

- ① REFERENCED DOCUMENTATION:  
 1.1 LIGO-E1100109, HAM SUS CONTROLS 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 TAB.

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

# PR2

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

REV.	DATE	DCN #	DRAWING TREE #
v1	25 APR 2012	-	-
v2	01 AUG 2012	E1200728-x0	-
-	-	-	-

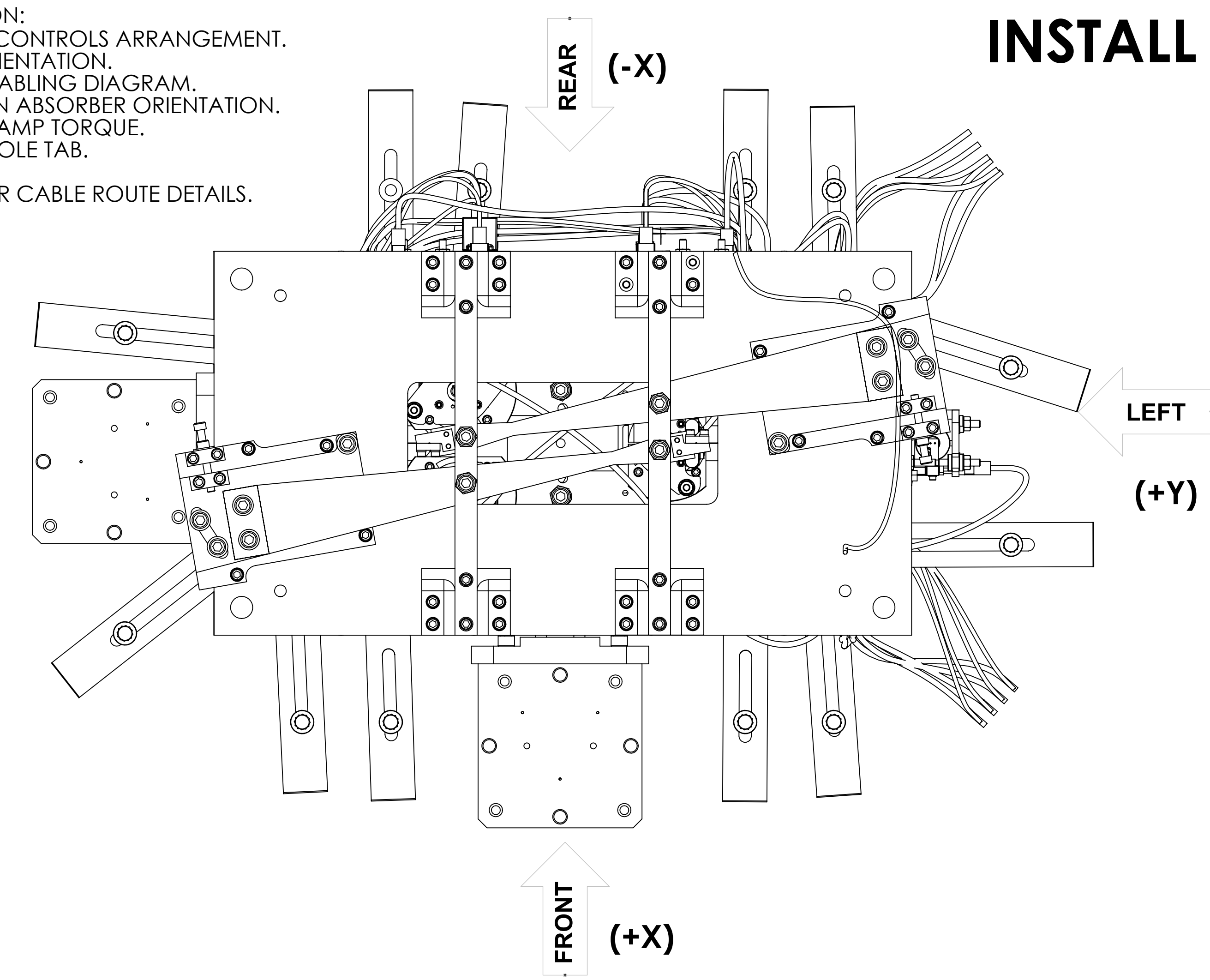
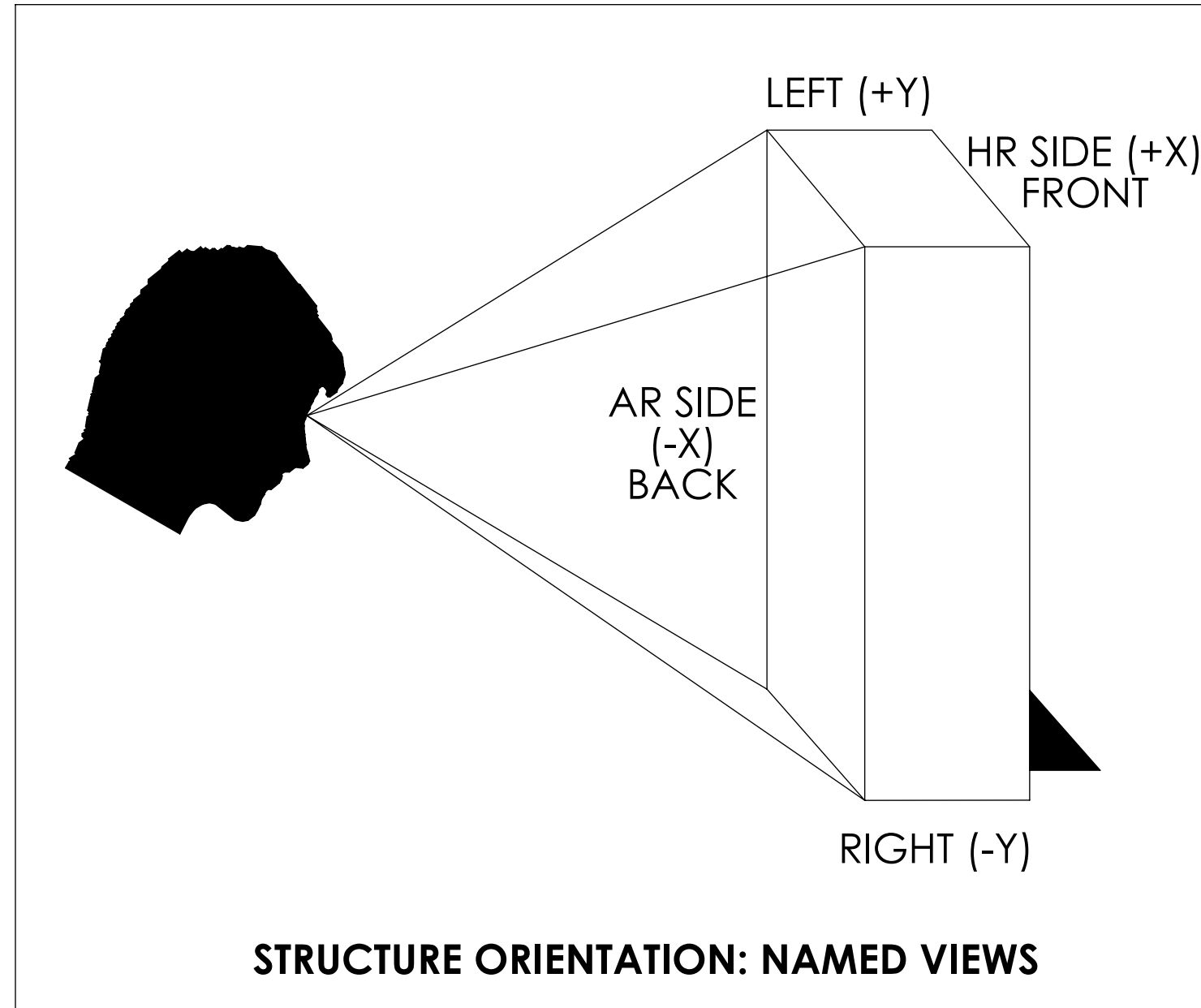
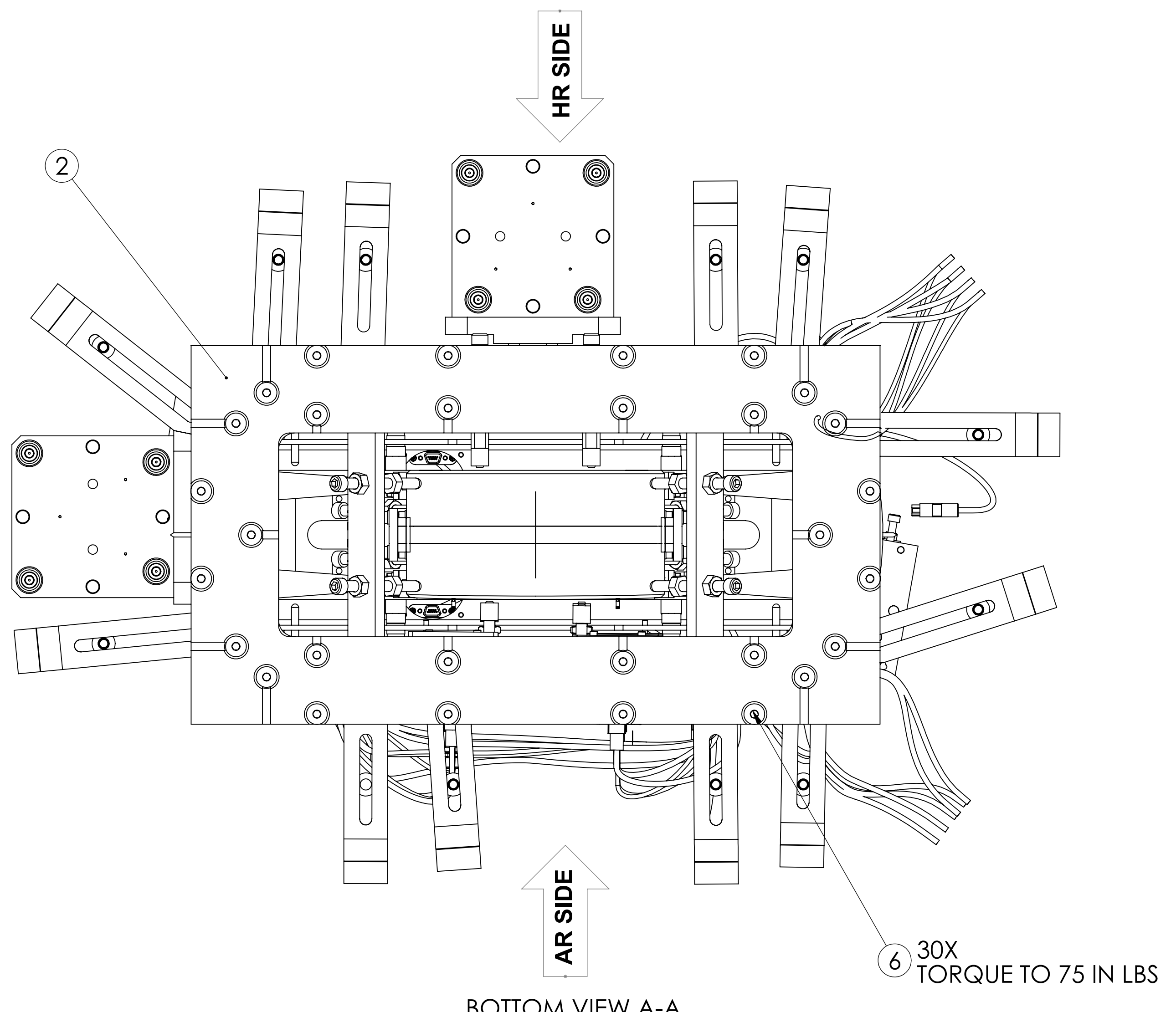
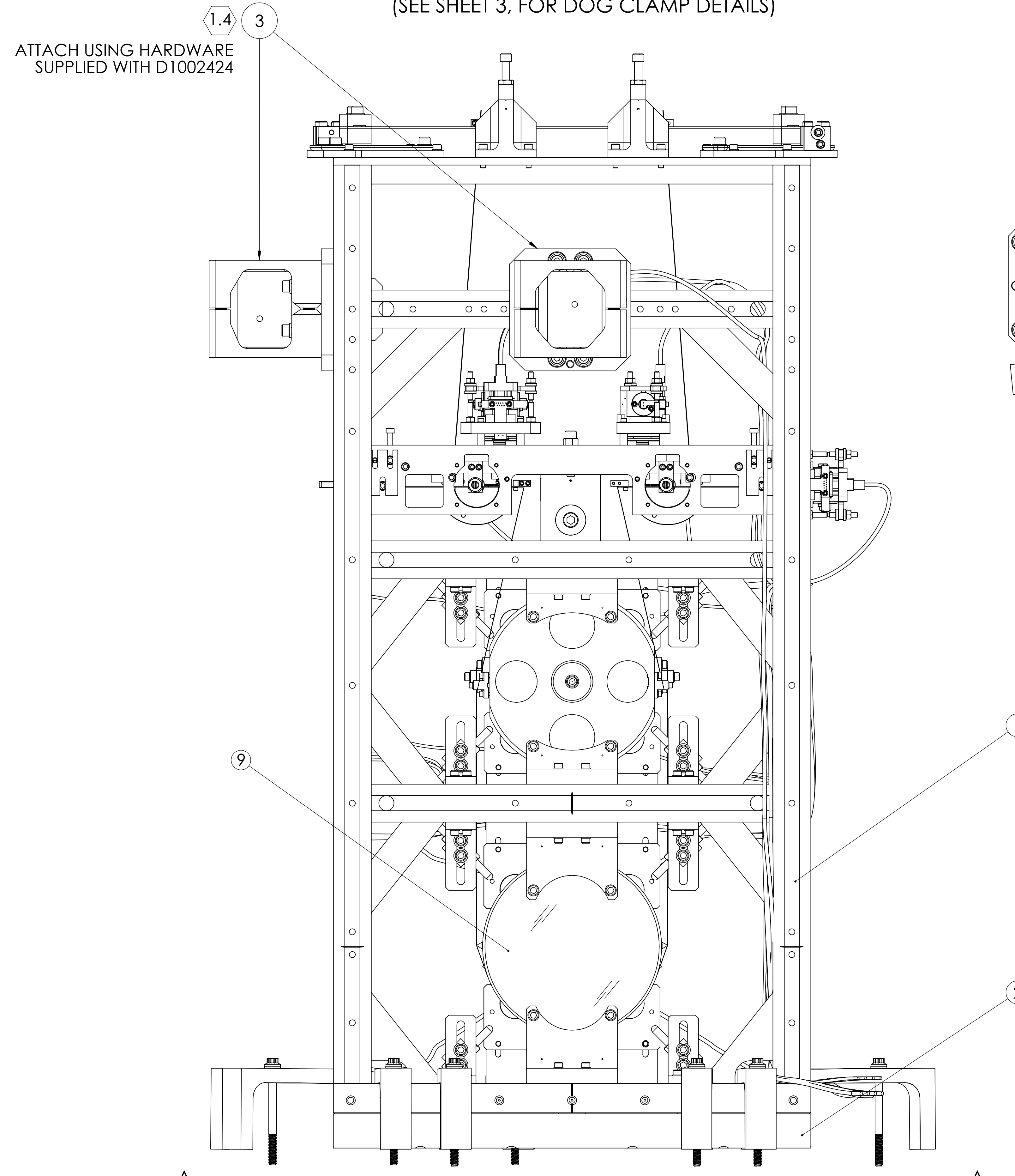


TABLE 1: HAM3-H1 PR2 CABLING SPECIFICATIONS, FROM/TO DES.

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

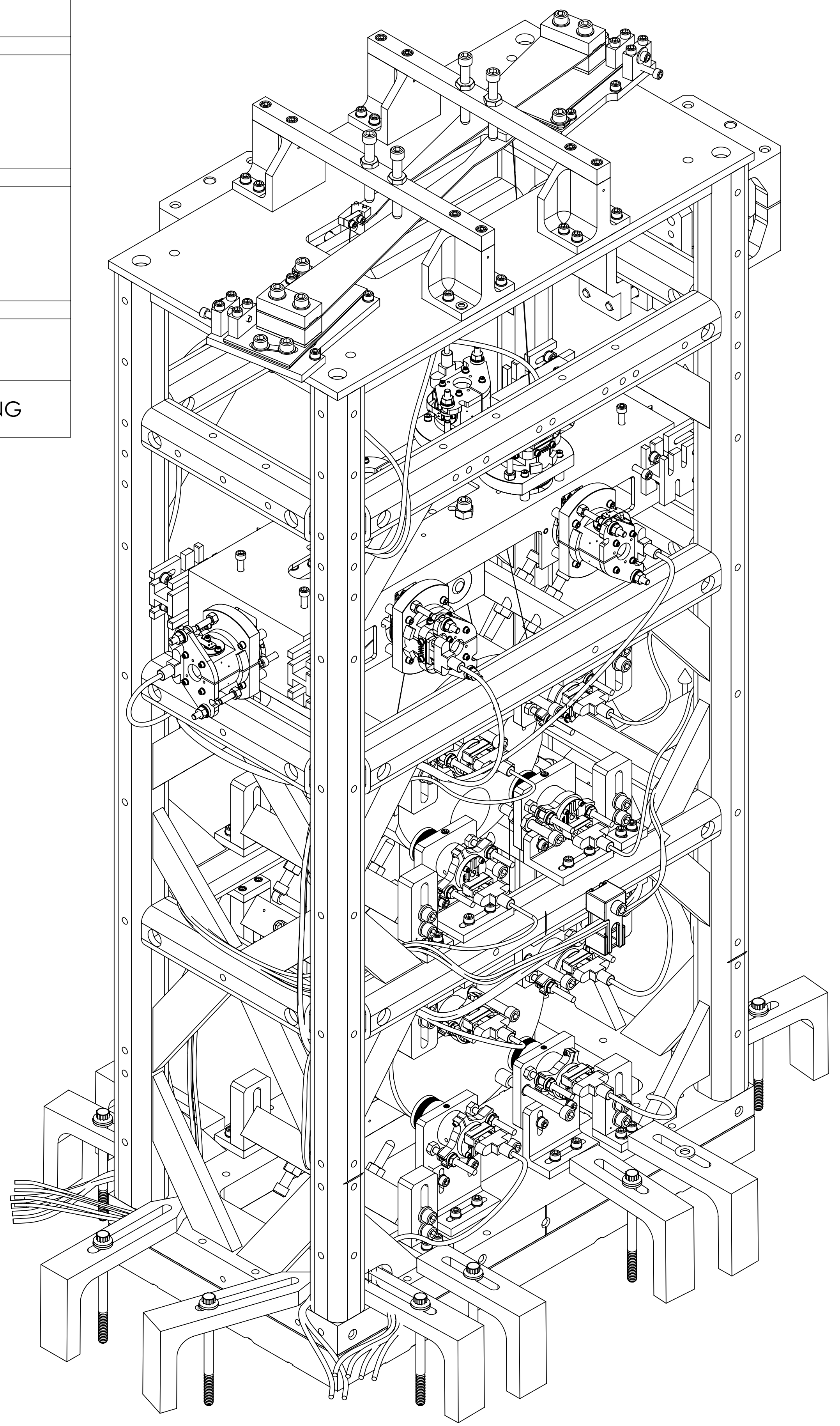
NOTE : ROUTE NO. 4 IS A SHARED CABLE. SEE D0901099 FOR QP LEGS 'A' AND 'B' ROUTING



