 Rutherford Appleton Laboratory	COMBINED DECLARED PROCESS LIST		PRODUCT ASSURANCE Space Science and Technology Department		
	Spacecraft/Project:	HERSCHEL	Document No:	SPIRE RAL PRJ 0001093	
Instrument/Model:	SPIRE	Issue No:	1	REV:	0
Subsystem:		Date:	30 Jan 2002		

SUBJECT: Combined Declared Processes List

PREPARED BY: E A Clark

DOCUMENT No: SPIRE-RAL-PRJ-0001093

ISSUE: Issue 1 **Date:** 30 January 2002

APPROVED BY:	Name	Date:	Signature
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DISTRIBUTION

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Instrument/Model:	SPIRE	Issue No:	1	REV:	0
Subsystem:		Date:	30 Jan 2002		

CHANGE RECORD

ISSUE	DATE	CHANGE
1	25 Jan 2002	First Issue



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DOCUMENT LIST

Note

Where a Sub-Systems / Institutes has combined some or all of their Declared lists and / or EEE parts etc into one document, that documents details are recorded below. However only the applicable pages are included in this document .

Sub-System	Document	
Institute	Title	Number
ATC	DECLARED PROCESS LIST	SPIRE-ATC-PRJ-708 Iss 0.1
CDF (QMW)		
CEA/SAp		
CEA/SBT	SPIRE & PACS Sorption Coolers Declared Processes List	HSO-SBT-LI-005 Iss 1.1
CSA/USK		
IFS (IFSI)	DPU DCL + DML+ DPL	SPIRE-IFS-Doc-001031 Issue 1
JPL		
LAM (LAS)	DECLARED PROCESS LIST	LAM/ELE/FTS/011009.01 Iss 0.0
MSSL	SPIRE – DECLARED PROCESSESS	MSSL/SPIRE/SP004.1



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INTRODUCTION


Processes used by RAL Space Science Technical Department (SSTD)) and co-producers / sub-system suppliers are listed on spreadsheets,

SCOPE

This document lists the “Declared Processes” used in the provision of the supplied parts of **Spire** Instrument from the following sub system suppliers. See Table 1.

Table 1


Sub-System / Institute		List Supplied
Acronym	Name	Yes / No / NA
ATC	Astronomy Technology Centre	Yes
CDF (QMW)	Department of Physics and Astronomy, University of Wales, Cardiff,	No
CEA/Sap	CEA, Service d'Astrophysique Saclay	No
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	Yes
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	No
IFS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	Yes
JPL	JPL/Caltech, Pasadena	No
LAM (LAS)	Laboratoire d'Astronomie Spatiale, Marseille	Yes
MSSL	Mullard Space Science Lab Surrey	Yes

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Appendix A to this document is a printout from that spreadsheet showing the Processes used on the RAL hardware provided for **Spire** by the above sub-system suppliers

The spreadsheet printout is compliant with ESA: PSS-01-700 Issue 2, each process has an individual identification number, the first digit being the group type as follows.

1. Adhesive Bonding
2. Composite Manufacture
3. Encapsulation/Moulding
4. Painting/Coating
5. Cleaning
6. Welding
7. Crimping/Stripping/Wire Wrapping
8. Soldering/Brazing
9. Surface Conversion Treatment
10. Plating
11. Machining
12. Forming
13. Heat Treatment
14. Special Fabrication: Processes developed specifically for the programme
15. Marking
16. Miscellaneous Processes
17. Inspection Procedures

 Rutherford Appleton Laboratory	COMBINED DECLARED PROCESS LIST		PRODUCT ASSURANCE Space Science and Technology Department		
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CONTENT OF THE DECLARED PROCESS LIST (DPL)

Extract from **ESA PSS -01-700 Issue 2 (August 1993)**

The process list consists of 10 columns, which shall be completed as indicated below. If a particular item does not apply, write N.A (Not Applicable).

Processes which apply to only one material (one Declared Material List item) and which are sufficiently defined in column 5 of the Declared Materials List should not appear in the Declared Processes List (unless they are critical).

COLUMN 1 : Item Number

Sequential item number in each group of the Declared Processes List. One only per process type. Does not change during the life of the processes list.

COLUMN 2 : Process Identification

Process name, title, clear identification, etc. Correct and standard identification

COLUMN 3 : Specification

Specification number (whether national, ESA, company in house etc.) and issue status. Only the contractor's/subcontractor's specifications that can be physically transmitted to ESA for review purposes list.

COLUMN 4 : Process Description

Brief description of the process.

COLUMN 5 : Use and Location

Define location in the spacecraft/equipment, uses, and purpose of process for the spacecraft.

COLUMN 6 : Manufacture's Name

Name/abbreviation (the one who applies the process).


COLUMN 7 : Item in Materials List or Mechanical Parts List

Corresponding materials list or mechanical parts items number.

