

- ① REFERENCED DOCUMENTATION:
 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
 1.2 LIGO-D1101493, OSEM ORIENTATION.
 1.3 LIGO-D1000581, 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.

MC1

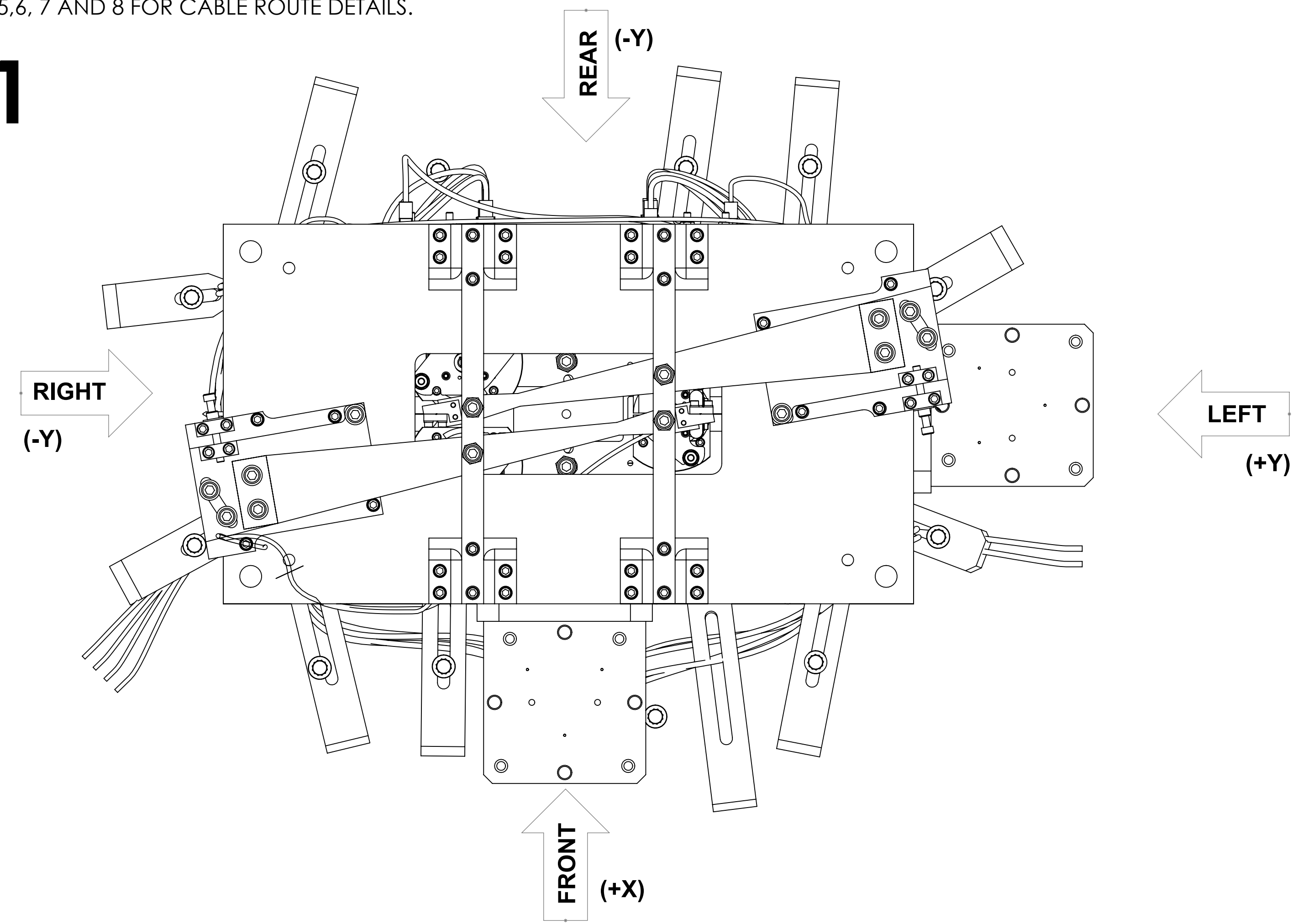
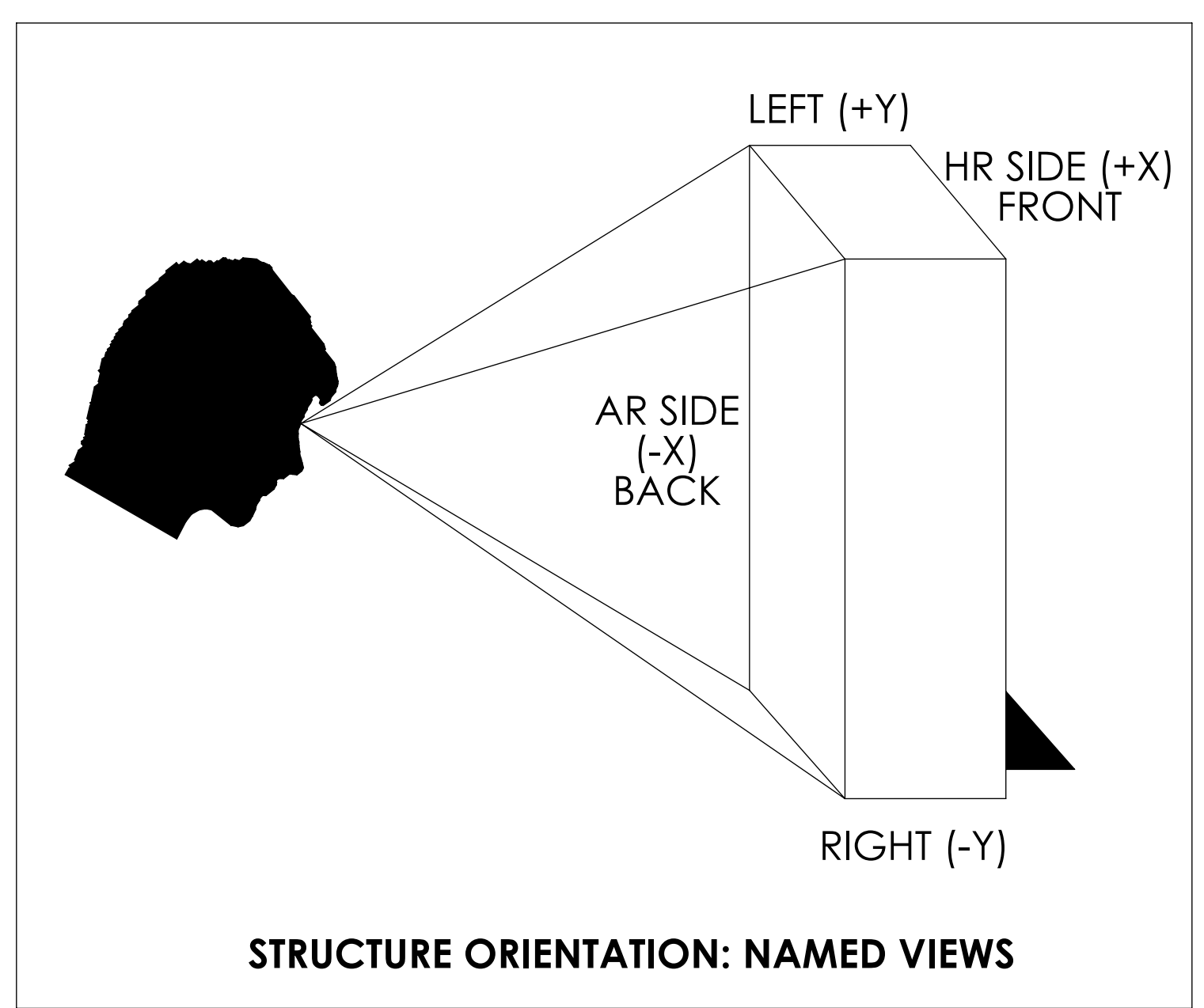
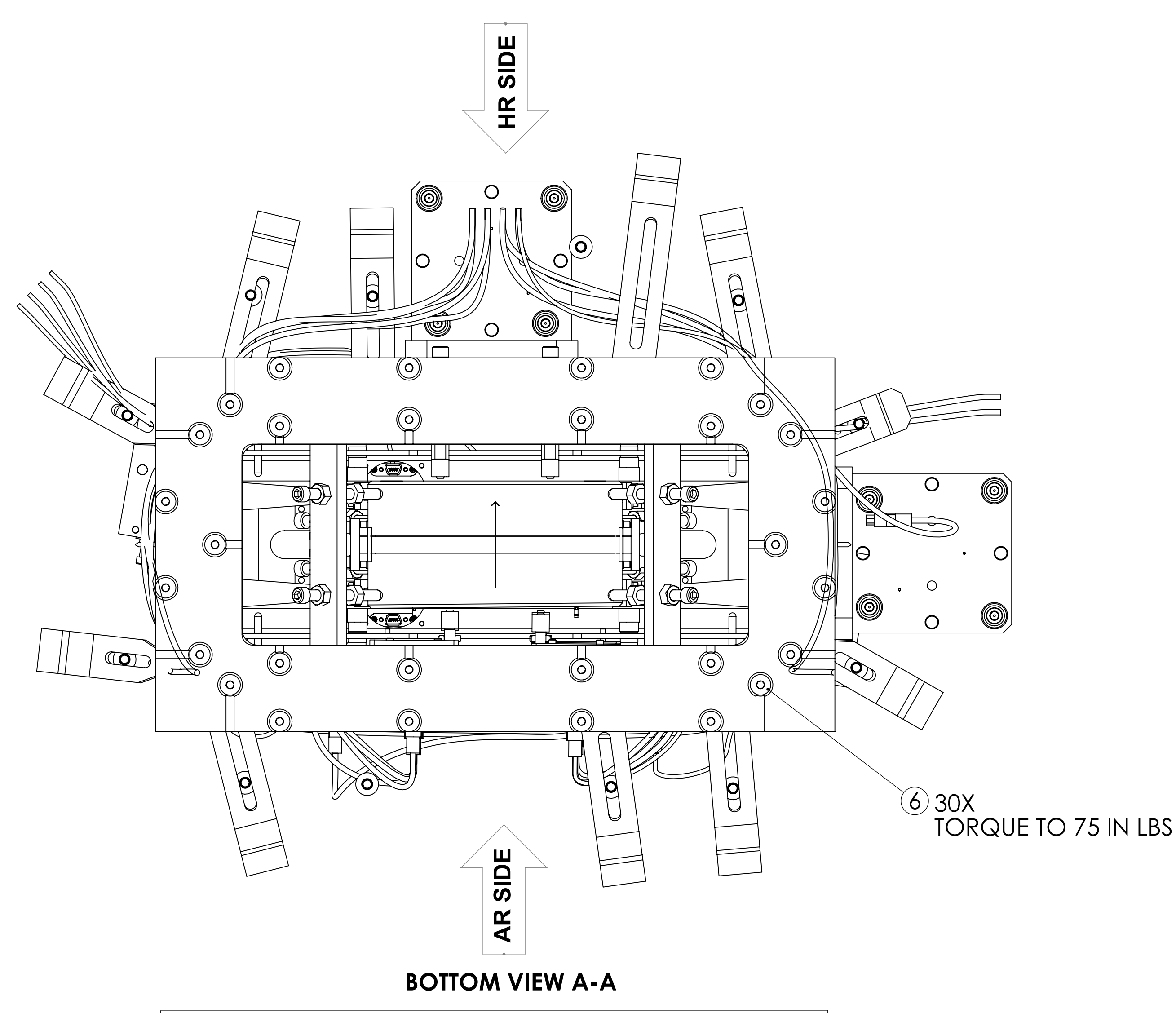
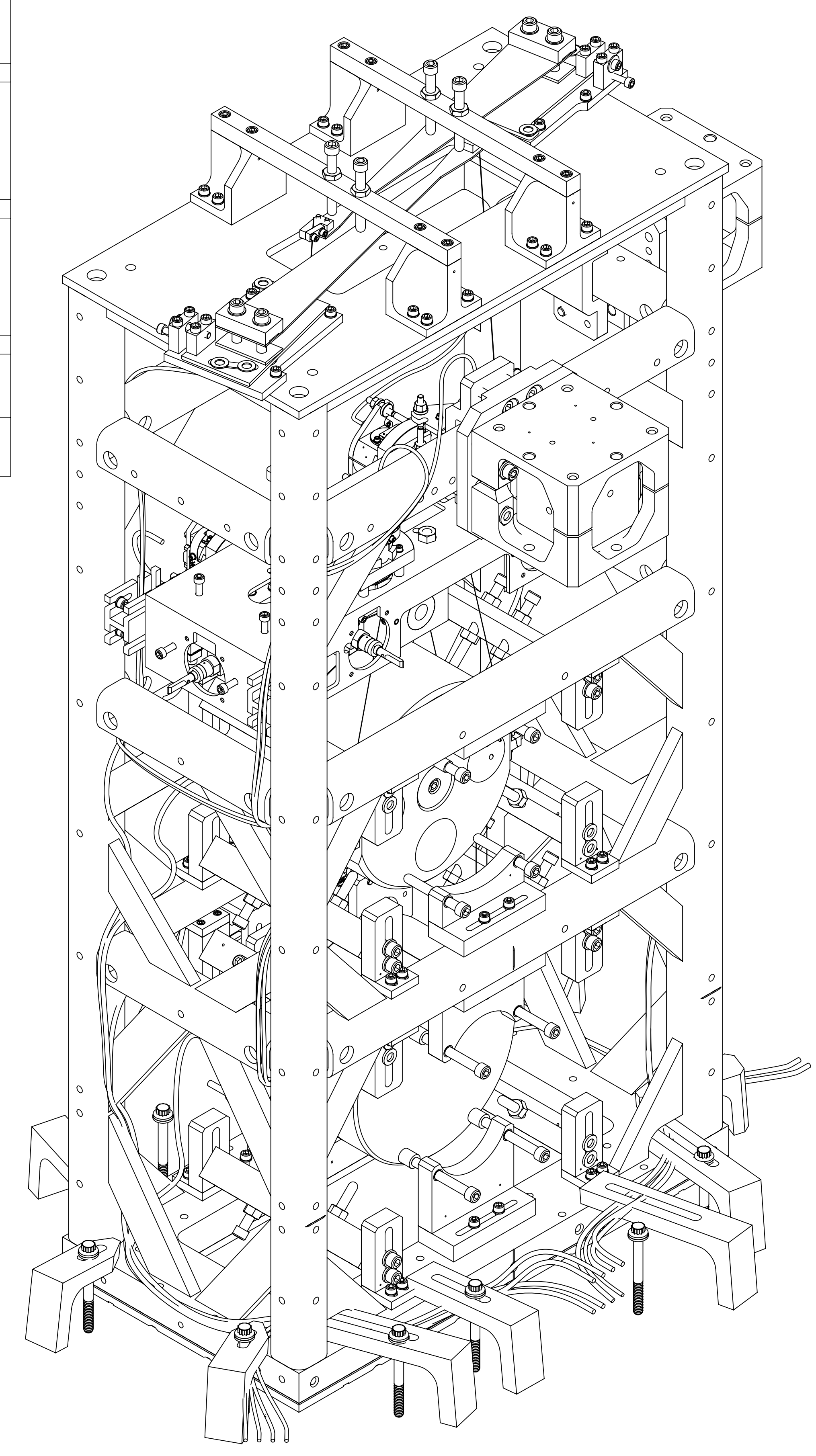


TABLE 1: HAM2-L1 MC1 CABLING SPECIFICATIONS, FROM/TO DES.

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

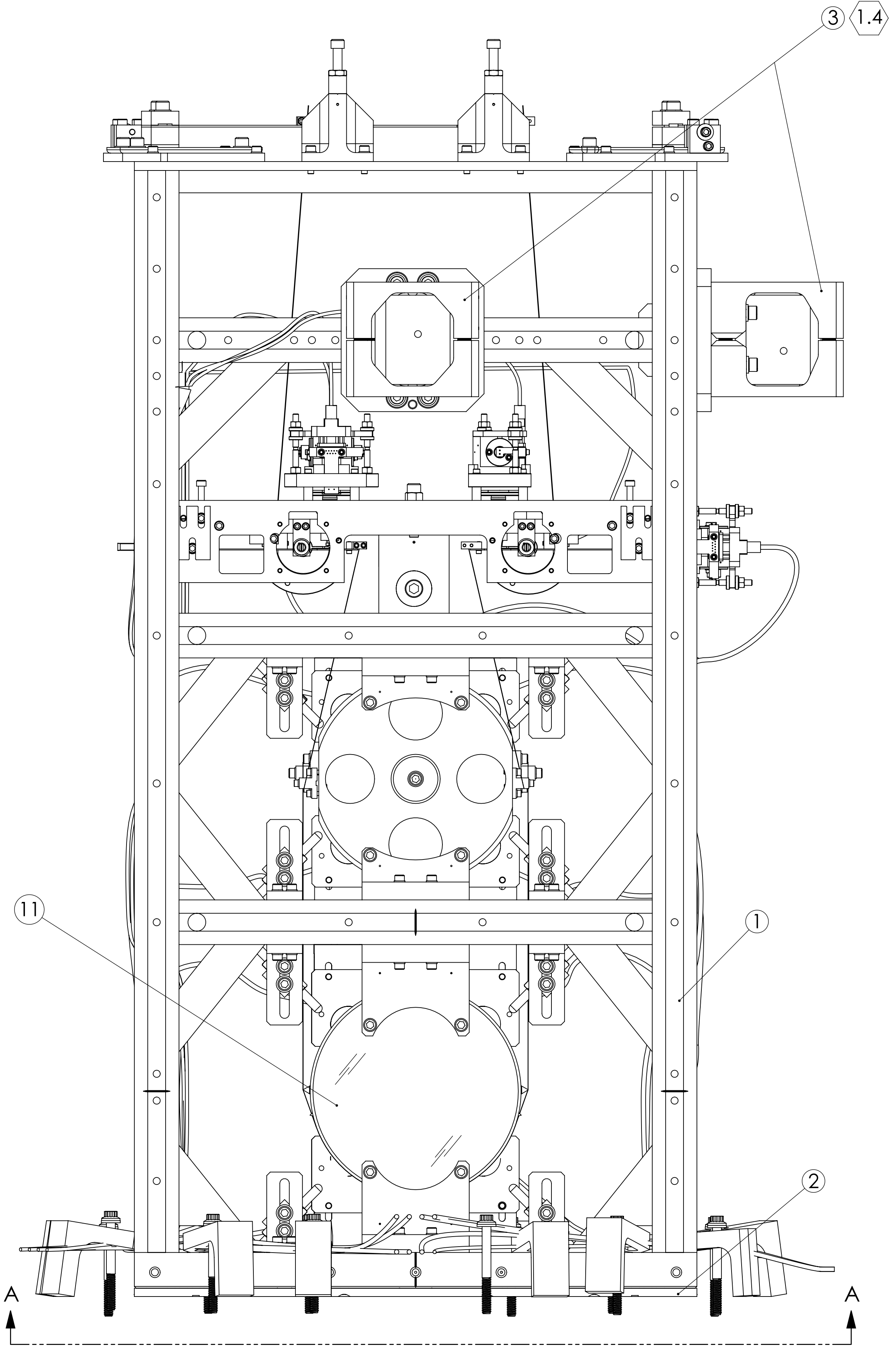
NOTE : ROUTE NO. 4 IS A SHARED CABLE, SEE D0900414 FOR QP LEGS 'C' AND 'D' ROUTING



LOCAL COORDINATES - REFERENCE

Xmm	Ymm	Zmm	YAW °
49.25	255	-107	134.35°

REFER TO DRAWING D1101233 FOR HAM2-L1 INSTALLATION PLATE, LAYOUT



ISO VIEW

ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
12	D1201157	ALIGO, SUS, DOG CLAMP CHAMFERED ENDS (CUSTOM)	304 SSSL	1
11	D1101365	MC1 L1 OPTICS ASSEMBLY	N/A	1
10	D1001376-12	AdvLIGO HAM Optics Table Dog Clamp 1.60L	304 SSSL	1
9	D1001376-11	AdvLIGO HAM Optics Table Dog Clamp 1.60M	304 SSSL	2
8	D1100641-12	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.60L	304 SSSL	4
7	D1100641-10	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.60S	304 SSSL	3
6	FA-2016-NA	.25-20 X 1 FHSC SCREW UC COMPONENTS FA-2016-NA	18-8 SSSL	30
5	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	12
4	2AL2.50-12SL	1/4-20 X 2.50 12PT BOLT	450 SSSL	12
3	D1002424	VIBRATION ABSORBER ASSEMBLY	N/A	2
2	D1100173	HSTS SUS STRUCTURE SPACER 5.71 MM	6061-16 Al	1
1	D020700	HSTS OVERALL ASSEMBLY	N/A	1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

