EADS ASTRIUM

Minutes of Meeting

Date:	03.10.06	**Herschel**	
Doc.-No.:	HP-2-ASED-MN1263		
Meeting place:	ESTEC	Chairman:	C.Scharmberg
Date/Time:		Secretary	D.Hendry
Agenda dated:	Agenda on pg. 2	Close of Meeting:	

Subject: SPIRE WU IRR for STM2

Participants:	E.Sawyer RAL T.Grundy RAL F.Pedersen ESA pt C.Jewell ESA pt C.Scharmberg ESA B.Gobillot. AAS-F A.Knight.AAS-F V.La Gioia ASED R.Hohn ASED D.Hendry ASED T.Bayer ASED	Additional Distribution:	ESA, ASP

Page: 1 of Page(s)

☐ Brief-Minutes (except following sheets) ☐ Summary of Results of Sheets 2 till

Summary and Conclusion :

The go ahead for mechanical integration, bench test and SIH integration is agreed.
A TRR will be performed prior to the straylight test, date TBD

Reference	Results	Remarks
	Agenda : 1. Hand-Over Meeting action close-out 2. Results of visual inspection 3. H/W Identification 4. H/W ABCL 5. H/W EIDP 6. Integration procedure 7. NCRs potentially affecting integration 8. Open Work status 9. Cleanliness / Inspection report / Reference 10. Safety Constraints 11. AOB 12. Release for integration.	

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Reference	Results	Remarks
	Introduction. The following reviews have been held which relate to SPIRE on the STM2 campaign. • Herschel SPIRE CQM FPU hand over for straylight tests ESA-SCI-PT/42316 dated 17,05.06 • IRR for SPIRE CQM into PLM STM2 HP-2-ASED-MN-1228 dated 24.05.06 • SPIRE EMC and Stray Light Preparation HP-2-ASED-MN-1257 dated 13.09.06. • SPIRE WU AVM handover for straylight test ESA-SCI-PT/44136 dated 21.09.06 1, Hand-over meeting action close-out. zu Internet RAL requested ~~a ISDN~~ connection to the IEGSE A standard ISDN connection is available in the ETS check out room, but cable/ connection and data rate should be confirmed by RAL representatives. ~~CLOSED~~ Open The ISDN connection does not provide Internet access RAL to provide a list of applicable procedures CLOSED see attached 2. Results of visual inspection. ASED e-mail comments following incoming inspections performed by ESA and ASED PA See attached e-mail and extract from IID-A 2.1 ESA request ASED to supply and fit unit grounding straps (Alenia supply SVM) (für FM). Bonding requirement IAW SPIRE-RAL-PRC-002642 Iss 1 10m ohm. 2.2. Nut and washer for unit grounding stud is M4 ESA request ASED to supply as not delivered with the unit nominally Inst supply. 2.3. Unit fixations bolts nuts and washers, ESA request ASED to supply nominally Alenia supply for SVM. (für FM) Size M4 and M5 length TBD during integration. Intended torque advised by ASED M4 2.5 Nm M5 4.8 Nm. 2.4 Unit connectors delivered without ESD caps, RAL advise that the units were provided by CEA with these caps . Delivery configuration for FM should be assessed and rectified for FM	Note RAL

Reference	Results	Remarks
	Mechanical Handling and integration procedure. RAL consider this sufficient and that there are no specific requirements other that standard ESD precautions, ie, use of wrist straps and unit grounding. Flatness and I/F ICD check is performed by ~~RAL~~ CEA prior to delivery and record is contained in the EIDP. ASED request copy of out going inspection report and hard copy of I/F ICD (AO format) to be delivered with the H/W in future (access to ftp server and EIDP is not always possible from ETS.	Note RAL
	2.5 Cleanliness Particle contamination identified , RAL advise that the units were cleaned prior to dispatch, but as 2 units were not double bagged and only loosly covered in single foil the contamination was probably from the transport contained. RAL to reassess for FM	Note RAL
	3. H/W Identification. 3.1.WU:- DCU Model QM2 FCU Model QM2 DPU Model AVM1 RAL confirm that the electrical I/F for these units is the same as for EQM 3.2.Harness:- WIH –test harness as used for EQM SIH SVM Harness- as used for EQM 3.3.Special GSE:- Hot black body and associated test equipment.- Commercial equipment 3.4.EGSE:- See attached list	

