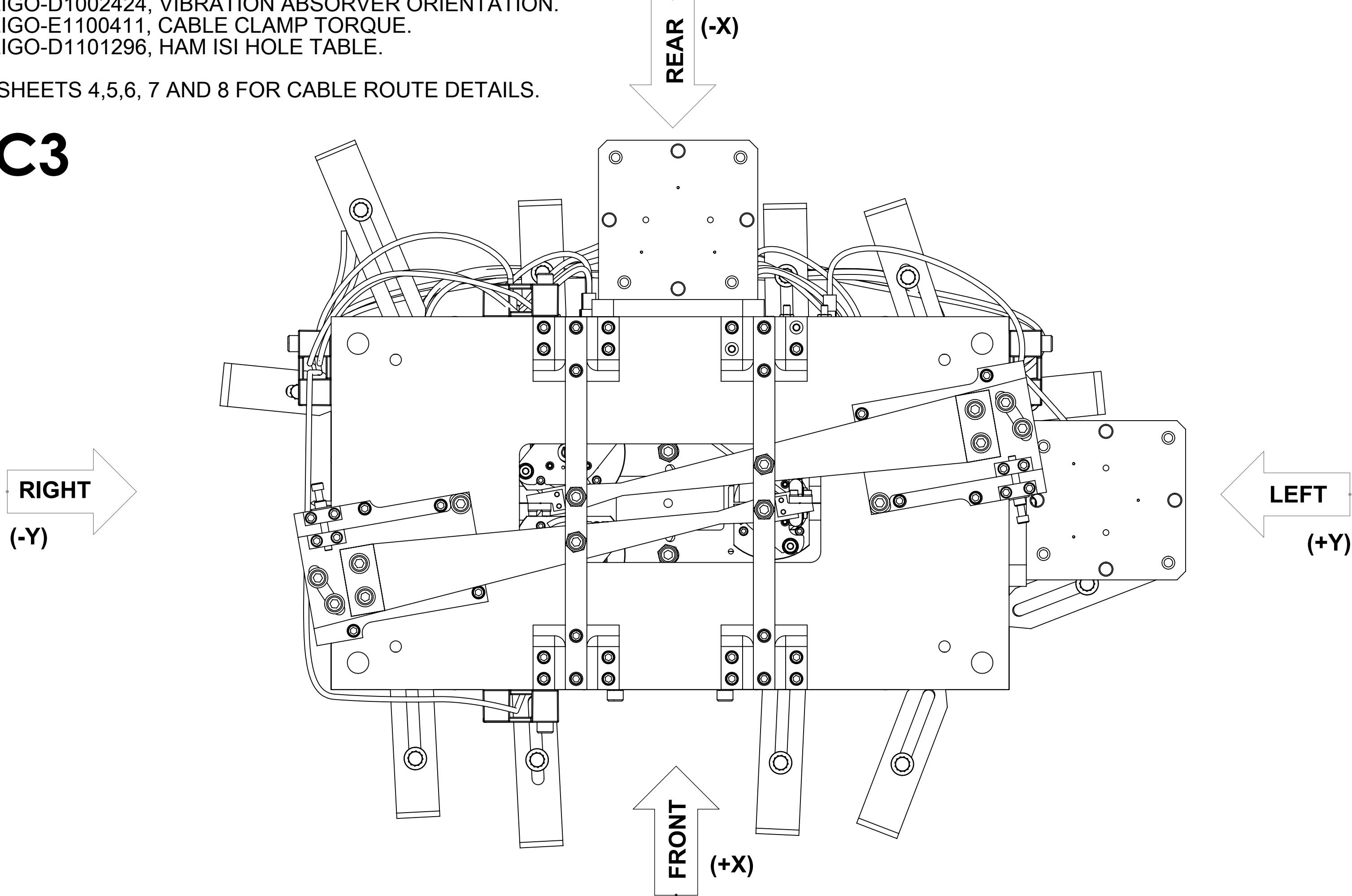


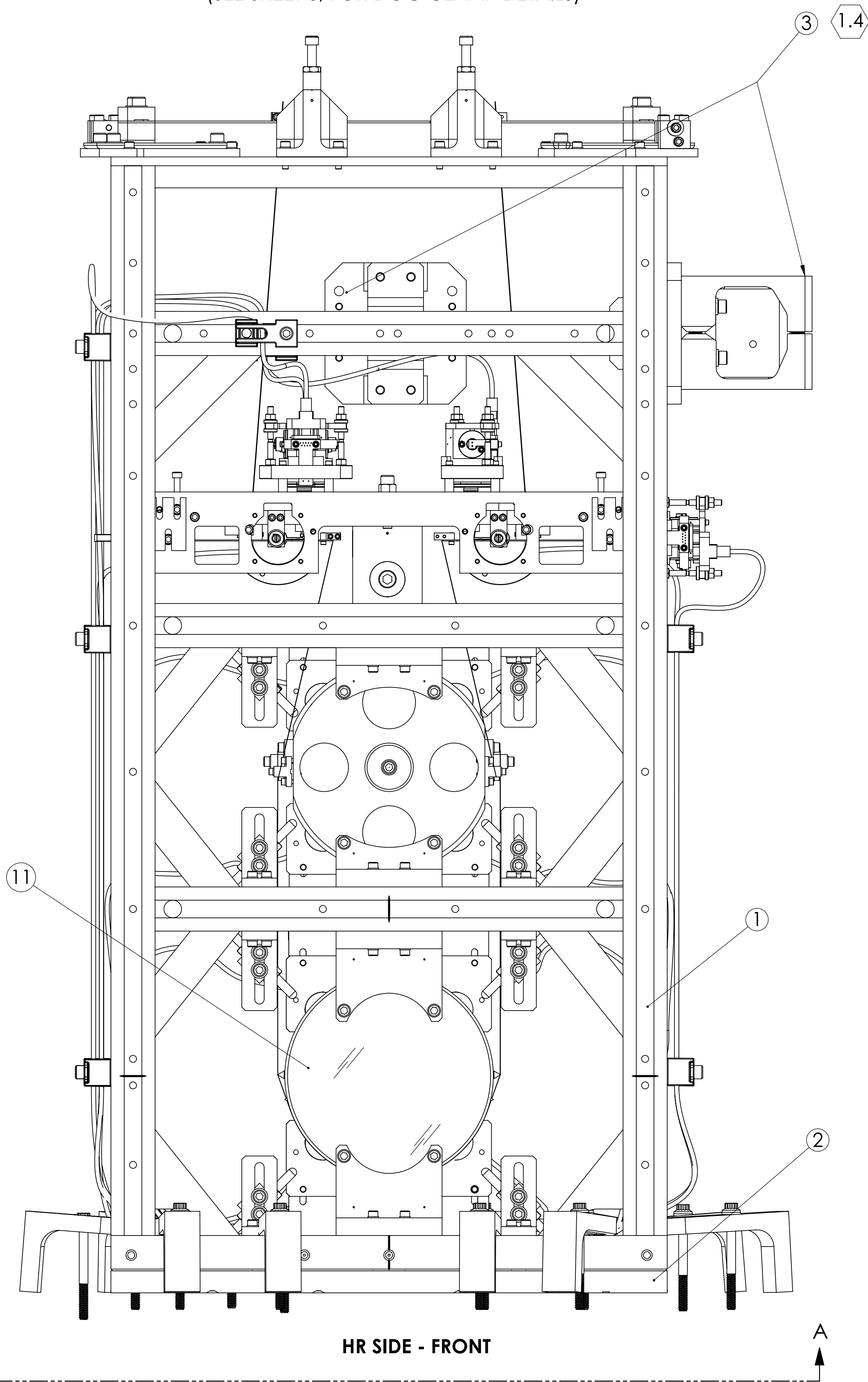
- ① REFERENCED DOCUMENTATION:
- 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
  - 1.2 LIGO-D1101493, OSEM ORIENTATION.
  - 1.3 LIGO-D1000581, SYSTEM CABLING DIAGRAM.
  - 1.4 LIGO-D1002424, VIBRATION ABSORVER ORIENTATION.
  - 1.5 LIGO-E1100411, CABLE CLAMP TORQUE.
  - 1.6 LIGO-D1101296, HAM ISI HOLE TABLE.

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

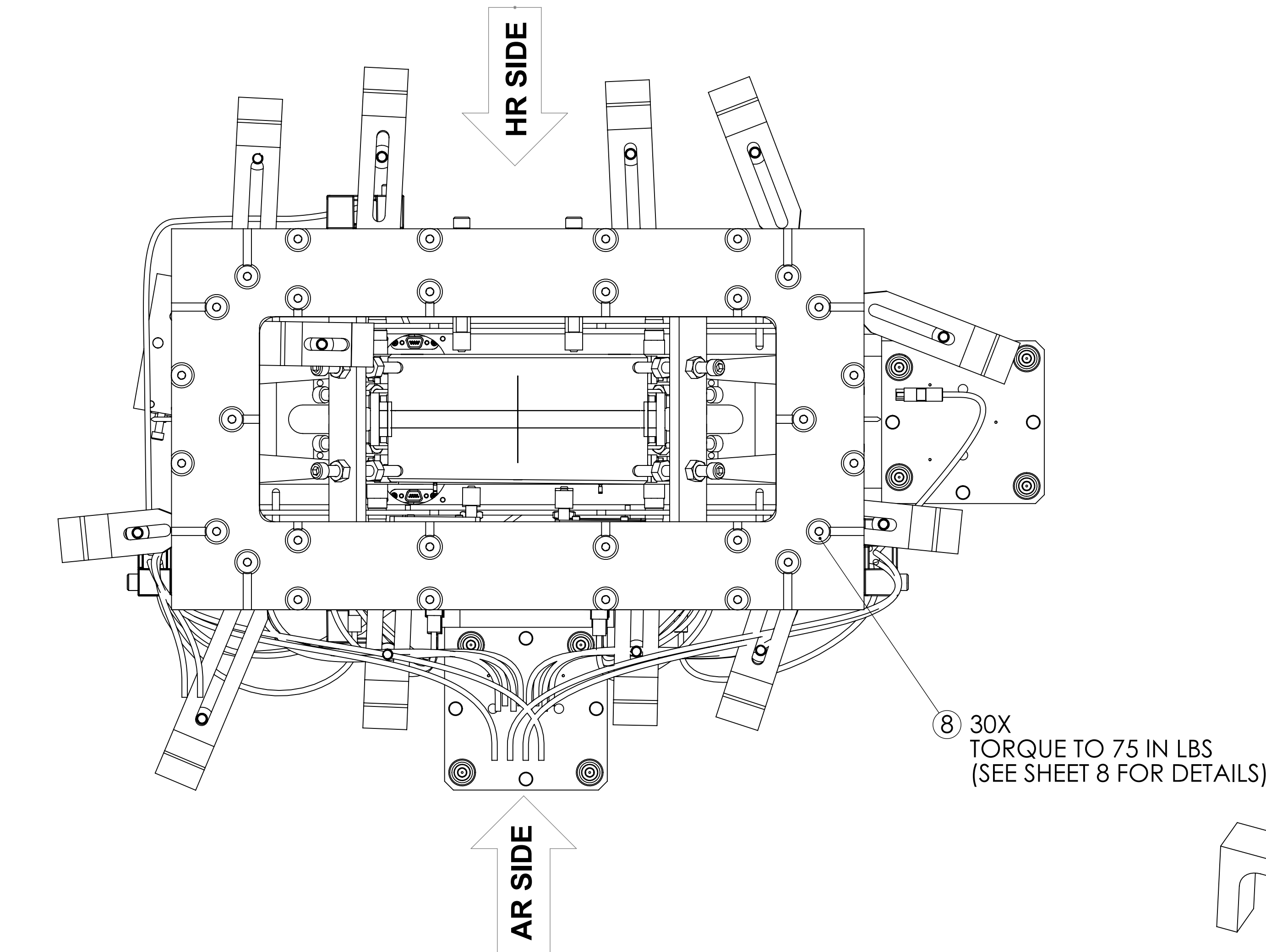
MC3



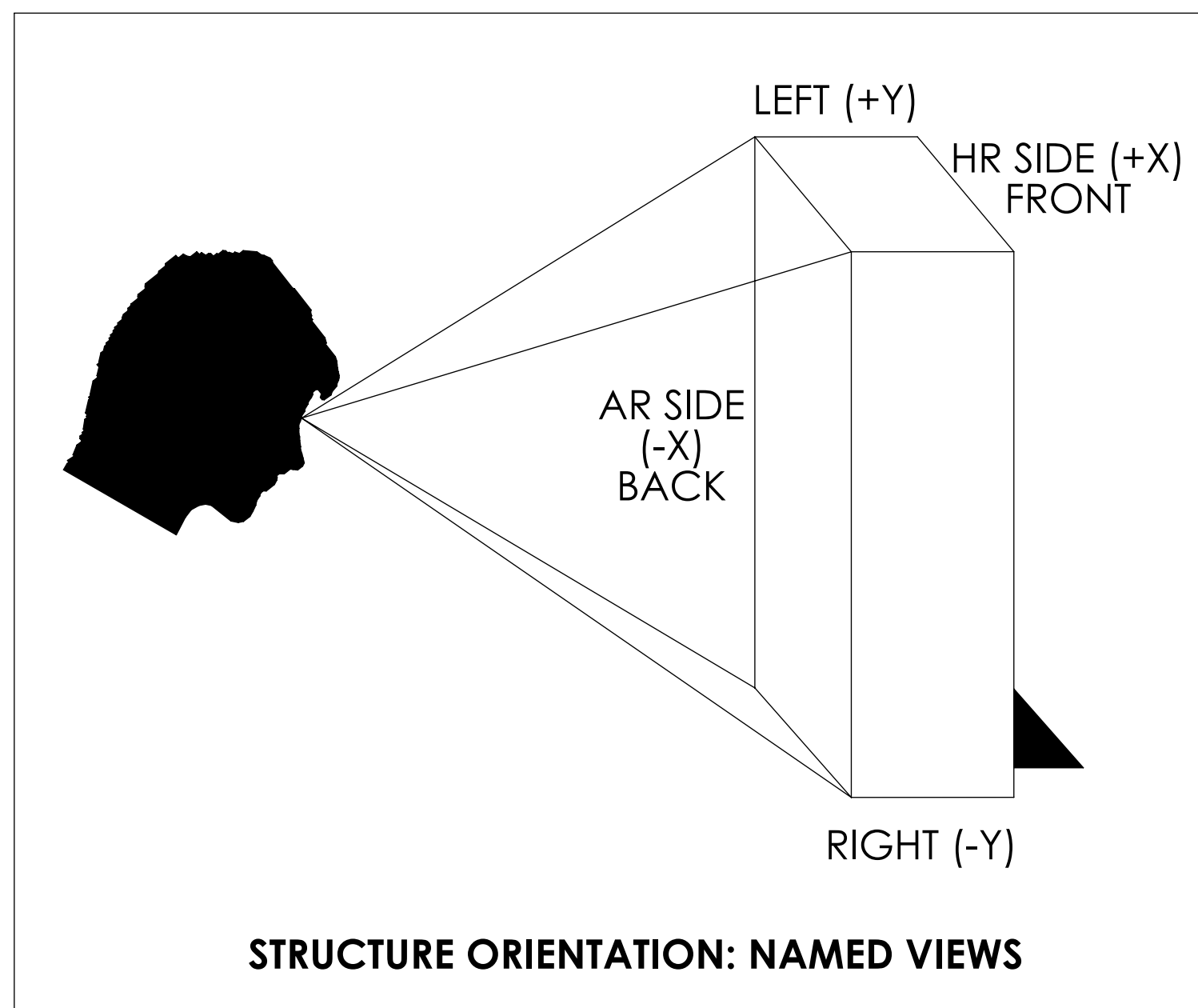
TOP VIEW  
(SEE SHEET 3, FOR DOG CLAMP DETAILS)



HR SIDE - FRONT



BOTTOM VIEW A-A



STRUCTURE ORIENTATION: NAMED VIEWS

LOCAL COORDINATES - REFERENCE

| Xmm  | Ymm   | Zmm   | YAW °   |
|------|-------|-------|---------|
| 49.5 | 720.0 | -97.4 | 134.33° |

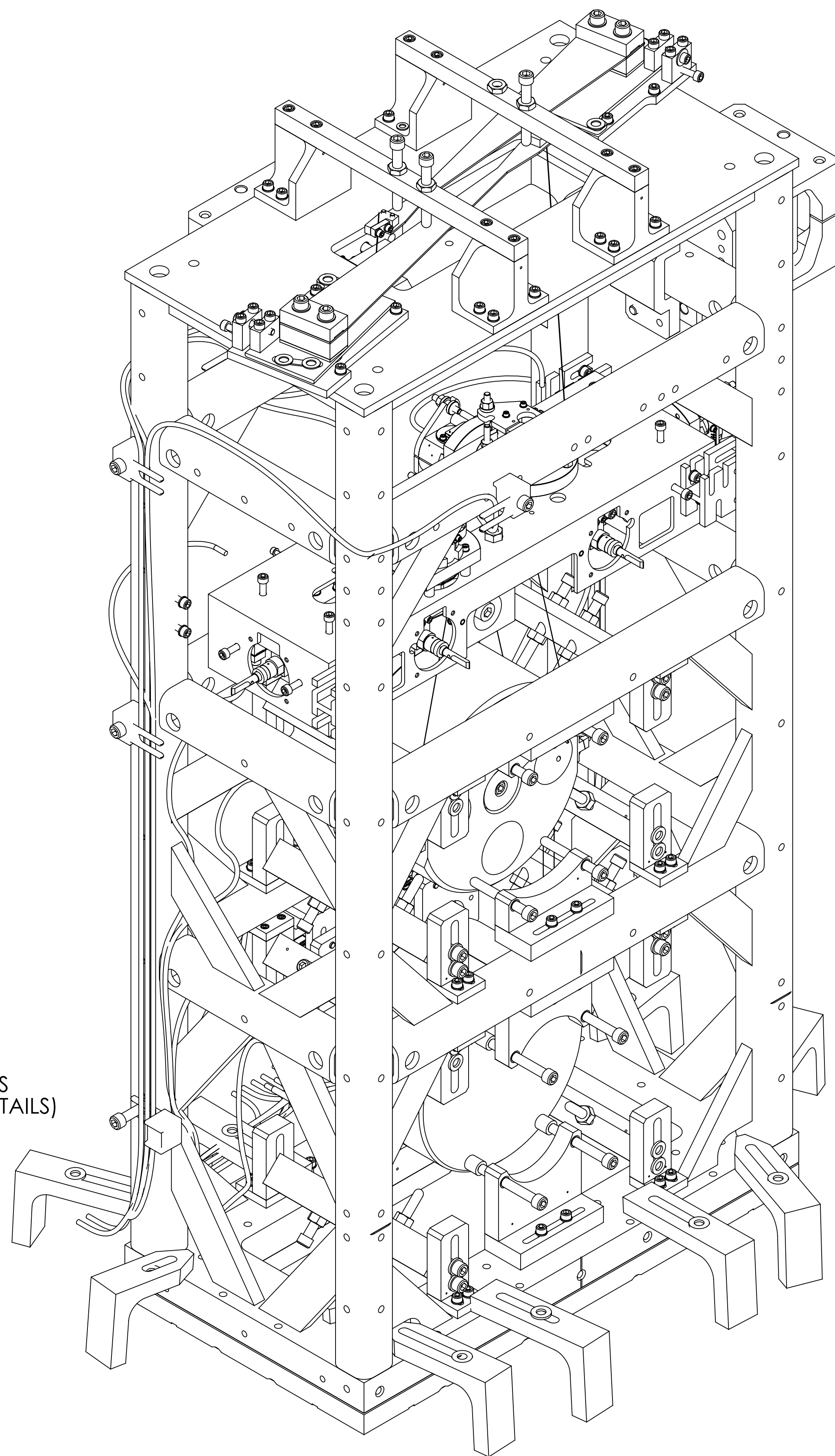
REFER TO DRAWING D1101251 FOR HAM2-H1  
INSTALLATION PLATE LAYOUT

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

TABLE 1: HAM2-H1 MC3 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-4 (SECOND)    | A           | D1000234       | 60                     |
|           | M2-LL (N)          |                  | B           |                |                        |
|           | M2-UR (N)          |                  | C           |                |                        |
|           | M2-LR (S)          |                  | D           |                |                        |
| 3         | M1-T3 (N)          | CB-4 (THIRD)     | A           | D1000234       | 66                     |
|           | M1-LF (N)          |                  | B           |                |                        |
|           | M1-RT (S)          |                  | C           |                |                        |
|           | M1-SD (S)          |                  | D           |                |                        |
| 4         | M1-T1 (S)          | CB-5 (FIRST)     | C           | D1000234       | 78                     |
|           | M1-T2 (S)          |                  | D           |                |                        |

