ALCATEL SPACE

HERSCHEL/PLANCK

REF. : H-P-ASP-MN-4106

DATE : 11/12/03

PAGE : 1/ 8 +10 annexes

COMPTE RENDU DE REUNION / *MINUTES OF MEETING*

LIEU / *PLACE* : ESTEC

OBJET / *PURPOSE* :

Herschel SVM/PLM harness splinter meeting

QPM#19

CLASSIFICATION :

PARTICIPANTS *ATTENDEES*	SOCIETE *FIRM*	SIGNATURE *SIGNATURE*	PARTICIPANTS *ATTENDEES*	SOCIETE *FIRM*	SIGNATURE *SIGNATURE*
JC Boschel	ASP		F. Cionini	ALS	
J Lang	ASED		R. Hohn	ASED	
A. Fehringer	ASED		E. Ciancetta	ALS	
A. Knoblauch	ASED	[signature]	B. Jackson	ESA	
B. Marchand *	ASP	[signature]			
G. Doubrovik	ASP				
M. Sias	ALS				

REDACTEUR / *WRITTEN BY* : *

CONCLUSION :

DISTRIBUTION : PARTICIPANTS / *ATTENDEES*	
	POUR ACTION : *FOR FURTHER ACTION*
	POUR INFORMATION : *FOR INFORMATION*

APPROUVE PAR / *APPROVED BY*

NOM / *NAME*	J-C BOSCHEL	M. SIAS		
SIGNATURE / *SIGNATURE*	[signature]	[signature]		

ALCATEL SPACE	HERSCHEL/PLANCK	REF. : H-P-ASP-MN-4106	
		DATE : 11/12/03	PAGE : 2/
COMPTE RENDU DE REUNION / *MINUTES OF MEETING*		LIEU / *PLACE* : ESTEC	

SUITE / CONTINUED :

	ACTION
CAD model configuration:	
ASED will now trace the CAD models with an issue number (in the CAD file name) instead of date	
ASED will send their latest (SIH + CCH) SVM CAD model to ASP	AI.1a ASED 15/12
ALS will send their models to ASP	AI.1b ALS 15/12
All files ~~etc~~ shall be exchanged officially between ASP/ASED/ALS (ftp + fax) and transit via ASP so that the evolutions are technically traced w.r.t. all parties. It is expected every parties finalize their design under ASP coordination.	

SUITE / CONTINUED : | ACTION

HIFI -Y panel

LCU +X side :

* routing to J04/J05 shall be shifted to left part of the unit to free access for CryoH.

* Connection to J01 connector (9 pins) shall consider a maximum allowed height of 70 mm over LCU top to pass underneath CryoH without problem.

  ⇒ Advise Nexans

* Enough flexibility shall be considered for connections to J02/J22 to go around Cryo connectors and avoid crossing Backshells
  ⇒ Advise Nexans

→ AI.2 ASP/ALS 19/12

* Up-converters CryoH routing to be performed on -Y panel.
  If bracket is necessary, to be provided by ASED and will be glued on lateral panel

AI.3. ASED

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		DATE : 11/12/03 — PAGE : 4
COMPTE RENDU DE REUNION / *MINUTES OF MEETING*		LIEU / *PLACE* : ESTEC

SUITE / *CONTINUED* : — ACTION

HIFI -Y-Z

~~Check possibility~~

FCU routing stay as it is, stand-off may be removed during AIT.

ASED will shift upward Cryo bundles on bottom of FCU and resend routing. — AI 5 - ASED

Up-converter routing to be performed on -Y-Z pannel — AI 4 - ASED

PACS

ASED will re-route CryoH around BOLC taking into account — AI 6 - ASED

- clearance volume for internal connection
- panel mountability and clearance / cleats used for panel fixation.
  Basically, vertical volume above cleats is forbidden

In the meantime, ASP will check with PACS if clearance volume can be reduced — AI 7 - ASP

Flexibility shall be given to SVMH/WIH connected to DECMEC to free top of Cryo connectors

=> Advise Nexans

SPIRE panel :

Collision between CryoH Stand-off and SVMH/WIH + tie-bases at left of HSDPU.
SVMH/WIH shall be slightly re-routed (ALS/ASP to instruct Nexhans) — AI8 ASP/ALS

CCH :
SVMH/WIH obstructs CryoH connectors access on top side of CCU.
ASED proposes a local re-routing of SVMH/WIH suiting CryoH. This proposal will be sent as a small lonely model which will be transmitted to NXH. ASP/ALS to instruct NXH & get a feedback — AI9 ASP/ALS + AI1 ASED

EMC Compatibility :

ASED/ASP report bad experience with Chofoil using as shield (brittle in TV/TB test).

SIH CryoH bundles are shielded and double-shielded (according to discussion with Instruments)

CCH bundles are ~~[illegible]~~ overshielded

SVM: Sensitive lines(*) and harness outside spacecraft only are shielded.
All hrn are twisted
(*) receiving noise, EMC class 4 (as per GDIR requirement) and identified in ALS EICD.

SUITE / *CONTINUED* :

	ACTION
Grounding :	
ASP will confirm that grounding rails underneath CryoH on upper closure panels are not needed	AI 10
(Cryobrackets shall be grounded to SVM bond)	
Solar Array harness	
ASP will send the Applicable drawing to ASED	AI 11
ASED will send the SA harness routing they performed (with DS) via a CAD model (from SA to SVM skin conn. plate) Situation to be investigated then.	AI 12
The routing is needed by ALS for definition of MLI.	
Pin allocation defined by ALS and ASED shall be checked by ASP (ALS baseline : EICD issue 3)	

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COMPTE RENDU DE REUNION / *MINUTES OF MEETING*		LIEU / *PLACE* : ESTEC

SUITE / *CONTINUED* : — ACTION

Umbilical connectors

ASED will send the brackets CAD model
Connectors accommodation, type & pin allocation shall be given. — AI 13

ALS will check with CASA the feasibility of the bracket implementation and — AI 14 - ALS
- either confirm position proposed by ASED
- or propose a proper location

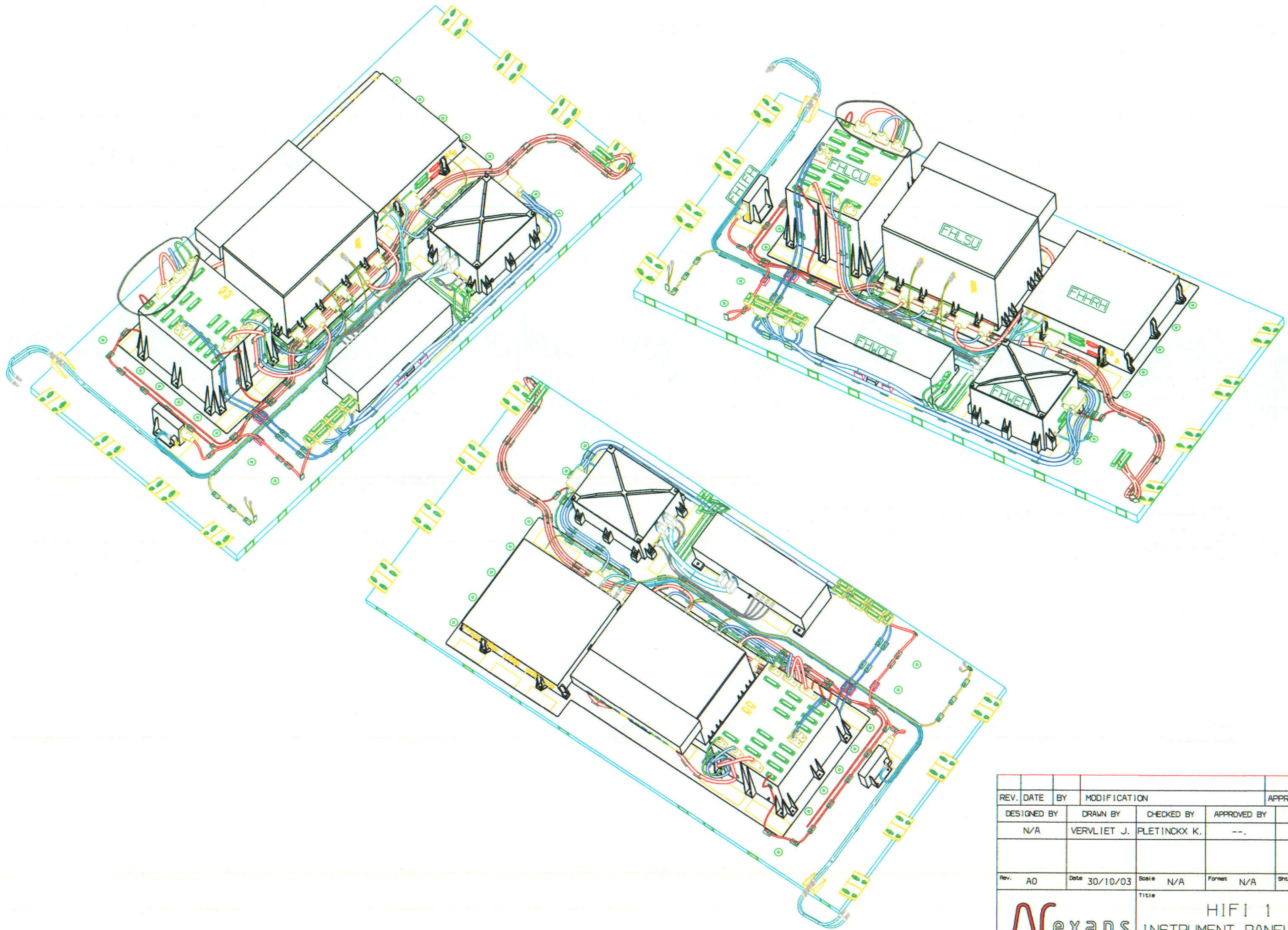
It is agreed between all parties that the new PLM/SVM I/F Bracket will be glued on STM. Option to use inserts To be evaluated for FM.

ASED points out that there will be a decision by the project manager whether the additional work introduced by the agreements above is in scope of the work or will be considered to be covered by a CR.

ASP remembers this is work part of the contract baseline = Cryo Harness Routing Participation on SVM.

