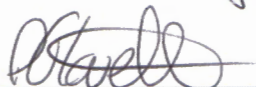


Solar Orbiter
Programme Description and End Use Note
DRL NO. N/A

CI CODE: 110 000

UK EXPORT CONTROL RATING: Not Listed
Rated by: A. Whitehouse

Prepared by:

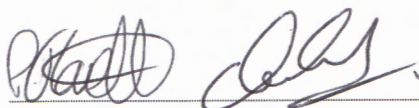


Solar Orbiter Team

Date:

16/04/14

Checked by:



P. Lovett – Industrial Manager

C. Earl – Contracts Manager

Date:

16/04/14



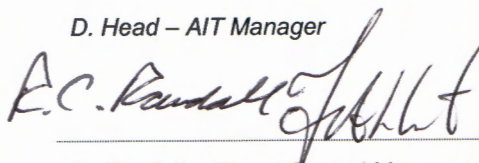
S. King – Engineering Manager

D. Head – AIT Manager

Date:

5/5/14

Approved by:



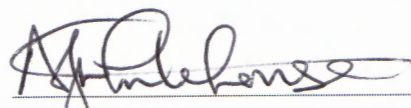
R. Randall – Export Control Manager

T. Hunt – P A Manager

Date:

6/5/14. 26/14.

Authorised by:



A. Whitehouse – Project Manager

Date:

2/6/14

The current issue is the electronic copy available through SPRINT on line. All paper copies are for information only.

This document is produced under ESA contract, ESA export exemptions may therefore apply.
These Technologies may require an export Licence if exported from the EU

ESA export licence exception applies, reference HM Customs Tariff Vol 1 Part 4 Para 4.3.11

© Astrium Limited 2014

Astrium Limited owns the copyright of this document which is supplied in confidence and which shall not be used for any purpose other than that for which it is supplied and shall not in whole or in part be reproduced, copied, or communicated to any person without written permission from the owner.

Astrium Limited
Gunnels Wood Road, Stevenage, Hertfordshire, SG1 2AS, UK

INTENTIONALLY BLANK

CONTENTS

1. INTRODUCTION	5
1.1 Scope of the Document	5
1.2 Background	5
2. ACRONYMS	5
3. MISSION SUMMARY AND SPACECRAFT DESCRIPTION	7
4. INDUSTRIAL ORGANISATION.....	10
4.1 Overview of Industrial Organisation	10
4.2 Registration and Address Information	10
5. ASSEMBLY, INTEGRATION AND TEST FACILITIES	12
6. LAUNCH AND OPERATIONS.....	18
7. ANNEX – ESA NON TRANSFER AND FINAL USER CERTIFICATE	21

FIGURES

Figure 3-1: Isometric view of the spacecraft configuration	9
--	---

INTENTIONALLY BLANK

1. INTRODUCTION

1.1 Scope of the Document

The purpose of this note is to provide information on the Solar Orbiter programme which may be used in the context of hardware or services procurements to support applications to obtain export licenses and/or governmental authorisations that require end use / end user statements.

1.2 Background

The Solar Orbiter mission, developed by ESA in collaboration with NASA, is designed to carry an extensive complement of scientific instruments to the near-Sun environment and will be able to provide unique insights in the workings of our Sun.

The Solar Orbiter Implementation Phase includes the phases B2/2, C/D, and E1 of the mission. Phases B2/2 and C/D cover the design, development, manufacture, integration and test activities up to the delivery of the Spacecraft at Flight Acceptance Review (FAR). The phase E1 covers the launch campaign, the launch, injection into orbit and in-orbit commissioning of the Solar Orbiter Spacecraft.

The "European Space Agency" (hereinafter referred to as "ESA" or "the Agency") is the Solar Orbiter end customer. ESA has awarded the contract for the Solar Orbiter Implementation Phase to Astrium Limited (trading as Airbus Defence & Space) during December 2011.