LOCAL COORDINATES - REFERENCE

Xmm	Ymm	Zmm	YAW °
249.3	-530.4	-83.2	.46°

REFER TO DRAWING D1101252 FOR HAM3-H1 INSTALLATION PLATE LAYOUT



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY
10	D0902462	CLAMP ASSY., UHV COMPATIBLE	N/A	1
9	D1101378	PR2 H1 OPTICS ASSEMBLY	N/A	1
8	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	12
7	2AL3.25-12SL	1/4-20 X 3.25 12PT BOLT	450 SSSL	12
6	FA-2024-NA	.25-20 X 1.5 FHSC SCREW UC COMPONENTS FA-2024-NA	18-8 SSSL	30
5	D1100641-09	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2L	304 SSSL	7
4	D1001376-08	AdvLIGO HAM Optics Table Dog Clamp 2.20M	304 SSSL	5
3	D1002424	VIBRATION ABSORBER ASSEMBLY	N/A	2
2	D1100038	HSTS SUS STRUCTURE SPACER 28.7MM	6061-T6 Al	1
1	D020700	HSTS OVERALL ASSEMBLY	N/A	1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

MATERIAL	N/A	FINISH	N/A μinch
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ADVANCED LIGO SUB-SYSTEM SUS

PROJECT: D0901094

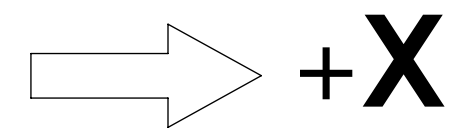
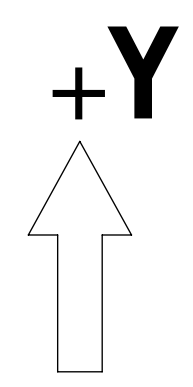
SCALE: 1:2

PROJECTION:

SHEET 1 OF 9

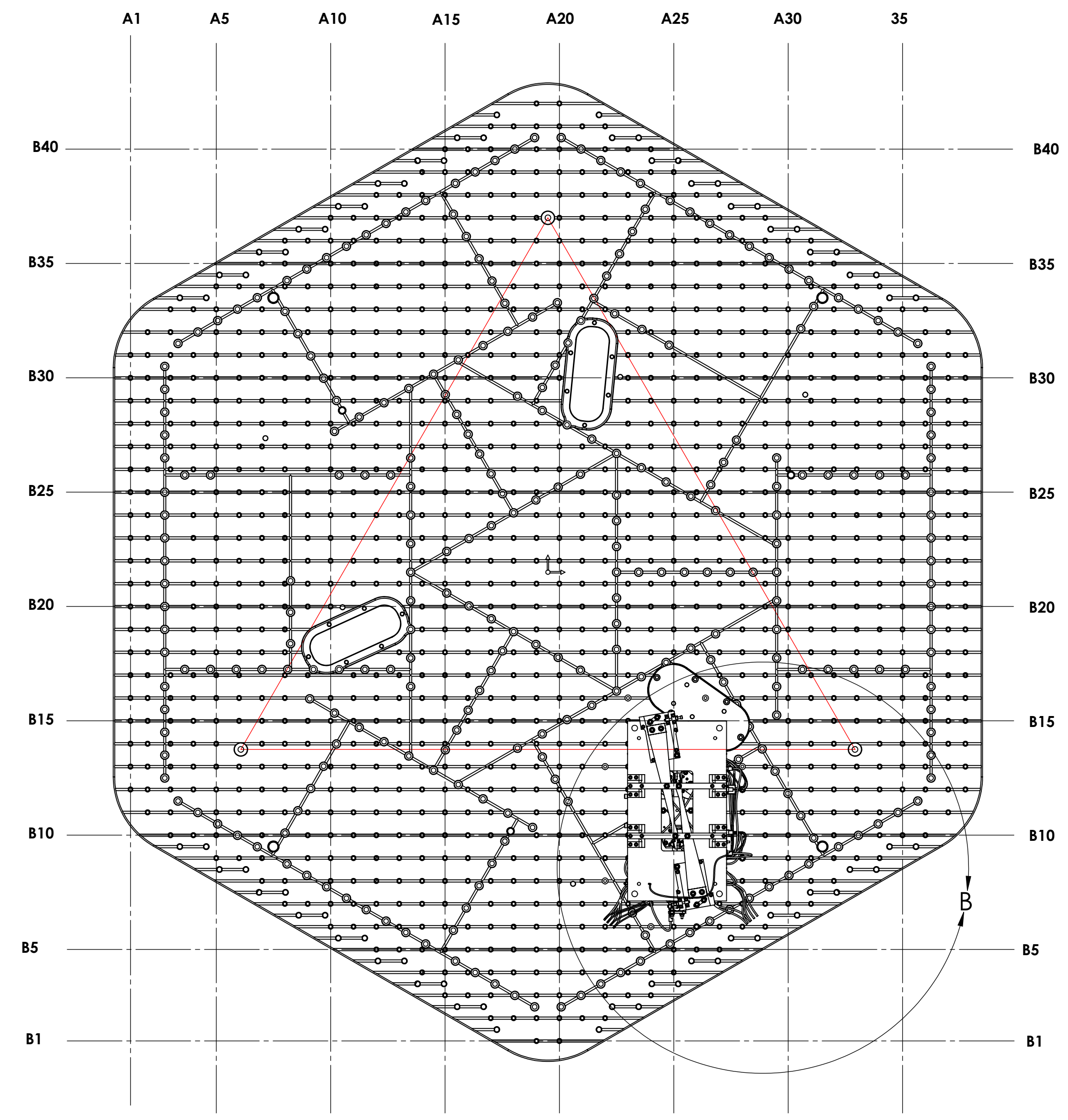
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# PR2

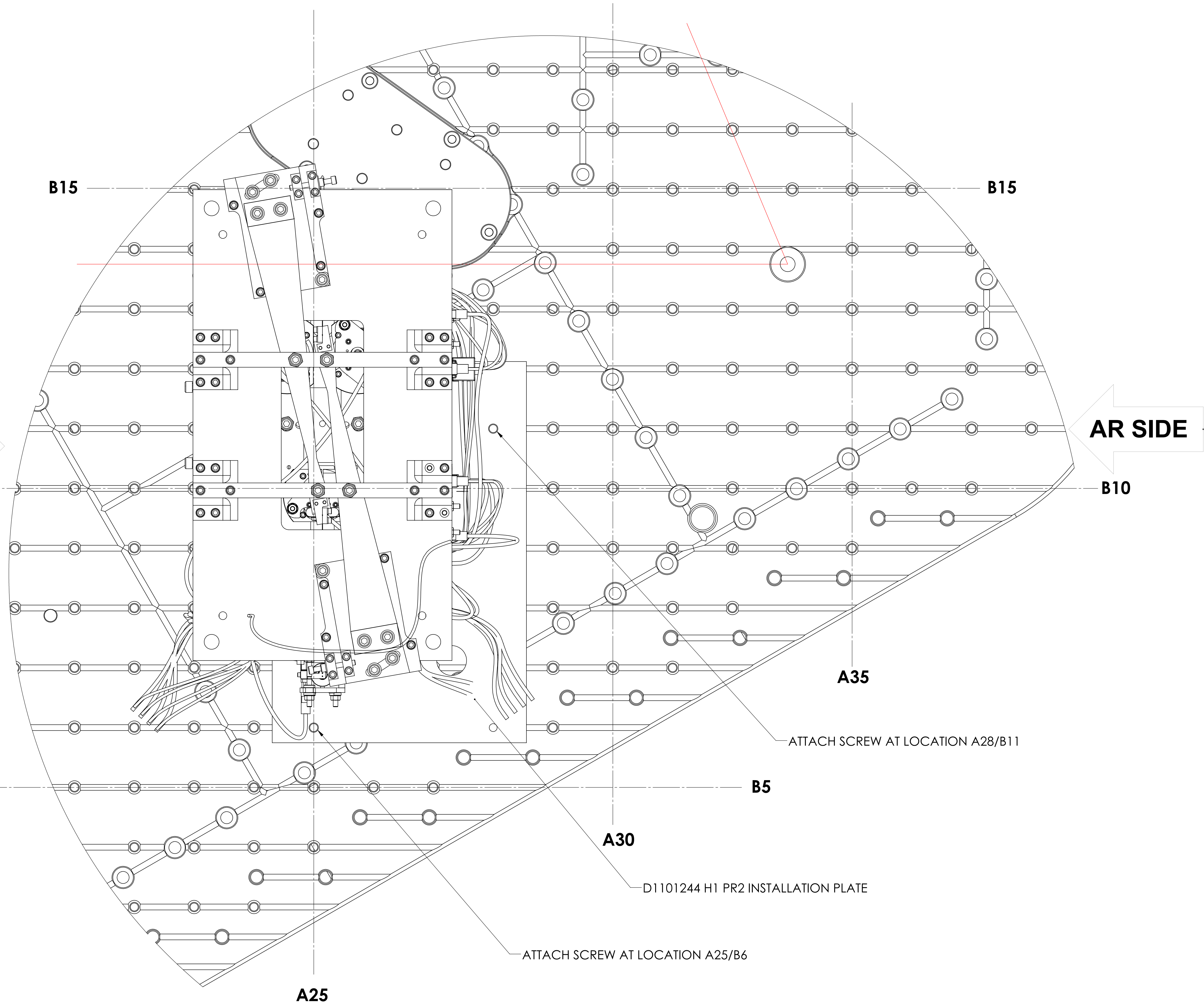


HR SIDE

AR SIDE



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



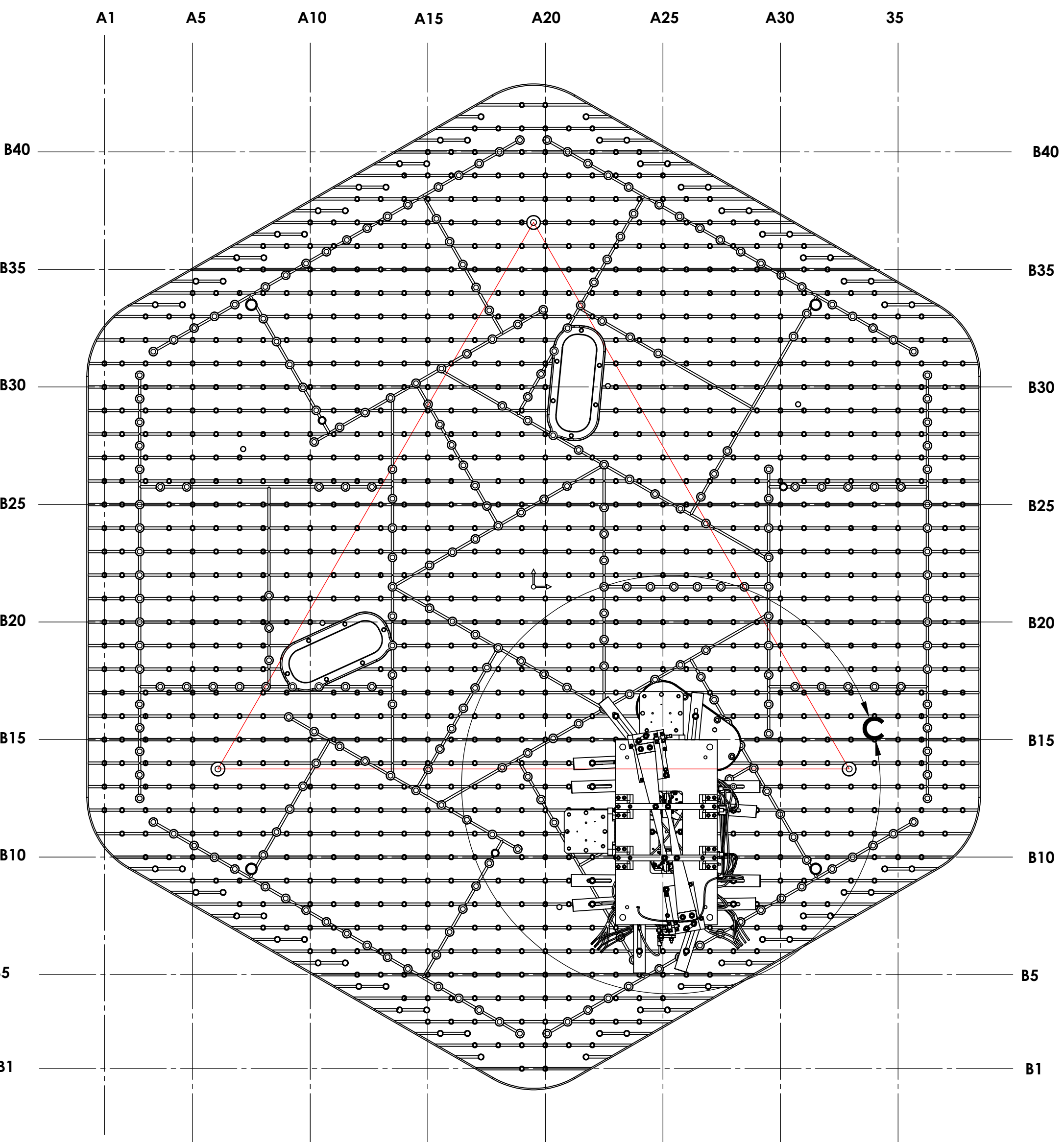
**DETAIL B**  
 SCALE 1 : 1.5

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

# PR2

+Y



## TOP VIEW 1.6

REF. TRIANGLE: SEE G1000125 FOR ISI NAMING AND ORIENTATION CONVENTION

③ SCREW LOCATION A22/B14

③ SCREW LOCATION A22/B13

③ SCREW LOCATION A22/B9

③ SCREW LOCATION A22/B8

HR SIDE

AR SIDE

⑧ SCREW LOCATION ON A23/B16  
③

⑧ SCREW LOCATION ON SPRING HATCH  
NEAR A26/B16  
③

③ SCREW LOCATION A28/B13

⑧ SCREW LOCATION  
A28/B12  
③

⑧ SCREW LOCATION A28/B9 ③

⑧ SCREW LOCATION A28/B8 ③

③ SCREW LOCATION A24/B6

SCREW LOCATION A26/B6 ③

ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY
8	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	12
7	2AL3.25-12SL	1/4-20 X 3.25 12PT BOLT	450 SSSL	12
5	D1100641-09	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 2.2L	304 SSSL	7
4	D1001376-08	AdvLIGO HAM Optics Table Dog Clamp 2.20M	304 SSSL	5

