Payloads for the United States, Australia and Japan

For its fourth launch of the year Arianespace will boost three satellites into orbit: DIRECTV 9S for American operator DIRECTV, Inc., OPTUS D1 for the Australian operator OPTUS, and the experimental satellite LDREX-2 for the Japan Aerospace Exploration Agency.

Arianespace's selection by leading spacecom manufacturer and operators in the United States, Australia and Japan is clear international recognition of its top-quality launch services.

DIRECTV 9S is the sixth satellite to be launched by Arianespace for DIRECTV, Inc., the leading provider of digital multichannel TV service in the United States, following DIRECTV 1 in December 1993, DIRECTV 3 in June 1995, DIRECTV 4S in November 2001, DIRECTV 7S in May 2004 and Spaceway 2 in November 2005.

DIRECTV 9S will give American TV viewers a greater choice of broadcast services, while prefiguring tomorrow's multibeam satellites for multimedia applications.

Built by Space Systems/Loral in Palo Alto, California, DIRECTV 9S is fitted with 52 high-power Ku-band transponders and 2 Ka-band transponders. Positioned at 101 degrees West, it will provide direct TV broadcasts using digital compression technology.

OPTUS D1 will be the third satellite orbited by Arianespace for the Australian operator. Arianespace launched OPTUS C1 in June 2003, after launching OPTUS A3 in 1987. SingTel, the parent company of OPTUS, had already chosen Arianespace for its own ST-1 satellite, launched in 1998.

American manufacturer Orbital Sciences Corporation integrated the satellite in Dulles, Virginia, based on a Star-2 platform. OPTUS D1 will weigh about 2,300 kg at launch. Positioned at 160 degrees East, it will provide direct TV broadcasts, Internet links, voice and data services for Australia and New Zealand. Its design life is 15 years.

LDREX-2 (Large-scale Deployable Reflector Experiment), launched on behalf of the Japan Aerospace Exploration Agency (JAXA), is a half-scale model representing the large deployable antenna to be used on the planned ETS-8 technology satellite.

Follow the launch live on the internet broadband
at www.arianespace.com
(starting 20 minutes before lift-off)

1. Mission profile

The 173rd Ariane launch will boost three satellites into orbit: DIRECTV 9S for American operator DIRECTV, Inc., OPTUS D1 for the Australian operator OPTUS, and the experimental satellite LDREX-2 for the Japan Aerospace Exploration Agency.

This will be the 29th Ariane 5 launch.

The launcher will be carrying a total payload of 9,031 kg, including 7,804 kg for the three satellites, which will be released separately into their targeted orbits.

The launch will be from the Ariane Launch Complex No. 3 (ELA 3) in Kourou, French Guiana.

Injection orbit

Perigee altitude	**250 km**
Apogee altitude	**35 942 km at injection**
Inclination	**7° degrees**

The lift-off is scheduled on the night of October 12 to 13, 2006 as soon as possible within the following launch window:

Launch opportunity

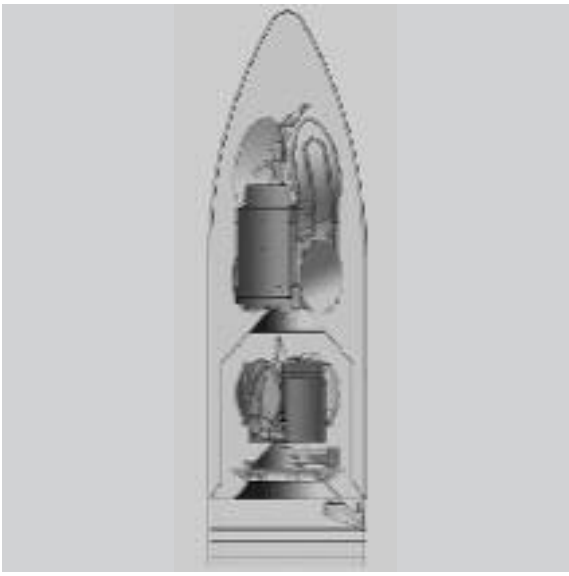
	Universal time (GMT)	*Paris*	*Washington time*	*Kourou time*	*Tokyo time*	*Sydney time*
Between	*08:56 pm*	*10:56 pm*	*04:56 pm*	*5:56 pm*	*5:56 am*	*06:56 am*
and	*9:56 pm*	*11:56 am*	*05:56 pm*	*6:56 pm*	*6:56 am*	*07:56 am*
on	*October 12, 2006*	*October 12, 2006*	*October 12, 2006*	*October 12, 2006*	*October 13, 2006*	*October 13, 2006*

