

A mission for civil and military communications

Arianespace will be sending two satellites into geostationary transfer orbit on its third mission of the year: the JCSAT-10 communications satellite for Japanese operator JSAT Corporation, and the Syracuse 3B communications satellite for the French Ministry of Defense.

Weighing approximately 4,048 kg at launch, JCSAT-10 is the sixth JSAT Corp. satellite to be entrusted to Arianespace, following JCSAT-1 in March 1989, JCSAT-5 in December 1997, N-SAT-110 in October 2000, JCSAT-8 in March 2002 and JCSAT-9 last April.

JCSAT-10 is fitted with 30 Ku-band and 12 C-band transponders, and will supply fixed satellite services (FSS) for Japan, the Asia-Pacific region and Hawaii. It was built by Lockheed Martin Commercial Space Systems in Newtown, Pennsylvania, and will be positioned at 128 degrees East.

Arianespace has won 23 of the 32 commercial satellite launch contracts awarded in Japan.

Syracuse 3B is the second satellite in France's third generation Syracuse III system, dedicated to secure military communications.

French defense procurement agency DGA (Délégation Générale pour l'Armement), part of the Ministry of Defense, is in charge of the program, with management being handled by the Observation, Telecommunications and Information Program Department (SPOT1).

Alcatel Alenia Space and Thales are co-prime contractors for Syracuse III. The Syracuse 3B satellite, weighing about 3,750 kg at launch, was designed by Alcatel Alenia Space, which is in charge of the space segment, while Thales Communications will produce the ground segment, including 600 networked ground stations.

NATO chose the Syracuse III system for its NATO Satcom Post 2000 project. Led by France, in conjunction with the British system Skynet and the Italian system Sicral, this project aims to pool these satellite resources, so they can be shared with allies in NATO.

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1. Arianespace Flight mission

The 172nd Ariane launch will orbit the JCSAT-10 communications satellite for Japanese operator JSAT Corporation, and the Syracuse 3B communications satellite for the French Ministry of Defense.

This will be the 28th Ariane 5 launch.

The launcher will be carrying a total payload of 8,922 kg, including 7,800 for the two 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

<i>Perigee altitude</i>	250 km
<i>Apogee altitude</i>	35,941 km at injection
<i>Inclination</i>	5.5° degrees

The lift-off is scheduled on the night of August 11 to 12, 2006 as soon as possible within the following launch window:

Launch opportunity

	<i>Universal time (GMT)</i>	<i>Paris</i>	<i>Washington time</i>	<i>Kourou time</i>	<i>Tokyo time</i>
<i>Between</i>	<i>10:15 pm</i>	<i>00:15 am</i>	<i>06:15 pm</i>	<i>07:15 pm</i>	<i>07:15 am</i>
<i>and</i>	<i>11:52 pm</i>	<i>01:52 am</i>	<i>07:52 pm</i>	<i>08:52 pm</i>	<i>08:52 am</i>
<i>on</i>	<i>August 11, 2006</i>	<i>August 12, 2006</i>	<i>August 11, 2006</i>	<i>August 11, 2006</i>	<i>August, 12 2006</i>

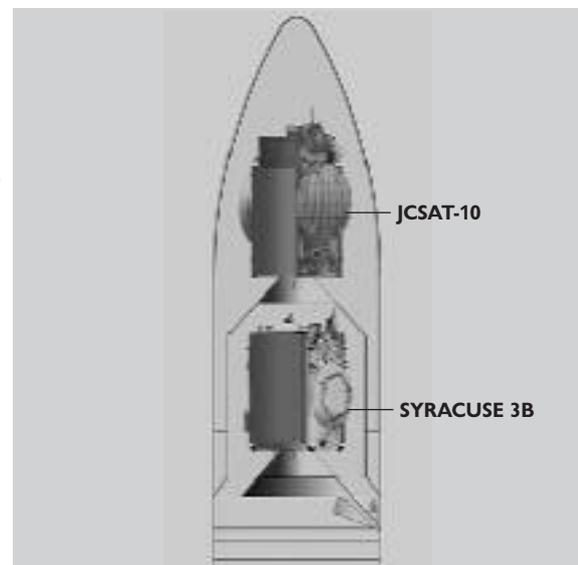
Ariane payload configuration

JCSAT-10 was built by Lockheed Martin Commercial Space Systems in Newtown, Pennsylvania on behalf of the Japanese operator JSAT Corporation.

Orbital position: 128° East

SYRACUSE 3B was built by Alcatel Alenia Space, which is in charge of the space segment, while Thales Communications will produce the ground segment.