	ACTION ITEM LIST	REF. :
ALCATEL SPACE	MEETING TITLE:	DATE :
	HERSCHEL/PLANCK	PAGE : 8

INITIATOR Firm / person	ACTION N°	ACTION DESCRIPTION	ACTION ACTIONEE Firm / person	DATE DUE
ASP/ALS	1	Send latest CryoH CAD models to ASP	ASED / ALS	15/12
ASED	2	Update LCU routing	ASP/ALS	19/12
	3	Up-Converter CryoH routing on -Y panel to be performed	ASED	30/01/04
	4	Up-Converter CryoH routing on -Y-Z panel to be performed	ASED	30/01/04
	5	ASED will shift upwards CryoBundles on bottom of FCU	ASED	30/01/04
	6	ASED to re-route CryoH around BOLC	ASED	30/01/04
	7	Check with PACS clearance volume possible reduction	ASP	15/01/04
	8	SVM/WIH to be locally re-routed	ASP/ALS	19/12
	9	Modify SVM/WIH on top of CCU according to ASED proposal	ASP/ALS	19/12
	10	Confirm no need for grounding rails below CryoH (upper panel)	ASP	15/01/04
	11	Send SA skin connectors applicable drawing	ASP	15/12
	12	send SA routing to SVM (CAD model)	ASED	15/12
	13	Send umbilical PLM bracket CAD model	ASED	15/12
	14	feedback on PLM bracket (umbilical) location	ALS	19/12



ANNEX #1

REV.	DATE	BY	MODIFICATION	APPROVAL

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	QUALITY
N/A	VERVLIET J.	PLETINCKX K.	--.	--.
Rev. A0	Date 30/10/03	Scale N/A	Format N/A	Sht 2/4

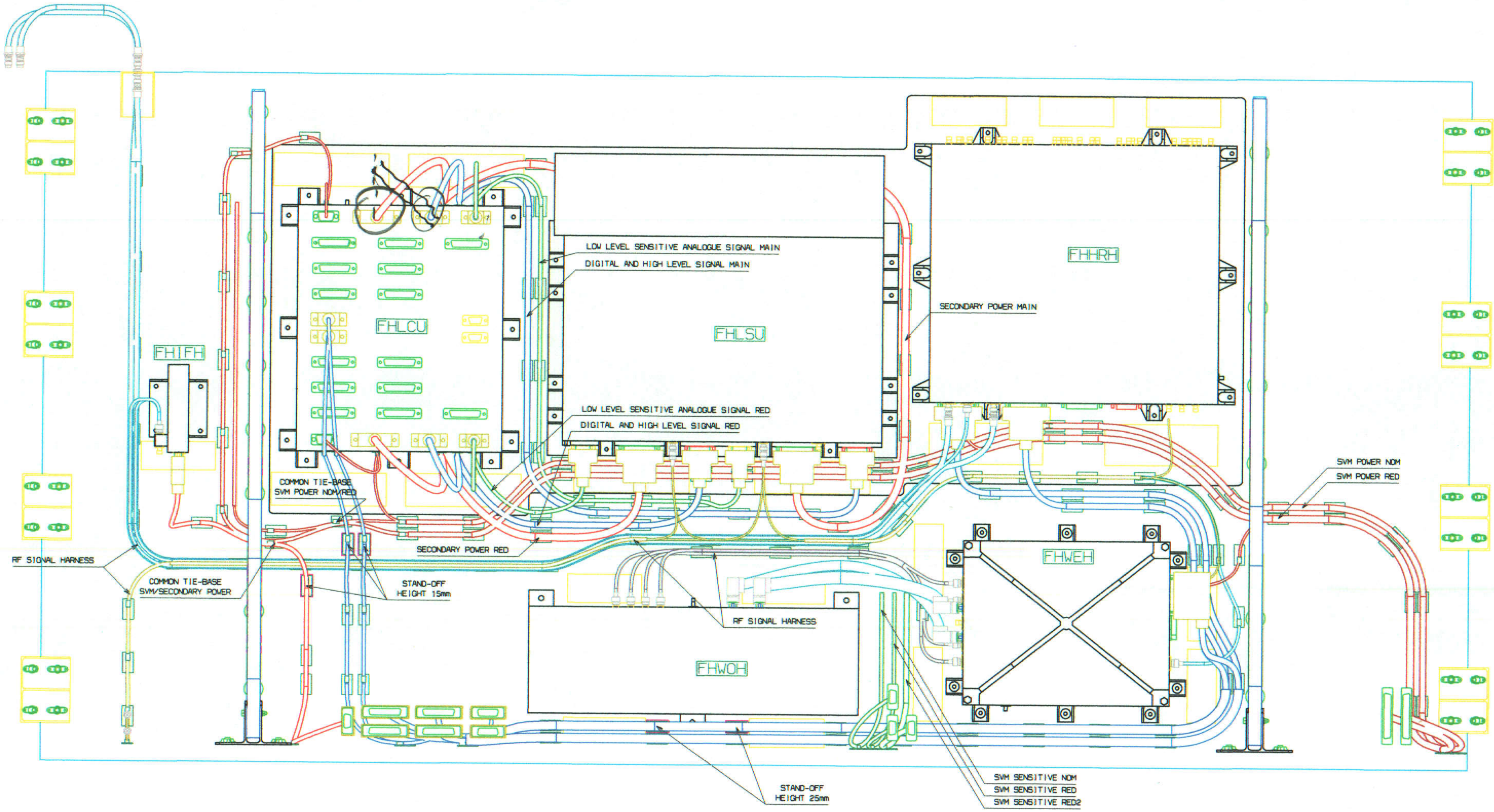
Nexans HARNESSES

Title
HIFI 1
INSTRUMENT PANEL ASSY

DWG N° HP-NXH-DW-1024

catadm FRAME 1 NOVEMBER 6, 2003 16.05.50

ANNEX #2



REV.	DATE	BY	MODIFICATION	APPROVAL

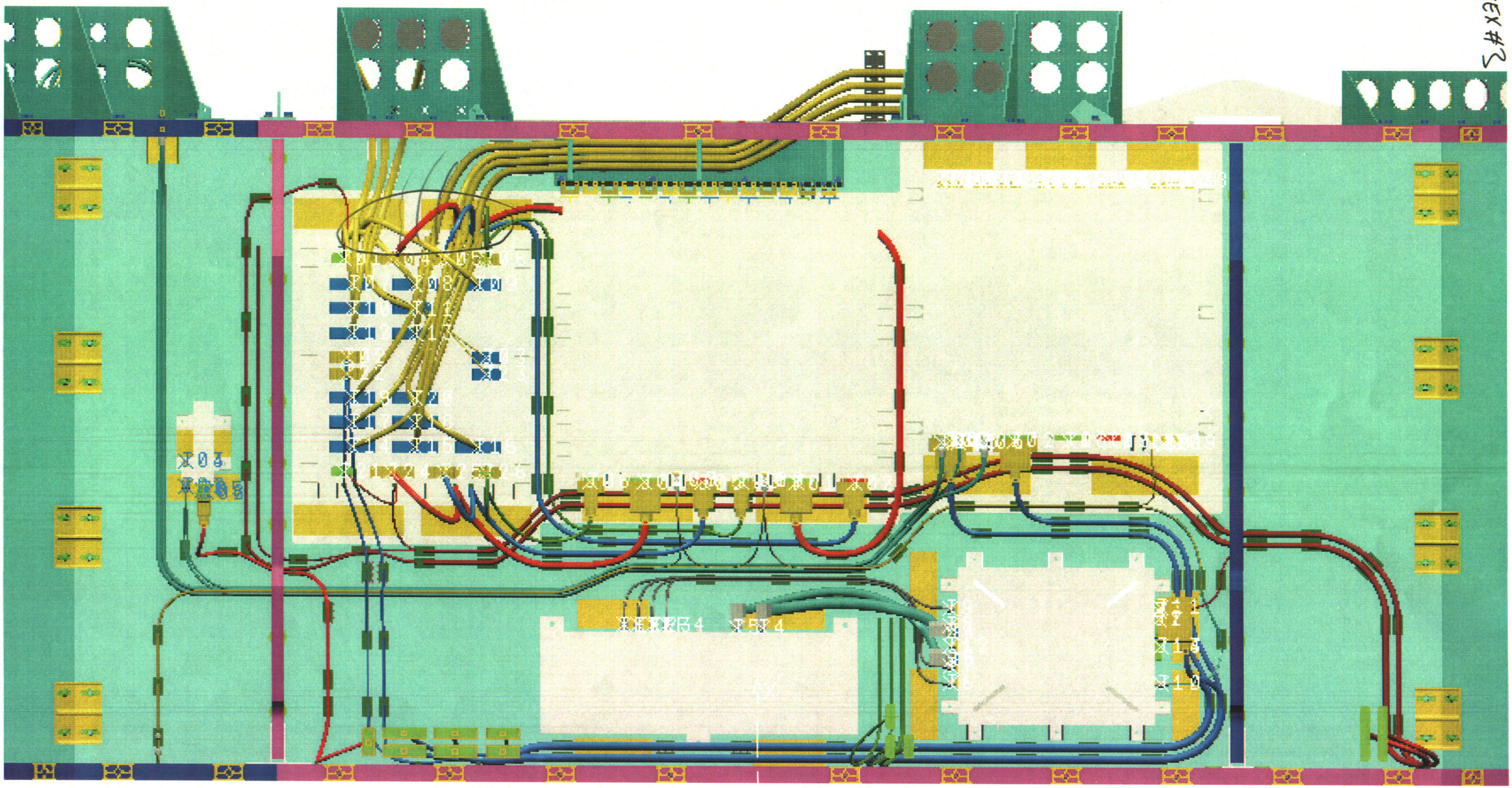
DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	QUALITY
N/A	VERVLIET J.	PLETINCKX K.	--.	--.
Rev. A0	Date 30/10/03	Scale N/A	Format N/A	Sht 1/4

Nexans HARNESSES

Title: HIFI 1 INSTRUMENT PANEL ASSY

DWG N° HP-NXH-DW-1024

ANNEX #3



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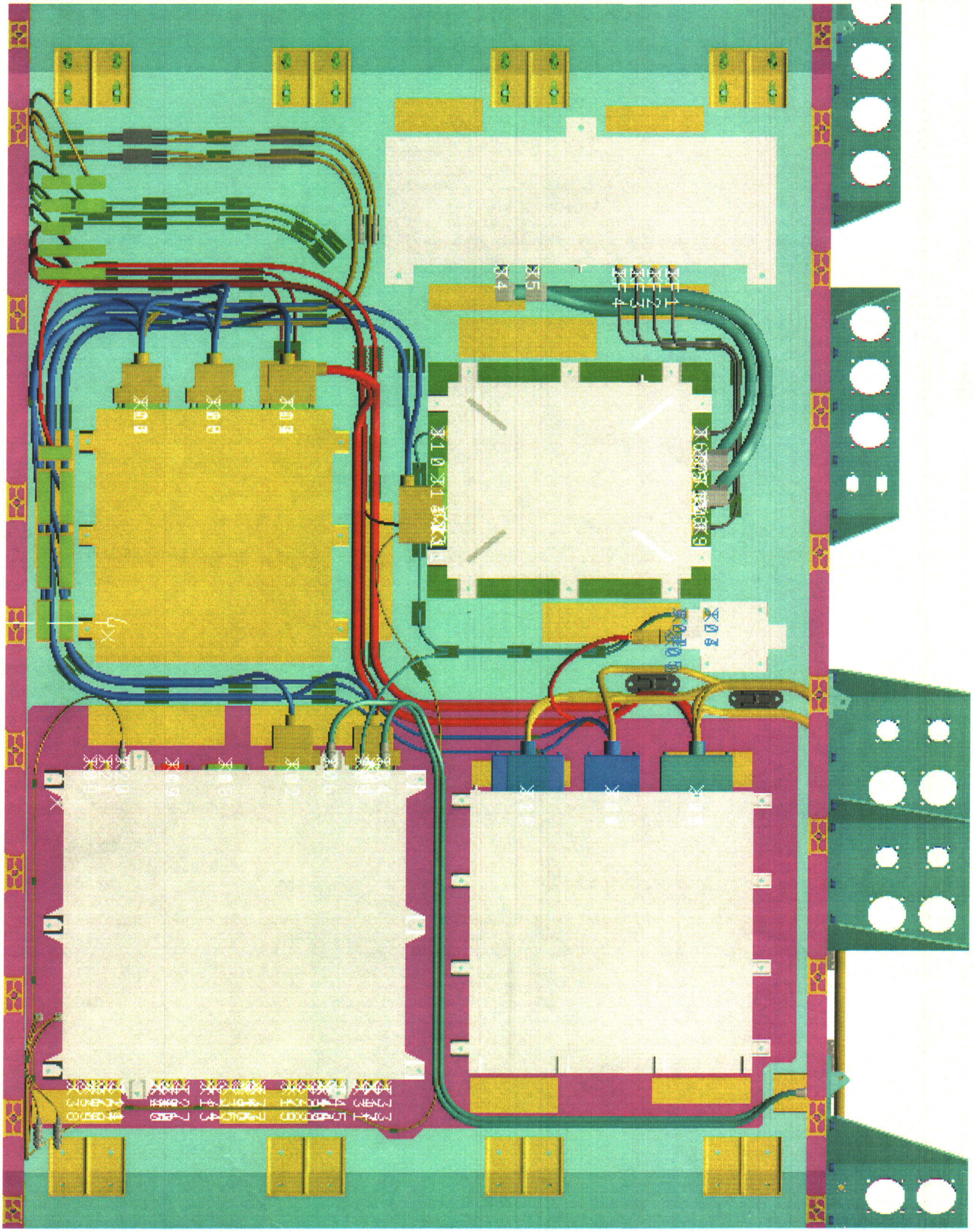