COLUMN 8 : Criticality of Process

Indicate here whether process is critical or non critical. In the case of a critical process, add reasons for criticality (see the definition in Annex A).

NOTE : For Critical Processes other than those performed exactly to an ESA PSS- 01-7XX series specification, this form is to be supplemented by a **Process Request for Approval** (RFA /Process) (in the same Annex).

 Rutherford Appleton Laboratory	COMBINED DECLARED PROCESS LIST		PRODUCT ASSURANCE Space Science and Technology Department		
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SUBCOLUMN 9.1 : Justification for Approval

ESA PSS -01-700 Issue 2 (August 1993)

The purpose of this is to enter any additional information that may be necessary in order to achieve customer's approval. This information comprise reference and issue of the RFA / approval, process justification file, evaluation reports and waivers. These documents must be made available to ESA on request.

SUBCOLUMN 9.2 : Contractor's Approval

The prime contractor shall complete this subcolumn and by doing so confirms that:

- the line indications are correct and complete
- the process has passed all applicability test (including quality control testing)

A = Approved - The Validation is approved by the contractor

W = Approved with a waiver - The use of such process shall be reduced to a minimum. All the waivers shall be approved by ESA. The waiver number shall be entered in Subcolumn 9.1.

P = Pending a decision - processes for which a validation report or a waiver is awaiting the contractors decision.

O = Open - New process or process for which investigation and qualifications are in progress.

D = Deleted - This classification is used for a process which is no longer used.

Where no approval can be granted, the Process Request for Approval (RFA / process) shall be submitted to ESA for approval if not yet available. ESA may request a copy of the process specification and an audit of the process.

COLUMN 10 : ESA Approval

This column will be completed by ESA in accordance with the standard comments listed in Annex G.



Rutherford
Appleton
Laboratory

COMBINED DECLARED PROCESS
LIST

PRODUCT ASSURANCE
Space Science and
Technology Department

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APPENDIX A

DECLARED PROCESS LIST		ORIGINATOR: UK ATC	
SPACECRAFT / PROJECT:	Herschel	Doc. Number	SPIRE-ATC-PRJ-708
SYSTEM / EXPERIMENT:	SPIRE	Sheet No	Page 1 of 1
SUB-SYSTEM:	BSM	Issue:	0.1
		Date:	24.Jun. 01

Process ID	Process	Specification (Incl. Issue)	Description / Identification	Use and Location	User Code	Associated DML Items	Criticality of Process	Approval / Status
1.	Adhesive bonding		Bonding of sensors into mounts	Jiggle frame & structure		Eccobond, G-10,	medium	
2.	Adhesive bonding		Bonding of flex-pivots into sleeves	Chop and Jiggle stage		inconel, Eccobond, aluminium 6082	high	
3.	Adhesive bonding		Bonding of sleeves into housings	Chop and Jiggle stage		Eccobond, aluminium 6082	high	
4.	Adhesive bonding		Harness tie-down (TBD if required)			Eccobond, aluminium 6082	low	
5.	Adhesive bonding		fastener locking (TBD if required)			Eccobond, aluminium 6082, stainless steel	medium	
6.	Adhesive bonding		Bonding of magnets into pockets	Chop and Jiggle stage		Eccobond, aluminium 6082/6061, magnet	medium	
7.	Adhesive bonding		Bonding of sensor actuators into pockets	Chop and Jiggle stage		Eccobond, aluminium 6082/6061, soft iron	medium	
8.	Thermal stabilization		Mirror stability cycling	Chop stage		Aluminium 6061	high	
9.	Gold plating 5 um			thermal contact		Gold, copper, nickel plate		
10.	Gold plating 3 um			Emmissivity control		Gold, copper, nickel plate		
11.	Anodizing			Corrosion control				
12.	Varnish application			Insulation/corrosion control				
13.	Soldering			Connectors				
14.	Crimping			Connectors				



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

SPIRE & PACS Sorption Coolers
DECLARED PROCESSES LIST
(D.P.L.)

SBT internal ref : SBT/CT/2001-20

	Name & Function	Date	Signature
Prepared	P. Dupont – Cooler PA manager		
SBT PA Check	P. Dupont – Cooler PA manager		
SPIRE Approval			
PACS Approval			
PA Approval	F. Loubere – PA manager		
Project Approval	J.L Augueres - SAp HSO project manager		
Project Approval	L. Duband - Cooler project manager		

Service des Basses Températures (SBT)
Département de Recherche Fondamentale sur la Matière Condensée (DRFMC)
COMMISSARIAT A L'ENERGIE ATOMIQUE - GRENOBLE (CEA-Grenoble)
17, rue des Martyrs 38054 GRENOBLE Cédex 9, France.