Orbital position: 5° West



2. Range operations campaign: ARIANE 5 - JCSAT-10/SYRACUSE 3B

Satellites and launch vehicle campaign calendar

Ariane activities	Dates	Satellites activities
<i>Campaign start review</i>	<i>June 12, 2006</i>	
<i>EPC Erection</i>	<i>June 12, 2006</i>	
<i>EAP transfer and positioning</i>	<i>June 13, 2006</i>	
<i>Integration EPC/EAP</i>	<i>June 14, 2006</i>	
<i>ESC-A Erection</i>	<i>June 19, 2006</i>	
<i>Integration equipment bay</i>	<i>June 20, 2006</i>	
	<i>July 6, 2006</i>	<i>Arrival in Kourou and beginning of SYRACUSE 3B preparation campaign in building S1 B</i>
	<i>July 11, 2006</i>	<i>Arrival in Kourou and beginning of JCSAT-10 preparation campaign in building S5 C</i>
<i>Roll-out from BIL to BAF</i>	<i>July 20, 2006</i>	
	<i>July 24-26, 2006</i>	<i>JCSAT-10 filling operations in S5B building</i>
	<i>July 27-28, 2006</i>	<i>SYRACUSE 3B filling operations in S5A building</i>

Satellites and launch vehicle campaign final calendar

<i>J-10</i>	<i>Saturday, July 29</i>	<i>JCSAT-10 integration on adaptor</i>
<i>J-9</i>	<i>Monday, July 31</i>	<i>JCSAT-10 transfer to Final Assembly Building (BAF)</i>
<i>J-8</i>	<i>Tuesday, August 1</i>	<i>JCSAT-10 integration on Sylva - SYRACUSE 3B integration on adaptor</i>
<i>J-7</i>	<i>Wednesday, August 2</i>	<i>Fairing integration on Sylva - SYRACUSE 3B transfer to Final Assembly Building (BAF)</i>
<i>J-6</i>	<i>Thursday, August 3</i>	<i>SYRACUSE 3B integration on launcher</i>
<i>J-5</i>	<i>Friday, August 4</i>	<i>Upper composite integration with JCSAT-10 on launcher</i>
<i>J-4</i>	<i>Saturday, August 5</i>	<i>ESC-A final preparations and payloads control</i>
<i>J-3</i>	<i>Monday, August 7</i>	<i>Launch rehearsal</i>
<i>J-2</i>	<i>Tuesday, August 8</i>	<i>Launch readiness review (RAL) and final preparation of launcher</i>
<i>J-2 bis</i>	<i>Wednesday, August 9</i>	<i>Arming of launch vehicle</i>
<i>J-1</i>	<i>Thursday, August 10</i>	<i>Roll-out from BAF to Launch Area (ZL), launch vehicle connections and filling of the EPC liquid Helium sphere</i>
<i>J-0</i>	<i>Friday, August 11</i>	<i>Launch countdown including EPC and ESC-A filling with liquid oxygen and liquid hydrogen</i>

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 18 s	Jettisoning of solid boosters	65.3	1964
+ 3 mn 12 s	Jettisoning of fairing	105.1	2198
+ 7 mn 38 s	Acquisition by Natal tracking station	167.9	5102
+ 8 mn 55 s	Shut-down of main cryogenic stage	166.4	6840
+ 9 mn 01 s	Separation of main cryogenic stage	166.6	6876
+ 9 mn 05 s	Ignition of upper cryogenic stage (ESC-A)	166.8	6878
+ 13 mn 42 s	Acquisition by Ascension tracking station	156.9	7566
+ 18 mn 22 s	Acquisition by Libreville tracking station	176.6	8351
+ 23 mn 26 s	Acquisition by Malindi tracking station	416.8	9216
+ 24 mn 46 s	Shut-down of ESC-A / Injection	549.2	9444
+ 27 mn 07 s	Separation of JCSAT-10 satellite	867.9	9175
+ 30 mn 42 s	Separation of Sylda 5	1514.2	8673
+ 32 mn 50 s	Separation of SYRACUSE 3B satellite	1969.2	8351
+ 43 mn 23 s	End of Arianespace Flight mission	4558.9	6882

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.