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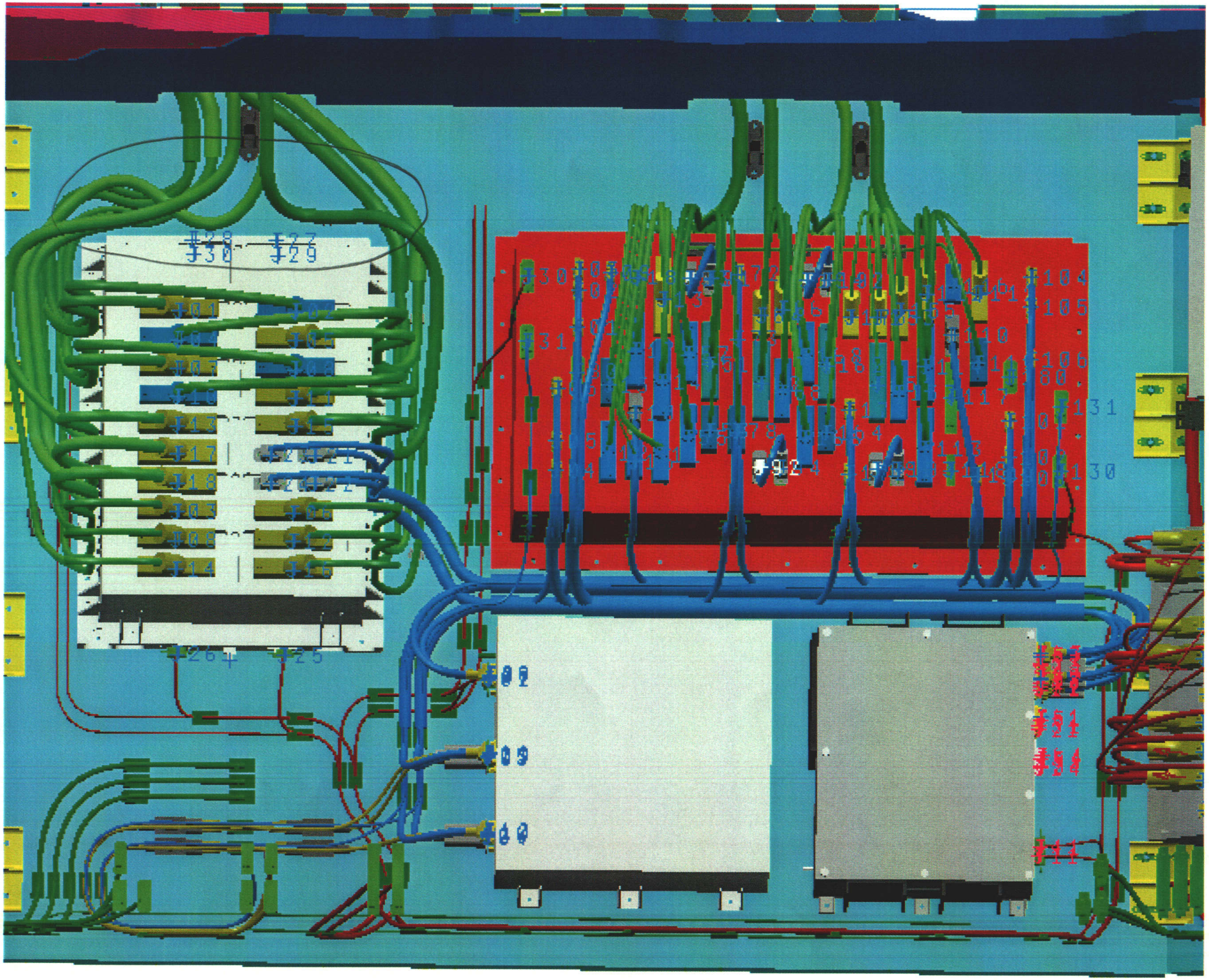

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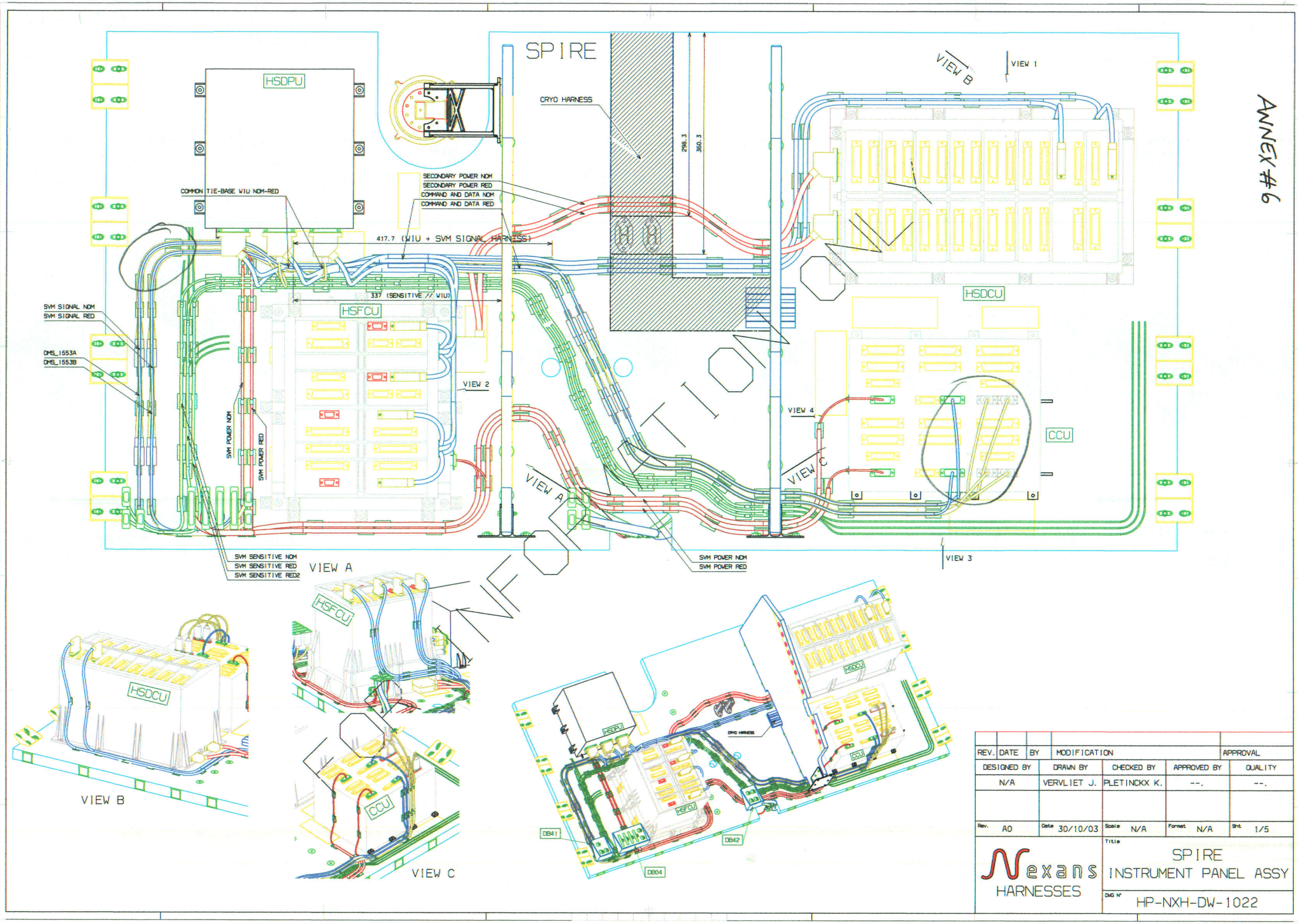


REV.	DATE	BY	MODIFICATION	APPROVAL

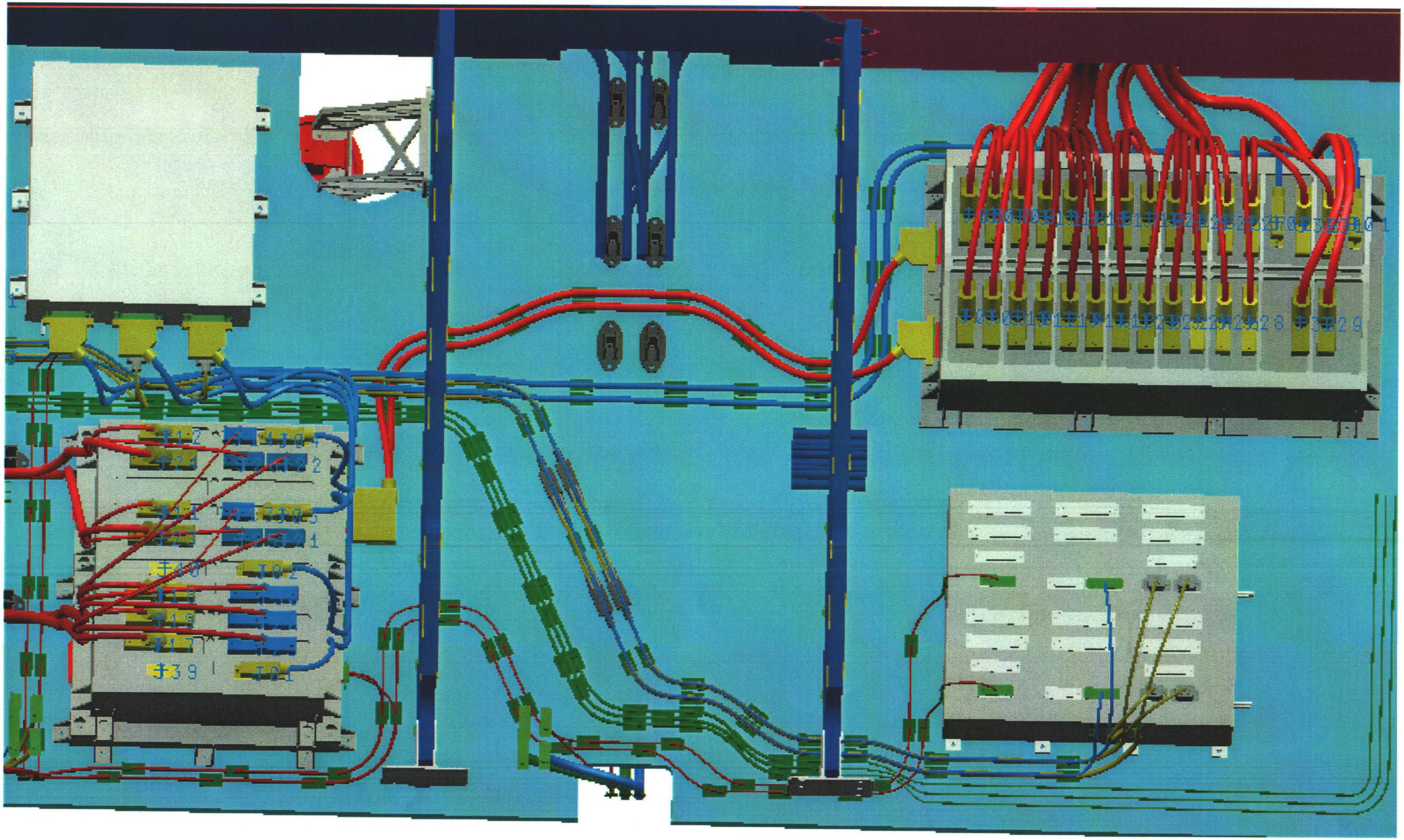
DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	QUALITY
N/A	VERVLIET J.	PLETINCKX K.	--.	--.