MATERIAL: -- FINISH: -- TOLERANCE: .001 INCH

SYSTEM: ADVANCED LIGO SUB-SYSTEM: SUS

DESIGNER: K. BUCKLAND DATE: 17 AUG 2011

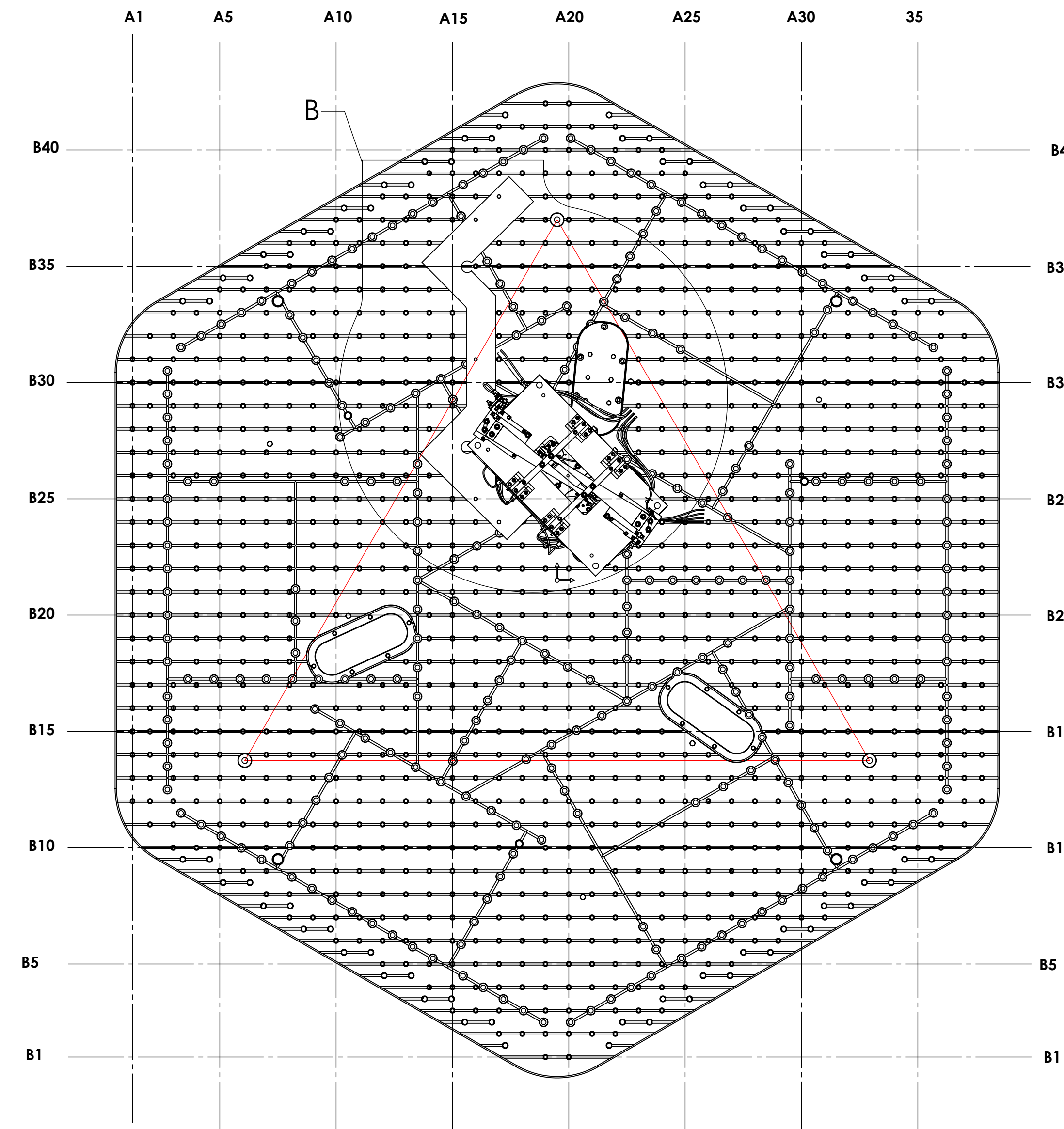
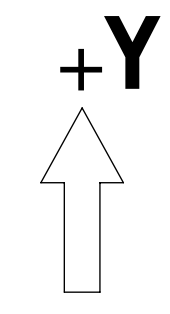
DRAWER: CHECKER: APPROVAL:

SIZE: DWG. NO. E D0900413

SCALE: 1:2 PROJECTION: SHEET 1 OF 10

D0900413-HAM2-L1-MC1-XYZ-LOCAL-CS-FOR-HSTS-MC1-Sub-ASSY-DRAWING-POWER-REV-01

MC1

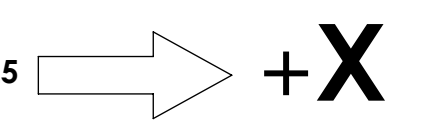


TOP VIEW (1.6)
REF. TRIANGLE: SEE G1000125
FOR ISI NAMING AND ORIENTATION CONVENTION

ATTACH AT SCREW LOCATION A16/B37

ATTACH SCREW AT LOCATION A17/B38

ATTACH AT SCREW LOCATION A16/B31



B35

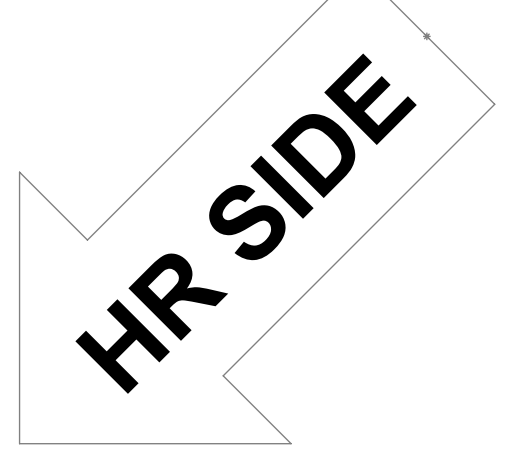
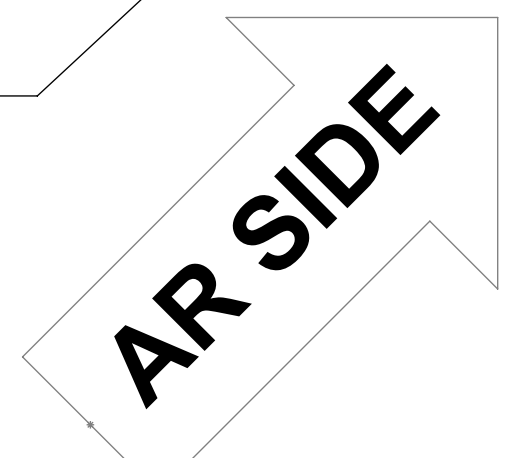
D1000140 IO L1 MC1 MC3 INSTALLATION PLATE

B30

B25

ATTACH AT SCREW LOCATION A16/B25

ATTACH SCREW AT LOCATION A17/B24



A15

A20

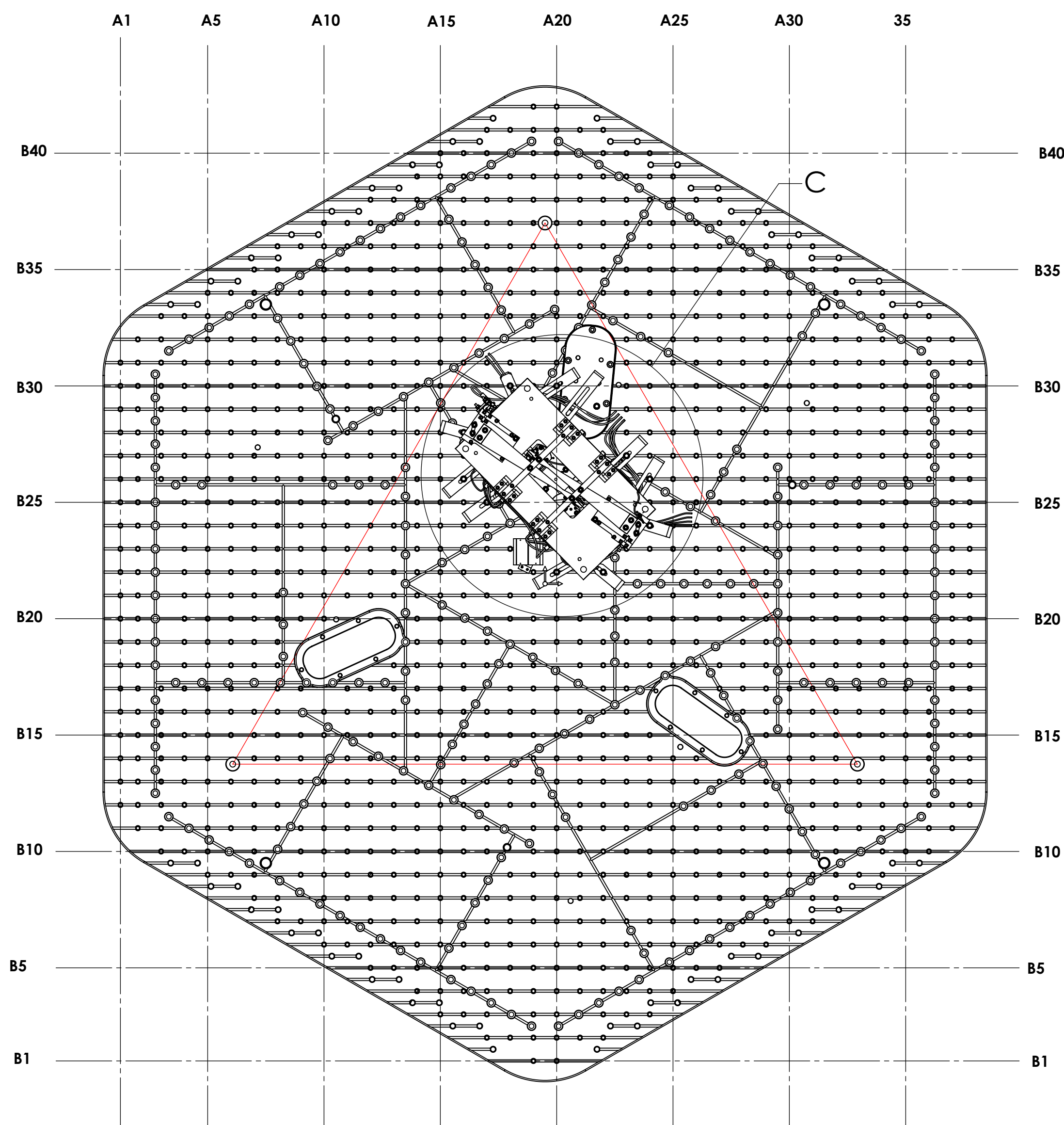
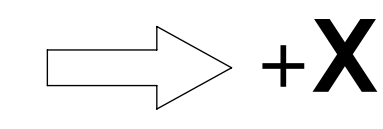
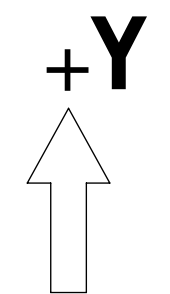
A25

DETAIL B
SCALE 1 : 1.5

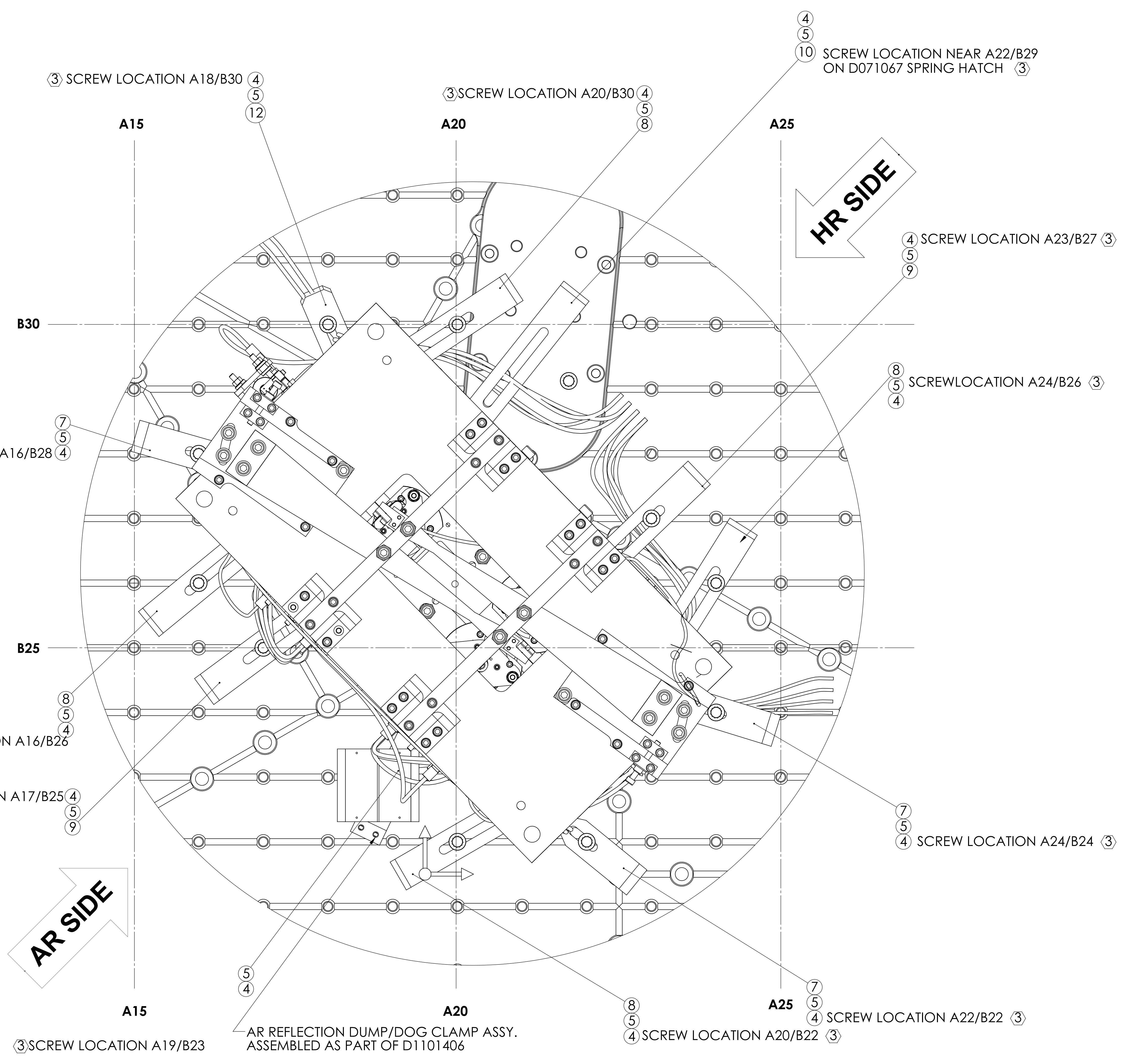
TOP VIEW SHOWING INSTALLATION PLATE LOCATION (1.6)
OPTICAL TABLE SHOWN FOR STRUCTURE LOCATION AND ORIENTATION
DOG CLAMPS VIBRATION ABSORBERS AND HARDWARE REMOVED FOR CLARITY

ALIGNMENT PLATE INSTALLATION / LOCATION

MC1



TOP VIEW 1.6
REF. TRIANGLE: SEE G1000125
FOR ISI NAMING AND ORIENTATION CONVENTION



DETAIL C
SCALE 1 : 1.5
TOP VIEW SHOWING DOG CLAMP INSTALLATION
OPTICAL TABLE SHOWN FOR STRUCTURE AND DOG CLAMP
LOCATIONS AND ORIENTATION ONLY.
VIBRATION ABSORBERS REMOVED FOR CLARITY

ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
12	D1201157	ALIGO, SUS, DOG CLAMP CHAMFERED ENDS (CUSTOM)	304 SSSL	1
10	D1001376-12	AdvLIGO HAM Optics Table Dog Clamp 1.60L	304 SSSL	1
9	D1001376-11	AdvLIGO HAM Optics Table Dog Clamp 1.60M	304 SSSL	2
8	D1100641-12	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.60L	304 SSSL	4
7	D1100641-10	AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.60S	304 SSSL	3
5	D1100785-530	WASHER, FLAT, .25 X .530 O.D.	NITRONIC 60	12
4	2AL2.50-12SL	1/4-20 X 2.50 12PT BOLT	450 SSSL	12

PARTIAL BOM (SEE SHEET 1 FOR COMPLETE BOM)

DOG CLAMP IDENTIFICATION / INSTALLATION

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

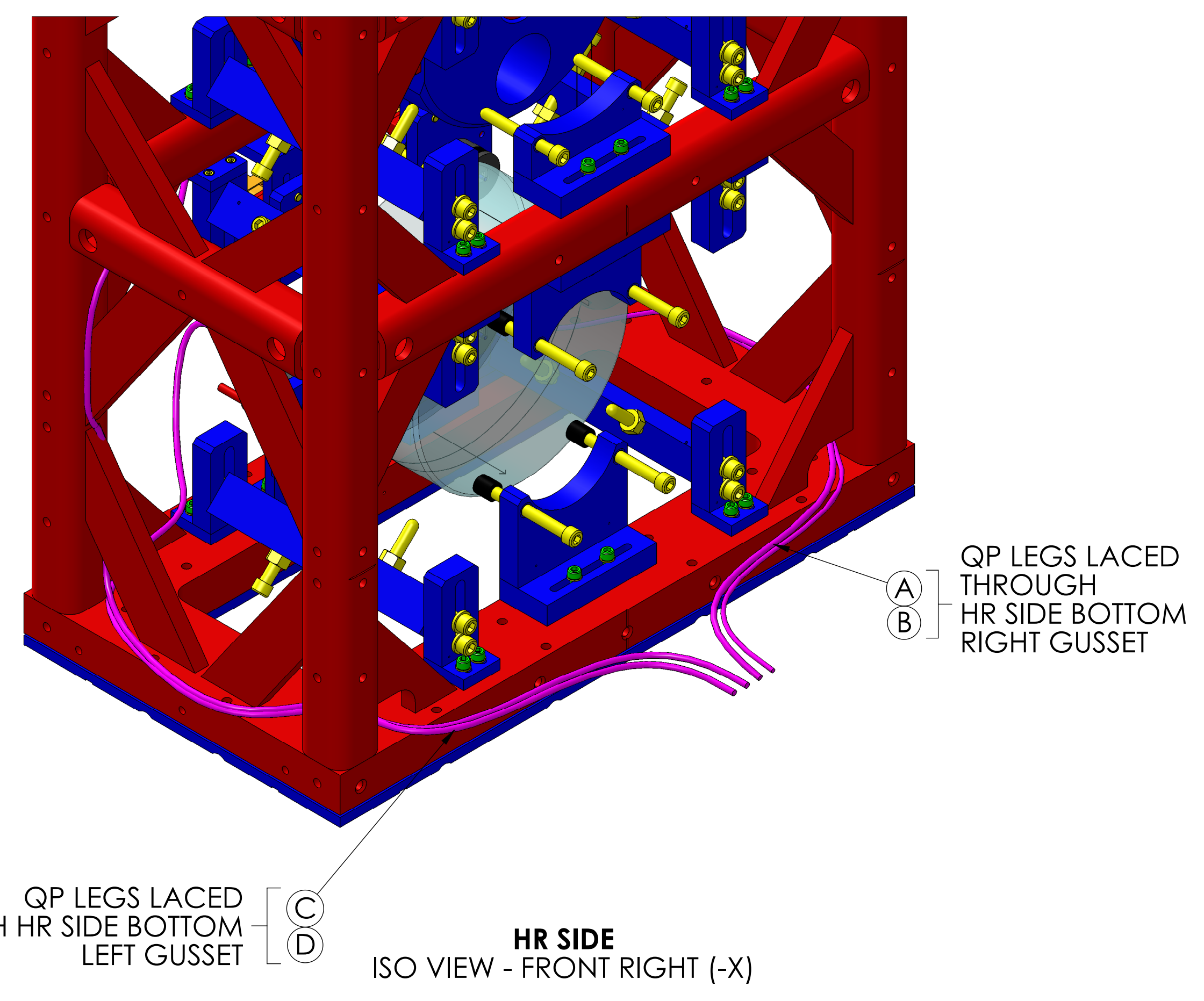
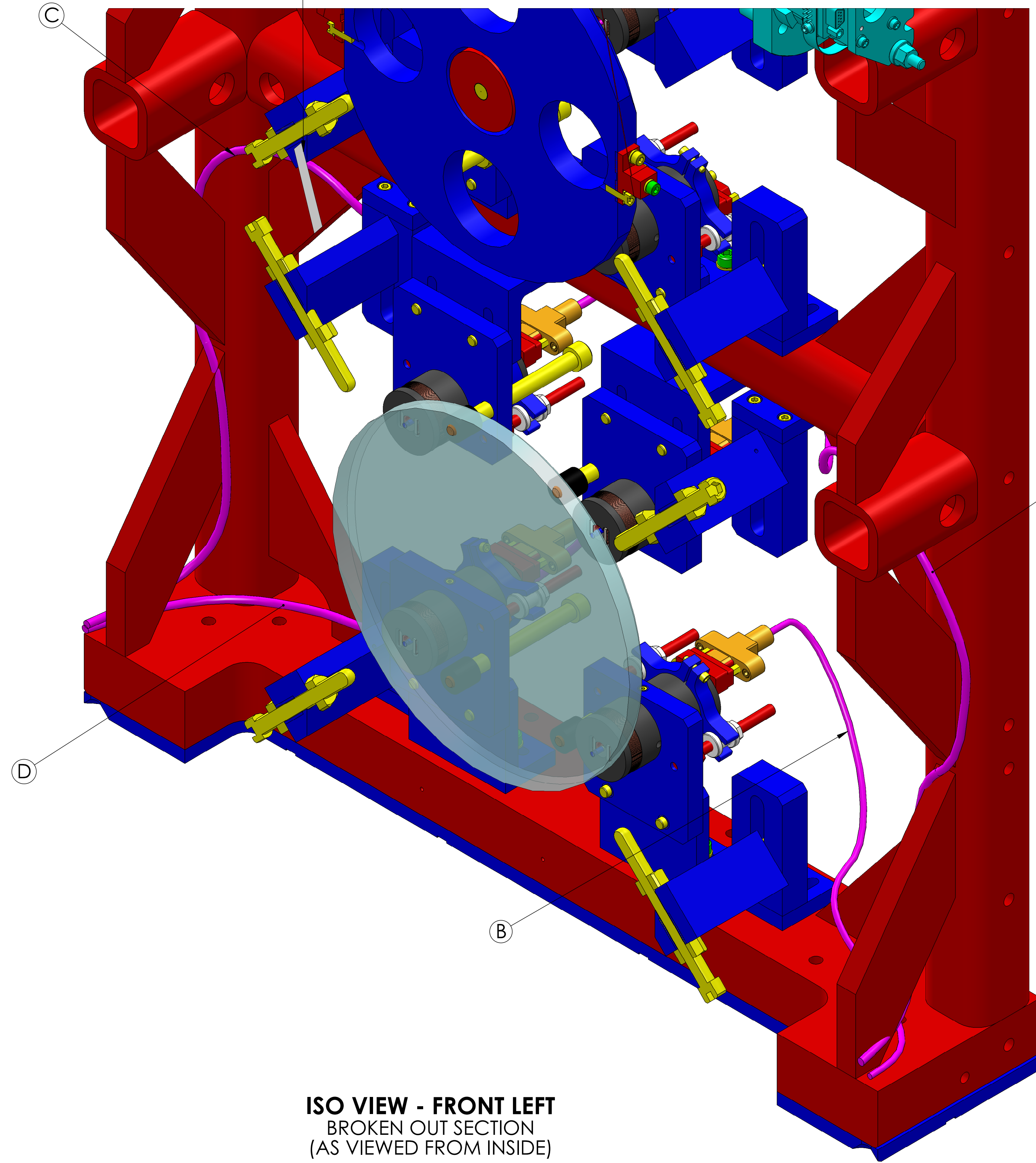
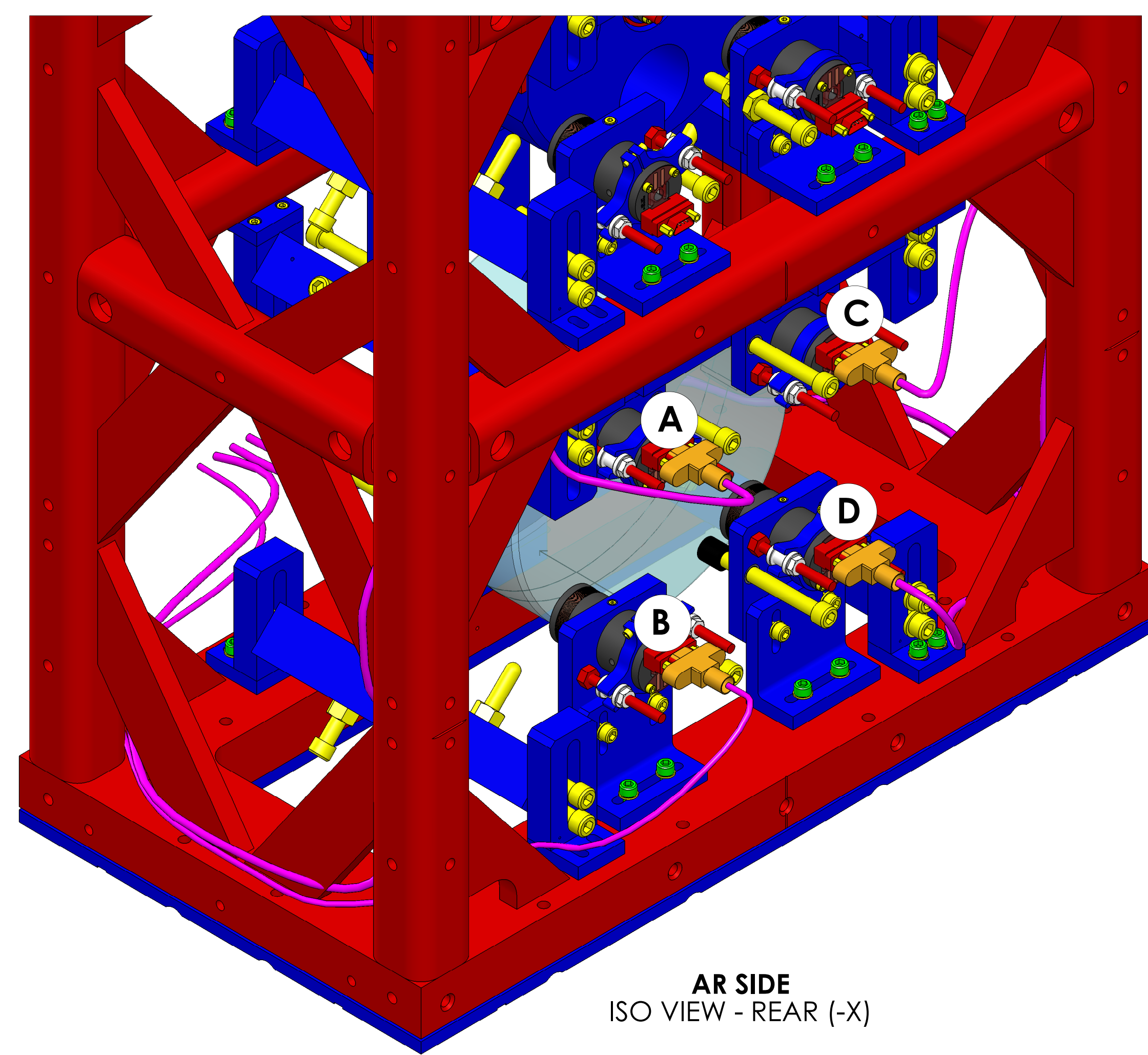
LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SIZE DWG. NO. **D0900413** REV. **v6**