NOTE : ROUTE NO. 4 IS A SHARED CABLE, SEE D0901088 FOR QP LEGS 'A' AND 'B' ROUTING

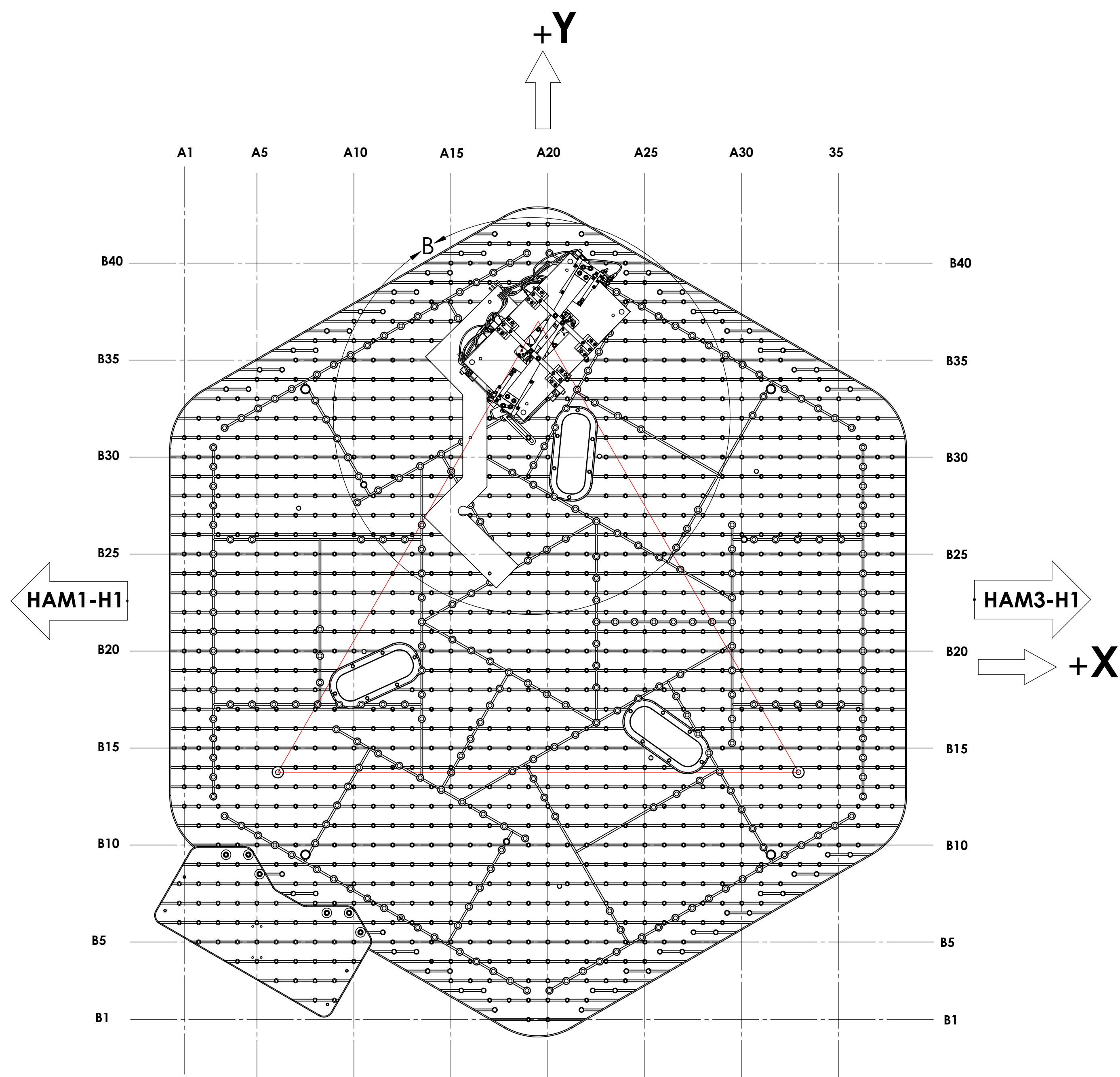


ISO VIEW

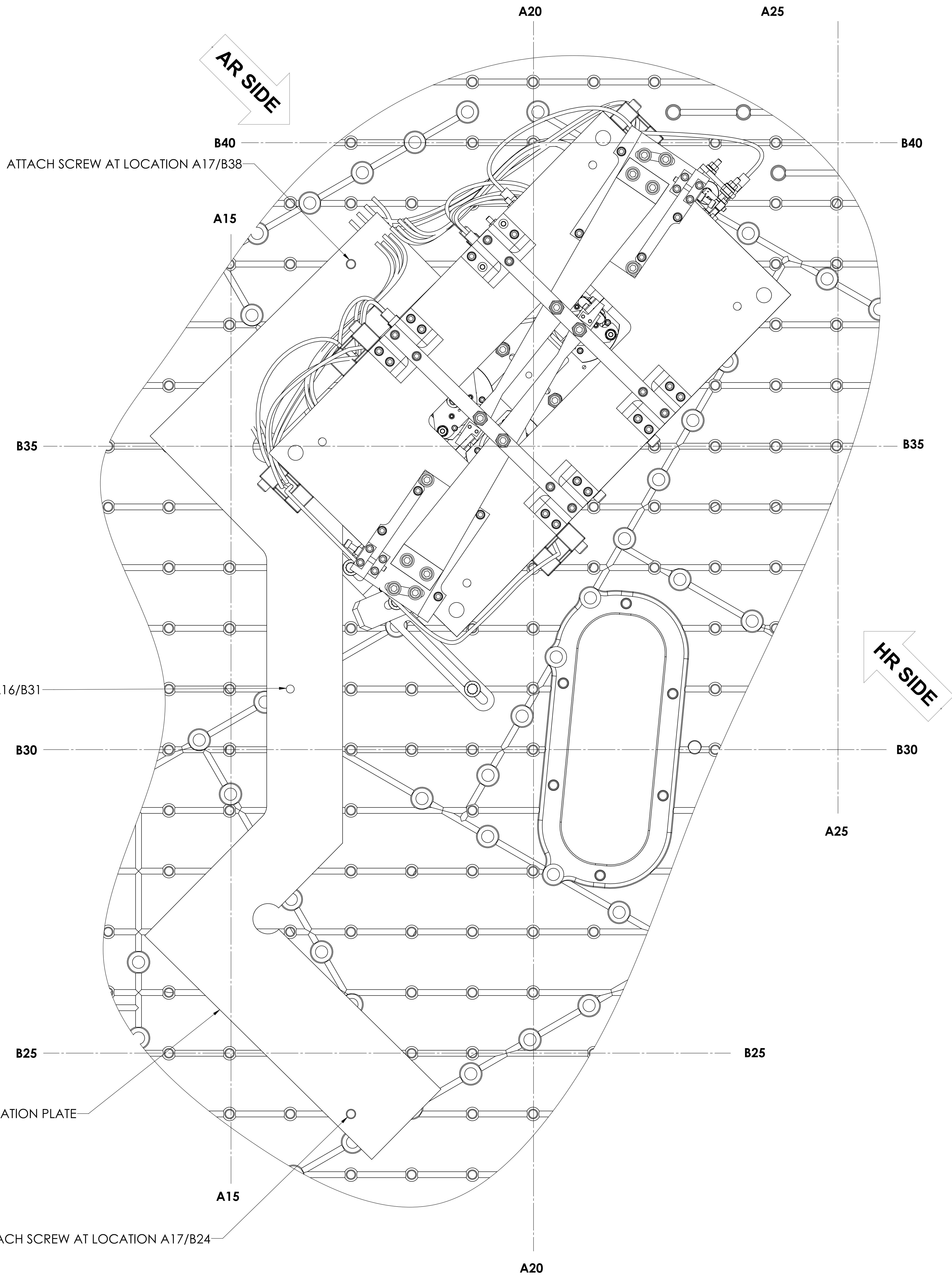
|          |              |  |             |      |
|----------|--------------|--|-------------|------|
| 17       | 2AL1.75-12SL | 1/4-20 X 1.75 12PT BOLT                                | 450 SSTL    | 1    |
| 16       | 2AL1.25-12SL | 1/4-20 X 1.25 12PT BOLT                                | 450 SSTL    | 3    |
| 15       | D1201158     | ALIGO, SUS, DOG CLAMP SUPPORT (CUSTOM)                 | AS NOTED    | 1    |
| 14       | D1201157-2   | ALIGO, SUS, DOG CLAMP CHAMFERED ENDS, 1.792 H (CUSTOM) | 304 SSTL    | 1    |
| 13       | D1201156-2   | ALIGO, SUS, Z-CLAMP CHAMFERED ENDS, 1.818 H (H1)       | 304 SSTL    | 1    |
| 12       | D0902462     | CLAMP ASSY., UHV COMPATIBLE                            | N/A         | A/R  |
| 11       | D1101376     | MC3 H1 OPTICS ASSEMBLY                                 | N/A         | 1    |
| 10       | D1100785-530 | WASHER, FLAT., .25 X .530 O.D.                         | NITRONIC 60 | 15   |
| 9        | 2AL2.75-12SL | 1/4-20 X 2.75 12PT BOLT                                | 450 SSTL    | 11   |
| 8        | FA-2016-NA   | .25-20 X 1 FHSC SCREW UC COMPONENTS FA-2016-NA         | 18-8 SSTL   | 30   |
| 7        | D1100641-06  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80L | 304 SSTL    | 1    |
| 6        | D1100641-05  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80M | 304 SSTL    | 4    |
| 5        | D1100641-04  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80S | 304 SSTL    | 2    |
| 4        | D1001376-05  | AdvLIGO HAM Optics Table Dog Clamp 1.8M                | 304 SSTL    | 4    |
| 3        | D1002424     | VIBRATION ABSORBER ASSEMBLY                            | N/A         | 2    |
| 2        | D1001070     | HSTS SUS STRUCTURE SPACER 15.8MM                       | 6061-T6 Al  | 1    |
| 1        | D020700      | HSTS OVERALL ASSEMBLY                                  | N/A         | 1    |
| ITEM NO. | PART NUMBER  | DESCRIPTION  | MATERIAL    | QTY. |

| NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED) |  |  |  | PARTS LIST   |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  | PART NAME<br>HAM2-H1, XYZ Local CS for HSTS (MC3) Sub-Assy |  |  |  |
|  |  |  |  | SYSTEM<br>ADVANCED LIGO                                    |  |  |  |
|  |  |  |  | SUB-SYSTEM<br>SUS  |  |  |  |
|  |  |  |  | NEXT ASSY<br>D0901083                                      |  |  |  |
|  |  |  |  | FINISH<br>N/A μinch  |  |  |  |
|  |  |  |  | PART NAME<br>HAM2-H1, XYZ Local CS for HSTS (MC3) Sub-Assy |  |  |  |
|  |  |  |  | DESIGNER<br>E.SANCHEZ                                      |  |  |  |
|  |  |  |  | DRAFTER<br>SEE DCC   |  |  |  |
|  |  |  |  | CHECKER<br>SEE DCC   |  |  |  |
|  |  |  |  | APPROVAL<br>SEE DCC  |  |  |  |
|  |  |  |  | SIZE<br>E  |  |  |  |
|  |  |  |  | DWG. NO.<br>D0901089                                       |  |  |  |
|  |  |  |  | SCALE<br>1:2   |  |  |  |
|  |  |  |  | PROJECTION<br>FIRST ANGLE                                  |  |  |  |
|  |  |  |  | SHEET 1 OF 10  |  |  |  |





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

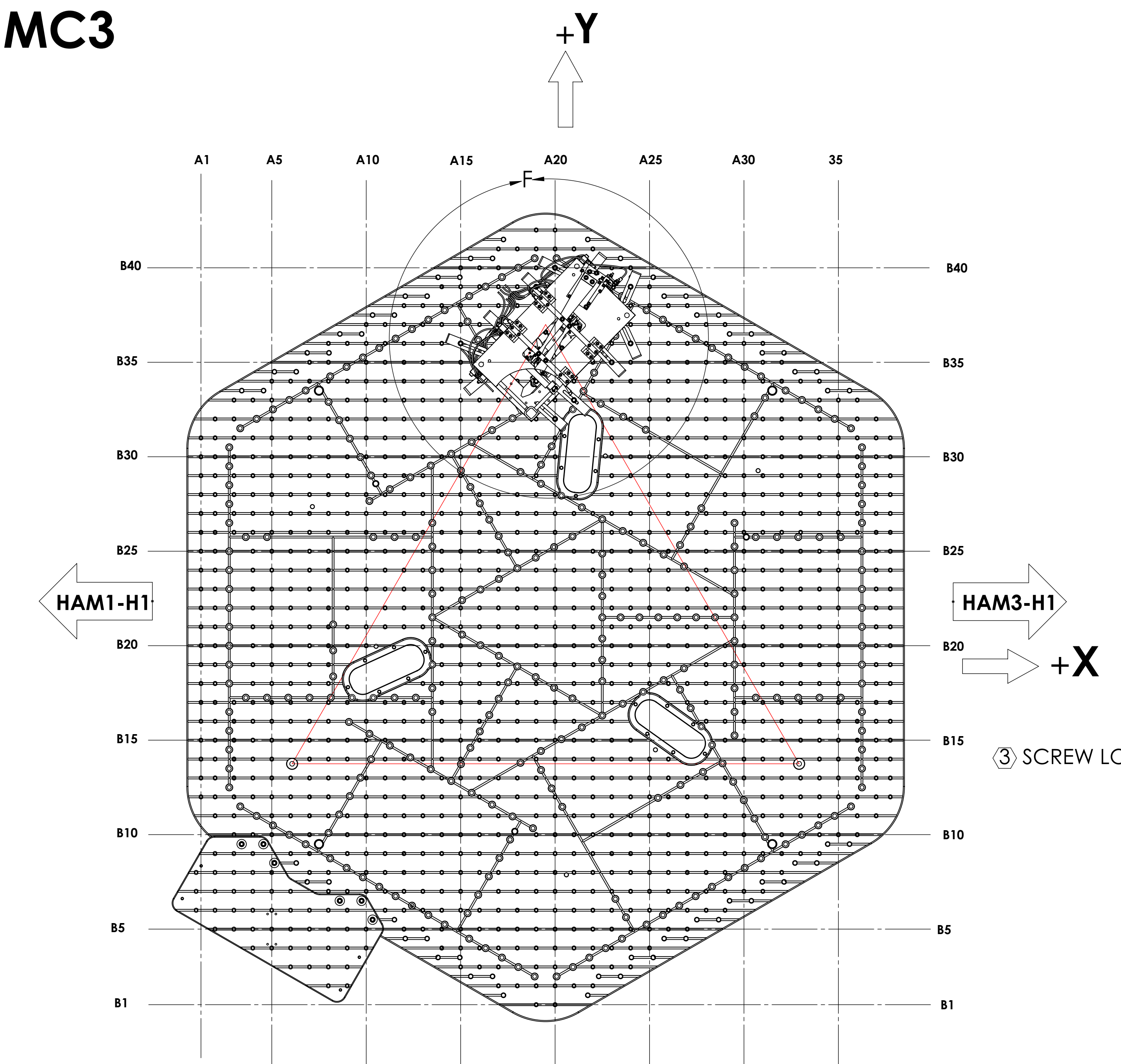


DETAIL B  
SCALE 1 : 1.5

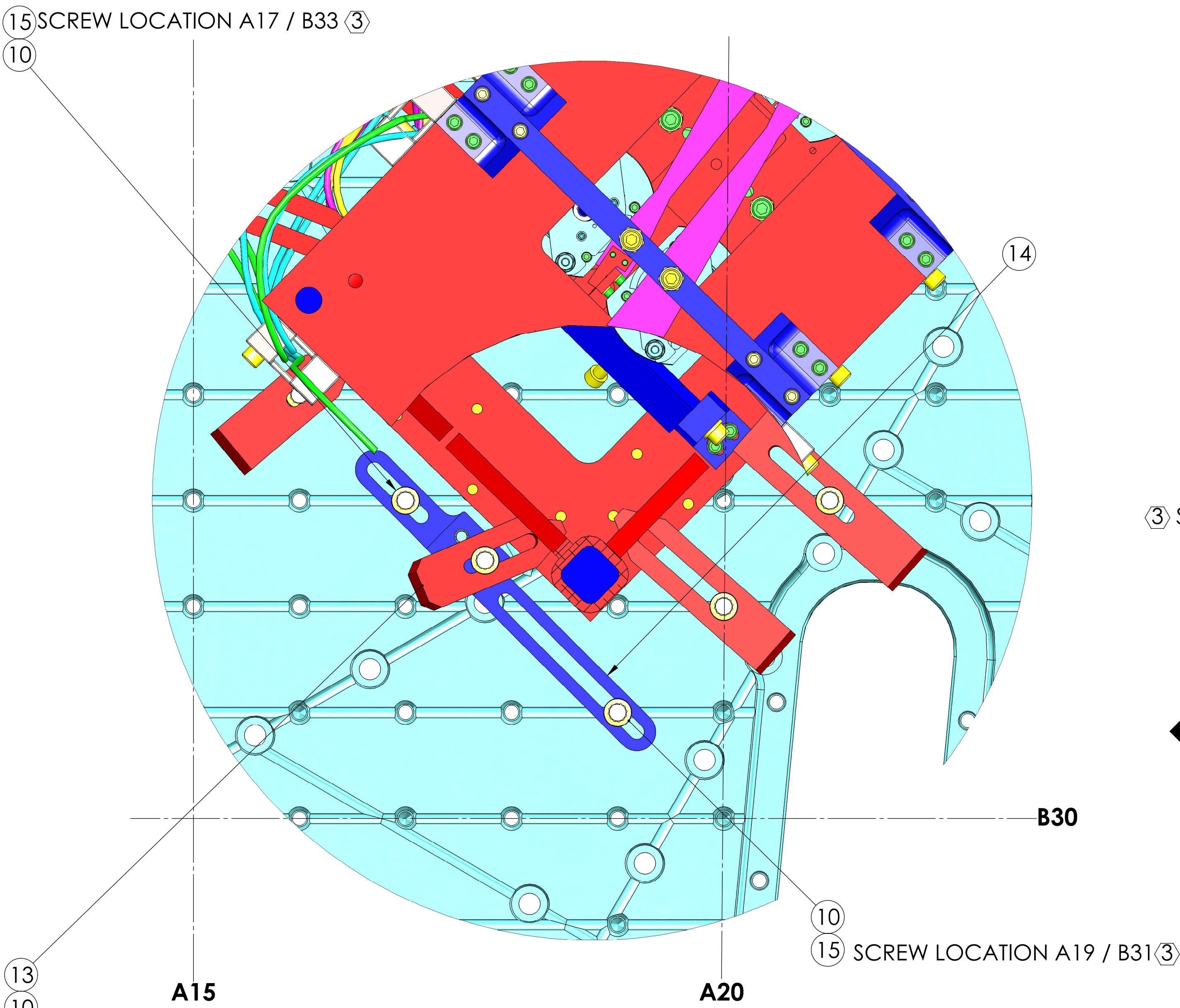
TOP VIEW SHOWING INSTALLATION PLATE LOCATION 1.6  
OPTICAL TABLE SHOWN FOR STRUCTURE LOCATION AND ORIENTATION  
DOG CLAMPS VIBRATION ABSORBERS AND HARDWARE REMOVED FOR CLARITY

