SUBJECT: COMBINED DECLARED MECHANICAL PARTS LIST

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CHANGE RECORD

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1	30 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 MECHANICAL PARTS LIST BSM	SPIRE-ATC-PRJ-00070 Iss 1.2
CDF (QMW)		
CEA/SAp	DECLARED MECHANICAL PARTS LIST DRCU. SPIRE- SAp-NC-0100-03 Iss 1.0	SPIRE-SAP-DOC-001610 Iss 1.0
CEA/SBT		
CSA/USK	**Not Applicable**	
IFS (IFSI)	DECLARED MECHANICAL PARTS DMPL	SPIRE-IFS-Doc-00xxxx Iss
JPL		
LAM (LAS)	DECLARED MECHANICAL PARTS LIST SMEC	SPIRE-LAM-DOC-000xxx Iss
	DECLARED MECHANICAL PARTS LIST FTS	SPIRE-LAM-DOC-000xxx Iss
MSSL	DECLARED MECHANICAL PARTS LIST	

INTRODUCTION

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

SCOPE

This document lists the "Declared Mechanical Parts" 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	**YES**
CEA/SBT	(CEA) Service du Basse Temperatures Grenoble	**No**
CSA/USK	Canadian Space Agency (CSA) University of Saskatchewan Canada	**No**
IFS (IFSI)	Instituto di Fisica dello spazio Interplanetario, Rome	**No**
JPL	JPL/Caltech, Pasadena	**No**
LAM (LAS)	Laboratoire d'Astonomie Spatiale, Marseille	**No**
MSSL	Mullard Space Science Lab Surrey	**No**

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

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

51. Spacing Parts (Washers, Spacers,....)
52. Connecting Parts (Bolts, Nuts, Rivets, Inserts, Clips,....)
53. Bearing Parts (Ball-Bearings, Needle Bearings,....)
54. Separating Parts (Pyrotechnics, Springs, Cutters,....)
55. Control (Gears,....)
56. Fluid Handling Parts (Diffusers,....)
57. Heating Parts
58. Measuring Instruments (Gauges, Thermocouples,....)
59. Optical Passive Equipment
60. Magnetic Parts
61. Other Parts

CONTENT OF THE MECHANICAL PARTS LIST

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

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

COLUMN 1 : Item Number
Sequential item number in each group of the list. One only per mechanical part type. Does not change during the life of the mechanical parts list.

COLUMN 2 : Commercial Identification
As required :
- type and number
- specification number (whether national, ESA, company in-house, etc.) and issue status. This document must be available for sending to ESA on request.
- materials

COLUMN 3 : Type of Part
Use a standard nomenclature, in order to ensure correct grouping of similar parts,
e.g.: Value, one way
Value , two ways
and not one-way value or two-way value.

COLUMN 4 : Procurement Information
- Manufacturer/supplier : name of the manufacture and the name of the supplier if different.
- Specification : reference of the procurement specification with issue and revision. It may be replaced by a national specification number if this exists and makes source of procurement irrelevant.

COLUMN 5 : Elementary Function, Main Characteristics
- function to be ensured by the mechanical part
- main characteristics: e.g. number of revolutions per minute for a ball bearing

COLUMN 6 : Use and Location
indicate in which subsystem, equipment or box the mechanical part is used + subcontractor's name/abbreviation.

- **COLUMN 7 :** Environmental Code

Radiation /UV/ATAXIA (1) (R)		Ambience (A)	Temperature (2) (T)
G = Geostationnary L = Low Orbit B = Radiation Belts I = Interplanetary	S = Outside Shadow L = Outside Light	V = Vacuum H = Hermetic M = Manned E = Elevated Pressure	1 = 0 to 100 2 = 101 to 200K 3 = 201 to 300 K “ etc.

(1) For parts inside the spacecraft, choose a letter from the left-hand side column. For parts on the surface of the spacecraft, combined this letter with “L” or “S”.
(2) Thermal cycle to be indicated by two values, e.g. 3/5.

(3) “RT” can be accepted as a code between 238 K (10°C) and 313 K (40°C).

Parts which are at a boundary between environments shall be described by two sets of codes.