PARTIAL BOM. SEE SHEET 1 FOR COMPLETE PARTS LIST

## DETAIL C SCALE 1:1.5

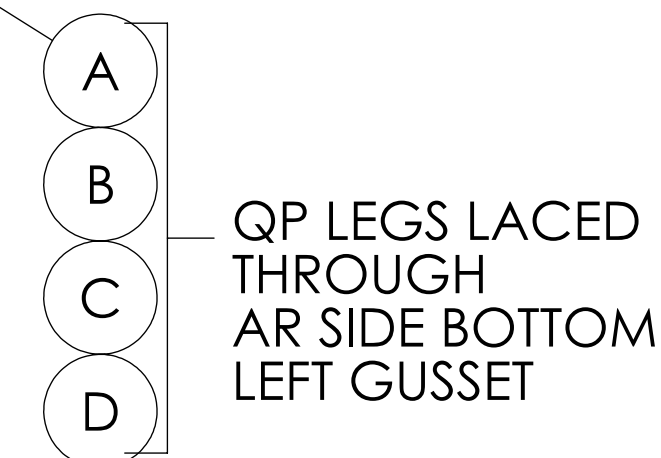
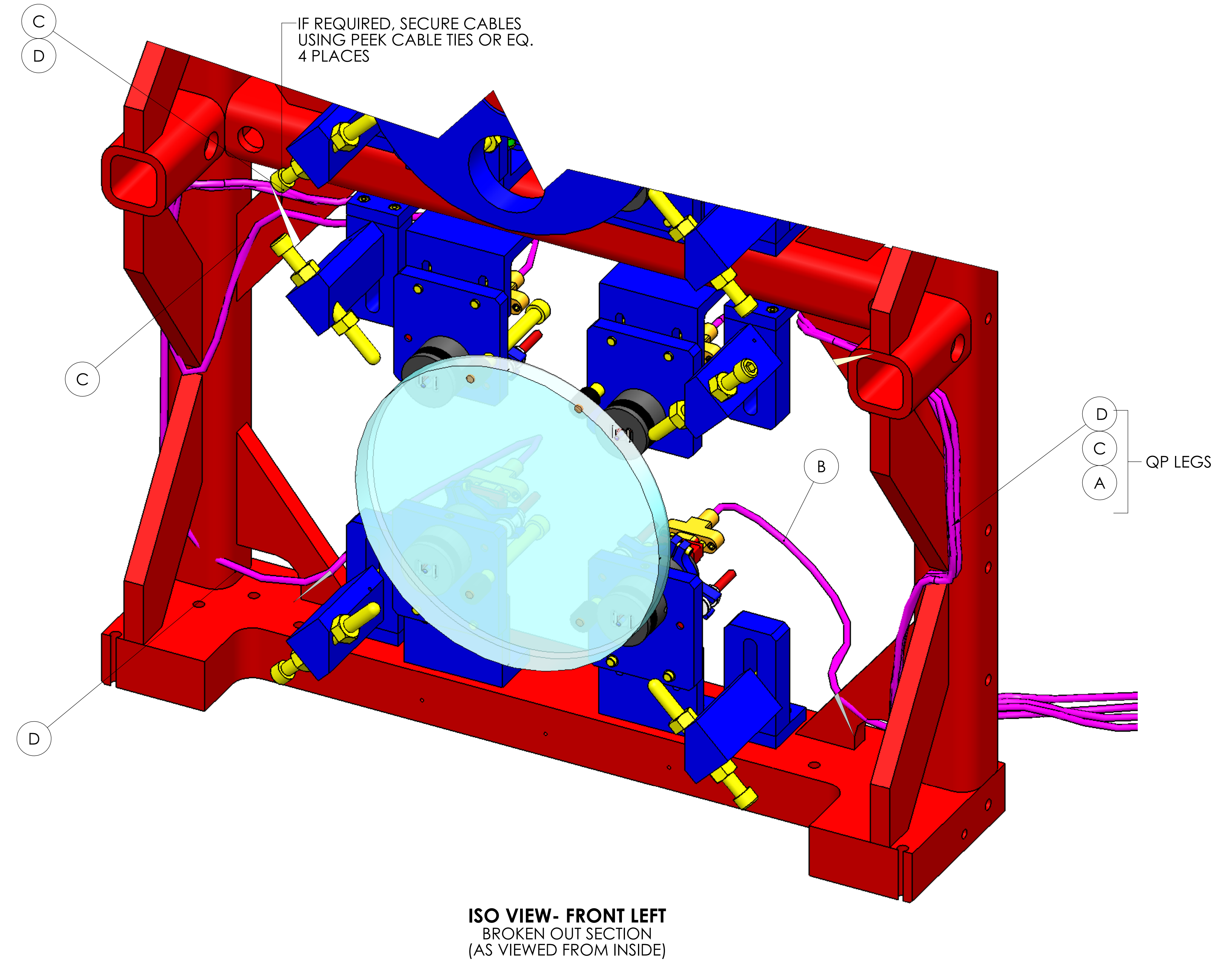
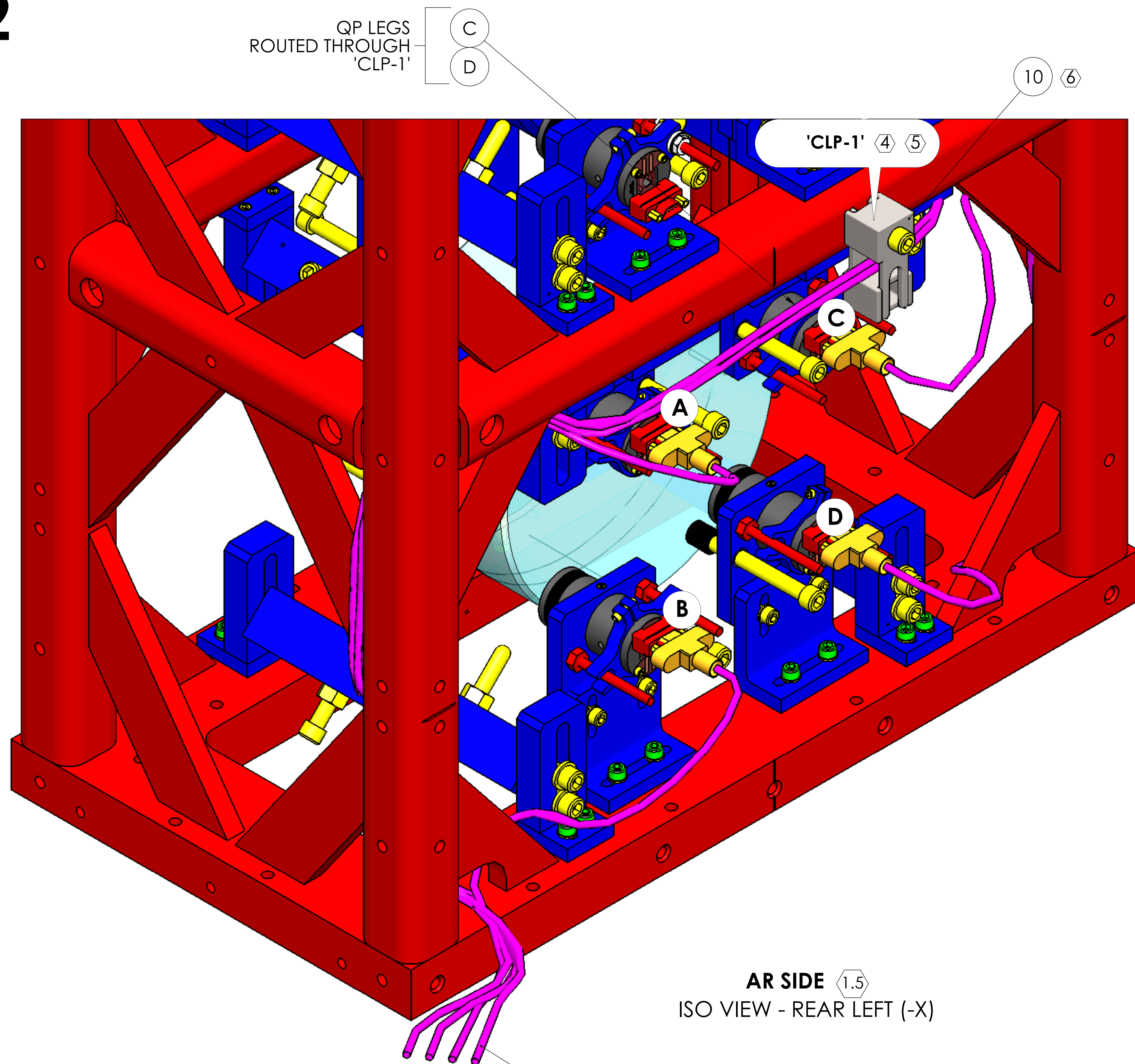
TOP VIEW 1.6

OPTICAL TABLE SHOWN FOR STRUCTURE AND DOG CLAMP LOCATIONS AND ORIENTATION

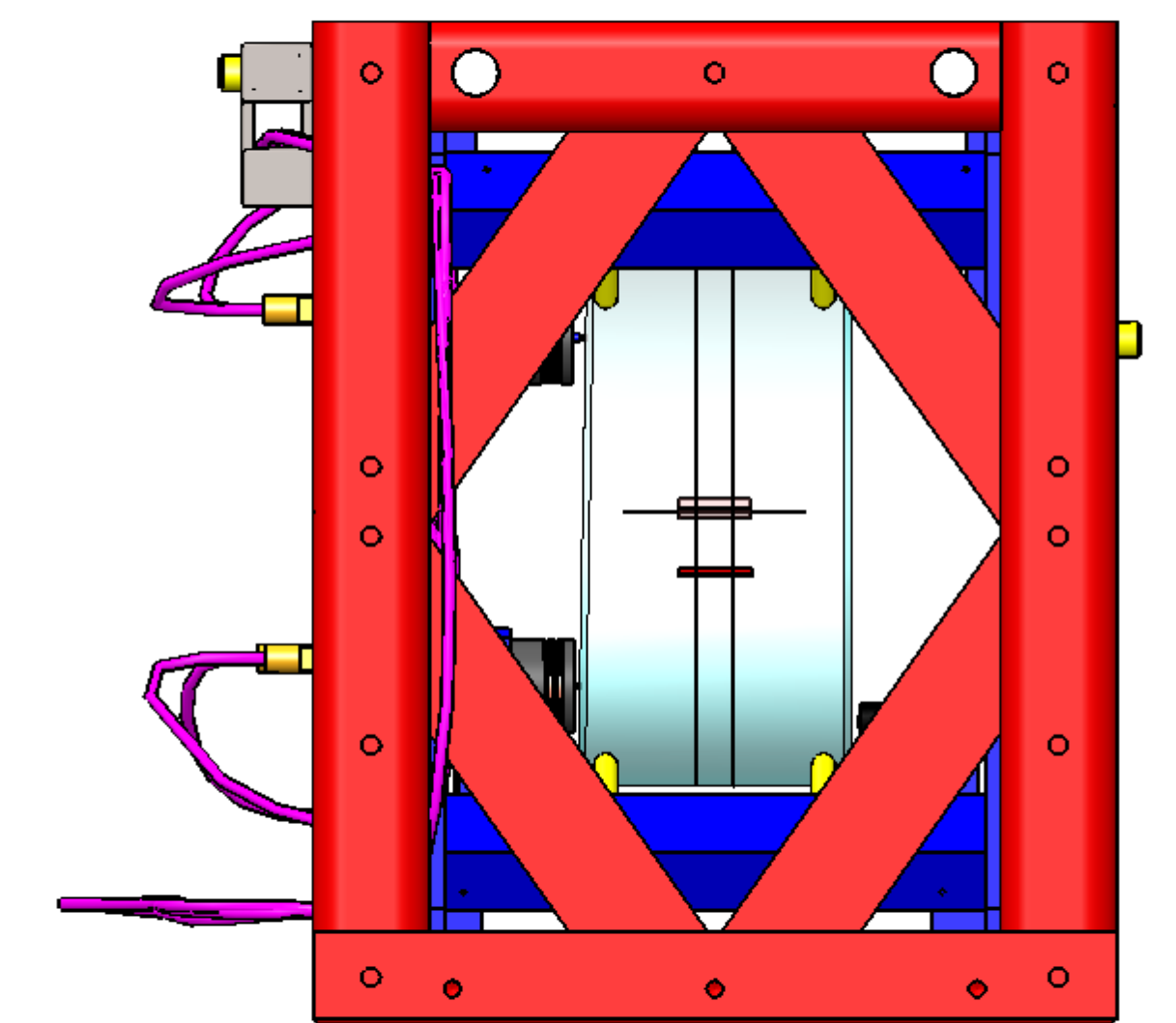
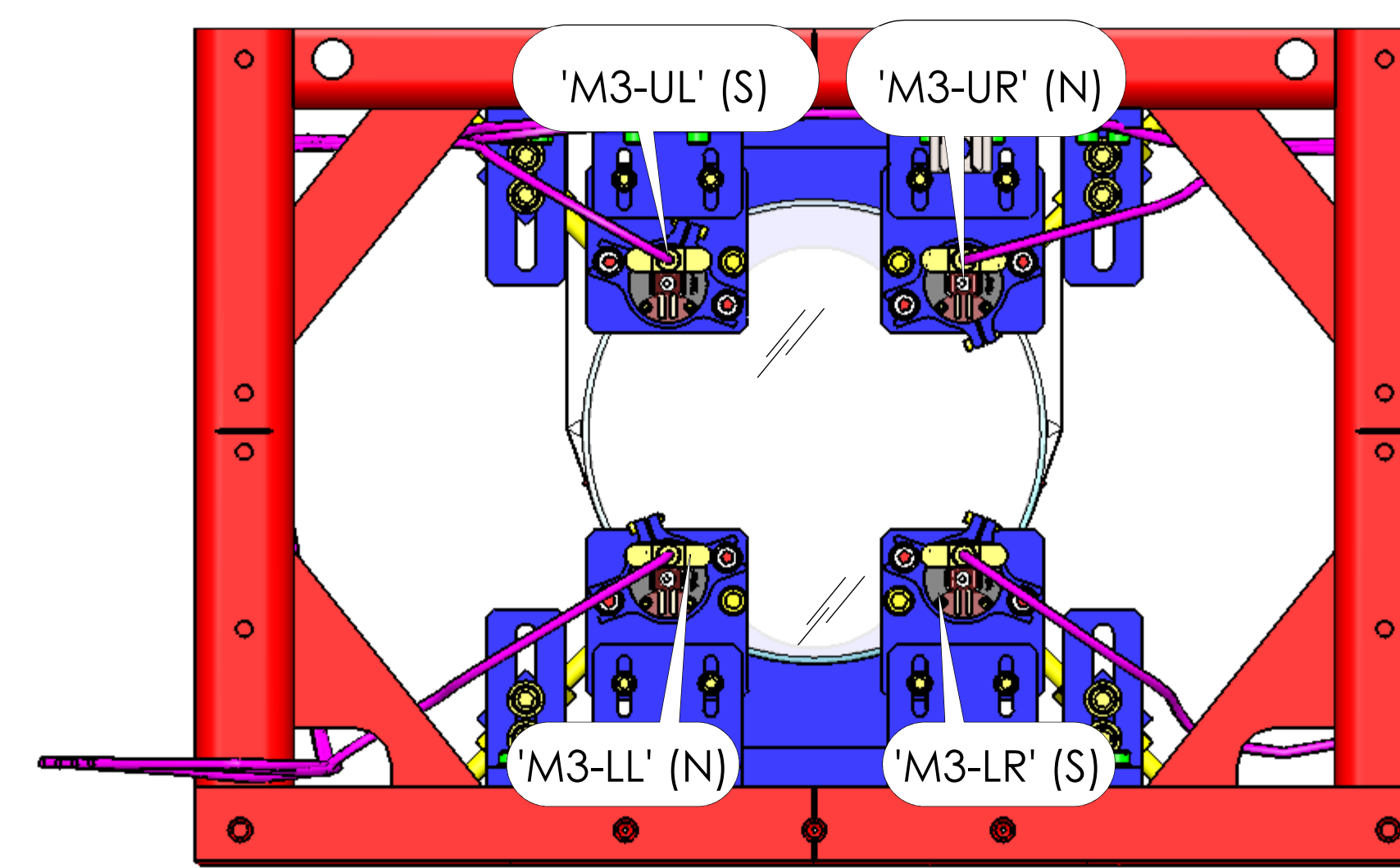
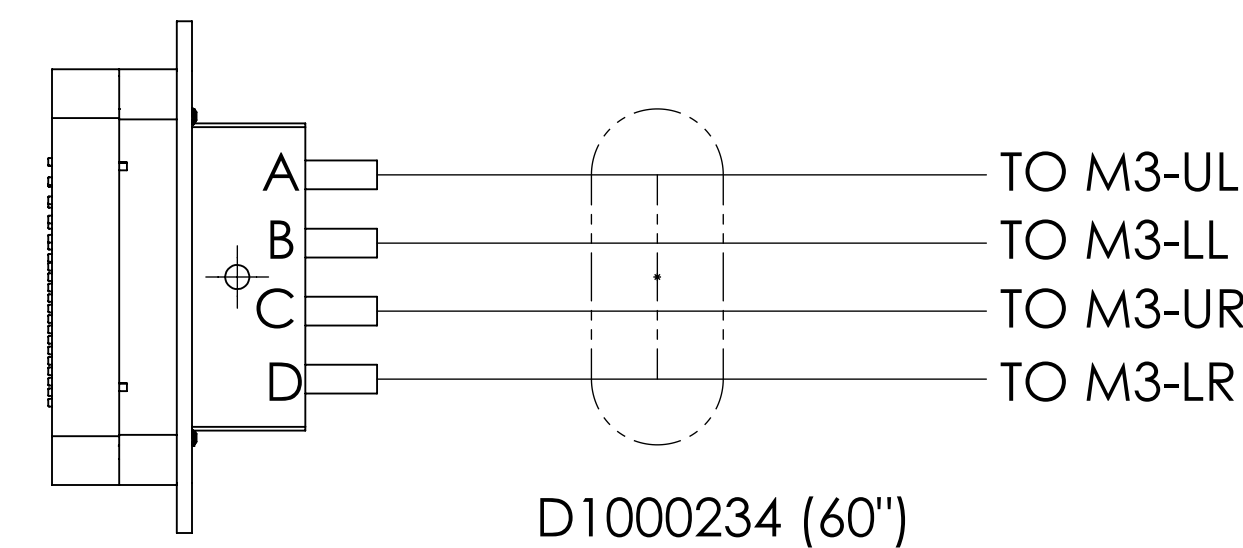
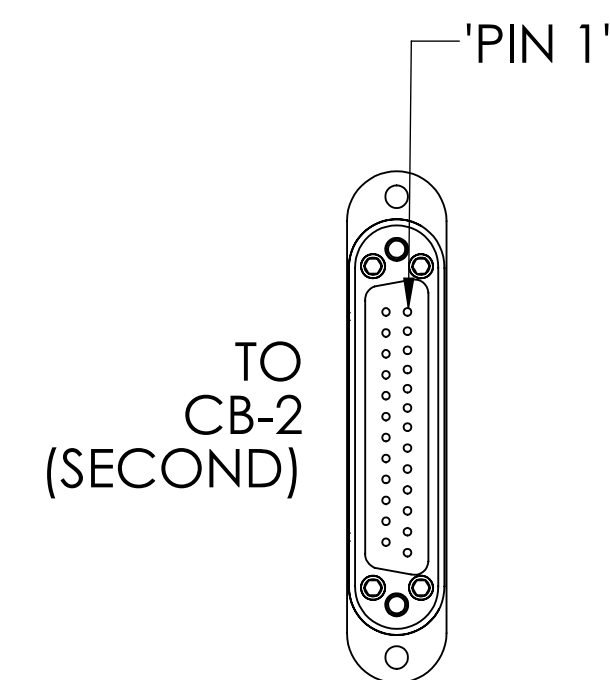
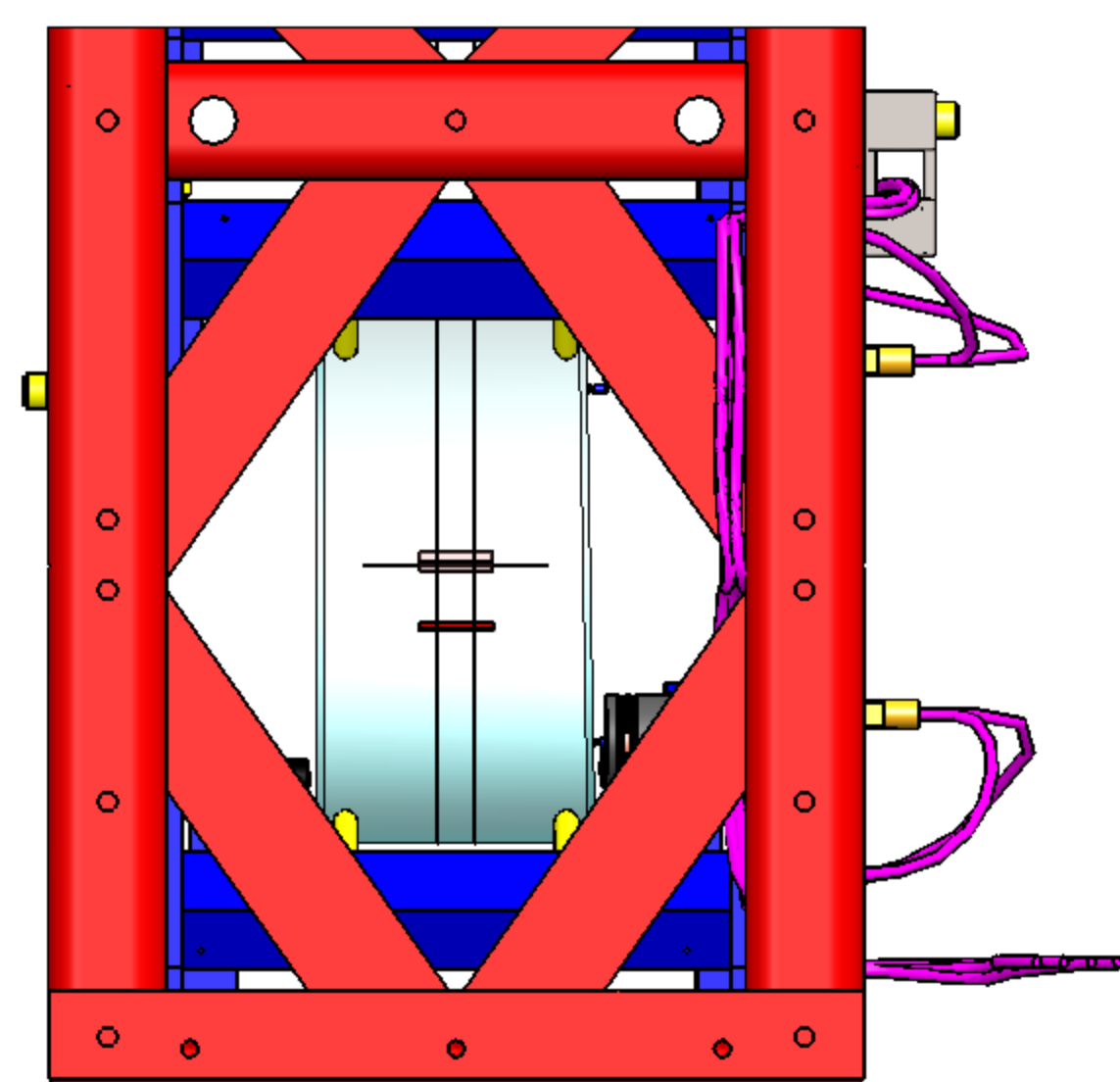
# DOG CLAMPS IDENTIFICATION / INSTALLATION