Ariane payload configuration

DIRECTV 9S was manufactured by Space Systems/Loral in Palo Alto, California for DIRECTV, Inc., the private American operator.
Orbital position: 101 degrees West, over the Pacific Ocean.

OPTUS D1 was manufactured by Orbital Sciences Corporation in Dulles, Virginia for Australian operator OPTUS.
Orbital position: 160 degrees East, right over the islands in the Melanesian archipelago.

The expérimental satellite **LDREX-2** was manufactured by NEC TOSHIBA Space Systems, Ltd. for the Japanese space agency JAXA.



2. Range operations campaign: ARIANE 5 - DIRECTV 9S/OPTUS D1/LDREX-2

Satellites and launch vehicle campaign calendar

Ariane activities	Dates	Satellites activities
Campaign start review	*July 24, 2006*	
EPC Erection	*July 24, 2006*	
EAP transfer and positionning	*July 25, 2006*	
Integration EPC/EAP	*July 27, 2006*	
ESC-A Erection	*August 1st, 2006*	
Integration equipement bay	*August 2, 2006*	
	August 15, 2006	*Arrival in Kourou and begining of LDREX-2 preparation campaign in the BAF HE*
	August 16, 2006	*Arrival in Kourou and begining of DIRECTV 9S preparation campaign in building S5 C*
	August 18, 2006	*Arrival in Kourou and begining of OPTUS D1 preparation campaign in building S5 C*
Roll-out from BIL to BAF	*Sept. 15, 2006*	
	Sept 16-19, 2006	*OPTUS D1 filling operations in S5A building*
	Sept 18, 2006	*LDREX-2 integration on launcher*
	Sept. 23-26, 2006	*DIRECTV 9S/ filling operations in S5B building*

Satellites and launch vehicle campaign final calendar

J-10	*Wednesday, Sept. 27*	*DIRECTV 9S integration on adaptor (ACU)*
J-9	*Thursday, Sept. 28*	*DIRECTV 9S transfer to Final Assembly Building (BAF)*
J-8	*Friday, September 29*	*DIRECTV 9S integration on Sylda - OPTUS D1 integration on adaptor*
J-7	*Monday, October 2*	*Fairing integration on Sylda - OPTUS D1 transfer to Final Assembly Building (BAF)*
J-6	*Tuesday, October 3*	*OPTUS D1 integration on launcher*
J-5	*Wednesdayday, Oct. 4*	*Upper composite integration with DIRECTV 9S on launcher*
J-4	*Thursday, October 5*	*ESC-A final preparations and payloads control*
J-3	*Friday, October 6*	*Launch rehearsal*
J-3 bis	*Monday, October 9*	*Arming of launch vehicle*
J-2	*Tuesday, October 10*	*Launch readiness review (RAL) and final preparation of launcher*
J-1	*Wednesday, October 11*	*Roll-out from BAF to Launch Area (ZL), launch vehicle connections*
		and filling of the EPC liquid Helium sphere
J-0	*Thursday, October 12*	*Launch countdown including EPC and ESC-A filling with liquid oxygen and liquid hydrogen*

3. Launch countdown and flight events

The countdown comprises all final preparation steps for the launcher, the satellites and the launch site. If it proceeds as planned, the countdown leads to the ignition of the main stage engine, then the two boosters, for a liftoff at the targeted time, as early as possible in the satellites launch window.
The countdown culminates in a synchronized sequence (see appendix 3), which is managed by the control station and onboard computers starting at T-7 minutes.
If an interruption in the countdown means that T-0 falls outside the launch window, then the launch will be delayed by one, two or more days, depending on the problem involved, and the solution developed.