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Document Status

Issue	Revision	Date	Nb of Pages	Modifications
Draft		April 4 th , 2001		First draft – released for comments
0	0	April 25 th , 2001	20	First Issue
1	0	October 29 th , 2001	20	Update of the document (see marking bar on the right)
1	1	december 12 th , 2001	20	Update of the document (after Sap comments)



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

List of Acronyms

AD / RD	Applicable / Reference Document		
ADP (EIDP)	Acceptance (End Item) Data Package		
AIT / (M)AIV	(Manufacturing,) Assembly, Integration & Test / Verification		
CADM	Configuration and Data Management		
CDR (DDR)	Critical (Detailed) Design Review	Revue de conception détaillée	RCD
CEA	Commissariat à l' Energie Atomique		
CIDL / ABCL	(As Built) Configuration Items Data List		
CN	Change Notice	Demande de Modification	DM
CQM	Cryogenic Qualification Model		
DML / DPL	Declared Material / Process List		
DRB	Delivery Review Board	Revue de Qualification	RQ
EM / (P)FM / FS	Engineering / (Proto)Flight / Spare Model		
ETF	Environmental Test Facility		
EV	Evaporator		
FIRST	Far Infrared and Submillimetre Telescope		
FMECA	Failure Mode Effects and Criticity Analysis		AMDEC
(M)GSE	(Mechanical) Ground Support Equipment		
H/W	Hardware		
HIFI	Heterodyne Instrument for FIrst		
HSE	Heat Switch (on evaporator)		
HSP	Heat Switch (on sorption pump)		
ICD	Interface Control Document	Dossier de Contrôle des Interfaces	DCI
KIP / MIP	Key / Mandatory Inspection Point		
MRB	Material Review Board		
N/A	Not Applicable		
NCR	Non Conformance Report	Fiche d'Anomalie	FA
PACS	Photoconductor. Array Camera and Spectrometer		
PDR	Preliminary Design Review	Revue de Définition Préliminaire	RDP
PTR	Post Test Review	Comité de Revue et d'essai	CRE
PFM	ProtoFlight Model		
QA / PA	Quality / Product Assurance	Assurance Qualité / Produit	AQ / AP



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RFA	Request For Approval		
SAP	Service d'Astrophysique		
SBT	Service des Basses Températures		
SCO	Sorption Cooler (full unit)		
S/C	SpaceCraft		
SP	Sorption pump		
SPIRE	Spectral & Photometric Imaging Receiver		
TRR	Test Readiness Review	Bilan Technique	BT



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

1. SCOPE OF THE DOCUMENT

This document lists all the processes to be used all along the SBT Sorption Coolers Project.



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2. DOCUMENTS

2.1 Applicable documents

All Applicable Documents are listed in the AD chapter of the CIDL (HSO-SBT-LI-010).

2.2 Reference documents

	<i>Title</i>	<i>Reference</i>	<i>Iss</i>	<i>Rev</i>	<i>Date</i>
RD01	Materials, Mechanical Parts & Processes	ECSS-Q-70A			19/04/96
RD02	Guide pour les Projets Scientifiques				



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3. DECLARED PROCESSES LIST

The SCO Declared Processes List, which consists of multiple arrays of 10 columns that shall be completed as indicated in doc. Ref. [RD01] & [RD02], is presented herebelow.

Processes should be grouped as explained in the table below:

<i>Group Type</i>	<i>Used</i>
1. Adhesive Bonding	✓
2. Composite Manufacturing	N/A
3. Encapsulation / Molding	N/A
4. Painting / Coating	N/A
5. Cleaning	✓
6. Welding / Brazing	✓
7. Crimping / Stripping / Wire Wrapping	✓
8. Soldering	✓
9. Surface Treatment	N/A
10. Plating	✓
11. Machining	✓
12. Forming	N/A
13. Heat Treatment	✓
14. Special Fabrication	N/A
15. Marking	✓
16. Miscellaneous Processes	✓
17. Inspection Procedure	✓



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 1 – Adhesive Bonding										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
1-1	Use of STYCAST 2850/FT9	1- SBT 2-	HSO-SBT-PR- 033	1- Pump 2- Gluing of charcoal onto/into Pump housing	N/A	1- N/A 2- 10-1	Not Critical	Common practice @ SBT		
				1- SCO 2- Gluing of Thermal Parts	N/A		Not Critical	Common practice @ SBT Performance Test		
				1- SCO 2- Gluing of covers onto filling tubes after crimping	N/A		Not Critical	Common practice @ SBT		
				1- Pump 2- Gluing of Grid & Grid Cover	N/A		Not Critical	Common practice @ SBT		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 5 – Cleaning										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
5-1	Cleaning of individual items	1- SBT 2-	HSO-SBT-PR-026	1- all single items 2- Cleaning of individual items before assembly/integration	N/A	1- N/A 2- 1-1,1-2, 2-1, 2-2, 4-1, 4-2, 6-1,6-2	Not Critical			