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

# PR2



**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.



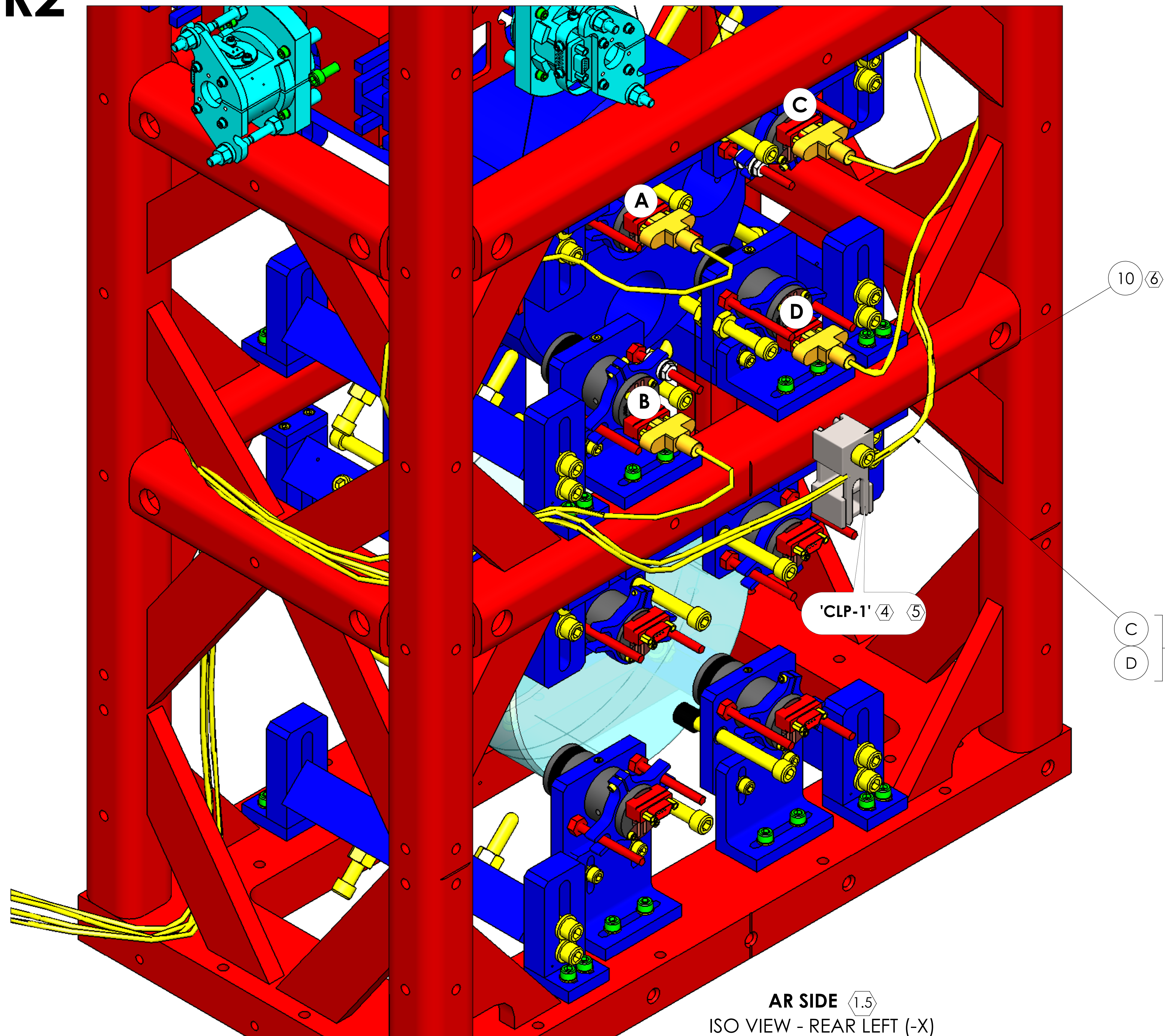
④ DO NOT CLAMP CABLES TIGHTLY. PROVIDE SUFFICIENT SPACE FOR THE CABLES TO RUN FREELY BETWEEN CLAMP JAWS.

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.

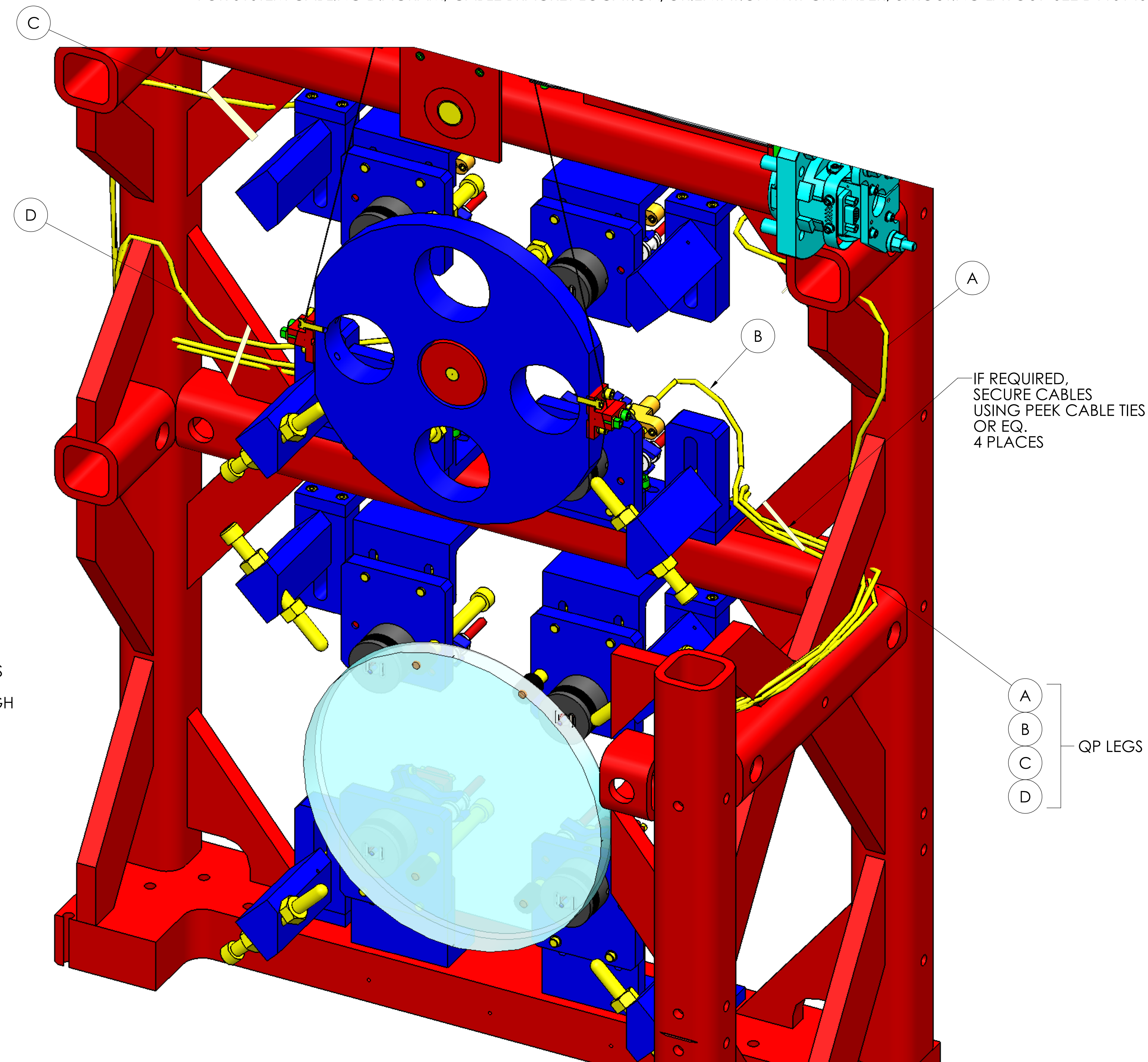
⑥ TORQUE TO APPROXIMATELY 20 IN/LBS.

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

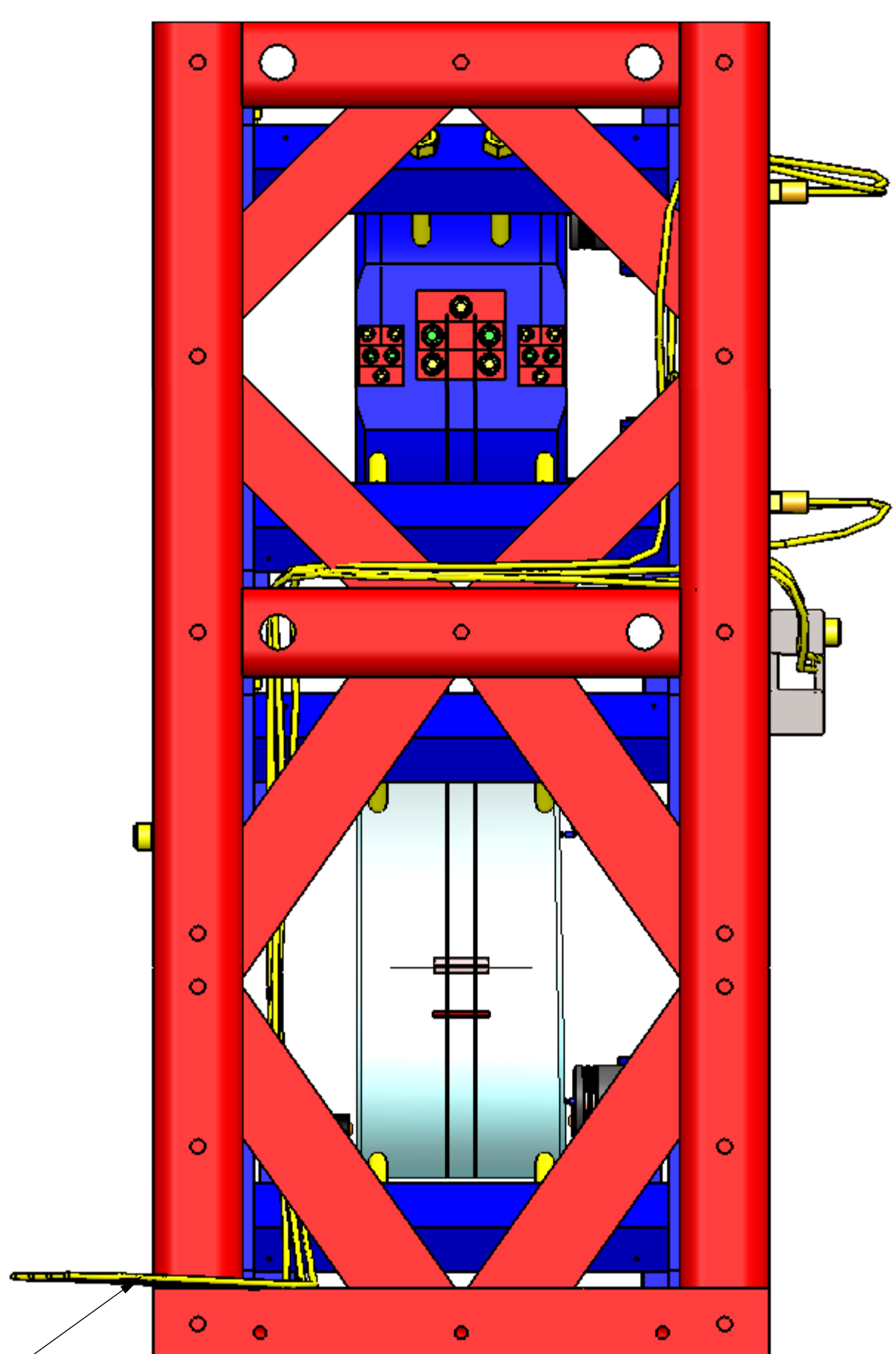
PR2



ISO VIEW - REAR LEFT (-X)



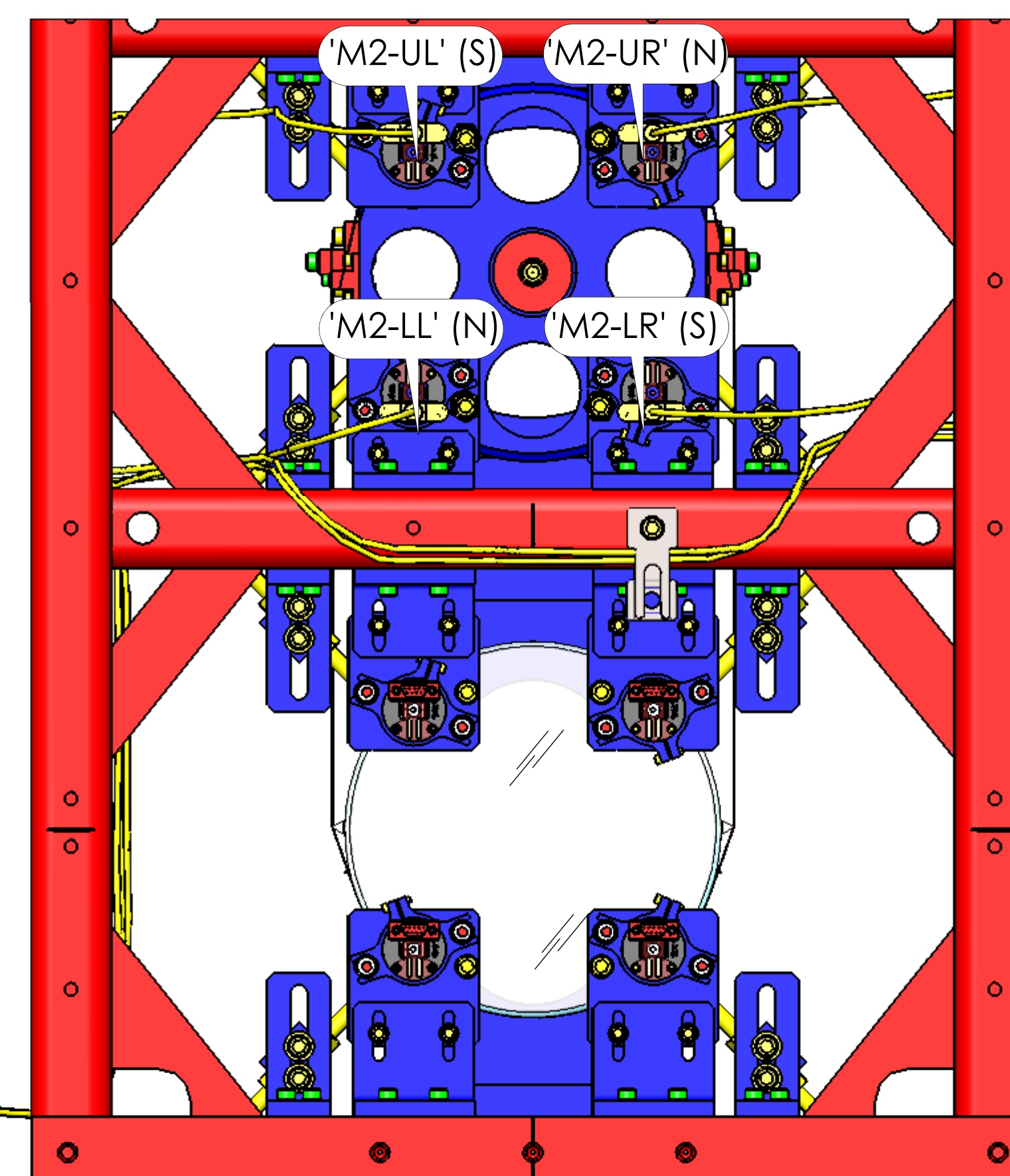
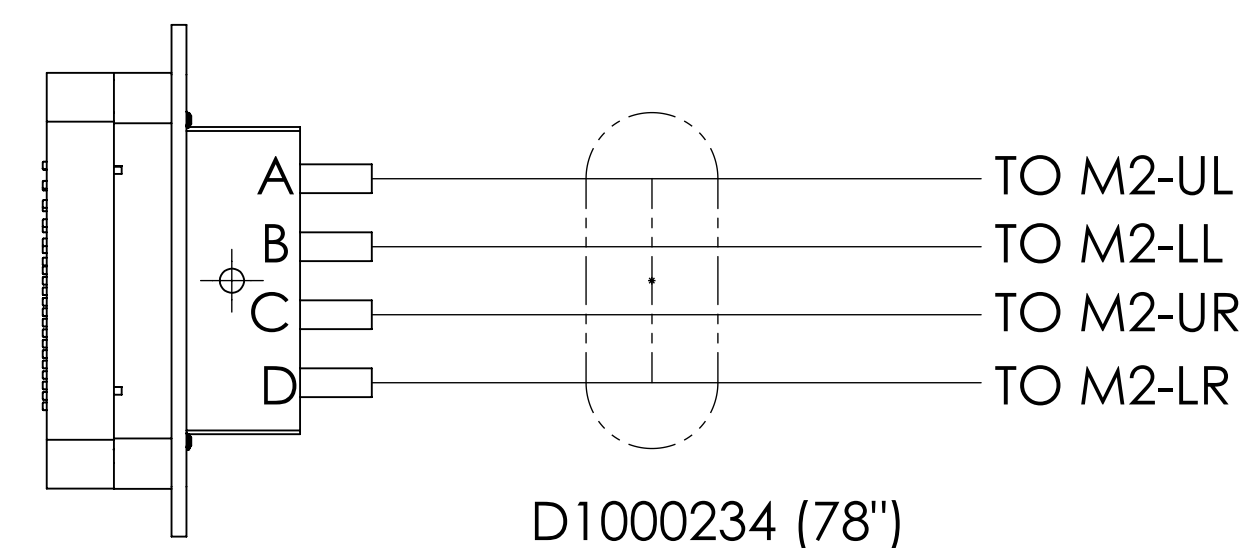
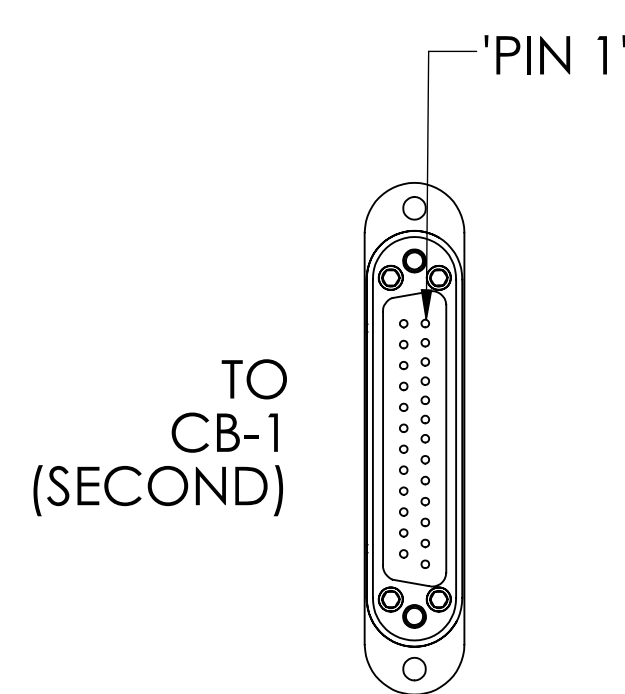
ISO VIEW - FRONT LEFT  
BROKEN OUT SECTION  
(AS VIEWED FROM INSIDE)