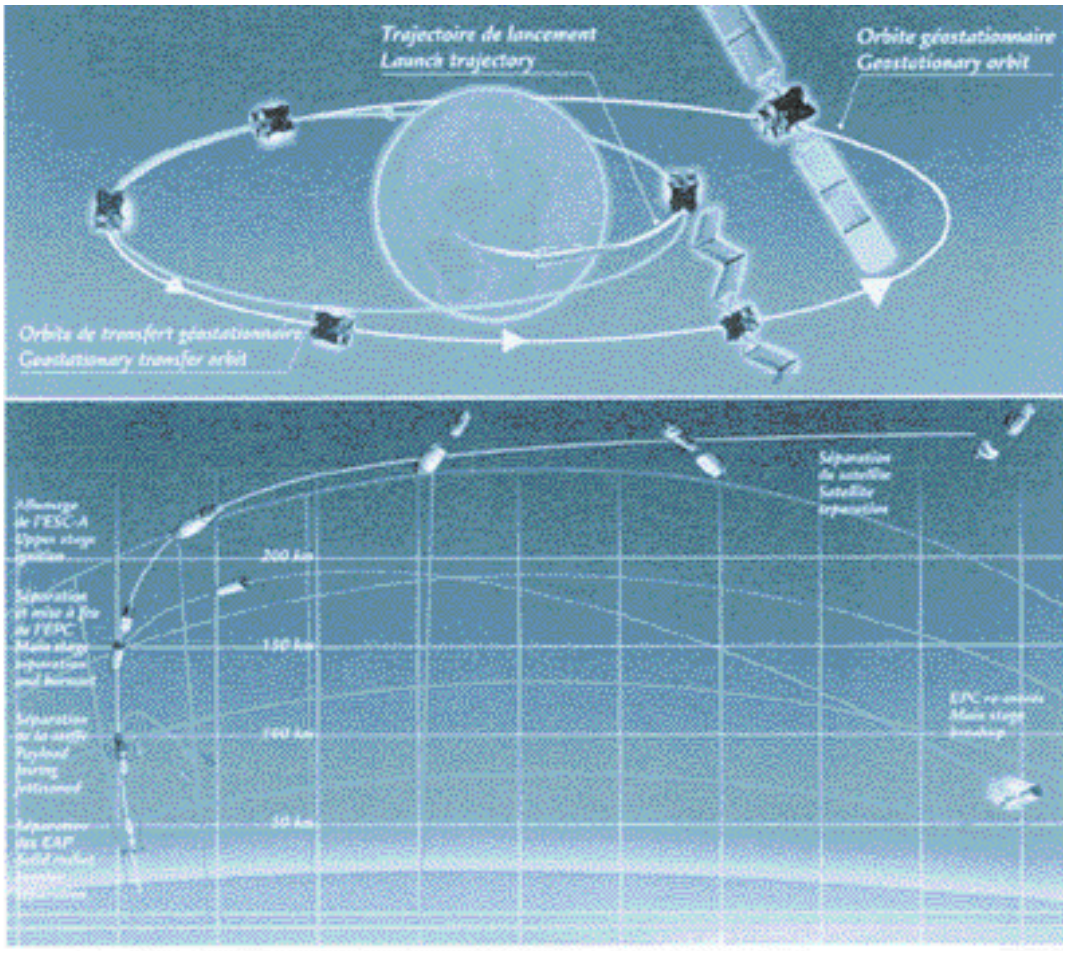
Time		Events
– 11 h	*30 mn*	*Start of final countdown*
– 7 h	*30 mn*	*Check of electrical systems*
– 5 h	*50 mn*	*Start of filling of main cryogenic stage with liquid oxygen and hydrogen*
– 3 h	*20 mn*	*Chilldown of Vulcain main stage engine*
– 1 h	*10 mn*	*Check of connections between launcher and telemetry, tracking and command systems*
	– 7 mn 00 s	*"All systems go" report, allowing start of synchronized sequence*
	– 4 mn 00 s	*Tanks pressurized for flight*
	– 1 mn 00 s	*Switch to onboard power mode*
	- 05,5 s	*Command issued for opening of cryogenic arms*
	– 04 s	*Onboard systems take over*
	– 03 s	*Unlocking of guidance systems to flight mode*