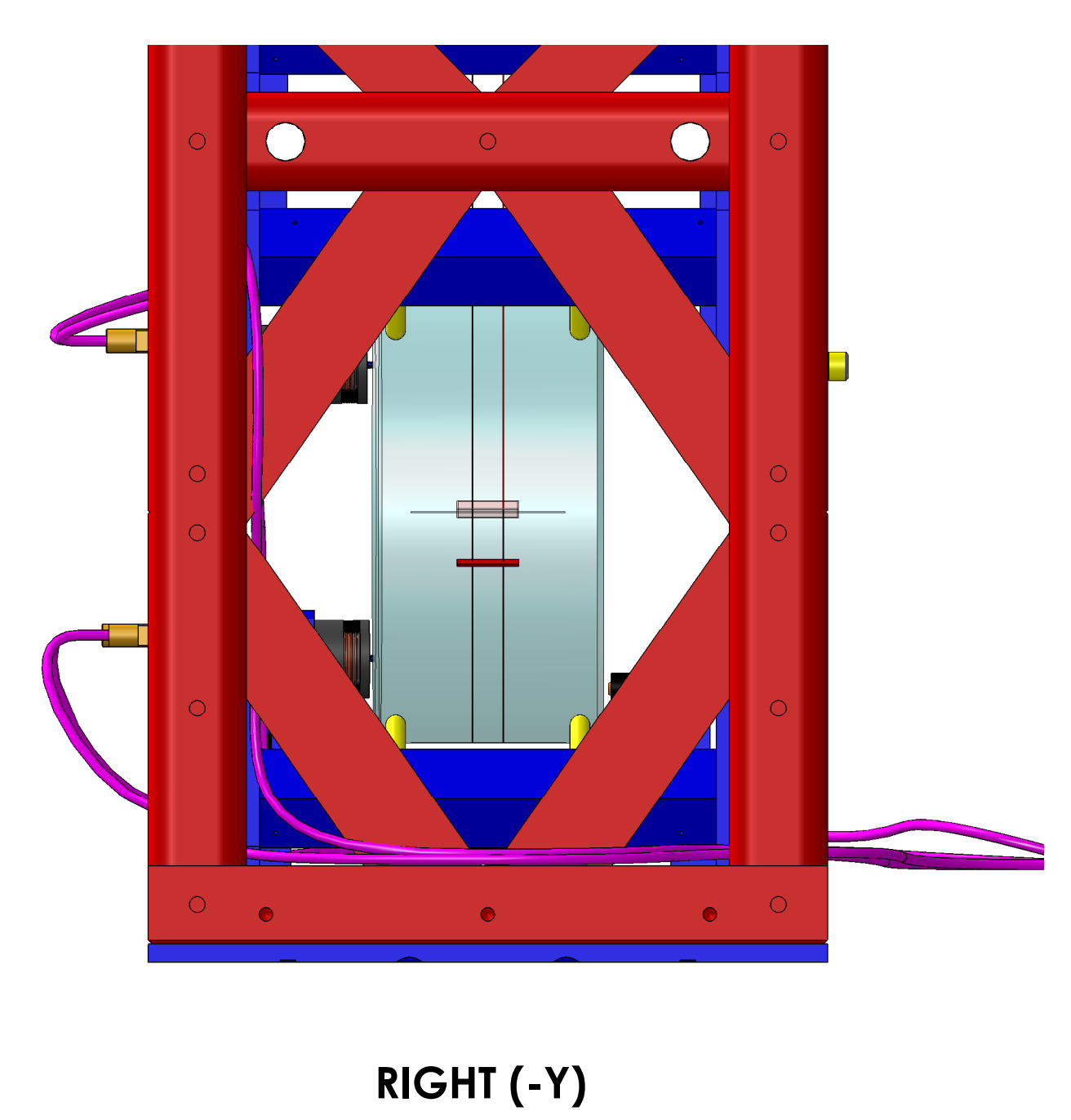
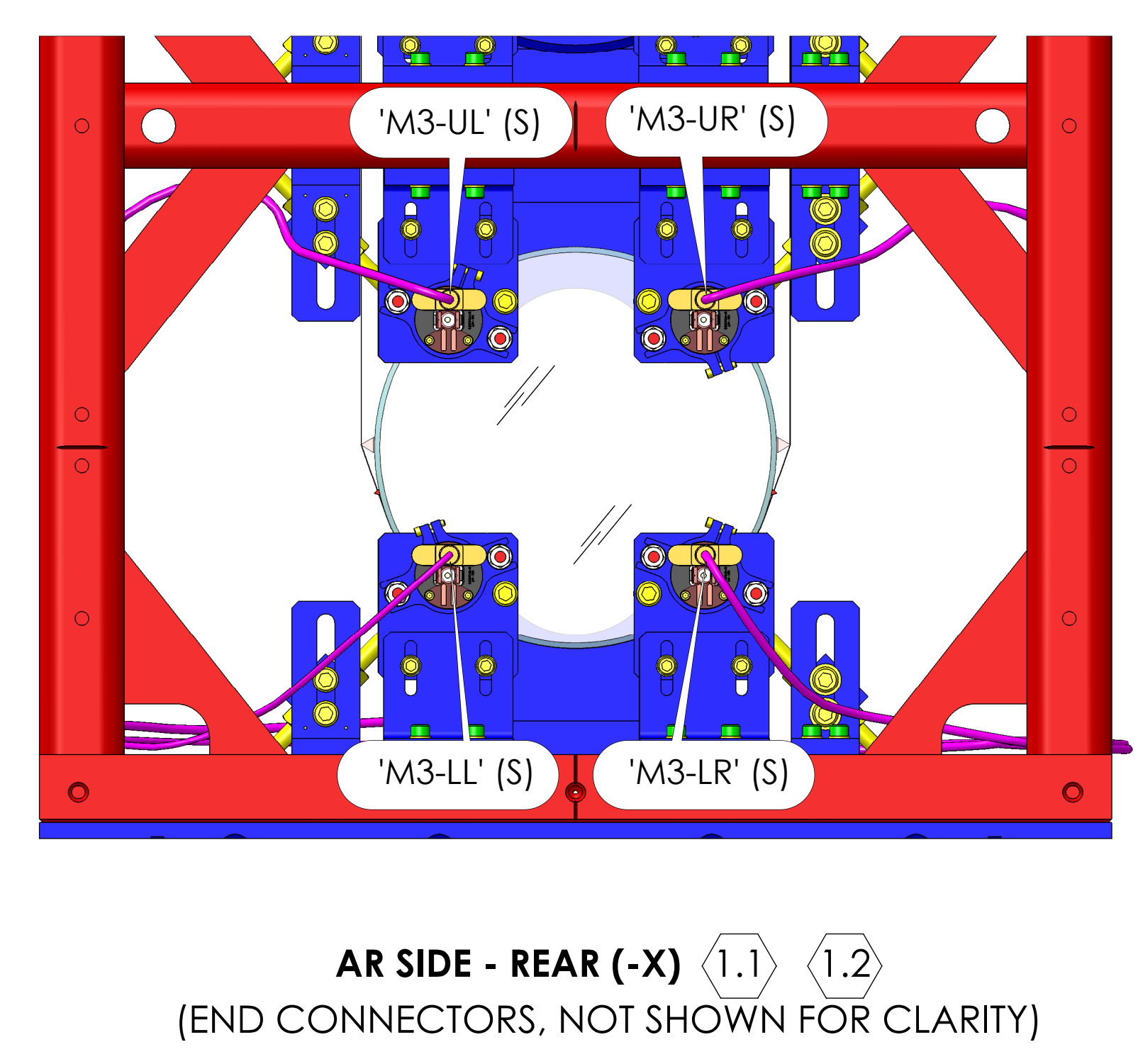
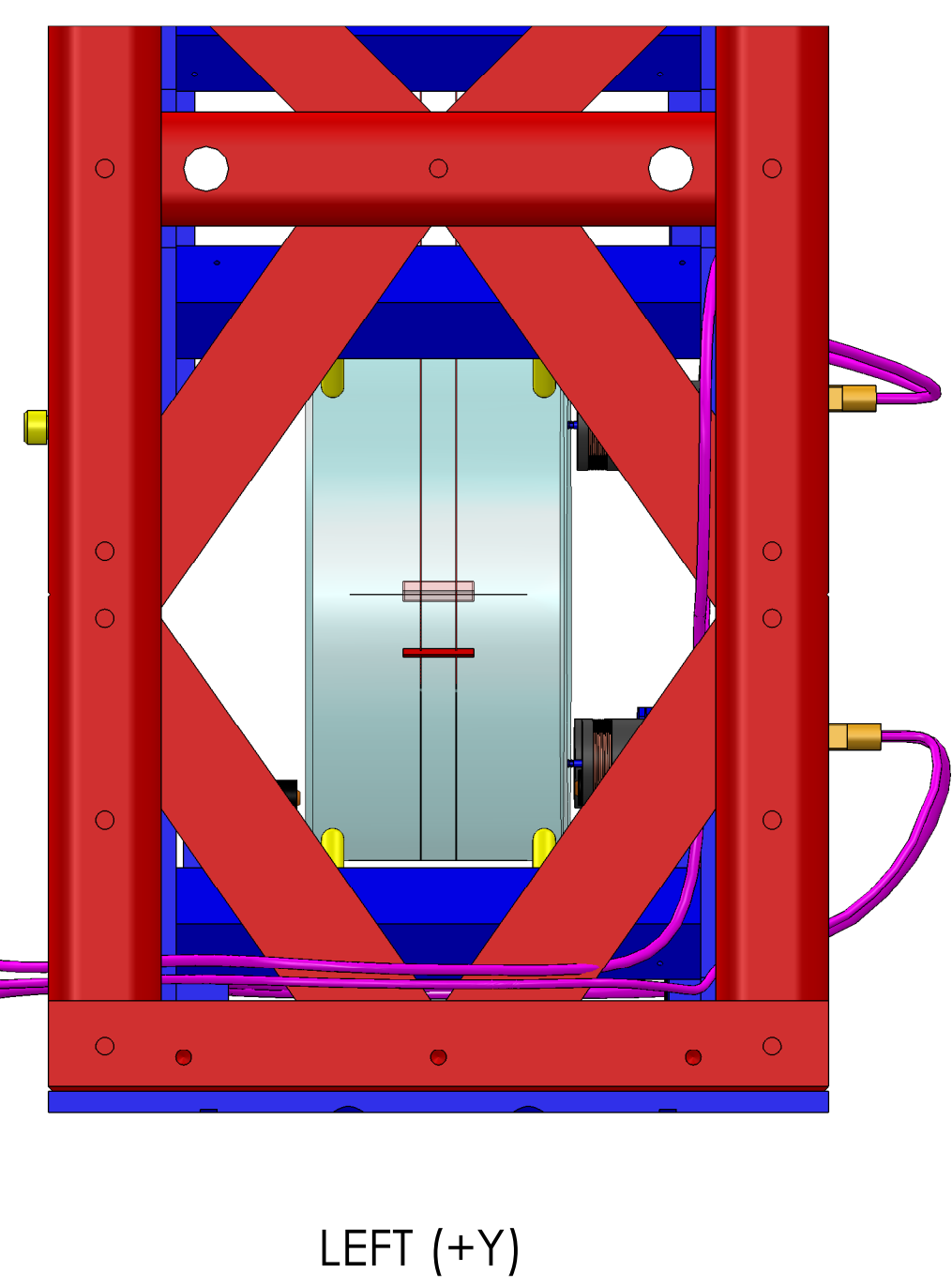
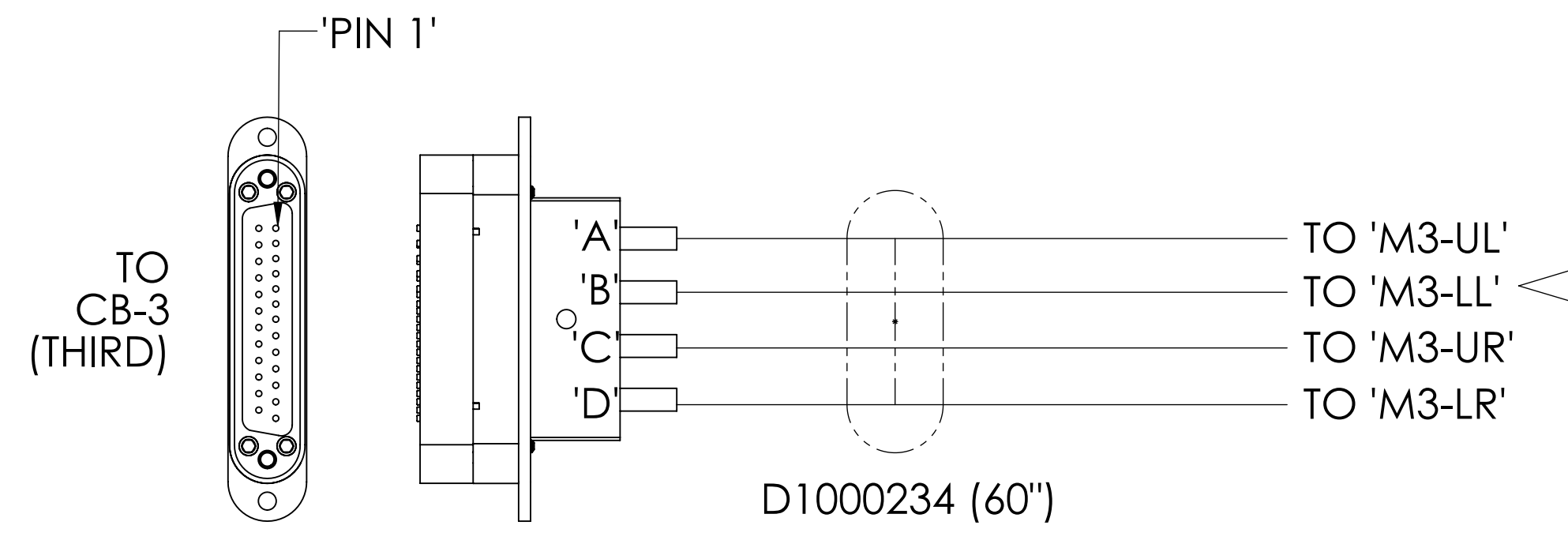
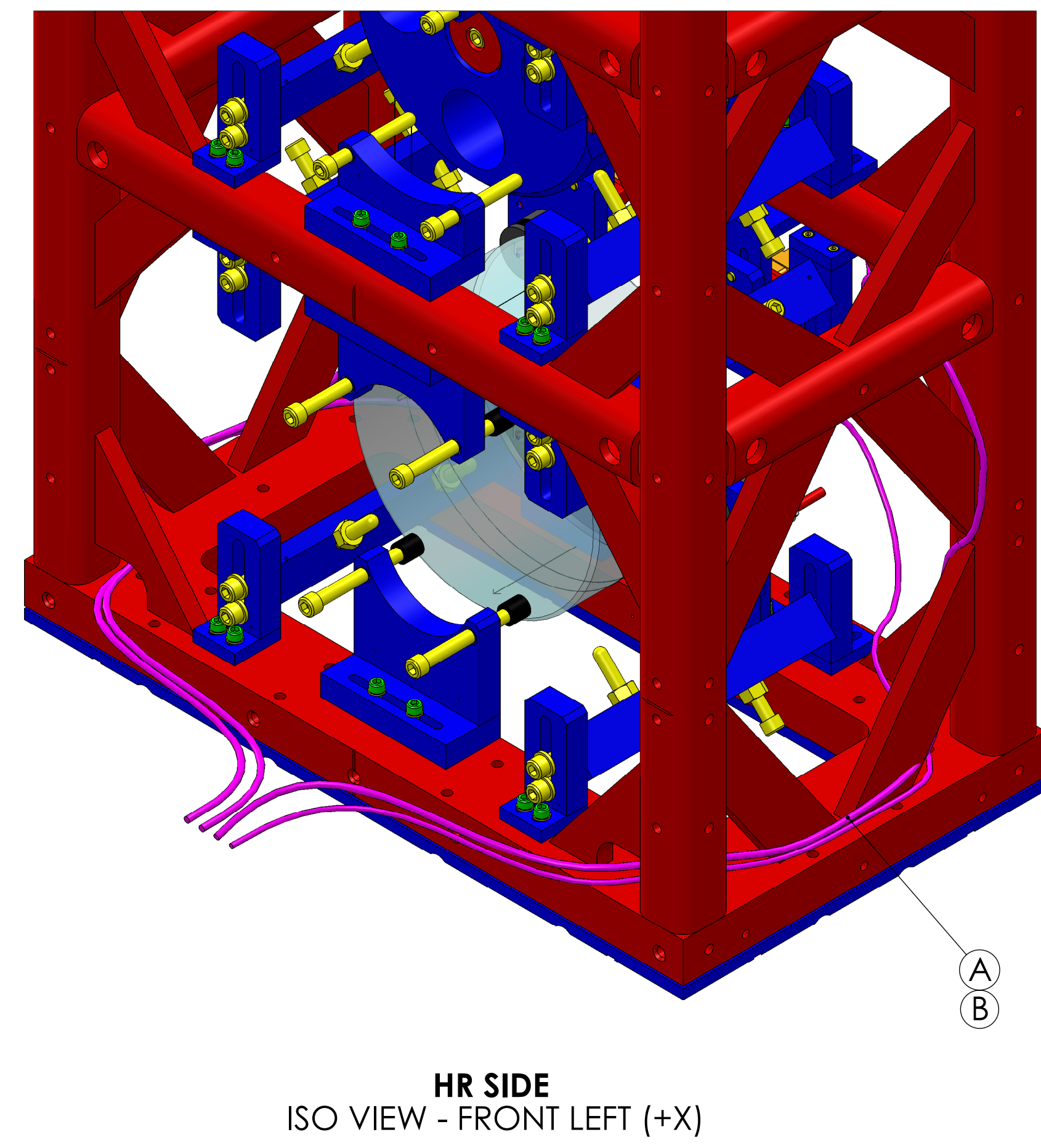
SCALE: 1:8 PROJECTION: SHEET 3 OF 10

MC1

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



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.