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Reference	Results	Remarks
	Out standing items from 1st delivery now available as follows:- Straylight detector electronics, test harness, 1553 bus coupler 1 off and cables One 1553 bus coupler and stub is still needed, ASED are requested to provide if available. 3.5.IEGSE:- PC network switch not included in delivery or patch cables, ETS asked to provide items for short term use 3.6. Power SCOE:- Compatibility of Planck power SCOE to be confirmed by AAS-F, ICD and harness definition for unit power connections also needed 3.7 Availability of power SCOE to Unit harness to be confirmed by AAS-F 4: H/W ABCL. See Hand-over Mom ESA-SCI-PT/44136 5. H/W EIDP. No EIDP is provided with the delivery of the units, RAL advise the EIDP is on the ftp server. ASED cannot access this ftp server from ETS , ESA will provide a copy of the updated EIDP in electronic format , eg memory stick or CD. — Done CD handed to Rüdiger 6. Integration procedure. 6.1.The attached list of procedures has been provided by RAL during the handover meeting as being applicable for WU mechanical and electrical integration, ASED consider that dedicated step by step procedures are necessary for both the mechanical and electrical integration and should be completed and checked off to provide the “As run”/ report. 6.2.Specific Mechanical integration procedure considered not necessary for STM2 , RAL advise standard ESD protection.	Note AAS-F Note AAS-F

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Reference	Results	Remarks
	6.3. Bench test procedure is SPIRE-RAL-NOT-002396 iss 0,1 The procedure will be redlined to cover the differences in configuration from EQM, eg, no CCS , direct command from IEGSE, power from Planck power SCOE, switch on sequence etc,-- 6.4 Power on The power harness from the SCOE to the units should be available from AAS-F /Alenia AAS-F are requested to confirm the provision of these cables and report the status by 10-00 hrs 04.10.06 The other options are:- 1) Manufacture new cables to the definition provided by AAS-F 2) Use bench power supplies and banana leads , voltage and current levels to be determined Bench power supplies are available at ETS but are out of calibration date. RAL to consider whether Bench power supplies can be used for the EMC test 7. NCRs potentially affecting integration. None identified which prevent integration, see Hand over Mom 8. Open work Status. 8.1.Incoming Inspection for IEGSE. **to be completed** 8.2.Incoming Inspection for SPIRE WIH and EGSE. **to be completed.** 8.3.Provision and definition of Power SCOE cables. **Addressed above** 8.4.Configuration for Planck power SCOE connections and SCOE set up and checkout. **ongoing** 8.5.Verification of SCOE harness to Unit connectors. **ongoing**	Note RAL

Reference	Results	Remarks
	8.6.Mechanical integration procedure including ESD and grounding details **CLOSED**. 8.7.Unit fixations **CLOSED** 8.8.Unit Grounding straps. **Ongoing** 8.9.IEGSE set-up and check out. **Ongoing** 8.10.Bench test procedure. Including test set-up /Configuration and connections to power SCOE and IEGSE. **ongoing** 8.11.Electrical Integration procedure. **Open planned for 05 and 06** 8.12.Hot Black body procedure. **Start this week continue next week** 8.13.1553 cable and bus couplers. **CLOSED** 9. Cleanliness / Inspection Report / reference. Incoming Inspection Reports. HP-2-ASED-II-0176 SPIRE FCU STM2 HP-2-ASED-II-0177 SPIRE DCU STM2 HP-2-ASED-II-0178 SPIRE DPU STM2 HP-2-ASED-II-SPIRE Black body and TE. 10. Safety constraints. Unit safety, power connections Unit ESD protection handling and integration. Covered by SPIRE ESD Procedure	

Reference	Results	Remarks
	11. AOB / Planning See attached fax ASED intend to advance the activities and intend to perform unit mech integration, SVM panel integration, SIH Harness integration this week and request SPIRE support. SPIRE to confirm TRR for Stray light TBD proposed 06.10.06 Cold FT will be performed as 1st step of Straylight test sequence app 2 hrs for test. 11.10.06 TBC Bench test 04.10.06 Black Body set up 09.10.06 12 release for integration. The go ahead for mechanical integration, bench test and SIH integration is agreed. A TRR will be performed prior to the straylight test, date TBD	Note RAL

Meeting:
Title:
Date:

Action Item List

Herschel

No.:	Description:	Due Date	Originator Comp./Pers.	Actionee Comp./Pers.	Source	Completion

Annex MN-1263

List of procedures applicable to the EMC/stray light test campaign.