Rev.	Date	Scale	Format	Sht
A0	30/10/03	N/A	N/A	1/5

Nexans HARNESSES

Title: SPIRE INSTRUMENT PANEL ASSY

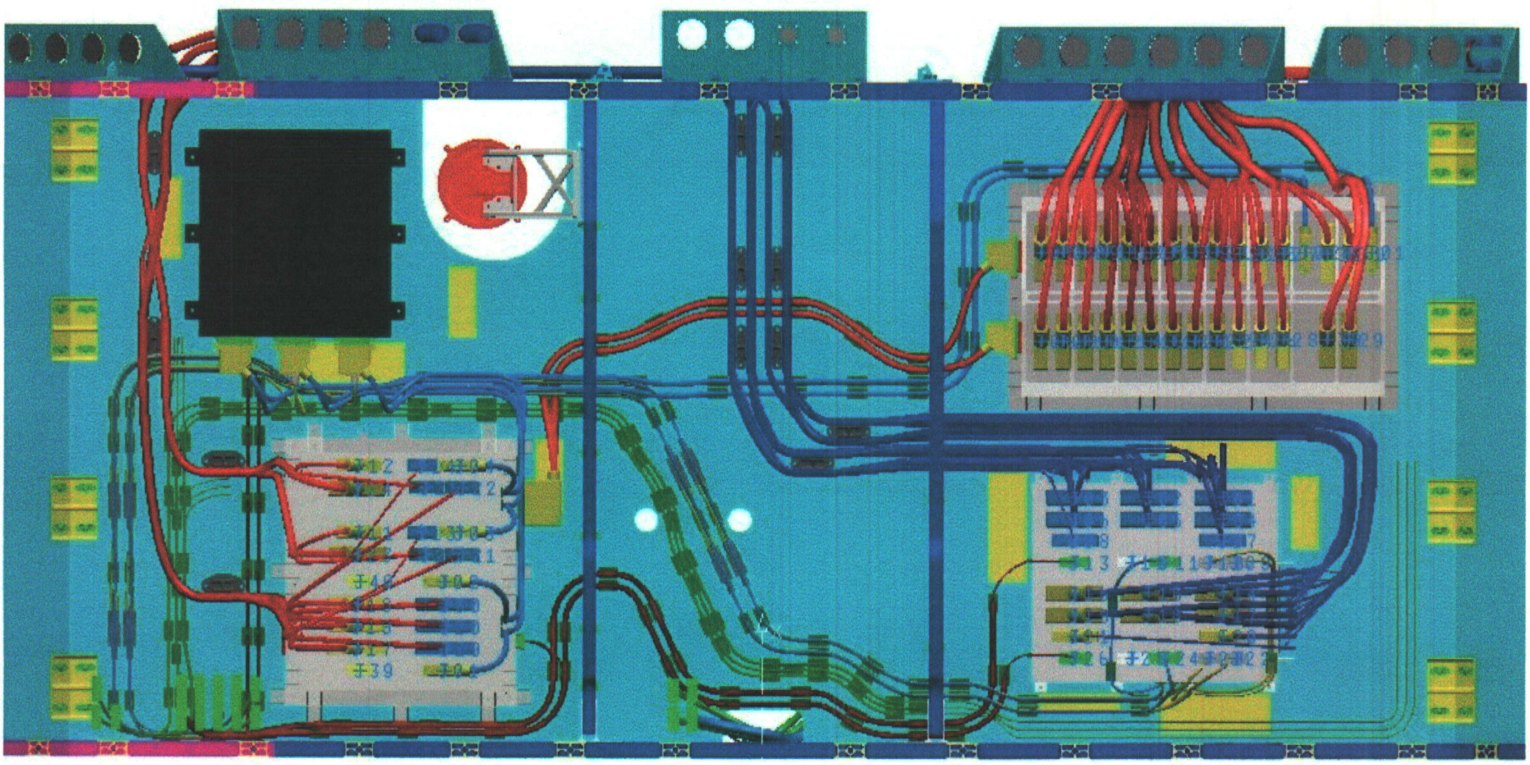
DWG N° HP-NXH-DW-1022

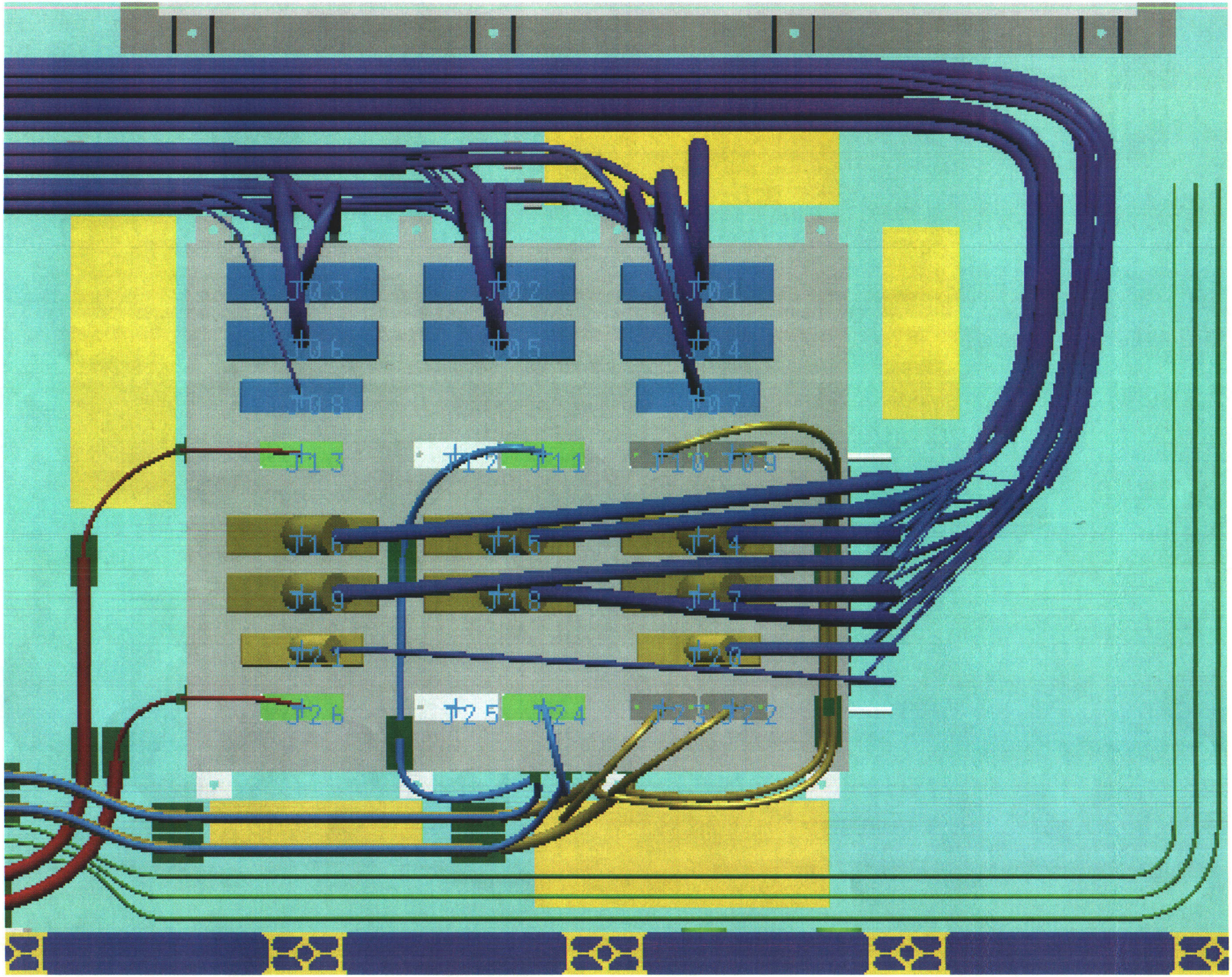


ANNEX # 7

Panel_7_Instr_Panel_-Z_(SPIRE)1.jpg (980x567x16M jpeg)

ANNEX #8




J03
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J20
J26
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J24
J23
J22