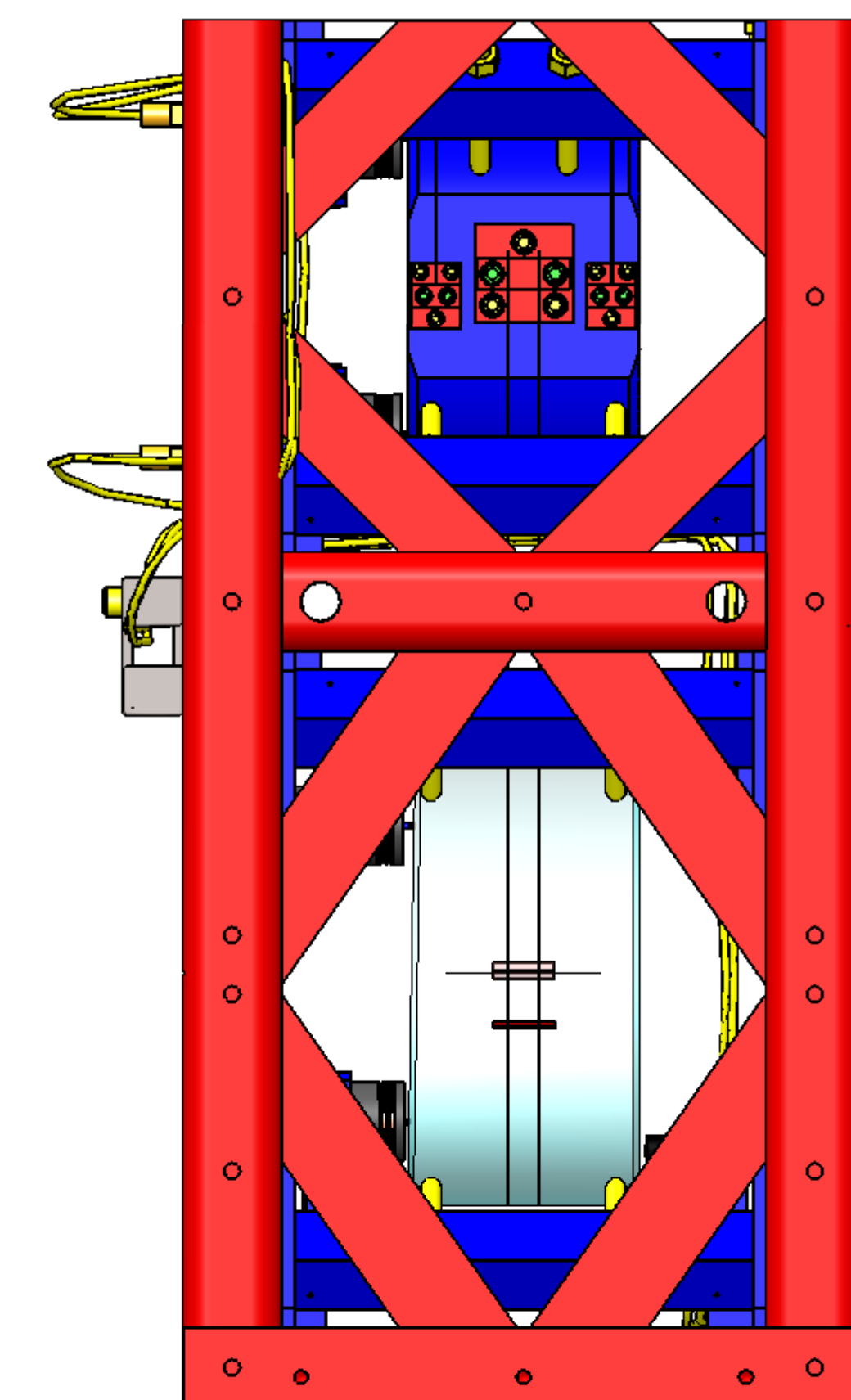
LEFT SIDE (+Y)



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



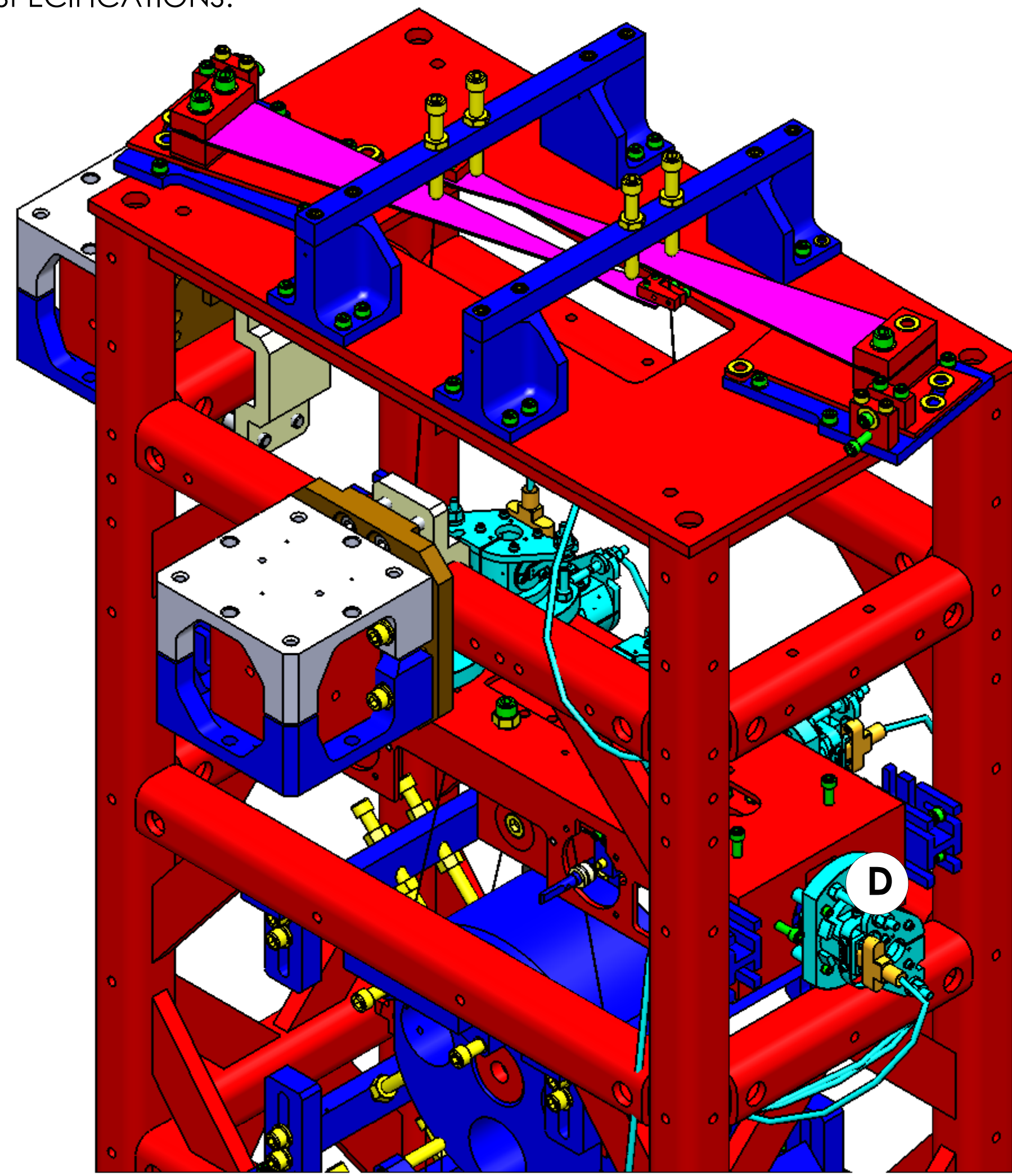
RIGHT SIDE (-Y)

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

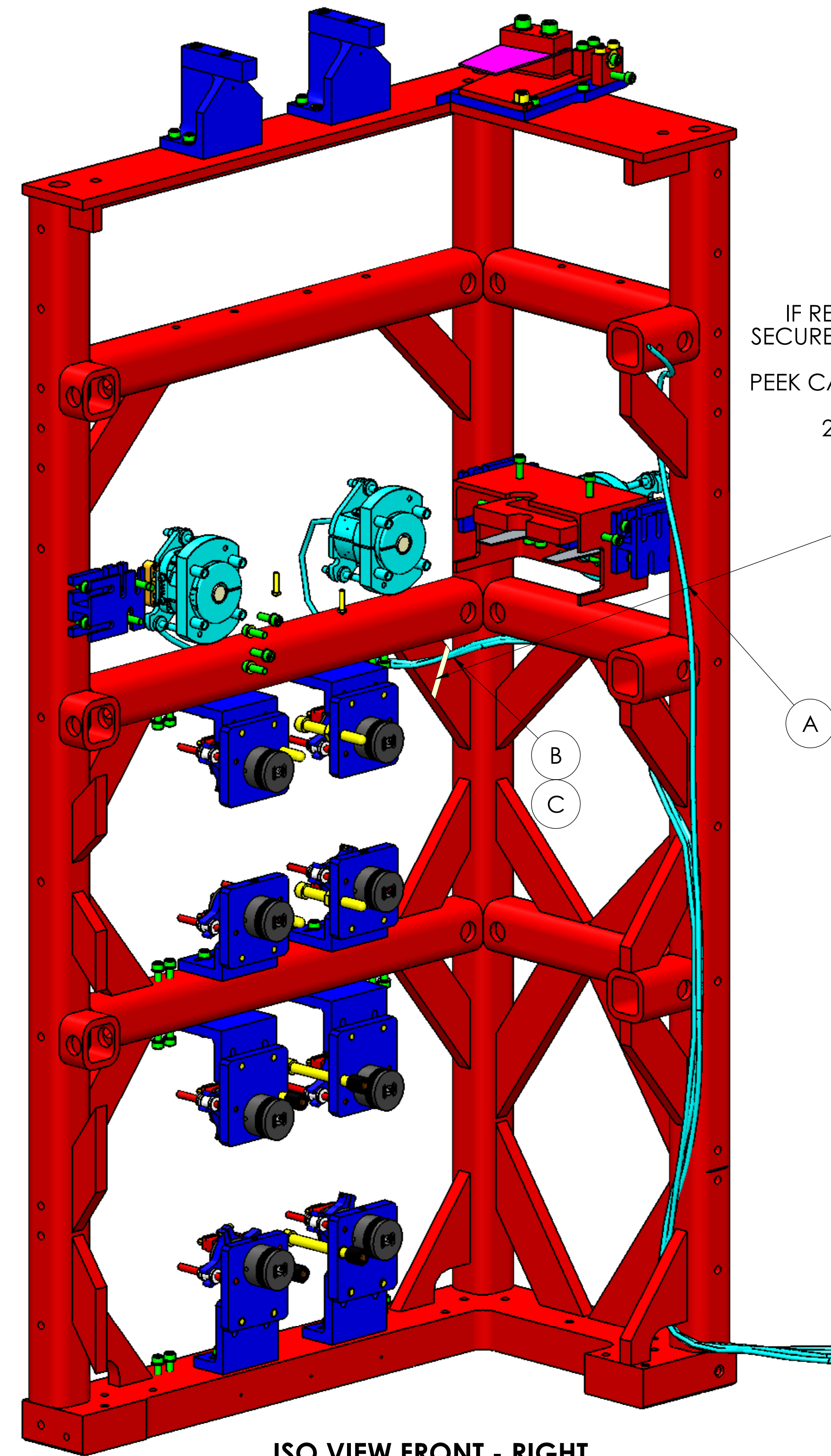
A  
B  
C  
D  
QP LEGS

**ROUTE NO. 2**  
SEE LIGO-T1200318  
FOR STEP BY STEP CABLING GUIDE

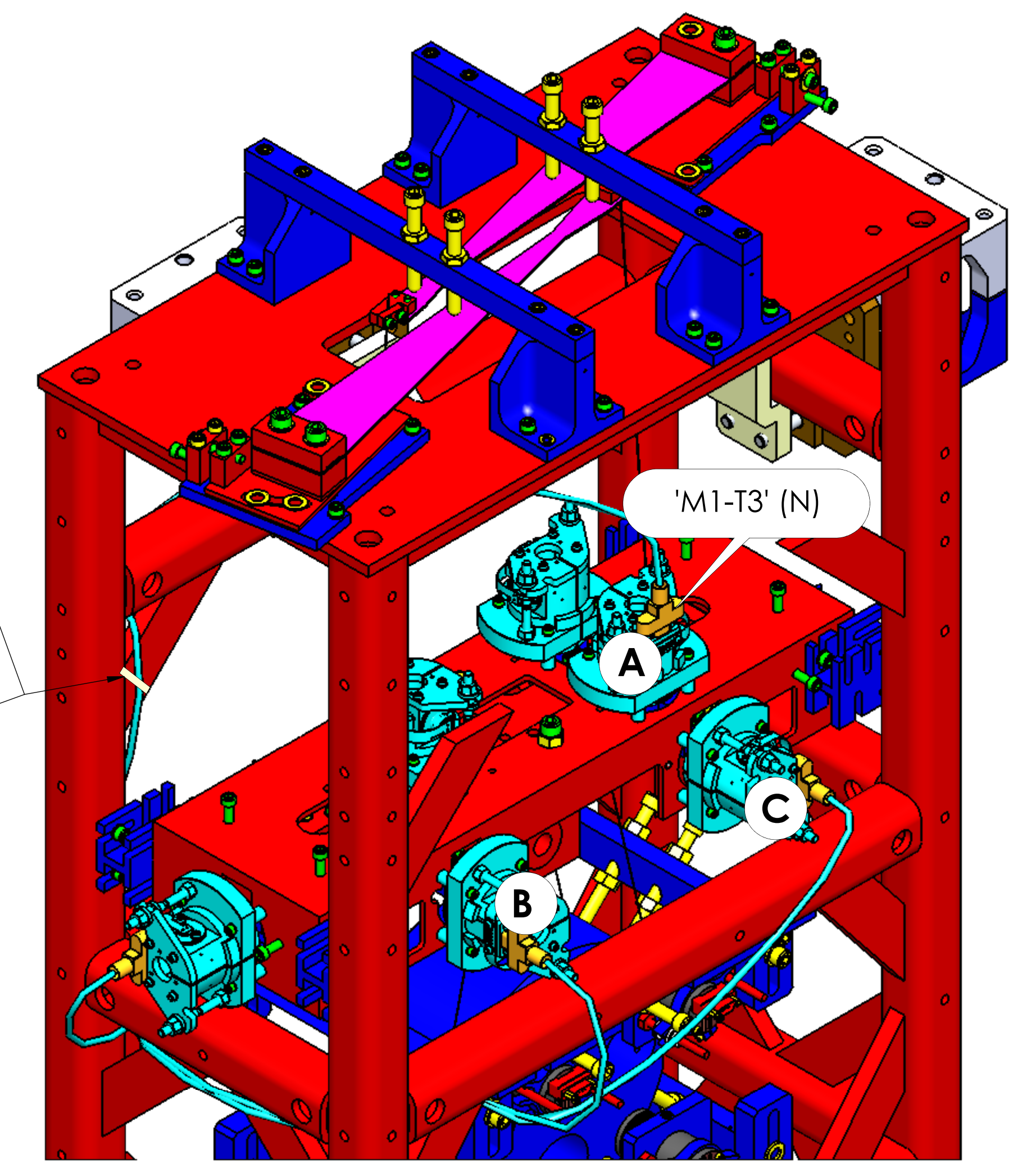
PR2



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

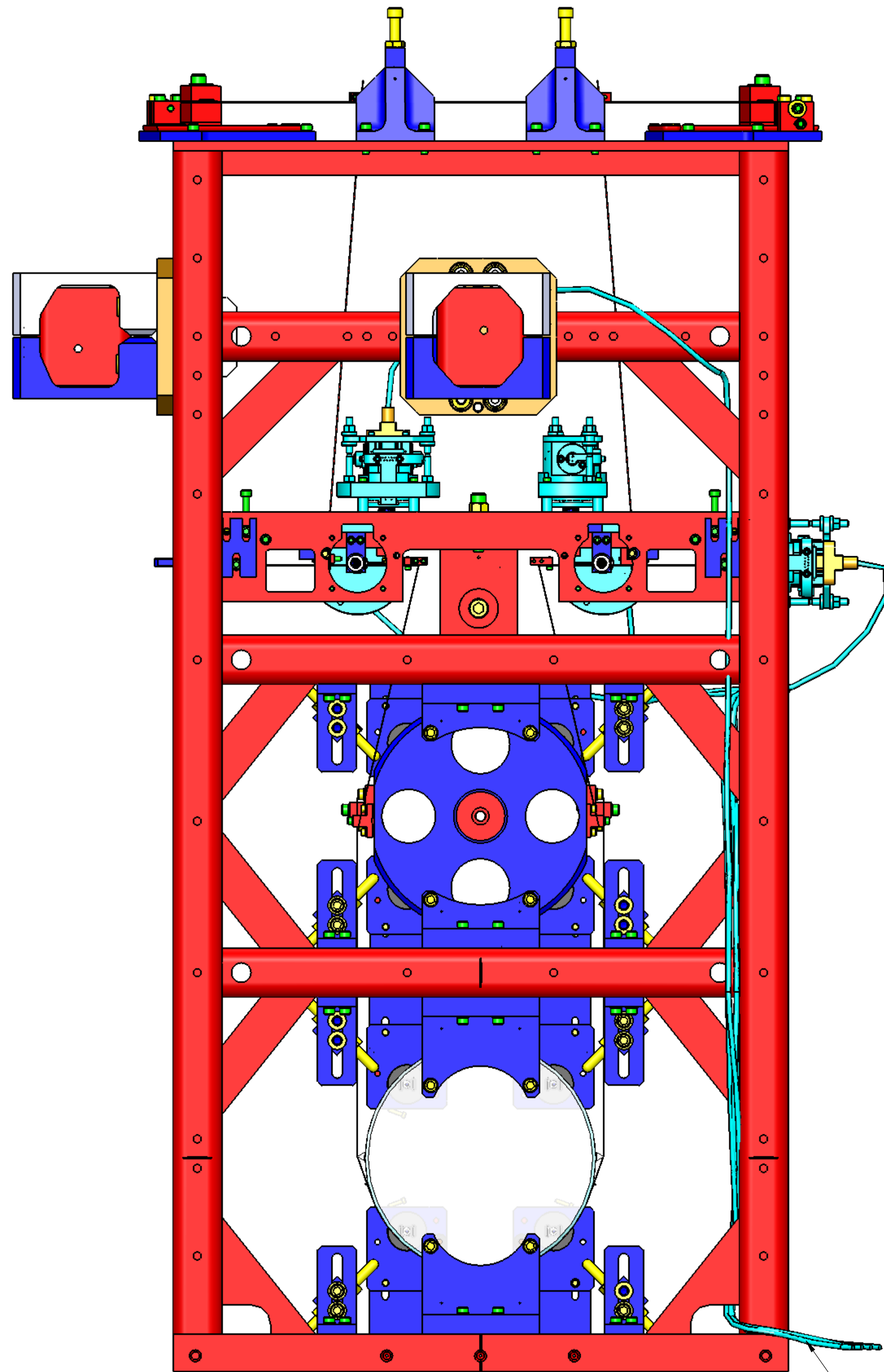


ISO VIEW FRONT - RIGHT  
BROKEN OUT SECTION  
(AS VIEWED FROM INSIDE)

