

Programmes under Development and Operations

(status end-June 2002)

In Orbit

PROJECT	1998	1999	2000	2001	2002	2003	2004	COMMENTS	
	JFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON		
SCIENCE PROGRAMME	SPACE TELESCOPE	[Main Development Phase]						[Operations]	LAUNCHED APRIL 1990
	ULYSSES	[Main Development Phase]						[Operations]	LAUNCHED OCTOBER 1990
	SOHO	[Main Development Phase]						[Operations]	LAUNCHED DECEMBER 1995
	HUYGENS	[Main Development Phase]						[Operations]	LAUNCHED OCTOBER 1997
	XMM-NEWTON	[Main Development Phase]						[Operations]	LAUNCHED DECEMBER 1999
	CLUSTER	[Main Development Phase]						[Operations]	RE-LAUNCHED MID 2000
APPLICATIONS/ TECHNOLOGY PROGRAMME	MARECS-B2	[Main Development Phase]						[Operations]	POSSIBLE NEW LEASE
	METEOSAT-5 (MOP-2)	[Main Development Phase]						[Operations]	OPERATED BY EUMETSAT
	METEOSAT-6 (MOP-3)	[Main Development Phase]						[Operations]	OPERATED BY EUMETSAT
	METEOSAT-7 (MTP)	[Main Development Phase]						[Operations]	OPERATED BY EUMETSAT
	ERS - 2	[Main Development Phase]						[Operations]	LAUNCHED APRIL 1995
	ECS - 4	[Main Development Phase]						[Operations]	OPERATED FOR EUTELSAT
	ARTEMIS	[Main Development Phase]						[Operations]	LAUNCHED JULY 2001
	PROBA	[Definition Phase]	[Main Development Phase]						[Operations]

Under Development

PROJECT	1998	1999	2000	2001	2002	2003	2004	COMMENTS		
	JFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON	DJFMAMJJJASON			
SCIENTIFIC PROGRAMME	INTEGRAL	[Main Development Phase]						[Operations]	LAUNCH OCTOBER 2002	
	ROSETTA	[Definition Phase]	[Main Development Phase]						[Operations]	LAUNCH JANUARY 2003
	MARS EXPRESS	[Definition Phase]	[Main Development Phase]						[Operations]	LAUNCH MAY 2003
	SMART-1	[Definition Phase]	[Main Development Phase]						[Operations]	LAUNCH FEB./MARCH 2003
COMMS/ NAV. PROG.	HERSCHEL/PLANCK	[Main Development Phase]						[Operations]	LAUNCH FEBRUARY 2007	
	GNSS-1/EGNOS	[Main Development Phase]						[Operations]	INITIAL OPS. START 2004	
	GALILEOSAT	[Main Development Phase]						[Operations]	FIRST LAUNCH 2005	
	EOPP	[Main Development Phase]						[Operations]		
	EOEP/CRYOSAT/GOCE/ SMOS/ADM-AEOLUS	[Main Development Phase]						[Operations]	LAUNCH GOCE FEB. 2006/ SMOS 2006/ADM-AEOLUS OCT. 2007	
	ENVISAT 1/ POLAR PLATFORM	[Main Development Phase]						[Operations]	LAUNCH MARCH 2002	
	METOP-1	[Definition Phase]	[Main Development Phase]						[Operations]	LAUNCH 2nd HALF 2005
	MSG-1	[Main Development Phase]						[Operations]	LAUNCHED AUGUST 2002	
	EARTH OBSERV. PROGRAMME	COLUMBUS	[Main Development Phase]						[Operations]	LAUNCH OCTOBER 2004
		ATV	[Definition Phase]	[Main Development Phase]						[Operations]
X-38		[Main Development Phase]						[Operations]	V201 TEST FLIGHT OCT. 2005 (UNDER REVIEW)	
NODE-2 & -3		[Main Development Phase]						[Operations]	LAUNCHES FEBRUARY 2004 & JULY 2005	
CUPOLA		[Main Development Phase]						[Operations]	LAUNCH JANUARY 2005 (UNDER REVIEW)	
ERA		[Main Development Phase]						[Operations]	LAUNCH UNDER REVIEW	
DMS (R)		[Definition Phase]	[Main Development Phase]						[Operations]	LAUNCHED JULY 2000
MELFI		[Main Development Phase]						[Operations]	LAUNCH JANUARY 2003	
GLOVEBOX		[Main Development Phase]						[Operations]	LAUNCH MAY 2002	
HEXAPOD		[Main Development Phase]						[Operations]	LAUNCH SEPTEMBER 2004	
MANNED SPACE & MICROGRAVITY PROGRAMME	EMIR	[Definition Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Operations]	BIO, FSL, EPM, in COLUMBUS	
	MFC	[Definition Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Operations]		
	ARIANE-5 DEVELOP.	[Definition Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Operations]	OPERATIONAL	
	ARIANE-5 PLUS	[Definition Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Operations]	FIRST LAUNCH OCT. 2002	
LAUNCHER PROGRAMME	VEGA	[Definition Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Main Development Phase]	[Operations]	FIRST LAUNCH MAY 2006	

- DEFINITION PHASE
- MAIN DEVELOPMENT PHASE
- OPERATIONS
- LAUNCH/READY FOR LAUNCH
- ADDITIONAL LIFE POSSIBLE
- ▼ RETRIEVAL
- STORAGE

ISO

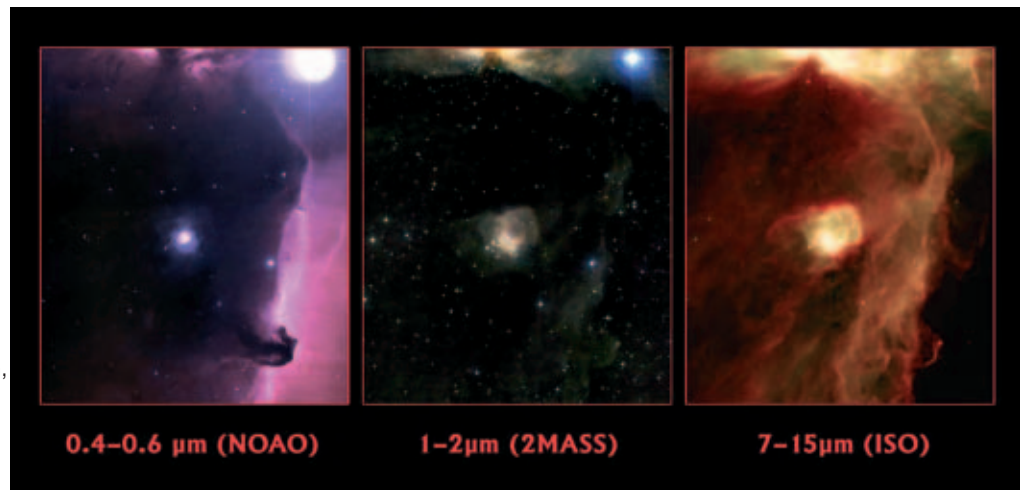
Around 100 astronomers from thirteen countries discussed the latest discoveries of ESA's Infrared Space Observatory (ISO) at the conference titled 'Exploiting the ISO Data Archive – Infrared Astronomy in the Internet Age', organised by the ISO Data Centre (Villafranca, Spain). The aim of this meeting held on 24-27 June 2002 in Sigüenza, Spain, was to further promote the scientific exploitation of the ISO Data Archive.