HO	Ignition of the cryogenic main stage engine (EPC)		ALT (km)	V. rel. (m/s)
	+ 7,0 s	*Ignition of solid boosters*	*0*	*0*
	+ 7,3 s	*Liftoff*	*0*	*0*
	+ 13 s	*End of vertical climb and beginning of pitch rotation (10 seconds duration)*	*0.107*	*36*
	+ 17 s	*Beginning of roll manoeuvre*	*0.332*	*74*
+ 2 mn	*20 s*	*Jettisoning of solid boosters*	*65.4*	*1940*
+ 3 mn	*14 s*	*Jettisoning of fairing*	*105.0*	*2200*
+ 7 mn	*46 s*	*Acquisition by Natal tracking station*	*160.8*	*5348*
+ 8 mn	*56 s*	*Shut-down of main cryogenic stage*	*158.6*	*6880*
+ 9 mn	*02 s*	*Separation of main cryogenic stage*	*158.8*	*6907*
+ 9 mn	*06 s*	*Ignition of upper cryogenic stage (ESC-A)*	*158.9*	*6908*
+ 13 mn	*39 s*	*Acquisition by Ascension tracking station*	*152.6*	*7584*
+ 18 mn	*11 s*	*Acquisition by Libreville tracking station*	*200.3*	*8313*
+ 23 mn	*08 s*	*Acquisition by Malindi tracking station*	*503.3*	*9080*
+ 24 mn	*44 s*	*Shut-down of ESC-A / Injection*	*685.0*	*9329*
+ 26 mn	*58 s*	*Separation of DIRECTV 9S satellite*	*1036.3*	*9086*
+ 30 mn	*49 s*	*Separation of Sylda 5*	*1764.4*	*8568*
+ 32 mn	*02 s*	*Separation of OPTUS D1 satellite*	*12038.2*	*8390*
+ 1h 37mn	*44 s*	*End of Arianespace Flight mission*	*17015.7*	*3743*