- **COLUMN 8 :** Criticality & Hazards

Mark here all parts participating in a safety-critical and/or reliability-critical function

- **SUBCOLUMN 9.1 :** Justification for Approval

The purpose of this sub column is to enter any additional information that may be necessary in order to achieve customer approval. This information is reference of the Requests For Approval; reference of justificatory file for materials approved for other space or aeronautical programmes meeting the specific needs of the programme, reference of the evaluation report or waivers etc. These documents must be made available to ESA on request.

SUBCOLUMN 9.2 : Approval Status of the Contractor

A - Approved = All Mechanical Parts classified "A" may be used without restriction.

Y - Approved with restriction = These Mechanical Parts require the preparation of QC test specimens or a treatment before use: potting, coating, test specimens...

W - Approved with a waiver = These Mechanical Parts do not meet the requirements but are used for functional reasons. The use of such materials shall be reduced to a minimum. All the waivers shall be approved by ESA. The waiver number shall be entered in Subcolumn 9.2.

P - Pending a decision = Mechanical Parts for which an evaluation report or a waiver is awaiting the contractor's provisional or definitive approval.

O - Open = New Mechanical Parts or Mechanical Parts for which investigations and qualification are in progress.

D - Deleted = This clarification is used for a Mechanical Part, which is no longer used.

- **COLUMN 10 :** ESA Approval and Comments

This column will be completed by ESA in accordance with the standard comments list in Annex E.

APPENDIX A

DECLARED COMPONENT LIST		ORIGINATOR: UK ATC	
SPACECRAFT / PROJECT:	Herschel	Doc. Number	SPIRE-ATC-PRJ-000709
SYSTEM / EXPERIMENT:	SPIRE	Sheet No	Page 1 of 3
SUB-SYSTEM:	BSM	Issue:	1.1
		Date:	12.Aug.02

Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
1.	DISC-SPRING-ID-3.2mm stainless steel	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, COC, BATCH TRACEABLE	
2.	CERNOX-THERMISTOR COPPER-CANISTER	Lakeshore	U.S	CX-1030-CU	TBD	Supplied via SPIRE Project office
3.	CAP-HD-SCREW-SS-M2-5X12	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, COC, BATCH TRACEABLE	
4.	CAP-HD-SCREW-SS-M2-5X21_8					Probably will use 22 or 24mm long - TBC
5.	CAP-HD-SCREW-SS-M2-5X24					
6.	CAP-HD-SCREW-SS-M2-5X6					
7.	CAP-HD-SCREW-SS-M2-5X7					
8.	CAP-HD-SCREW-SS-M2-5X7_75					Probably will use 8mm long - TBC
9.	CAP-HD-SCREW-SS-M2X10					
10.	CAP-HD-SCREW-SS-M4X10					MSSL to supply flight screws for BSM-Strucyre interface
11.	CSK-HD-SCREW-SS-M2-5X5					

DECLARED COMPONENT LIST		ORIGINATOR: UK ATC	
SPACECRAFT / PROJECT:	Herschel	Doc. Number	SPIRE-ATC-PRJ-000709
SYSTEM / EXPERIMENT:	SPIRE	Sheet No	Page 2 of 3
SUB-SYSTEM:	BSM	Issue:	1.1
		Date:	12.Aug.02

Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
12.	CAP-HD-SCREW-SS-M2-5x7					
13.	CAP-HD-SCREW-SS-M2-5x6	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002	
14.	CAP-HD-SCREW-SS-M2-5x12					
15.	P-CLIPS BRASS (TBC)	TBD	E.U	TBD	TBD	
16.	P-CLIP FASTENERS	Reliance Gear Co.Ltd	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, , COC, BATCH TRACEABLE	Probably M2.5
17.	LOCKING INSERTS	WTI Fasteners Inc	E.U	Austenitic, DIN A2, Grade 70	ISO 9002, , COC, BATCH TRACEABLE	
18.	DOWEL pins 2mm dia 8mm long	TBC	E.U	Austenitic, DIN A2, Grade 70	TBC	
19.	LACING TAPE, BRAIDED DACRON 22DPTH	TBC	E.U	Gude-Space PT/MIL-T-43435B	TBD	RAL PREVIOUS USE
20.	Flex Pivot : LUCAS 5010-600	Lucas TRW	U.S.	5010-600, Stainless steel, brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
21.	Flex Pivot : LUCAS 5010-800	Lucas TRW	U.S.	5010-600, Stainless steel, brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC