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 6 – Welding / Brazing										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
6-1	TIG Welding	1- SNLS 2- subcontractor specification		1- Evaporator 2- Assembly of Evaporator _ sphere (S8)	SNLS		Not Critical	LeakTightness Test		
				1- Pump 2- Assembly of Pump _ sphere (S6)	SNLS		Not Critical	LeakTightness Test		
				1- Evaporator 2- Assembly of Evaporator _ sphere (S7)	SNLS		Not Critical	LeakTightness Test		
				1- Braided Copper & Copper Ends 2- Welding of Braided Copper onto Copper Ends	SNLS		Not Critical			
6-2	Silver Soldering	1- SNLS 2- subcontractor specification	BRASV_01_11	1- Pumping Line 2- Mounting of Thermal Shunt & Crimped Tube (B3, B4 & B5)	SNLS		Not Critical	LeakTightness Test		



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Group 6 – Welding / Brazing										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
				1- Evaporator 2- Assembly of Evaporator _ sphere (B2)	SNLS		Not Critical	LeakTightness Test		
				1- Pump 2- Assembly of Pump _ sphere (B1)	SNLS		Not Critical	LeakTightness Test		
6-3	EB Welding	1- TECHMETA 2-	FA 09001	1- Pumping Line 2- Pump & Evaporator Pre-assembly (S1, S2 & S3)	TECHMETA		Not Critical	LeakTightness Test		
				1- Cooler Heart 2- Closing of Cooler (S4, S5)	TECHMETA		Not Critical	LeakTightness Test & Pressure Test @ 200 bars		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/GBT)

Group 7 – Crimping / Stripping / Wire Wrapping										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
7-1	Stripping of Manganin Wires	1- SBT 2-	HSO-SBT-PR-034	1- Manganin Wires 2- Removal of protective varnish before soldering	N/A	1- N/A 2- 19-1	Not Critical			
7-2	Crimping of filling Tubes	1- SBT 2-	HSO-SBT-PR-030	1- Cooler 2- Crimping of filling Tubes after filling of Cooler with 3He	N/A		Not Critical	Common practice @ SBT Leaktightness Test		
				1- Heat Switch 2- Crimping of filling Tubes after filling of Heat Switch with 3He	N/A		Not Critical	Common practice @ SBT Leaktightness Test		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 8 – Soldering										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
8-1	Soldering of Heaters, Thermometers & Connectors wires	1- SBT 2-	HSO-SBT-PR-034	1- Manganin Wires, Heaters, Thermometers & Connectors 2- Soldering of Heaters, Thermometers & Connectors wires	N/A	1- Mech.Part 2- Material	Not Critical	Performance Test		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 10 - Plating										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
10-1	Gold Plating of Copper Parts	1- TERMOCOMPACT 2- subcontractor specification		1- Copper Parts 2- Gold Plating of Copper Parts to avoid corrosion	N/A	1- Mech.Part 2- Material	Not Critical			



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 11 - Machining										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
11-1	Machining of Mechanical Parts	1- OMG 2- subcontractor specification		1- see Drawing List 2- Machining of Mechanical Parts (wire machining, classical machining)	N/A	1- Mech.Part 2- Material	Not Critical	Dimensional Check & Certificate of Conformity		
11-2	Final Machining of Structure after welding	1- OMG 2- subcontractor specification		1- Structure 2- Removal of excess material in order to reach dimensional specification			Not Critical	Dimensional Check & Certificate of Conformity		



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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 13 – Heat Treatment										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
13-1	Baking of SCO under vacuum	1- SBT 2-	HSO-SBT-PR-035	1- SCO 2- Removal of polluting particles, greases, water	N/A	1- Mech.Part 2- Material	Not Critical	Cleanliness & Contamination monitoring (TBD)		
	Baking of Vegetal Charcoal			1- Vegetal Charcoal 2- Removal of water	N/A		Not Critical			
	Baking of PROCELIT			1- PROCELIT 2- Removal of water	N/A		Not Critical			



SPIRE & PACS
Sorption Coolers
Declared Processes List

DOC N°: [HSO-SBT-LI-005](#)
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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 15 - Marking										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use				Justif. for Approval	Status	
15-1	Marking of Individual Items	1- IDLas 2	HSO-SBT-SP-039	1- all removable items 2- Marking of Individual Items	N/A	1- Mech.Part 2- Material	Not critical			



SPIRE & PACS Sorptions Coolers *Declared Processes List*

DOC N°: [HSO-SBT-LI-005](#)
 Iss/Rev : 1.1
 DATE : [December 12th, 2001](#)
 PAGE : 14

SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 16 – Miscellaneous Processes										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
16-1	Assembly of Kevlar suspension system	1- SBT 2-	HSO-SBT-PR-028	2- Suspension of cooler heart into structure			Critical			
16-2	Filling of Cooler & HS with 3He	1- SBT 2-	HSO-SBT-PR-029 & 036	Filling of Cooler & HS with 3He			Not Critical			