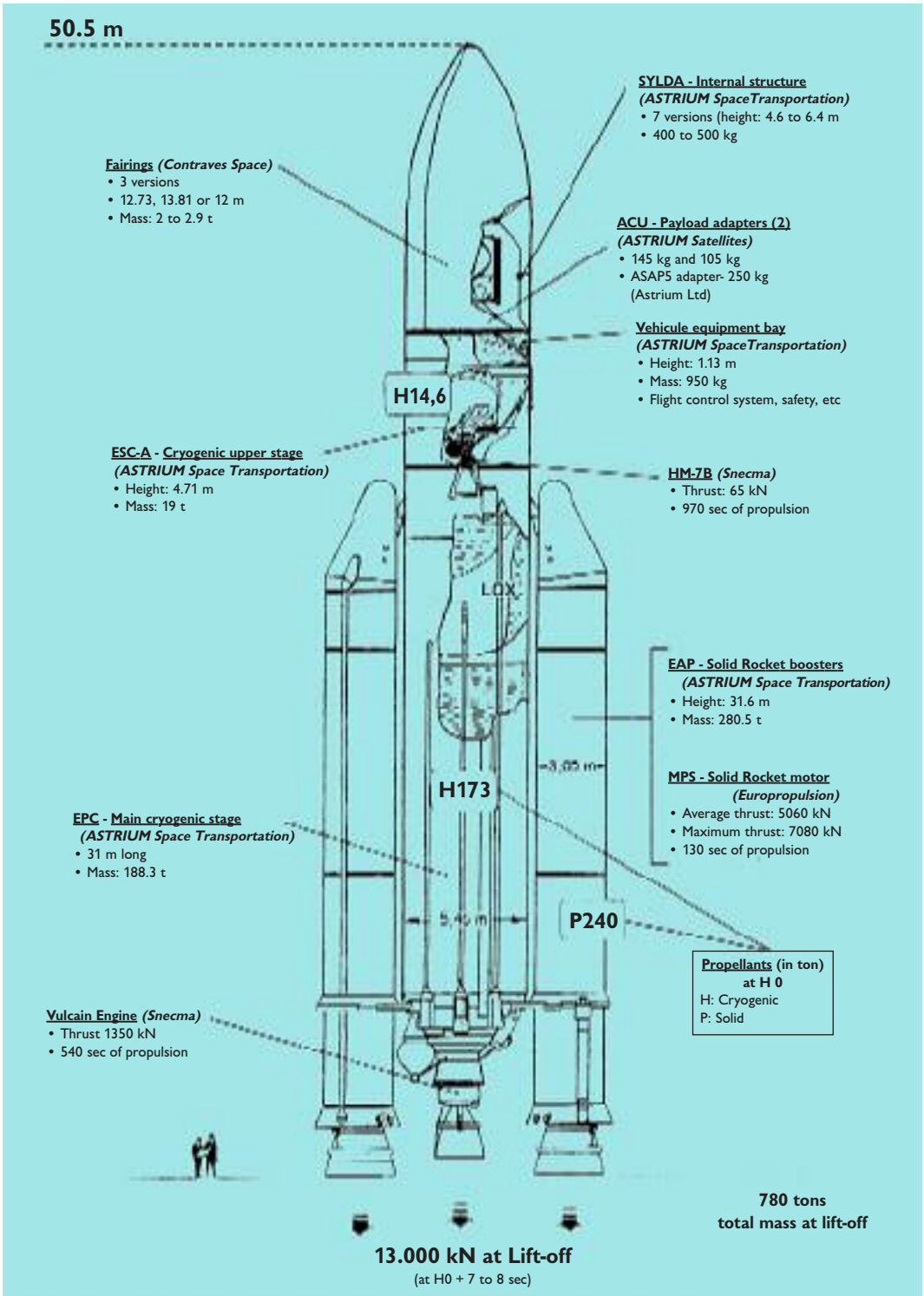
4. Flight trajectory

The launcher's attitude and trajectory are totally controlled by the two onboard computers, located in the Ariane 5 vehicle equipment bay (VEB).
7.05 seconds after ignition of the main stage cryogenic engine at T-0, the two solid-propellant boosters are ignited, enabling liftoff. The launcher first climbs vertically for 6 seconds, then rotates towards the East. It maintains an attitude that ensures the axis of the launcher remains parallel to its velocity vector, in order to minimize aerodynamic loads throughout the entire atmospheric phase, until the solid boosters are jettisoned.
Once this first part of the flight is completed, the onboard computers optimize the trajectory in real time, minimizing propellant consumption to bring the launcher first to the intermediate orbit targeted at the end of the main stage propulsion phase, and then the final orbit at the end of the flight of the cryogenic upper stage.
The main stage falls back off the coast of Africa in the Atlantic Ocean (in the Gulf of Guinea).
On orbital injection, the launcher will have attained a velocity of approximately 9329 meters/second, and will be at an altitude of about 685 kilometers.
The fairing protecting the DIRECTV 9S/OPTUS D1 spacecraft is jettisoned shortly after the boosters are jettisoned at about T+194 seconds.

Standard Ariane 5 trajectory for geostationary transfer orbit



5. The Ariane 5-ECA (Industrial prime contractor: ASTRIUM SpaceTransportation)



6. The DIRECTV 9S satellite

Customer	DIRECTV	
Prime contractor	*Space Systems Loral*	
Mission	*Direct TV and HD*	
Mass	*Total mass at lift-off*	*5,535 kg*
	Dry mass	*2,364 kg*
Stabilization	*3 axis stabilized*	
Dimensions	*7.5 x 2.9 x 3.3 m*	
Span in orbit	*31.3 m*	
Platform	*FS 1300 OMEGA BUS*	
Payload	*52 Ku-band transponders, 2 Ka-band transponders*	
On-board power	*12.656 W (beginning of life)*	
Life time	*15 years*	
Orbital position	*101° West*	
Coverage area	*CONUS, Alaska and Hawaii*	