ALIGNMENT PLATE INSTALLATION / LOCATION





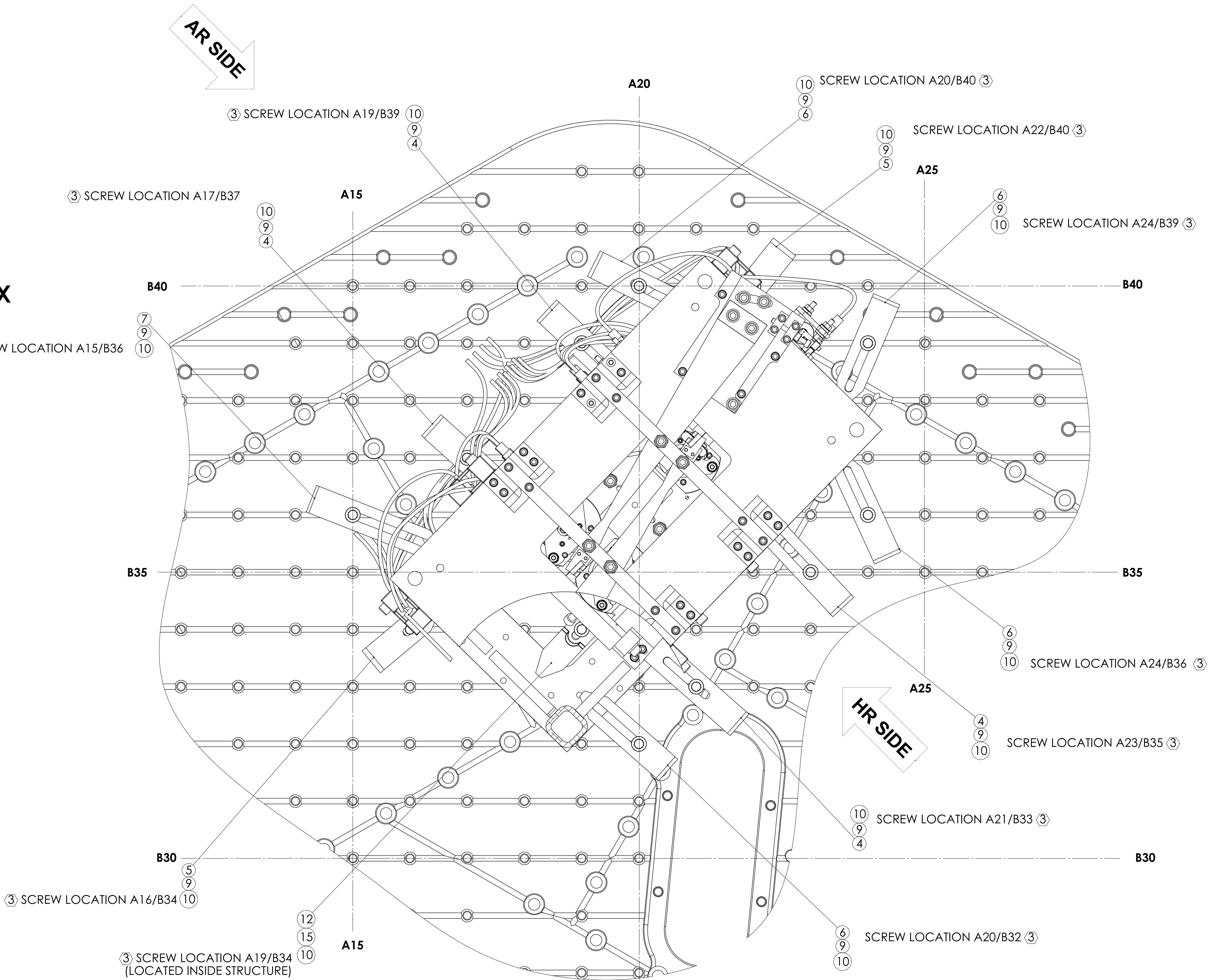
TOP VIEW 1.6  
REF. TRIANGLE: SEE G1000125  
FOR ISI NAMING AND ORIENTATION CONVENTION



ALTERNATE CLAMPING METHOD

DOG CLAMP IDENTIFICATION / INSTALLATION

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



OR

TOP VIEW SHOWING DOG CLAMP INSTALLATION  
OPTICAL TABLE SHOWN FOR STRUCTURE AND DOG CLAMP  
LOCATIONS AND ORIENTATION ONLY.  
VIBRATION ABSORBERS REMOVED FOR CLARITY

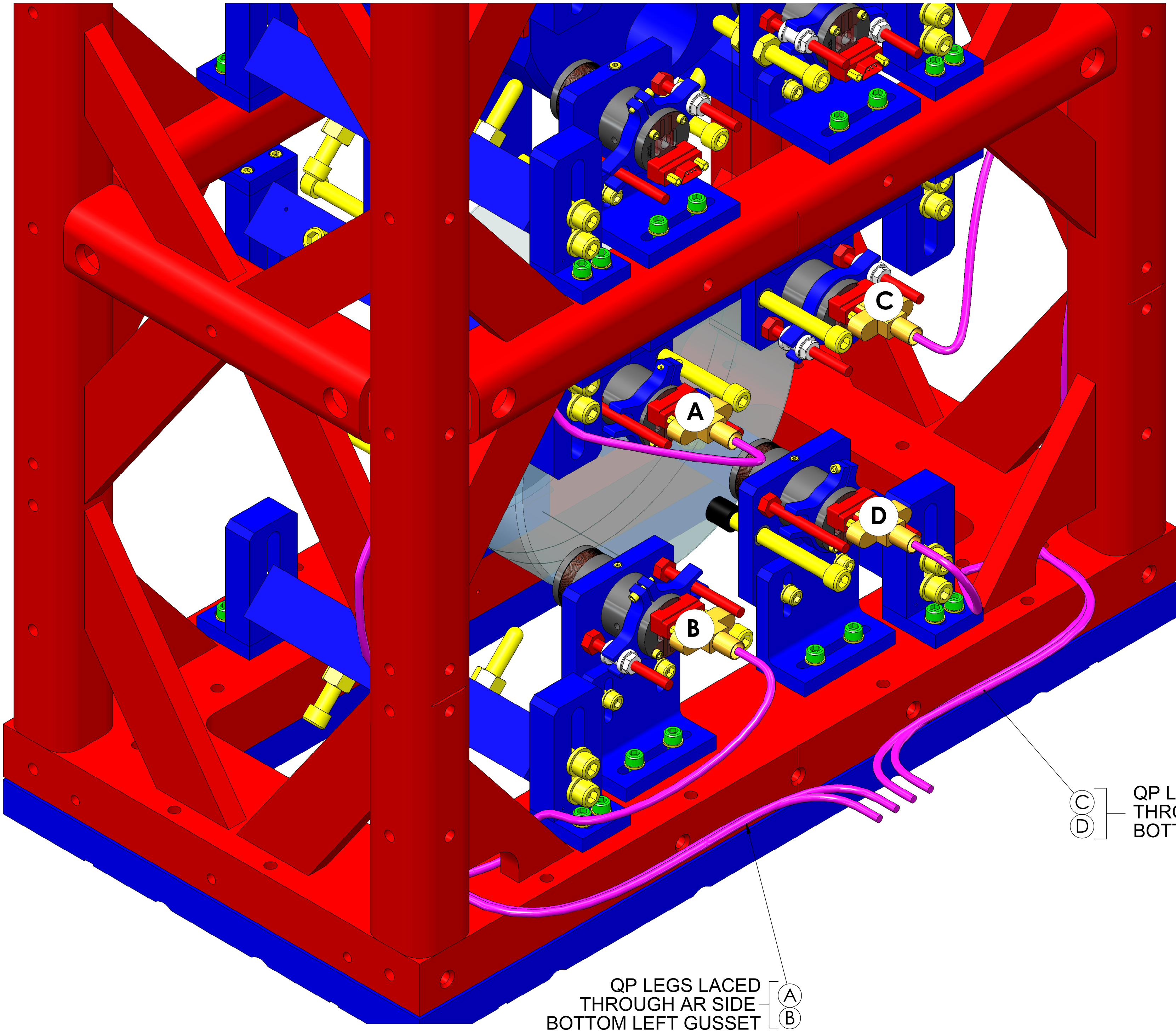
DETAIL F  
SCALE 1 : 1.5

|          |              |  |             |      |
|----------|--------------|--|-------------|------|
| 16       | 2AL1.75-12SL | 1/4-20 X 1.75 12PT BOLT                                | 450 SSSL    | 1    |
| 15       | 2AL1.25-12SL | 1/4-20 X 1.25 12PT BOLT                                | 450 SSSL    | 3    |
| 14       | D1201158     | ALIGO, SUS, DOG CLAMP SUPPORT (CUSTOM)                 | AS NOTED    | 1    |
| 13       | D1201157-2   | ALIGO, SUS, DOG CLAMP CHAMFERED ENDS, 1.792 H (CUSTOM) | 304 SSSL    | 1    |
| 12       | D1201156-2   | ALIGO, SUS, Z-CLAMP CHAMFERED ENDS, 1.818 H (H1)       | 304 SSSL    | 1    |
| 10       | D1100785-530 | WASHER, FLAT, .25 X .530 O.D.                          | NITRONIC 60 | 15   |
| 9        | 2AL2.75-12SL | 1/4-20 X 2.75 12PT BOLT                                | 450 SSSL    | 11   |
| 7        | D1100641-06  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80L | 304 SSSL    | 1    |
| 6        | D1100641-05  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80M | 304 SSSL    | 4    |
| 5        | D1100641-04  | AdvLIGO HAM Optics Table Dog Clamp Chamfered End 1.80S | 304 SSSL    | 2    |
| 4        | D1001376-05  | AdvLIGO HAM Optics Table Dog Clamp 1.8M                | 304 SSSL    | 4    |
| ITEM NO. | PART NUMBER  | DESCRIPTION  | MATERIAL    | QTY. |

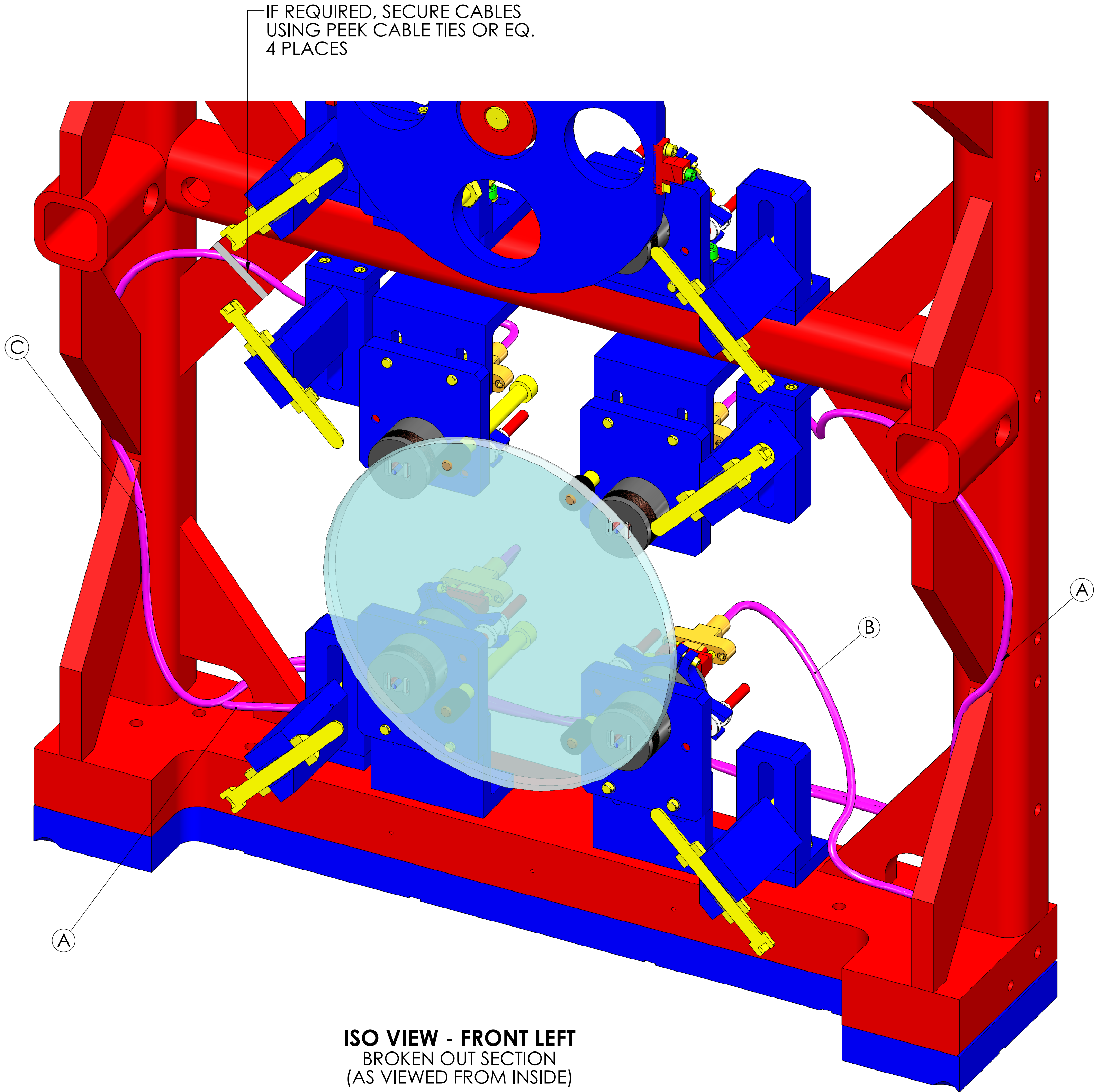
PARTIAL BOM (SEE SHEET 1 FOR COMPLETE BOM)



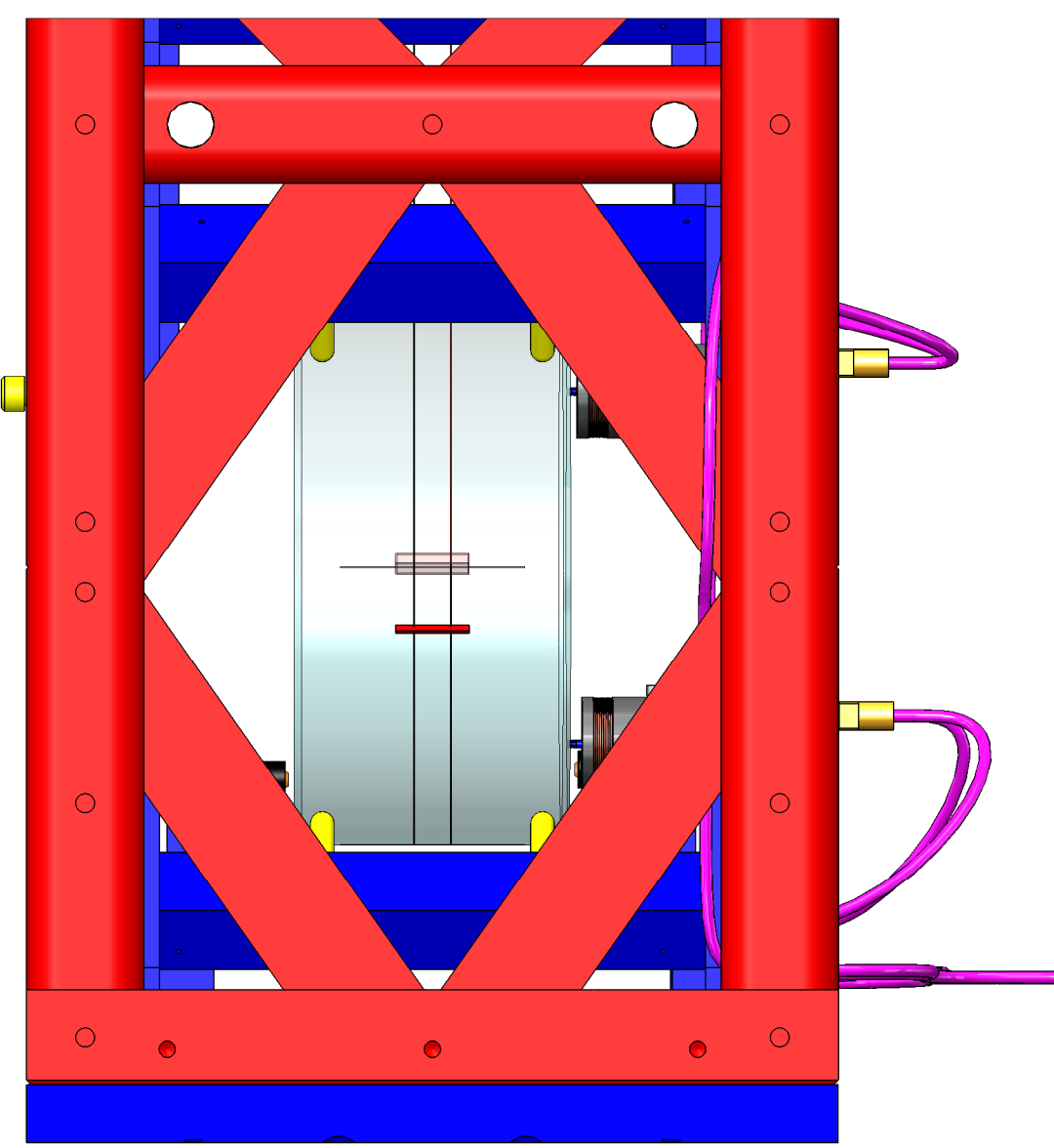
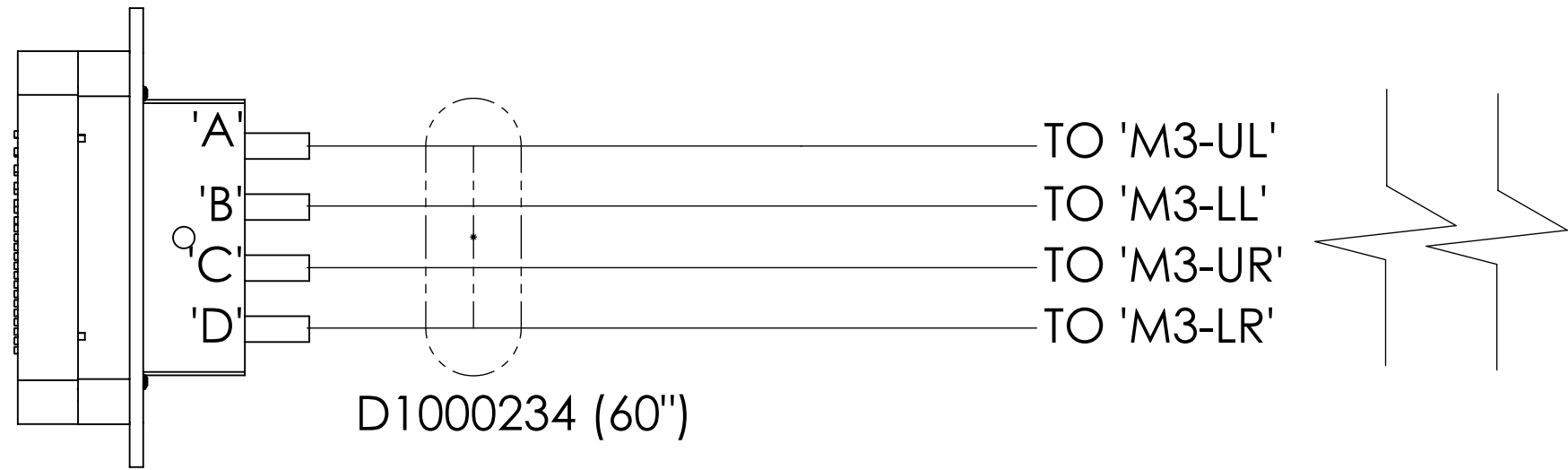
MC3



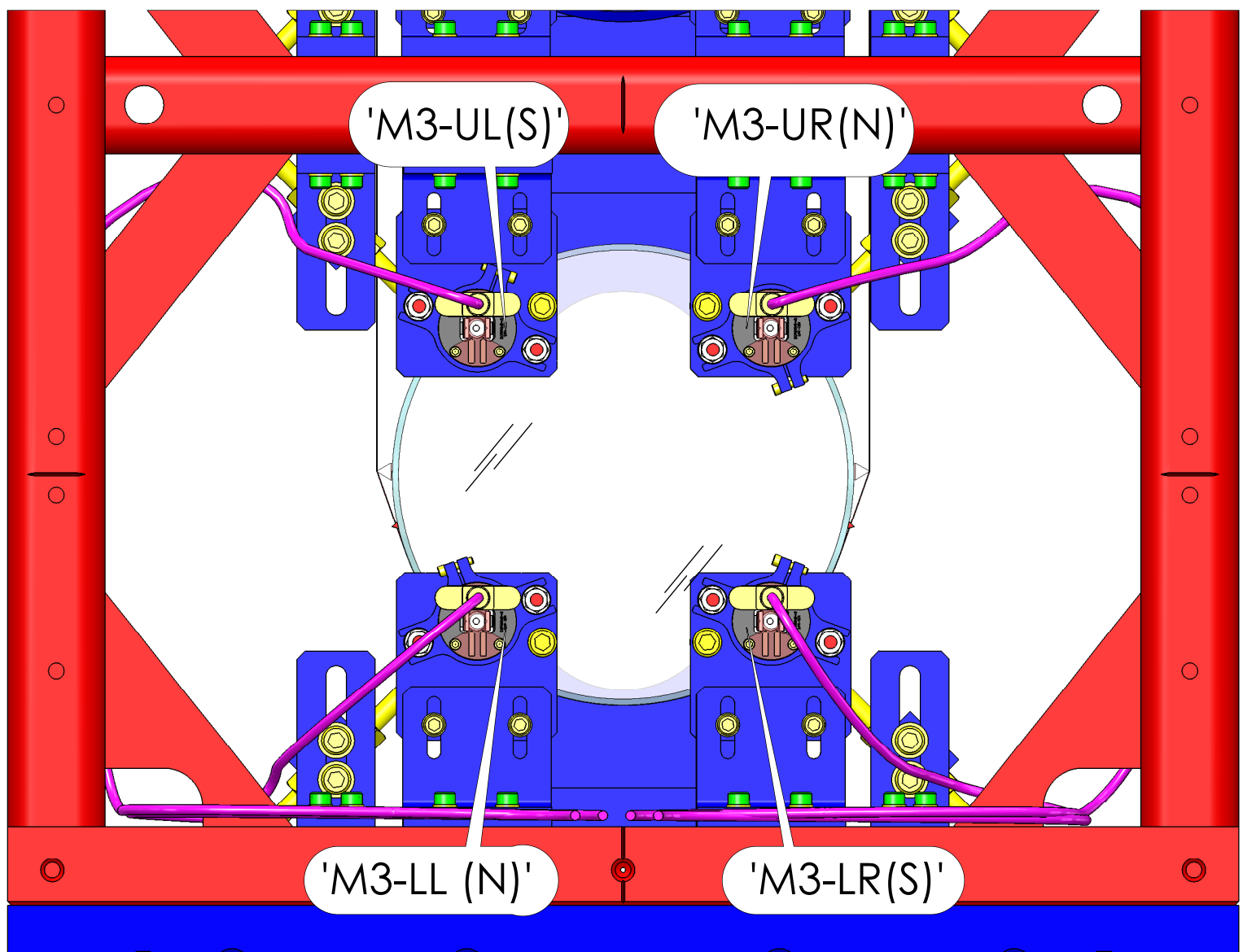
AR SIDE  
ISO VIEW - REAR (-X)