ANNEX # 9

ANNEX #10

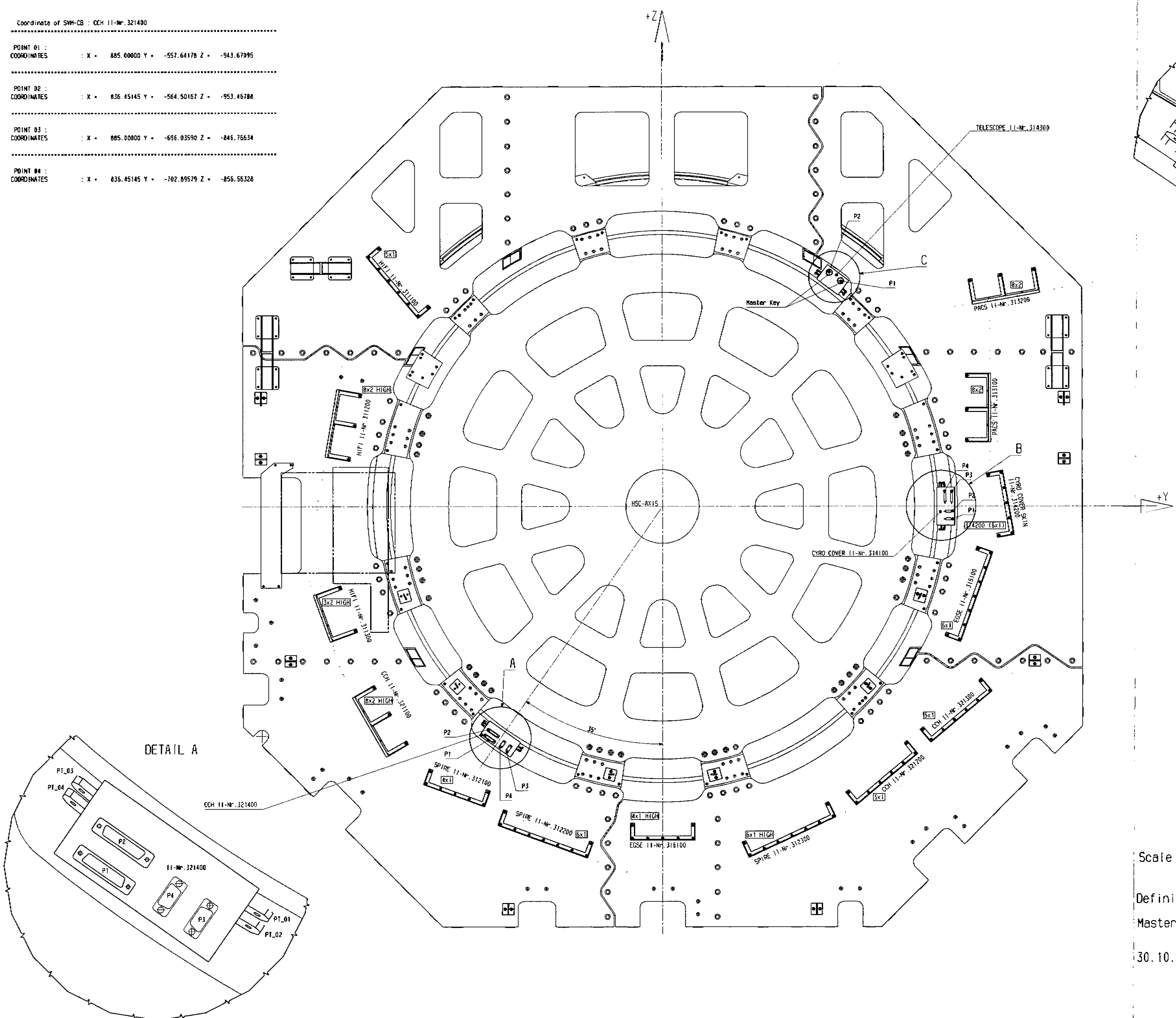
Coordinate of SVM-CB : CCH II-Nr.321400

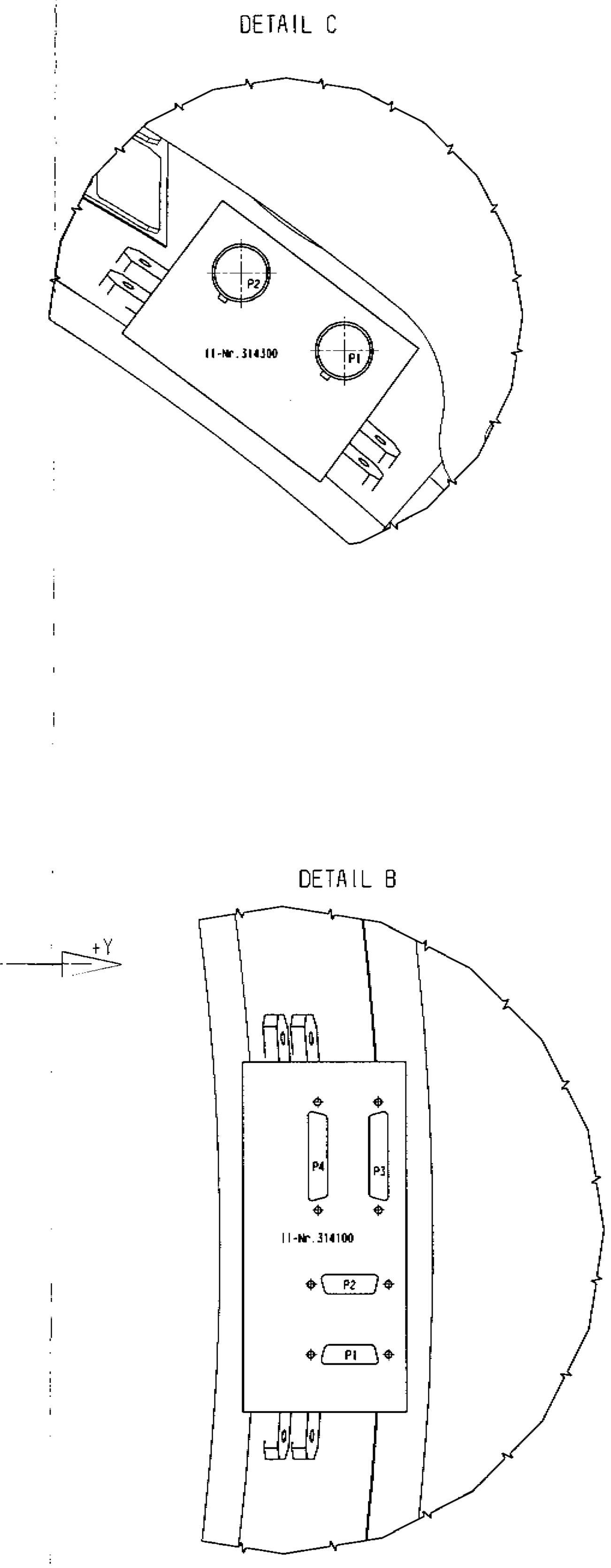
POINT 01 :
COORDINATES : X = 885.00000 Y = -557.64178 Z = -943.67095

POINT 02 :
COORDINATES : X = 836.45145 Y = -564.50167 Z = -953.46788

POINT 03 :
COORDINATES : X = 885.00000 Y = -696.03590 Z = -846.76634

POINT 04 :
COORDINATES : X = 836.45145 Y = -702.89579 Z = -856.56328





Scale 1:5

Definition of SVM-CB : CCH II-Nr.321400

Master Key of 314100, 314300 and 321400

30.10.03 A. Fehringer

STRH Relocation

THERMAL DESIGN

STRH Relocation

STR main requirements (@ SC side)

- **2 STR On T_{max} = 30 °C (w/o Stability)**
- **1 STR On T_{ref} = 0 °C (with Stability)**
- **Max STR feet ΔT = 0.4 °C**
- **Stability (time gradient) = 0.25°C/100seconds**

- **Max Heat Flux to CVV = 150 mW**

STRH Relocation

Radiator Plate Design

- **High Conductivity CFRP skins (+X=2 mm, -X=3mm)**
- **33650 mm^2 Silver Teflon radiator areas around STR Heads**
- **8 heaters in parallel in 1 heater line, controlled at °0 by thermistor on STR feet**
- **Plate-STR feet I/F with good contact conductivity (avoid thermal filler):**
  - planarity=0.01mm
  - roughness=1.6 micron

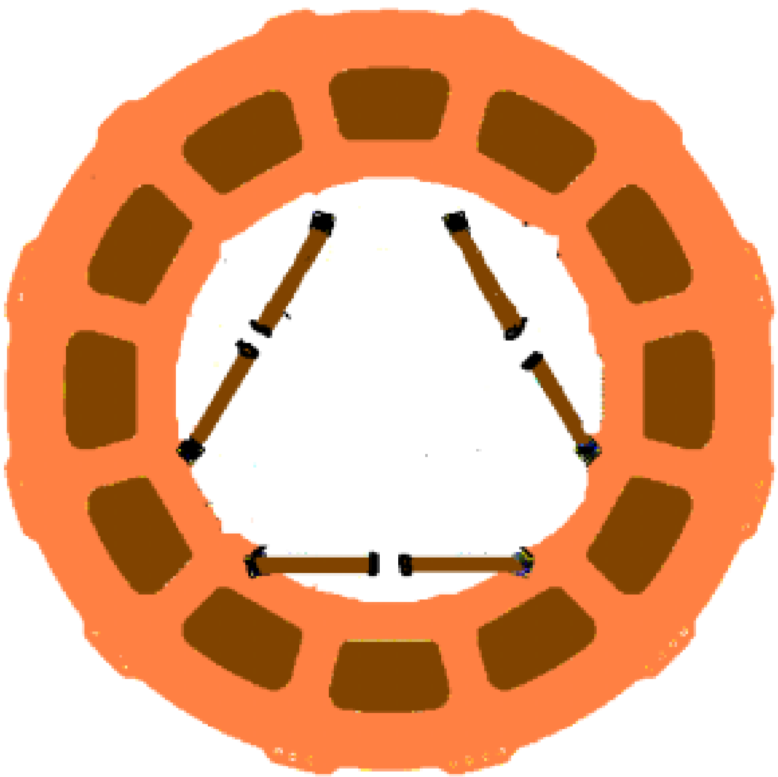
STRH Relocation

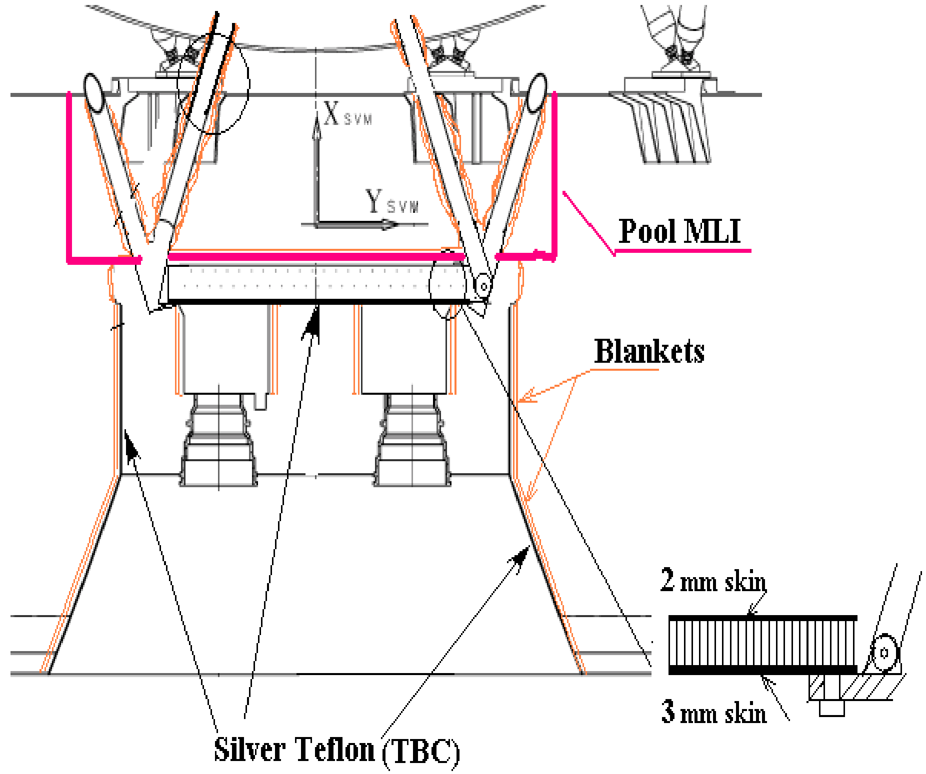
Struts Design

- **Glass Fiber (GFRP): ϕ 30mm * 0.8 mm (or 20*1.2)**
- **Glass Fiber length 426 mm out of 466 mm (distance between CVV I/F - STR plate I/F = 574 mm)**
- **Compatible with buckling analysis MLI covered pool**
- **GFRP Struts covered with MLI**
- **MLI pool (shown in figure over-leaf)**
- **Thermal closure (sub-platform) design, two alternatives:**
  - **with cross reinforcement**
  - **w/o cross reinforcement (shown in figure over-leaf)**