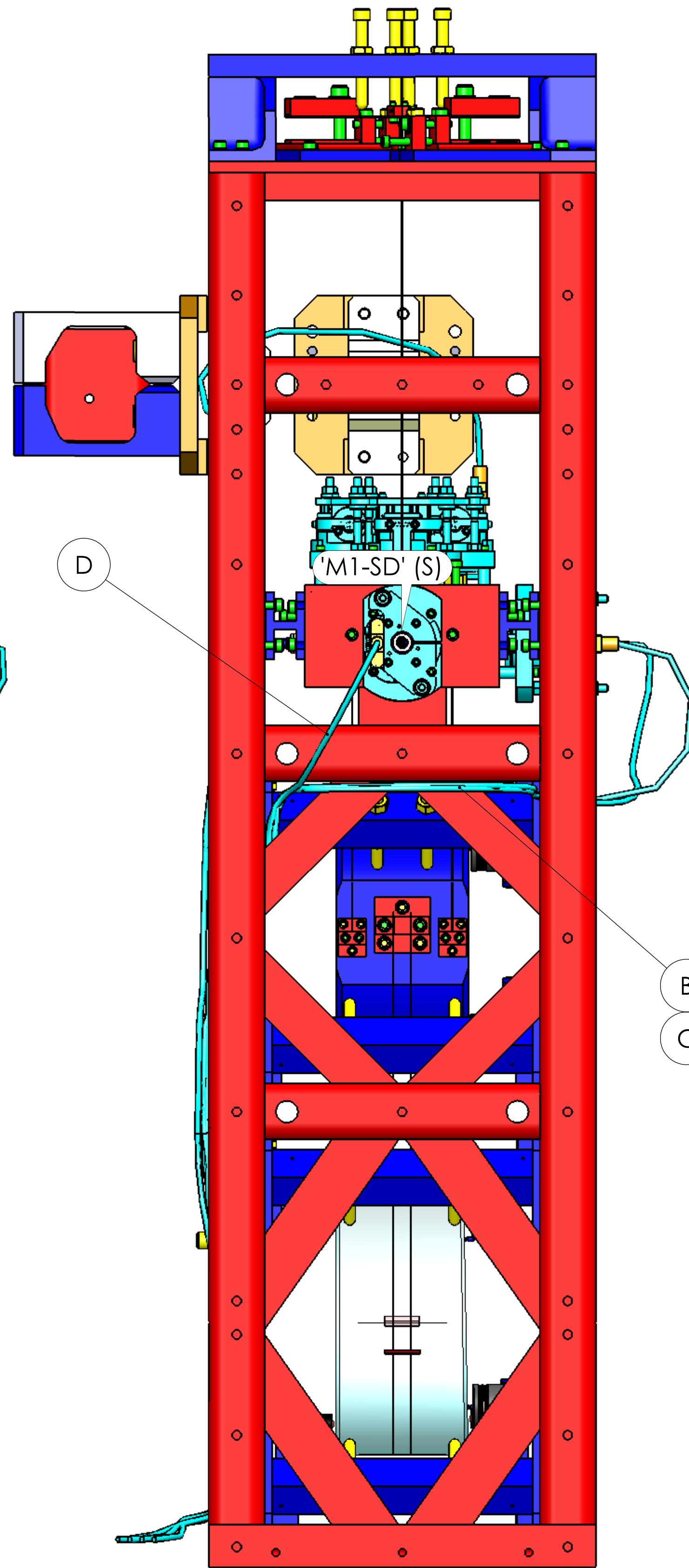


IF REQUIRED,  
SECURE CABLES  
USING  
PEEK CABLE TIES  
OR EQ.  
2 PLACES

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

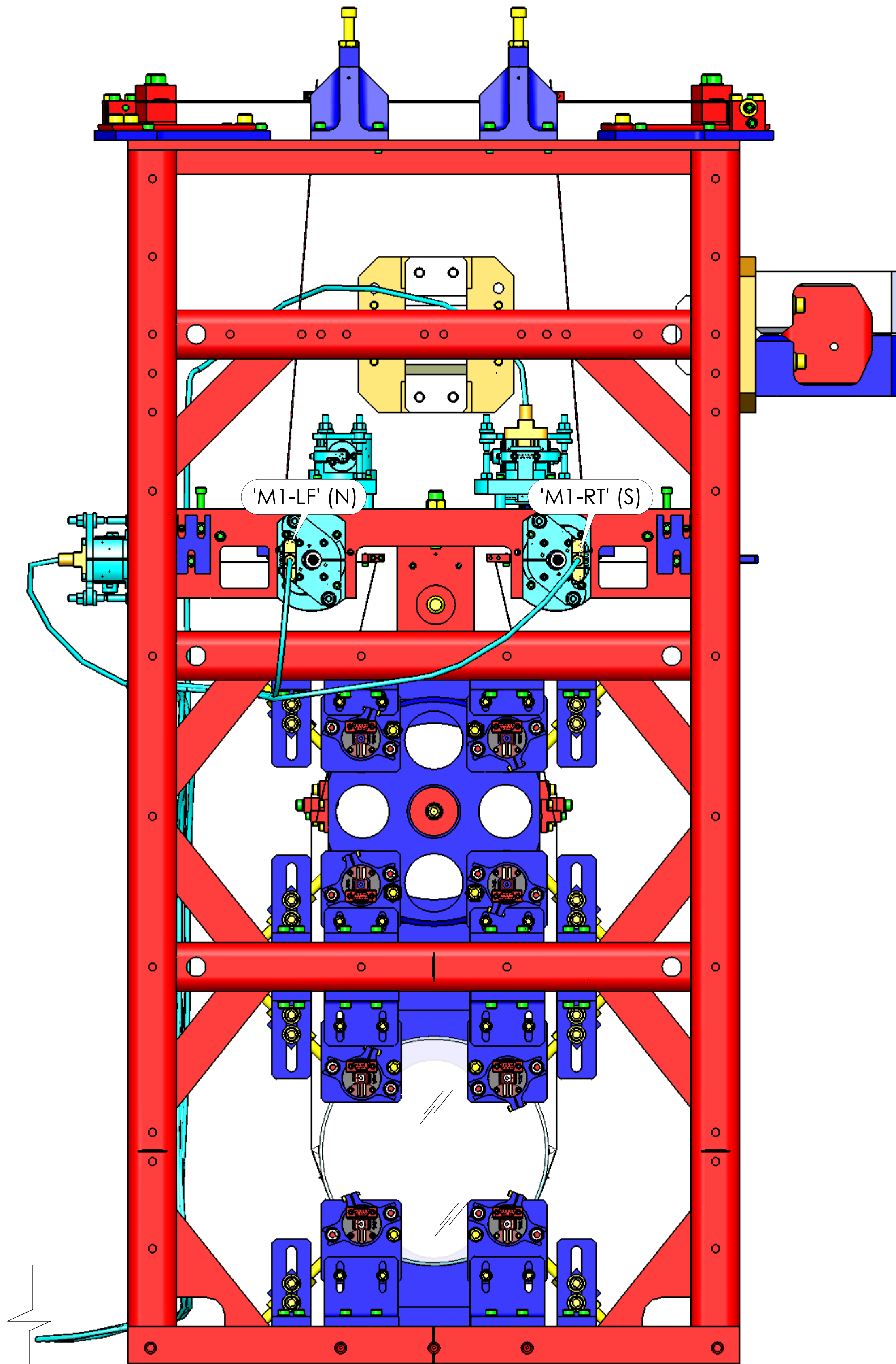


HR SIDE - FRONT (+X)  
(END CONNECTORS, NOT SHOWN FOR CLARITY)



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

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

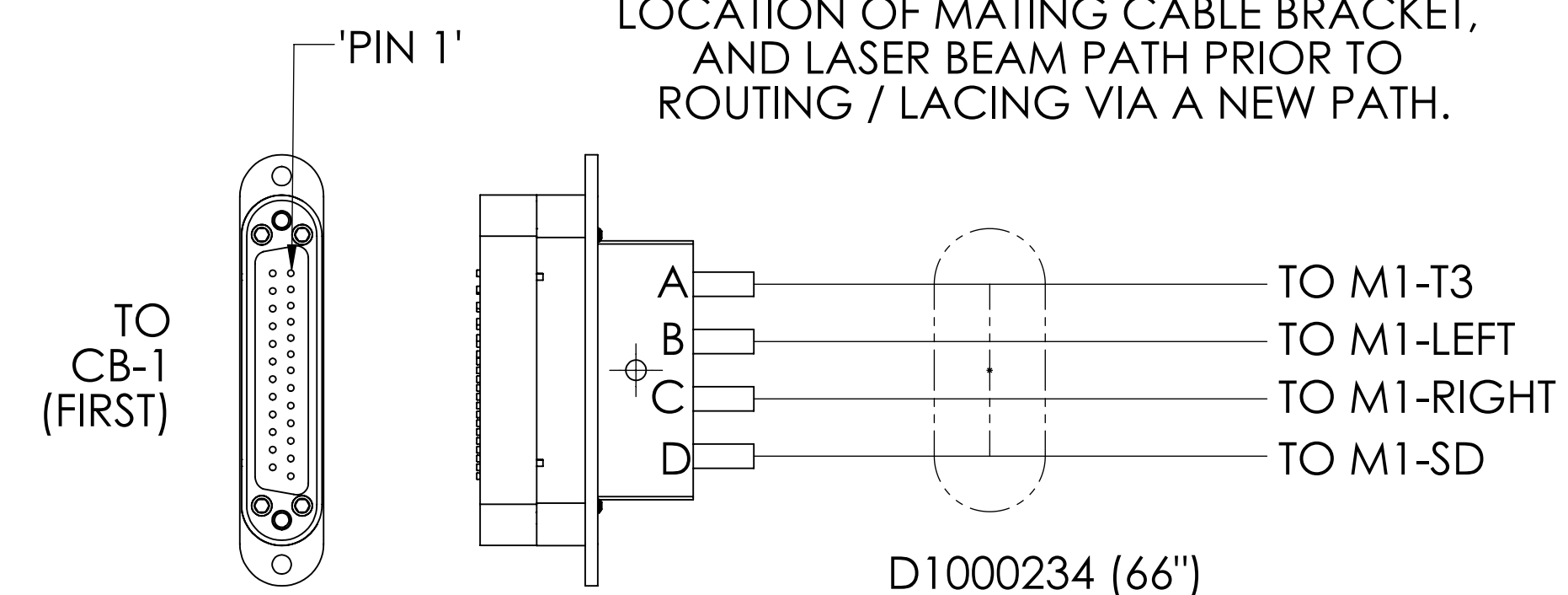


AR SIDE - REAR (-X) (1.1) (1.2)  
(END CONNECTORS, NOT SHOWN FOR CLARITY)



**WARNING**

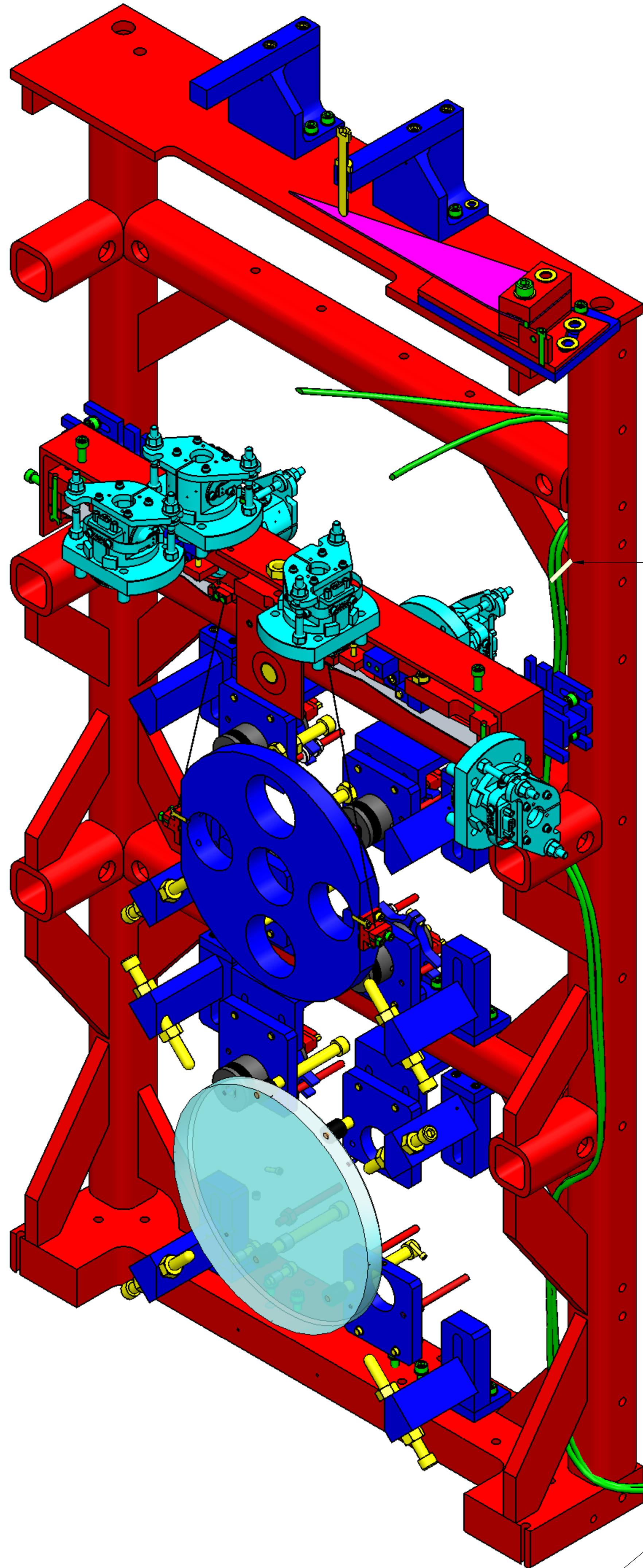
**CABLE ROUTING:**  
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LOCATION OF MATING CABLE BRACKET,  
AND LASER BEAM PATH PRIOR TO  
ROUTING / LACING VIA A NEW PATH.



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

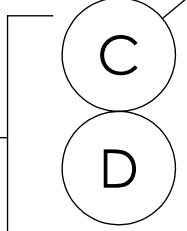
PR2

(SHARED)

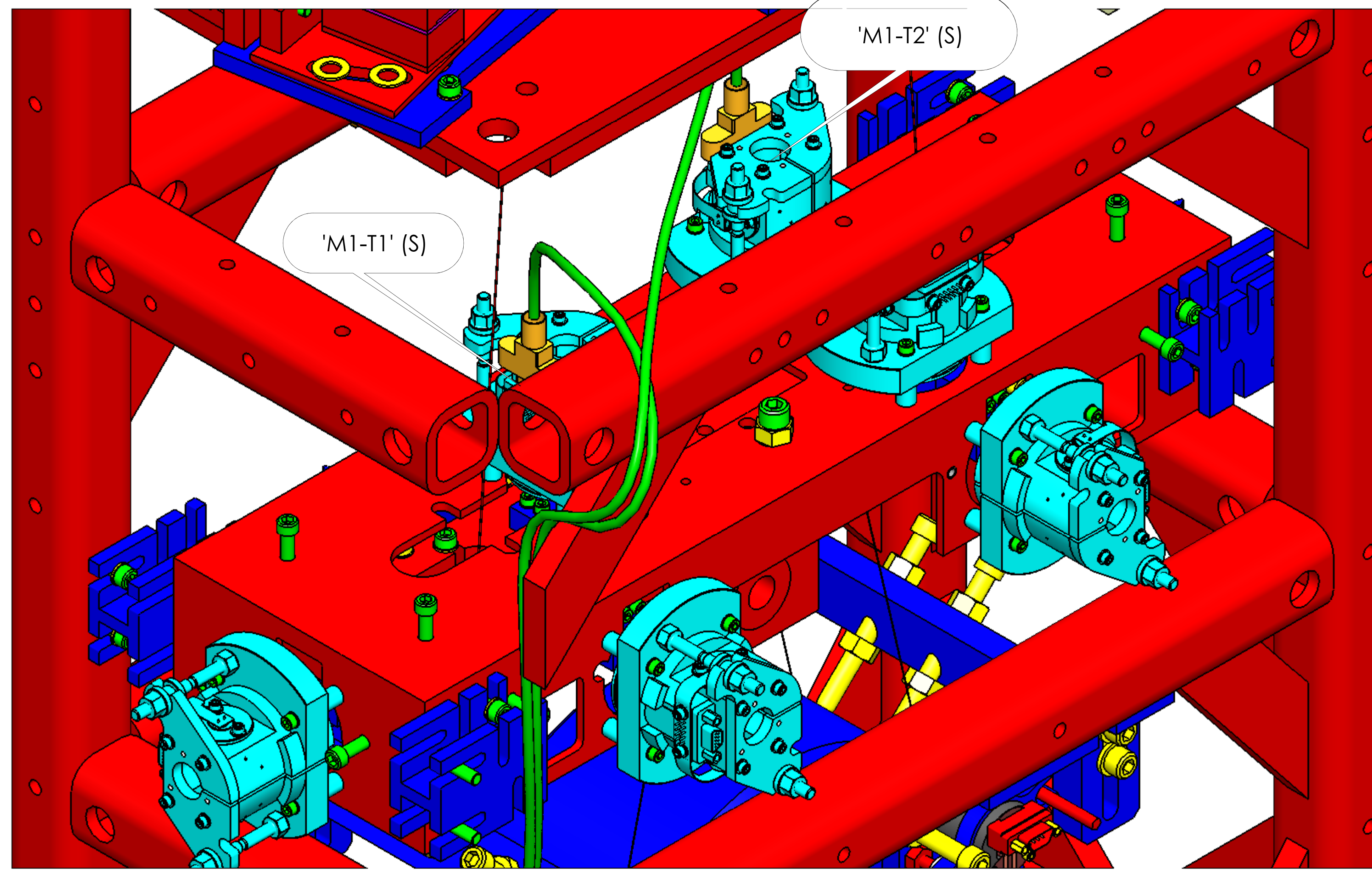


ISO VIEW FRONT - LEFT  
BROKEN OUT SECTION  
(AS VIEWED FROM INSIDE)