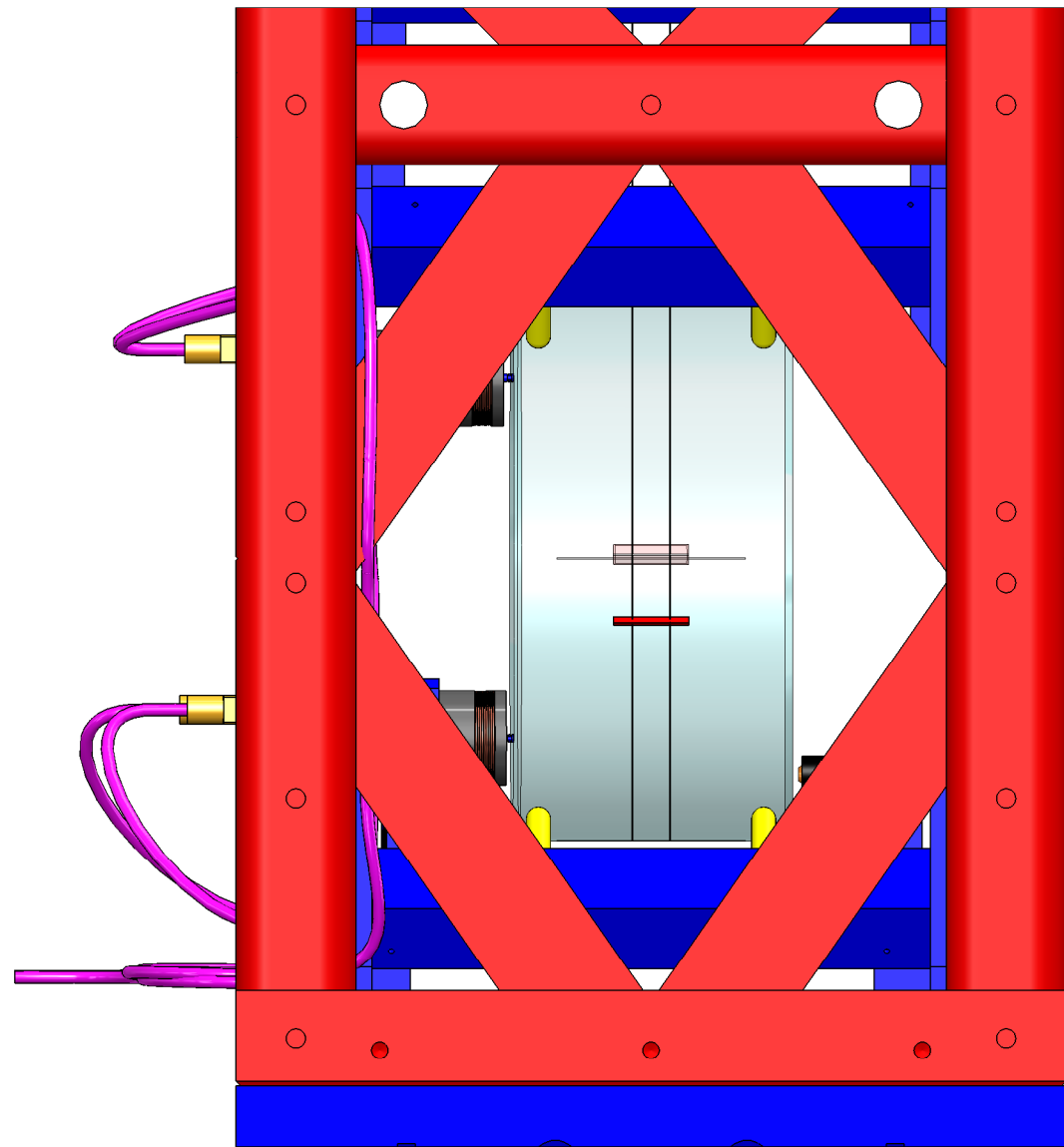
**CABLE ROUTING:**  
ROUTE ALL CABLES IN ACCORDANCE WITH LIGO-T1200203 AND T1200318. CABLE ROUTES DEPICTED IN THIS DOCUMENT ARE NOT MANDATORY, BUT RATHER A CONSIDERED ROUTE AIMED TO CLEAR LASER BEAM PATHS. ALTERNATE ROUTES FOR PROBLEMATIC AREAS ARE ACCEPTABLE, BUT SHOULD BE HANDLED IN A CASE BY CASE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



RIGHT SIDE (-Y)

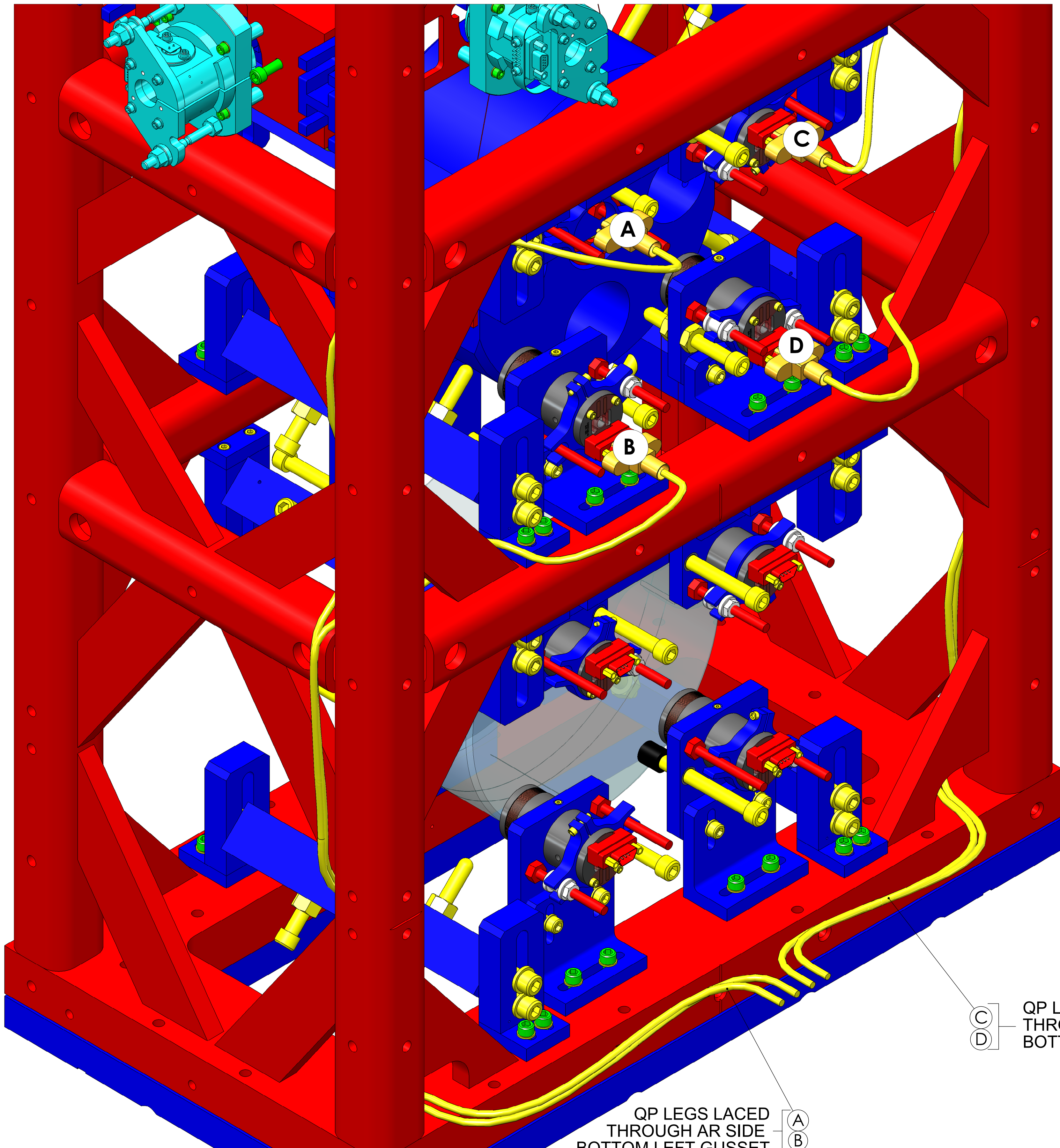
**ROUTE NO.1**  
SEE LIGO-T1200318  
FOR STEP BY STEP CABLING GUIDE

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.

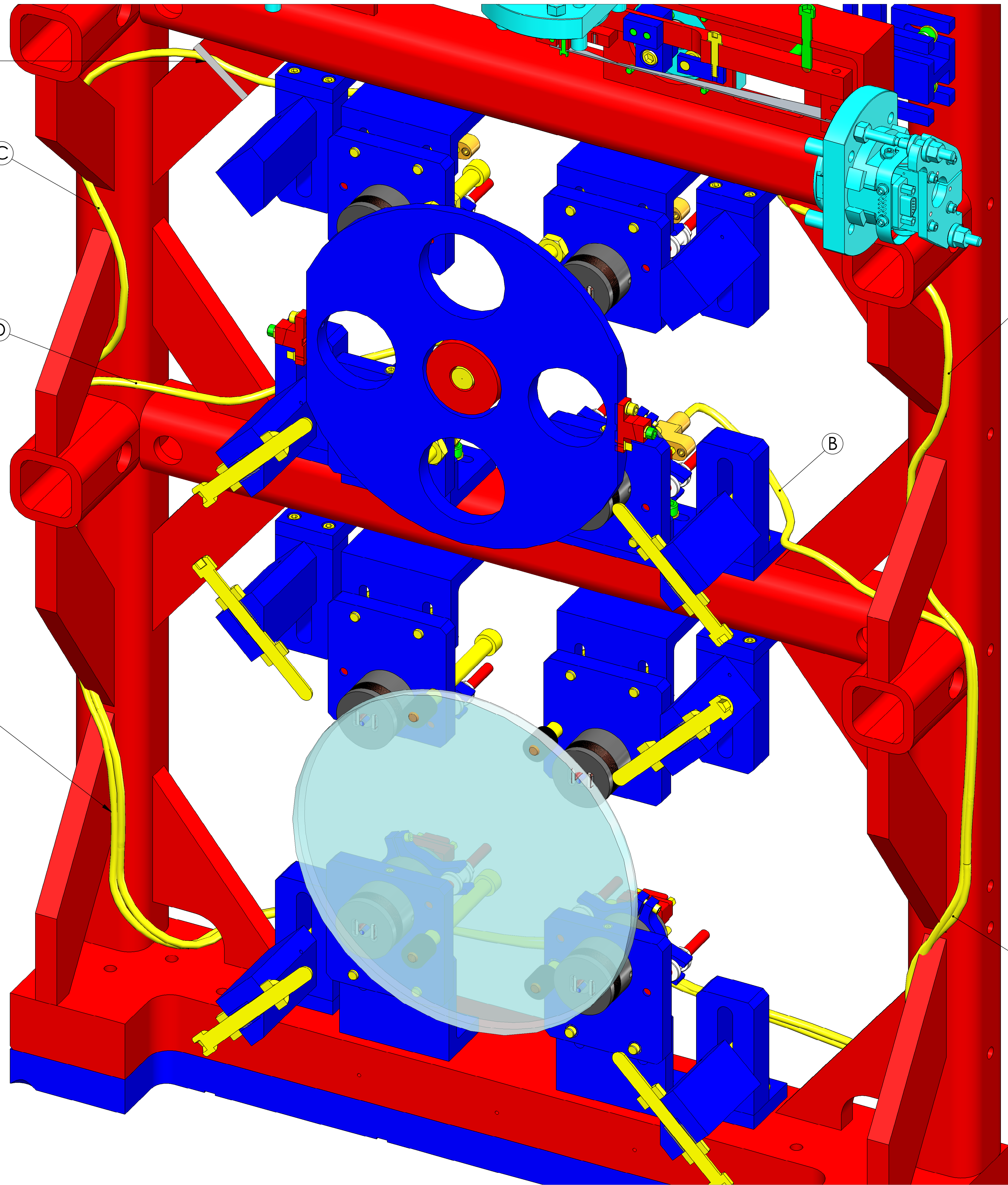


MC3

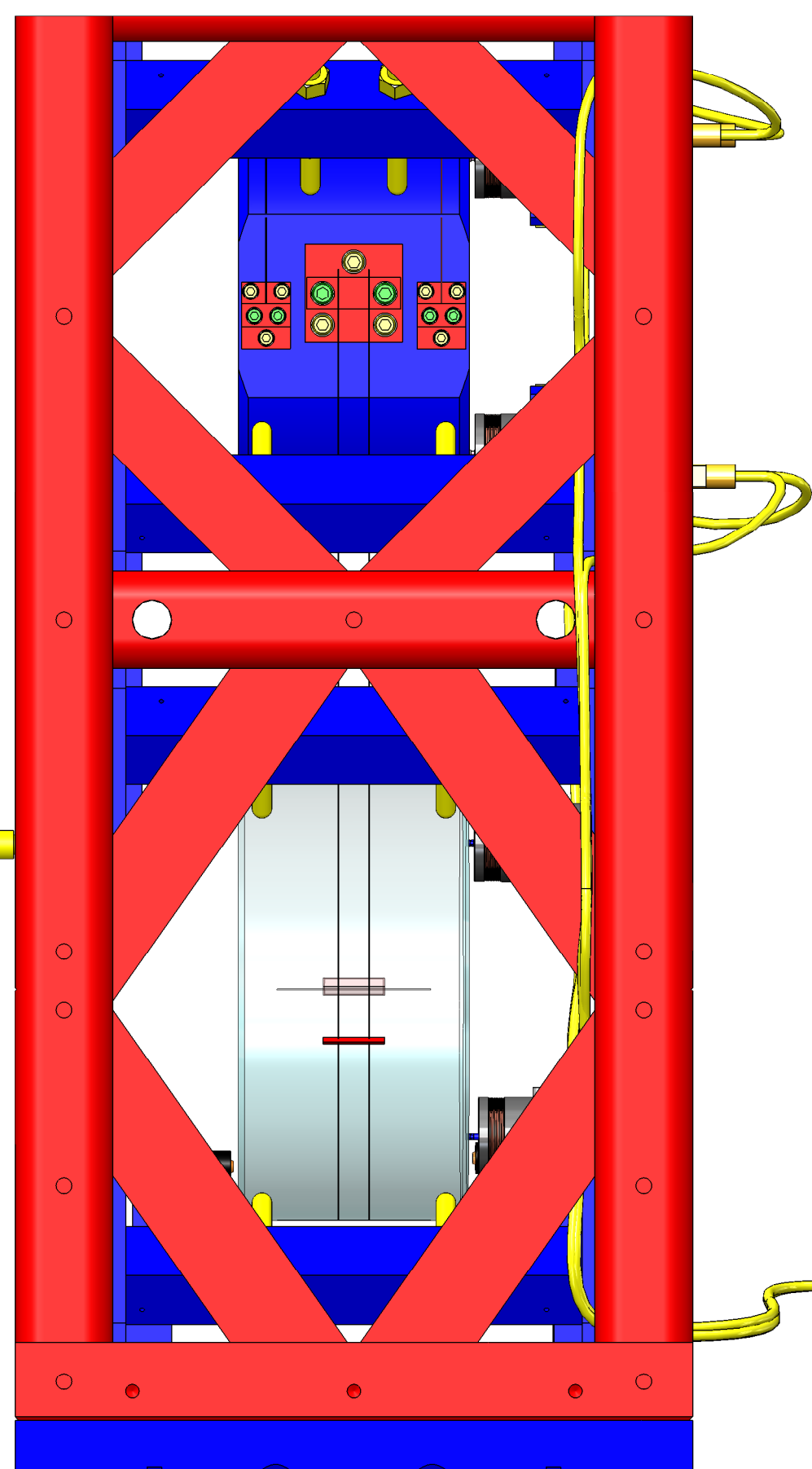
FOR SYSTEM CABLING DIAGRAM, CABLE BRACKET LOCATION/ORIENTATION WRT CHAMBER, & ROUTING LAYOUT SEE D1000581.



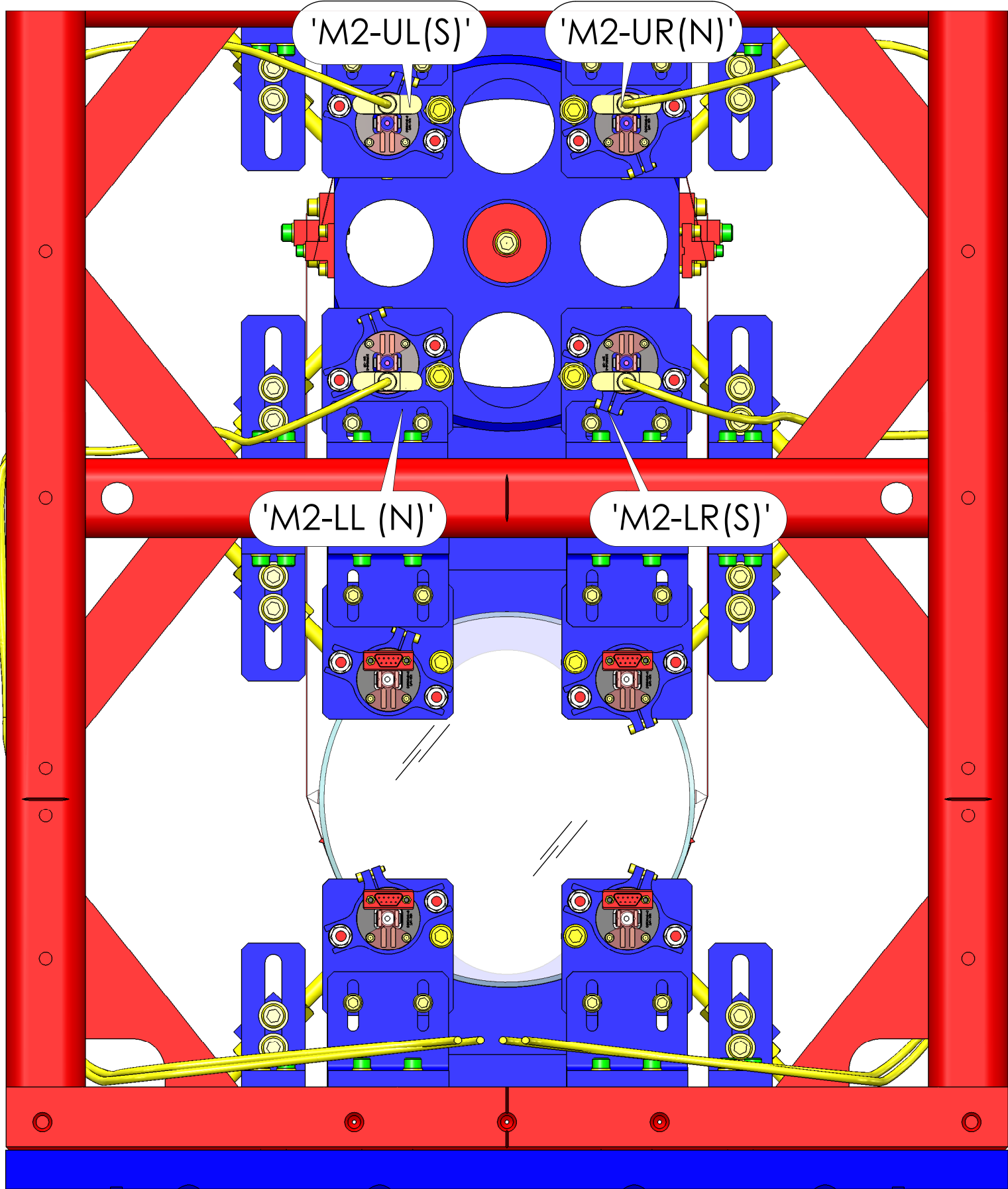
AR SIDE  
ISO VIEW - REAR (-X)