STRH Relocation

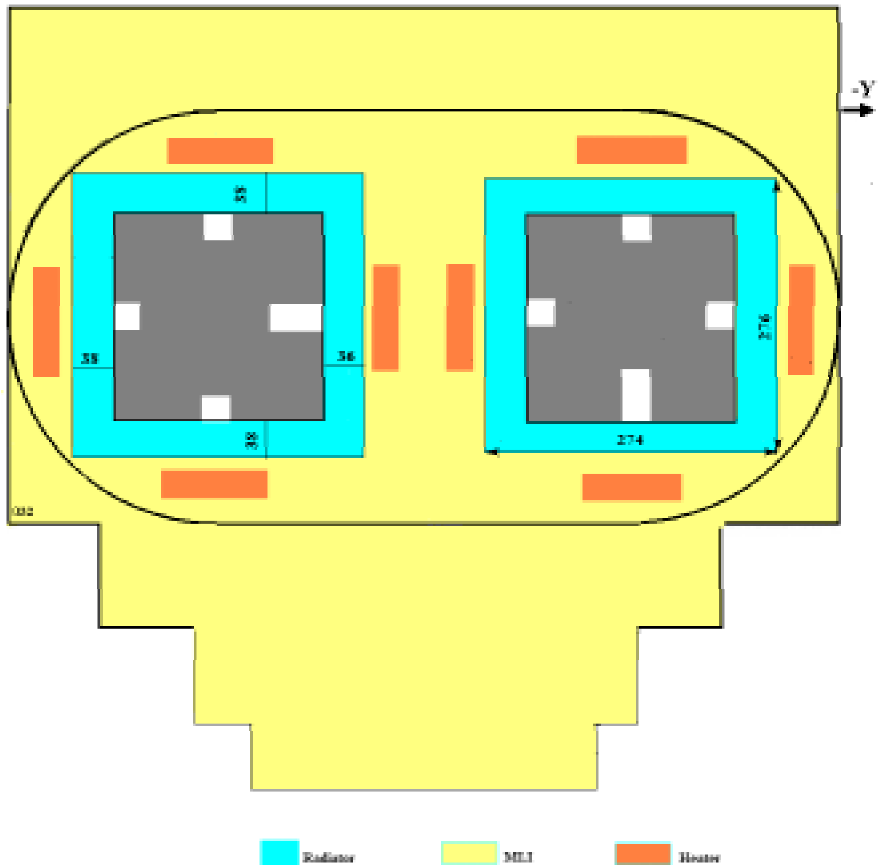
Struts Design





STRH Relocation

Support Plate Design



STRH Relocation

Design Verification Analysis

- 20 axial and 4 radial nodes per struts
- CVV Boundary temperatures (at SAA = -30°, 0°, +30°)
- GF thermal conductivity variable with temperature
- 512 (inside Sunshade) nodes + 18 (outside Sunshade) nodes per each support plate face.
- Support Plate equivalent conductivity 350 W/m/K
- New STR detailed TMM with thermal washers between Primary Baffle and STR

STRH Relocation

Design Verification Analysis - Results

Thermal Cases	E0L7	E0L7	EOL0	EOL2	EOL-10	EOL-20
SAA	-30°	-30°	0°	+30°	-10° (1)	-20° (1)
STR ON	2 STR	1 STR	1 STR	1 STR	1 STR	1 STR
Q to CVV	146mW	138mW	130mW	123mW	135mW	138mW
Q Heater	-	-	9.5 W	9.6 W	6.8 W	4.0 W
STR temp (2)	28.7 °C	-0.4 °C	-0.3 °C	-0.3 °C	-0.3 °C	-0.3 °C
Max feet ΔT	N/A	0.40 °C	0.39 °C	0.39 °C	0.39 °C	0.39 °C

1) PLM boundary temperatures as per EOL0
2) Active STR reference point (foot)

STRH Relocation

Plate temperature Summary

Case EOL7

		-3.1	-2.9	-2.7	-2.6		
	-3.5	-3.3	-3.0	-2.6	-2.3	-2.1	
-3.8	-3.7	-3.5	-3.0	-2.5	-2.0	-1.7	-1.7
-4.0	-3.9	-3.7	-3.1	-2.3	-1.4	-1.2	-1.5
-4.0	-3.9	-3.7	-3.1	-2.4	-1.4	-1.2	-1.5
-3.9	-3.8	-3.5	-3.1	-2.5	-1.9	-1.7	-1.7
-3.8	-3.7	-3.4	-3.0	-2.5	-2.1	-1.9	-1.8

Case EOL0

-X Side

		-2.7	-2.5	-2.4	-2.2		
	-3.1	-2.9	-2.6	-2.3	-1.9	-1.6	
-3.8	-3.7	-3.5	-3.0	-2.5	-2.0	-1.7	-1.7
-4.0	-3.9	-3.7	-3.1	-2.3	-1.4	-1.2	-1.5
-4.0	-3.9	-3.7	-3.1	-2.4	-1.4	-1.2	-1.5
-3.9	-3.8	-3.5	-3.1	-2.5	-1.9	-1.7	-1.7
-3.5	-3.3	-3.0	-2.6	-2.2	-1.7	-1.5	-1.5

→ +Y
↓ +Z

Case EOL2

-X Side

		-2.7	-2.6	-2.4	-2.3		
	-3.2	-2.9	-2.7	-2.3	-2.0	-1.7	
-3.8	-3.7	-3.5	-3.0	-2.5	-2.0	-1.7	-1.7
-4.0	-3.9	-3.7	-3.1	-2.3	-1.4	-1.2	-1.5
-4.0	-3.9	-3.7	-3.1	-2.4	-1.4	-1.2	-1.5
-3.9	-3.8	-3.5	-3.1	-2.5	-1.9	-1.7	-1.7
-3.6	-3.4	-3.1	-2.7	-2.2	-1.8	-1.6	-1.5

STRH Relocation

Parametric Analysis Verification

Additional analysis to evaluate the effects of the design sensitivity:

- **all GF struts Thermal conductivity values increased by 20%**
- **Support plate equivalent thermal conductivity reduced from 350 W/m/K to 300 W/m/K**
- **Requested Heater power increased to compensate the 9 °C usual temperature uncertainty at the STR feet**
- **Radiator Plate areas reduced from 33650 mm2 to 22500 mm2**

- **All analyses with EOL 7 (SAA=-30°) conditions**

STRH Relocation

Parametric Analysis Results

	E0L7	E0L7	EOL0	EOL2
Case	GFR k	Plate eq. k	Heaters	Red. Rad.
STR ON	1 STR	1 STR	1 STR	2 STR
Q to CVV	156mW	138mW	130mW	
Q Heater	-	-	9.5 W	-
STR temp (2)	-0.3 °C	-0.5 °C	-0.3 °C	44°C
Max feet ΔT	0.40 °C	0.42 °C	0.39 °C	°C

2) Active STR reference point (foot)

STRH Relocation

Thermal Conclusions

The proposed design meets all the thermal requirements and provides the temperature distribution which allows to meet the thermo-elastic requirements (see next pages). No problems are expected from the (still in progress) thermal stability analysis (time gradient):

same control law of HIFI
requirement less tight than HIFI

The parametric analysis showed that there are some margins on the design assumptions.

STRH Relocation

THERMAL ELASTIC ANALYSIS

STRH Relocation

STR alignment stability requirement

- **Present target for Thermal Elastic analysis**
  - **Rx, Ry, Rz** ≤ 3.84E-6 rad ≈ 0.8”

- Derivative requirement:
  - Rx ≤ 0.8”
  - P ≤ √2 * 0.8” ≈ 1.13”

STRH Relocation

Thermal-elastic cases and results

SAA = -30°, 0°, + 30°

Δ(SAA)	Rx (1)	P (1)
(-30°)-(0°)	5.49E-04	**0.13**
(-30°)-(+30°)	-2.10E-02	**0.08**
(0°)-(+30°)	-2.17E-02	**0.05**

(1) All values in arcsec

STRH Relocation

T.E. Analysis Conclusions

- **Significant improvement w.r.t. to the previous runs:**
  - **STR detailed thermal model was revised by Galileo**
  - **baffle and head were isolated by means of thermal washer (this had been neglected in the model previously received from Galileo)**
  - **thermal inputs for T.E. were re-defined and ΔT between plate upper and lower skins was shown to be very much sensitive to STR thermal model/configuration**
- **Alignment stability requirements are met:**
  - **with margins**
  - **all over the pointing range**

STRH Relocation

T.E. Sensitivity Analysis

- Several analyses have been run to verify **alignment stability sensitivity** to the variation of the following thermal-elastic model parameters:
  - Geometrical
  - Material characteristics (Strut Coefficient of Thermal Expansion - CTE)
  - Thermal distribution inputs

(details over-leaf)

STRH Relocation

Sensitivity Analysis

- Geometrical
  - Strut/panel interface type and location
  - Length of the 6 struts A,B,C,D,E.F

- Strut (A,B,C,D,E,F) material characteristics
  - $CTE_{nominal} = 6*10^{-6}$ mm/°K
  - CTE spread (relative values) = +10% “pair-by-pair” and “strut-by-strut”
- Temperature distribution on panel upper and lower skins
  - Uniform (average) temperature distribution
  - Real temperature distribution

SAA=-30°

Side +X — Average –2.8

		-3.0	-2.9	-2.8	-2.7		
	-3.3	-3.1	-2.9	-2.8	-2.6	-2.4	
-3.6	-3.4	-3.2	-3.0	-2.7	-2.5	-2.3	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.4	-2.2	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.3	-2.1	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.4	-2.2	-2.1
-3.5	-3.4	-3.2	-3.0	-2.7	-2.5	-2.3	-2.2

Side -X — Average –2.7

		-3.1	-2.9	-2.7	-2.6		
	-3.5	-3.3	-3.0	-2.6	-2.3	-2.1	
-3.8	-3.7	-3.5	-3.0	-2.5	-2.0	-1.7	-1.7
-4.0	-3.9	-3.7	-3.1	-2.3	-1.4	-1.2	-1.5
-4.0	-3.9	-3.7	-3.1	-2.4	-1.4	-1.2	-1.5
-3.9	-3.8	-3.5	-3.1	-2.5	-1.9	-1.7	-1.7
-3.8	-3.7	-3.4	-3.0	-2.5	-2.1	-1.9	-1.8

SAA=0°

Side -X

Average
–2.6

		-2.7	-2.5	-2.4	-2.2		
	-3.1	-2.9	-2.6	-2.3	-1.9	-1.6	
-3.8	-3.7	-3.5	-3.0	-2.5	-2.0	-1.7	-1.7
-4.0	-3.9	-3.7	-3.1	-2.3	-1.4	-1.2	-1.5
-4.0	-3.9	-3.7	-3.1	-2.4	-1.4	-1.2	-1.5
-3.9	-3.8	-3.5	-3.1	-2.5	-1.9	-1.7	-1.7
-3.5	-3.3	-3.0	-2.6	-2.2	-1.7	-1.5	-1.5

Side +X

Average
–2.8

		-2.8	-2.7	-2.6	-2.5		
	-3.1	-2.9	-2.7	-2.5	-2.4	-2.2	
-3.6	-3.4	-3.2	-3.0	-2.7	-2.5	-2.3	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.4	-2.2	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.3	-2.1	-2.1
-3.6	-3.5	-3.3	-3.0	-2.7	-2.4	-2.2	-2.1
-3.3	-3.2	-3.0	-2.8	-2.5	-2.2	-2.1	-2.0

STRH Relocation

T.E. Conclusions

- **Results still under thorough evaluation**
- **Geometrical and material parameters**
  - **absolute alignment values differ by order of magnitude**
  - **however alignment differences (ΔSAA) do stay within requirements**
- **Temperature distribution**
  - **the align. differences have been calculated for the w.c. (-30°)-(0°) using uniform and real temperature distributions**
  - **both cases are very similar in both conditions**

Herschel Star Tracker Integration

- The following charts present the baseline mounting and alignment concept for the Herschel Star Trackers, as an evolution from the preliminary concepts presented during PM18. Some comments, received from ASP, have been implemented by ALS. There are still some points to be discussed; these points have been listed at the end of this presentation.