SPIRE FPU Handling & Integration Procedure	SPIRE-RAL-PRC-002642	1	Contained din the FPU EIDP
SPIRE Warm Electronics Integration Procedure	SPIRE-RAL-PRC-002181	1*	See note below

*Note, The data pack contains issue 3, which is a later version and applies to QM1 only (it describes the remote switch box we needed with the external power supply, this is not needed for this model.) Issue 1 attached.

The procedures to be run during the tests will be based on the procedures run during the EQM test campaign, these are listed below. There is likely to be some modification as we do the test in order to respond to the test conditions.

Test	Document Number	Issue
Instrument Module Test (IMT)	SPIRE-RAL-NOT-002284	2
Instrument EMC Test (EMC)	SPIRE-RAL-NOT-002402	1
Functional Check (Warm)	SPIRE-RAL-NOT-002396	0.1
SPIRE Functional check (WFT)	SPIRE-RAL-NOT-002397	0.1
Short Functional test (SFT)	SPIRE-RAL-NOT-002398	0.1

These can be found in the FPU EIDP.

ANNEX MN-1263.

Shipping list
SPIRE Warm units for Stray Light Test
20 September 2006

The following equipment will be delivered to:-

Astrium Satellites/Herschel Project
c/o ESTEC
Keplerlaan 1
2201 AZ Noordwijk
The Netherlands

Contact persons at ESTEC
Mr. R. Hohn 56189.
Dave Hendry (ext. 55334)
Holger Brune (ext. 55298).

Box No	Contents	Model	Size (LxWxH) Meters	Weight Kg
1	DCU	QM2	0.7x0.5x0.5	45
2	FCU	QM2	0.7x0.5x0.5	40
3	DPU	AVM1	.4x.3x.3	15
4	CDMS simulator PC CDMS simulator keyboard and mouse CDMS simulator monitor Optical bench Chopper mechanism Misc optical components Stray light detector electronics ✓ Test Harness. ✓ WIH	EGSE	.6x.5x.5	60
5	Hot black body, test equipment			

From

Eric Sawyer
Space Science and Technology Department
Rutherford Appleton Laboratory
Chilton, Didcot
Oxon, OX11 0QX.
UK
Tel 44 (0)1235 44 6385
mailto:e.sawyer@rl.ac.uk

ITEM		Preliminary Definition	Approval of prelim. Def.	Detailed definition	Approval before procurement	Procurement	Integration Herschel	Integration Planck
Planck Instrument coolers pipes on the SVM	Routing on SVM (pipes routing, length, attachment pitch & support definition).	ALS	ASPI / Instrum	Instrum	ASPI	Pipes :Instrum		ASPI
	Routing on PPLM (pipes routing, length, attachment pitch & support definition).	ASPI	Instrum	ASPI		Pipes : Instrum		ASPI
	Fixation of pipes: Attachment part on SVM (inserts, paint free areas)	ALS	ASPI / Instrum	ALS	ASPI / Instrum	ALS		ALS
	Fixation of pipes: Attachment part on PPLM (inserts, paint free areas)	ASPI	Instrum	ASPI		Instrum		ASPI
	Fixation of pipes: Attachment part on the pipe and support	Instrum	ASPI/Instrum	Instrum	N/A	Instrum		ASPI
	Pipes hardware	Instrum.	ASPI	Instrum	N/A	Instrum.		ASPI

Table 5.6.3-4: Planck instruments pipes fixations responsibilities

5.6.3.6 Fixation hardware for warm units on the SVM

The following table gives the responsibility sharing for the definition and procurement of the fixation hardware of warm units on the SVM