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



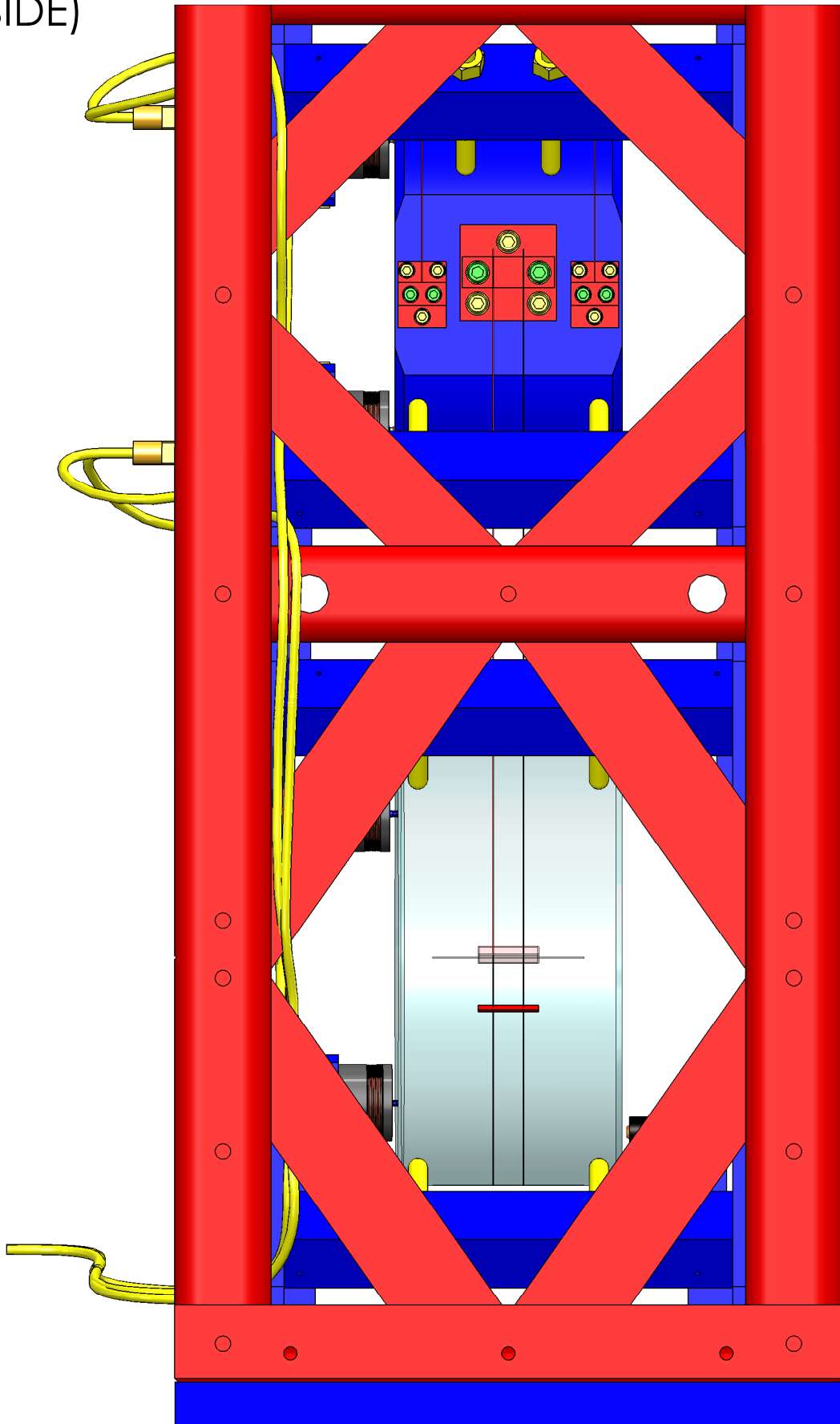
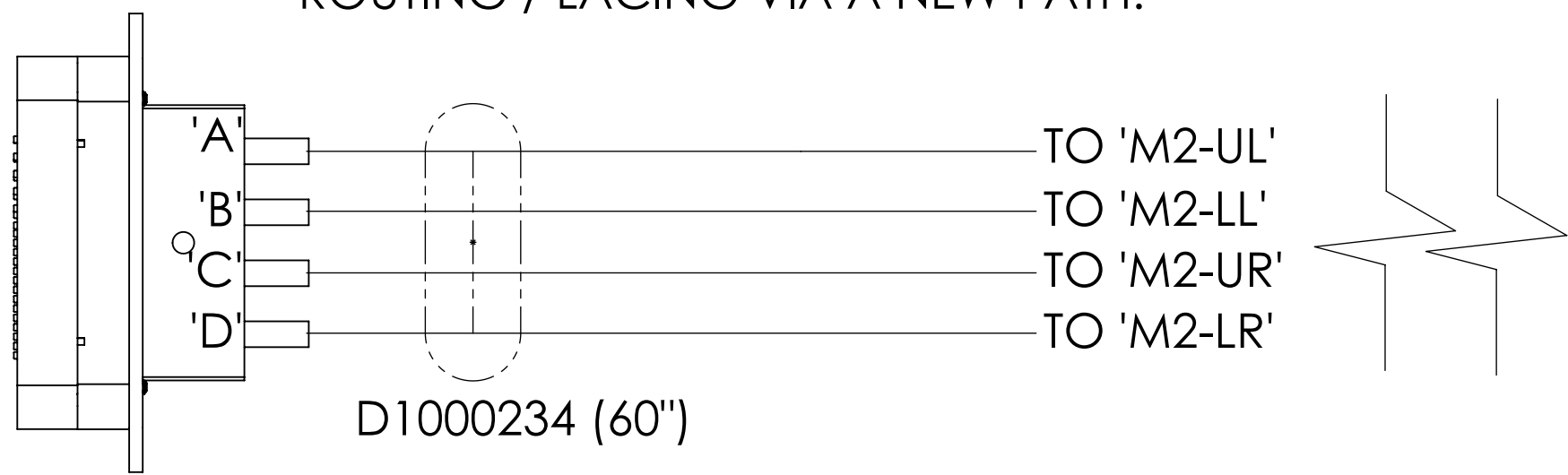
LEFT SIDE (+Y)



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



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LOCATION OF MATING CABLE BRACKET,  
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ROUTING / LACING VIA A NEW PATH.



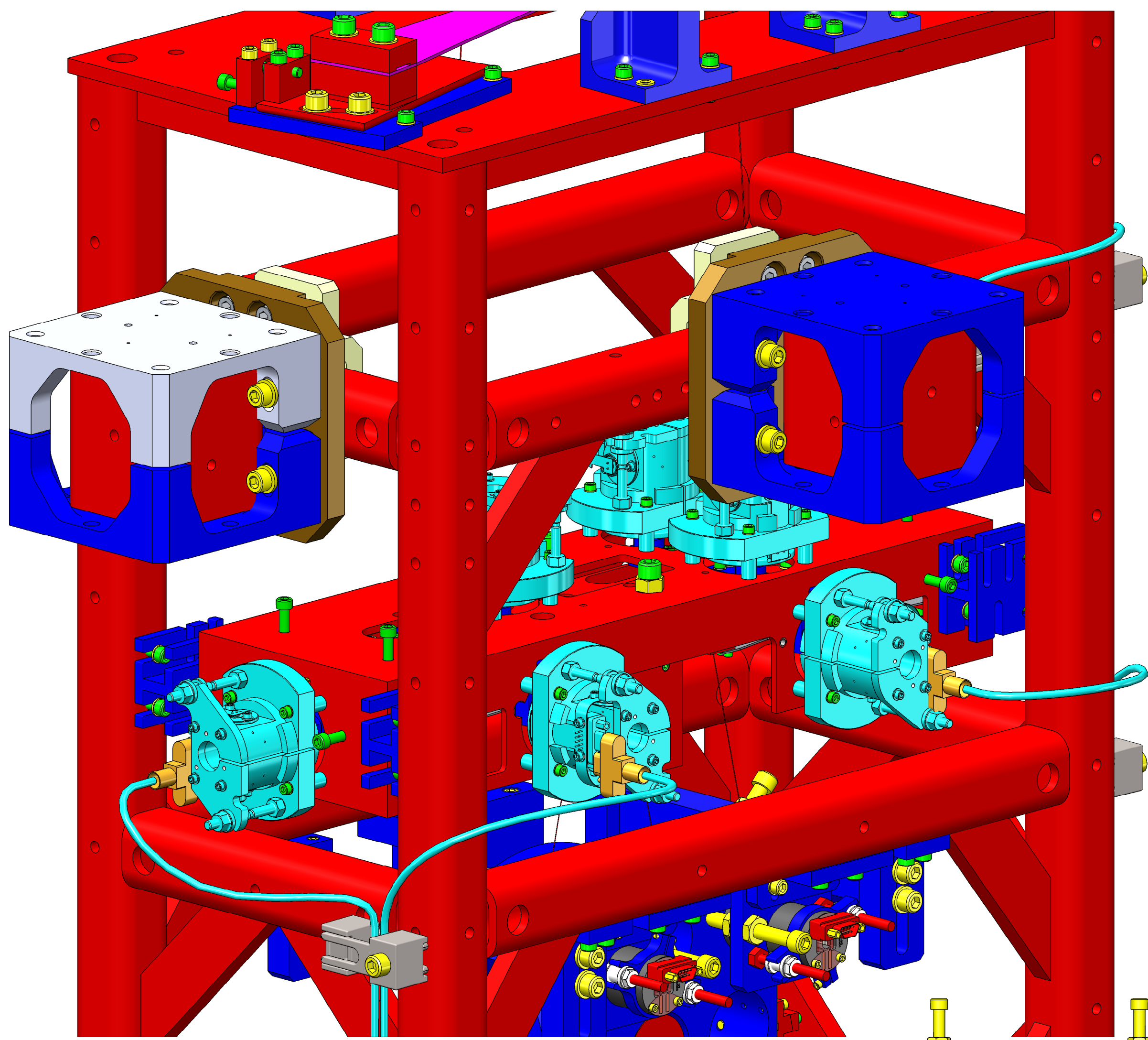
RIGHT SIDE (-Y)

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.

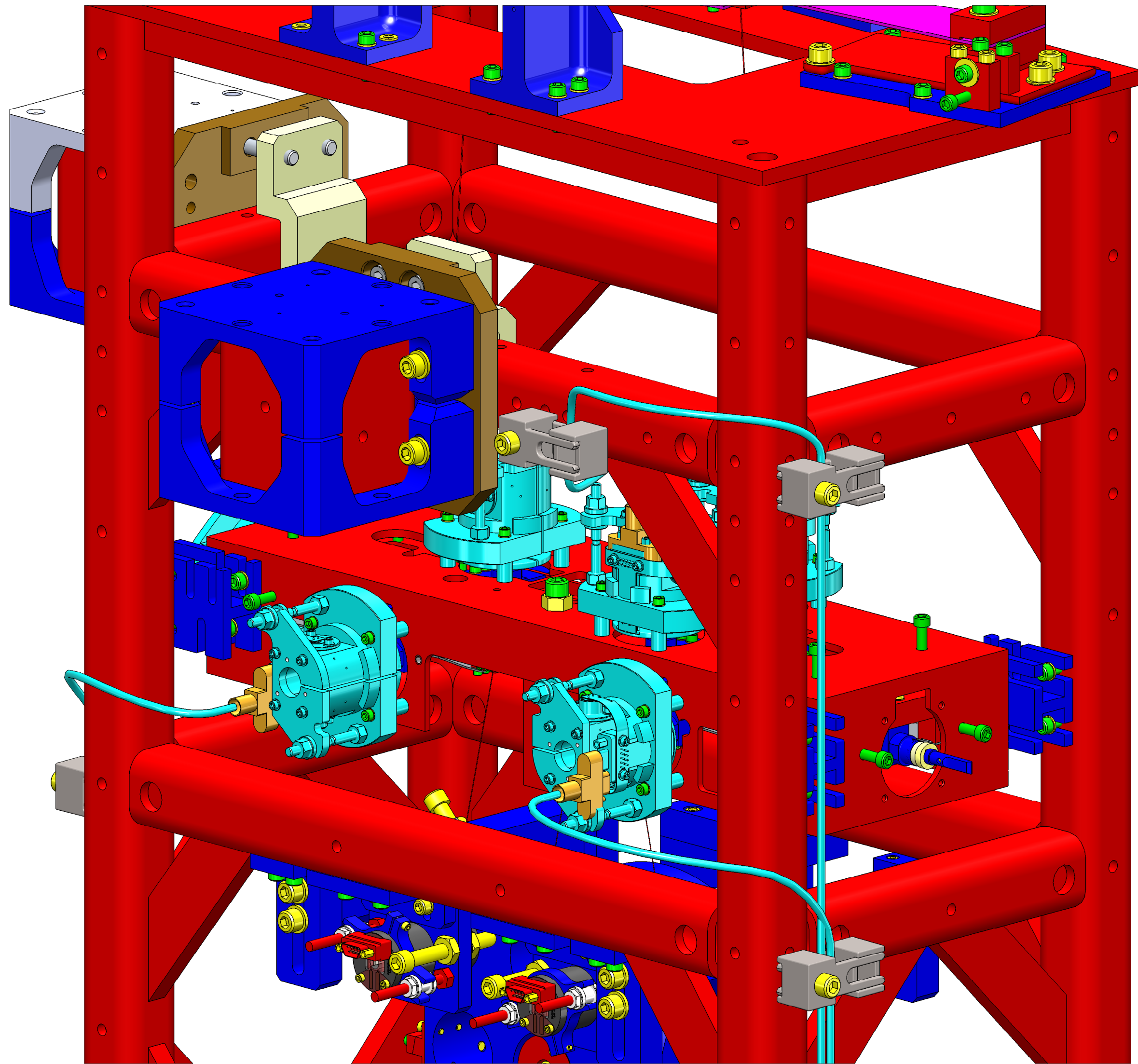
**ROUTE NO.2**  
SEE LIGO-T1200318  
FOR STEP BY STEP CABLING GUIDE



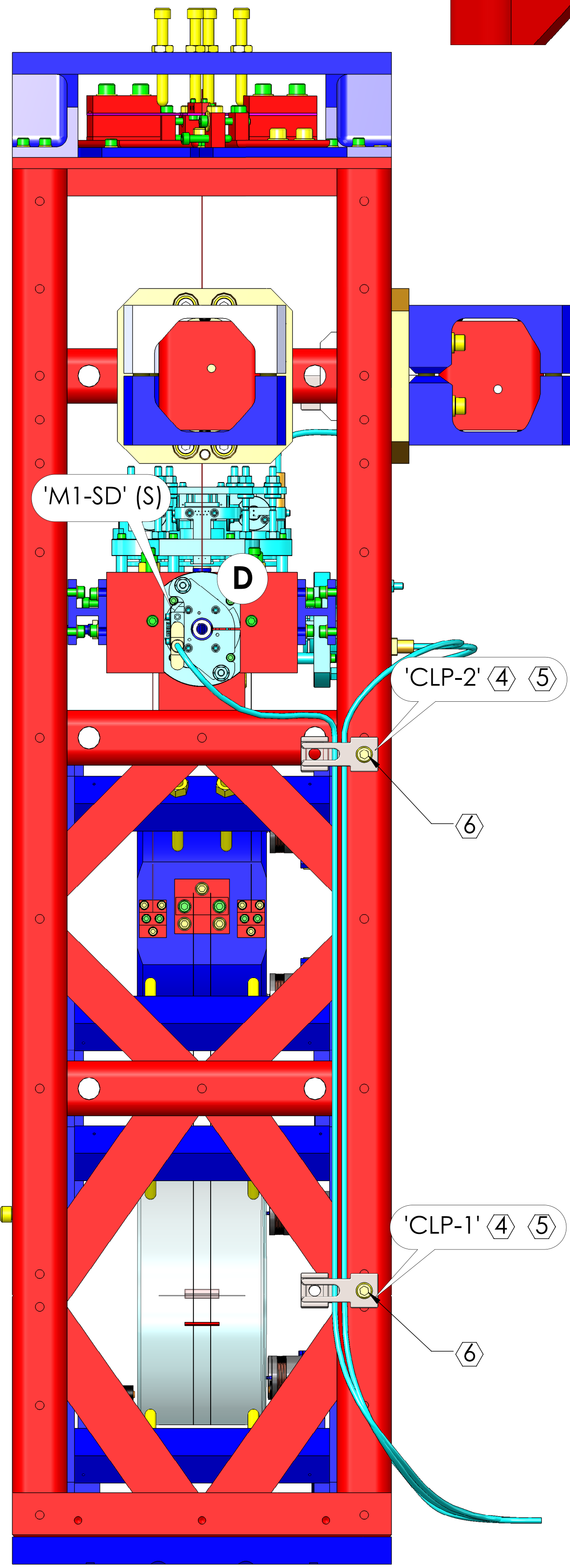
# MC3



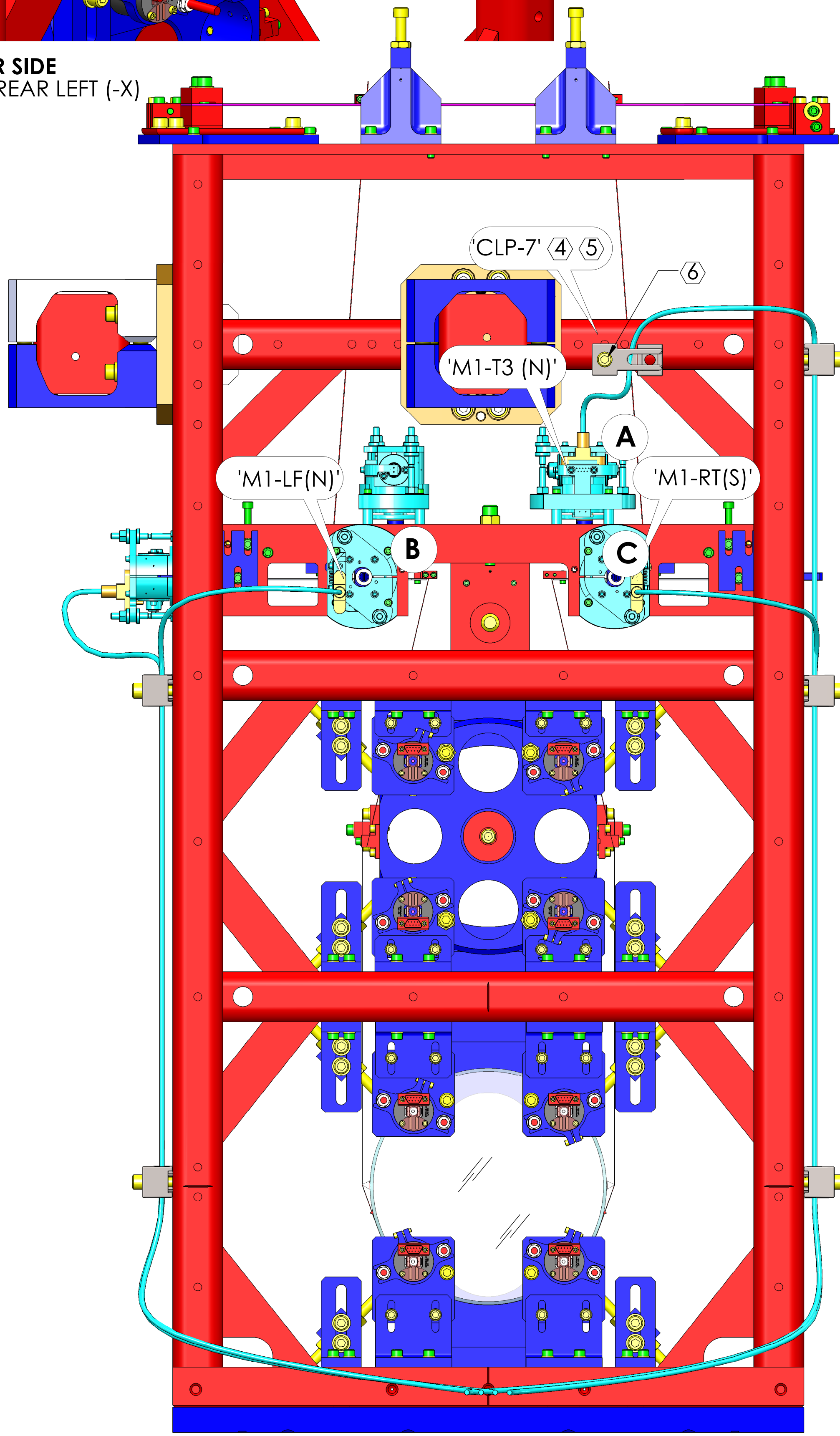
AR SIDE  
ISO VIEW-REAR LEFT (-X)