- The concept is the same for PFM and STM, where for this latter the CVV is obviously substituted with suitable attachment points on the Thermal Test Adapter.

Sequence of integration activities for **STM**:

Activities at ALS premises on a bench:

1. Struts fit-check to baseplate

2. Pre-integration of STR (dummies) onto the baseplate

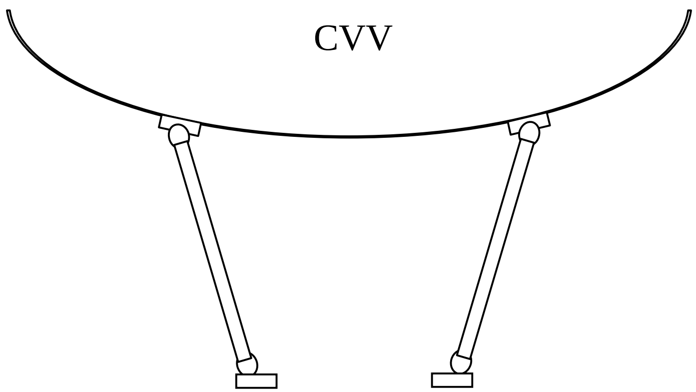
3. STR dummies alignment test → alignment matrix M2

4. STR dummies dismounting

5. Delivery of struts, baseplate and STR dummies as loose parts to Astrium

Activities at Astrium premises on the Herschel PLM (MGSE configuration TBD by ASP):

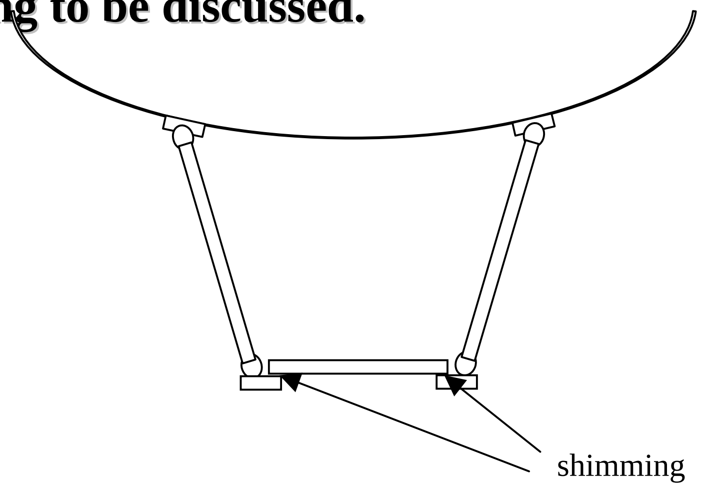
6. Connection of the struts to CVV:



7. Installation of the baseplate on the struts

8. Baseplate alignment test and shimming → alignment matrix M3. The shimming will be carried out at the struts/baseplate interface, as there are 3 interface points defining a plane:

Need for shimming to be discussed.

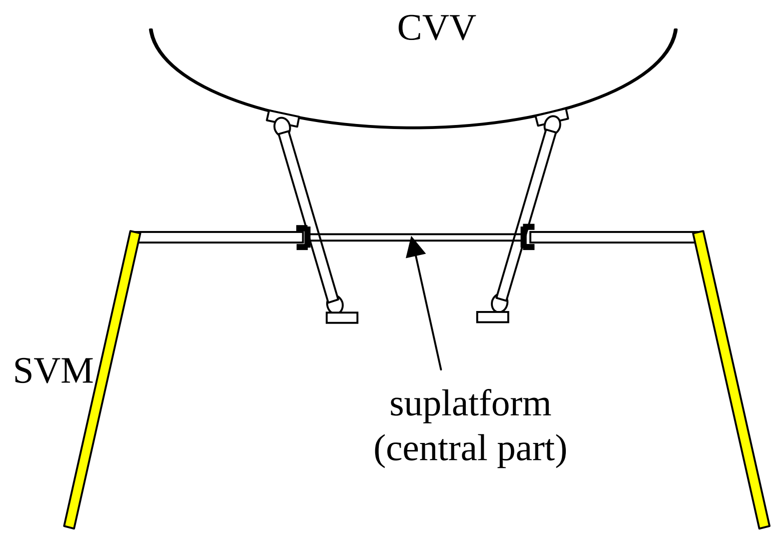


9. Baseplate removal

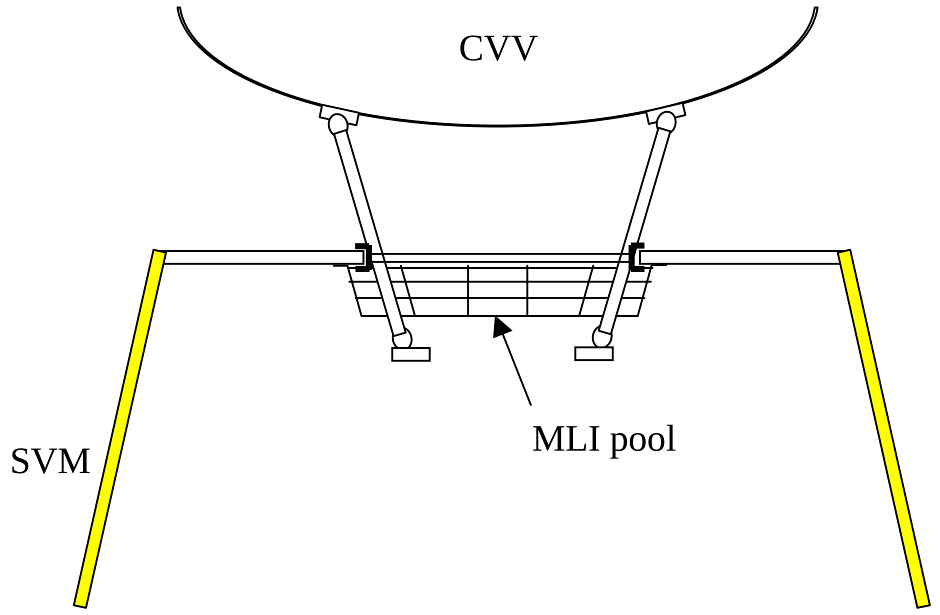
Activities at Astrium premises on Herschel satellite (on the VIS):

10. SVM-PLM mating

11. SVM subplatform finalization (rays+central disk, TBC).

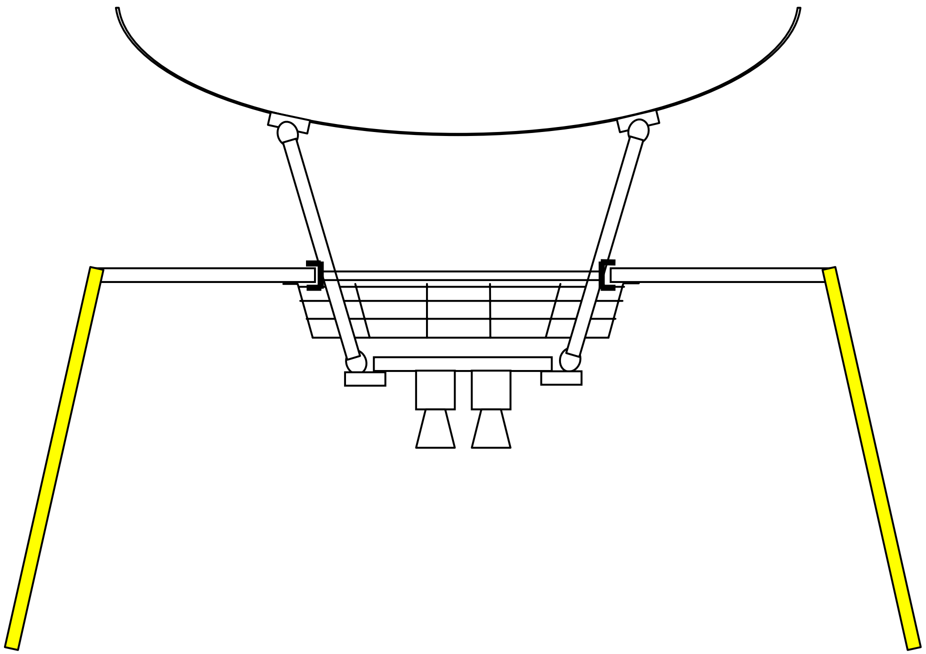


12. MLI pool installation underneath the subplatform (MLI installation on the pool previously performed as off-line activity)



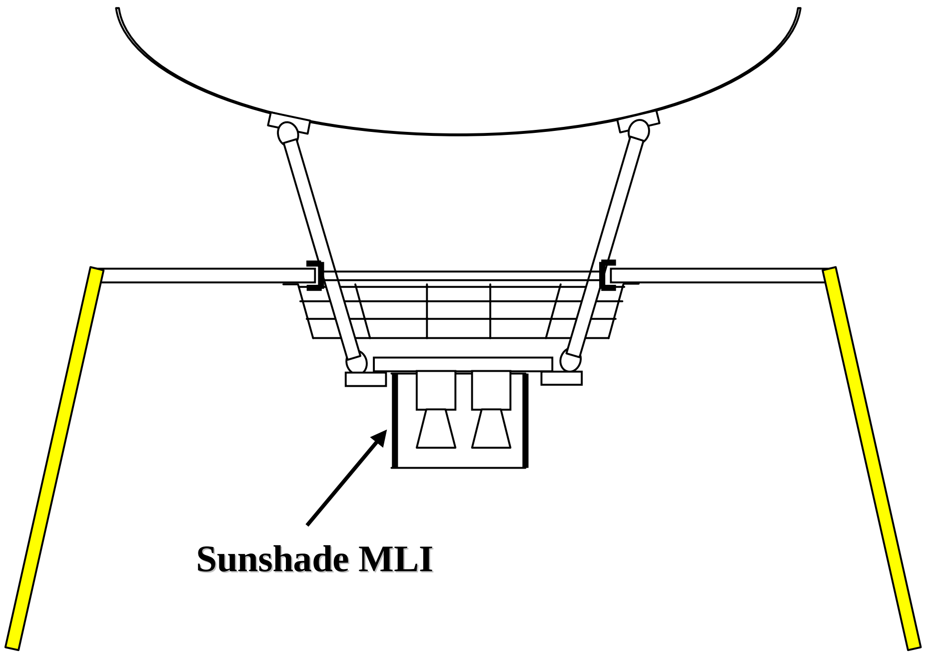
13. Installation of the baseplate on the struts