SPIRE & PACS Sorptions Coolers *Declared Processes List*

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 Iss/Rev : 1.1
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SERVICE DES BASSES TEMPERATURES (CEA/DSM/DRFMC/SBT)

Group 17 – Inspection Procedure										
1	2	3	4	5	6	7	8	9		10
Item #	Process Id.	Specification	Process Description	Location & Use	Subcontractor Name	Associated Item	Criticality of Process	Approval Status		Comment
		1- Manufacturer 2- Specification		1- Equipment 2- Use		1- Mech.Part 2- Material		Justif. for Approval	Status	
17-1	Welding Inspection	1- SBT 2- HSO-SBT-PR-025	Inspection of Pump & Evaporator after EB Welding	1- Pump & Evaporator 2- see 4	N/A	1- Mech.Part 2- Material	Not Critical	LeakTightness Test		
17-2	Verification of tension into Kevlar cords	1- SBT 2	HSO-SBT-PR-028	1- Kevlar cords 2- To verify tension into Kevlar cords	N/A	1- Mech.Part 2- Material	Critical			



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DPU Declared Components List,
Materials List
Processes List**

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Issue: Issue 1.0
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Herschel
~~DPU Declared Components List~~
~~Materials List~~
Processes List

Document Ref.: SPIRE-IFS-DOC-001031

Issue: 1.0

Prepared by: R. Orfei

Date: 21 November 2001

SPIRE_DPU_DCL-ML-PL_Issue1.doc



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Document Status Sheet:

Document Title: Herschel DPU Declared Components List Materials List Processes List			
Issue	Revision	Date	Reason for Change
Issue 1		21 November 2001	First Issue

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Document Change Record:

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Document Reference Number: SPIRE-IFS-DOC-	
Document Issue/Revision Number: Issue 1.0	
Section	Reason For Change
All	Issue 1.0

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1 INTRODUCTION

1.1 Scope of the document

This document is the preliminary Declared Components List, Materials List and Processes List in terms of selection and approval for the SPIRE-DPU subsystem. It has to be noted that all DPU electronic components will be purchased through the Coordinated Parts Procurement Agency set up by ESA and contracted to Tecnologica (Sevilla, Spain) and TOP-REL (Rome, Italy).

Acronyms and Abbreviations

1.1.1 Acronyms

AD	Architectural Design
ATP	Acceptance Test Plan
AVM	Avionic Model
CIDL	Configuration Identification Document List
CSL	Configuration Status List
CNR	Consiglio Nazionale delle Ricerche
CPP	Coordinated Parts Procurement
CPP	Coordinated Parts Procurement Board
CPU	Control Processing Unit
CDMS	Central Data Management System
CDMU	Central Data Management Unit
CQM	Cryogenic Qualification Model
DCU	Detector Control Unit
DDD	Detailed Design Document
DPU	Digital Processing Unit
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ESA	European Space Agency
FIRST	Far InfraRed and Submillimeter Telescope
HK	HouseKeeping
HW	HardWare
IBDR	Instrument Baseline Design Review
ICD	Interface Control Document
ICDR	Instrument Critical Design Review
ICU	Instrument Control Unit
IHDR	Instrument Hardware Design Review
IFSI	Istituto di Fisica dello Spazio Interplanetario
ISVR	Instrument Science Verification Review

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MCU	Mechanism Control Unit
NA	Not Applicable
OBS	On-Board Software
PA	Product Assurance
PDU	Power Distribution Unit
PROM	Programmable Read Only Memory
S/C	SpaceCraft
SCC	SpaceCraft Components
SCU	S..... Control Unit
SEU	Single Event Upset
SPIRE	Spectral and Photometric Imaging Receiver
S/S	SubSystem
SVM	Service Module
SW	Software
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TV	Thermal Vacuum
WBS	Work Breakdown Structure

1.2 References

1.2.1 Applicable Documents

Document Reference	Name
AD1	SPIRE Instrument Specification
AD2	FIRST/Planck Instrument Interface Document Part A
AD3	FIRST/Planck Instrument Interface Document Part B Instrument "SPIRE"
AD4	Product Assurance Plan for the FIRST-SPIRE Instrument
AD5	SPIRE Product Tree
AD6	FIRST SPIRE DPU Subsystem Specification Document
AD7	ESA Preferred Parts List. ESA PSS-01-603

1.2.2 Reference Documents

Document Reference	Name
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 IFSI CNR	Herschel DPU Declared Components List Materials List Processes List	Ref.: SPIRE-IFS-DOC- Issue: Issue 1.0 Date: 21/11/2001 Page: Page 8 of 82
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Reference	
RD1	SPIRE Design Description
RD2	SPIRE Preliminary EEE Parts List
RD3	Carlo Gavazzi Space: DPU Preliminary Declared Components List

2 Status of the lists

This is the first issue of the DPU Declared Components List, Materials List and Processes List prepared for the DDR.