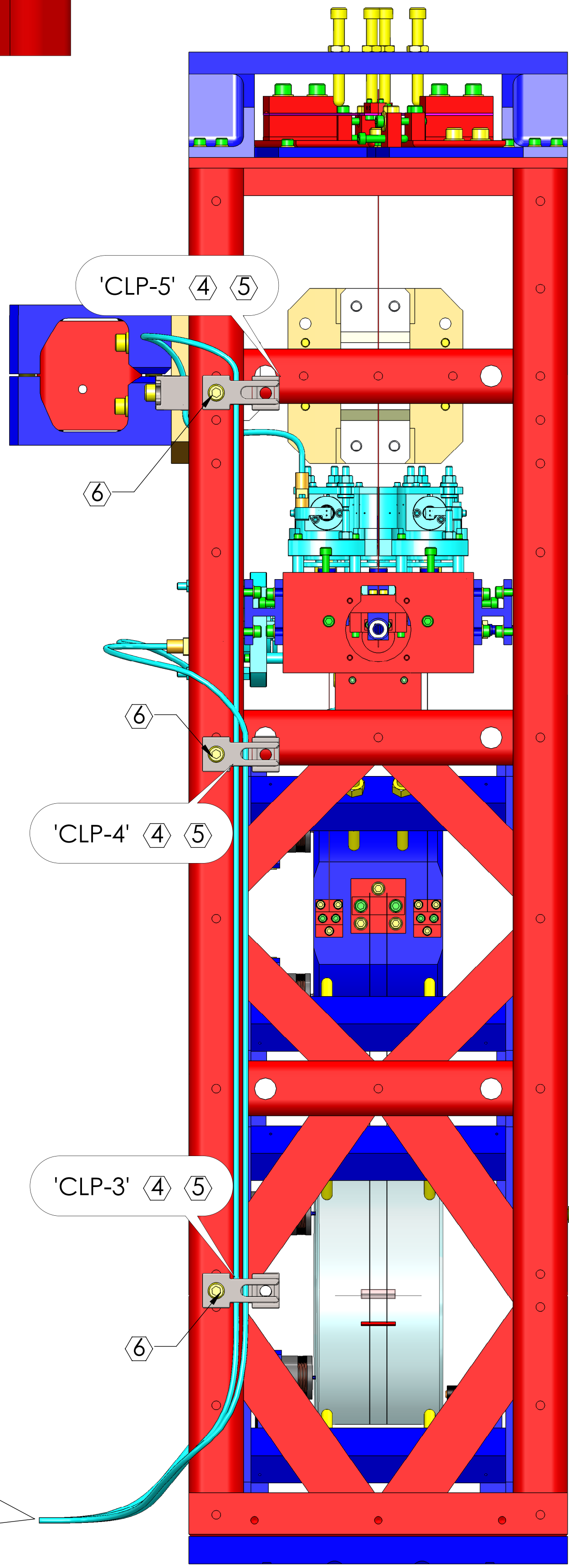
AR SIDE  
ISO VIEW-REAR RIGHT (-X)



LEFT SIDE (+Y)



AR SIDE - REAR (-X) (1) (2)  
(END CONNECTORS, NOT SHOWN FOR CLARITY)

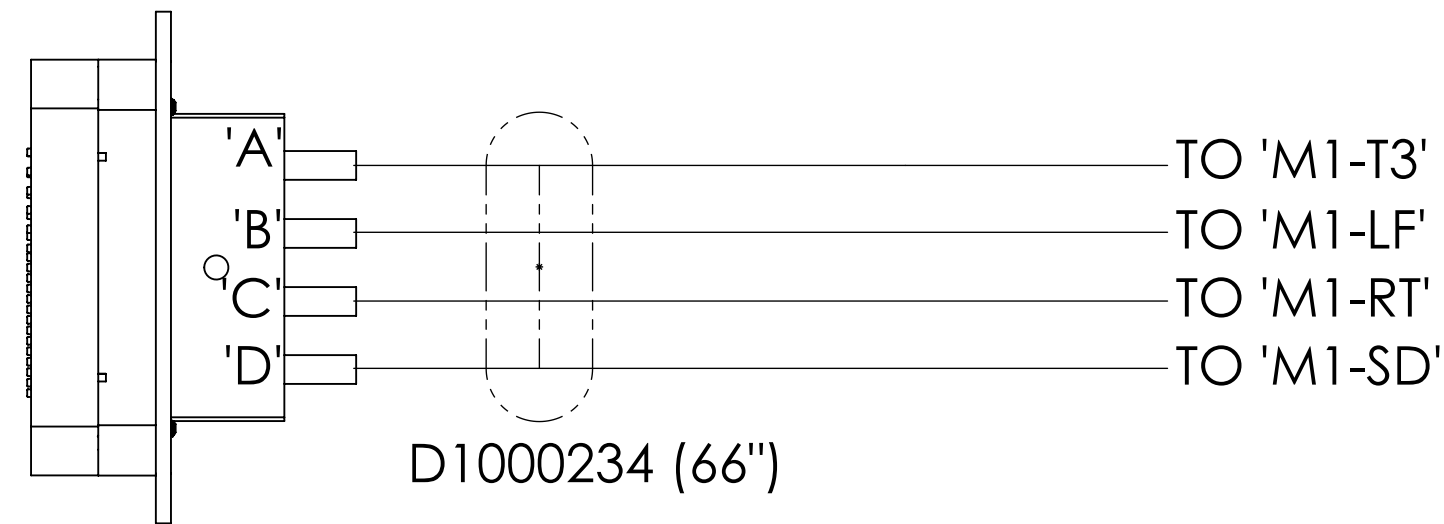


RIGHT SIDE (-Y)



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

TO  
CB-4  
(THIRD)



① REFERENCED DOCUMENTATION:

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- 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.

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

⑤ SHORTING MAY OCCUR IN QP BOSEMAN & 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.

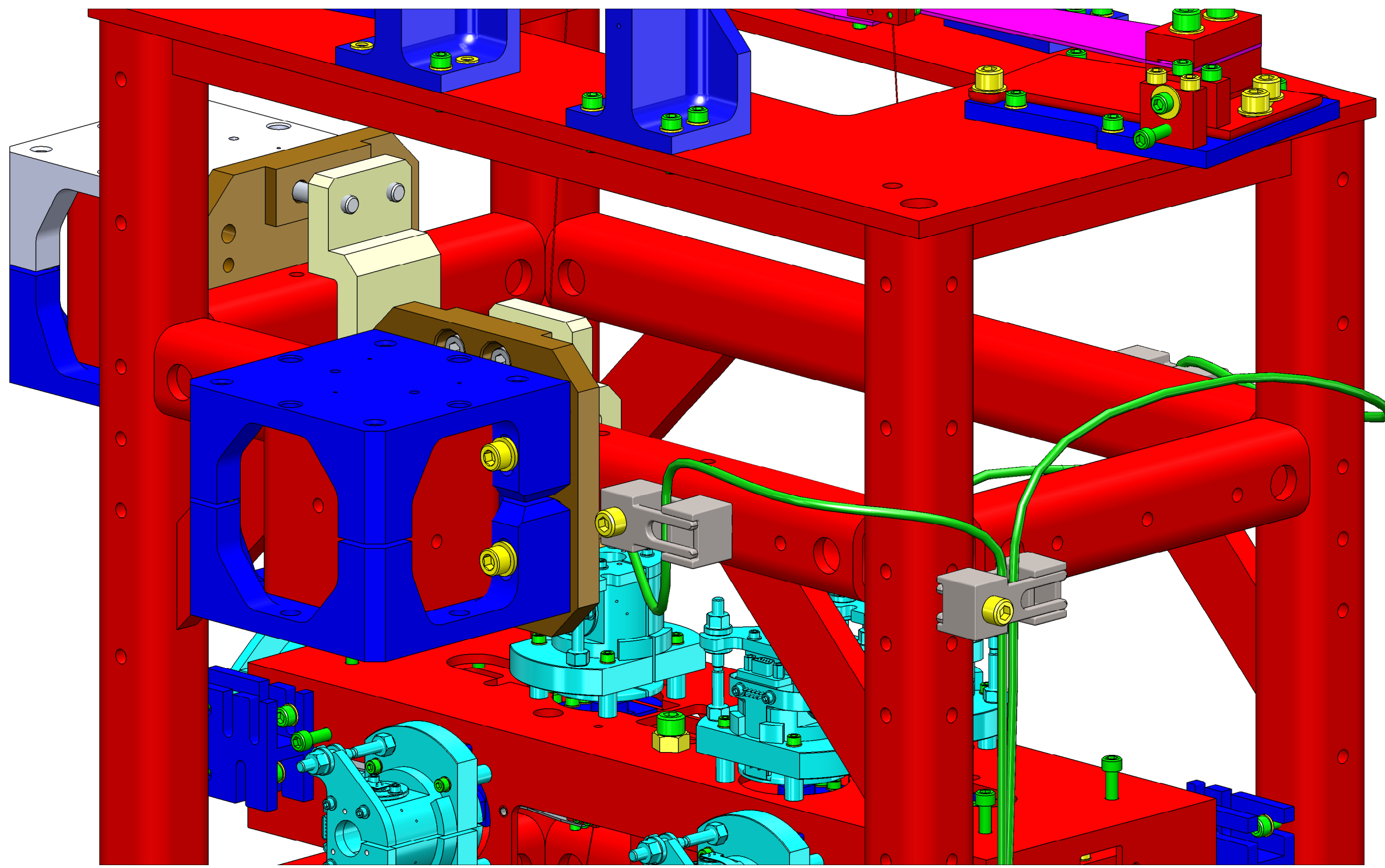
## ROUTE NO.3

SEE LIGO-T1200318  
FOR STEP BY STEP CABLING GUIDE

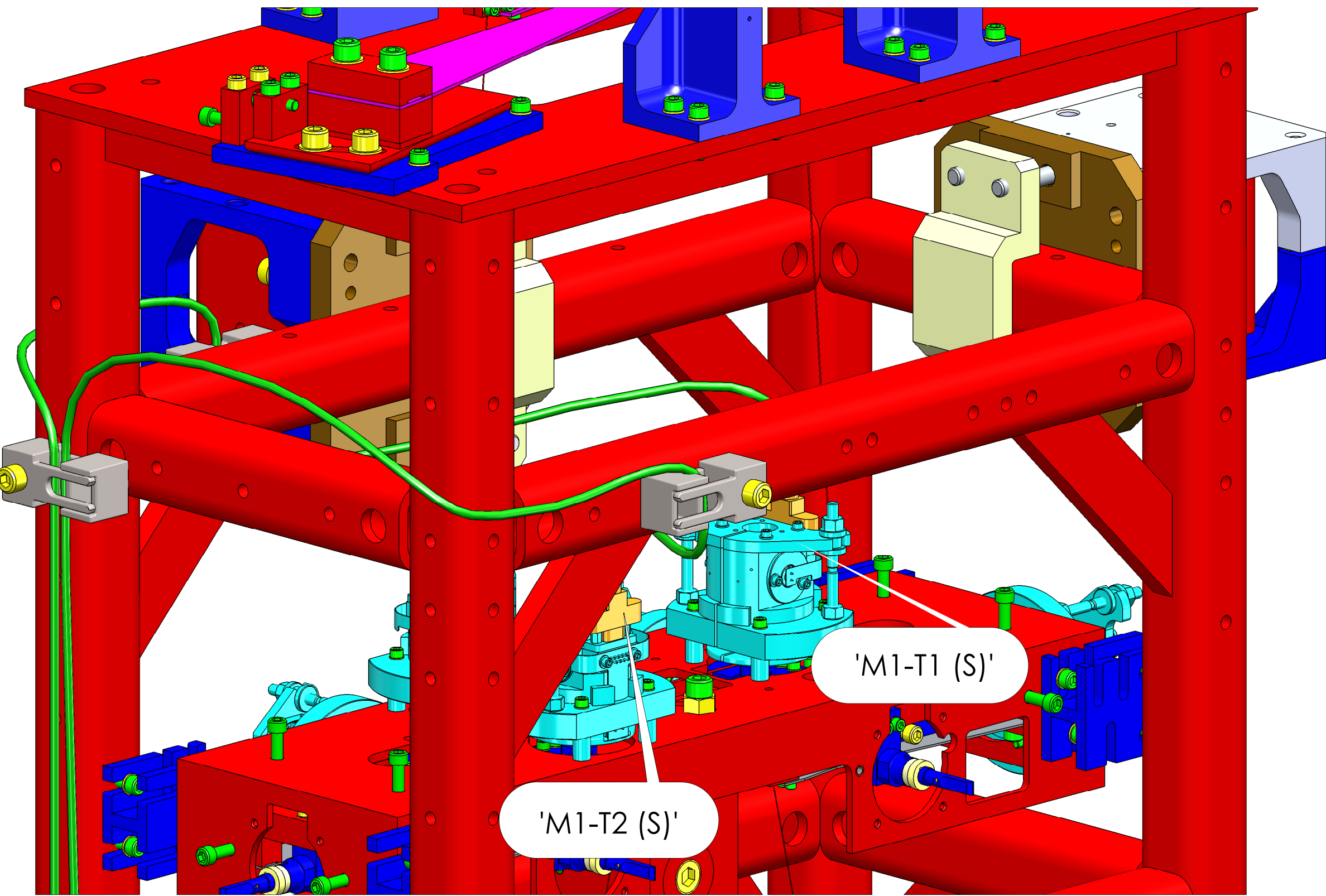


MC3

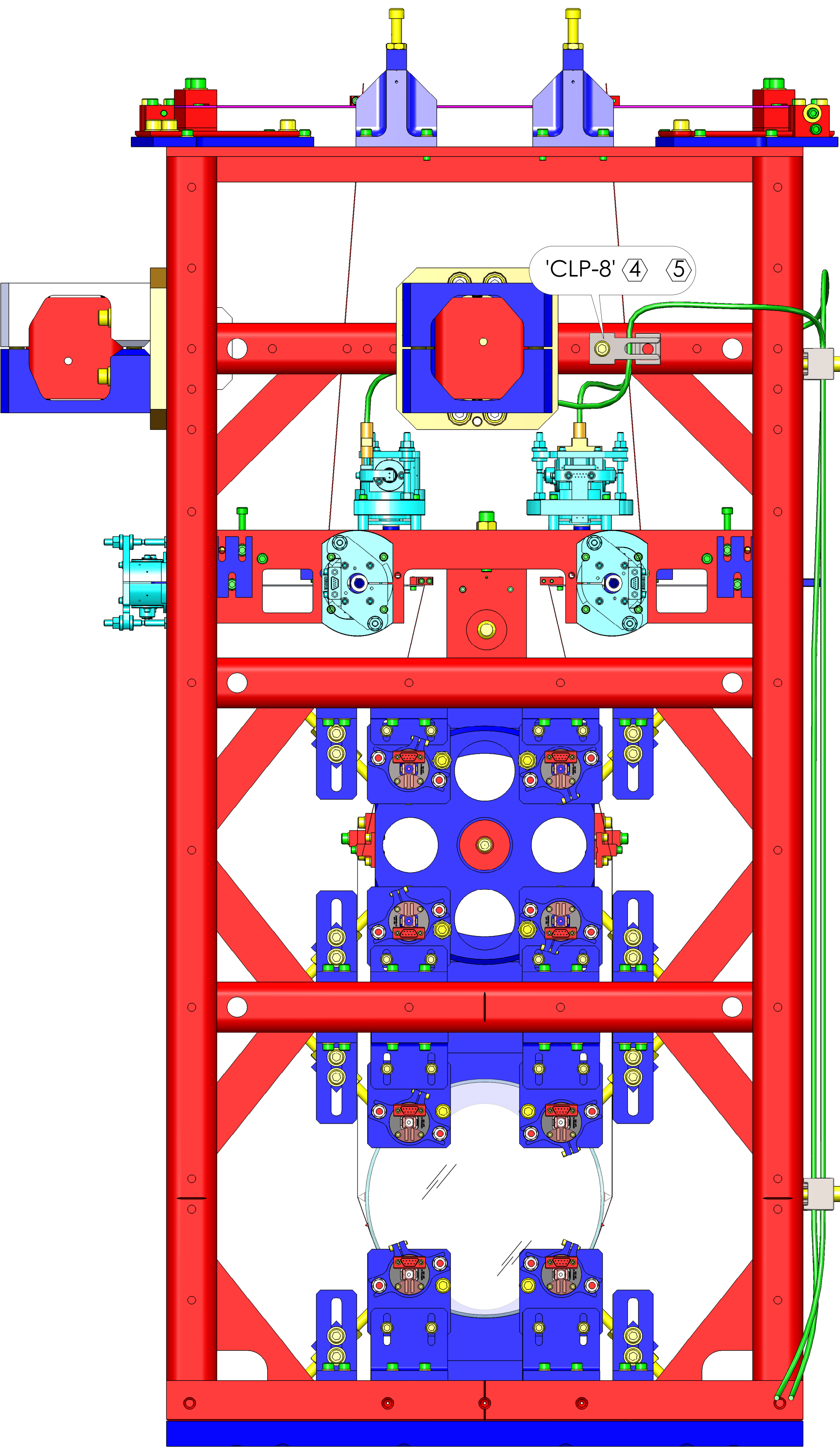
(SHARED)



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



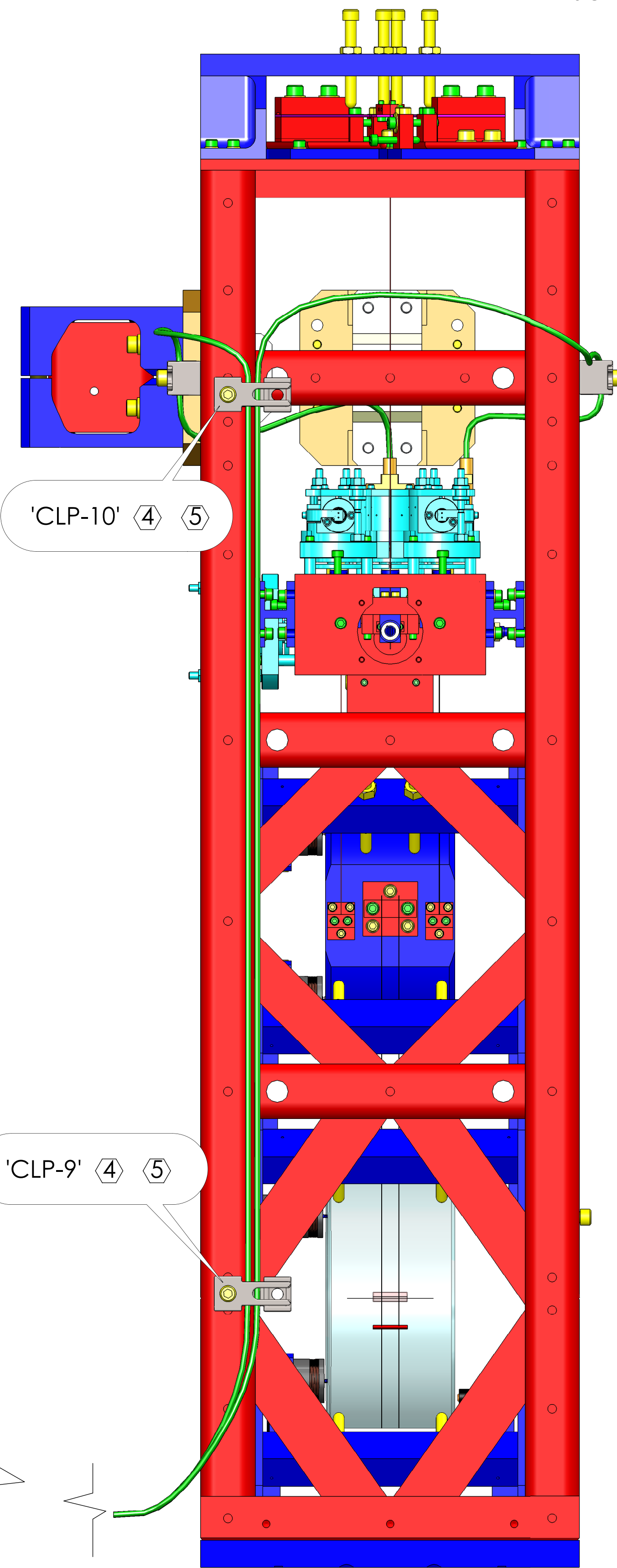
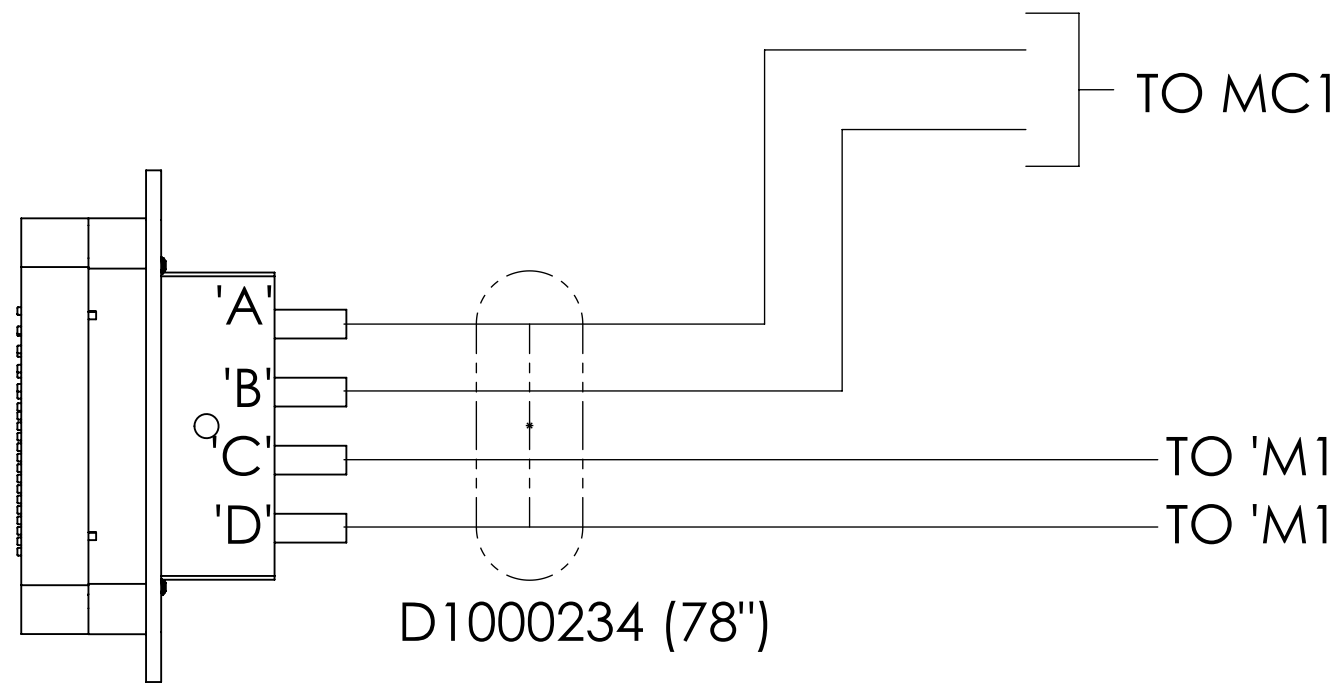
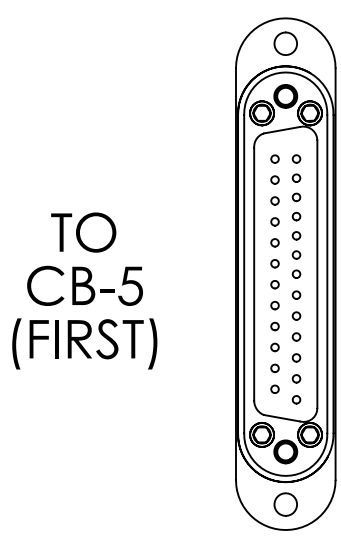
HR SIDE (1.1) (1.2)  
ISO VIEW, FRONT-RIGHT (+X)