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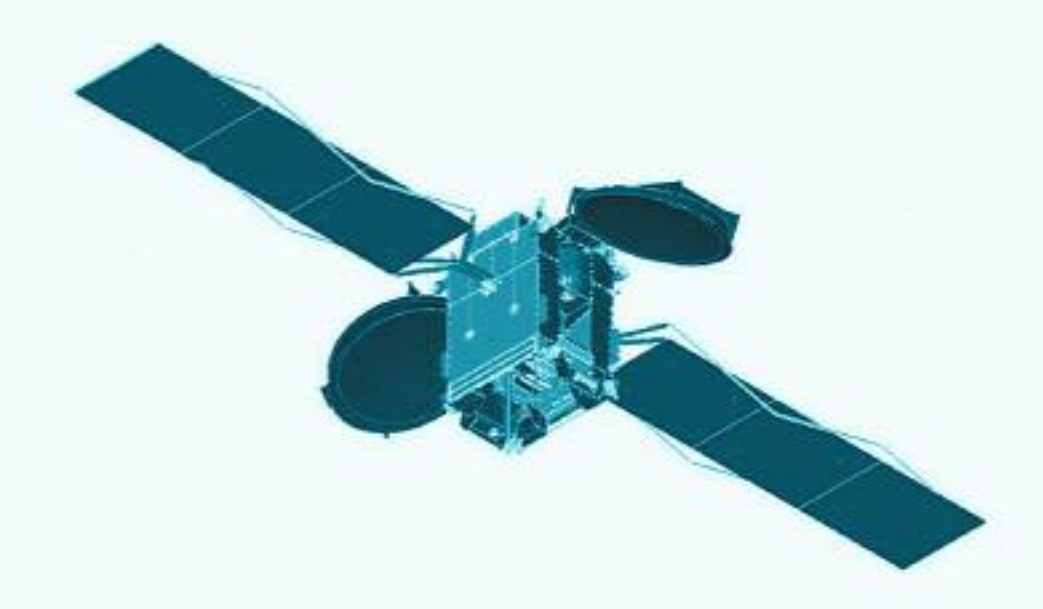
7. The OPTUS D1 satellite



Customer	OPTUS	
Prime contractor	*Orbital Sciences Corporation*	
Mission	*DTH, Internet, voice and data transmission*	
Mass	*Total mass at lift-off*	*2.299 kg*
Stabilization	*3 axis*	
Dimensions	*at launch*	*4.0 x 3.2 x 2.3 m*
	span in orbit	*17 m*
Platform	*STAR-2*	
Payload	*24 Ku-band transponders*	
On-board power	*4.800 W (end of life)*	
Life time	*15 years*	
Orbital position	*160° Est*	
Coverage area	*Australia and New Zealand*	

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E-mail : simone.bergholcs@optus.com.au

8. The LDREX-2 experimental satellite

Customer	JAXA (Japan Aerospace Exploration Agency)	
Prime contractor	*NEC TOSHIBA Space Systems, Ltd.*	
Mission	*Deployement experiment and validation of the antenna reflector*	
Mass	*Total mass at lift-off*	*211 kg*
Dimensions	*0.7 x 0.6 x 1.9 m*	
Span in orbit	*6.5 m*	

Press contact
JAXA Public Affairs Department
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Fax : +81-3-6266-6910
E-mail : proffice@jaxa.jp

Appendix 1. Arianespace DIRECTV 9S/OPTUS D1/LDREX-2 launch key personnel

In charge of the launch campaign			
Mission Director	*(CM)*	*Jean-Marc DURAND*	*ARIANESPACE*
In charge of the launch service contract			
Ariane Payload Manager	*(RCUA)*	*Alexandre MADEMBA-SY*	*ARIANESPACE*
Ariane Deputy Mission Manager	*(RCUA/A)*	*Michael CALLARI*	*ARIANESPACE*
In charge of DIRECTV 9S satellite			
Satellite Mission Director	*(DMS)*	*Gustave STROES*	*DIRECTV*
Satellite Program Manager	*(CPS)*	*Eric ELLER*	*SS/L*
Satellite Preparation Manager	*(RPS)*	*Keith MARCO*	*SS/L*
In charge of OPTUS D1 satellite			
Satellite Mission Director	*(DMS)*	*Gordon PIKE*	*OPTUS*
Satellite Program Manager	*(CPS)*	*Frank DE MAURO*	*OSC*
Satellite Preparation Manager	*(RPS)*	*Nagesh KRISHNAMURTY*	*OSC*
In charge of LDREX-2 satellite			
Satellite mission director	*(DMS)*	*Akio TSUJIHATA*	*JAXA*
Satellite Program Manager	*(CPS)*	*Takashi TSUKASHIMA*	*NTSpace*
Satellite preparation manager	*(RPS)*	*Yoshiharu KAWAI*	*NTSpace*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*Daniel GROULT*	*ARIANESPACE*
Ariane Production Project Manager	*(CPAP)*	*Pierre-Yves TISSIER*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Pierre RIBARDIÈRE*	*CNES/CSG*
Flight Safety Officer	*(RSV)*	*Laurent JOLIVET*	*CNES/CSG*