2. ACRONYMS

Acronym	Meaning
A5	Ariane 5
AIT	Assembly Integration and Test
AU	Astronomical Unit
CFI	Customer Furnished Items
CPS	Chemical Propulsion System
CSG	Centre Spatial Guyanais (Guiana Space Centre)
CSW	Central SoftWare
ESA	European Space Agency
ESOC	European Space Operations Centre
ESTEC	European Space Research and Technology Centre
ETB	Electrical / Engineering Test Bench
ETS	European Test Services
FDM	Feed-Through Doors and Mechanism
FM	Flight Model
IABG	Industrieanlagen-Betriebsgesellschaft GmbH
MLI	Multilayer insulation
NASA	National Aeronautics and Space Administration
QM	Qualification Model
RF	Radio Frequency

Acronym	Meaning
SIS	Spacecraft Interface Simulator
STM	Structure Thermal Model

3. MISSION SUMMARY AND SPACECRAFT DESCRIPTION

Solar Orbiter's mission is to address the central question of Heliophysics: How does the Sun create and control the heliosphere?. Solar Orbiter is specifically designed to identify the origins and causes of the solar wind, the heliospheric magnetic field, the solar energetic particles, the transient interplanetary disturbances, and the Sun's magnetic field itself.

Over the past two decades, an international effort to understand the Sun and heliosphere has been undertaken with an array of spacecraft carrying out both remote observations at visible, UV, and X-ray wavelengths, as well as in-situ observations of interplanetary plasmas, particles, and fields. Combined and coordinated observations from missions such as Ulysses, Yohkoh, SOHO, TRACE, RHESSI, Hinode and STEREO have resulted in an enormous advance in the understanding of the Sun and heliosphere and have proven that critical progress in understanding the physics requires both remote and in-situ observations working together.

Although the vantage point of the Earth at 1 AU is close by astrophysical measures, it has been long known that much of the crucial physics in the formation and activity of the heliosphere takes place much closer to the Sun and that by the time magnetic structures, shocks, energetic particles and solar wind pass by Earth they have already evolved and in many cases mixed so as to blur the signatures of their origin. Given the success of the missions cited above, it is clear that flying a spacecraft with a combined remote-sensing and in-situ payload into the inner solar system will critically advance scientific knowledge.

In order to meet its science objectives, the Solar Orbiter spacecraft must make in-situ measurements of the solar wind plasma, fields, waves, and energetic particles close enough to the Sun that they are still relatively pristine and have not had their properties modified by dynamical evolution during their propagation. Solar Orbiter must also relate these in-situ measurements back to their source regions and structures on the Sun through simultaneous, high-resolution imaging and spectroscopic observations both in and out of the ecliptic plane. The near-Sun part of the operational orbit will enable the spacecraft to approach the Sun as close as 0.28 AU during part of its orbit. The angular speed of a spacecraft at this distance approaches the rotation rate of the Sun, so that the remote sensing instruments will be able to observe a given point on the Sun's surface for many days. During the out-of-ecliptic part of the orbit, the spacecraft will reach higher solar latitudes (up to 34° close to the end of the mission), making detailed studies of the Sun's polar regions possible.

The Solar Orbiter spacecraft will carry 10 different in-situ and remote sensing experiments, some of which are suites of multiple sensors. Combined, these experiments will perform a comprehensive range of scientific measurements with the aim of unravelling the mysteries that shroud the workings of the inner heliosphere. These experiments are:

- EPD: Energetic Particle Detector
- EUV: Extreme Ultraviolet Instrument
- MAG: MAGnetometer instrument
- METIS: Multi Element Telescope for Imaging and Spectroscopy
- PHI: Polarimetric and Helioseismic Imager
- RPW: Radio and Plasma Wave experiment
- SOLOHI: SOLar Orbiter Heliospheric Imager
- SPICE: SPectral Imaging of the Coronal Environment
- STIX: Spectrometer / Telescope for Imaging X-rays
- SWA: Solar Wind Analyser

The main technical design driver for the Solar Orbiter mission is the punishing thermal flux that the spacecraft will experience, peaking at ~13 solar constants. To protect the spacecraft from direct solar flux, an overhanging, sun-facing heat shield is located on its top face. The spacecraft pointing monitoring and control ensures that the main SC body remains within the heatshield shadow at all times when near to the Sun; this enables the potential use of conventional units, materials and technologies.