ITEM		Preliminary Definition	Approval of prelim. Def.	Detailed definition	Approval before procurement	Procurement	Integration Herschel	Integration Planck
Warm unit external Interfaces (fixation & grounding)	Bonding stud (M4*6)	Instrum.	ALS / ASPI	Instrum.	ALS / ASPI	Instrum.	N/A	N/A
	Washer, nut & max torke value on bonding stud (warm unit side)	Instrum	ALS / ASPI	Instrum.	ALS/ASPI	Instrum.	ASED	ASPI
	Bonding strap and fixation on SVM (insert + screw) for WU grounding.	ALS	N/A	ALS	N/A	ALS	ALS for SVM inserts, ASED for WU bonding strap.	ALS for SVM inserts, ASPI for WU bonding strap.
	WU fixation screws and inserts on SVM, paint-free areas.	ALS	ASPI	ALS	ASPI	ALS	ASED, for fixation screws.	ASPI, for fixation screws.
	Paint, surface treatment of WU, paint-free areas.	Instrum.	ALS / ASPI	Instrum.	ALS / ASPI	Instrum.	N/A	N/A
	Paint-free areas for MLI attachment points on WU	ALS	Instrum	ALS / Instrum. for paint-free areas	ASPI/Instrum	Instrum	ASED for MLI attachment points.	ASPI for MLI attachment points.
	Paint-free areas for MLI attachment points on SVM	ALS	ALS	ALS	N/A	ALS	ALS	ALS
	MLI (including attachment points)	ALS	Instrum	ALS	ASPI/Instrum	ALS	ASED	ASPI

Table 5.6.3-5: Warm units fixations and grounding responsibilities

ANNEX MN-1263

ASTRIUM

Astrium Satellites

Telefax

+33 4 92 92 3010
ALCATEL ALENIA SPACE, Cannes, F
J. J. Juillet, D. Montet, B. Collaudin,
G. Dubrovik, P. Martin

Copy to:

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C. Scharmberg

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Name
S. Idler
Telephone
+49/(0)7545/8-4671
E-Mail
siegmund.idler@astrium.eads.net
Reference
HP-ASED-FX-0293-06
Date:
28.09.2006

Subject: STM2 Straylight Test Planning

Dear Sirs,

taking into account the delay in the AVM test program we have now established the following schedule for the STM2 straylight test activities at ESTEC:

03.10.06	SPIRE WUs integration
	SPIRE WIH integration
	IEGSE setup
04.10.06	Functional check of SPIRE WUs
05.10.06	Functional check of SPIRE WUs cont'd
	Hot blackbody source setup
	Check of LO window temperature increase with hot blackbody
06.10.06	Straylight TRR
	SPIRE SVM SIH integration
10.10.06	Mating of SPIRE WU to FPU
	SPIRE cold functional check
	Check of straylight detector
12.10.06	Start of straylight test

Astrium GmbH
Deutschland/Germany
Telefon: +49 (0)7545 8-01
Telefax: +49 (0)7545 8-4411

Annex MN-1263.

ASTRIUM

From: S. Idlerr
Reference: HP-ASED-FX-0293-06
Date: 28.09.2006
-2-

Note: Only those activities are listed where RAL support is required.

The EMC test setup and test will be performed following the completion of the stray-light test.

Please inform us in case of any conflicts with your planning.

Kind regards

ASTRIUM Satellites

i. V. Dr. W. Fricke

i. A. S. Idler

ANNEX MN-1263.

Hendry, David (external)

From: Carsten.Scharmberg@esa.int
Sent: Montag, 2. Oktober 2006 18:01
To: Hendry, David (external)
Cc: 'Pearce, A (Alan)'; 'Benoit.Gobillot@alcatelaleniaspace.com'; 'Bernard Collaudin'; Barlage, Bernhard; 'Swinyard, BM (Bruce)'; Hendry, David (external); 'Griffin, DK (Doug)'; 'Clark, EA (Eric)'; 'Sawyer, EC (Eric)'; 'Flemming.Pedersen@esa.int'; 'Guy.Doubrovik@alcatelaleniaspace.com'; 'Jan.Rautakoski@esa.int'; Lang, Juergen; Langfermann, Michael; 'Nicjknight@aol.com'; 'Pierre.Olivier@esa.int'; Stritter, Rene; Hohn, Ruediger; Idler, Siegmund; Bayer, Thomas; 'ulrich.gageur@esa.int'; La Gioia, Valentina (external); 'Yvan_HP@yahoo.fr'
Subject: RE: SPIRE WU Incoming Inspection

Dear Dave,

15:00 looks adequate. May I kindly ask you to organize the TRR and take the minutes. The meeting will be chaired by me.