Exciting new results were presented in all fields of astronomy, showing that the exploitation of ISO data continues to be very productive. Many new projects were reported involving all kinds of observational modes. Special emphasis was given to projects involving large data sets and/or systematic data reduction, or any project making use of the data with a different purpose than that planned in the original proposal. It was confirmed that significant effort is required on the modelling and laboratory work to interpret the so far mostly unexplored wavelength range of 2-200 microns. The good position of the ISO archive in the framework of the international Astronomical Virtual Observatories was evidenced in a dedicated session.

The conference had several positive effects: it stimulated researchers in their on-going projects to have results ready for the conference, it motivated people to think about the potential of ISO data and to realise what new studies could be undertaken, and it triggered new collaborations between teams and individuals thanks to the many opportunities for discussion, which ensured a lively scientific atmosphere.

ISO has so far resulted in more than 860 papers in the refereed literature, impacting all areas of astronomy. The ISO Data Archive has been populated with the last version of the automated Off-Line Processing pipeline, and the final version of a five-volume handbook is being released, giving a thorough description about the mission, its products and the associated calibration. A direct download capability has been introduced in the latest version 5.2.

ISO is now in its Active Archive Phase, lasting until end-2006, which will



consolidate the success of the mission. During this phase, the Archive will continue to be improved with new data and information being ingested. Major tasks are: stimulating systematic expert data reduction and capturing the resulting data products into the Archive; tracking of refereed ISO publications and incorporating this information; ingestion of new ISO catalogues and atlases; continuing the process of increasing the interoperability of archives by linking to other data sets; and maintaining the ISO Archive, especially the user interface to maximise its usefulness and ease of use.

The Horsehead Nebula, NGC 2023, as seen, on the right, by ESA's Infrared Space Observatory (ISO)

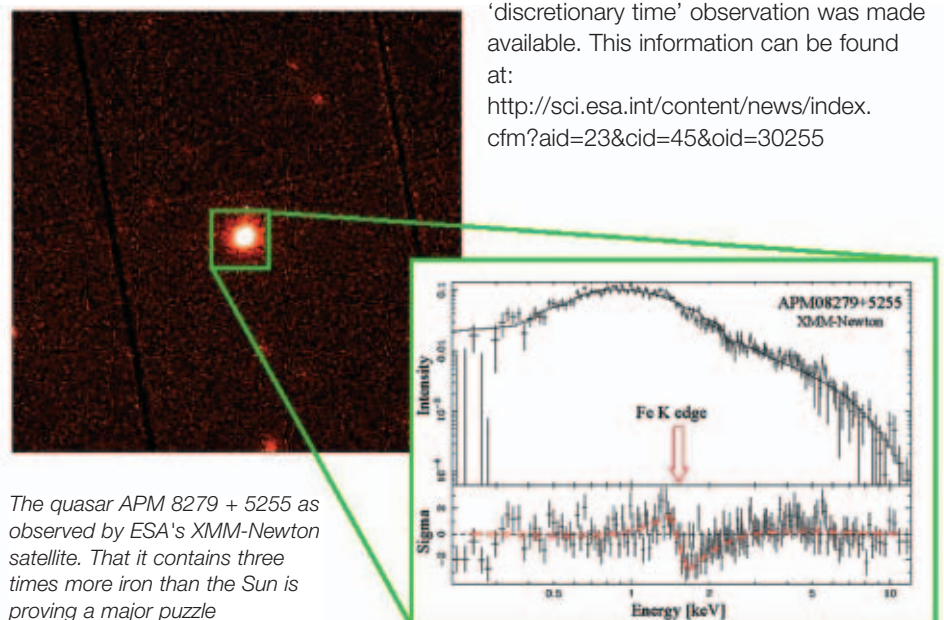
XMM-Newton

XMM-Newton operations continue to run smoothly. Solar activity has been minimal and very little science time was lost due to this.

Investigations to operate the X-ray detectors on-board XMM-Newton at -120°C , instead of the current -90°C , have started. The purpose of lowering the operating temperature of the X-ray detectors is to ameliorate some of the radiation-damage effects caused by spending over 2.5 years in space.

Preparations for the next eclipse season, in August/September 2002, have started. In between the autumn 2002 and spring 2003 eclipse seasons, an orbit-maintenance manoeuvre will be needed to ensure proper visibility of the XMM-Newton observatory from the ground stations.

The results of a very successful, so-called 'discretionary time' observation was made available. This information can be found at:
<http://sci.esa.int/content/news/index.cfm?aid=23&cid=45&oid=30255>



The quasar APM 8279 + 5255 as observed by ESA's XMM-Newton satellite. That it contains three times more iron than the Sun is proving a major puzzle

The story, which was also covered by CNN, describes an XMM-Newton result that may indicate that the Universe is older than so far believed.

XMM data processing and data shipment is proceeding nominally. Currently 1911 observation sequences have been executed, and the data for 1820 of these have been shipped.

The XMM-Newton Science Archive (XSA) has been released, allowing external observers to retrieve public, as well as proprietary data. The XSA is a very successful re-use of the software developed for the ISO Data Archive (IDA). The XSA can be found at:

<http://xmm.vilspa.esa.es/xsa>.

By end-June, some 160 papers based on XMM-Newton data had been published in the refereed literature, with quite some papers describing ground-breaking discoveries in X-ray astrophysics.