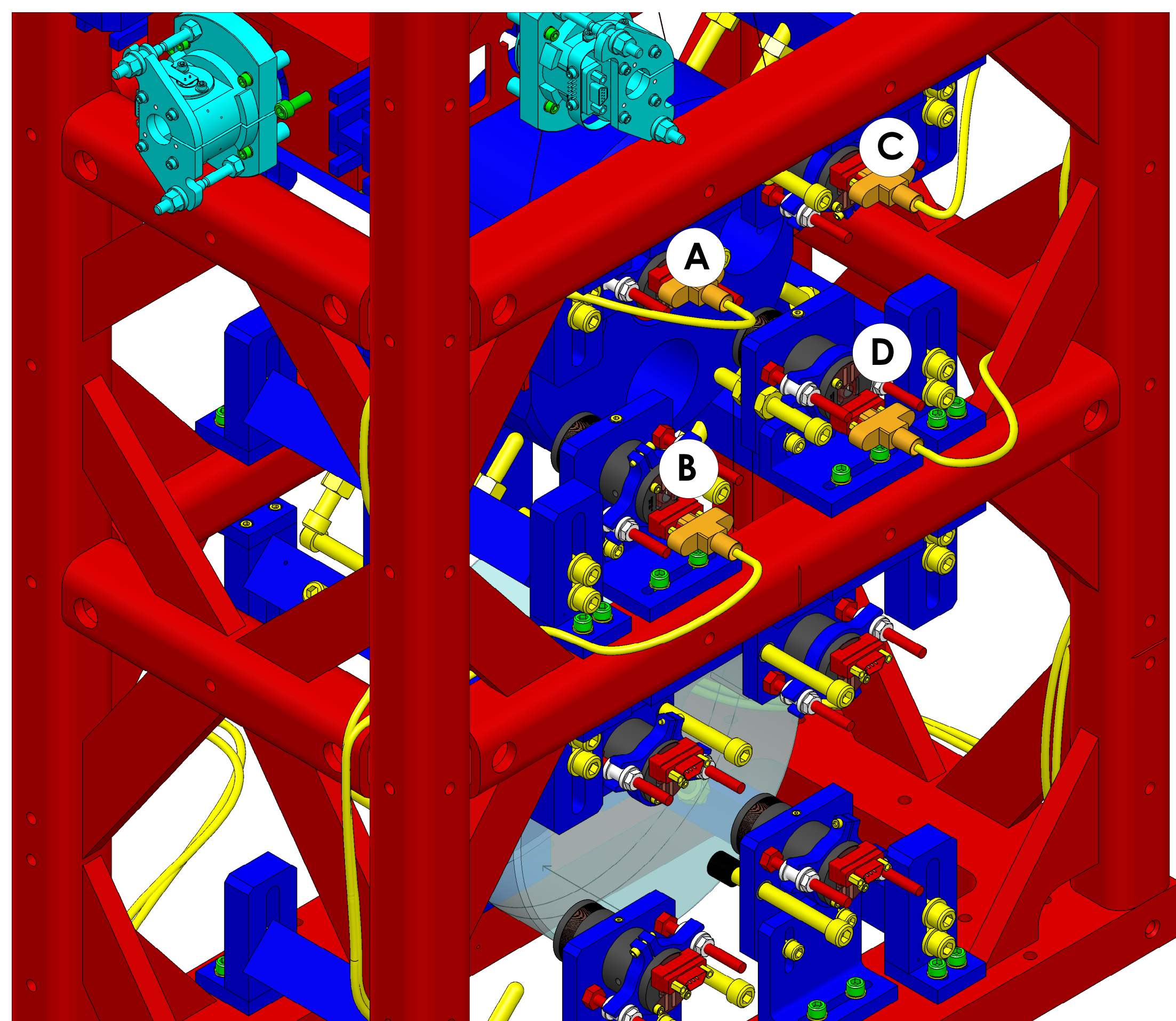
ROUTE NO.1

SEE LIGO-T1200318 FOR STEP BY STEP CABLING GUIDE

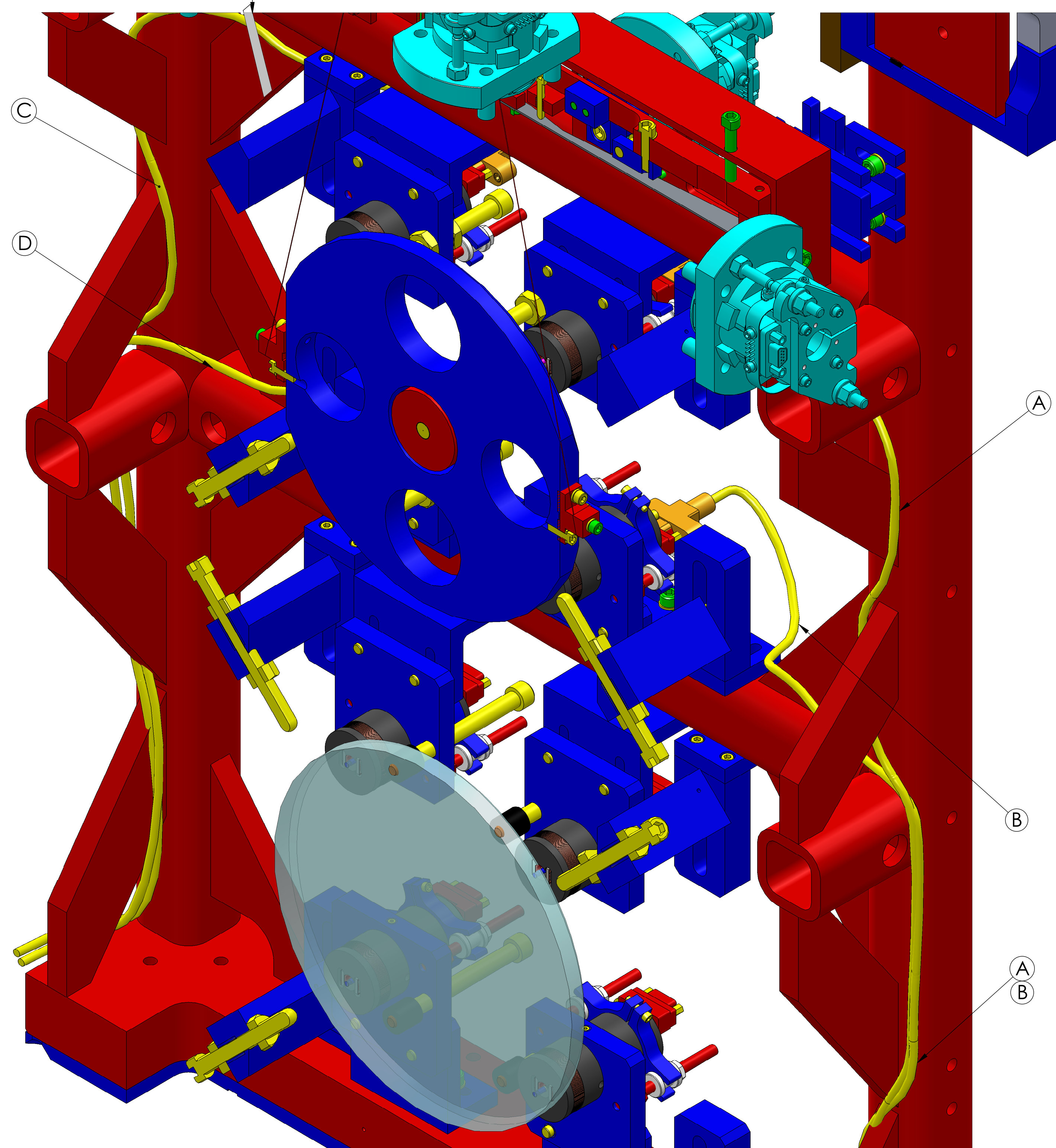
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1.2 LIGO-D1101493, OSEM ORIENTATION.
1.3 LIGO-D1000581, SYSTEM CABLING DIAGRAM.
1.4 LIGO-D1002424, VIBRATION ABSORBER ORIENTATION.
1.5 LIGO-E1100411, CABLE CLAMP TORQUE.
1.6 LIGO-D1101296, HAM ISI HOLE TABLE.

MC1

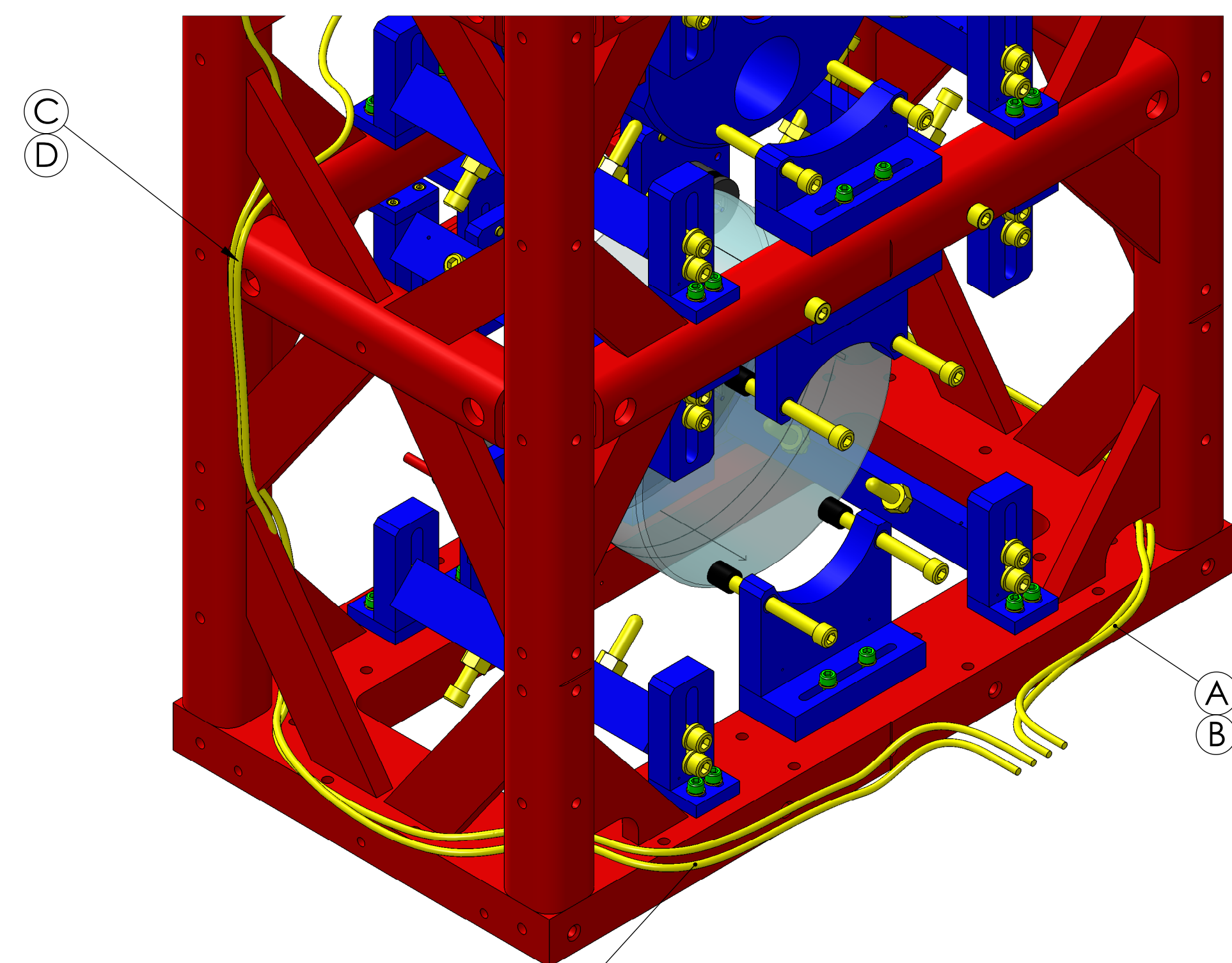
IF REQUIRED, SECURE CABLES USING PEEK CABLE TIES OR EQ. 4 PLACES.



AR SIDE
ISO VIEW - REAR (-X)



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



HR SIDE
ISO VIEW - FRONT RIGHT (-X)

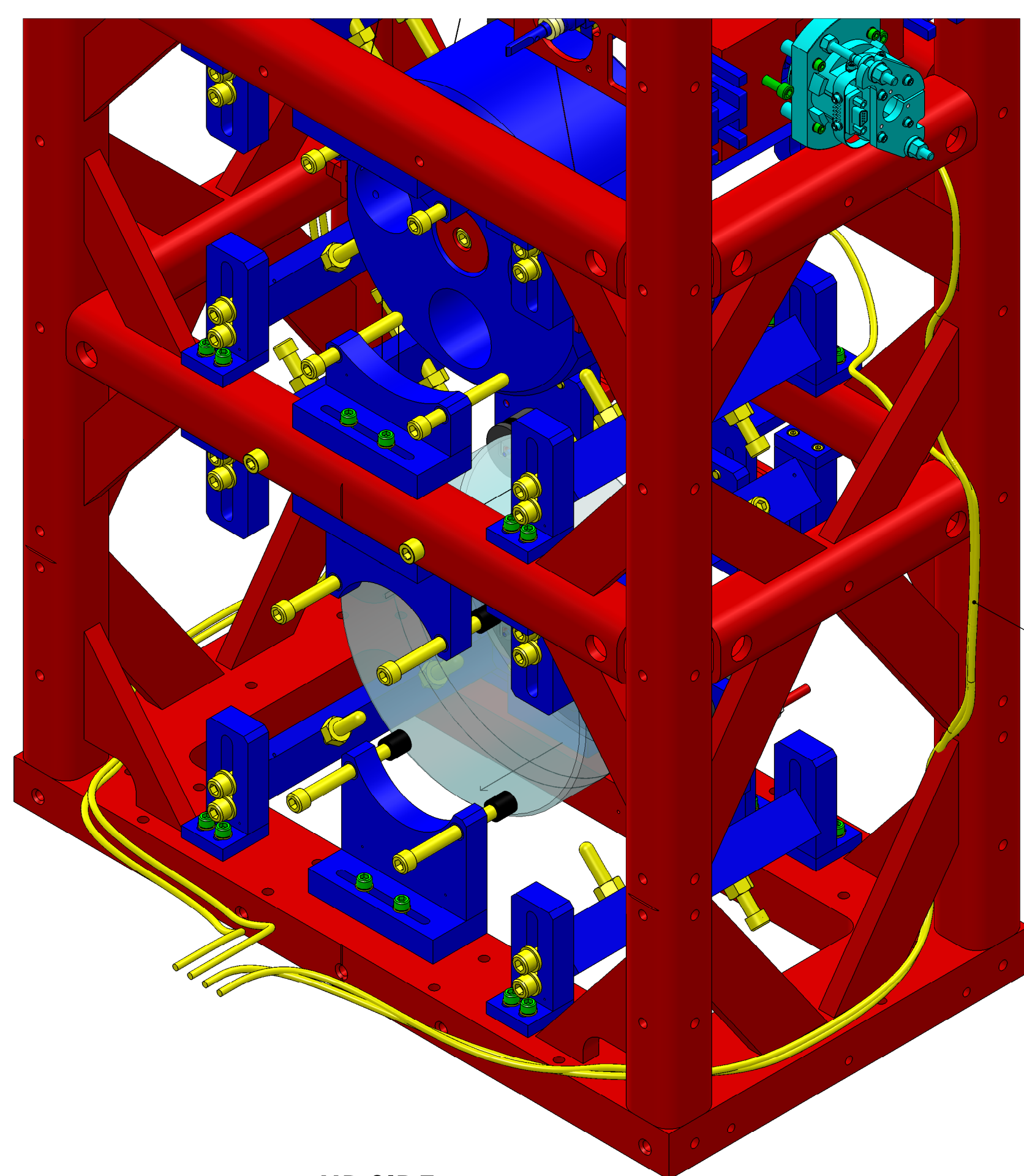
QP LEGS LACED THROUGH HR SIDE BOTTOM LEFT GUSSET

QP LEGS LACED THROUGH HR SIDE BOTTOM RIGHT GUSSET

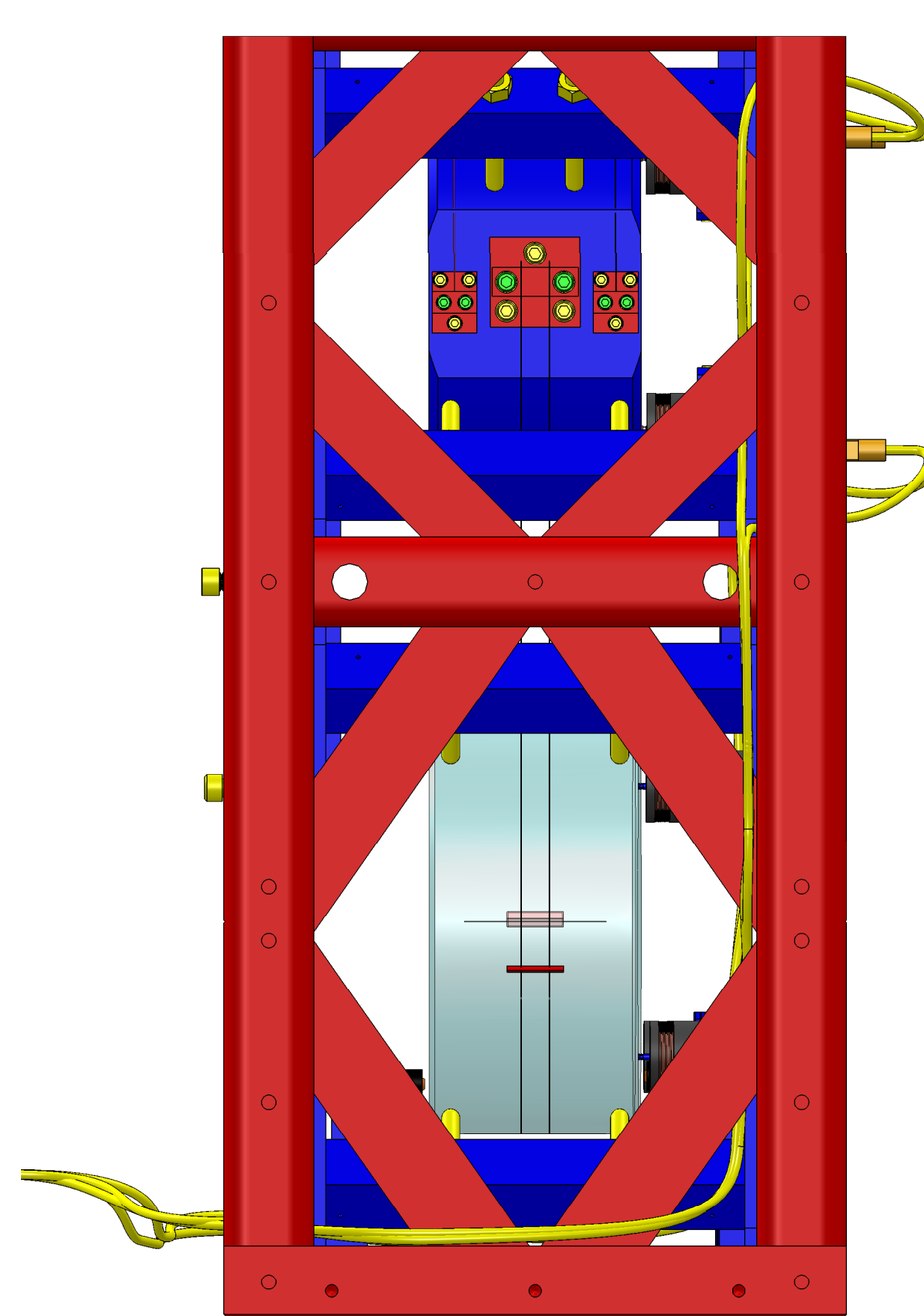
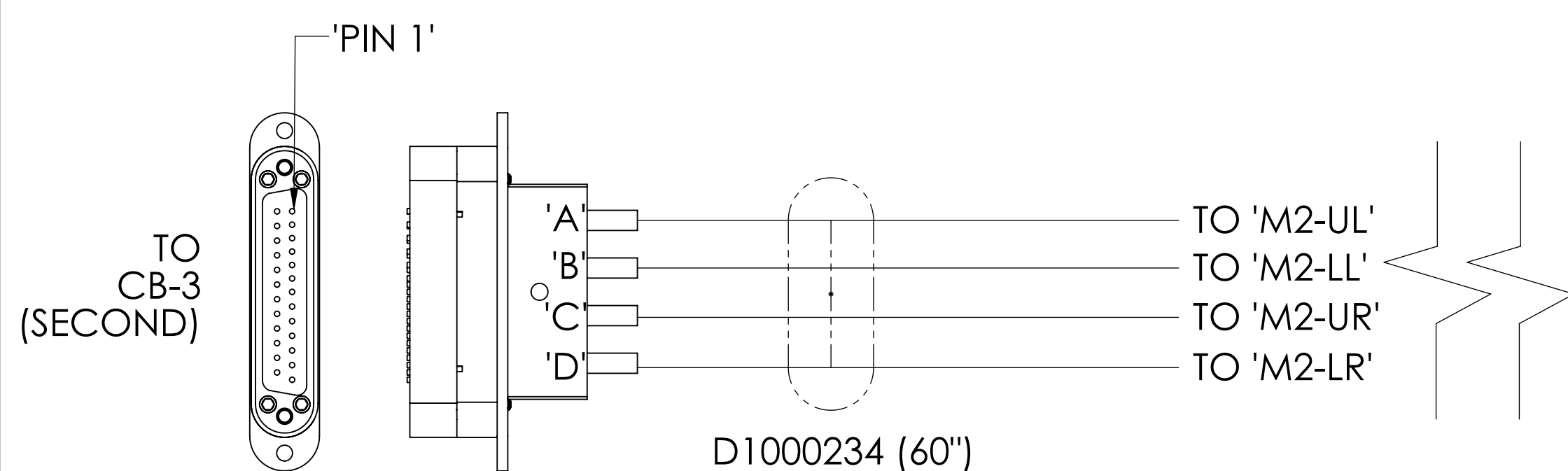