Please find below the proposed agenda:

1. Hand-over meeting action close-out
2. Results of visual inspection
3. H/W Identification
4. H/W ABCL
5. H/W EIDP
6. Integration Procedure
7. NCRs potentially affecting integration
8. Open Work Status
9. Cleanliness / Inspection Report / Reference
10. Safety Constraints
11. AOB
12. Release for Integration

Kind regards,

Carsten

Instruments Manager, HERSCHEL/PLANCK Project, ESA/ESTEC
Tel +31(0)71565 ext 5786
e-mail: carsten.scharmberg@esa.int

"Hendry, David (external)" <David.Hendry.external@astrium.eads.net>

10/02/2006 16:52

To "'Carsten.Scharmberg@esa.int'" <Carsten.Scharmberg@esa.int>, "'Jan.Rautakoski@esa.int'" <Jan.Rautakoski@esa.int>

cc "'Bernard Collaudin'" <bernard.collaudin@alcatelaleniaspace.com>, "'Clark, EA (Eric)'"

<E.A.Clark@rl.ac.uk>,
"'Guy.Doubrovik@alcatelaleniaspace.com'"
<Guy.Doubrovik@alcatelaleniaspace.com>, "'Nicjknight@aol.com'"
<Nicjknight@aol.com>,
"'Yvan_HP@yahoo.fr'"
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"'ulrich.gageur@esa.int'"
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"'Jan.Rautakoski@esa.int'"
<Jan.Rautakoski@esa.int>,
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<D.K.Griffin@rl.ac.uk>, "'Swinyard, BM (Bruce)'"
<B.M.Swinyard@rl.ac.uk>, "'Pearce, A (Alan)'" <AP68@rl.ac.uk>, "'Sawyer, EC (Eric)'" <E.C.Sawyer@rl.ac.uk>,
"Hendry, David (external)"
<David.Hendry.external@astrium.eads.net>, "Idler, Siegmund"
<Siegmund.Idler@astrium.eads.net>,
"La Gioia, Valentina (external)"
<Valentina.LaGioia@astrium.eads.net>, "'Pierre.Olivier@esa.int'"
<Pierre.Olivier@esa.int>

Subject
RE: SPIRE WU Incoming Inspection

Dear Jan and Carsten
I have not yet received a response to the attached e-mail.
RAL will arrive tomorrow at 14-00 hrs and it may be advisable to hold a IRR and review the status prior to the integration activities, I suggest 15-00 hrs with participation of all levels, Could you advise who should arrange and chair this meeting. Regards
Dave

-----Original Message-----
From: Hendry, David (external)
Sent: Donnerstag, 28. September 2006 13:32
To: Carsten.Scharmberg@esa.int; Pierre.Olivier@esa.int
Cc: Bernard Collaudin; Clark, EA (Eric);
Guy.Doubrovik@alcatelaleniaspace.com; Nicjknight@aol.com;
Yvan_HP@yahoo.fr; Flemming.Pedersen@esa.int; ulrich.gageur@esa.int;
Jan.Rautakoski@esa.int; Pierre.Olivier@esa.int; Stritter, Rene; Hohn,

Ruediger; Lang, Juergen; Langfermann, Michael; Bayer, Thomas; Barlage, Bernhard; Benoit.Gobillot@alcatelaleniaspace.com; Griffin, DK (Doug); Swinyard, BM (Bruce); Pearce, A (Alan); 'Sawyer, EC (Eric)'
Subject: RE: SPIRE WU Incoming Inspection

Dear Pierre and Carsten
Please provide the ESA position to allow activities to proceed, at present we are blocked on points 1 to 5.
Regards
Dave