Artemis

During the last three months, the raising of Artemis's orbital altitude has continued, using its ion-thruster engines. Artemis has already been boosted by more than 1500 km from its parking orbit at 31 000 km altitude. Some problems with the ion thrusters on the south-facing side of the satellite mean that the orbit raising is presently being performed using only one thruster on the north side. This provides an altitude increment of about 15 km per day. As Artemis must climb another 3000 km, it will arrive at its nominal geostationary position only at the beginning of 2003.

The whole orbit-raising manoeuvre, involving a total altitude increment of 4500 km, will consume not more than 17 kg of ion-thruster fuel (xenon gas). This is serving as a perfect demonstration of the capabilities and high efficiency of the novel electrical-propulsion system carried by Artemis.

The satellite itself continues to show very robust behaviour. Not only are the nominal operations being performed fully

satisfactorily, but it is also proving capable of sustaining previously unthought of manoeuvres in support of the orbit-raising activities. This demonstrates both the flexibility of Artemis's design and the excellent skills of the spacecraft's designers and operators.

Integral

The Integral spacecraft has now successfully completed the environmental test campaign in the ESTEC facilities in Noordwijk (NL). The final test of the campaign, the thermal-vacuum and thermal-balance test, passed without major problems. Subsequent functional verification tests demonstrated that the satellite is fully functional after the harsh test campaign and therefore ready to perform its scientific mission.

Based on the results of all various tests performed and the contents of the Integral technical data package, the Flight Acceptance Review resulted in the spacecraft being declared ready for

shipment to the launch site. The Instrument Flight Acceptance Review had already previously concluded that the scientific payload was ready to fly. The plan is to ship the spacecraft and all the necessary ground-segment equipment to the Baikonur Cosmodrome in August, for a launch in October 2002.

The Launch Facilities Acceptance Review has also been completed and the conclusion was that the launch facilities are ready for the Integral launch campaign. The production of the Proton launcher system for Integral is also proceeding according to the agreed master schedule.

The last System Validation Test and End-to-End Test involving the spacecraft and the entire ground segment have been successfully completed. The Integral ground segment consists of the Science Operations Centre at ESTEC in Noordwijk (NL), the Mission Operations Centre at ESOC in Darmstadt (D) and the Science Data Centre in Geneva (CH). The Ground Segment Readiness Review has also been successfully completed.



Integral undergoing mass-properties testing at the end of the environmental test campaign at ESTEC in Noordwijk (NL)

Rosetta

The Rosetta flight-model spacecraft has successfully completed its environmental test campaign. It has undergone thermal-vacuum, acoustic, vibration and EMC testing, the latter finishing in June 2002. During July, some refurbishment is taking place, which will be followed in August by the final functional testing before shipment to Kourou (Fr. Guiana) in September. All subsystems are working nominally and the final on-board software that will be used for the launch and the commissioning phase is frozen. The electrical qualification model programme has been continuing in parallel to check out all of the autonomy and failure-recovery actions and to verify the on-board control procedures.

The Flight Acceptance Review (FAR) process for the proto-flight model spacecraft before shipment to the launch site has commenced.

Several of the scientific payload's detectors have been exchanged during the refurbishment activities and now a fully optimised and calibrated set of experiments are integrated. All payload elements have successfully passed their Experiment Flight Operations Reviews (EFORs).

The Lander is also being refurbished at ESTEC in Noordwijk (NL), with the final integration onto the Orbiter scheduled for mid-August. The Landing Gear Working Group has confirmed that the baseline landing gear, which has now been completely qualified, is acceptable for flight and so it will be mounted during this period.

The ground segment's development is nearing completion. The New Norcia ground station has already been used for ranging measurements with a spacecraft already in orbit and will be handed over for pre-launch preparations in August. Various test campaigns have been performed commanding the flight spacecraft from ESOC in Darmstadt (D).

Final preparations for the launch campaign are in progress, in order to receive the first shipment of ground support equipment in Kourou in early September. The manufacture and qualification of the Rosetta launch vehicle are proceeding according to plan.



The Rosetta flight spacecraft on the vibration shaker at ESTEC in May 2002

In summary, the risk on all outstanding items has considerably reduced over the last few months and everything is fully in progress for launch in mid-January 2003.

The spacecraft launch-vehicle adaptor is presently in Russia for integration checks with the Soyuz Fregat upper stage.

Mars Express

The Mars Express spacecraft is nearing completion, as the last units are being integrated and tested. All experiment units are now mounted and the last flight unit to be integrated is the FM1 transponder, which has recently been delivered. Integrated system testing will commence at the beginning of August and the first Ground System Verification Test will take place shortly thereafter.

Following the tragic accident at the Baikonur launch facilities, a team of Starsem personnel have visited the site and are now working to restore the Mars Express integration facilities to 'flight status' in time for the spacecraft's arrival at the end of February 2003.

Arrival of the spacecraft at the environmental facilities in Toulouse is planned for 23 August, in order to begin the thermal-balance and thermal-vacuum testing in early-September. The spacecraft will remain in the Intespace test facilities until all of the system environmental tests (thermal, vibration, acoustic and EMC) are completed by the end of the year.

SMART-1

Spacecraft

The last three months have seen the assembly, integration and testing of the spacecraft flight-model units. The spacecraft is now almost entirely integrated. The system and power-control and distribution unit of the electronics subsystem are still represented by qualification/spare units, but all of the others are flight models. The on-board

software is undergoing detailed verification testing, but a qualification version has been released. This version is presently being used to run the System Functional and Performance Tests (SFPT) to verify system hardware-software compatibility. The System Validation Tests, which will test end-to-end the commanding and telemetry functions from the Mission Control System at ESOC to the spacecraft, have also begun.

The spacecraft is currently being tested in the Saab Ericsson Space premises in Linköping (S), but will be moved to ESTEC in Noordwijk (NL) at the end of July, where it will complete the SFPT and will undergo environmental acceptance testing (vibro-acoustic, thermal vacuum and EMC). The current plan foresees the Flight Acceptance Review taking place in December 2002.

Payload

All of the payload instrument flight models have been integrated and tested on the spacecraft except KaTE, which will be integrated in early August. Some instruments have been dismantled after the test and shipped back to the responsible institutes for final calibration, and will be re-integrated on the spacecraft before the environmental tests.