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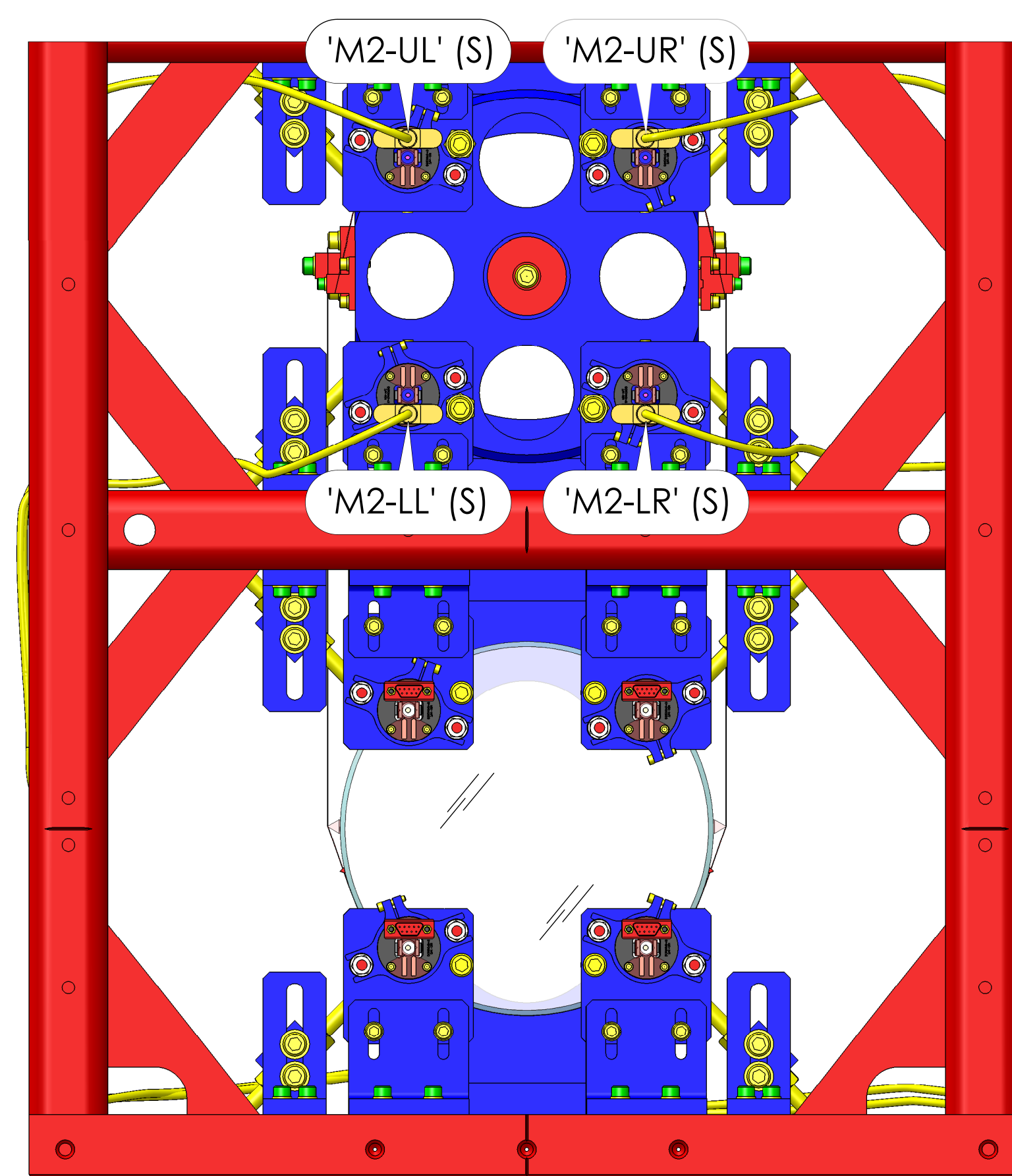
CABLE ROUTING:
ROUTE ALL CABLES IN ACCORDANCE WITH LIGO-T1200203 AND T1200318. CABLE ROUTES DEPICTED IN THIS DOCUMENT ARE NOT MANDATORY, BUT RATHER A CONSIDERED ROUTE AIMED TO CLEAR LASER BEAM PATHS. ALTERNATE ROUTES FOR PROBLEMATIC AREAS ARE ACCEPTABLE, BUT SHOULD BE HANDLED IN A CASE BY CASE SITUATION. 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.



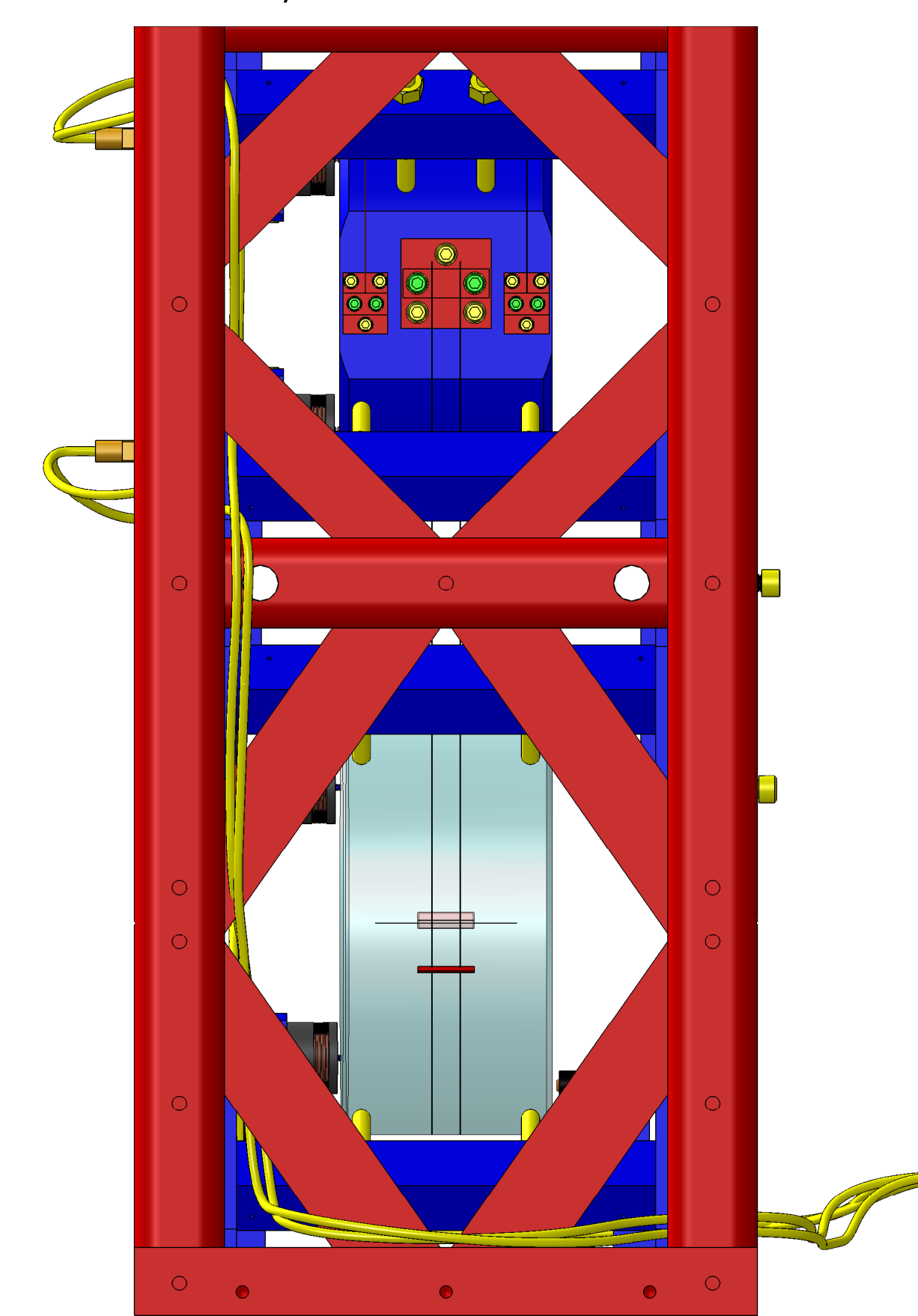
HR SIDE
ISO VIEW - FRONT LEFT (+X)



LEFT (+Y)



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



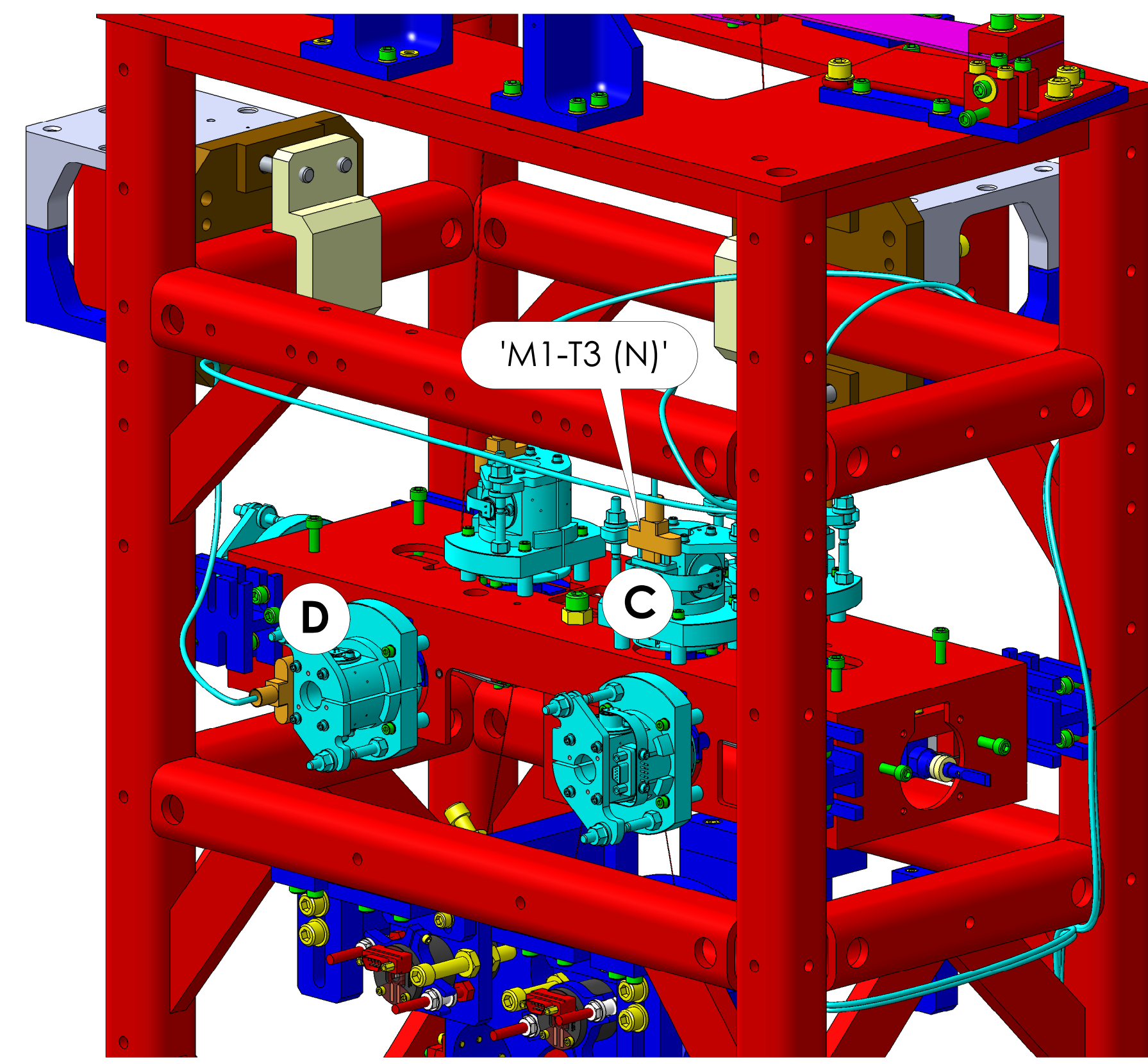
RIGHT (-Y)

ROUTE NO.2

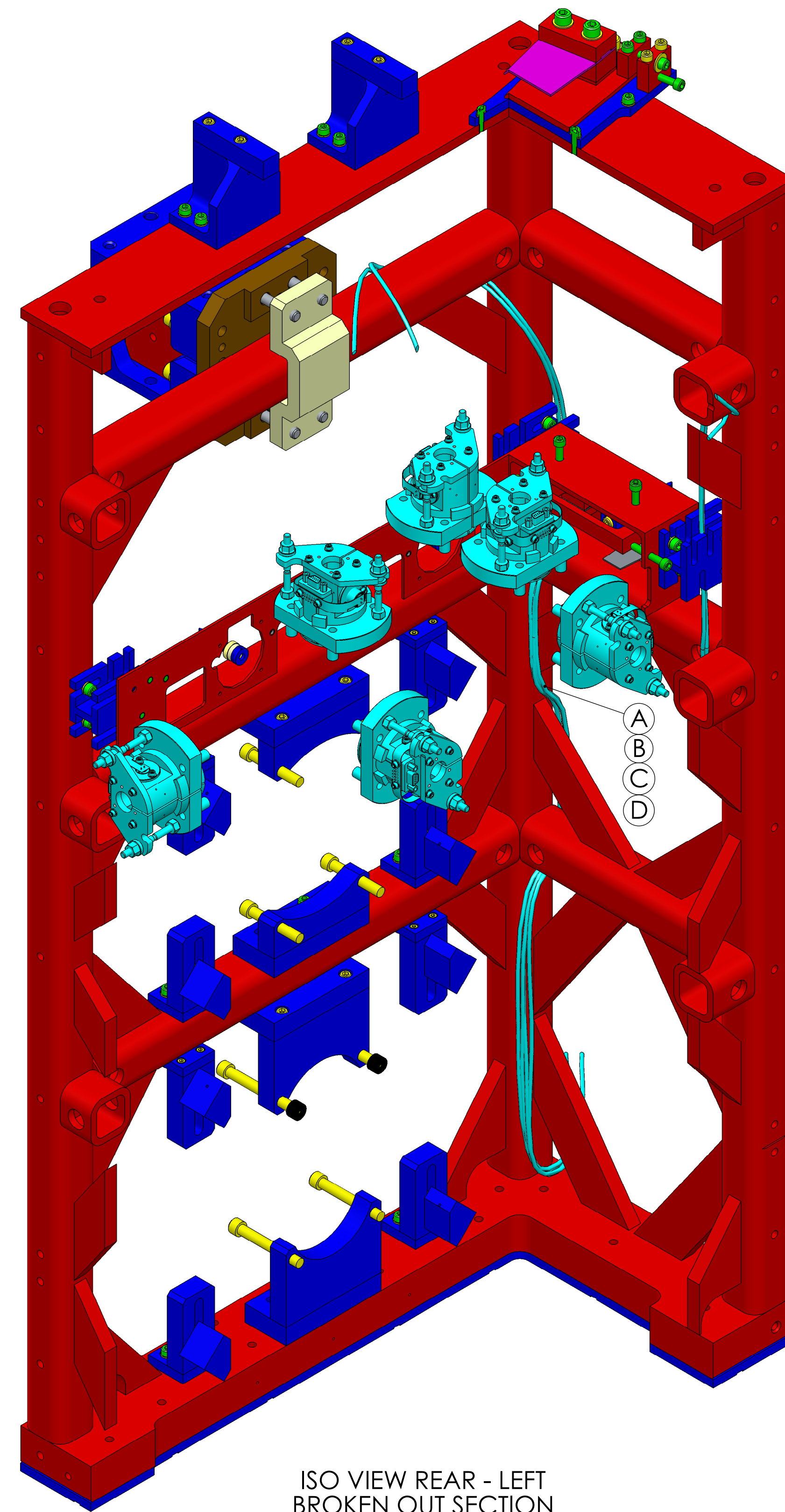
SEE LIGO T1200318
FOR STEP BY STEP CABLING GUIDE

① REFERENCED DOCUMENTATION:
1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
1.2 LIGO-D1101493, OSEM ORIENTATION.
1.3 LIGO-D1000581, 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.

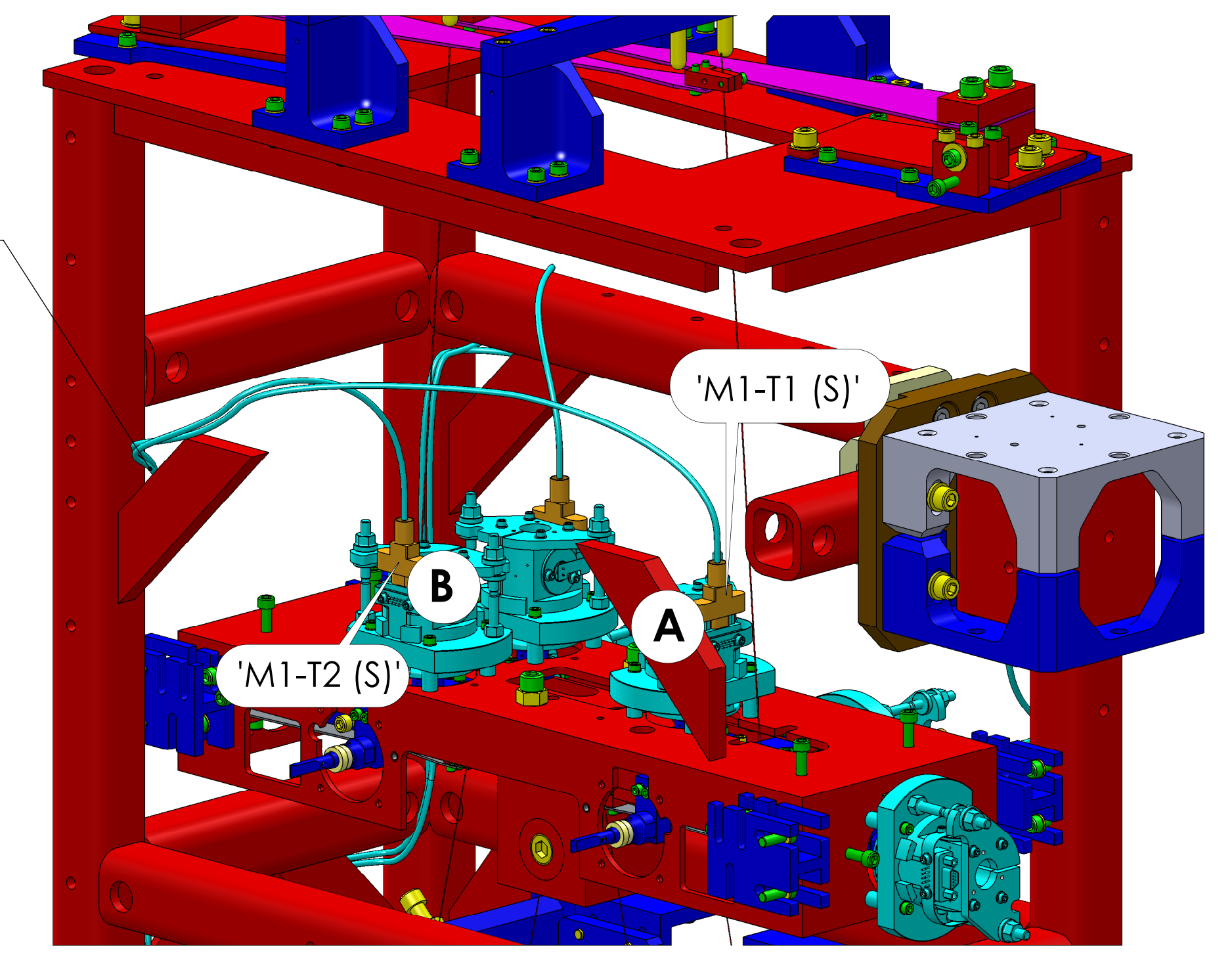
MC1



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

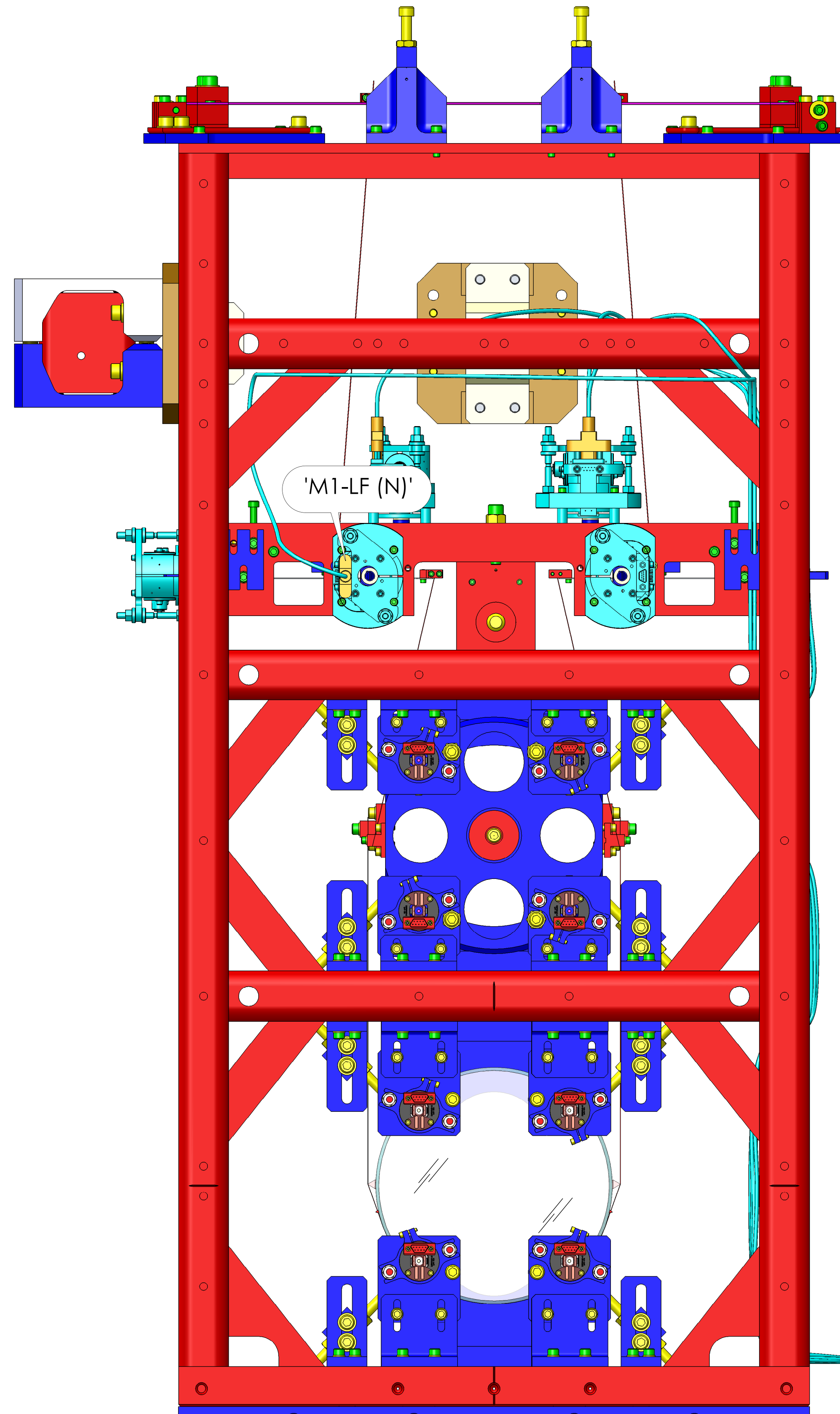


ISO VIEW REAR - LEFT
BROKEN OUT SECTION
(AS VIEWED FROM INSIDE)