The functionality provided by the spacecraft includes:

- **Structural support.**
The spacecraft configuration consists of a closed box type structure on which the instruments and accompanying equipment are mounted. Mounted on the top panel of the spacecraft is a heatshield which provides the required shielding from the direct solar illumination. The structural support incorporates an Instrument Boom which is a deployable boom that supports and deploys those in-situ sensors whose requirements necessitate their position to be away from the spacecraft.
- **Thermal control including heat shield.**
The thermal control element of the spacecraft is responsible for maintaining the equipment of the spacecraft (platform and payload) within their specified temperature limits and ensuring the provision of sufficient heat rejection of the sun exposed payloads. To achieve this, in addition to the function of the heat shield, the thermal control of the spacecraft utilises various passive thermal control techniques (such as black painted interior, mirror tile radiator areas of external surfaces of panels, heat pipes and multilayer insulation (MLI)), as well as the use of heaters.
- **Solar power generation.**
The Solar Array will generate electrical energy during sun periods for the spacecraft's equipments for the complete mission lifetime.
- **Power conditioning and control.**
The power conditioning and control element of the spacecraft will transfer power generated by the solar array, store energy, condition the SA power, and control the battery charges to provide a fully regulated power bus and finally distribute electrical power to the entire spacecraft at all times during the mission.
- **Telecommunications.**
The communications element of the spacecraft will provide functions for the reception of uplink signals for telecommand purposes, transmission of downlink telemetry (housekeeping and science) data and the taking of range and range rate measurements. These functions are performed within a X/X-Band link.
- **Data handling.**
The functionality provided by the data handling element of the spacecraft includes:
 - *Provision of a processor and associated memory for the on-board software to enable the Spacecraft to function autonomously (including failure management), to respond to telecommands and to generate telemetry.*
 - *Interfacing with the Science Payload equipments to collect time-stamped science data for analysis on Earth.*
 - *Provision of long-term data storage, in particular to store science data during long periods when downlink to earth is not possible.*
 - *Interfacing with the many Platform equipments, distributing commands and collecting telemetry,*
 - *Interfacing with the Telecommunications element of the spacecraft to communicate with Earth.*
- **Attitude and orbit control.**
The Attitude and orbit control element of the spacecraft provides all the functionalities required to control the spacecraft attitude and rates and perform orbit correction manoeuvres during all phases of the mission. It is a highly autonomous and requires minimal ground support. It comprises a dedicated set of sensors (Star Trackers, Inertial Measurement Unit, and Fine Sun Sensor), a dedicated set of actuators (Reaction Wheels and, thrusters) and application software which resides within the data handling element of the spacecraft.