Electric propulsion

The various flight-model components of the electric propulsion subsystem have been successfully integrated and tested on the spacecraft, except for the pressure

regulator electronic card, which has to be integrated into the system unit, and the flight-model thruster, which can only be operated in vacuum conditions. The electric-propulsion end-to-end test will be performed in a specially equipped vacuum chamber (HBF3) at ESTEC in November. The engine will be turned on inside the chamber and its main functions will be verified.

Operations

The Ground Segment Implementation Review was successfully held in the spring. The testing phase is now in progress, both for the Mission Operations Centre at ESOC and the Science and Technology Operations Coordination at ESTEC.

Launcher

Arianespace has announced a flight opportunity for SMART-1 in the February-March 2003 time frame aboard an Ariane-5 vehicle, shared with a telecommunications satellite.

Herschel/Planck

The procurement activities for the Herschel and Planck spacecraft by the Prime Contractor and two core team members, Astrium GmbH and Alenia Spazio, dominated the activities in spring of this year. The completion of these activities and the finalisation of the industrial consortium for the overall development will be take place late this year.

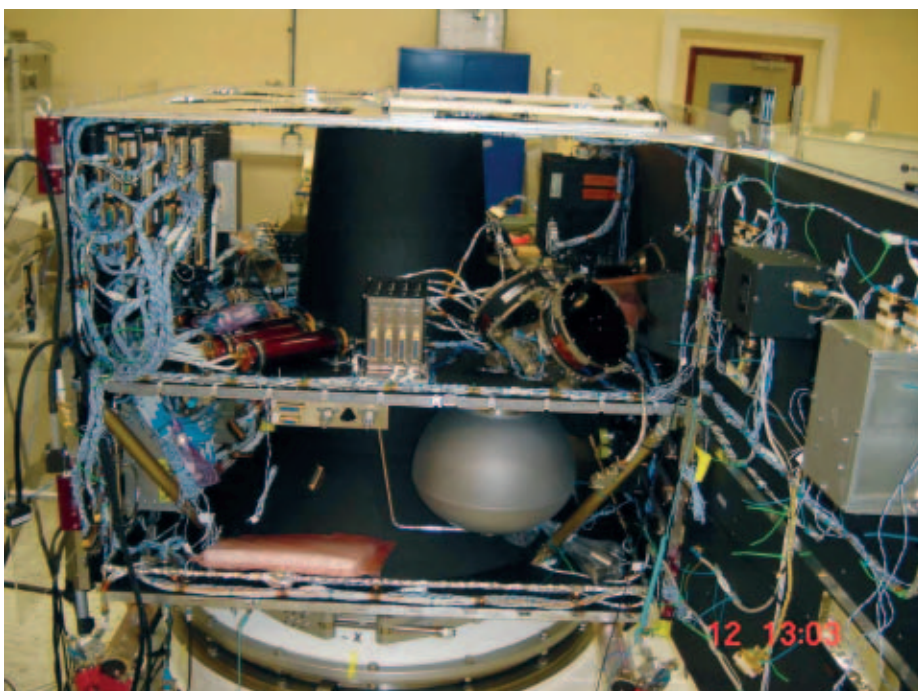
The Herschel/Planck Senior Procurement Board (SPB) has met twice during this period and gave authorisation to enter negotiation with companies that had provided proposals for Invitations to Tender (ITTs) in these two successive batches. The most important procurements considered in this period included the Attitude Control and Measurement Subsystem (ACMS) and a number of core avionics units. By the end of the three-month reporting period, about 40% of the total number of procurement items had been authorised, adding up to nearly two thirds of their total contractual value.

The activities on the baseline system and module designs continued, enhancing the maturity of the designs in preparation of the forthcoming Preliminary Design Review (PDR). The data-package delivery for this second major review in the Herschel/Planck spacecraft development effort takes place 2 July. The review will be conducted throughout the summer period and completed by a Review Board meeting in early October. Technically the most critical parameter for the spacecraft design remains the overall system mass.

The Herschel Telescope, developed under direct ESA contract by Astrium SAS, successfully passed its Critical Design Review (CDR) in May 2002. This review gave the go-ahead to start the manufacturing of the silicon-carbide primary-mirror petals. The Planck reflectors, under development at Astrium GmbH (outside the spacecraft contract with Alcatel and via a common contract with ESA and the Danish Space Research Institute) had its Critical Design Review in June and was equally successful. Both developments are proceeding according to plan.

The interfaces and contacts with the launch provider (Arianespace) further matured during this period and resulted in an updated understanding of the baseline.

Regarding the payloads of the two spacecraft, the defined plan of action to establish a clear technical baseline for the forthcoming PDR was implemented, involving significant effort on all sides. This goal was achieved and the remaining



Interior of the SMART-1 spacecraft

open points in the definition of instrument interfaces to the spacecraft were settled. Delays in the instrument development work, approaching manufacturing of the qualification models, led to new delivery dates. Industry fortunately found ways to modify the module and spacecraft qualification and acceptance test sequences such that the delays could be accommodated without impacting the launch date in February 2007.

Regarding the preparation of the scientific operations, the provision and review of the Science Implementation Plans for Herschel and Planck is running according to plan. Similarly for the Mission Operations Centre's preparation, a Customer Requirements Review was successfully completed on the 10 April at ESOC and the Mission Implementation Requirements Document was formally signed. The subsequent Mission Implementation Plan was released by ESOC in June.

At the meeting of the Science Programme Committee (SPC) held on 22-23 May 2002 in Andoya, Norway, the Executive's proposal to include the Eddington mission within the product and procurement cycle for Herschel/Planck was approved. Eddington, which will use an identical space bus to that of Herschel/Planck, will be integrated into the existing ESA Herschel/Planck project structure. The activities to establish the details of the implementation scenario for Eddington started shortly thereafter.

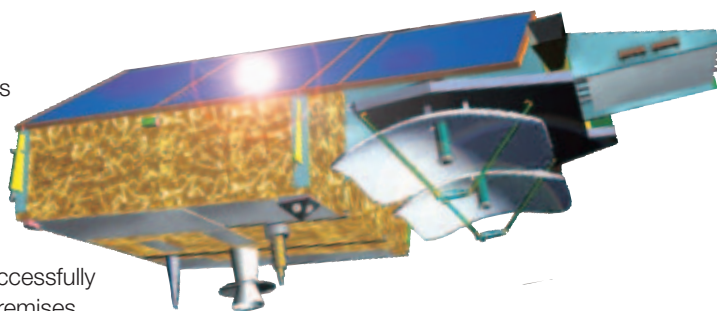
CryoSat

The CryoSat project is progressing well, within Phase-C/D. The engineering model of the onboard computer (CDMU) has been successfully tested at Laben's(l) premises. Concerning the radar altimeter (SIRAL), the original design has been slightly modified to include a calibration loop that will be able to provide, during flight, an increased accuracy of the SAR interferometric mode. Most of the industrial partners of Astrium GmbH, the Prime Contractor for the Space Segment, are now ready to start manufacturing the various equipment items for the flight model.