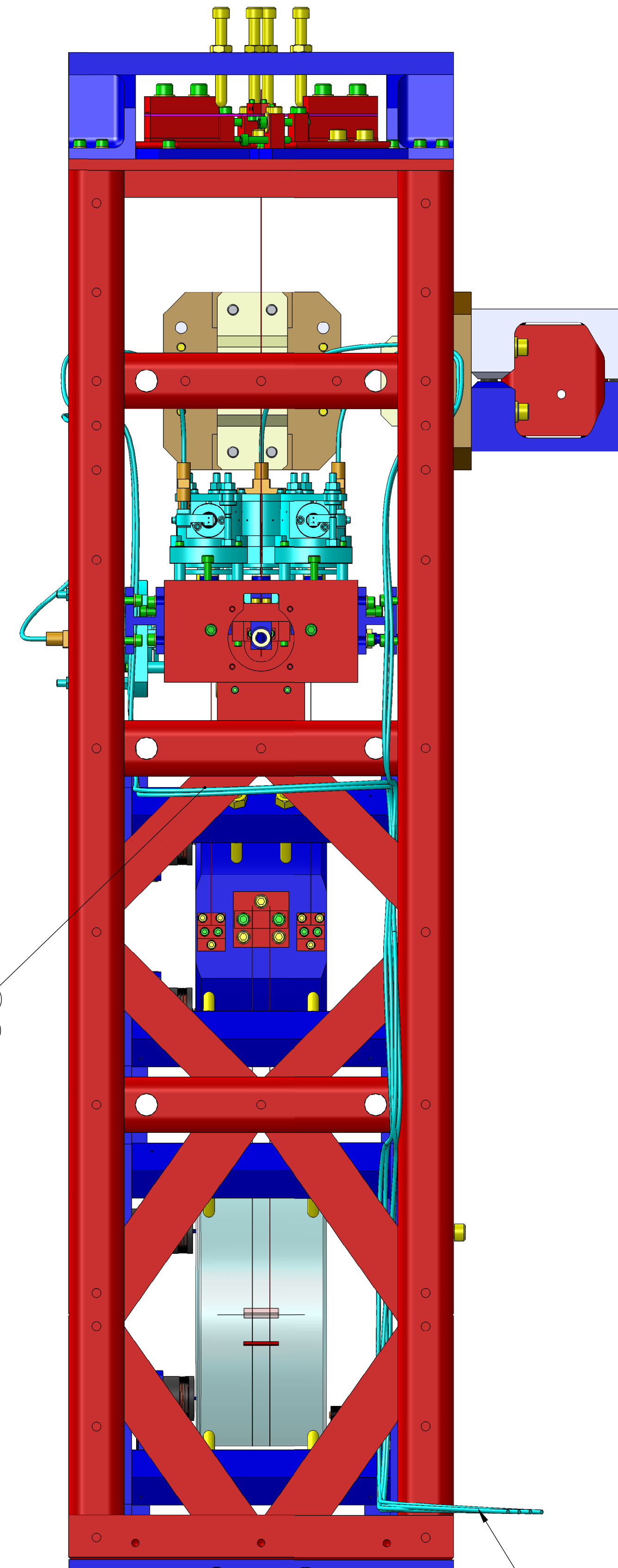


HR SIDE (1.1) (1.2)
ISO VIEW, FRONT - RIGHT (+X)

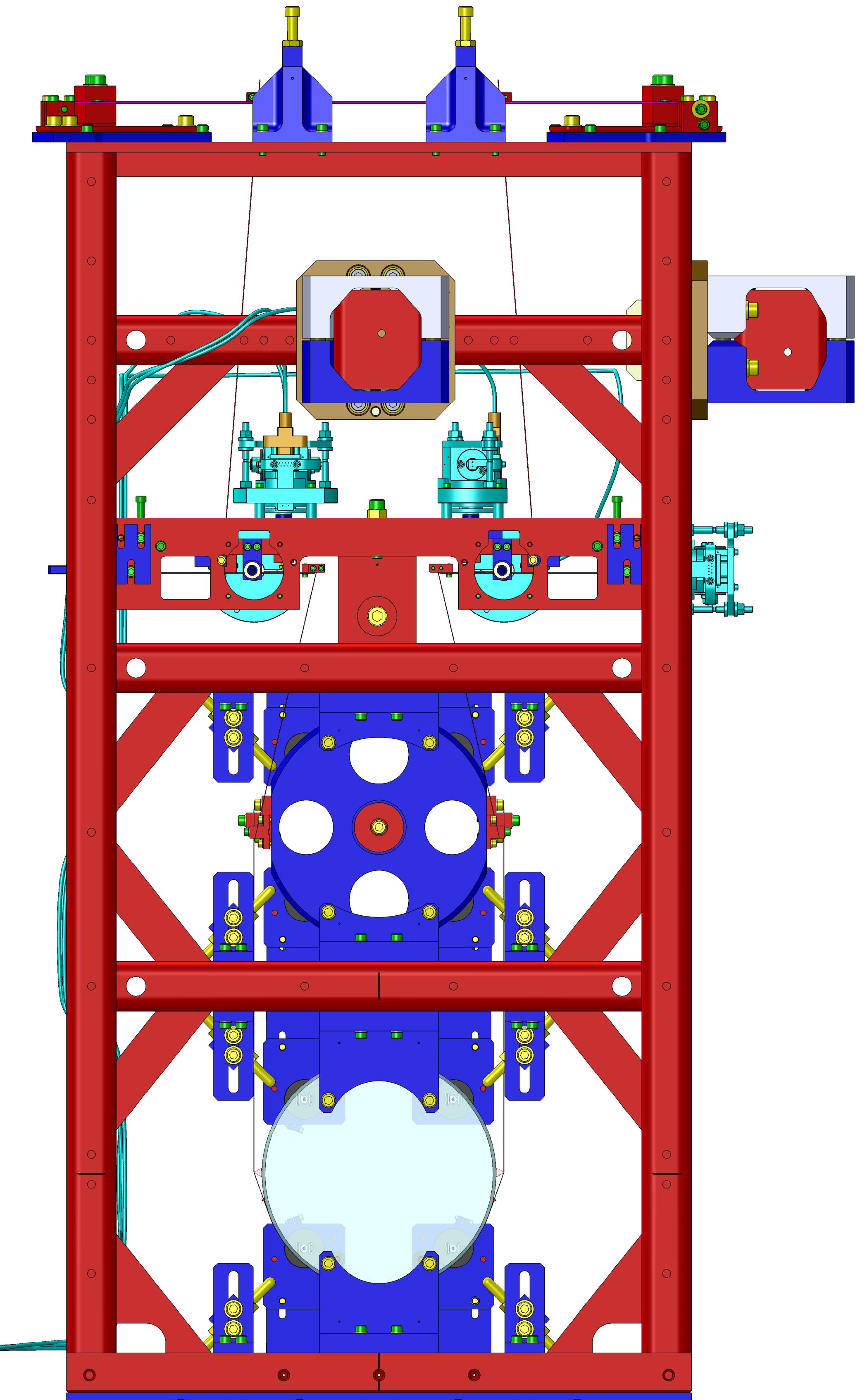
IF REQUIRED,
SECURE CABLES
USING PEEK CABLE TIES
OR EQ.



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



RIGHT SIDE (-Y)

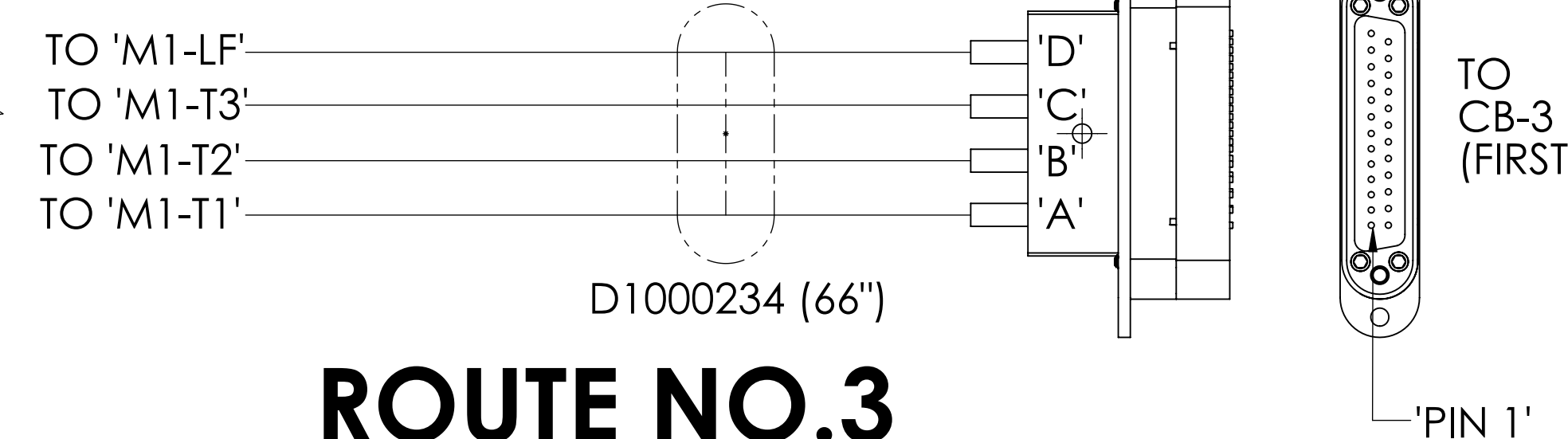


HR SIDE - FRONT (+X)
(END CONNECTORS, NOT SHOWN FOR CLARITY)

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



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WITH LIGO-T1200203 AND T1200318
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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

① REFERENCED DOCUMENTATION:

- 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
- 1.2 LIGO-D1101493, OSEM ORIENTATION.
- 1.3 LIGO-D1000581, 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.

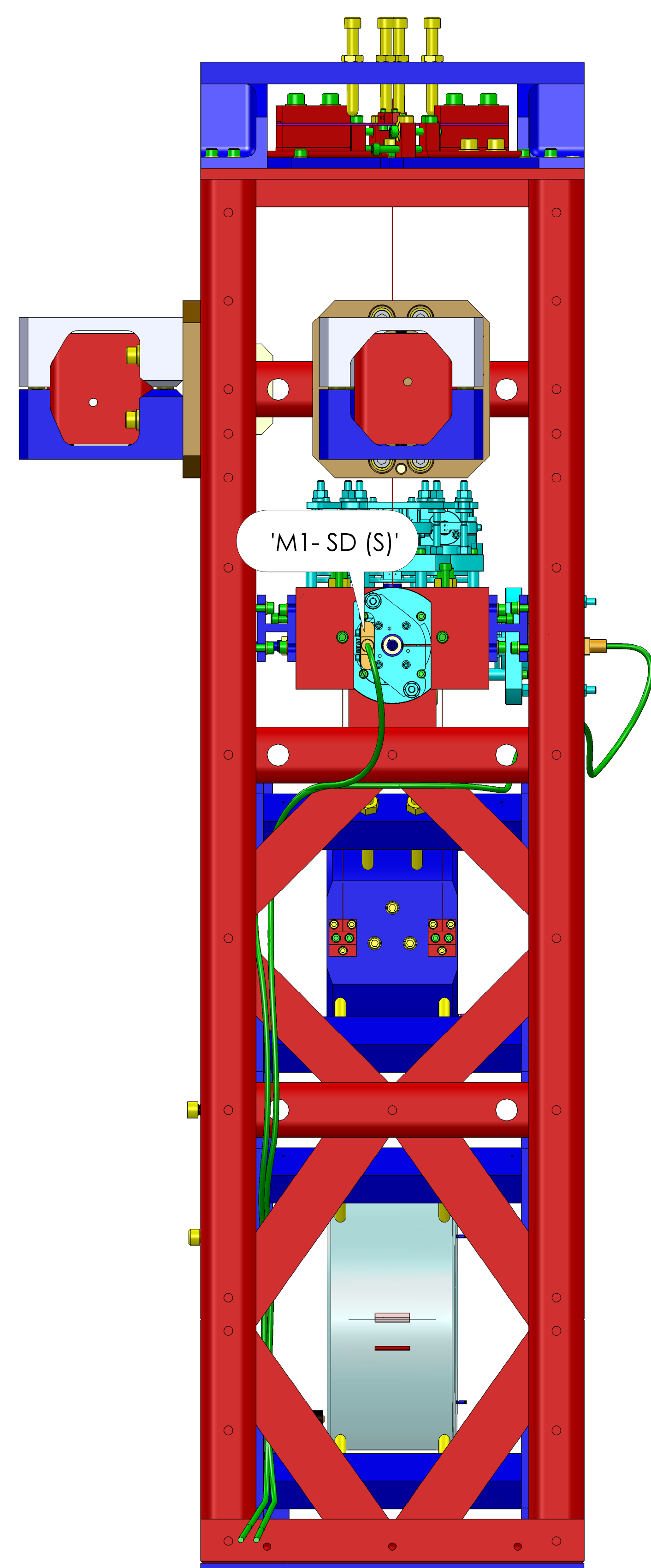
MC1

(SHARED)

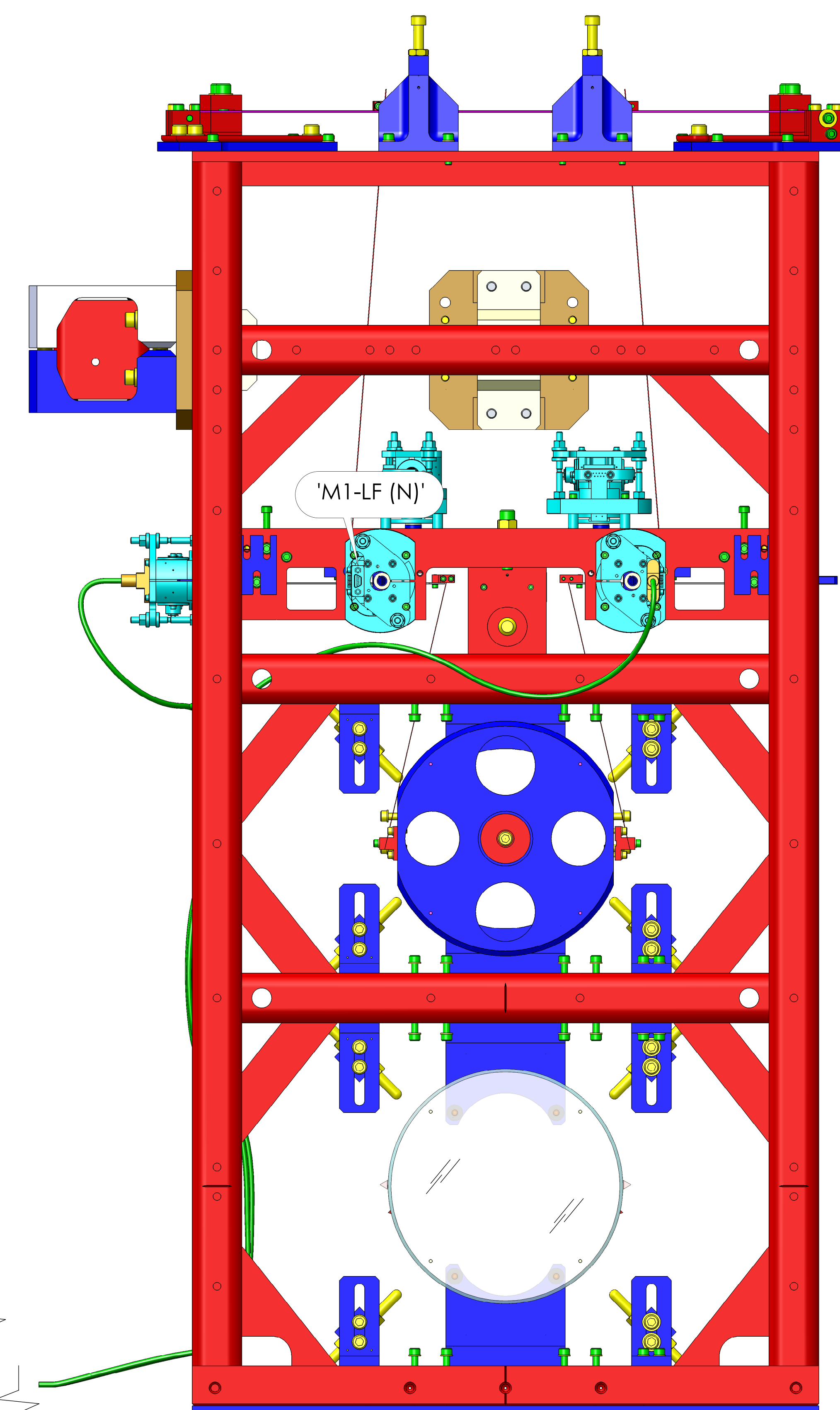
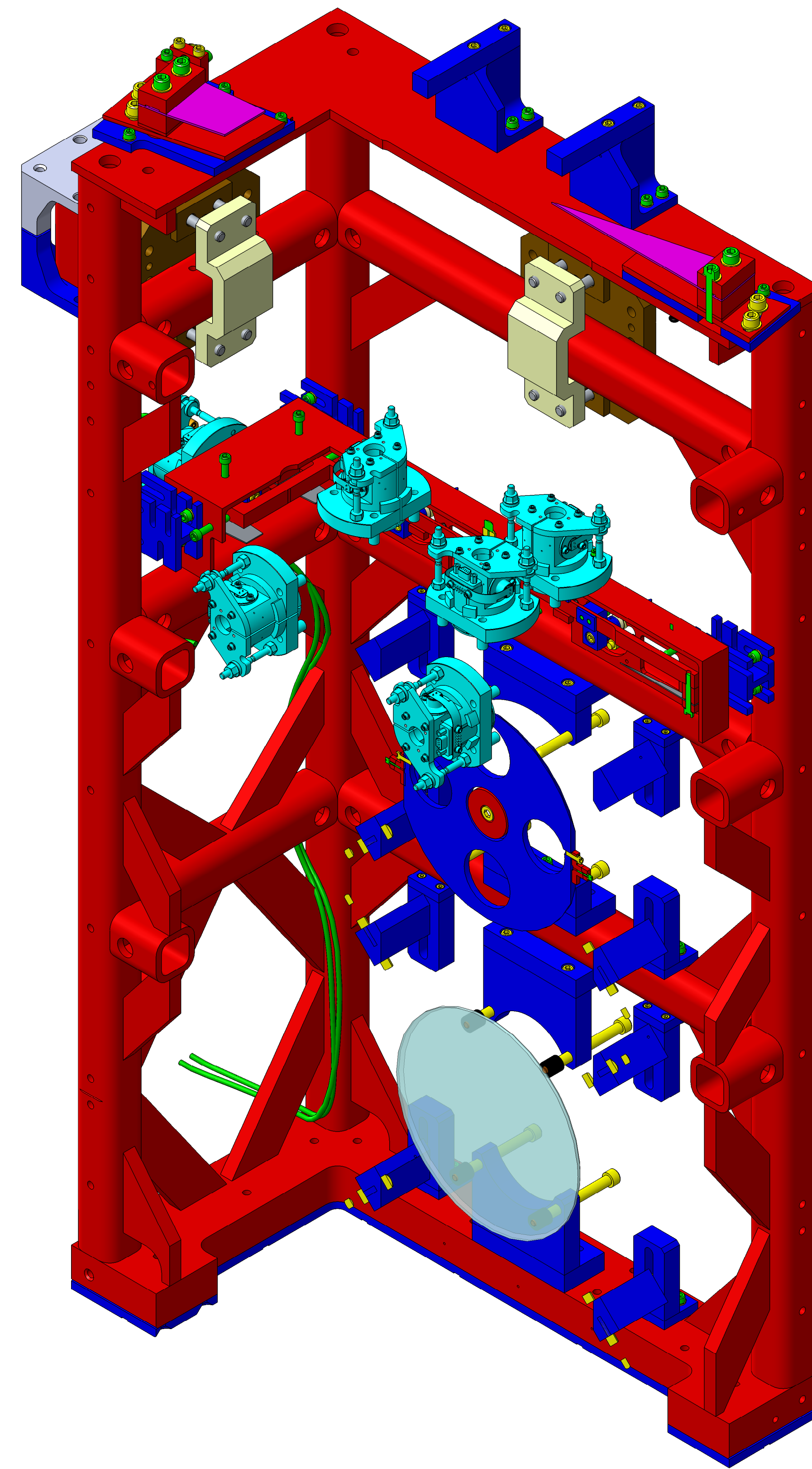