-----Original Message-----
From: Sawyer, EC (Eric) [mailto:E.C.Sawyer@rl.ac.uk]
Sent: Donnerstag, 28. September 2006 12:31
To: Hendry, David (external); Carsten.Scharmberg@esa.int
Cc: Bernard Collaudin; Clark, EA (Eric); Guy.Doubrovik@alcatelaleniaspace.com; Nicjknight@aol.com; Yvan_HP@yahoo.fr; Flemming.Pedersen@esa.int; ulrich.gageur@esa.int; Jan.Rautakoski@esa.int; Pierre.Olivier@esa.int; Stritter, Rene; Hohn, Ruediger; Lang, Juergen; Langfermann, Michael; Bayer, Thomas; Barlage, Bernhard; Benoit.Gobillot@alcatelaleniaspace.com; Griffin, DK (Doug); Swinyard, BM (Bruce); Pearce, A (Alan)
Subject: RE: SPIRE WU Incoming Inspection

Hi Dave,

Thank you for the reports, here are my comments to you e-mail points.

1) Grounding straps are not an instrument supplied item.
2) Unit fixation screws are also not an instrument supplied item. We can supply a nut for the DPU ground stud, but it is just a standard M4 nut.
3) Lack of protective caps is an omission on our part.
4 and 5) SPIRE-RAL-PRC-002181 is the procedure that covers the mechanical integration of the warm units. SPIRE-RAL-PRC-001923 is the procedure that covers the electrical integration.
6) An outgoing inspection was carried out including a UV light inspection, contamination may have come from the container, we will investigate, and improve our procedure for FM.
7) electronic copies are available, you can print them any size you like.

I have no response regarding visit by RAL next Tuesday, is this ok for you.

Regards

Eric

Eric Sawyer
Space Science and Technology Department
Rutherford Appleton Laboratory
Chilton, Didcot
Oxon, OX11 0QX.
UK
Tel 44 (0)1235 44 6385
mailto:e.sawyer@rl.ac.uk

-----Original Message-----
From: Hendry, David (external)
[mailto:David.Hendry.external@astrium.eads.net]

Sent: 27 September 2006 17:44
To: Carsten Scharmberg (Carsten.Scharmberg@esa.int); Sawyer, EC (Eric)
Cc: Bernard Collaudin; Clark, EA (Eric); Guy. Doubrovik (Guy.Doubrovik@alcatelaleniaspace.com); (Nicjknight@aol.com); Yvan (Yvan_HP@yahoo.fr); 'Flemming.Pedersen@esa.int'; Gageur Ulrich (ulrich.gageur@esa.int); Jan Rautakoski (Jan.Rautakoski@esa.int); Pierre.Olivier@esa.int; Stritter, Rene; Hohn, Ruediger; Lang, Juergen; Langfermann, Michael; Bayer, Thomas; Barlage, Bernhard; 'Benoit.Gobillot@alcatelaleniaspace.com'
Subject: SPIRE WU Incoming Inspection

Dear Eric and Carsten
The SPIRE WU Incoming inspection and fit check has been performed today by ESA PA and supported by ASED PA and AIT personnel.

The 4 Inspection reports are attached for review and comment.
The following main points need to be addressed prior to the IRR/TRR for integration.
1) Units delivered without grounding straps and DPU has no nut and washer on the Ground stud. Grounding straps are needed for mechanical and electrical integration.

2) No Unit fixations are provided, Screws , washers and nuts.
3) Units connectors some without ESD protective caps see details in reports.
4) Handling procedure not sufficiently detailed and does not identify handling frames and grounding configuration, needs to be updated.

5) No step by step procedure for mechanical integration provided.
For STM2 / PFM ASED AIT need a step by step procedure which will be followed and completed as an, "as run" procedure.The FPU procedure has a step by step section which also identifies the WU integration, but there should be dedicated procedures for WU inegration both mechanical and electrical especially where ESD sensitive units are being handled and mounted.

6) Units have particle contamination and require cleaning.
7)The ICDs provided in annex to procedure SPIRE-RAL-PRL-002181 Issue 1 are in A4 formal any very difficult to read detail, ASED request that copies at least A2 format are provided.