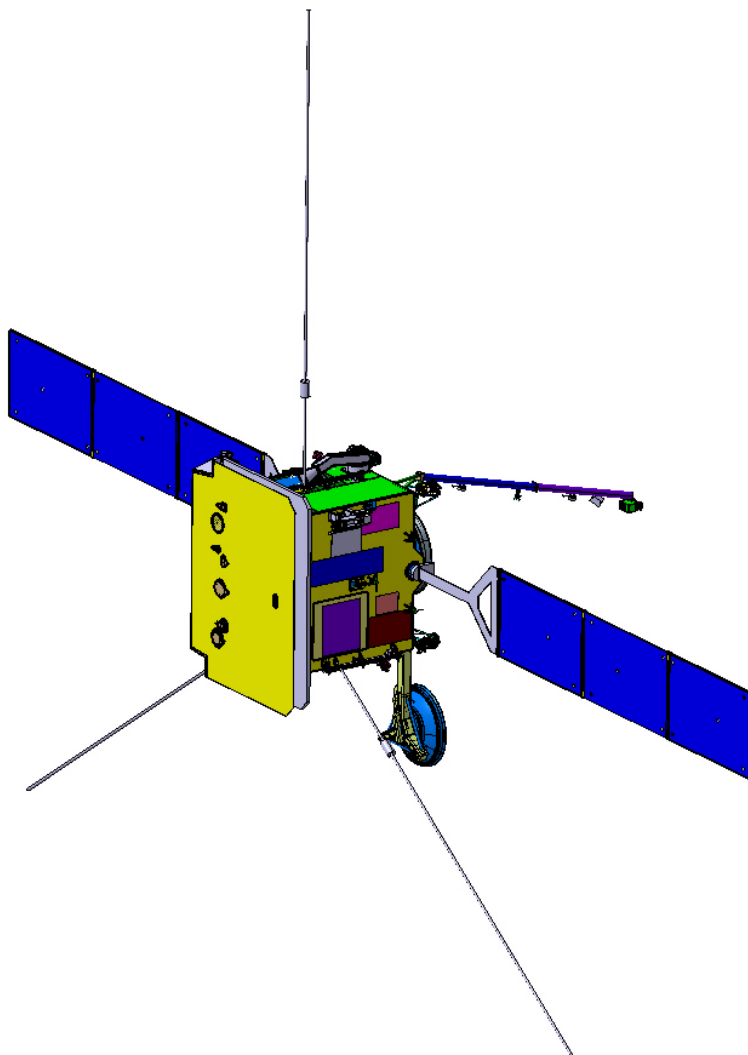


Figure 3-1: Isometric view of the spacecraft configuration

4. INDUSTRIAL ORGANISATION

4.1 Overview of Industrial Organisation

Astrium Limited the Prime Contractor has the primary responsibility to deliver the spacecraft and all other deliverables in accordance with the Agency requirements. The prime contractor is the design authority and takes responsibility for the spacecraft design and development, including system engineering, management of payload interfaces and payload accommodation. Responsibilities also include overall project planning and coordination, spacecraft integration, test and verification.

The Prime Contractor establishes and leads an industrial team comprising:

- a number of Subsystem Contractors who are responsible for executing the technical work and the build-up of the industrial team necessary to design, develop and verify the subsystems
- Equipment and lower level element subcontractors

The 10 experiments to be carried by Solar Orbiter are provided to the Prime Contractor by the Agency as customer furnished items (CFI).

The Assembly, Integration , and Test (AIT) of the Solar Orbiter spacecraft will be performed at several sites by Astrium Limited.

The environmental testing will be performed at test facilities which are yet to be selected. Candidate European test facilities are identified in this note.

4.2 Registration and Address Information

ESA is an international organisation having nineteen Member States which are: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom.

Canada, Hungary, Poland, Estonia, and Slovenia also participate in some projects under cooperation agreements.

ESA headquarters are located at :

8-10 rue Mario Nikis
75738 Paris Cedex 15
France

ESA also has centres in a number of European countries, each of which has different responsibilities :

- ESTEC, the European Space Research and Technology Centre, is the design hub for most ESA spacecraft and technology development, and is situated in Noordwijk, the Netherlands,
- ESOC, the European Space Operations Centre, is responsible for controlling ESA satellites in orbit and is situated in Darmstadt, Germany.

ESA staff can be of the nationality of any of the ESA member states or cooperating countries.

Astrium Limited, a company under the laws of England and Wales, is registered and has offices at :

Gunnels Wood Road
Stevenage
Hertfordshire
SG1 2AS
United Kingdom

5. ASSEMBLY, INTEGRATION AND TEST FACILITIES

During the Implementation Phase of the Solar Orbiter programme, several models will be built and tested at various sites. Transit of hardware may be to the potential sites and countries indicated below :

