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HERSCHEL/SPIRE

DRCU / Preliminary Declared Processes List (DPL)

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	Function	Name	Date	Visa
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DOCUMENT STATUS and CHANGE RECORD

Date	Issue	Affected pages
15/11/01	0.0	Draft
13/02/03	1.0	5 Purpose 8 Item 4-1 & 4-2 Specification filled out Other Various minor modifications in the formulation

List of acronyms

AD / RD	Applicable / Reference Document
ADP	Acceptance Data Package
CDR	Critical Design Review
CEA	Commissariat à l'Energie Atomique
DCU	Detector Control Unit
DML	Declared Material List
DMPL	Declared Mechanical Part List
DPL	Declared Processes List
DRCU	Detector Readout and Control Unit
EIDP	End Item Data Package
FCU	FPU Control Unit
FIRST	Far InfraRed and Sub millimeter Telescope
FM	Flight Model
FMECA	Failures Modes Effects & Criticality Analysis
FPU	Focal Plane Unit
FS	Flight Spare
GSE	Ground Support Equipment
HIFI	Heterodyne Instrument for First
ICD	Interface Control Document
LAM	Laboratoire d'Astrophysique de Marseilles
MAIV	Manufacturing, Assembly, Integration Verification
MCU	Mechanisms Control Unit
MGSE	Mechanical Ground Support Equipment
N/A	Not Applicable
PA / QA	Product / Quality Assurance
PACS	Photoconductor Array Camera & Spectrometer
PCB	Printed Circuit Board
PDR	Preliminary Design Review
PSU	Power Supply Unit
QM	Qualification Model
RFA	Request For Approval
RT	Room Temperature
S/C	SpaceCraft
SAP	Service d'Astrophysique
SCU	Subsystems Control Unit
SPIRE	Spectral & Photometric Imaging Receiver
TBC	To Be Confirmed
TBD	To Be Defined

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1 Purpose

This document lists the process expecting to be used for the SPIRE DRCU QM2, FM,FS construction. This is a list based on our experience on previous similar devices built for SOHO / GOLF, XMM / EPIC or INTEGRAL / ISGRI.

2 Documentation

2.1 Applicable documents

The following documents will describe subsystems physically contained in the DRCU. These documents are to be written.

- MCU DPL Subsystem under LAM responsibility but physically contained in the FCU box.
- PSU DPL Subsystem to be furnished by a subcontractor (with spatial experience) under SAp responsibility

2.2 Reference documents

- ECSS-Q-70A Materials, mechanical parts and processes
- PSS-01-700 2.0 The technical reporting and approval procedure for materials and processes
- PSS-01-703 1.0 The black-anodising of aluminium with inorganic dyes

CNES Guide for science projects EEE, Materials, and Processes Lists

3 Subassembly and equipment codes

Subassembly codes		Names	Responsibility
DRCU		Detector Readout and Control Unit	SAP
	FCU	FPU (Focal Plane Unit) Control Unit	SAP
		MCU	Mechanisms Control Unit
		SCU	Subsystems Control Unit
		PSU	Power Supply Unit
DCU		Detector Control Unit	SAP

4 Process groups

Code	Group	Used
1	Bonding	<input checked="" type="checkbox"/>
2	Manufacture of composites	<input type="checkbox"/>
3	Encapsulation, moulding	<input type="checkbox"/>
4	Coating, application of paint	<input checked="" type="checkbox"/>
5	Cleaning	<input checked="" type="checkbox"/>
6	Welding, mechanical soldering	<input checked="" type="checkbox"/>
7	Crimping, stripping, making wire-wrapped connections	<input checked="" type="checkbox"/>
8	Electronic soldering	<input checked="" type="checkbox"/>
9	Surface treatments	<input checked="" type="checkbox"/>
10	Gilding, silver-plating, etc...	<input type="checkbox"/>
11	Machining	<input checked="" type="checkbox"/>
12	Forming	<input type="checkbox"/>
13	Heat treatments	<input type="checkbox"/>
14	Special manufacturing, processes developed specifically for the programme	<input type="checkbox"/>
15	Marking	<input checked="" type="checkbox"/>
16	Sundry processes	<input checked="" type="checkbox"/>
17	Inspection procedures	<input checked="" type="checkbox"/>



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Group 1 – Bonding

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
1-1	Put seals on fasteners	1. CEA/DSM DAPNIA/SAP 2. SAP-GERES-OM-0384-98	Put a drop of Scotchweld EC 2216 at the appropriate place between the fastener and the structure Curing TBD	1. DRCU 2. Every fastener (screw, nuts bolts) in the DRCU 3. Identification of the elements tightened with defined torque	CEA/DSM DAPNIA/SAP	1. 52-x 2. 10-2	Not critical	Used for SOHO/GOLF XMM/EPIC INTEGRAL/ISGRI INTEGRAL/SPI SAP common practice for space application	A	

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 4 – Coating, application of paint

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
4-1	Nusil conformal coating	1. TBD 2. Sap-GERES-TO-0433-99 rev0	Application of a thin or thick layer of Nusil CV-1152	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. Protective coating		1. 61-1 or 61-2 2. 10-3	Not critical	Already used by Sap for space applications to be filled out	A	
4-2	Solithane 113 conformal coating	1. TBD 2. Sap-GERES-FM-0239-96 rev1	Application of a thin or thick layer of Solithane 113	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. Protective coating		1. 61-1 or 61-2 2. 10-4	Not critical	SAP common practice for each electronic board for space application	A	