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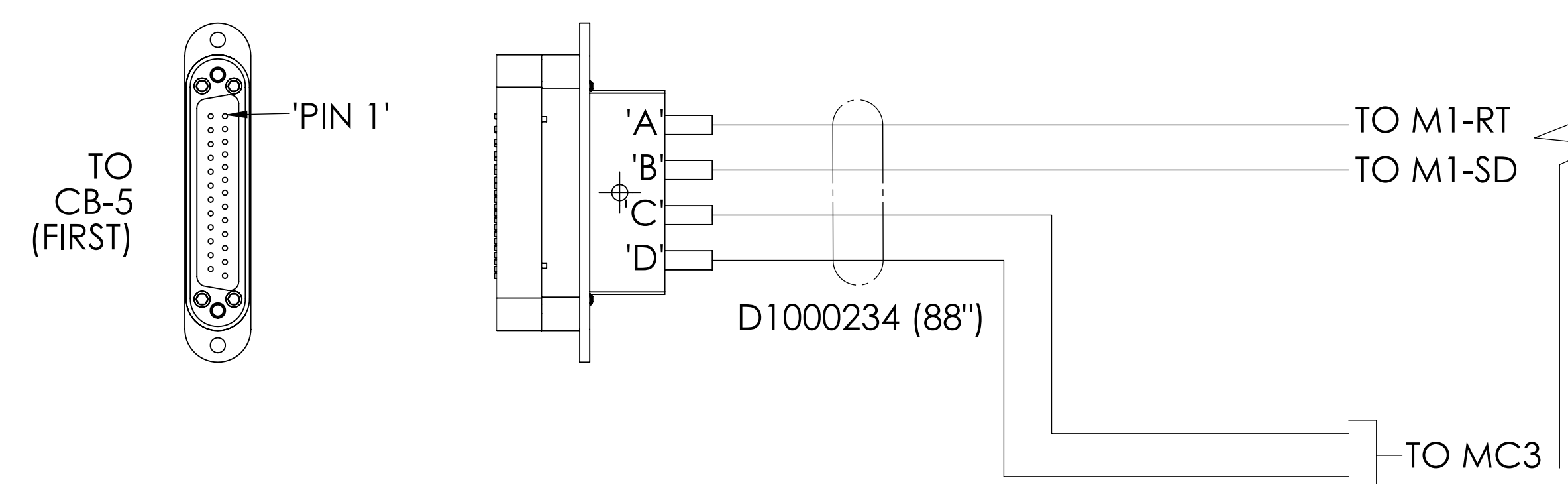
CABLE ROUTING:
 ROUTE ALL CABLES IN ACCORDANCE WITH LIGO-T1200203 AND T1200318
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LEFT SIDE (+Y) (1.1) (1.2)



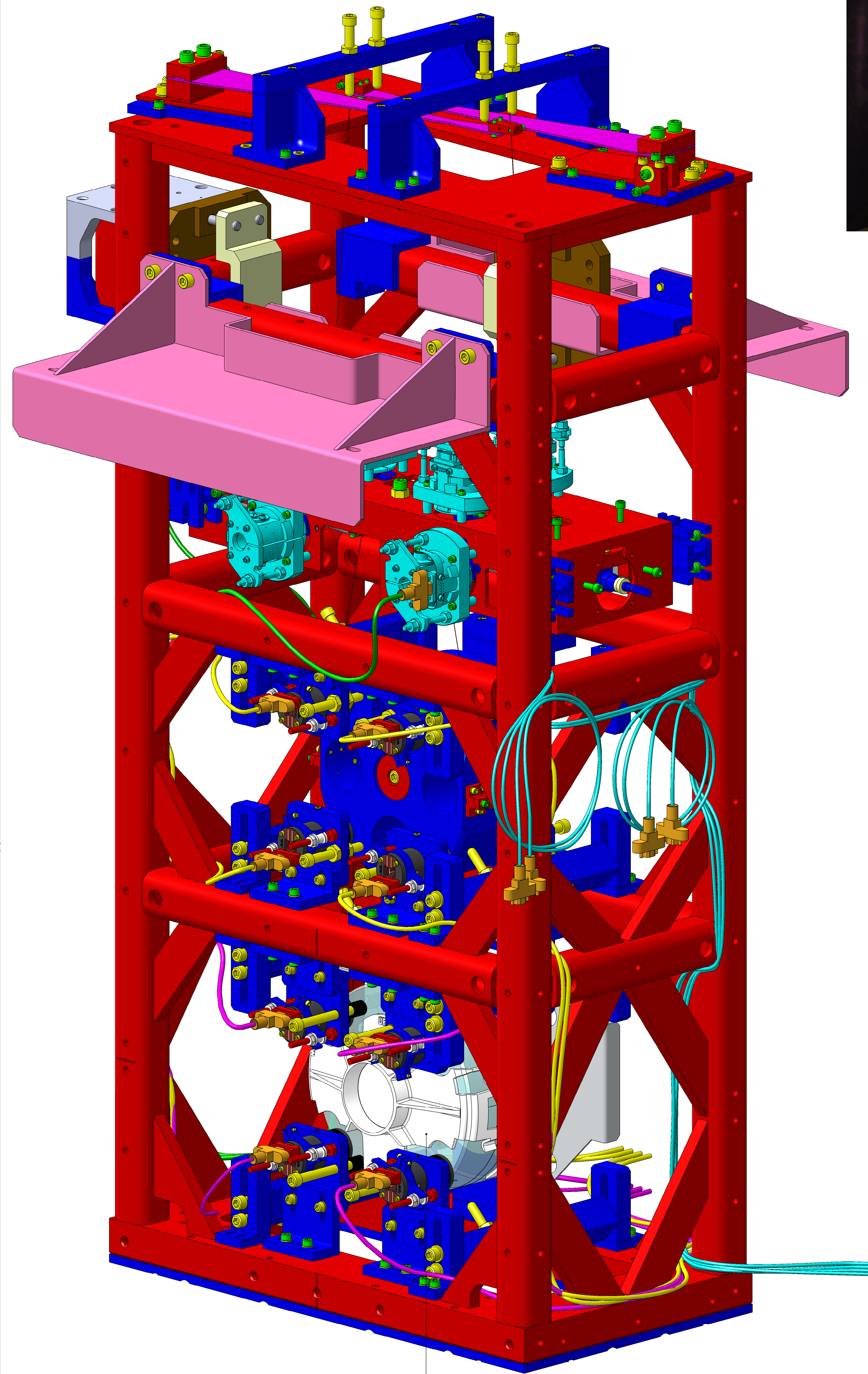
AR SIDE - REAR (-X) (1.1) (1.2)
 (END CONNECTORS, NOT SHOWN FOR CLARITY)



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

- ① REFERENCED DOCUMENTATION:
- 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
 - 1.2 LIGO-D1101493, OSEM ORIENTATION.
 - 1.3 LIGO-D1000581, 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.

MC1



D1102299 (7)
AR OPTIC CAP

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

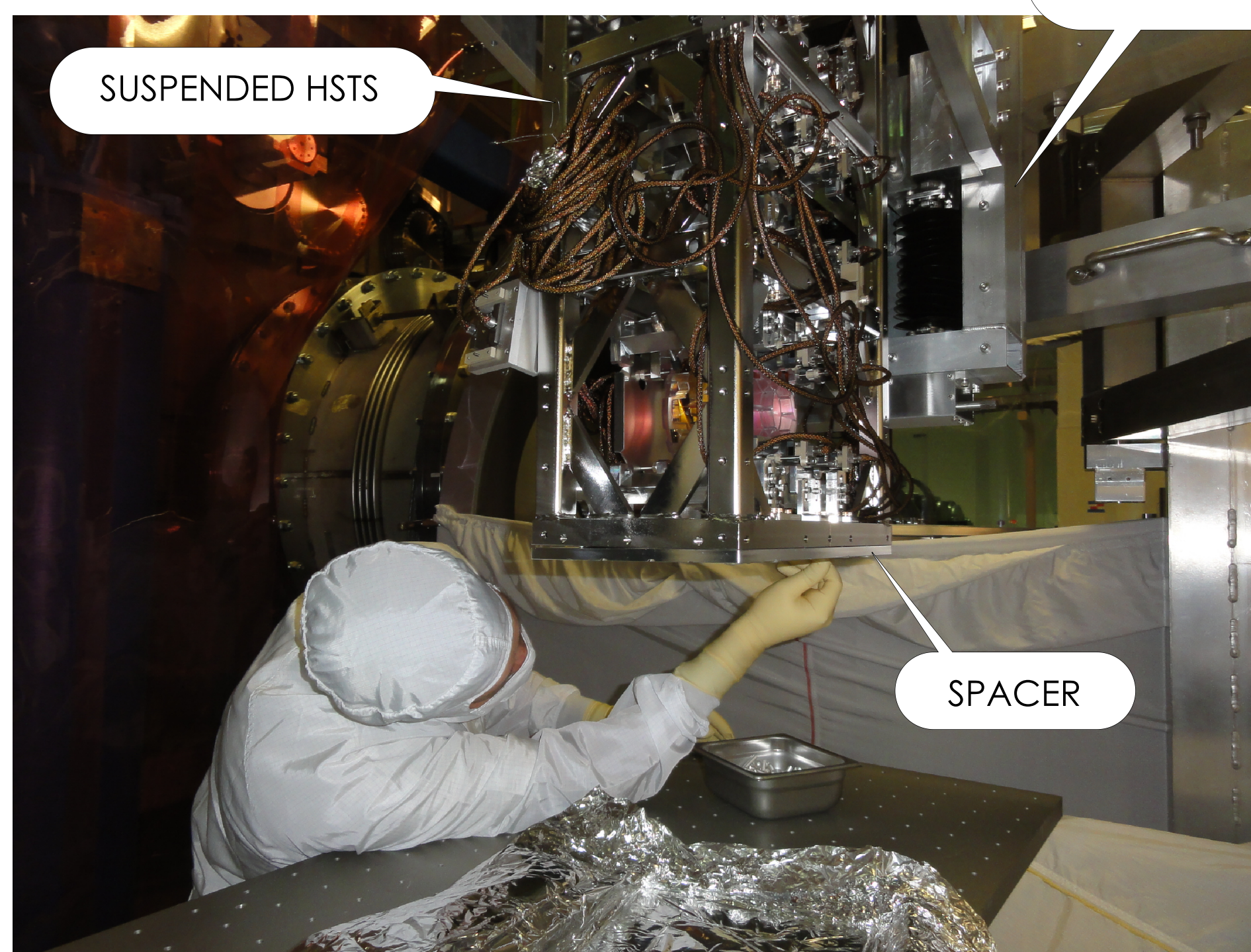
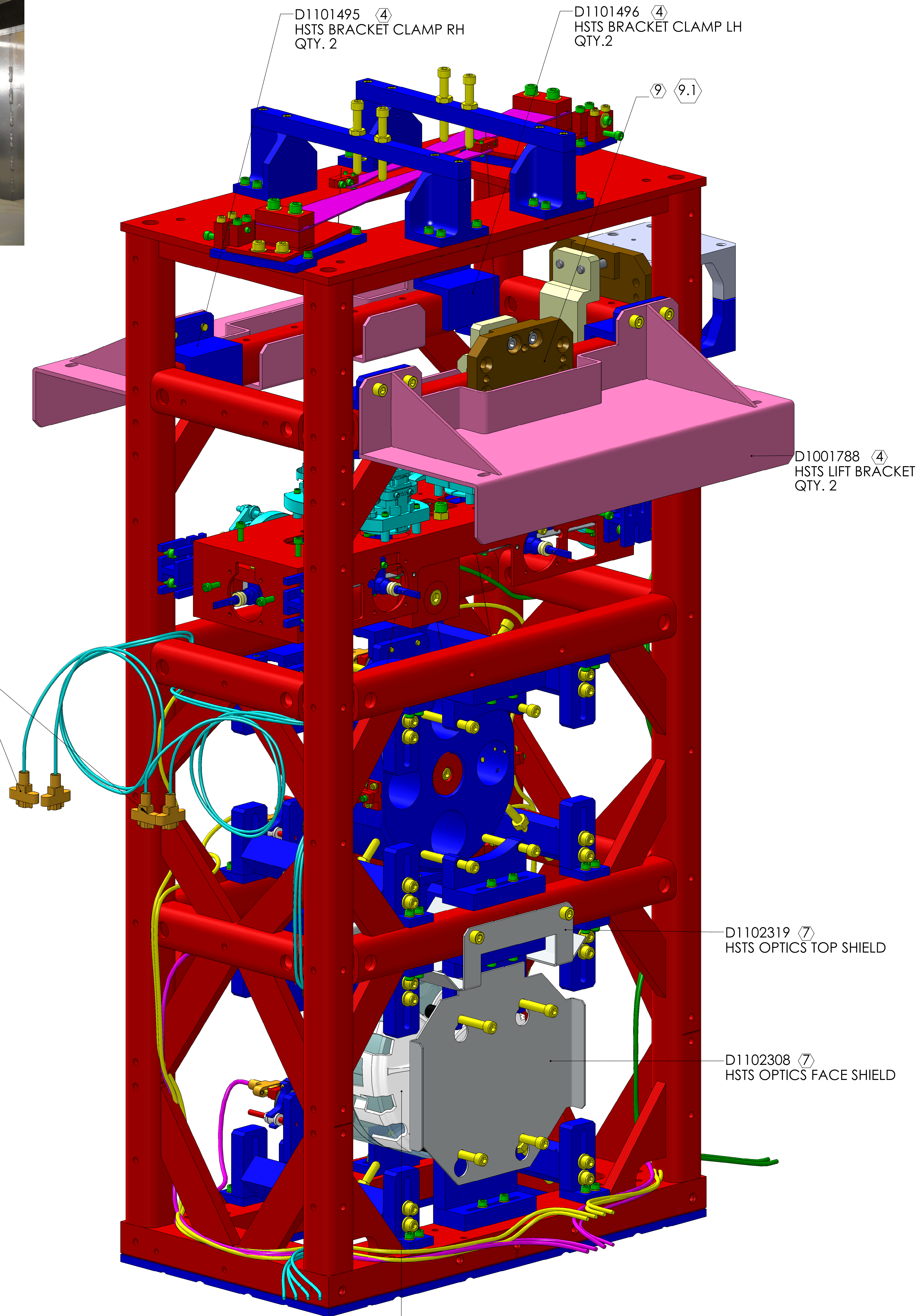


FIG 1.0: SPACER INSTALLATION (10)



D1101495 (4)
HSTS BRACKET CLAMP RH
QTY. 2

D1101496 (4)
HSTS BRACKET CLAMP LH
QTY. 2

D1001788 (4)
HSTS LIFT BRACKET
QTY. 2

D1102319 (7)
HSTS OPTICS TOP SHIELD

D1102308 (7)
HSTS OPTICS FACE SHIELD

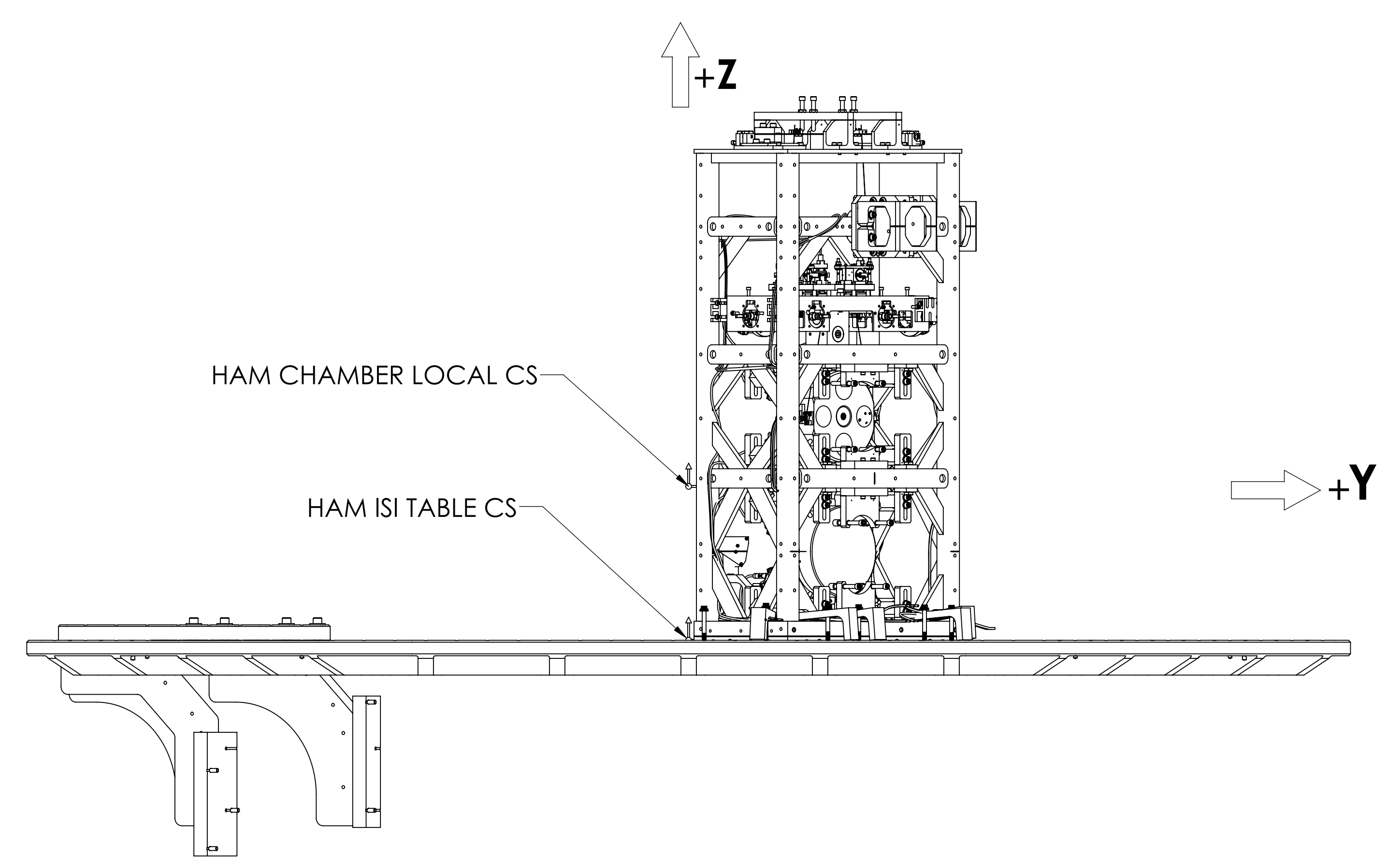
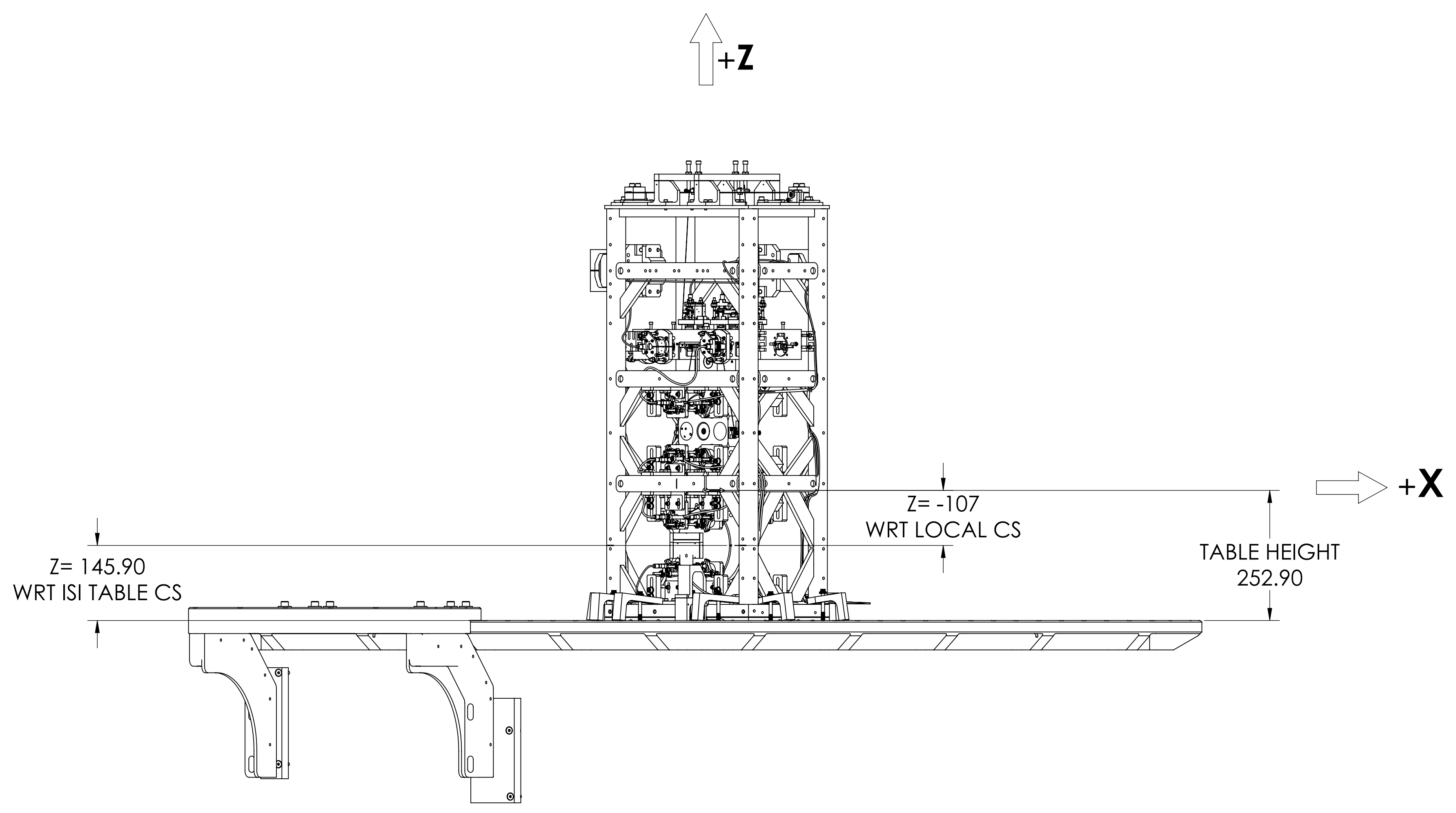
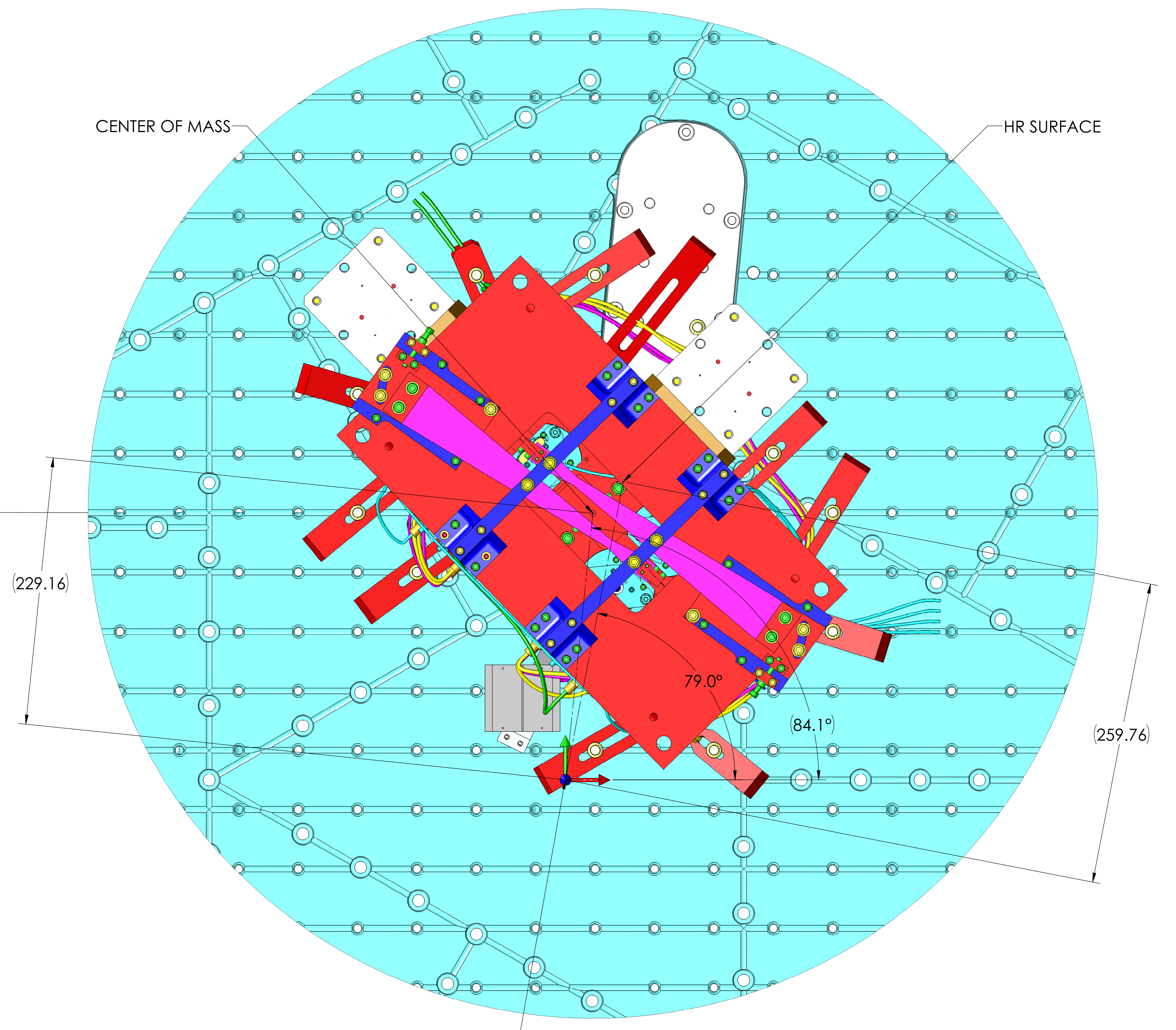
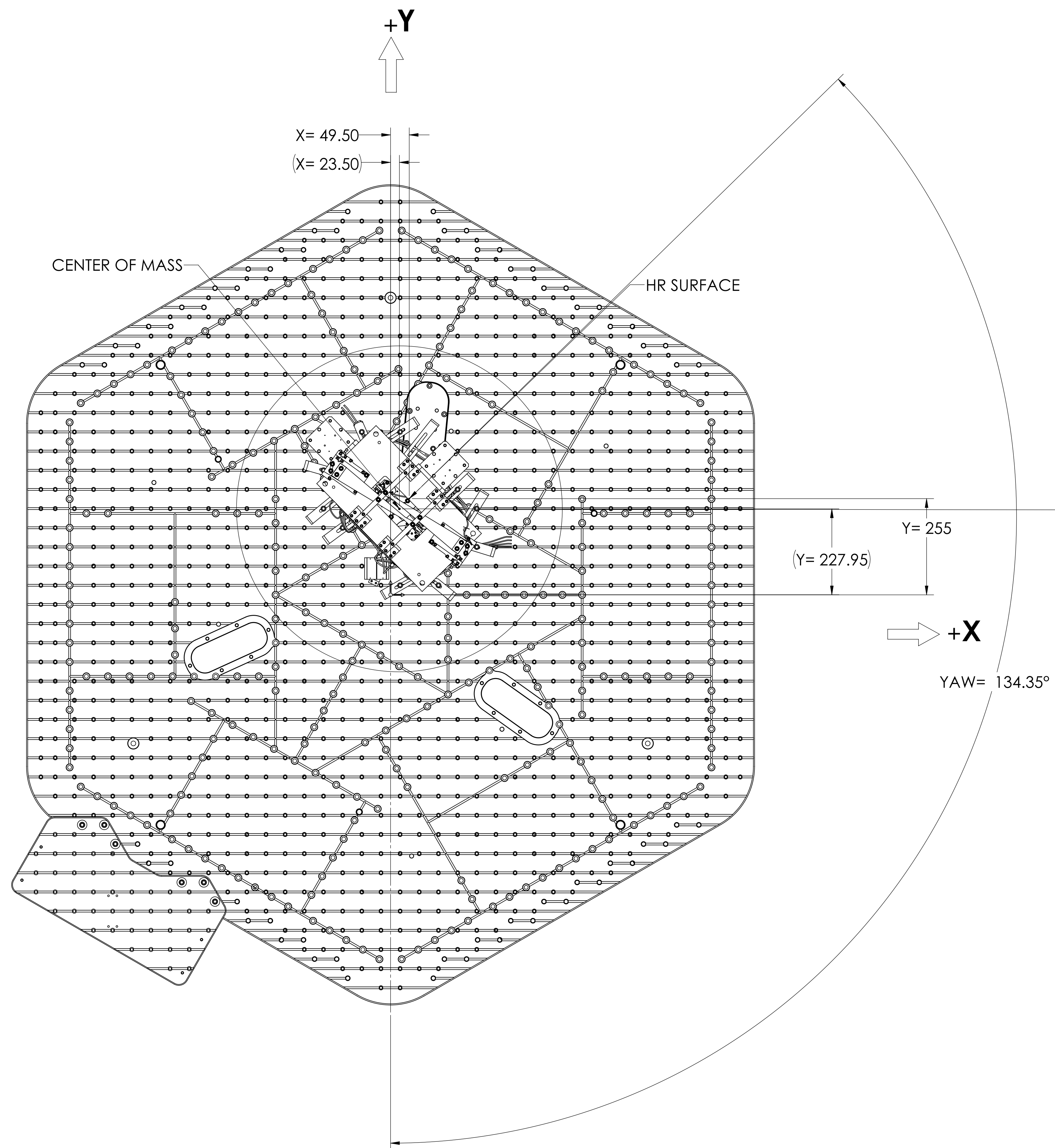
D1101143 (7)
HSTS OPTICS CAP