ID	Model	Activity	Organisation / Country	Address
[A]	Spacecraft Structural & Thermal Model	AIT	Astrium Ltd / UK as Spacecraft Prime	Gunnels Wood Road Stevenage Hertfordshire SG1 2AS – UK
		Environmental tests	European Test Services (ETS)/ The Netherlands as candidate Test Facility	European Space Research & Technology Centre Keplerlaan 1, Postbox 299 2201 AZ Noordwijk The Netherlands
		Environmental tests	Intespace / France as candidate Test Facility	Intespace 2 rond-point Pierre Guillaumat BP 64356 31029 Toulouse Cedex 4 France
		Environmental tests	IABG mbH / Germany as candidate Test Facility	Einsteinstrasse 20 85521 Ottobrunn Germany
		Magnetic Tests	IABG mbH / Germany as candidate Magnetic Test Facility	IABG, MFSA Meisenstrasse, Gudrunsiedlung D-85649 Brunnthal Germany
[B]	FDM Mass / Thermal Dummies	AIT	Thales Alenia Space Italia SpA / Italy as Heatshield supplier	Strada Antica di Collegno, 253 10146 Turin Italy
		Heatshield Level Environmental tests	European Test Services (ETS)/ The Netherlands as candidate Test Facility	European Space Research & Technology Centre Keplerlaan 1, Postbox 299 2201 AZ Noordwijk The Netherlands
[C]	Feedthroughs Mass / Thermal Dummies	AIT – Extreme UV Imagers	CSL Centre Spatial de Liège / Belgium as Instrument Principal Investigator (PI) Institute	CSL Centre Spatial de Liège, Belgium

ID	Model	Activity	Organisation / Country	Address
		AIT – Multi-Element Telescope for Imaging and Spectroscopy	Osservatorio Astronomico di Torino / Italy as Instrument Principal Investigator (PI) Institute	INAF Osservatorio Astronomico di Torino, Italy
		AIT – Polarimetric and Helioseismic Imager	Max-Planck-Institut für Sonnensystemforschung / Germany as Instrument Principal Investigator (PI) Institute	Max-Planck-Institut für Sonnensystemforschung, Germany
		AIT – Solar Orbiter Heliospheric Imager	Naval Research Laboratory / USA as Instrument Principal Investigator (PI) Institute	Naval Research Laboratory, Washington, DC, USA
		AIT – Spectral Imaging of the Coronal Environment	Rutherford Appleton Laboratory (RAL) / UK as institute participating in the instrument development	Science & Technology Facilities Council Rutherford Appleton Laboratory Space Science & Technology Department Harwell Science & Innovation Campus Oxon OX11 0QX UK.
		AIT – Spectrometer/Telescope for Imaging X-rays	Institute of Astronomy at ETH / Switzerland as Instrument Principal Investigator (PI) Institute	Institute of Astronomy at ETH Zurich, Switzerland
[D]	Dummy Propellant tanks	STM Structure AIT	RUAG Schweiz AG / Switzerland as Structure supplier	Schaffhauserstrasse 580, 8052 Zurich, Switzerland
		STM Propulsion AIT	OHB-Sweden AB / Sweden as Propulsion Subsystem supplier	Solna Strandvaeg 86 SE-171 22 Solna Sweden
[E]	Spacecraft Electrical / Engineering Test Bench	AIT	Astrium Ltd / UK as Spacecraft Prime	Gunnels Wood Road Stevenage Hertfordshire SG1 2AS – UK
[F]	Spacecraft Flight Model	AIT	Astrium Ltd / UK as Spacecraft Prime	Gunnels Wood Road Stevenage Hertfordshire SG1 2AS – UK
		Environmental tests (*)	European Test Services (ETS)/ The Netherlands as candidate Test	European Space Research & Technology Centre

ID	Model	Activity	Organisation / Country	Address
			Facility	Keplerlaan 1, Postbox 299 2201 AZ Noordwijk The Netherlands
		Environmental tests (*)	Intespace / France as candidate Test Facility	Intespace 2 rond-point Pierre Guillaumat BP 64356 31029 Toulouse Cedex 4 France
		Environmental tests (*)	IABG mbH / Germany as candidate Test Facility	Einsteinstrasse 20 85521 Ottobrunn Germany
		Magnetic Tests	IABG mbH / Germany as candidate Magnetic Test Facility	IABG, MFSA Meisenstrasse, Gudrunsiedlung D-85649 Brunnthal Germany
[G]	Flight model Central Cone cylinder halves fitted with propellant tanks	Flight Model Structure AIT	RUAG Schweiz AG / Switzerland as Structure supplier	Schaffhauserstrasse 580, 8052 Zurich, Switzerland
		Flight Model Propulsion AIT	OHB-Sweden AB / Sweden as Propulsion Subsystem supplier	Solna Strandvaeg 86 SE-171 22 Solna Sweden
[H]	Flight Model Propellant tank	Flight Model Structure AIT	RUAG Schweiz AG / Switzerland as Structure supplier	Schaffhauserstrasse 580, 8052 Zurich, Switzerland
		Flight Model Propulsion AIT	OHB-Sweden AB / Sweden as Propulsion Subsystem supplier	Solna Strandvaeg 86 SE-171 22 Solna Sweden
[I]	Flight Model FDM	Heatshield AIT (back up only)	Thales Alenia Space Italia SpA / Italy as Heatshield supplier	Strada Antica di Collegno, 253 10146 Turin Italy
[J]	Spacecraft Transportation Container	Structure STM / FM Transportation	RUAG Schweiz AG / Switzerland as Structure Supplier	Schaffhauserstrasse 580, 8052 Zurich, Switzerland
[K]	RF Suitcase: Pre- RF	AIT		