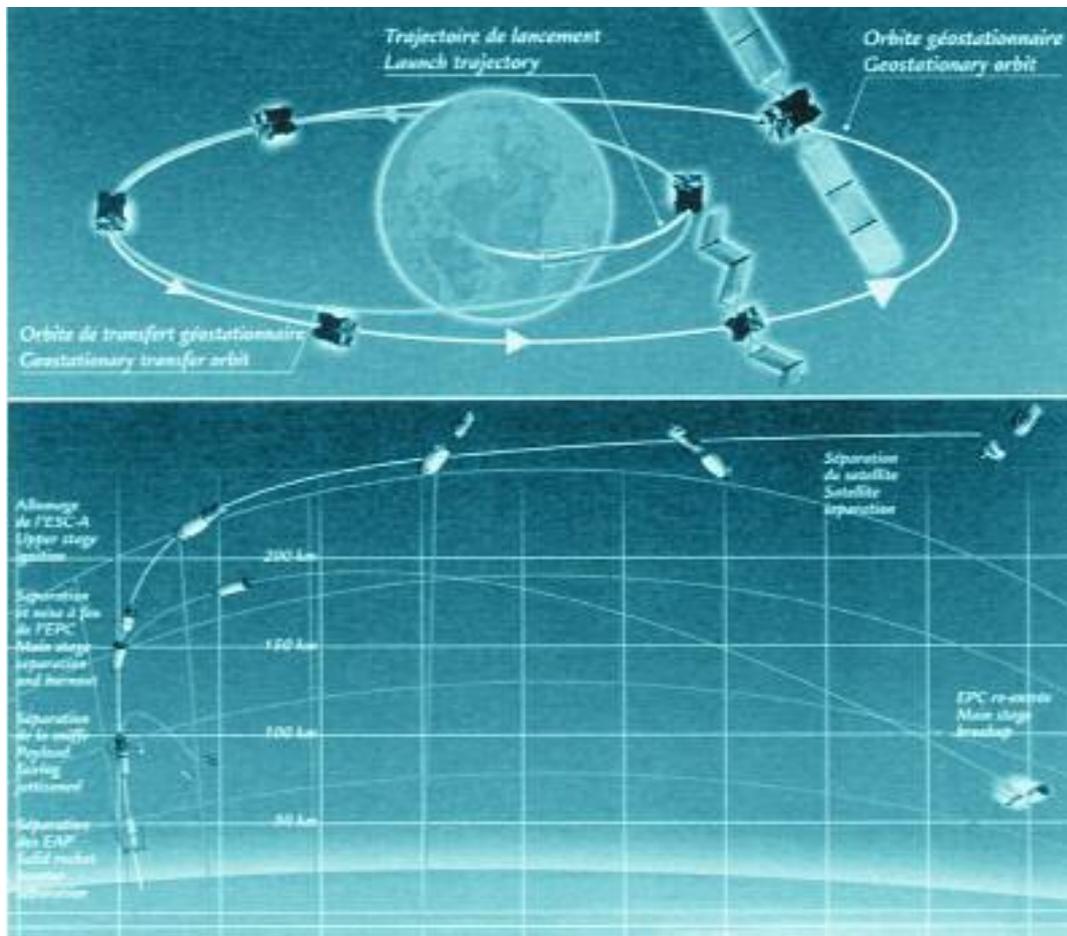
Once this first part of the flight is completed, the onboard computers optimize the trajectory in real time, minimizing propellant consumption to bring the launcher first to the intermediate orbit targeted at the end of the main stage propulsion phase, and then the final orbit at the end of the flight of the cryogenic upper stage.

The main stage falls back off the coast of Africa in the Atlantic Ocean (in the Gulf of Guinea).