Following evaluation of the offers received in April 2002, it has been decided that CryoSat will be launched by Eurockot from Plesetsk Cosmodrome in Russia.

The development of the CryoSat ground segment is going according to plan and the first review of the Instrument Processing Facility, limited to Level-1b products, has been successfully completed. The development of algorithms to derive CryoSat Level-2 products has been initiated.

More than 30 offers have been received from some 13 countries to support the calibration and validation campaigns for



Artist's impression of the CryoSat spacecraft

CryoSat. Consolidation of these proposals is currently in progress.

GOCE

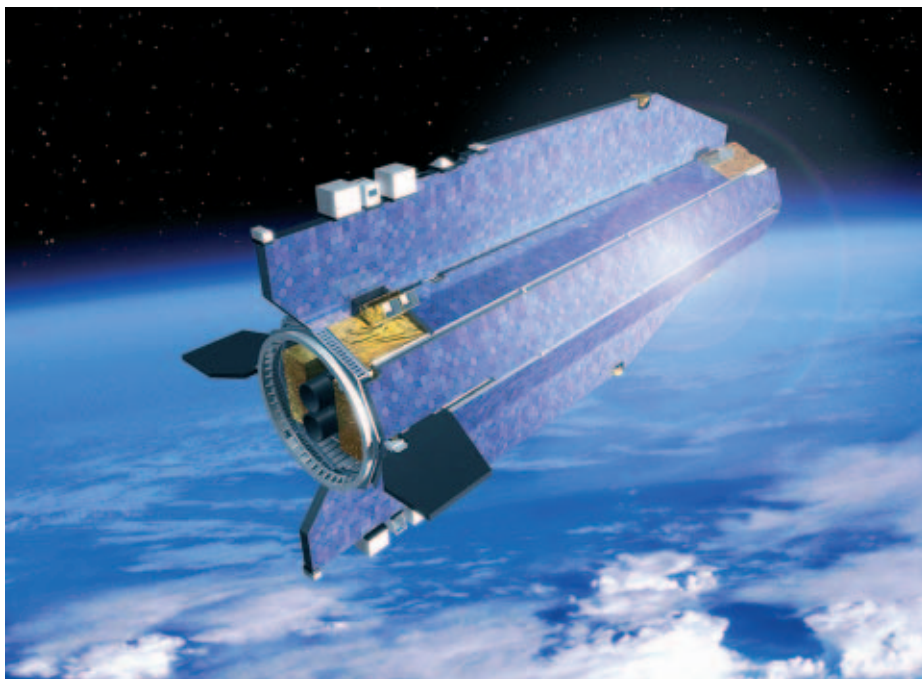
The GOCE space-segment development effort has achieved the last Phase-B milestone represented by the successful conclusion of the GOCE Preliminary Design Review (PDR) at the Board Meeting held on 9 April. The PDR Board concluded that the overall design of the GOCE space segment is sound and that no technical showstoppers have been identified.

Authorisation has been given to Alenia Spazio to proceed with the Phase-C/D activities.

The competitive-selection process for the various equipment suppliers is nearing completion, with the selection of the suppliers for the solar array and the micro propulsion assembly.

In the gradiometer development area, which is the most critical element in terms of the GOCE schedule, several solutions have been identified and are currently under discussion. In addition, dedicated tribological tests have been started for improving the capability of the accelerometers to withstand the launch vibration environment. Analysis and simulation campaigns have been initiated to consolidate the performance of the gradiometer in-flight calibration.

At satellite level, design rules and testing techniques are currently defined as proactive measures for detecting in the



Artist's impression of the GOCE spacecraft

Illustration: Pierre Carril

early equipment-development phase and thereby avoiding micro disturbances, which would have an adverse impact on GOCE's performance.

Preparations for the Ground Segment Requirements Review are progressing nominally towards the planned September 2002 date.

Envisat

The Envisat satellite was successfully launched on 1 March 2002, attained its final orbital position on 3 April, and is now orbiting in its assigned 35-day repeat cycle, 30 min ahead of ERS-2. Both satellites are controlled to fly over the same ground track with ± 1 km accuracy. The Service Module and all instruments are operating nominally, and all instrument modes have been used and very stable performances have been observed from all of them.

In the Flight Operations Segment (FOS), control of the key functions of the satellite service module and the related functions such as orbit maintenance continue to be nominal. The experience gained during the first months of commissioning has been reflected in an update of the Flight Control Procedures by the ESOC Flight Control Team. The FOS is now fully operational, with satisfactory performances to support the next phases of the mission.

The Payload Data Segment (PDS) has been operated to support the Switch-On Data Acquisition Phase (SODAP), the acquisition of the first images (from ASAR and MERIS), and the early activities of the Calibration/Validation Phase. The PDS is being operated in a so-called 'Kiruna-only' mission scenario, inducing a very high workload on the ground segment, due to the recovery of the full global mission (i.e. 14 orbits per day at the Kiruna station). The PDS performance was initially not found to be reliable enough to maintain the original planning for data-product delivery to users. Corrective actions are underway.

All installed instrument ground processors have been updated to reflect the specific characteristics observed early on in-orbit and the current instrument commissioning status. Good products should be available to users on a regular basis shortly.



The Italian island of Sicily as seen with Envisat's MERIS instrument

In the area of mission management, work is ongoing with distributor entities, and international-cooperation projects. Of the more than 600 Envisat Announcement of Opportunity (AO) projects, more than 200 are already in progress. Well over 100 Principal Investigators (PIs) have already started working within the various calibration and validation teams.

Envisat early results have already been presented in dedicated Envisat sessions at various large scientific symposia and at Earth Observation exploitation events (e.g. IGARSS'02, EUSAR, EGS, DUP and TESEO workshops). Material prepared for these events is available for further promotional use. A wide selection of Envisat images are available in an image gallery within the ESA web portal.

The Envisat Commissioning-Phase Review is foreseen to be held at ESTEC (NL) from 9 to 13 September 2002.