Appendix 2. Launch environment conditions

Acceptable wind speed limits at lift-off range from between 7.5 m/s to 9.5 m/s according to the wind direction. The most critical is a northerly wind. For safety reasons, the wind's speed on the ground (Kourou), and at a high altitude (between 10,000 and 20,000 m) is also taken into account.

Appendix 3. The synchronized sequence

The synchronized sequence starts 7 mn beforre ignition (T-0), it is primarily designed to perform the final operations on the launcher prior to launch, along with the ultimate checks needed following switchover to flight configuration. As its name indicates, it is fully automatic, and is performed concurrently by the onboard computer and by two reduntant computers at the ELA 3 launch complex until T-4 seconds.

The computers command the final electrical operations (startup of the flight program, servocontrols, switching from ground power supply to onboard batteries, etc.) and associated checks. They also place the propellant and fluid systems in flight configuration and perform associated checks. In addition, it handles the final ground system configurations, namely:

- Startup of water injection in the flame trenches and jet guide (T-30 sec).
- Hydrogen aspiration for chilldown of the Vulcain engine in the jet guide (T-18 sec).
- Burnoff of hydrogen used for chilldown (T-5.5 sec).

At T-4 seconds, the onboard computer takes over control of final engine startup and lift-off operations:

- It starts the ignition sequence for the Vulcain main stage engine (T-0).
- It checks engine operation (from T+4.5 to T+7.3 sec).
- It commands ignition of the solid boosters for immediate lift-off at T+7.3 seconds.

Any shutdown of the synchronized sequence after T-7 mn automatically places the launcher back in its

Appendix 4. Arianespace, its relations with ESA and CNES

From a production base in Europe, Arianespace, a private company, serves customers all over the world.

Arianespace is the world's first commercial space transportation company, created in 1980 by 36 leading European aerospace and electronics corporations, 13 major banks and the French space agency CNES (Centre National d'Etudes Spatiales).

The shareholder partners in Arianespace represent the scientific, technical, financial and political capabilities of 12 countries: Belgium, Denmark, Germany, France, Great Britain, Ireland, Italy, Netherlands, Norway, Spain, Switzerland and Sweden.

In order to meet the market needs, Arianespace is present throughout the world: in Europe, with its head office located near Paris, France at Evry, in North America with its subsidiary in Washington D.C. and in the Pacific Region, with its representative offices in Tokyo, Japan, and in Singapore.

Arianespace employs a staff of 250. Share capital totals 395,010 €.

Arianespace is in charge of these main areas:

- markets launch services to customers throughout the world ;
- finances and supervises the construction of Ariane expendable launch vehicle ;
- conducts launches from Europe's Spaceport of Kourou in French Guiana.

Personalized reliable service forms an integral part of Arianespace launch package. It includes the assignment of a permanent team of experts to each mission for the full launch campaign.

Today, Arianespace's offer is mainly based on Ariane 5. With its proven experience, demonstrated business model and unquestioned credibility, Arianespace has been committed for more than 24 years to providing its customers - satellite operators around the world - a technically and economically reliable means offer to place their satellites on the targeted orbit at the right moment. This offer is strengthened by the flexibility provided by the three launcher fleet - Ariane 5, Soyuz and Vega - and by the Launch Services Alliance, which gives customers mission back-up aboard alternative launch systems.