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

- (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.

HSTS STRUCTURE TRANSPORT

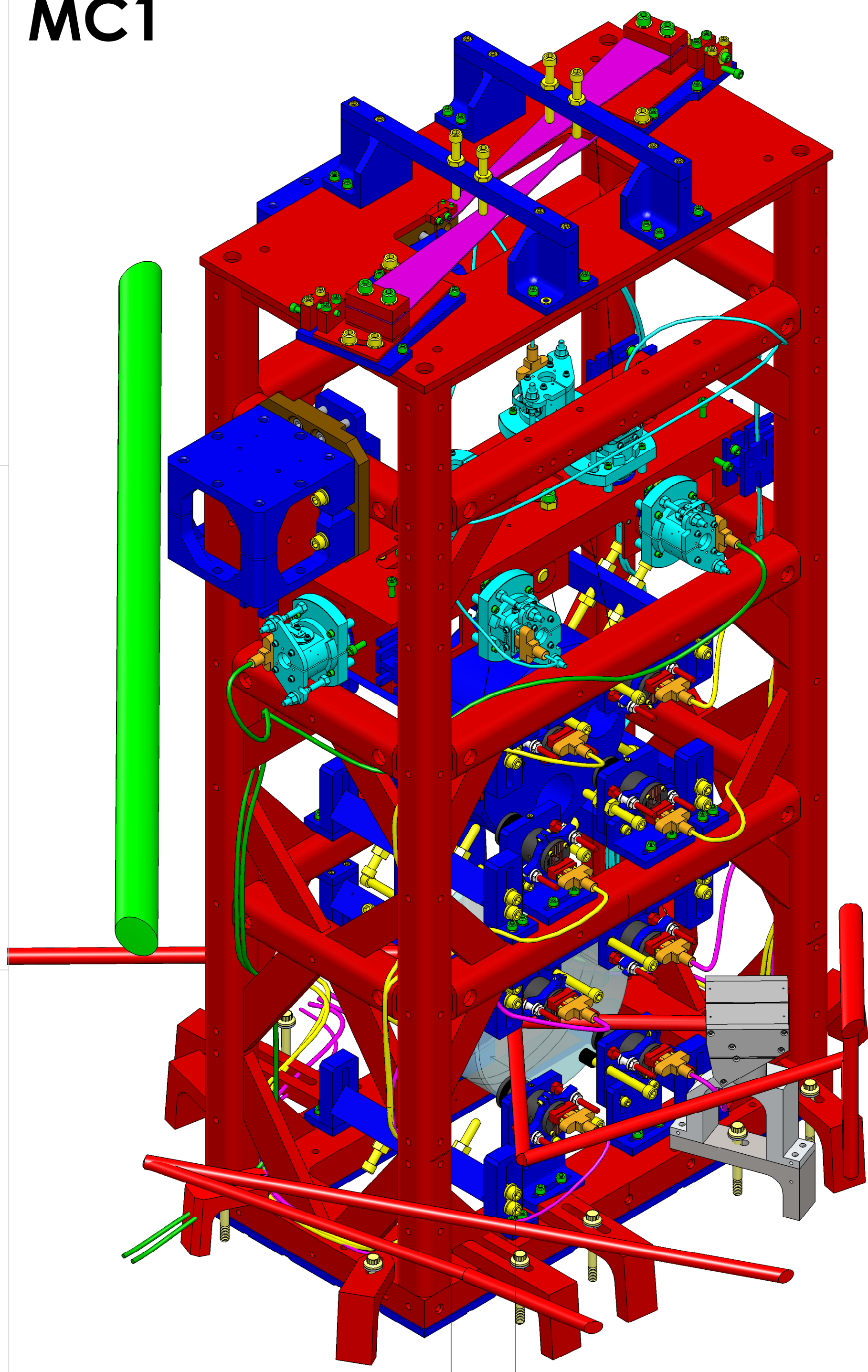
VIBRATION ABSORBER ON FRONT SIDE NOT SHOWN
(REMOVED FOR TRANSP. PURPOSES)



LOCAL COORDINATES DEFINITIONS

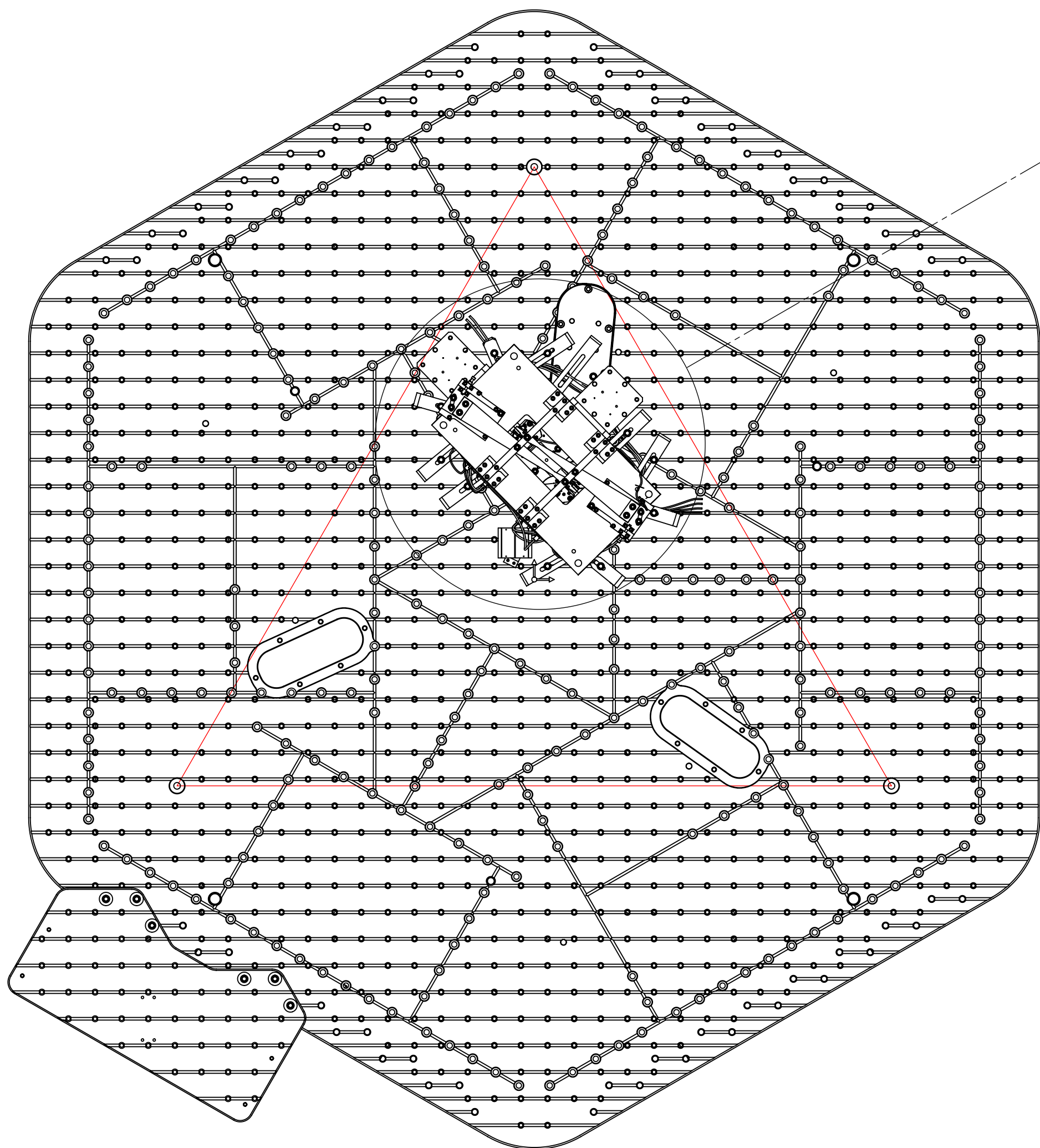
NOTE: DIMENSION IN PARENTHESIS (REFERENCE DIMENSIONS), ARE FROM CENTER OF MASS.

MC1

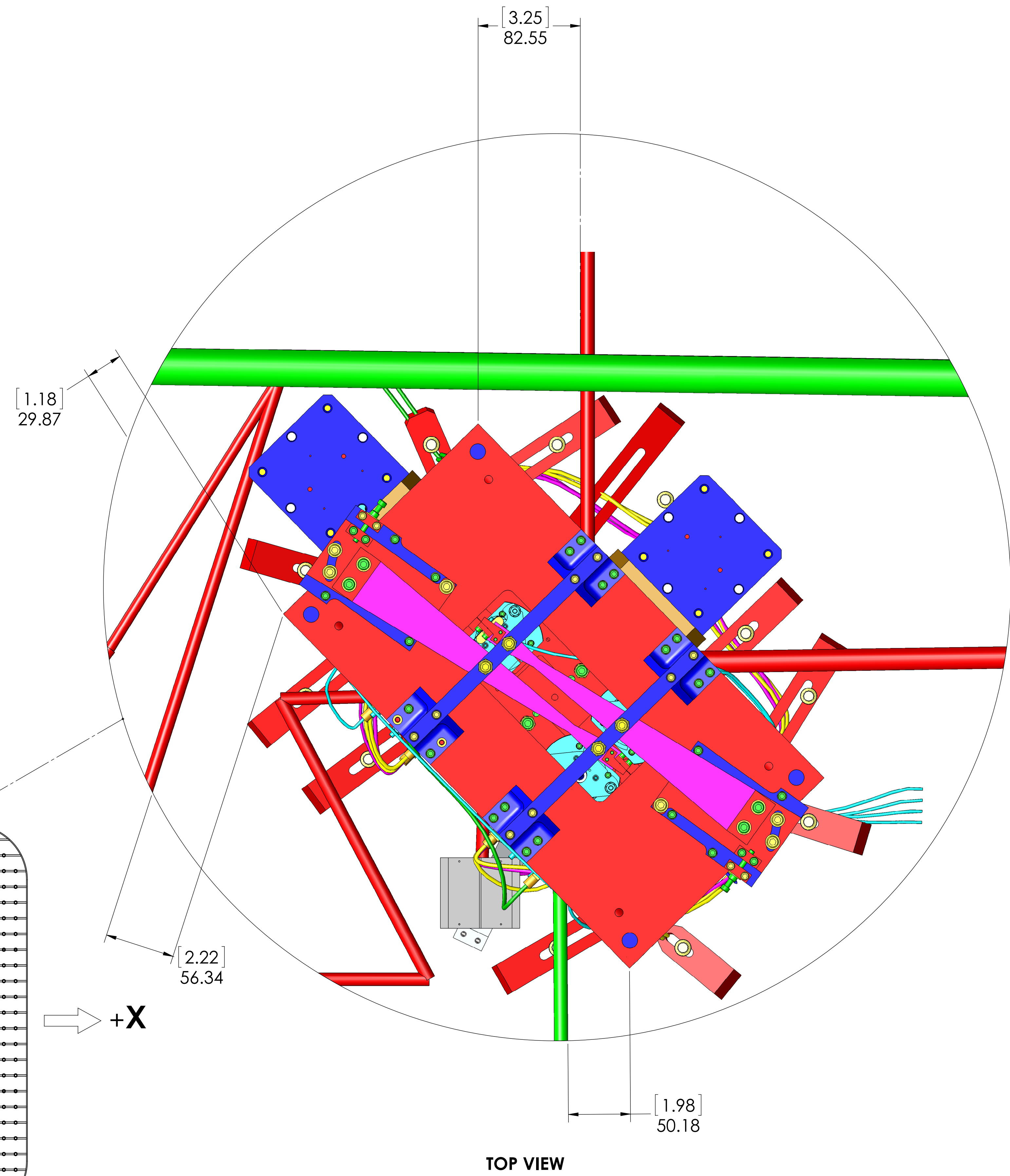


AR SIDE
ISO VIEW, REAR - LEFT (-X)

+Y

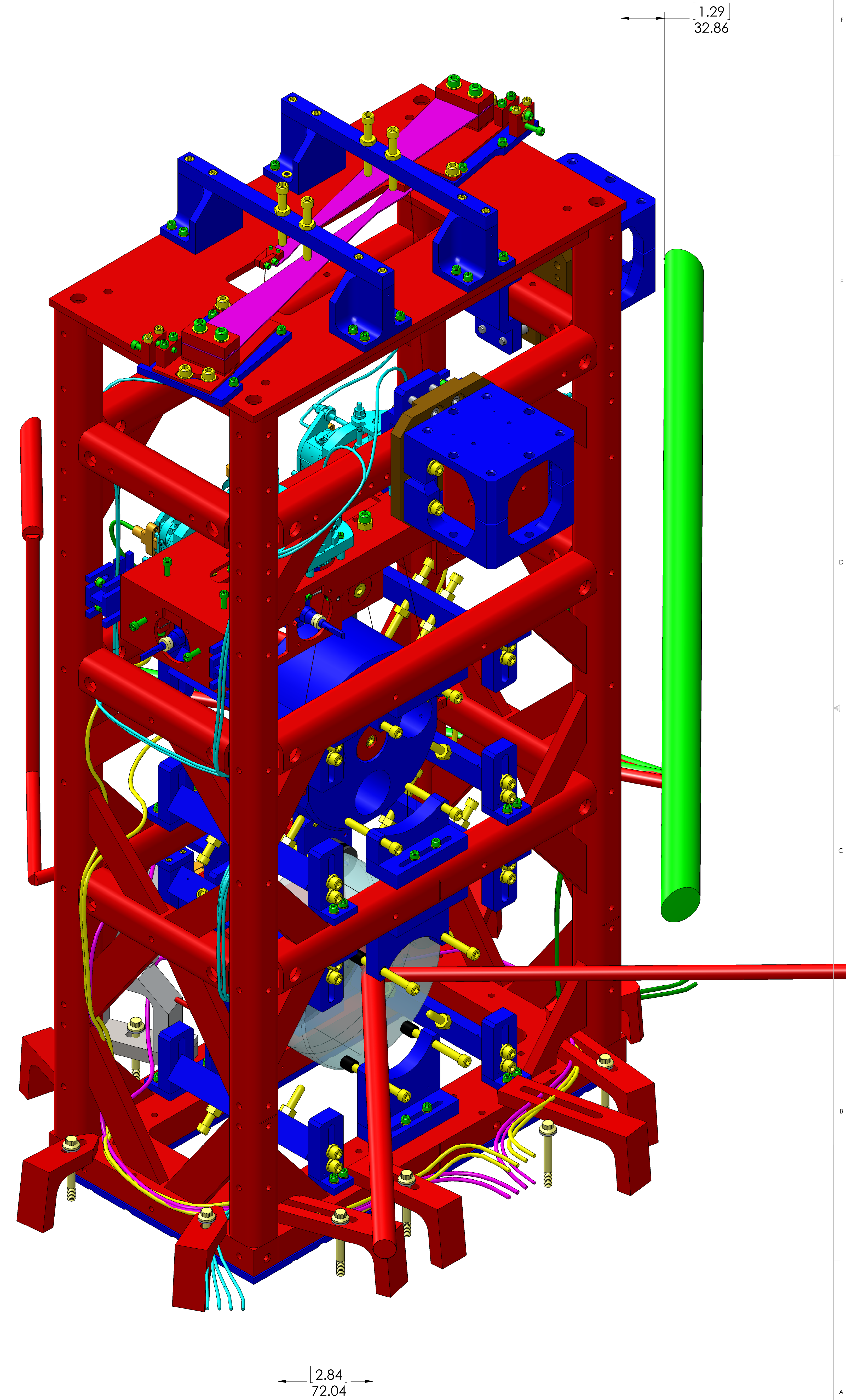


TOP VIEW
REF. TRIANGLE: SEE G1000125
FOR ISI NAMING AND ORIENTATION CONVENTION



TOP VIEW

LASER BEAM CLEARANCES
(ALL DIMENSIONS ARE FOR REFERENCE ONLY)



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