ID	Model	Activity	Organisation / Country	Address
	transponder assembly		N/A	N/A
[L]	RF Suitcase	AIT	To be selected	
[M]	Spacecraft Interface Simulator (SIS)	Interface verification - Extreme UV Imagers	CSL Centre Spatial de Liège / Belgium as Instrument Principal Investigator (PI) Institute	CSL Centre Spatial de Liège, Belgium
		Interface verification - Multi-Element Telescope for Imaging and Spectroscopy	Osservatorio Astronomico di Torino / Italy as Instrument Principal Investigator (PI) Institute	INAF Osservatorio Astronomico di Torino, Italy
		Interface verification - Polarimetric and Helioseismic Imager	Max-Planck-Institut für Sonnensystemforschung / Germany as Instrument Principal Investigator (PI) Institute	Max-Planck-Institut für Sonnensystemforschung, Germany
		Interface verification - Solar Orbiter Heliospheric Imager	Naval Research Laboratory / USA as Instrument Principal Investigator (PI) Institute	Naval Research Laboratory, Washington, DC, USA
		Interface verification - Spectral Imaging of the Coronal Environment	Rutherford Appleton Laboratory (RAL) / UK as institute participating in the instrument development	Science & Technology Facilities Council Rutherford Appleton Laboratory Space Science & Technology Department Harwell Science & Innovation Campus Oxon OX11 0QX UK.
		Interface verification - Spectrometer/Telescope for Imaging X-rays	Institute of Astronomy at ETH / Switzerland as Instrument Principal Investigator (PI) Institute	Institute of Astronomy at ETH Zurich, Switzerland
		Interface verification - Energetic Particle Detector	University of Alcalá / Spain as Instrument Principal Investigator (PI) Institute	University of Alcalá, Spain.
		Magnetometer	Imperial College / London as Instrument Principal Investigator (PI) Institute	The Blackett Laboratory, Imperial College London, UK
		Radio and Plasma Waves Experiment	Observatoire de Paris / France as Instrument Principal Investigator (PI) Institute	LESIA, CNRS, Observatoire de Paris, France.
		Solar Wind Analyzer	University College London/Mullard Space	University College London/Mullard Space

ID	Model	Activity	Organisation / Country	Address
			Science Laboratory / UK as Instrument Principal Investigator (PI) Institute	Science Laboratory, Surrey, UK
[N]	On-Board Software Maintenance System, development environment (hardware and software)	Operations support	ESOC / Germany as Customer (ESA) Facility	European Space Operations Centre Robert-Bosch Str. 5 64293 Darmstadt Germany
[O]	OBCP Maintenance System development and testing (unit level validation) environment (hardware and software)	Operations support	ESOC / Germany as Customer (ESA) Facility	European Space Operations Centre Robert-Bosch Str. 5 64293 Darmstadt Germany
[P]	AOCS Functional Verification Tools and Models	Operations support	ESOC / Germany as Customer (ESA) Facility	European Space Operations Centre Robert-Bosch Str. 5 64293 Darmstadt Germany
			Astrium Ltd / UK as Spacecraft Prime	Gunnels Wood Road Stevenage Hertfordshire SG1 2AS – UK
[Q]	Spacecraft Flight Model partial build (Structure & Propulsion)	Propulsion Testing	Moog ISP UK Westcott Limited / UK as Propulsion Testing Facility	Building 47 Westcott Venture Park Westcott Aylesbury Buckinghamshire HP18 0NZ
[R]	Development (PTB) Boom	AIT	Astrium Ltd / UK as Spacecraft Prime	Gunnels Wood Road Stevenage Hertfordshire SG1 2AS – UK
		Magnetic Test	Physikalisch-Technische Bundesanstalt	Physikalisch-Technische Bundesanstalt Abbestr. 2-12, 10587 BERLIN, Germany