Relations between ESA, CNES and ARIANESPACE

Development of the Ariane launcher was undertaken by the European Space Agency in 1973. ESA assumed overall direction of the ARIANE 1 development program, delegating the technical direction and financial management to CNES. The ARIANE 1 launcher was declared qualified and operational in January 1982. At the end of the development phase which included four launchers, ESA started the production of five further ARIANE 1 launchers. This program, known as the "promotion series", was carried out with a management arrangement similar to that for the ARIANE 1 development program.

In January 1980 ESA decided to entrust the commercialization, production and launching of operational launchers to a private-law industrial structure, in the form of ARIANESPACE company, placing at its disposal the facilities, equipment and tooling needed of producing and launching the ARIANE launchers. ARIANE follow-on development programs have been undertaken by ESA since 1980. They include a program for developing updated versions of the launcher: Ariane 2 and Ariane 3 (qualified in August 1984) ; the program for building a second ARIANE launch site (ELA 2) (validated in August 1985) ; the Ariane 4 launcher development program (qualified on June 15th, 1988) ; and the preparatory and development program of the Ariane 5 launcher and its new launch facilities: ELA 3 (qualified on November, 1997). All these programs are run under the overall direction of ESA, which has appointed CNES as prime contractor. In general,

as soon as an updated version of the launcher has been qualified 5 oct, 1998, ESA makes the results of the development program together with the corresponding production and launch facilities available to ARIANESPACE. ESA is responsible (as design authority) for development work on the Ariane launchers. The Agency owns all the assets produced under these development programs. It entrusts technical direction and financial management of the development work to CNES, which writes the program specifications and places the industrial contracts on its behalf. The Agency retains the role of monitoring the work and reporting to the participating States.

Since Flight 9 Arianespace has been responsible for building and launching the operational Ariane launchers (as production authority), and for industrial production management, for placing the launcher manufacturing contracts, initiating procurements, marketing and providing Ariane launch services, and directing launch operations.

The Guiana Space Center: Europe's Spaceport

For over 30 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches. It mainly comprises the following:

- CNES/CSG technical center, including various resources and facilities that are critical to launch bas operation, such as radars, telecom network, weather station, receiving sites for launcher telemetry, etc.
- Payload processing facilities (ECPU), in particular the new S5 facility.
- Ariane launch complexes (ELA), comprising the launch zone and launcher integration buildings.
- Various industrial facilities, including those operated by Regulus, Europropulsion, Air Liquide Spacial Guyane and EADS, which contribute to the production of Ariane 5 elements. A total of 40 European manufacturers and local companies are involved in operations.

Europe's commitment to independent access to space is based on actions by three key players: the European space Agency (ESA), French space agency CNES and Arianespace.

ESA has helped change the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, payload processing buildings and associated facilities. Initially used for the French space program, the Guiana Space Center has gradually become Europe's own spaceport, according to the terms of an agreement between ESA and the french government.

To ensure that the Spaceport is available for its programs, ESA takes charge of the lion's share of CNES/CSG fixed expenses, and also helps finance the fixed costs for the ELA launch complexes.

French space agency CNES plays several roles at the Space Center.

- It designs all infrastructures and, on behalf of the French government, is responsible for safety and security.
- It provides the resources needed to prepare the satellites and launcher for missions.

Whether during tests or actual launches, CNES is also responsible for overall coordination of operations. It collects and processes all data transmitted from the launcher via a network of receiving stations, to track Ariane rockets throughout their trajectory.

In French Guiana, Arianespace is the contracting authority in charge of operating the family of three launchers, Ariane, Soyuz and Vega.

For the Ariane launcher, Arianespace: calls on EADS ST, launcher integration prime contractor, for all launcher integration and functional checks in the Launcher Integration Building (BIL), coordinates satellite preparation in the Payload Preparation Complex (EPCU), operated by the Guiana Space Center (CSG), handles final assembly of the launcher and integration of satellites in the Final Assembly Building (BAF), handles transfer of the launcher to Launch Zone No. 3, then oversees final countdown and launch from Launch Center No. 3.

Arianespace has created a top-flight team and array of technical resources to get launchers and satellites ready for their missions. Building on this unrivalled expertise and outstanding local facilities, Arianespace is now the undisputed benchmark in the global launch services market.