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Group 5 – Cleaning

Group 5 – Cleaning										
1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
5-1 (1)	Electronic parts cleaning	1. CEA/DSM DAPNIA/SAp 2. GERES-PROC-402	Wiping with isopropyl alcohol	1. DRCU 2. Each part to be assembled 3. Cleaning of single electronic parts before assembling		1. EEE parts 61-1 or 61-2 2.	Not critical	ECSS-Q-70-08A		
5-1 (2)	Electronic parts cleaning	1. Subcontractor 2. Subcontractor procedure To be filled out	Wiping with isopropyl alcohol	1. DRCU 2. Each part to be assembled 3. Cleaning of single electronic parts before assembling		1. EEE parts 61-1 or 61-2 2.	Not critical	ECSS-Q-70-08A		
5-2	Mechanical parts cleaning	1. CEA/DSM DAPNIA/SAp 2. GERES-PROC-402	Wiping with isopropyl alcohol	3. Cleaning of mechanical parts			Not critical			
5-3	PCB dry out	1. Subcontractor 2. Subcontractor procedure To be filled out	Bake out of bare PCB Temperature? How long?	1. DRCU 2. Each bare PCB 3. Dry out of bare PCB after cleaning		1. 61-1 or 61-2 2.	Not critical			

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 6 – Welding, mechanical soldering

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
6-1	Salt bath brazing	1. AML 2. Subcontractor procedure To be filled out	Brazing of the electronic boxes (EN-AW-6082) with solder alloy (EN-AW-4047)	1. DRCU 2. DCU box, FCU/(MCU+SCU) box 3. See column 4		1. 2. 1-1 7-1	Not critical	Used for SOHO/GOLF XMM/EPIC INTEGRAL/ISGRI INTEGRAL/SPI Experienced subcontractor	A	

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Group 7 – Crimping, stripping, making wire-wrapped connections

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
7-1	Connector pins crimping	1. Subcontractor 2. Subcontractor procedure To be filled out	Crimping of the pins of the connector	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. see column 4		1. EEE parts 2. To be filled out with the item number of the used wire	Not critical	ESA-ECSS-Q-70-26 requirements applied by a subcontractor with significant space application experience	A	

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 8 – Electronic soldering

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
8-1	SMC soldering	1. Subcontractor 2. Subcontractor procedure To be filled out	Soldering of surface-mount components on PCB	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. See column 4		1. EEE Parts 61-1 or 61-2 2. 7-3	Not critical	ESA-PSS-01-738 requirements applied by a subcontractor with significant space application experience	A	
8-2	Electronic part soldering	1. Subcontractor 2. Subcontractor procedure To be filled out	Manual soldering of electronic parts on PCB	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. See column 4		1. EEE Parts 61-1 or 61-2 2. 7-4	Not critical	ESA-ECSS-Q-70-26 requirements applied by a subcontractor with significant space application experience	A	
8-3	Electronic part soldering (SAp)	1. CEA/DSM DAPNIA/SAp 2. GERES-PROC-402	Manual soldering of electronic parts on PCB	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. See column 4		1. EEE Parts 61-1 or 61-2 2. 7-2 or 7-4	Not critical	ESA-ECSS-Q-70-26 requirements applied by experienced personnel of SAp for corrective operation if needed	A	

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Group 9 – Surface treatments

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
9-1	Black-anodising	1. Subcontractor 2. Subcontractor procedure To be filled out	Black-anodising with inorganic dyes.	1. DRCU 2. DCU box, FCU/(MCU+SCU) box 3. Optical treatment		1. 2. 1-1, 1-2, 7-1	Not critical	ESA-PSS-703 requirements applied by a subcontractor with significant space application experience	A	
9-2	Alodine 1200	1. Subcontractor 2. Subcontractor procedure To be filled out	Aluminium conversion using CrO ₃ acid + HF acid bath	1. DRCU 2. DCU box, FCU/(MCU+SCU) box 3. Corrosion protective treatment		1. 2. 1-1, 1-2, 7-1	Not critical	Used to be applied widely on space equipments.	A	

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 11 – Machining

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ⁱ	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
11-1	Standard machining	1. Subcontractor 2. Subcontractor procedure To be filled out	Machining of the elementary parts with well known and standard tools	1. DRCU 2. DCU box structure and electronic board support structures, FCU/(MCU+SCU) box structure and electronic board support structures		1. 2. 1-1, 1-2	Not critical	Only well known non specific process	A	

ⁱ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 15 – Marking

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
15-1	Mechanical item marking	1. Subcontractor 2. Subcontractor procedure To be filled out	Milling marking on mechanical parts	1. DRCU 2. DCU box structure and electronic board support structures, FCU/(MCU+SCU) box structure and electronic board support structures 3. Identification		1. 2. 1-1, 1-2	Not critical	Only well known non specific process	A	

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 15 – Sundry processes

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
15-1	Screw tightening	1. Subcontractor 2. Subcontractor procedure To be filled out	Tightening and control of the applied torque of every fastener.	1. DRCU 2. Every fastener (screw, nuts bolts) in the DRCU 3. Mechanical assembly		1. 52-x 2.	Not critical	SAP common practice for space application	A	

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis



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Group 17 – Inspection procedures

1	2	3	4	5	6	7	8	9		10
Item no.	Process identification	1. Manufacturer 2. Specification Iss./ Rev.	Process description	1. Sub-system 2. Equipment 3. Use	Sub-contractor name	Related elements 1. Component 2. Material	Process criticality ¹	9.1	9.2	Comments ESA approval
								Approval Justification	Approval Status	
17-1	Mechanical control	1. TBD 2. TBD	Dimensional & geometrical control with respect to the specifications							

¹ As defined in ECSS-Q-70A §5.1.4 Criticality analysis