MetOp

The MetOp integration programme is continuing to plan, without major problems. A notable milestone was reached with the delivery, following the completion of its calibration campaign, of the first GOME-2 flight model.

Good progress has also been made on the first flight model of the GRAS instrument, whose electronic units should be completed in time for integration later this year. Some problems have been

encountered with the antennas for this instrument, in terms of the quality of the metallisation and solutions for this are being identified.

Integration of the ASCAT flight instrument is proceeding to plan. A higher than anticipated sensitivity to cosmic-ray-induced single-event upsets has been detected in the switching front-end, which may impact the design of this unit. However, work-arounds are in place to safeguard the MetOp-1 schedule.

The IAST instrument's CDR has completed, with generally successful results. Concerns remain, however, about the instrument's ability to cope with the MetOp mechanical environment, and as far as its delivery schedule is concerned. This latter concern has been compounded by a recently discovered problem of cracking in the detectors.

Eumetsat's Polar System has now completed its Preliminary Design Review. The core ground segment has successfully passed its Critical Design Review, with good progress being evident since the Preliminary Design Review. An important milestone for the ground segment was achieved with the first delivery, from MetOp, of the Spacecraft simulator.

An in-house assessment of the feasibility of replacing the AVHRR on MetOp-3 with

a new European imager has been conducted for the case where the AVHRR's use proves not to be viable. It is intended that this assessment will be complemented by focused industrial studies in the coming months. In parallel, within the framework of EOPP, preparations are in hand for the Phase-A study of a new imager, VIRI-M, aimed at fulfilling a supporting role to the IAST sounding mission.

Meteosat Second Generation

The first MSG spacecraft (MSG-1) is ready for its Ariane-5 launch, which is now scheduled for 27 August (Flight V-153). All the tests planned have been performed successfully. The predicted shock levels are now compatible with the MSG qualification designed for Ariane-4, thanks to the introduction of a mass attenuator in addition to the shock absorber used for Envisat. The late battery problem with the GERB instrument has been overcome by means of an operational solution. Following the launch delay from 13 to 27 August announced by Arianespace, a break of three weeks was introduced into the launch campaign in July. The launch rehearsals are being performed as planned by ESOC (D). (see page 24 for news of launch)



during Phase-B, which is expected to last about 15 months.

MSG's arrival in Kourou, French Guiana

ADM-Aeolus

The industrial contract for the satellite was kicked off on 1 July, as the result of an Invitation to Tender (ITT) issued in September 2001, and extensive negotiation of the resulting proposal. The contract foresees a launch in October 2007.

The fixed-price contract is for Phases-B, C, D and E1 of the satellite, together with some supporting equipment and services. The Phase-B has been kicked off with Astrium UK as Prime Contractor, Astrium France supplying the single instrument (ALADIN, a direct-detection doppler lidar), and Astrium Germany supplying platform equipment. Saab of Sweden will also provide data-handling support during Phase-B. Other subcontractors will be selected, in close consultation with ESA,

To measure global wind velocities throughout the Earth's atmosphere, the satellite will embark a solid-state laser producing ultraviolet light at 355 nm. Significant development work has already taken place on this laser. This work was reviewed by the satellite contractors and by ESA prior to the kick-off. The pulse output energy available from the lasers under development is not yet completely adequate for ALADIN. A number of alternative strategies are therefore being developed during the first four months of the Phase-B for dealing with this issue.

International Space Station

ISS Overall Assembly Sequence

Four assembly and logistic flights made to the ISS in the second quarter of

2002, bringing the total number of flights to date to 29. The most recent additions are the centre segment of the 91 m station truss, attached to the US laboratory 'Destiny', and the Mobile Transporter, which allows the Station's robotic arm to ride along the truss to perform assembly and maintenance work. ESA astronaut Roberto Vittori was taken to the ISS onboard a Soyuz 'Taxi' flight. The fifth MPLM logistics flight carried ESA's Microgravity Science Glovebox (MSG), the first multi-user experiment facility for the ISS, and the fifth Expedition Crew to the Station. In addition, one Russian 'Progress' logistics flight has been flown.

Investigations are still ongoing as to the overall final content of the ISS, the so-called 'End State' configuration, which is under question due to the budgetary situation of NASA in the USA.

Columbus Laboratory

Integration of almost all the internal functional components of the Columbus flight unit is now complete, and the close-out plate of the starboard end-cone has been installed and wired up. The first functional system testing on the flight unit has been performed successfully, and system functional qualification testing on the electrical test model has continued.

Columbus Launch Barter

Nodes-2 and -3

The system-level modal-survey test has been successfully conducted and the integration of the Node-2 flight unit has been initiated. Integration of the very complicated active and passive docking mechanisms has also been initiated.

The Node-3 Critical Design Review (CDR) is planned for spring 2002, and preparations for this are now underway.

Crew Refrigerator / Freezer (RFR)

Preparatory activities for the qualification of the Refrigerator/Freezer in October are in progress.

Cryogenic Freezer (CRYOS)

Following the kick-off in February, activities are progressing as planned.

Cupola

Preparation for the system qualification vibro-acoustic test on the Cupola Structural Test Article (STA) has been

completed and the STA has been shipped to the test site. Following completion of that activity, the STA will be delivered to NASA/JSC for use in crew training.

Manufacture of the flight-unit dome forgings, shutters, harness and window frames has been completed; the forgings are now undergoing machining.

Automated Transfer Vehicle (ATV)

All mechanical system qualification tests with the Structural/Thermal Model (STM) have been completed at ESTEC in Noordwijk, and the configuration has now been disassembled, with the pressurised Cargo Carrier being returned to the Contractor for refurbishment into a Crew Trainer, and the functional spacecraft being prepared for the thermal-vacuum test.

Tests on the avionics Electrical Test Model (ETM) are continuing and equipment CDRs have been completed without problems. The Stage-2 propulsion qualification test has been performed and the structural elements of the first flight model - christened 'Jules Verne' - are now being manufactured, with integration of the corresponding avionics bay also having started.

X-38/CRV and Applied Re-entry Technology (ART)

Work on the European contributions to the X-38 vehicle has continued and all European contributions to the X-38 vehicle will be completed in 2002. In the

meantime, NASA has initiated a so-called 'graceful shut down' of the X-38 programme as part of their ISS cost-reduction exercise, and the Crew Return Vehicle procurement has been put in abeyance for the time being.