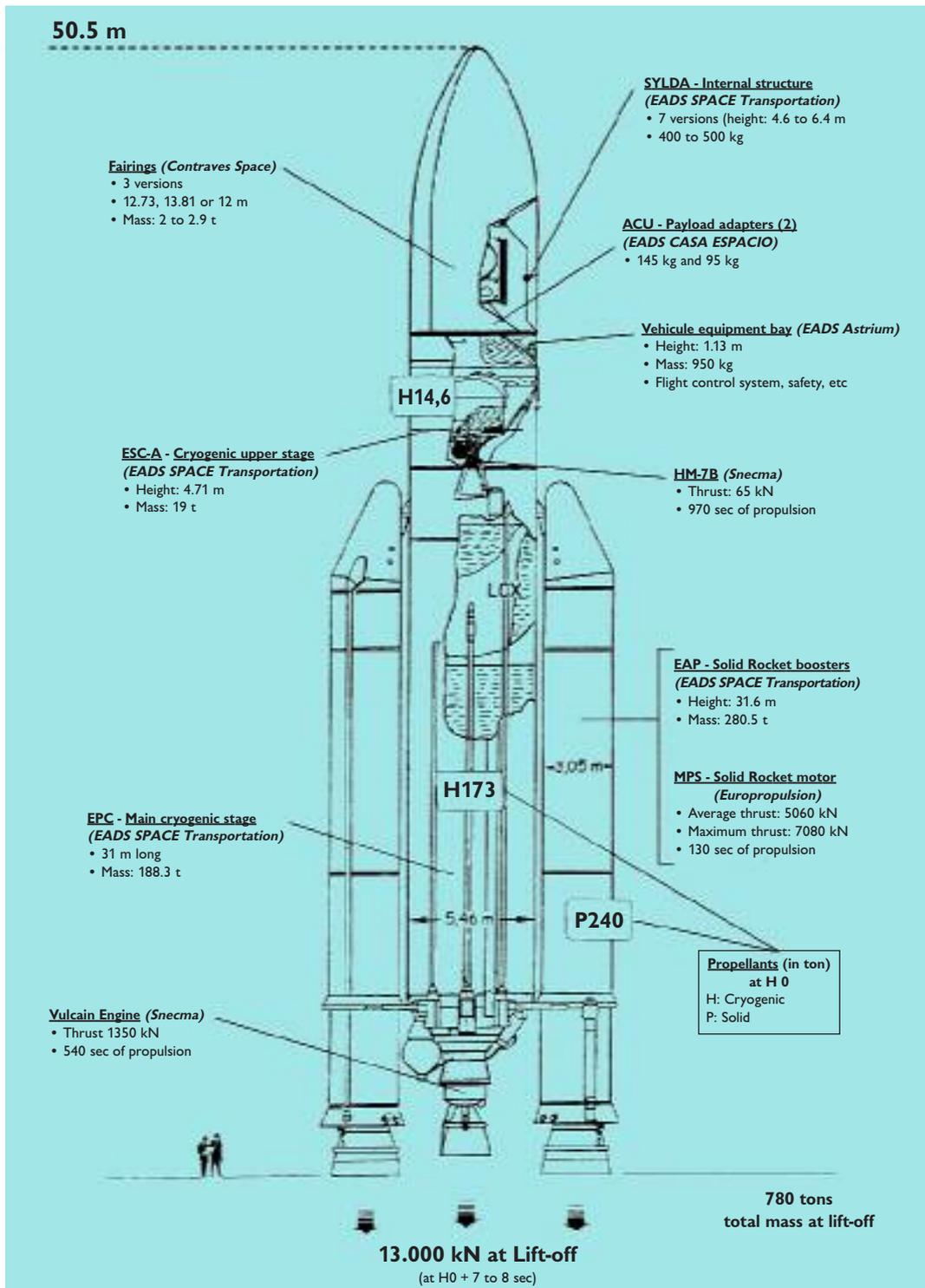
On orbital injection, the launcher will have attained a velocity of approximately 9444 meters/second, and will be at an altitude of about 550 kilometers.

The fairing protecting the JCSAT-10/SYRACUSE 3B spacecraft is jettisoned shortly after the boosters are jettisoned at about T+193 seconds.

Standard Ariane 5 trajectory for geostationary transfer orbit



5. The Ariane 5-ECA (Industrial architect: EADS SPACE Transportation)



6. The JCSAT-10 satellite



Customer	JSAT Corporation	
<i>Prime contractor</i>	<i>Lockheed Martin Commercial Space Systems</i>	
<i>Mission</i>	<i>Direct TV and HD</i>	
<i>Mass</i>	<i>Total mass at lift-off</i>	<i>4,048 kg</i>
	<i>Dry mass</i>	<i>1,858 kg</i>
<i>Stabilization</i>	<i>3 axis stabilized</i>	
<i>Dimensions</i>	<i>5.5 x 2.2 x 2.2 m</i>	
<i>Span in orbit</i>	<i>26.9 m</i>	
<i>Platform</i>	<i>A 2100 AX</i>	
<i>Payload</i>	<i>30 Ku-band transponders, 12 C-band transponders</i>	
<i>On-board power</i>	<i>8.739 W (end of life)</i>	
<i>Life time</i>	<i>15 years</i>	
<i>Orbital position</i>	<i>128° East</i>	
<i>Coverage area</i>	<i>Japan, Asia-Pacific Region and Hawaii</i>	

Press Contact:

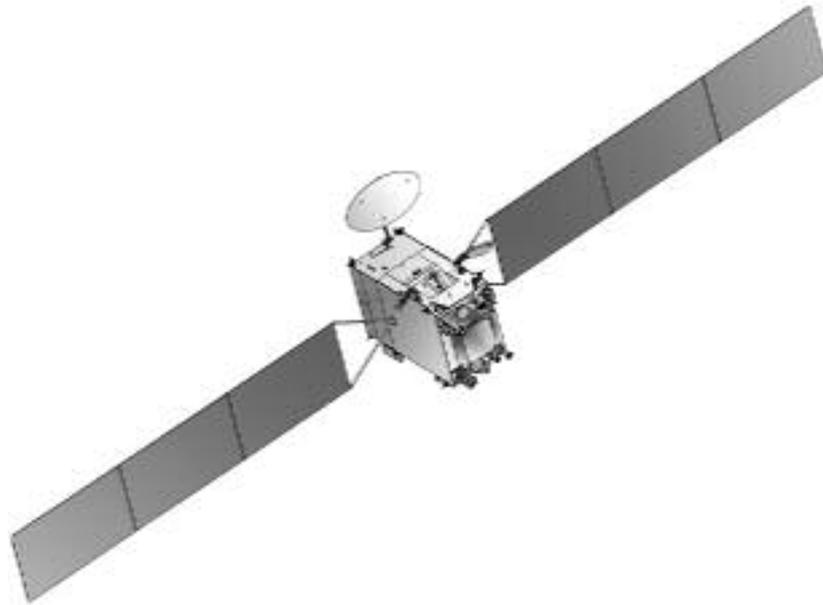
Corporate Communications Department

JSAT Corporation

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E-mail : info@jsat.net

7. The SYRACUSE 3B satellite



Customer	Alcatel Alenia Space for Ministère français de la Défense	
<i>Prime contractor</i>	<i>Alcatel Alenia Space</i>	
<i>Mission</i>	<i>Military communications</i>	
<i>Mass</i>	<i>Total mass at lift-off</i>	<i>3.750 kg</i>
<i>Stabilization</i>	<i>3 axis</i>	
<i>Dimensions</i>	<i>at launch</i>	<i>4.0 x 2,3 x 2,3 m</i>
	<i>span in orbit</i>	<i>29.5 m</i>
<i>Platform</i>	<i>Spacebus 4000 B3</i>	
<i>Payload</i>	<i>15 channels: 9 SHF and 6 EHF</i>	
<i>On-board power</i>	<i>5.640 W (end of life)</i>	
<i>Life time</i>	<i>12 years</i>	
<i>Orbital position</i>	<i>5° West</i>	

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Appendix 1. Arianespace JCSAT-10/SYRACUSE 3B launch key personnel

In charge of the launch campaign

<i>Mission Director</i>	<i>(CM)</i>	<i>Dan MURÉ</i>	<i>ARIANESPACE</i>
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In charge of the launch service contract

<i>Ariane Payload Manager</i>	<i>(RCUA)</i>	<i>Michael CALLARI</i>	<i>ARIANESPACE</i>
<i>Ariane Deputy Mission Manager</i>	<i>(RCUA/A)</i>	<i>Christophe BARDOU</i>	<i>ARIANESPACE</i>

In charge of JCSAT-10 satellite

<i>Satellite Mission Director</i>	<i>(DMS)</i>	<i>Noriko MASUDA</i>	<i>JSAT</i>
<i>Satellite Program Manager</i>	<i>(CPS)</i>	<i>Wayne ALWARD</i>	<i>LMCSS</i>
<i>Satellite Preparation Manager</i>	<i>(RPS)</i>	<i>Roy WELLER</i>	<i>LMCSS</i>

In charge of SYRACUSE 3B satellite

<i>Satellite Mission Director</i>	<i>(DMS)</i>	<i>Christian HERBERE</i>	<i>Alcatel Alenia Space</i>
<i>Satellite Program Manager</i>	<i>(CPS)</i>	<i>Serge COYER</i>	<i>Alcatel Alenia Space</i>
<i>Satellite Preparation Manager</i>	<i>(RPS)</i>	<i>Jacques ANSELME</i>	<i>Alcatel Alenia Space</i>

In charge of the launch vehicle

<i>Launch Site Operations Manager</i>	<i>(COEL)</i>	<i>André SICARD</i>	<i>ARIANESPACE</i>
<i>Ariane Production Project Manager</i>	<i>(CPAP)</i>	<i>Pierre-Yves TISSIER</i>	<i>ARIANESPACE</i>

In charge of the Guiana Space Center (CSG)

<i>Range Operations Manager</i>	<i>(DDO)</i>	<i>Thierry VALLEE</i>	<i>CNES/CSG</i>
<i>Flight Safety Officer</i>	<i>(RSV)</i>	<i>Fleur LEFEVRE</i>	<i>CNES/CSG</i>

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 before 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 redundant 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 T-7 min configuration.



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 (EPCU), 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.