14. Mounting of the STR dummies on the baseplate



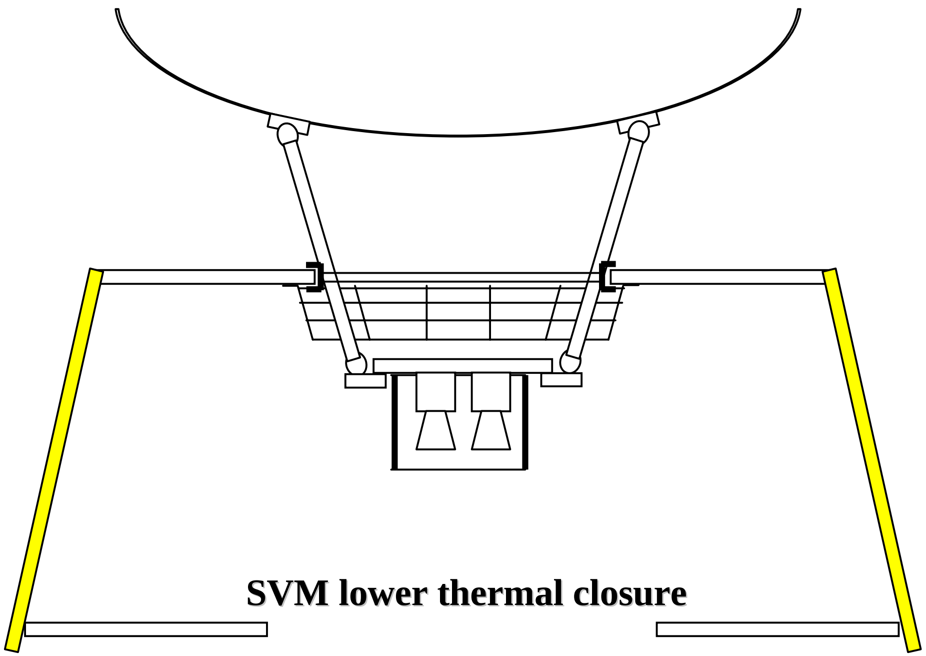
15. Installation of the sunshade MLI support brackets

16. Sunshade MLI installation

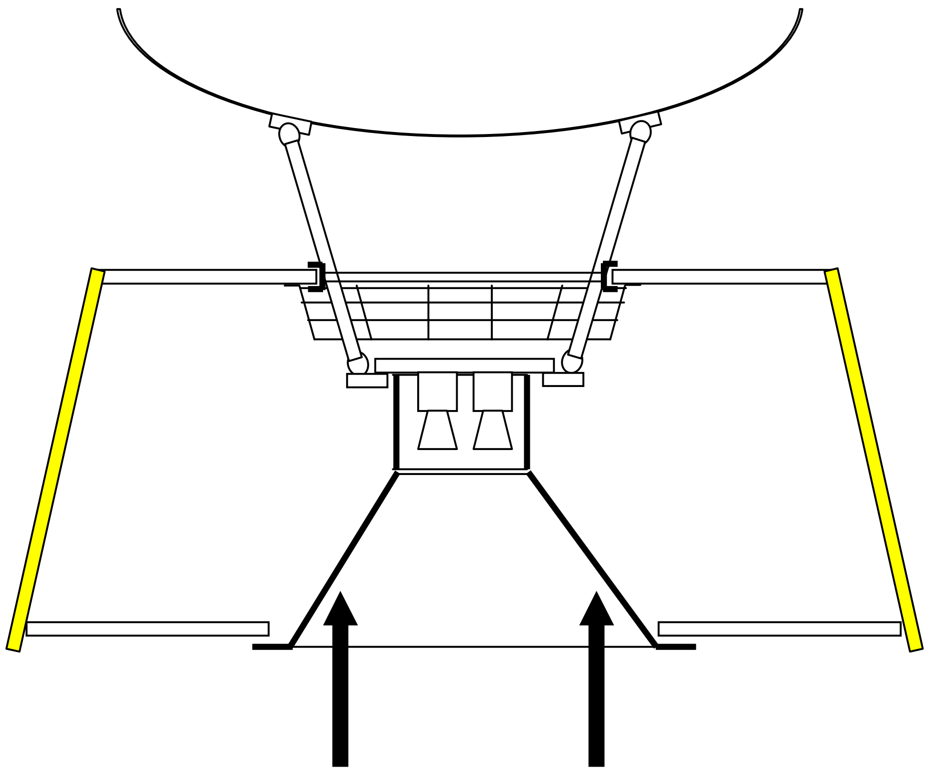


17. STR dummies alignment test (and adjustment, if needed). → alignment matrix M5.
Note: for the STR alignment test the satellite must be tilted (X-axis in horizontal position).

18. Installation of the lower thermal closure

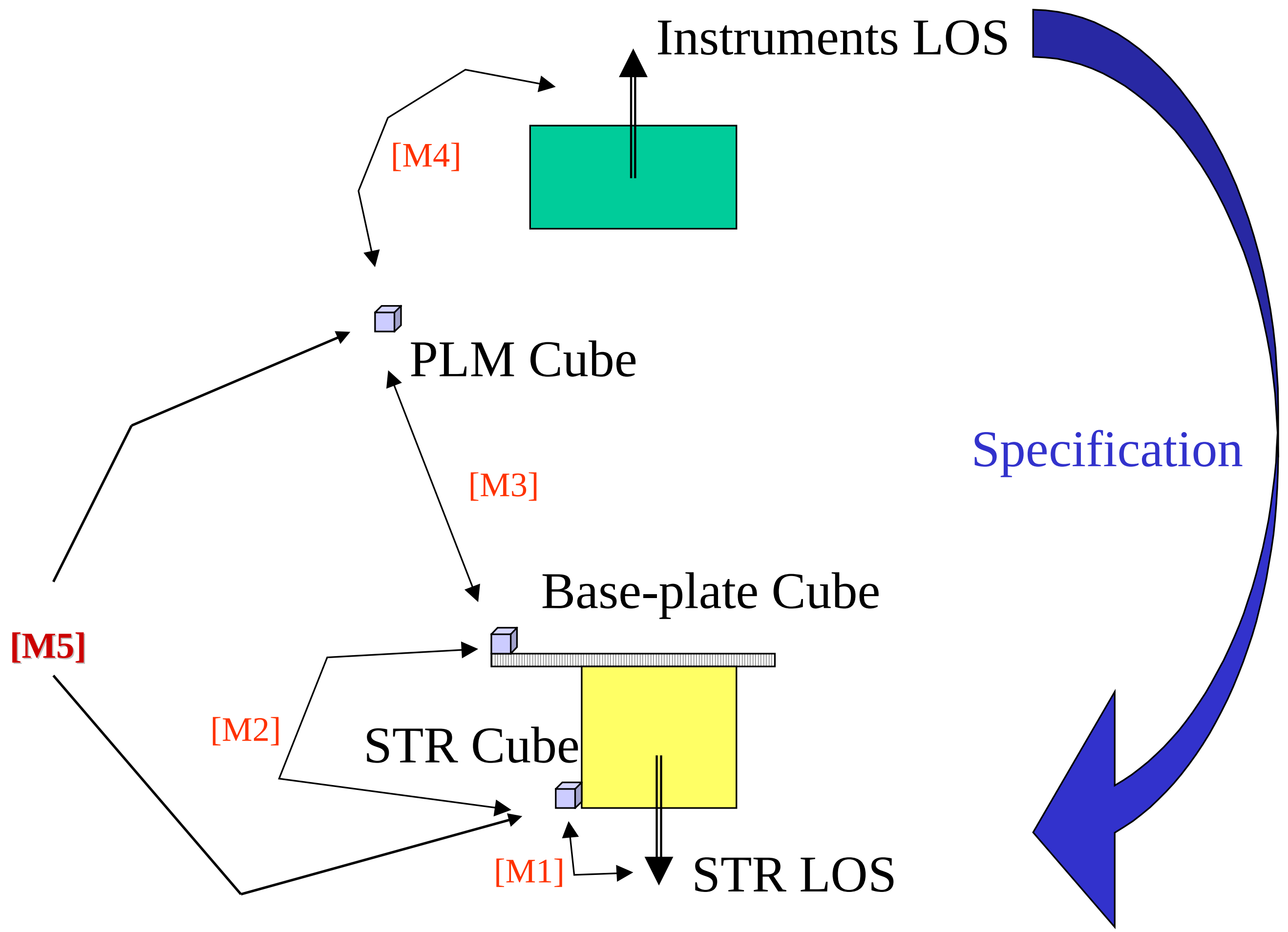


17. Installation of the secondary baffle (MLI installation around the secondary baffle previously performed as off-line activity).



For clarification, hereafter there is a summary of the alignment sequence (based on ASP proposal)

- **STR subco will provide the matrix giving the STR LOS w.r.t. the mirror cube attached to the STR: [M1]**
- **Alenia will perform, on a bench, the measurement of the position of the STR cubes vs the cube on the baseplate: [M2]. In parallel ASED will perform the measurement of the matrix [M4] giving the instrument LOS w.r.t. the reference cube attached to the PLM**
- **After baseplate mounting, Alenia/ASED (TBD) will perform the measurement of the position of the baseplate cube vs the PLM cube: [M3]. Knowing the matrix [M1], [M2] and [M4], Alenia/ASP/ASED (TBD) will define the shimming at baseplate/struts interface in order to cope with the requirement by modifying [M3].** ***Needs to be further discussed.***
- **After final integration of the STR on Herschel satellite the official alignment test will be performed with direct measurement between the reference cube attached to the PLM and the mirror cube attached to the STR’s: [M5]. This will be the reference for the following alignment checks.**



Instruments LOS
[M4]
PLM Cube
[M3]
Specification
Base-plate Cube
[M5]
[M2]
STR Cube
[M1]
STR LOS

Open issues:

- alignment repeatability (STR vs baseplate and baseplate vs PLM cube). It will not be considered in the alignment budget, as the official alignment test will be performed afterwards.
- Need of shimming
- MGSE configuration during integration activities at PLM and satellite level are under ASP responsibilities

- alignment test activities at PLM and satellite level. ALS position is that these activities are under ASP responsibilities, in particular shimming determination shall be done by ASP. ALS will support ASP/ASED in the preparation of specification/procedure and test execution.

- centering pins location.

- continuity between Sunshade MLI and secondary baffle

- +X side of the radiator: MLI fixing on dedicated structure (e.g. the bottom of the MLI pool) or on the +X side of the baseplate