The electronic components list presented (taken from RD3) has already been subjected to scrutiny by the Coordinated Parts Procurement Boards (CPPB) and it is still subject to be updated in just a few items, mainly for standardisation of packages and types.

2.1 Overview of the DPU

The DPU is the only subsystem that interfaces electrically with the spacecraft for telemetry and telecommand. It takes care of the command execution and synchronisation, it controls all the subsystems, packages the telemetry and takes care of the health-autonomous mode.

The DPU electronics will consist of a single box, positioned in the warm part of the S/C and as close as possible to the DCU, the MCU and SCU sub-systems.

3 Notes on Components Criticality

With the present EEE lists there are no criticalities implied.

4 Introduction to the Components and Materials Lists

It has to be stressed the point that IFSI is involved in the design and manufacturing of the DPU/ICU of the three Herschel instruments, so the lists will be nearly the same for the three instruments. In the following pages the components and Bill of Materials are reported. The components are corresponding to the ones actually shown in the electrical schematics and soldered in the related printed boards and are reported for each printed board:

- CPU,
- CPU PIGGY-BACK;
- PL-IF,
- DC/DC Converter and Motherboard.



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7 DECLARED PROCESSES LIST

Herein the list of the processes used for the DPU boards are shown.

7.1 GROUP N° 1 - ADHESIVE BONDING

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Adhesion of identification label	PA 072 issue 1	Adhesion of identification label with epoxide adhesive Eccobond 285 cat.11	Adhesion of identification label	CGS	GROUP 1 N°3	NOT CRITICAL	MSFC-HDBK-527(05475)	
2	Adhesion of non structural parts	Technical Bulletin of manufacturer	Adhesion of non structural parts with Scotch-weld 2216B/A	Adhesion of bonding and screw locking	CGS	GROUP 1 N°4 GROUP 7 N°4,7,8,9	NOT CRITICAL	ESA PSS-01-701 MSFC-HDBK-527(05066)	
3	Adhesion of non structural parts	Technical Bulletin of manufacturer	Adhesion of non-structural parts with Loctite 222	Locking of screws	CGS	GROUP 1 N° 5 GROUP 7 N° 4,7,8,9	NOT CRITICAL		
4	Adhesion of non structural parts	Technical Bulletin of manufacturer	Adhesion of non-structural parts with Thermal -A-Gap-A274	Glueing of A274-pad to mechanical parts	CGS	GROUP 4 N° 3	NOT CRITICAL		



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7.2 GROUP N° 3 - ENCAPSULATION/MOULDING

ITEM N°	PROCESS IDENTIFICATIO N	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURE R NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Potting of electrical components	GD-PR-CGS-011 iss.1	Potting of electrical components with RTV566A/B	Potting of electrical components on PCB	CGS	GROUP 1 N°2	NOT CRITICAL	ESA-PSS-01-701 MSFC-HDBK-527(03484)	

7.3 GROUP N° 4 - PAINTING/COATING

ITEM N°	PROCESS IDENTIFICATIO N	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURE R NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Conformal Coating	GD-PR-CGS-033 iss.1	Conformal coating on assembled PCBs with CV1152	Conformal coating on PCB	CGS	GROUP 1 N°1	NOT CRITICAL	ESA-PSS-01-701	

7.4 GROUP N° 5 - CLEANING

ITEM N°	PROCESS IDENTIFICATIO N	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURE R NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Cleaning	PA071 iss.1	Cleaning of PCBs	PCBs of the electronic box	CGS	GROUP 4 N° 1, 2	NOT CRITICAL	PA071 iss.1	



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7.5 GROUP N° 7 - CRIMPING

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Crimping	PA 082 iss.1 PSS-01-726 iss.2	Crimping of high reliability electrical connection	Wires crimping on connectors	CGS	GROUP 8: N°1	CRITICAL FOR RELIABILITY	ESA-PSS-01-726 iss.2	

7.6 GROUP N° 8 - SOLDERING

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Manual Soldering	GD-PL-CGS-016 PSS-01-708 iss.1	Soldering of high reliability electrical connection	Electrical components on PCBs	CGS	GROUP 8: N°1,2 GROUP 4 N° 1,2	CRITICAL FOR RELIABILITY	ESA-PSS-01-708 iss.1 GD-PL-CGS-016	
2	Manual SMT Soldering	GD-PL-CGS-016 PSS-01-738 iss.1	High-reliability soldering for surface-mount and mixed technology printed circuit	Electrical components on PCBs	CGS	GROUP 4 N° 1,2	CRITICAL FOR RELIABILITY	ESA-PSS-01-738 iss.1 GD-PL-CGS-016	YES



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7.7 GROUP N° 9 - SURFACE CONVERSION TREATMENTS