Whilst awaiting clarification on the final outcome of the project, activities related to generic technology developments for manned re-entry vehicles have been initiated at a low level.

Ground-segment development and operations preparation

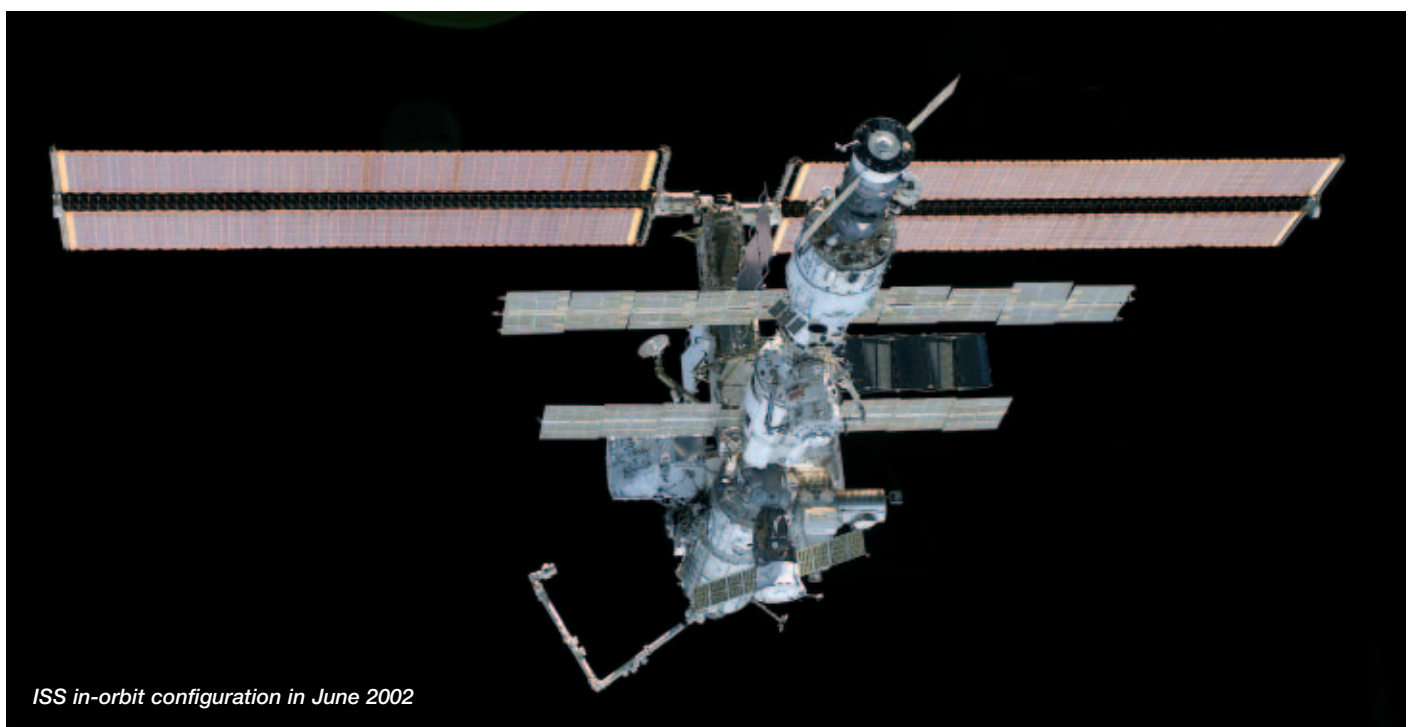
The Preliminary Design Review (PDR) for the ATV Control Centre has been completed in May/June. The design and planning data will serve as the technical input for the Phase-C/D proposal to be submitted in September. The procurement of all subsystems for the Columbus Control Centre has been initiated. The system Phase-C/D proposal will be submitted in October.

The mechanical crew trainers for Columbus have been delivered to NASA and to the European Astronaut Centre (EAC) in Cologne. The implementation phase for the ATV crew training and simulation facility has started in June.

Utilisation

Preparation

The European Utilisation Board (EUB) met on 27 May and discussed the status of



ISS in-orbit configuration in June 2002

Space Station Utilisation and the NASA Research Maximisation and Prioritisation Task Force (ReMap), as well as the priorities regarding external payloads and the options under investigation by ESA.

Of the 44 Microgravity Applications Promotion (MAP) projects originally planned, 43 are now ongoing with some approaching first-phase completion.

Payloads and their integration

A NASA assessment has concluded that two ESA external payloads mounted on the ICC-Lite carrier could fly on the Columbus flight. The ICC-Lite is a non-deployable, cross-bay carrier, which may require adaptation to transport the ESA external payloads, instead of the originally planned Express Pallet System.

The PDR and Safety Review 0/1 for Solar/Expose have been successfully completed.

The Matroshka radiation-monitoring instrument for the Russian segment passed the Phase-0/1 safety review with NASA.

Phase-C/D for the European Drawer Rack (EDR) has been in progress since November 2000. A successful safety-panel review took place at NASA/JSC in April.

The Materials Science Glovebox (MSG) was successfully delivered to the Space Station in June and the Ground Unit (GU) was in the High Bay of the Erasmus User Centre at ESTEC for use during the F. de Winne Taxi-Flight experiment tests and training.

The MELFI -80 degC freezer flight unit (FU1) has been at NASA/KSC since late-March, where compatibility and post-shipment functional tests have been successfully performed. FU1 is manifested for launch on flight ULF1 in January 2003.

Qualification testing of the linear actuator for the Hexapod pointing system has been completed. Delivery to NASA is planned for November 2002.

The Global Transmission System (GTS) in-orbit checkout tests continued, as did the investigation of the cause of the transmission problems experienced.

Astronaut activities

Claudie Haigneré, the ESA Astronaut who flew to the ISS with the Andromède mission in October 2001, has been nominated 'Minister' for Research and New Technologies in the newly elected French Government.

Roberto Vittori became the third ESA astronaut to visit the ISS, as Soyuz Board Engineer on the 'Marco Polo' mission, which was launched from Baikonur on 25 April 2002. After the successful completion of the mission, the crew landed safely in Kazakhstan on 5 May.

Frank De Winne continued training in Star City for the 'Odissea' taxi flight sponsored by the Belgian Office for Scientific, Technical and Cultural Affairs (OSTC). Andre Kuipers resumed Basic Training at EAC and Star City in May and June.