DECLARED COMPONENT LIST		ORIGINATOR: UK ATC	
SPACECRAFT / PROJECT:	Herschel	Doc. Number	SPIRE-ATC-PRJ-000709
SYSTEM / EXPERIMENT:	SPIRE	Sheet No	Page 3 of 3
SUB-SYSTEM:	BSM	Issue:	1.1
		Date:	12.Aug.02

Declared Part ID No.	Description	Manufacturer/ Supplier	Country	Specification	Quality	Notes
22.	ALTERNATE Flex Pivot	C-Flex	U.S.	E-10 CuBe brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
23.	ALTERNATE Flex Pivot	C-Flex	U.S.	E-20 CuBe brazed	COTS, COC, BATCH TRACEABLE	upscreened by UK ATC
24.	TERMINAL_PIN_571-4015	LOGIC ELECTRONIC COMPONENTS INC	E.U.	CAMBION 571-4015-01-0519	COTS, COC, BATCH TRACEABLE	MATERIALS : BRASS, PTFE, SILVER
25.	PACS type slim magnet	Magnet Sales and Service Limited Unit 31, Blackworth Industrial Estate Highworth Swindon SN6 7NA	E.U.	N42 disc dia 10mm +/- 0.1 x 2.0 +/- 0.1 mm (A), Nickel coated ON ALL FACES.	COTS, COC, BATCH TRACEABLE	Upscreened by UK ATC Materials: NdFeB to DIN 388/111. Data sheet stored as SPI-BSM-NOT-0020

Note: EEE parts covered by separate document.

HERSCHEL/SPIRE

DRCU
Declared Mechanical Parts List (DMPL)

Reference: SAp-SPIRE-NC-0100-03
Issue: 1.0
Date: 11/02/03

	Function	Name	Date	Visa
Prepared by	Mechanics Product Assurance	Nathalie Colombel	11/02/03	
Verified by	Mechanical Engineer	Thierry Tourrette		
Approved by	PA Manager			
Authorized by	Project Manager	Jean-Louis Auguères		

DOCUMENT STATUS and CHANGE RECORD

Date	Issue	Affected pages
19/11/01	0.0	Draft
11/02/03	1.0	1 "Preliminary" removed from document title 8 Addition of item 51-3 9 Precision item 52-1 Addition of item 52-3 10 61-3 removed item 61-1 & 61-2 Subcontractor not known yet

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 mechanical parts expecting to be used in the SPIRE DRCU QM, FM, FS.

2 Documentation

2.1 Applicable documents

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

MCU DMPL	Subsystem under LAM Marseilles responsibility physically contained in the FCU box.
PSU DMPL	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

CNES Guide for science projects EEE, Materials, 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	LAM
		SCU	Subsystems Control Unit	SAp
		PSU	Power Supply Unit	SAp
	DCU		Detector Control Unit	SAp

4 Codes used in the list

4.1 Environment codes

These codes are used to indicate the type of environment to which the material is subjected.

'Radiation' Code	
Code	**Meaning**
G	Geostationary orbit
L	Low Earth orbit
B	Radiation belt
I	Interplanetary
P	Planetary

For components, which are attached outside the satellite, 'S' is added for Shadow if the material is in the shade or 'L' for Light if the material is in the illuminated area.

'Environment' Code	
Code	**Meaning**
V	Vacuum
H	Hermetic
M	Manned
E	High pressure

'Temperature' Code	
Code	**Meaning**
1	0 ≤ 100 K
2	101 ≤ 200 K
3	201 ≤ 300 K
etc.	etc.

The given temperature code correspond to the operating temperature. If needed, the thermal cycle is described by two values, e.g.: 3/5.

4.2 Approval codes

These codes refer to:

- Comments made by the user or sub-contractor laboratory on use of the material in question;
- Comments from the 'higher level' (the instrument manager in charge of drawing up the list).

'Approval' Code	
Code	**Meaning**
A	Approved: use without restriction.
D	Approved with waiver: the mechanical part does not comply with requirements but is used for fonctionnal reasons. Waiver number is entered in subcolumn 9-1.
P	Decision pending: mechanical part for which an evaluation report or waiver is necessary.
O	Open: new mechanical part for which an examination or evaluation is under way.
C	Eliminated: mechanical part, which is no longer used.