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Chemical conversion coating on aluminium alloy with Alodine 1200	MIL-C-5541C	Surface treatment of aluminium alloy to prevent corrosion	Mechanical parts	IMAS MAROTTA MUTITECH	GROUP 5 N° 1÷8	NOT CRITICAL	MIL-C-5541C	
2	Anodic coating on aluminium alloy	MIL-A-8625 class 1,2 type II and type III	Surface treatment of aluminium alloy to prevent corrosion and provide black surface	Mechanical parts	IMAS MAROTTA MUTITECH.	GROUP 5 N° 1÷8 GROUP 6 N° 1	NOT CRITICAL	MIL-A-8625	
3	Passivation treatment for corrosion-resistant steel	QQ-P-35	Surface treatment of steel to prevent corrosion	Mechanical parts	IMAS MAROTTA MUTITECH	GROUP 5 N° 9	NOT CRITICAL	QQ-P-35	
4	Nickel plating electrodeposited	QQ-N-290	Surface plating of copper alloy to prevent corrosion	Mechanical parts	IMAS MAROTTA MUTITECH	GROUP 5 N° 10,11	NOT CRITICAL	QQ-N-290	

7.8 GROUP N° 11 - MACHINING

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Stiffener and others mechanical parts machining	PA 070 iss.1	Construction of mechanical parts	Stiffener and others mechanical parts for boards	Marotta, IMAS	GROUP 5 N° 1÷11	NOT CRITICAL	PA070 Is.1	




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7.9 GROUP N° 16 - MISCELLANEOUS

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Repair and modification of PCB and solder joint	PA063 iss.1 PSS-01-728 iss.2	Repair and modification of PCB and solder joint	PCBs	CGS	GROUP 4 N° 1,2	CRITICAL FOR RELIABILITY	ESA-PSS-01-728 iss.2	
2	PCB manufacturing	For double side : PSS-01-710 iss.1 For Multilayer : CNES/QFT/SP -0117 iss.1 rev.A	Manufacturing of double side and multilayer PCBs	PCBs	PRINTCA, VIASYSTEMS division C.S.I.	GROUP 4 N° 1,2	NOT CRITICAL	For double side : PSS-01-710 iss.1 For Multilayer : CNES/QFT/SP -0117 iss.1 rev.A	
3	Flight electronic equipment production and inspection control plan	GD-PL-CGS-016, Is. 1	Flight electronic equipment Flight electronic equipment production and inspection control plan control plan	Equipment production and inspection control plan	CGS	All items	NOT CRITICAL	GD-PL-CGS-016, Is. 1	Y
4	Cabling	PA 082 iss.1 PSS-01-726 iss.2 Technical cabling doc.	Electrical Isolation of connection by mean shrinkable tubes	Connectors	CGS	GROUP 1 N° 6	NOT CRITICAL	ESA PSS-01-726, Is. 2	

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7.10 GROUP N° 17 - INSPECTION PROCEDURES

ITEM N°	PROCESS IDENTIFICATION	SPECIFICATION ISSUE/REV.	PROCESS DESCRIPTION	USE AND LOCATION	MANUFACTURER NAME	ASSOCIATED ITEMS IN MATERIAL LIST	CRITICALITY OF THE PROCESS	JUSTIFICATION FOR VALIDATION APPROVAL	ESA VAL.
1	Incoming inspection procedure	PA049 iss.1	Incoming inspection of the Hi-Rel Parts	Electronic Box	CGS	All items	NOT CRITICAL	PA049 iss.1	
2	MIP and KIP inspection Plan	GD-PL-CGS-003 iss.1	MIP - KIP	Electronic Box	CGS	GROUP 4 N° 1,2	NOT CRITICAL	GD-PL-CGS-003 iss.1	
3	Inspection on assembled PCBs	PA 005 iss.1	Inspection on assembled PCBs	PCBs of Box	CGS	GROUP 4 N° 1,2	NOT CRITICAL	PA 005 iss.1	

L.A.M. UMR 6110	HERSCHEL	Ref : SPI.PFM.00.LD.02.A	Page : 1 / 1
	SPIRE SMECm	Author : P. Dargent	Date : 03 October 2001
Liste des Procédés Processes List			

Process	Document #	Description	Use
6061 annealing	SPI-PFM-00-01-A	Cryogenic thermal cycling	6061 Aluminum
Alodine 1200	SPI-PFM-00-02-A	Electrical conductive protection	6061 Aluminum
Black Anodisation	SPI-PFM-00-03-A	Black oxyde protection	6061 Aluminum
Silver coating	SPI-PFM-00-04-A	Friction	321 nuts and screws
Parylene coating	SPI-PFM-00-05-A	Tight polymer coating	Coils and Magnets

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MULLARD SPACE SCIENCE LABORATORY

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SPIRE – DECLARED PROCESSESS

Document Number: MSSL/SPIRE/SP004.1 29 November 2001

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			Date: November 2001
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	0.1	September 2001	New document
	1.0	November 2001	Issued



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Glossary


All terms are listed in the CIDL.