ID	Model	Activity	Organisation / Country	Address
[S]	Flight Model Harness	AIT	EADS CASA ESPACIO	Avda. Avagon, 404 28022 Madrid Spain
		Enviromental Test	Instituto Nacional de Técnica Aeroespacial (INTA)	Ctra. Ajalvir Km 4, 28850 Torrejón de Ardoz Madrid Spain

6. LAUNCH AND OPERATIONS

Section ID Number: [1]

ESA will procure the launch services for Solar Orbiter.

The baseline launch vehicle for the Solar Orbiter mission is the Atlas V 400 series (version 401 or 411) with Centaur upper stage, launching from Cape Canaveral. The backup launch vehicle options are the Delta IV M from Cape Canaveral and Ariane 5 from Kourou

There are launch slots for the Solar Orbiter spacecraft in:

- January 2017 to March 2017 (Nominal slot)
- August 2018 to September 2018 (Back up slot).

The Solar Orbiter spacecraft will be shipped from Europe to the launch site under the responsibility of Astrium Limited.

Model	Activity	Organisation / Country	Address
Spacecraft Flight Model	Launch campaign (Florida) Spacecraft Processing Facility (Applicable for both Atlas V and Delta IV M launches)	Astrotech Space Operations HQ/USA	1515 Chaffee Drive Titusville Florida 32780 USA
	Launch campaign (Florida) Atlas V	United Launch Alliance / USA Headquarters: P.O. Box 277005 Littleton Colorado 80127-7005 USA	Kennedy Space Center Florida 32899 USA
			Cape Canaveral Air Force Station (CCAFS), Florida 32920 USA
	Launch campaign (Florida) Delta IV M (Backup only)	United Launch Alliance / USA Headquarters: P.O. Box 277005 Littleton Colorado 80127-7005 USA	Kennedy Space Center Florida 32899 USA
			Cape Canaveral Air Force Station (CCAFS), Florida 32920 USA
	Launch campaign (Kourou) Ariane 5 (Backup only)	Arianespace / France Headquarters: Boulevard de l'Europe BP 177 91006 Evry-Courcouronnes Cedex France	Arianespace BP 809 97388 Kourou CEDEX French Guiana

		CNES / France	Centre national d'études spatiales Centre spatial guyanais BP 726 _ Route Nationale 1 97 387 KOUROU CEDEX FRENCH GUIANA
--	--	---------------	---

Section ID Number: [2]

The End User of the Solar Orbiter spacecraft will be the European Space Agency (ESA) and it will be operated by European Space Operations Centre (ESOC) at the following address :

European Space Operations Centre
 Robert-Bosch Str. 5
 64293 Darmstadt
 Germany

Title of ownership transfers from Astrium Limited to ESA at lift-off of the launch vehicle carrying the Solar Orbiter spacecraft. Lift-off is defined as the moment when the ignition of the launcher's engine is irreversibly commanded.

Section ID Number: [3]

The Spacecraft Electrical / Engineering Test Bench will be shipped to European Space Operations Centre (ESOC) for operations support activities. These activities will be undertaken at the following address:

European Space Operations Centre
 Robert-Bosch Str. 5
 64293 Darmstadt
 Germany

Section ID Number: [4]

The RF Suitcase will be used to validate ground stations and ground segment.