Thank you for your response and comments to the above.
Regards
Dave

<<HP-2-ASED-II-0176 Spire FCU STM2.pdf>>
<<HP-2-ASED-II-0177 Spire DCU STM2.pdf>>
<<HP-2-ASED-II-0178 Spire DPU STM2.pdf>>
<<HP-2-ASED-II-0179 Spire Black body STM2.pdf>>

	Name	Dep./Comp.
X	Alberti von Mathias Dr.	ASG22
X	Barlage Bernhard	AED13
X	Bayer Thomas	ASA42
	Brune Holger	ASA45
	Edelhoff Dirk	AED2
	Fehringer Alexander	ASG13
X	Fricke Wolfgang Dr.	AED 65
	Geiger Hermann	ASA42
	Grasl Andreas	OTN/ASA44
	Grasshoff Brigitte	AET12
	Hartmann Hans	AED32
	Hauser Armin	ASG22
X	Hendry David	Terma
	Hengstler Reinhold	ASA42
	Hinger Jürgen	ASG22
X	Hohn Rüdiger	AED65
	Hölzle Edgar Dr.	AED32
	Huber Johann	ASA42
	Hund Walter	ASE252
X	Idler Siegmund	AED312
	Ilsen Stijn	Terma
	Ivády von András	FAE12
	Jahn Gerd Dr.	ASG22
	Kalde Clemens	ASM2
	Kameter Rudolf	OTN/ASA42
	Kettner Bernhard	AET42
	Knoblauch August	AET32
X	Koelle Markus	ASA43
	Koppe Axel	AED312
X	Kroeker Jürgen	AED65
X	La Gioia Valentina	Terma
X	Lamprecht Ernst	OTN/ASQ22
X	Lang Jürgen	ASE252
X	Langenstein Rolf	AED15
X	Langfermann Michael	ASA41
	Much Christoph	ASA43
	Müller Jörg	ASA42
	Müller Martin	ASA43
	Peltz Heinz-Willi	ASG13
	Pietroboni Karin	AED65
	Platzer Wilhelm	AED2
	Reichle Konrad	ASA42
	Runge Axel	OTN/ASA44
	Schink Dietmar	AED32
X	Schlosser Christian	OTN/ASA44
	Schmidt Rudolf	FAE12

	Name	Dep./Comp.
	Schweickert Gunn	ASG22
	Steininger Eric	AED32
X	Stritter Rene	AED11
	Suess Rudi	OTN/ASA44
	Thörmer Klaus-Horst Dr.	OTN/AED65
	Wagner Klaus	ASG22
	Wietbrock Walter	AET12
	Wöhler Hans	ASG22
X	Alcatel Alenia Space Cannes	ASP
X	ESA/ESTEC	ESA
	Instruments:	
	MPE (PACS)	MPE
X	RAL (SPIRE)	RAL
	SRON (HIFI)	SRON
	Subcontractors:	
	Air Liquide, Space Department	AIR
	Air Liquide, Space Department	AIRS
	Air Liquide, Orbital System	AIRT
	Alcatel Alenia Space Antwerp	ABSP
	Austrian Aerospace	AAE
	Austrian Aerospace	AAEM
	APCO Technologies S. A.	APCO
	Bieri Engineering B. V.	BIER
	BOC Edwards	BOCE
	Dutch Space Solar Arrays	DSSA
	EADS Astrium Sub-Subsyst. & Equipment	ASSE
	EADS CASA Espacio	CASA
	EADS CASA Espacio	ECAS
	EADS Space Transportation	ASIP
	Eurocopter	ECD
	European Test Services	ETS
	HTS AG Zürich	HTSZ
	Linde	LIND
	Patria New Technologies Oy	PANT
	Phoenix, Volkmarsen	PHOE
	Prototech AS	PROT
	QMC Instruments Ltd.	QMC
	Rembe, Brilon	REMB
	Rosemount Aerospace GmbH	ROSE
	RYMSA, Radiación y Microondas S.A.	RYM
	SENER Ingenieria SA	SEN
	Stöhr, Königsbrunn	STOE
	Terma A/S, Herlev	TER