1 Scope of Document

This document presents all the processes to be used all along the design, development and manufacture of the structure for SPIRE.

2. Applicable and Reference Documents

All documents are listed in Figure 3.2 of the CIDL.


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3 Declared Processes List


The Structure Declared Processes List, which consists of multiple arrays of 10 columns which shall be completed as indicated in AD04, is presented here below:

Processes should be grouped in the table below:


<i>Group Type</i>	<i>Used</i>
1. Adhesive Bonding	✓
2. Composite Manufacturing	N/A
3. Encapsulation/Molding	N/A
4. Painting/Coating	✓
5. Cleaning	✓
6. Welding/Brazing	N/A
7. Crimping/Stripping/Wire Wrapping	✓
8. Soldering	N/A
9. Surface Treatment	N/A
10. Plating (Allo-chroming)	✓
11. Machining	✓
12. Forming	✓
13. Heat Treatment	✓
14. Special Fabrication	N/A
15. Marking	✓
16. Miscellaneous Processes	N/A
17. Inspection Procedure	✓

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		Declared Processes	Issue:	0.1
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PROJECT:		HERSCHEL							
EXPERIMENT:		SPIRE							
EXPERIMENTERS:		MULLARD SPACE SCIENCE LABORATORY (MSSL)							
PREPARED BY:		C Brockley-Blatt							
Itm No	Process	Specification	Description/ identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status	ESA Comments
1.	Araldite	AV100/HV100 Q-NT-0123 ESA-PSS-01-701	Epoxy adhesive 2 part 1:1 cure 4 hrs @ 60 C	Secure magnets Dichroic assy Telescope structure	MSSL	10-01	Non-critical		
9.	Bonding with Solithane 113	Q-NT-0121 ESA-PSS-01-701	2 part 100:73 cure 7 days @ 25 C or 4 hrs @ 65 C	Locking screws	MSSL	10-02	Non-critical		
4.	Chemglaze Z 306, L300 & Z307	ESA PSS-01-725 & SS-R16205A	Black paint polyurethane non-conducting	Blue Module	CYF & SNL	01-01,02, 01-03, 10-05	Non-critical		
5.	Cleaning								
7.	Crimp connections	ESA PSS-01-726	Fabrication of wiring harnesses	Internal and external wiring harnesses	MSSL	19-01	Non-critical		

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		Declared Processes	Issue: 0.1
			Date: September 2001
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Issue No 1		<u>DECLARED PROCESSES LIST</u>							
PROJECT: HERSCHEL EXPERIMENT: SPIRE EXPERIMENTERS: MULLARD SPACE SCIENCE LABORATORY (MSSL)									
PREPARED BY: C Brockley-Blatt									
Itm No	Process	Specification	Description/ identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status	ESA Comments
10.	Alocrom 1200	MOD 03-18	Chromating - Commercial process	Various	MSSL	01-01,02, 01-03 06-04	Non-critical		
10	Anodising	DEF STAN 0324	Chromic acid process	Gear - dichroic assembly	I & G	01-03 12-02	Non-critical		
11.	Machining								
12	Forming								

	<h1>SPIRE</h1>	Project Document	Ref:	MSSL/SPIRE/SP004.11
		Declared Processes	Issue:	0.1
			Date:	September 2001
			Page:	Page 8 of 9

Issue No 1		<u>DECLARED PROCESSES LIST</u>							
PROJECT:		HERSCHEL							
EXPERIMENT:		SPIRE							
EXPERIMENTERS:		MULLARD SPACE SCIENCE LABORATORY (MSSL)							
PREPARED BY:		C Brockley-Blatt							
Itm No	Process	Specification	Description/identification	Use and location	User code	Associated DML items	Criticality of process	Approval Status	ESA Comments
13.	Heat Treatment T 73	Mil-H-6088-F	Thermal treatment	Treatment for aluminium	SNL	01-01	Non-critical		
				Various, in DEM	SNL	01-05	Non-critical		
				PCB's in DEM	SNL	15-01	Non-critical		
				PCB's & signs in DEM	SNL	10-07	Non-critical		
				PCBs in OM 1	MSSL	10,03	Non-critical		

	SPIRE	Project Document	Ref: MSSL/SPIRE/SP004.11
		Declared Processes	Issue: 0.1
			Date: September 2001
			Page: Page 9 of 9

Issue No 1		<u>DECLARED PROCESSES LIST</u>							
PROJECT: HERSCHEL EXPERIMENT: SPIRE EXPERIMENTERS: MULLARD SPACE SCIENCE LABORATORY (MSSL)									
PREPARED BY: C Brockley-Blatt									
11.	Alodine	Mil-C-5541C	Chromate coating						