Model	Activity	Organisation / Country	Address
RF Suitcase: Pre- RF transponder assembly	Ground station validation (Darmstadt)	ESOC / Germany	European Space Operations Centre Robert-Bosch Str. 5 64293 Darmstadt Germany
RF Suitcase	Ground station validation (Darmstadt)	ESOC / Germany	European Space Operations Centre Robert-Bosch Str. 5 64293 Darmstadt Germany
	Ground station validation (Malargüe)	TBD (Await ESA advice) / Argentina	TBD (Await ESA advice)
	Ground station validation (New Norcia)	TBD (Await ESA advice) / Australia	TBD (Await ESA advice)
	Ground station validation (Cebreros)	ESA / Spain	ESA Cebreros Satellite Tracking Station

Model	Activity	Organisation / Country	Address
			Carretera AV-562, Km 18 E-05260 Cebreros (Avila) Spain

Section ID Number: [5]

Contract fixed assets (items purchased under the contract) will (at the Agency's request) be shipped to European Space Research and Technology Centre (ESTEC) at the following address:

European Space Research & Technology Centre
Keplerlaan 1, Postbox 299
2201 AZ Noordwijk
The Netherlands

7. ANNEX – ESA NON TRANSFER AND FINAL USER CERTIFICATE

ESA UNCLASSIFIED – For Official Use

8-10 rue Mario Nikis
F-75738 Paris Cedex 15
France
T +33 (0)1 53 69 76 54
F +33 (0)1 53 69 75 60
www.esa.int**To Whom It May Concern**

Paris, 27 September 2012

Subject: End Use Statement for the Solar Orbiter Programme

The European Space Agency (hereinafter “ESA”), is an intergovernmental organization established by the Convention that entered into force on October 30, 1980 with nineteen Member States (Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom, four European Cooperating States, Estonia, Hungary, Poland, Slovenia, and a Cooperating State, Canada, with its headquarters located at 8-10 rue Mario Nikis, 75738 Paris Cedex 15 France and offices in multiple locations within the Member States including its European Space and Technology Research Centre (“ESTEC”) at Keplerlaan 1, 2200 Noordwijk, The Netherlands.

ESA confirms that we are the end user for all deliverables in the Solar Orbiter scientific mission - a programme developed by ESA in collaboration with NASA. The programme is designed to carry an extensive complement of scientific instruments to the near-Sun environment and will be able to provide unique insights in the workings of the Sun.

ESA further confirms that we have contracted Astrium Limited, Gunnels Wood Road, Stevenage, Hertfordshire, SG1 2AS, United Kingdom, as the prime contractor for the Solar Orbiter programme. For the parts procurement for the scientific experiment payload, we have contracted Alter Technology, C/ Tomás A. Edison 4, 41092 Sevilla, Spain. These companies will manage the detailed end user statements with lists of ultimate and intermediate consignees.

Signed by:

Claes Hansen
ESA Export Control Coordinator

DOCUMENT CHANGE DETAILS

ISSUE	CHANGE AUTHORITY	CLASS	RELEVANT INFORMATION/INSTRUCTIONS
1	SOL.S.ASTR.ECO.00018	-	Initial Issue
2		-	Updates to Section 6: <ul style="list-style-type: none"> incorporate the details of the spacecraft processing facility in the case of a launch from Florida. Background information concerning the location of the headquarters of Arianespace and ULA added.
3		-	Updates to Section 7: <ul style="list-style-type: none"> revised ESA non transfer and final user certificate.
4		-	Additional Signatories
5		-	Updates to Section 5: <ul style="list-style-type: none"> Sections [D], [G] and [H] updated with OHB-Sweden AB. Section [F] updated with Moog ISP UK Westcott Limited. Updates to Section 6: <ul style="list-style-type: none"> Sections updated with ID numbers.
6		-	Updates to Section 5: <ul style="list-style-type: none"> Section [F] remove Moog ISP UK Westcott Limited. Section [K] no longer applicable. Section [Q] added with Moog ISP UK Westcott Limited. Section [R] added with Physikalisch-Technische Bundesanstalt Section [S] added with CASA ESPACIO and INTA

DISTRIBUTION LIST

INTERNAL

P. Lovett
 D. Hough
 T. Hunt
 S. King
 A. Whitehouse
 C. Earl
 E. Samat
 I. Vanoorschot
 T. Harris
 L. Waugh
 D. Head
 R Randall

Configuration Management
 Library

EXTERNAL

ESA