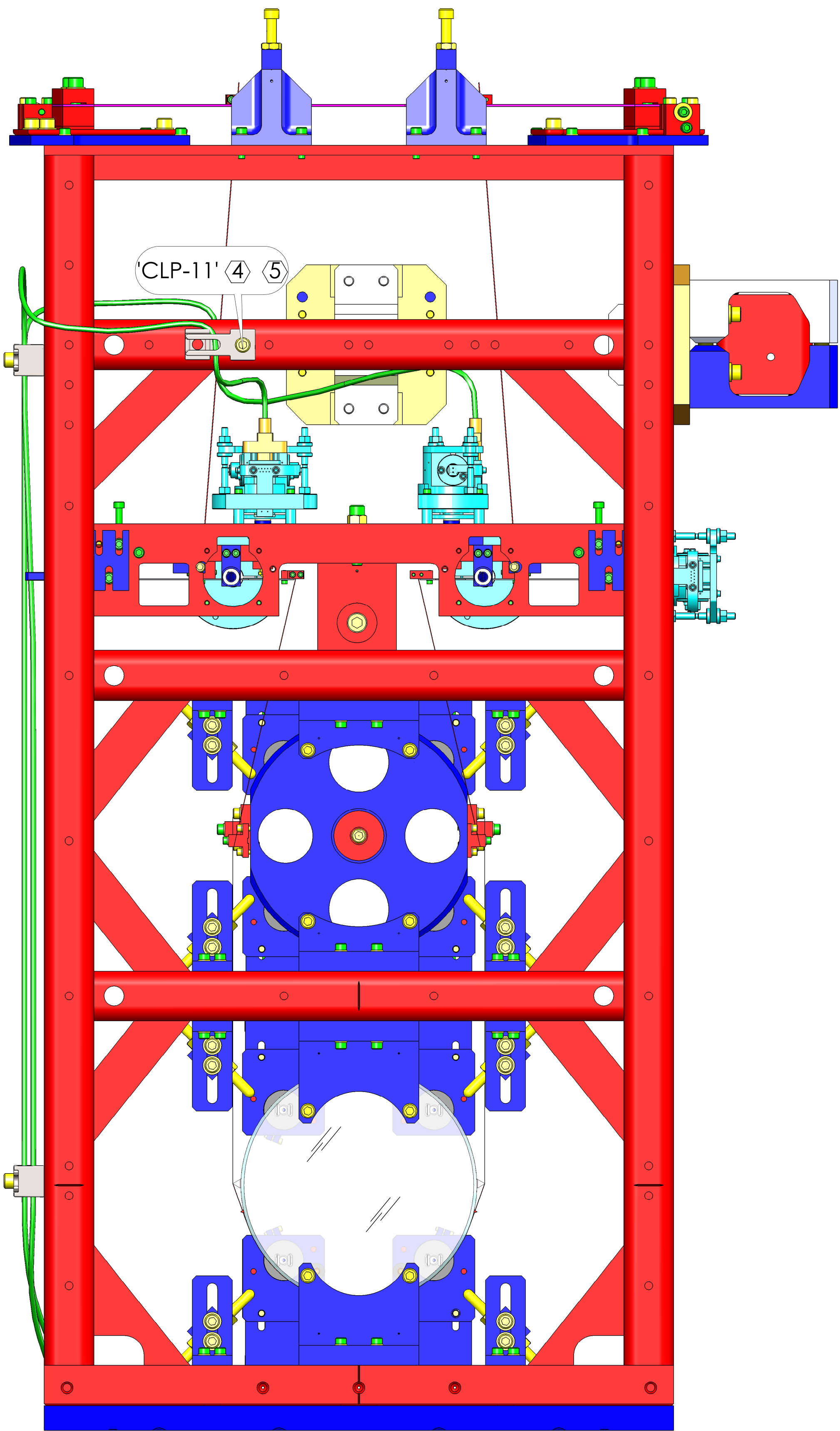
AR SIDE - REAR (-X) (1.1) (1.2)  
(END CONNECTORS, NOT SHOWN FOR CLARITY)



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AND LASER BEAM PATH PRIOR TO  
ROUTING / LACING VIA A NEW PATH.



RIGHT SIDE (-Y)



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

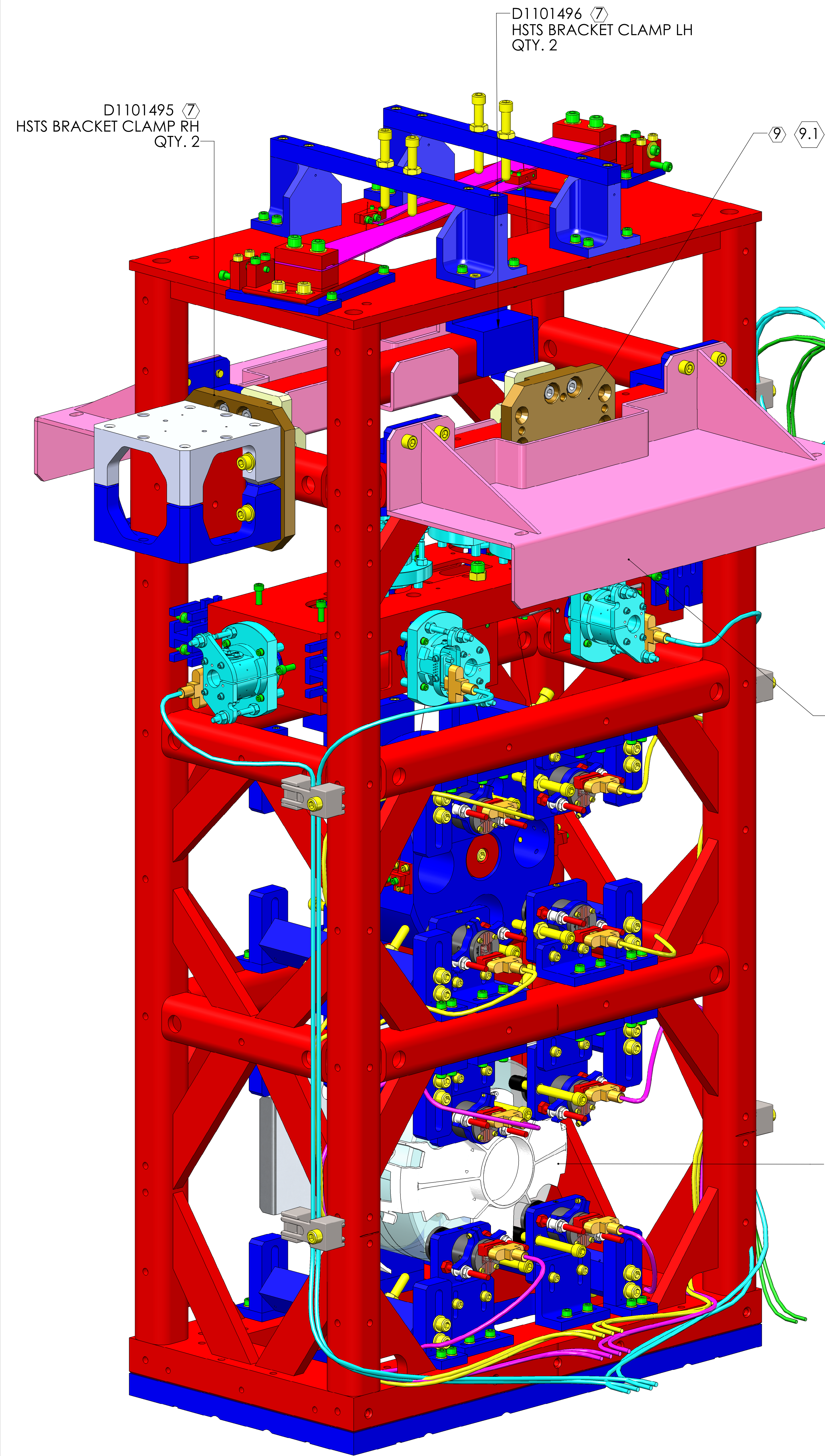
- ① REFERENCED DOCUMENTATION:
- 1.1 LIGO-E1100109, HAM SUS CONTROL ARRANGEMENT.
  - 1.2 LIGO-D1101493, OSEM ORIENTATION.
  - 1.3 LIGO-D1000581, SYSTEM CABLING DIAGRAM.
  - 1.4 LIGO-D1000242, VIBRATION ABSORBER ORIENTATION.
  - 1.5 LIGO-E1100411, CABLE CLAMP TORQUE.
  - 1.6 LIGO-D1101296, HAM ISI HOLE TABLE.

- 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 PEEL 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.4**  
SEE LIGO-T1200318  
FOR STEP BY STEP CABLING GUIDE



# MC3



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

## HSTS STRUCTURE TRANSPORT

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

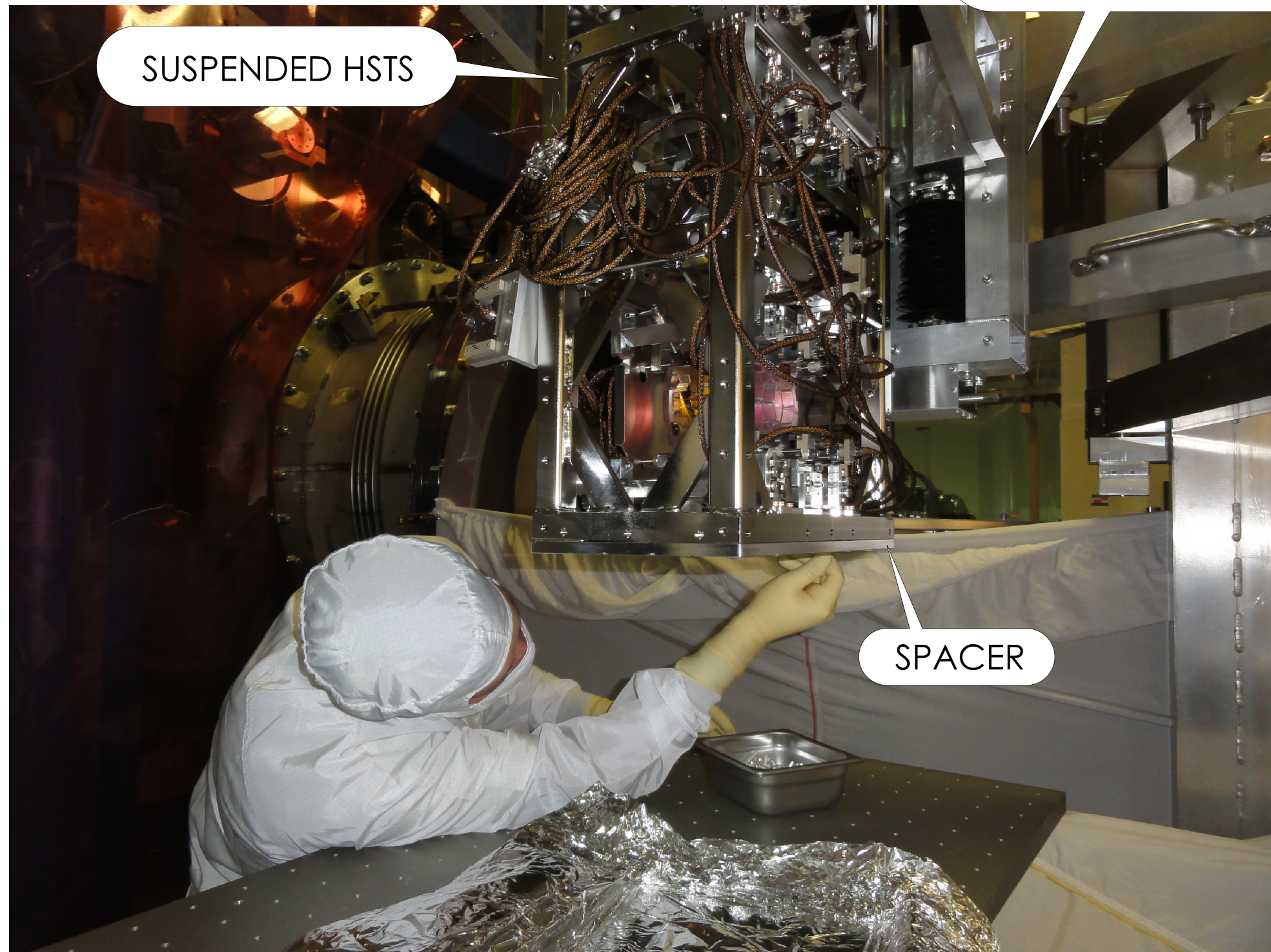
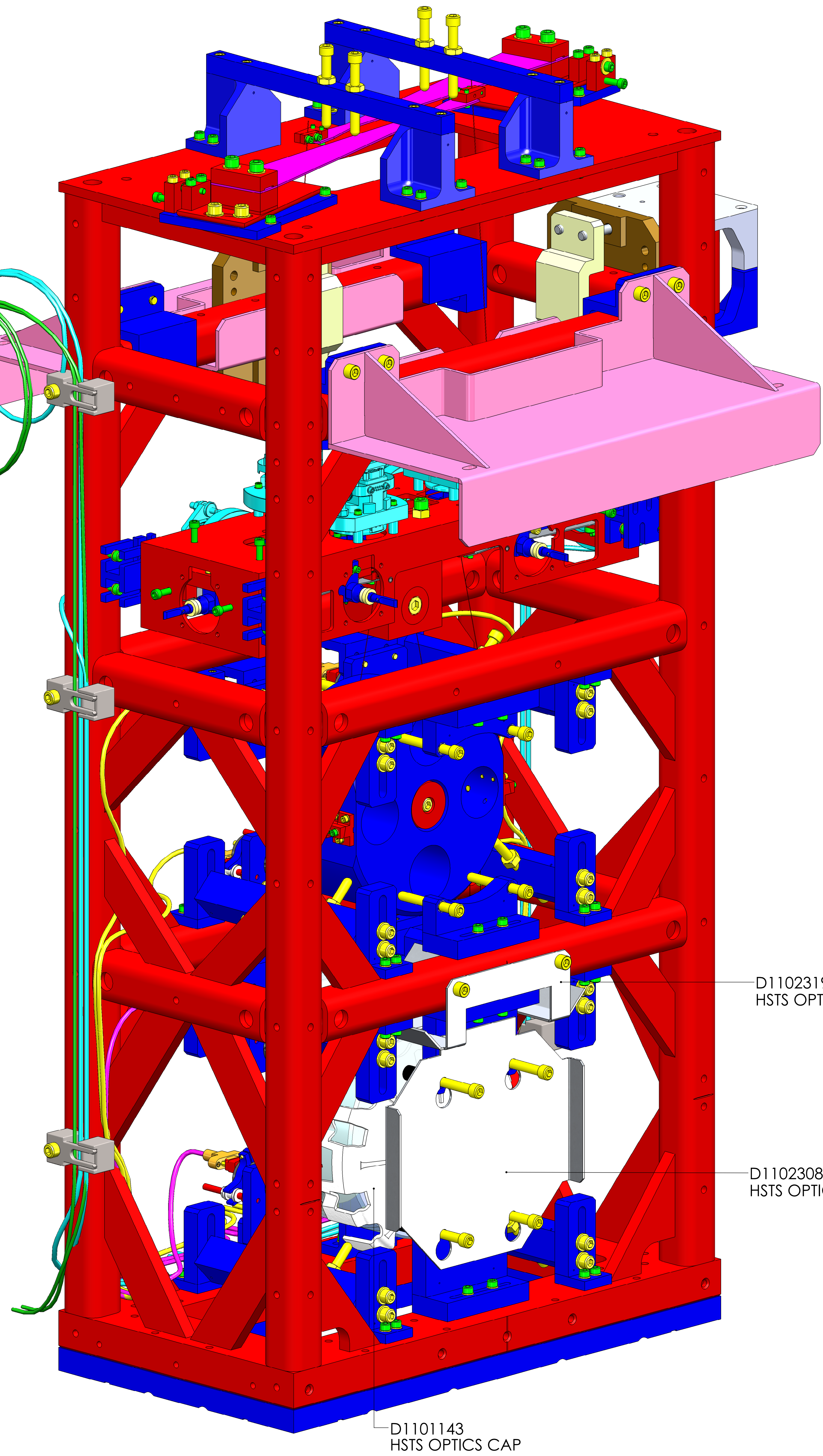


FIG 1.0: SPACER INSTALLATION

IF REQUIRED, BUNDLE CABLES AND ATTACH AS SHOWN TO THE SIDE OF THE STRUCTURE FOR TRANSPORT PURPOSES ONLY (SEE SHEET 6 AND 7, FOR ROUTE 3 DETAILS)