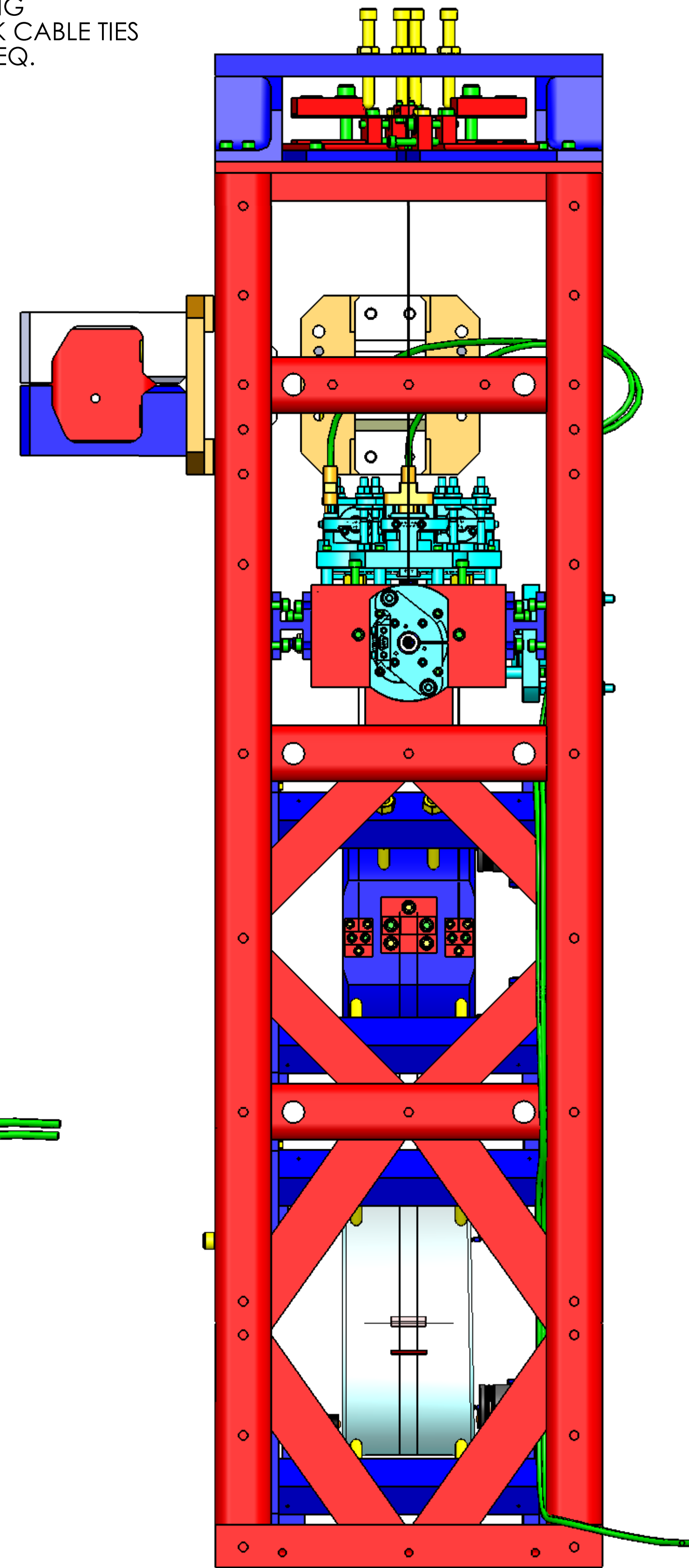
QP LEGS LACED  
LEFT SIDE BOTTOM  
RIGHT GUSSET



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



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

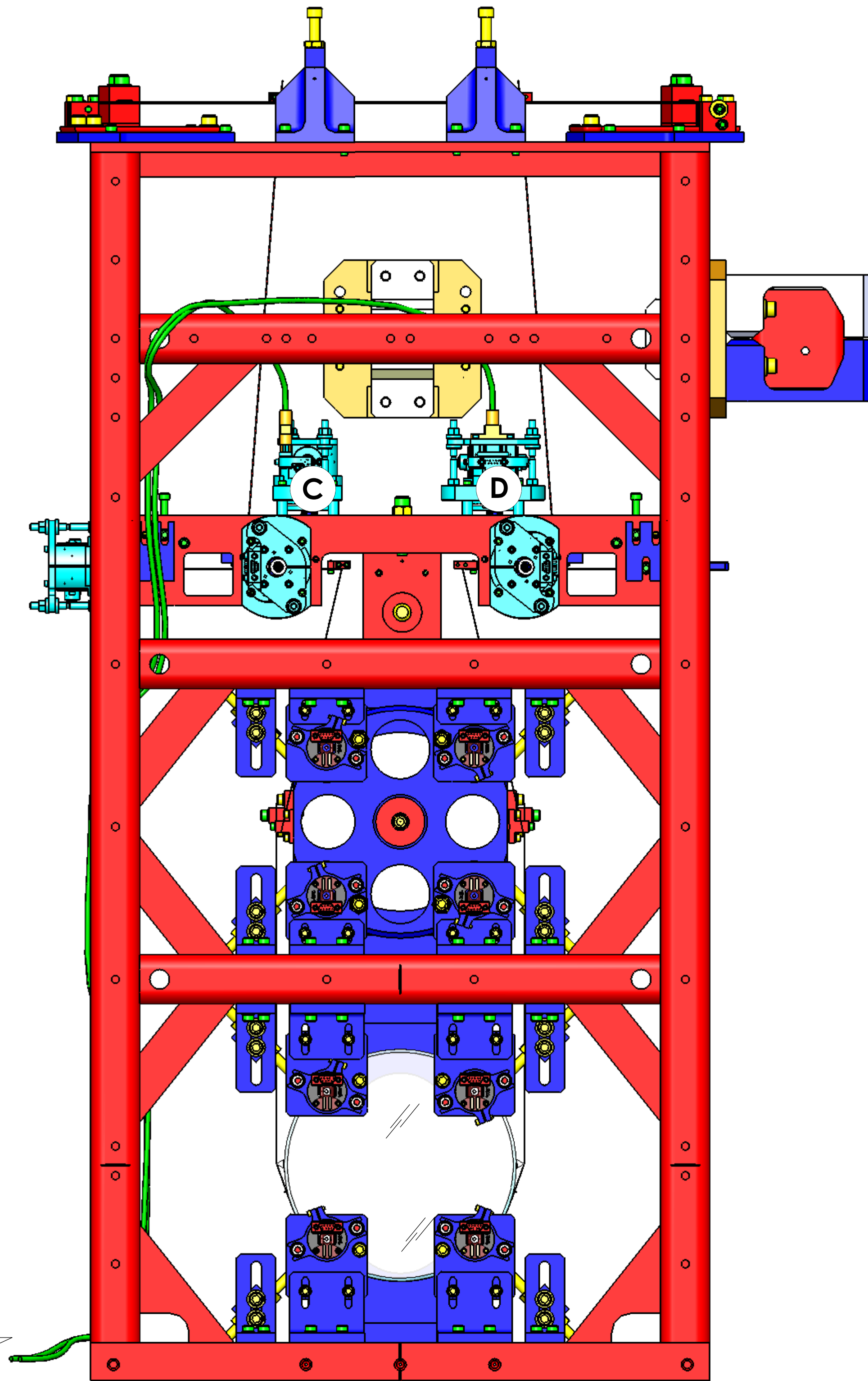
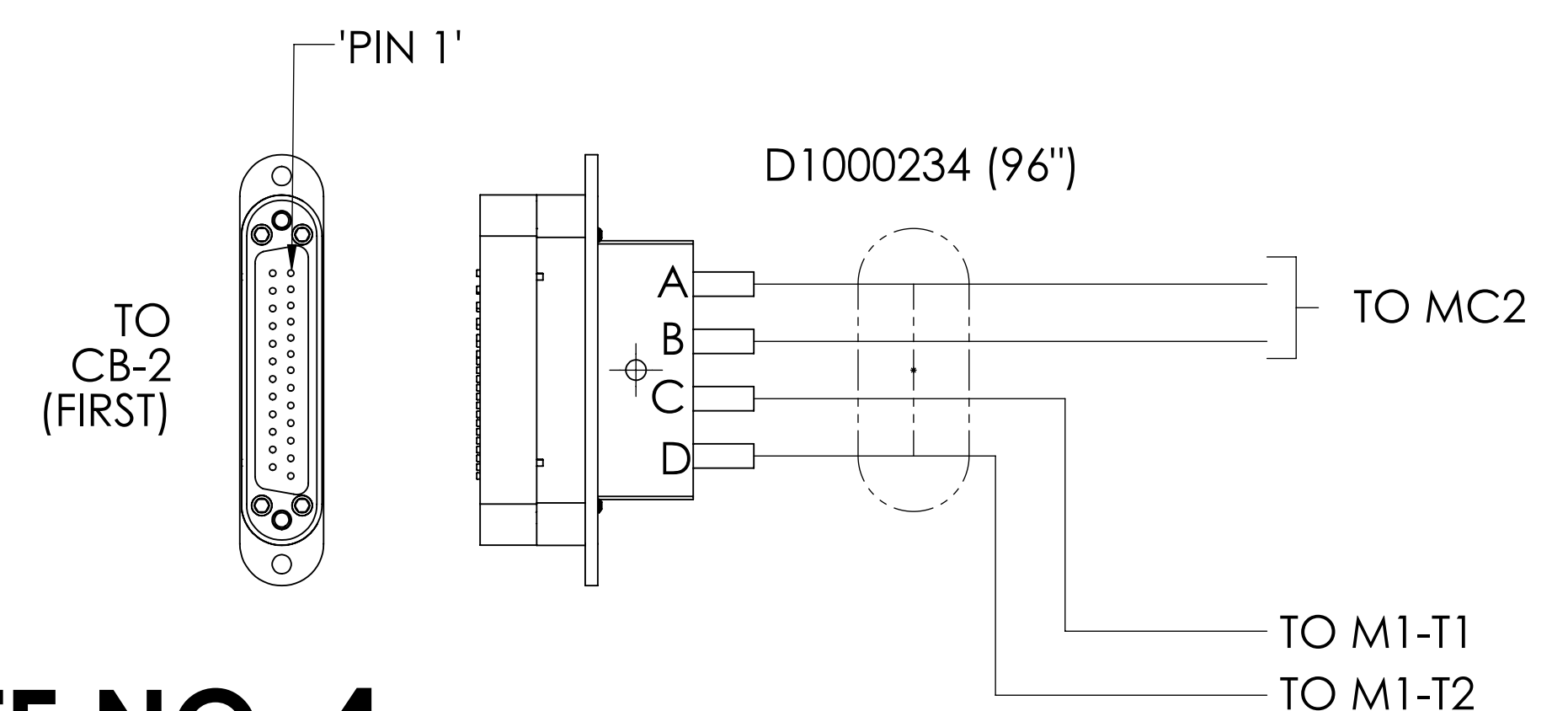


LEFT SIDE (+Y)



**WARNING**

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ROUTING / LACING VIA A NEW PATH.



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

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

# PR2

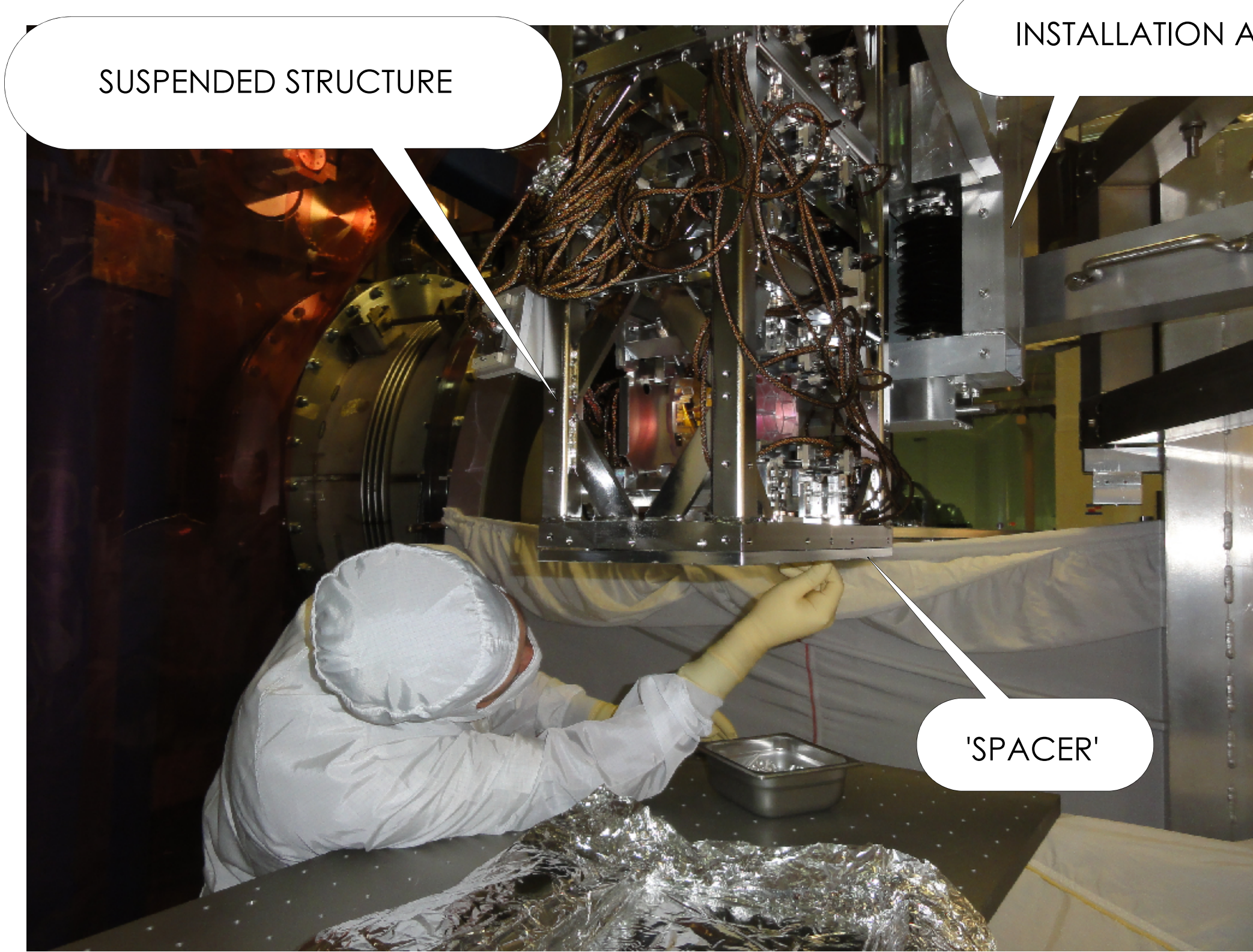
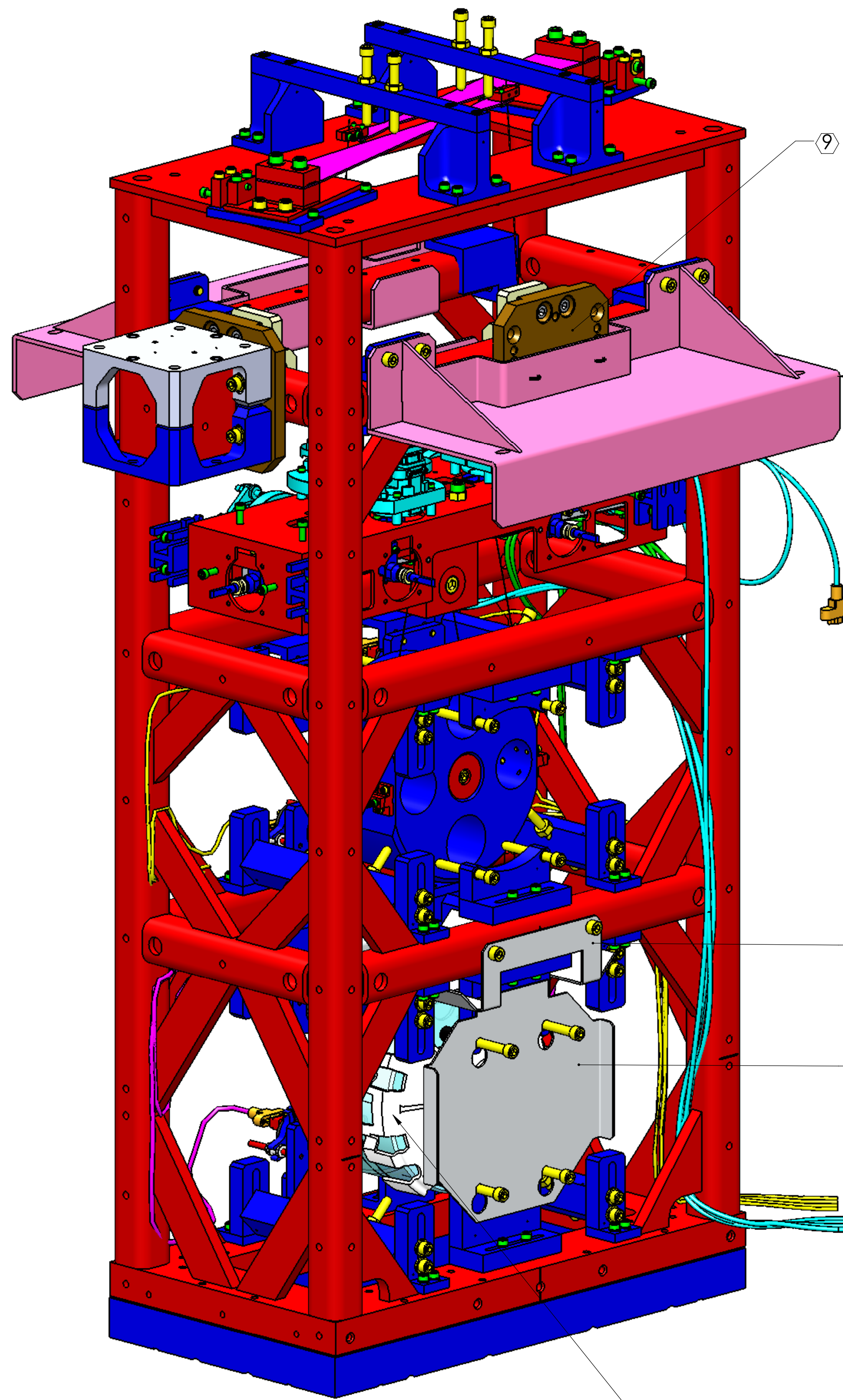


FIG 1.0: SPACER INSTALLATION

- 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 LIFT 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. ATTACHED 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)