The Advanced Training Readiness Review for Columbus Systems Training (first part), with the participation of ISS Partner and crew representatives, has been successfully concluded. The second part will take place in August to confirm readiness for the first ISS Advanced Training at EAC, which will be carried out in September 2002.

ESA astronauts and the EAC Crew Surgeon supported the first mission of CNES astronaut Philippe Perrin.

Early deliveries

Data Management System for the Russian Service Module (DMS-R)

The DMS-R is continuing to perform without problems. A single anomaly in the interface area between the ESA and Russian software, which occurred in February, has been corrected.

European Robotic Arm (ERA)

The ERA qualification programme at system level is in progress. The complexity of the Mission Preparation and Training Equipment has been a major contributing factor to the further delay of the Qualification and Acceptance Review to spring 2003.

The Russian Space Agency has proposed an alternative launch option for ERA to decouple this launch from the development and launch of a not-yet-available Russian element. A decision on this proposal should be taken by the end of year.

ISS Exploitation Programme

In line with the agreement with industry for a transitional approach towards implementing the industrial operations end-to-end service contract, the procurement of critical ATV components has been initiated. The RFQ for the production of seven ATVs for the exploitation phase has also been released.

For commercialisation, the mechanisms to implement the cooperation agreement with industry have been jointly established.

For the important task of promoting the image of the ISS, a number of non-space communication companies have responded to the ESA call for interest. The RFQ has been released and the contract should be initiated before the end of this year. The Canadian Space Agency is participating and providing additional funding.

The commercial blood-pressure-measurement project has been successfully performed during the taxi mission with the ESA astronaut Roberto Vittori.

Microgravity

Coordination discussions with the European Commission continued and ESA submitted two responses, one in life sciences and one in physical sciences, to the recent EC Call for Ideas for Integrated Projects.

Preparation of ESA's APCF, Biobox, ERISTO, FAST, ARMS and Biopack payloads for their July 2002 flight on STS-107 were completed. In June, however, NASA announced the grounding of the Shuttle fleet whilst investigations are carried-out into cracks in the liners of Shuttle fuel lines. This will seriously impact the STS-107 launch date.

All ESA facilities for the Foton M-1 Russian recoverable-capsule mission, scheduled for 15 October, have been completed and were in the process of being shipped.

Preparations for the March 2003 Maxus-5 sounding-rocket mission continued.

Development of various payloads for the ISS continued. NASA has announced a launch date of July 2004 for the European Modular Cultivation System (ECMS) biology facility, and it is now expected that

the Expose facility for exobiology will be launched with Columbus. Delivery to NASA of the physiology instruments HGD/PFD and PEMS is nearing completion.

Development of the MARES (physiology) and Matroshka (radiation) facilities for the Russian module and the PCDF (proteins) facility for the European Drawer Rack (EDR) has continued.

Microgravity Facilities for Columbus (MFC)

The Biolab flight-model subsystem procurement and manufacturing has continued without major difficulties, at a level of 80%. For the Fluid Science Laboratory (FSL), the studies on the experiment containers started, and the crew review was successfully completed with ESA and NASA astronauts.

For the Material Science Laboratory (MSL) in the US Lab, the engineering-model tests started in June. The engineering-model functional test was successfully completed. Manufacture of the MSL flight model is 85% complete.

The CDR data package for the European Physiology Modules has been completed.

The Intermediate Design Review for the Electromagnetic Levitation Furnace in MSL (MSL-EML) was successfully held and significant progress was made in the definition of the system, the subsystems and the operational scenario.

Ariane-5 Plus

The second simulation of the launch chronology with the filling (MR) model of the ESC-A stage took place in April, with four synchronised sequences. The stage was completely filled and several operational sequences were run. The ground facilities systems and equipment showed good behaviours. Some complementary analysis and improvements to the stage's thermal protection were implemented before the third simulation, which took place in mid-June. It allowed some key procedural points to be investigated (e.g. the case of an aborted launch sequence), as well as the effectiveness of the improved thermal insulation of the tanks. The test results are currently being analysed; the insulation's

improved thermal behaviour provided a significant improvement in the conditions for the liquid hydrogen and oxygen. Two additional MR chronology sequences are scheduled in the second half of July.

The acceptance of the Vulcain-2 engine for the first Ariane-5 ESC-A flight is still pending, awaiting a number of investigations and complementary tests concerning the qualification of the existing manufacturing standard of the liquid-oxygen turbo-pump. The date of the first Ariane-5 ESC-A flight (A517), which has been rescheduled for end-October 2002, remains to be confirmed.

Vega / P80

For the Vega small launcher's development, the Preliminary Design Reviews (PDRs) for the solid-rocket motors (Zefiro-23 and Zefiro-9), the inter-stages, and the fairing were completed in June. These reviews, covered by the initial activities contract, have implemented the design choices resulting from the System PDR at sub-system level. Meanwhile, the industrial proposal received at the end of April for the main development phase is being evaluated, including several clarification meetings with the Prime Contractor (ELV).

On the P80 side, the Preliminary Design Review final report has been submitted to the Review Board. Development work has continued with special emphasis on the actions resulting from the PDR Board's recommendations.

Launch base and ground facilities

The ELA-3 Control and Command Systems Qualification Commission meeting took place in April. The final report of the Technical Review Board on the UPG (Guiana solid-propellant plant) was presented in May, and an action plan coherent with the Commission's recommendations will be prepared. The Critical Design Review for the additional solid-propellant casting pit building equipment took place in June; the civil works for the building are progressing well and on schedule.



In the Vega Ground Segment area, activities have been concentrated on the preparation of the Preliminary Design Review, for which the kick-off meeting took place in June. On the contractual side, a Request for Quotation covering the Vega Ground Segment Technical Management, Engineering and Tests has been issued, in line with the Procurement Plan approved by ESA's Industrial Policy Committee (IPC). A proposal is expected by the end of July.

A new procedure concerning 'Ariane Assets Management' has been finalised and sent to all industrial partners, CNES and Arianespace at the beginning of May. The development of an electronic Ariane asset-management system has started with the definition of the functional specifications. The system will be made available on line to all industrial companies involved in the Ariane programmes, with remote secure access to a Windows-based application through a central server located at ESA Headquarters. It will facilitate the management of the Ariane inventories by improving the exchange of data between the ground-facilities managers and ESA. The database will be the repository for all information on European ground infrastructure for Ariane.