOCKING PINS: RETAIN IN PLACE FOR TRANSPORTATION AND INSTALLATION ONLY. REMOVE BEFORE CHAMBER DOORS ARE CLOSED
- 10 LIFT STRUCTURE VIA INSTALLATION ARM AT CHAMBER SIDE. ATTACH ITEM 2 (SPACER_ USING ITEM 6 (SCREW). TORQUE TO 75 IN LB. SEE FIG. 1.0 FOR REFERENCE.



HR SIDE
ISO VIEW, FRONT - RIGHT (+X)

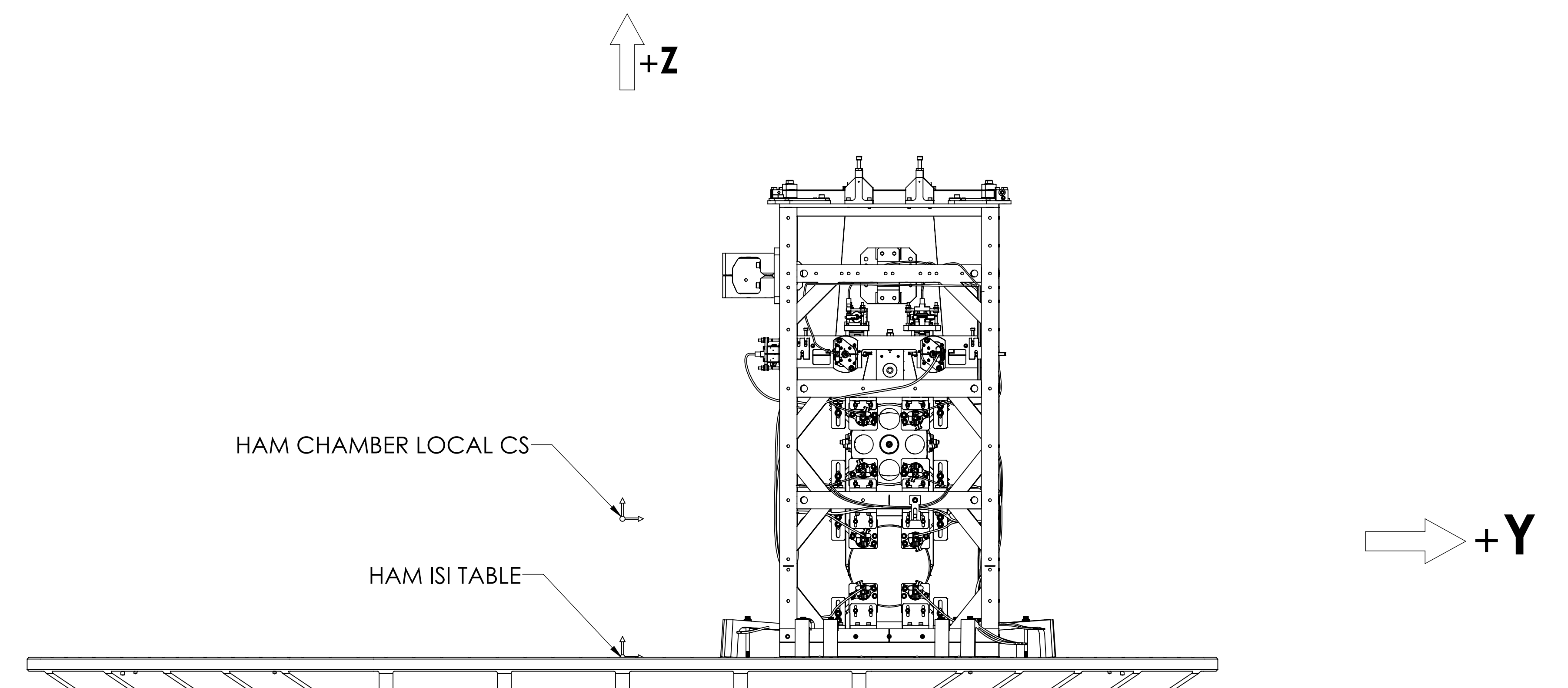