5 Mechanical parts groups

Code	Group	Used
51	Spacing parts (washers, spacers,…)	☒
52	Connecting parts (bolts, nuts, rivets, inserts, clips, …)	☒
53	Bearing parts (ball-bearings, needle bearings, …)	☐
54	Separating parts (pyrotechnics, spring, cutters, …)	☐
55	Control parts (gears, …)	☐
56	Fluid handling parts (diffusers)	☐
57	Heating parts	☐
58	Measuring instruments (gauges, thermocouples, …)	☐
59	Optical passive equipment	☐
60	Magnetic parts	☐
61	Other parts	☒

Group 51 – Spacing parts										
1	2	3	4	5	6	7	8	9		10
								9.1	9.2	
Item no.	Trade identification or standard description	Type of part	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	1. Elementary functions 2. Main characteristics	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	Criticality [i]	1. Justification 2. Subcontractor comments	Approval status	Comments ESA approval
51-1		Stainless steel Flatwasher	To be filled out	o		R I E V T 3/4	Not critical	1. Common use	A	
51-2		Stainless steel Lockwasher	To be filled out	o		R I E V T 3/4	Not critical	1. Common use	A	
51-3		Stainless steel ondulated washer	To be filled out	o Used to compensate the difference between thermal expansion coefficient		R I E V T 3/4	Not critical	1. Common use	A	

[i] As defined in ECSS-Q-70A §4.1.4 Criticality analysis

Group 52 – Connecting parts										
1	2	3	4	5	6	7	8	9		10
								9.1	9.2	
Item no.	Trade identification or standard description	Type of part	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	1. Elementary functions 2. Main characteristics	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	Criticality [i]	1. Justification 2. Subcontractor comments	Approval status	Comments ESA approval
52-1	Card-lock retainer Series 260 V260-4.80ET2K http://www.calmark.com/pdfs/260.pdf	Clampling device	1. Calemark® Ireland 2. BCF MKM (France) 3.	o Clamping of electronic cards. o http://www.calmark.com/pdfs/260.pdf	1. DRCU 2. DCU FCU/(MCU+SCU) 3. To clamp the electronic boards in the electronic boxes	R I E V T 3/4	Not critical	1. Already used in space applications Rosette Project landing module (MPE) Glove box control equipment one space station (Bradford Engineering Holland)	A	
52-2	A4-80 screw	Stainless steel screw	To be filled out			R I E V T 3/4	Not critical	1. Common use	A	
52-3	Heli Coil® inserts	Stainless steel AISI 302/304 inserts	To be filled out	o Installed in thread holes of pieces made of aluminium o Size indicative colour ink removed by dipping in isopropyl alcohol	1. DRCU 2. DCU FCU/(MCU+SCU) 3.	R I E V T 3/4	Not critical	1. Common use for spatial application	A	

[i] As defined in ECSS-Q-70A §4.1.4 Criticality analysis

Group 61 – Other parts										
1	2	3	4	5	6	7	8	9		10
								9.1	9.2	
Item no.	Trade identification or standard description	Type of part	1. Manufacturer 2. Distributor 3. Proc. Spec. no. Issue / Revision	1. Elementary functions 2. Main characteristics	1. Sub-system code 2. Equipment code 3. Use	1. Rad 2. Env 3. Temp	Criticality [i]	1. Justification 2. Subcontractor comments	Approval status	Comments ESA approval
61-1	Multilayer FR4 PCB	Printed circuit Board with Epoxy glass FR4 isolator	1. Subcontractor 2. Subcontractor 3. Subcontractor procedure to be filled out	o See column 3	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. PCB	R I E V T 3/4	Not critical	1. Space qualified subcontractor 2. Could be used for non-flying models	A	
61-2	Multilayer KERIMID PCB	Printed circuit Board with KERIMID isolator	1. Subcontractor 2. Subcontractor 3. Subcontractor procedure to be filled out	o See column 3	1. DRCU 2. DCU electronic boards, FCU/(MCU+SCU) electronic boards 3. PCB	R I E V T 3/4	Not critical	1. Space qualified subcontractor 2. Used for FM & FS	A	

[i] As defined in ECSS-Q-70A §4.1.4 Criticality analysis