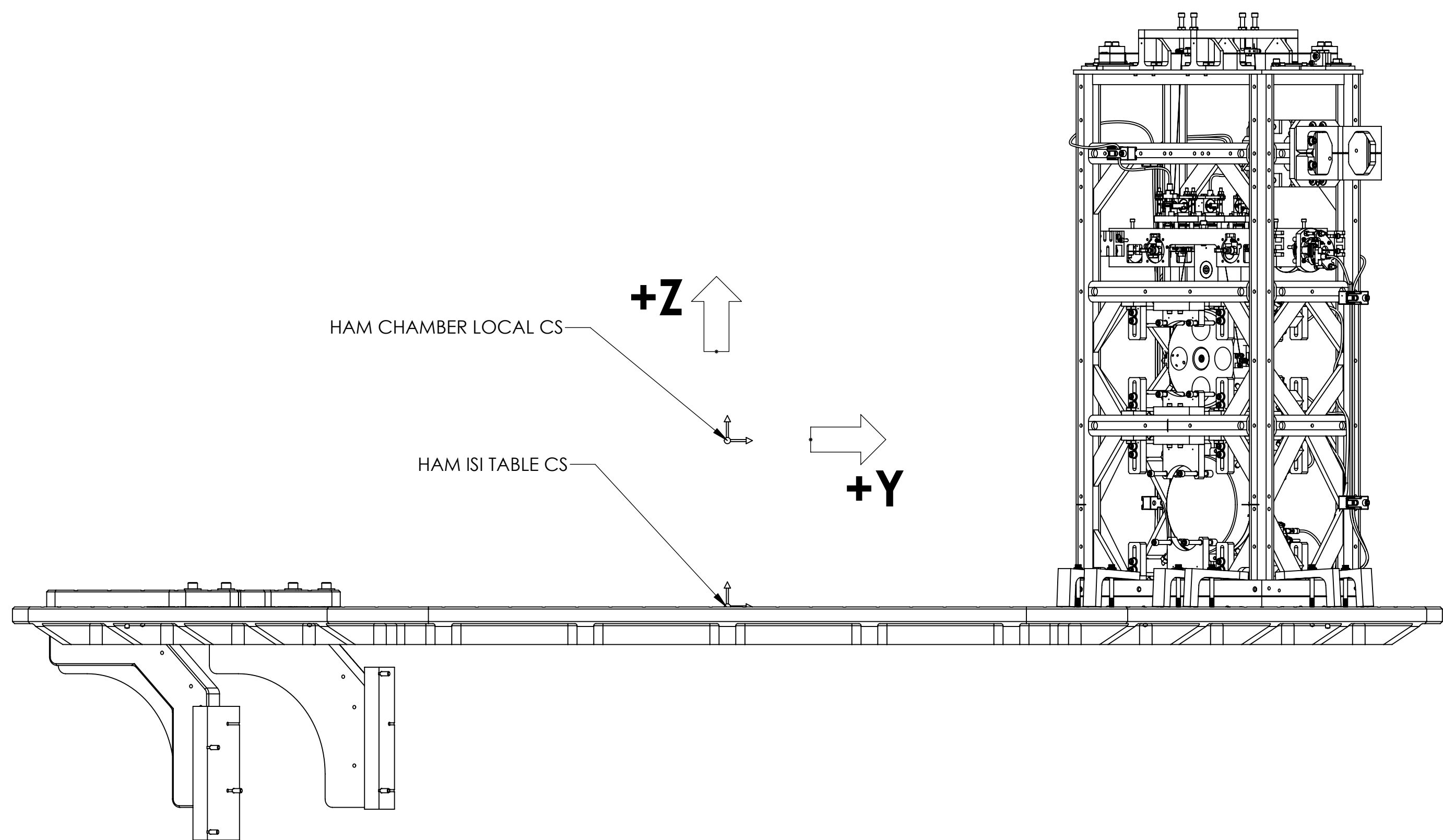
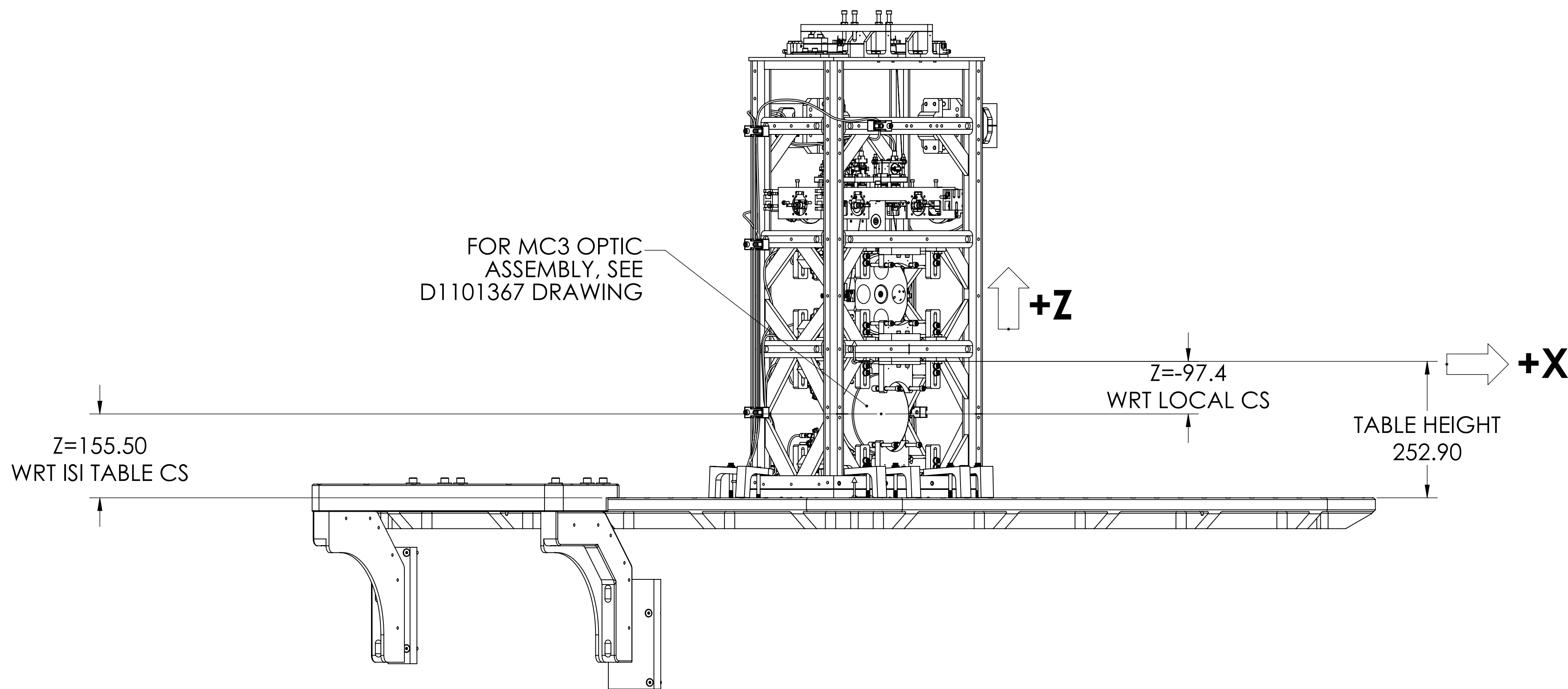
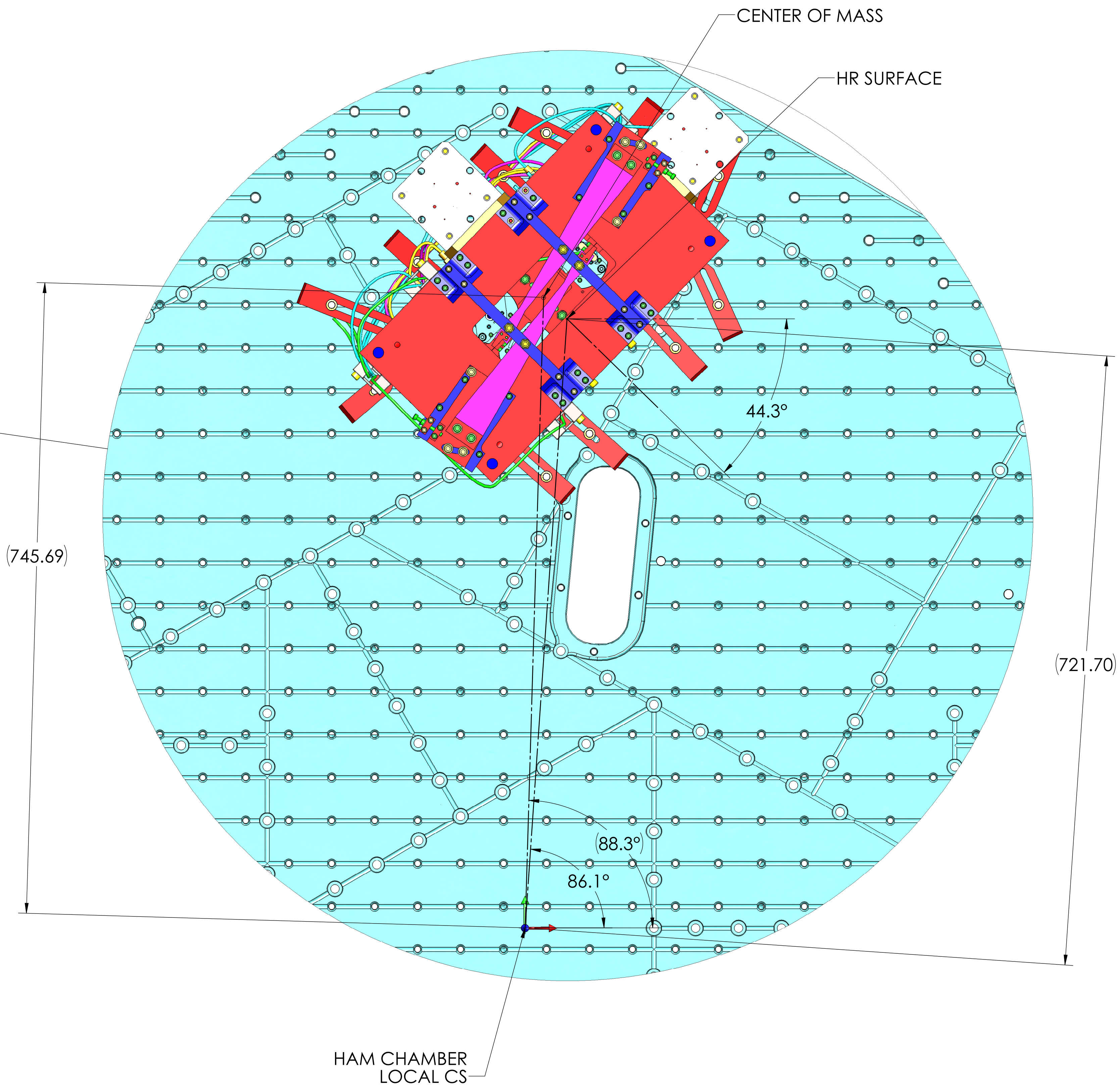
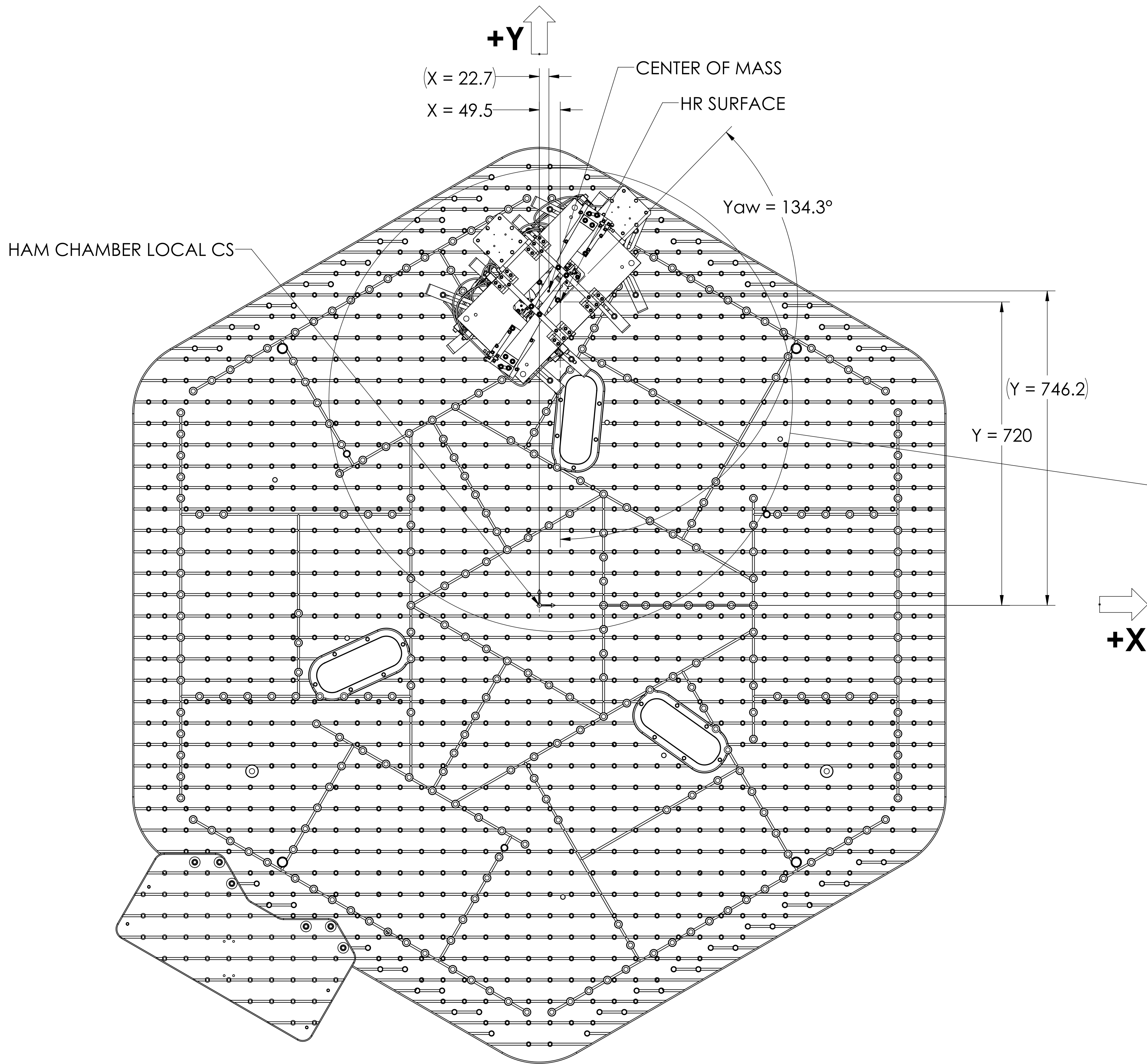


HR SIDE  
ISO VIEW, FRONT - RIGHT (+X)

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



MC3

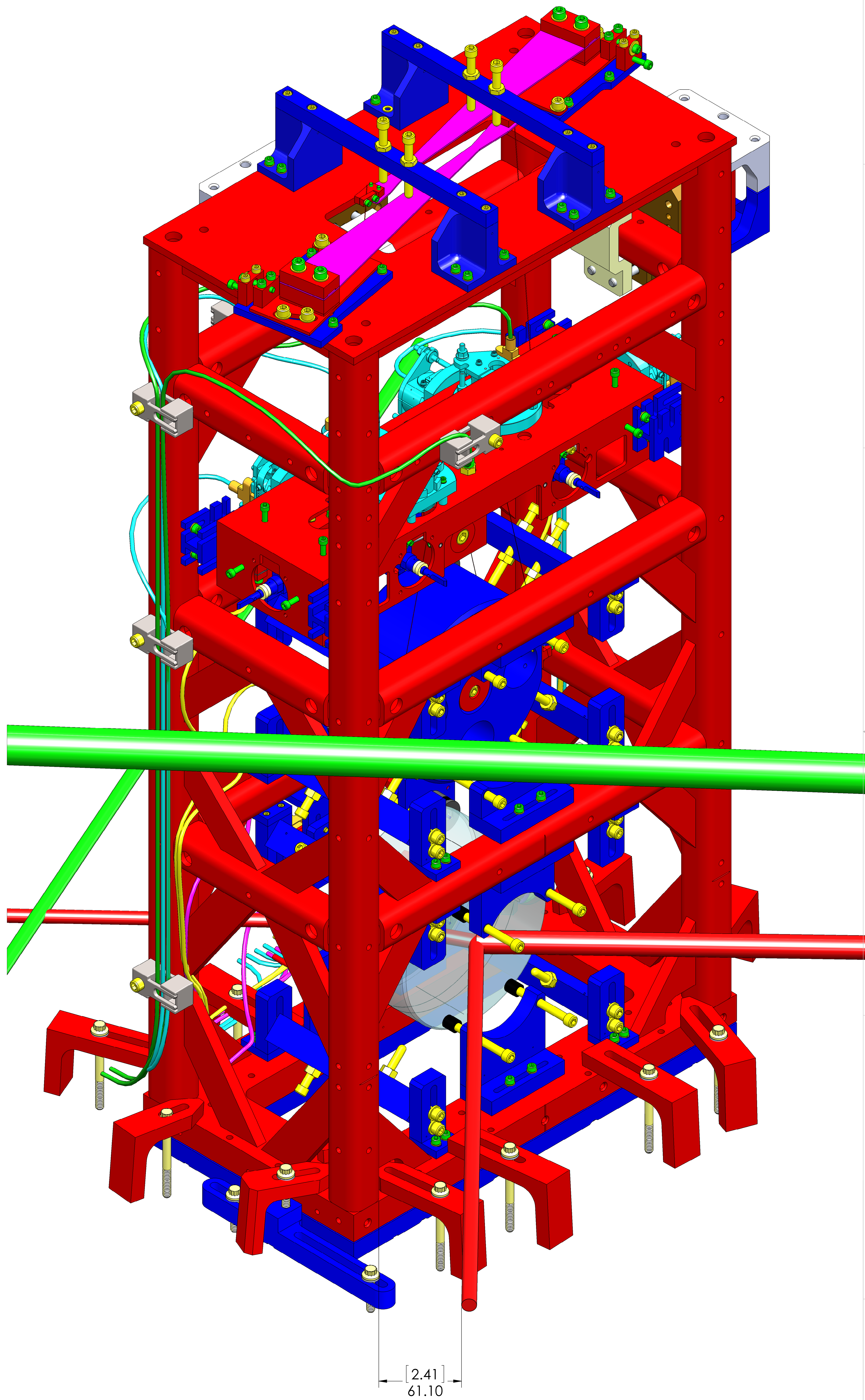
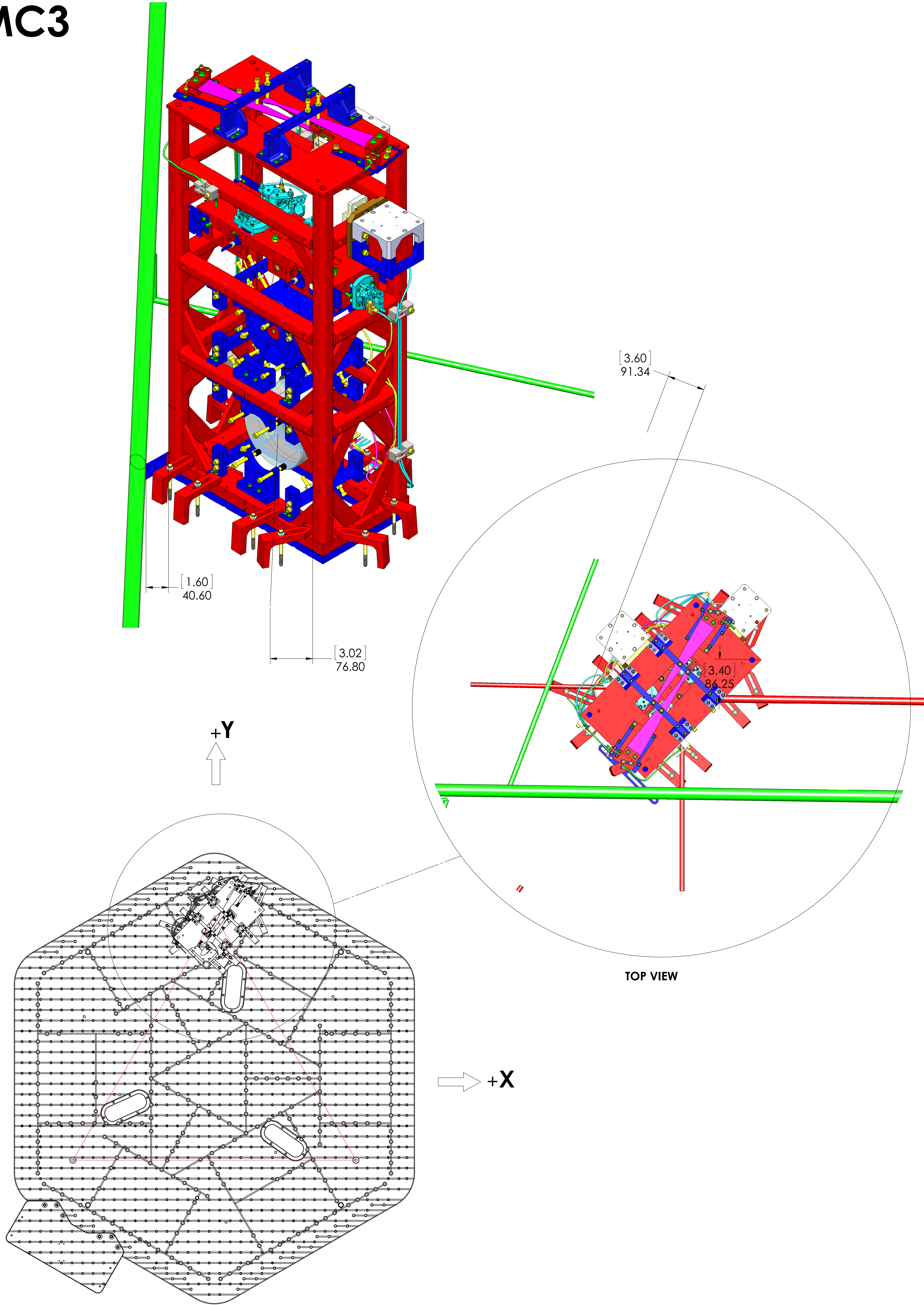


LOCAL COORDINATES DEFINITIONS

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



MC3



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

LASER BEAM CLEARANCES  
(ALL DIMENSIONS ARE FOR REFERENCE ONLY)