D1001788 ⑦ ⑨  
HSTS LIFT BRACKET  
QTY.2

D1102319 ⑦  
HSTS OPTIC TOP SHIELD

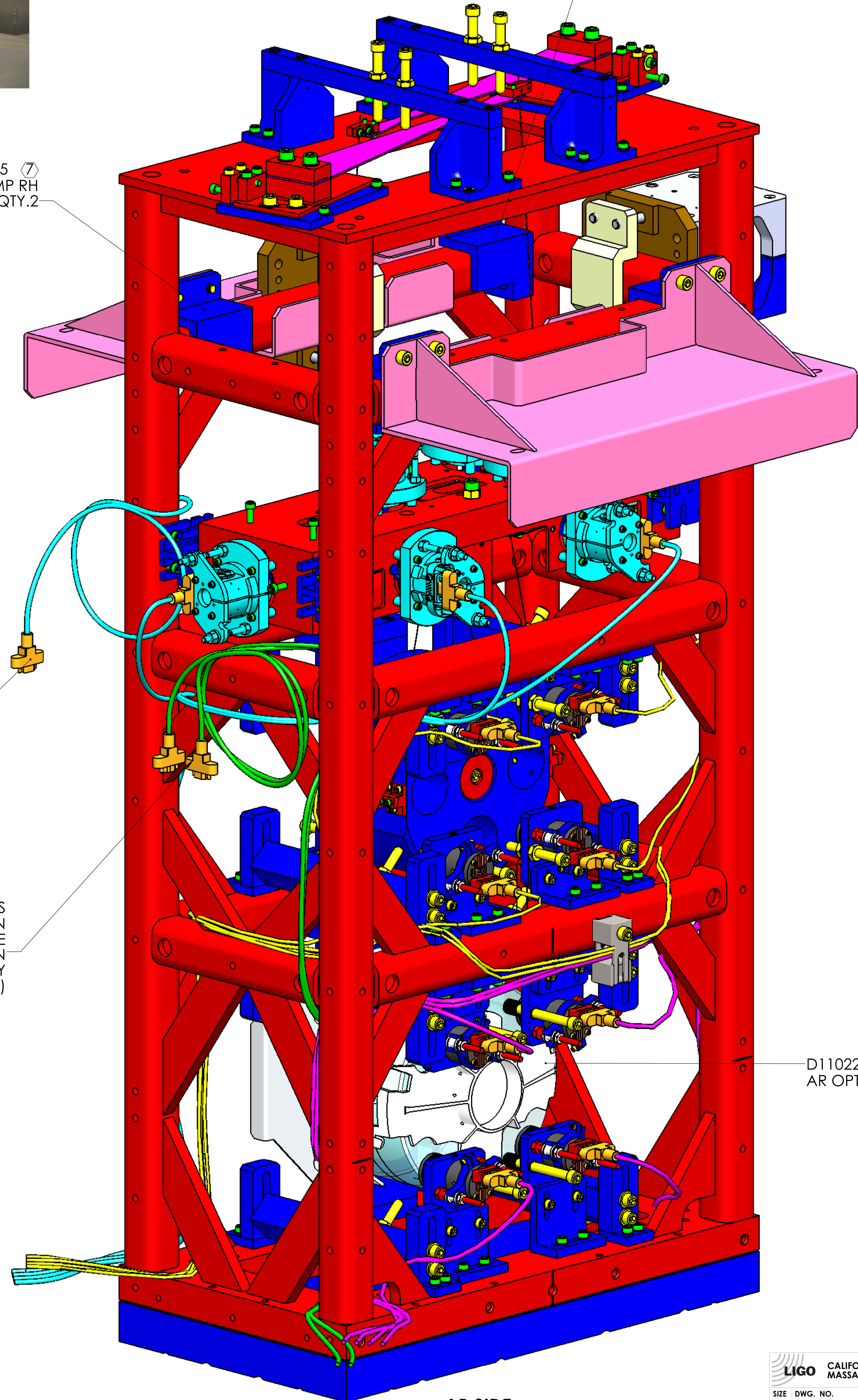
D1102308 ⑦  
HSTS FACE SHIELD

D1101443 ⑦  
HSTS OPTICS CAP

D1101495 ⑦  
HSTS BRACKET CLAMP RH  
QTY.2

⑧ IF REQUIRED, BUNDLE CABLES AND ATTACH AS SHOWN TO THE SIDE OF THE STRUCTURE FOR TRANSPORTATION PURPOSES ONLY (SEE SHEET 6 FOR ROUTE DETAILS)

⑧ IF REQUIRED, BUNDLE CABLES AND ATTACH AS SHOWN TO THE SIDE OF THE STRUCTURE FOR TRANSPORTATION PURPOSES ONLY (SEE SHEET 7 FOR ROUTE DETAILS)



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

D1101496 ⑦  
HSTS BRACKET CLAMP LH  
QTY.2

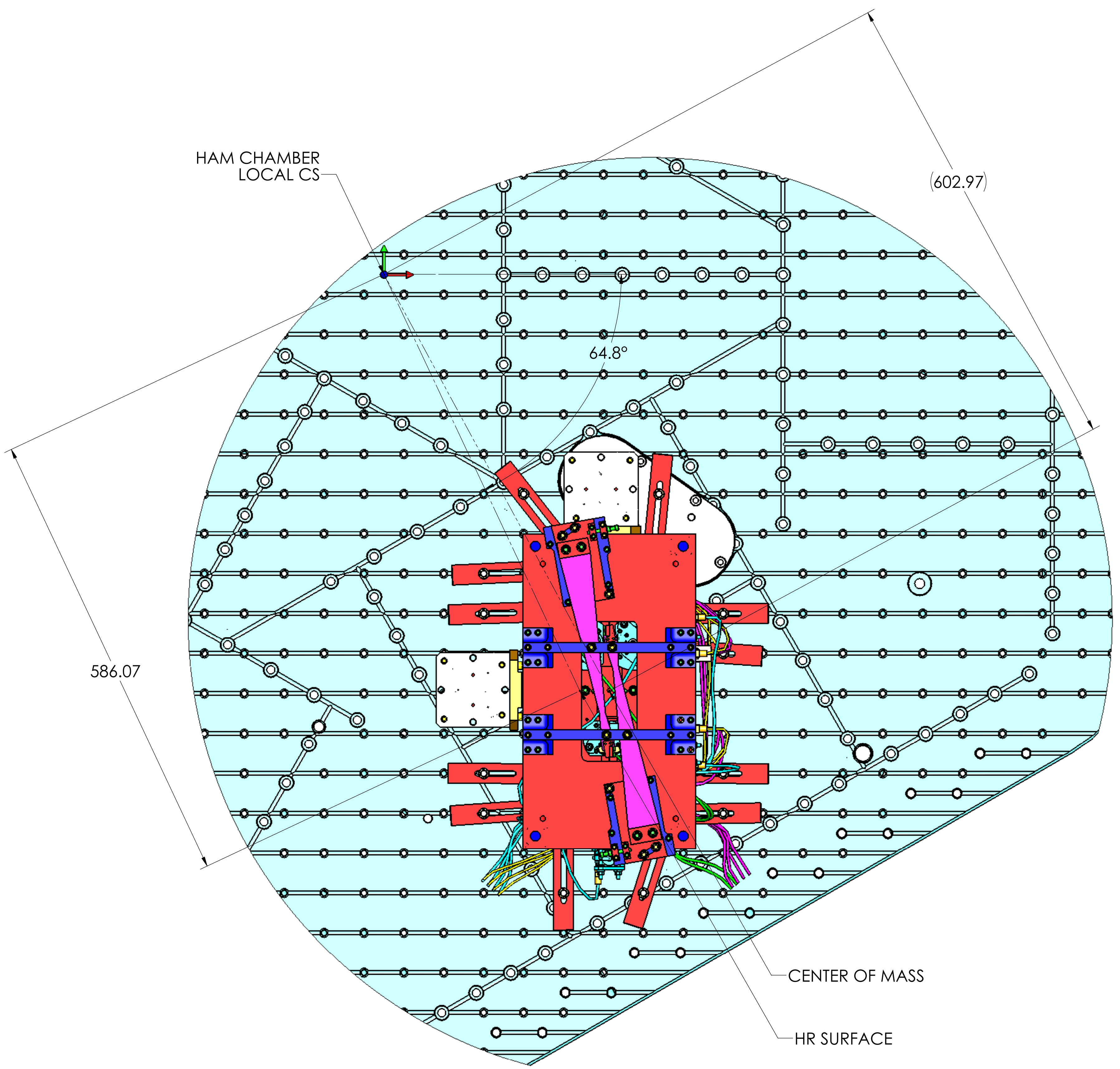
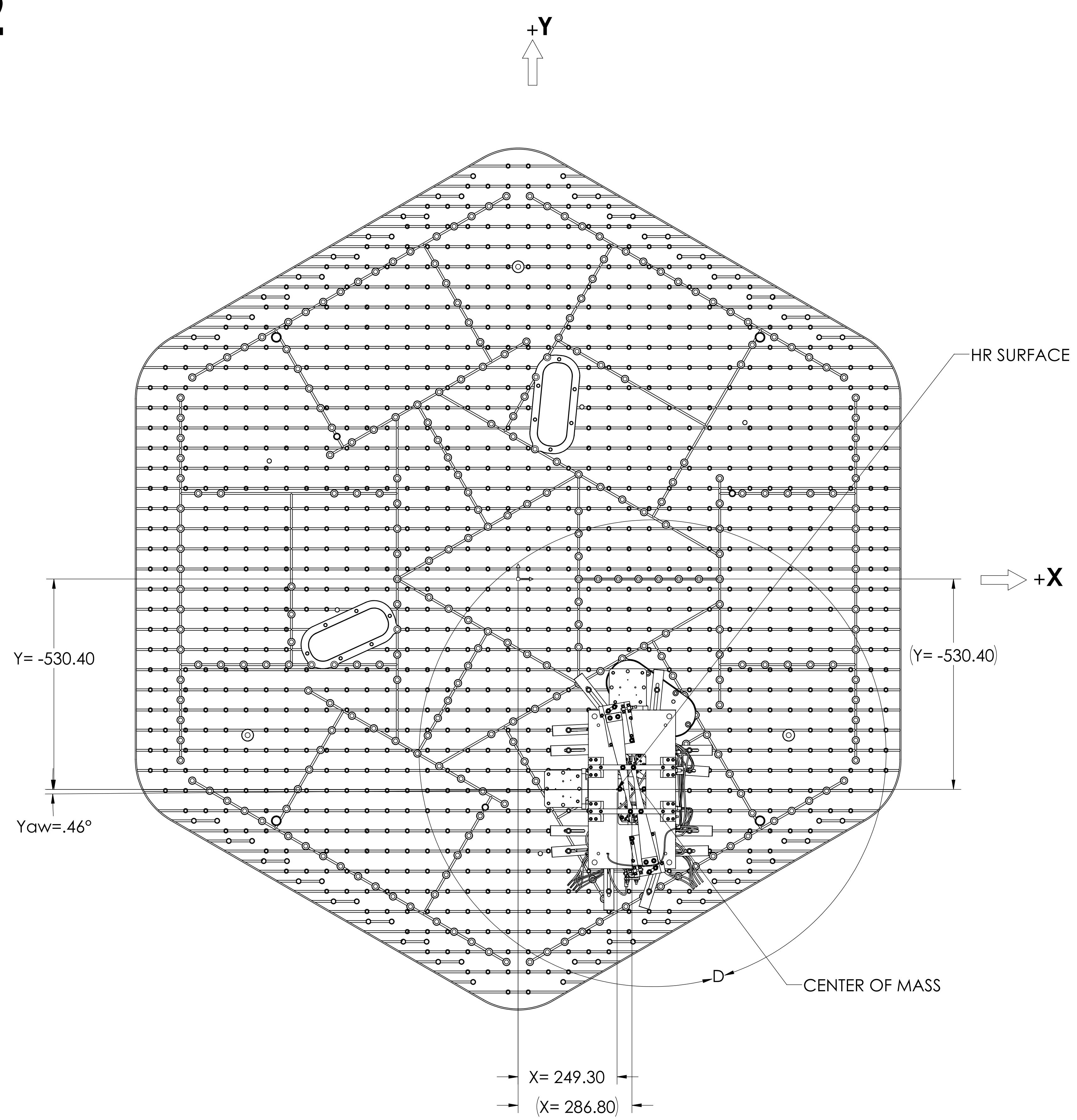
D11022999 ⑦  
AR OPTIC CAP

## HSTS STRUCTURE TRANSP.

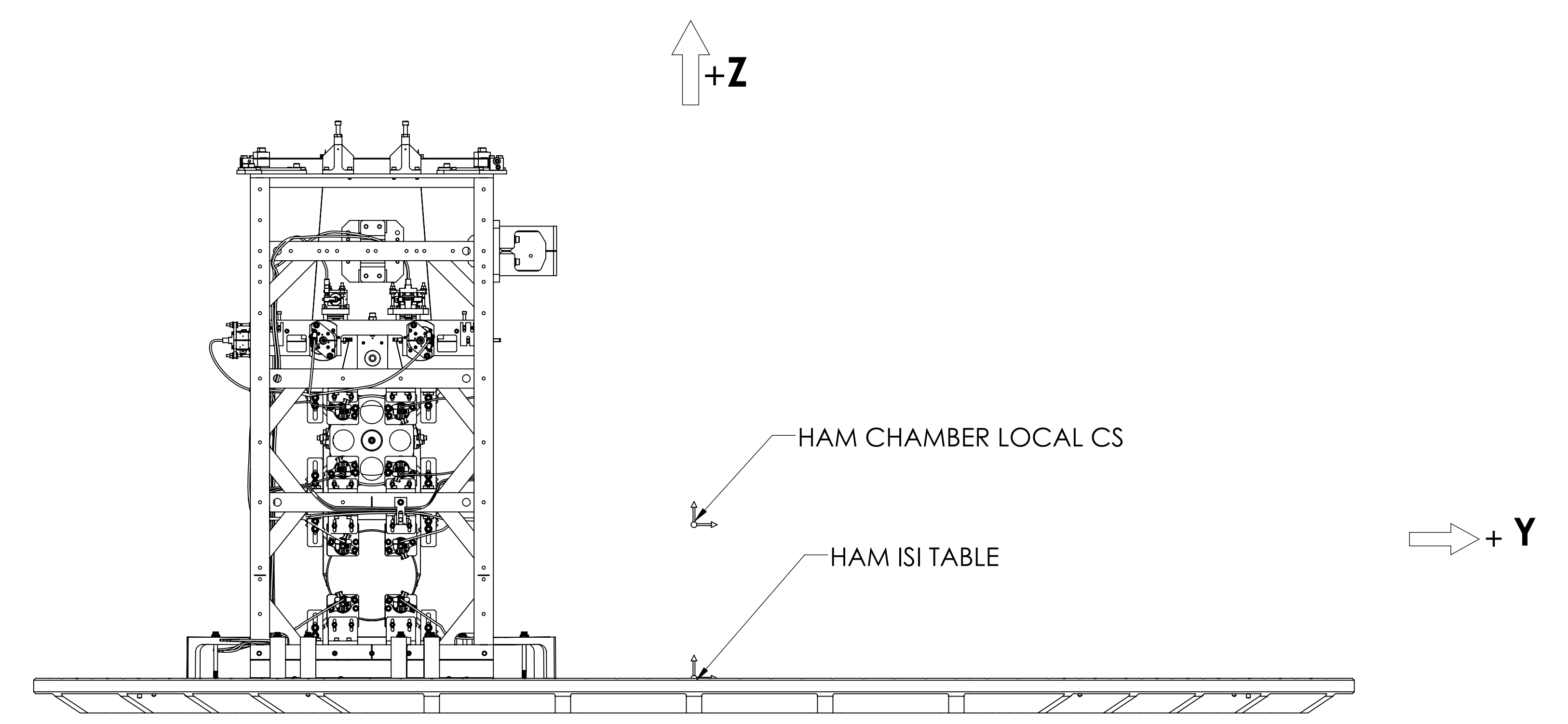
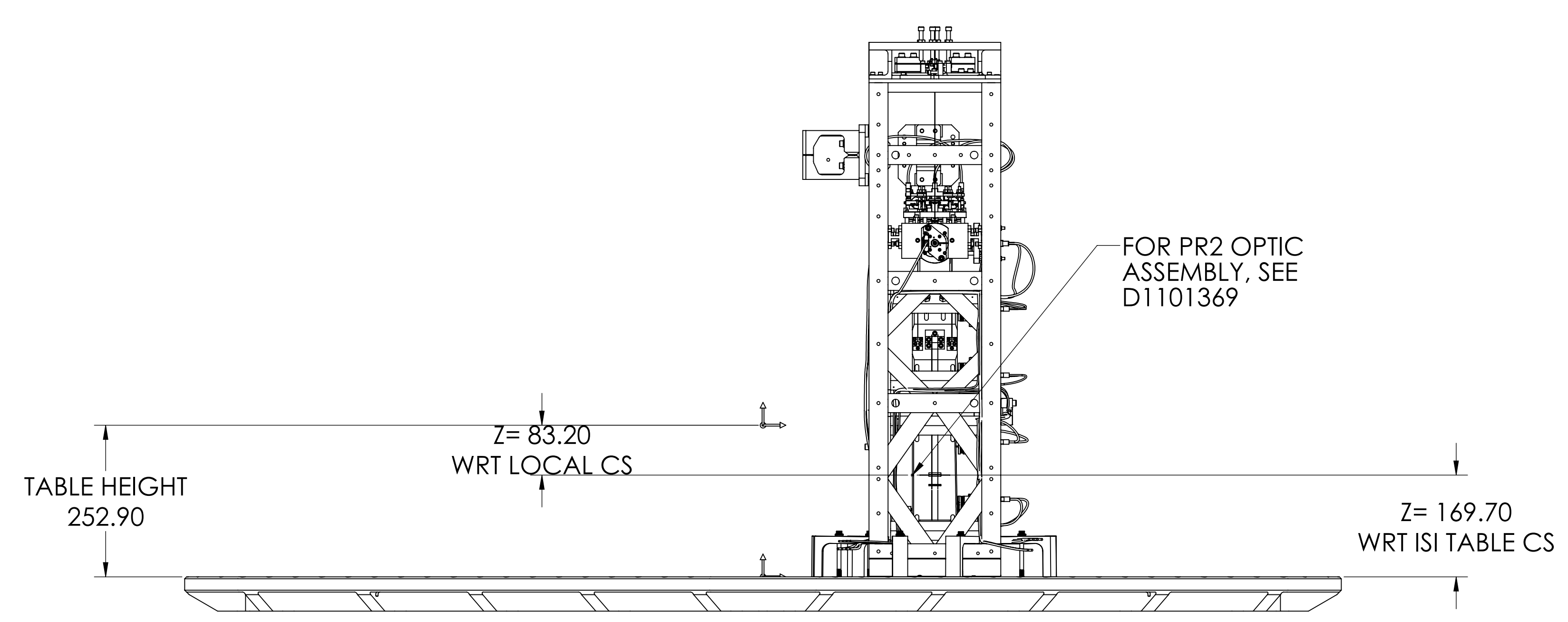
VIBRATION ABSORBERS ON FRONT SIDE NOT SHOWN (REMOVED FOR TRANSP. PURPOSES)



PR2



DETAIL D  
SCALE 1 : 3



# LOCAL COORDINATES DEFINITIONS

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