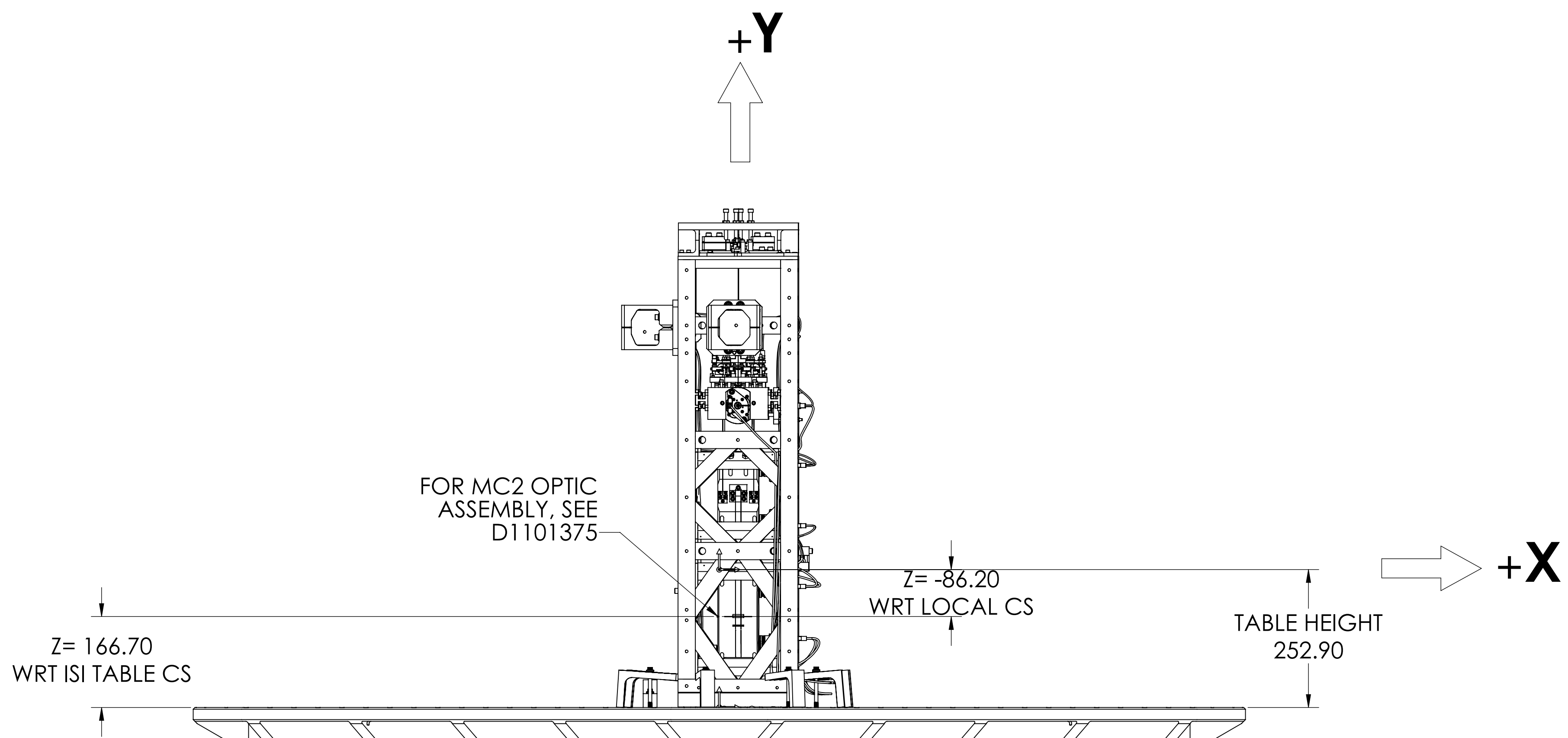
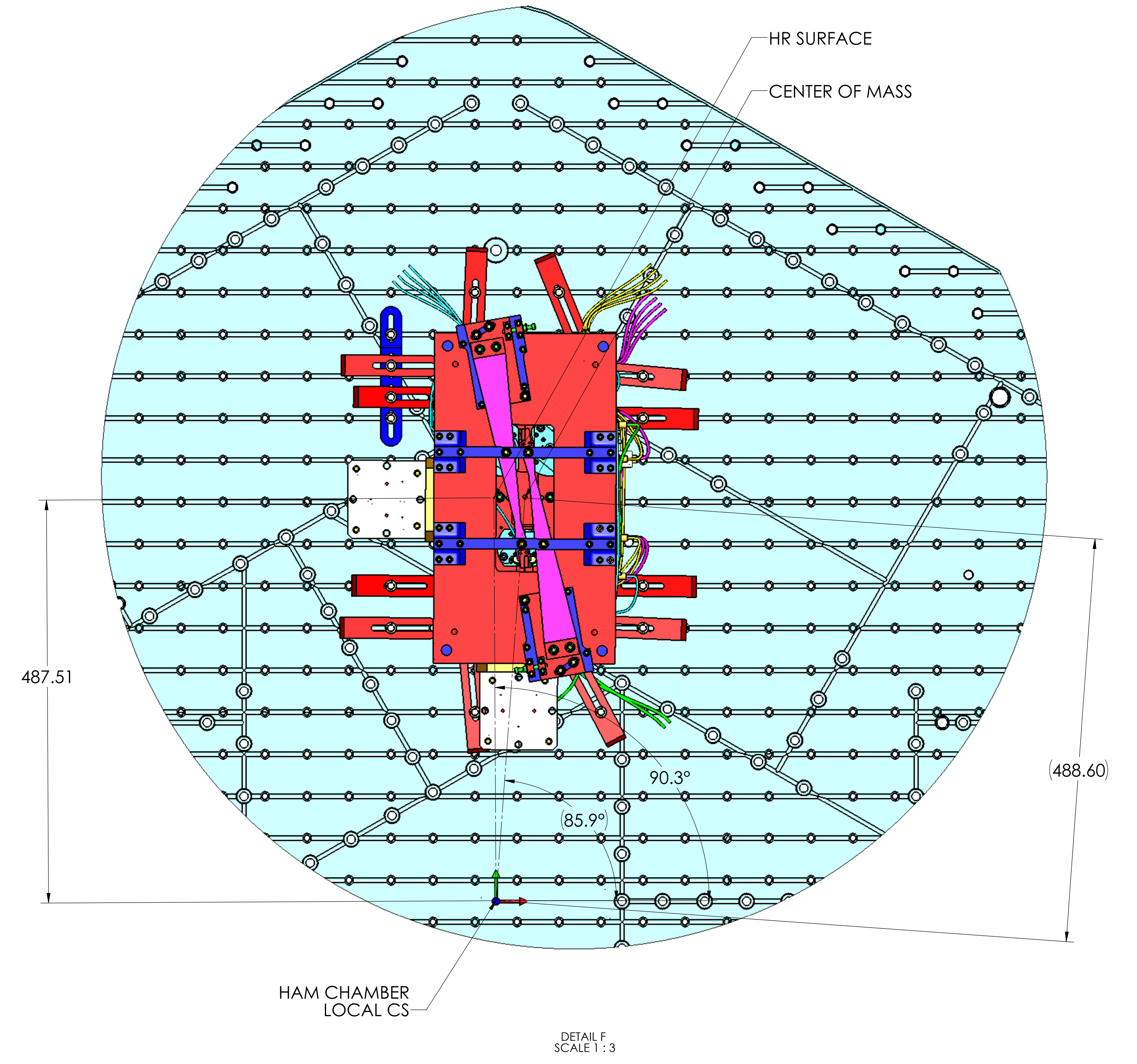
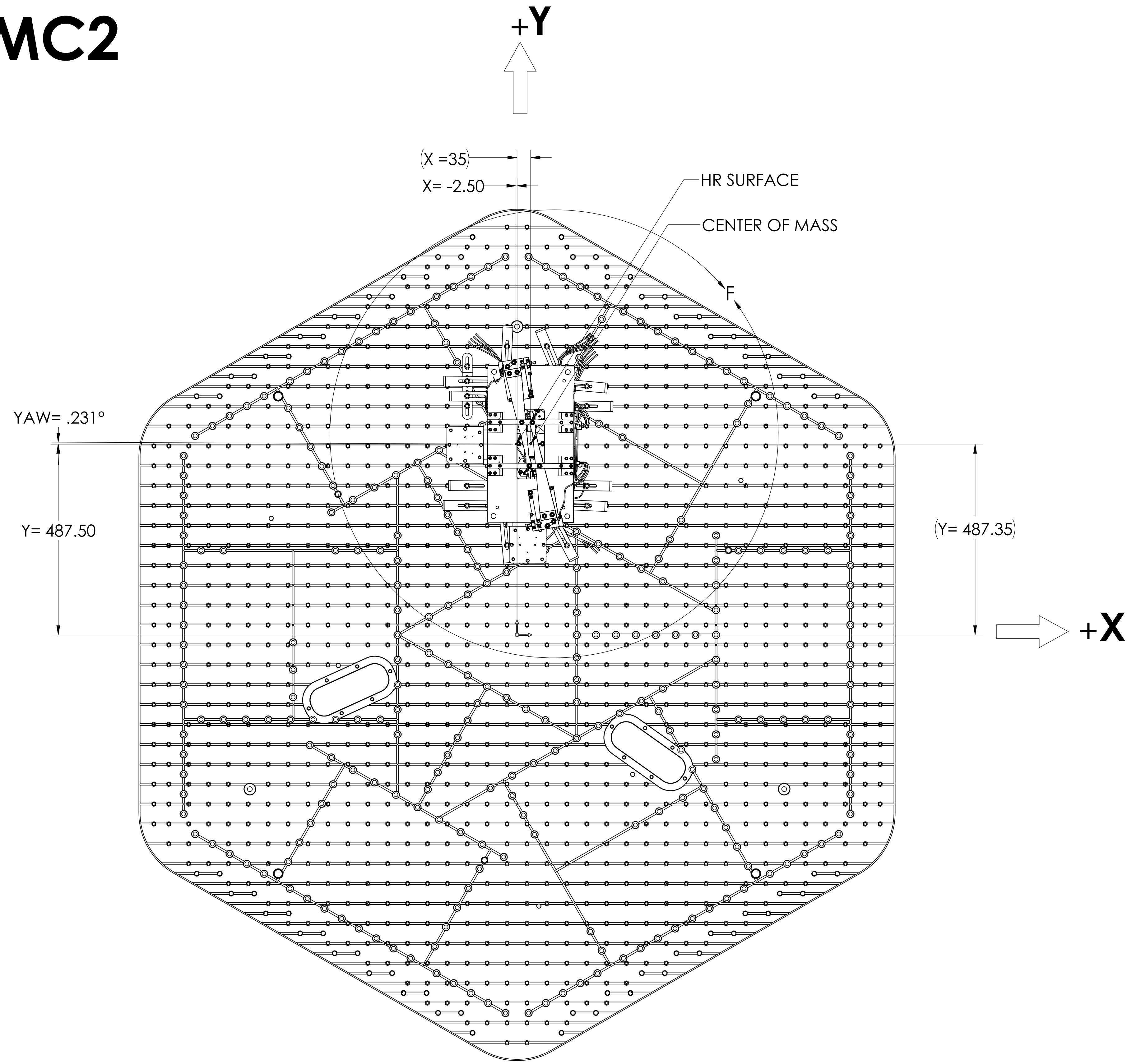


AR SIDE
ISO VIEW, REAR - LEFT (-X)

HSTS STRUCTURE TRANSP.

VIBRATION ABSORBERS ON FRONT SIDE NOT SHOWN (REMOVED FOR TRANSP. PURPOSES)

MC2



LOCAL COORDINATES DEFINITIONS

NOTE: DIMENSION IN PARENTHESIS (REFERENCE DIMENSIONS), ARE FROM CENTER OF MASS.