

## SATELLITE LAUNCHES FOR THE UNITED ARAB EMIRATES AND AFRICA

ArianeSpace will orbit two communications satellite on its second launch of the year: Yahsat Y1A for Al Yah Satellite Communications Company PrJsc (Yahsat) of the United Arab Emirates, and Intelsat New Dawn for New Dawn Satellite Company Ltd., a joint venture between Intelsat and Convergence Partners.

The choice of ArianeSpace by leading space communications operators and manufacturers is clear international recognition of the company's excellence in launch services. Based on its proven reliability and availability, ArianeSpace continues to confirm its position as the world's benchmark launch system.

Ariane 5 is the only commercial satellite launcher now on the market capable of simultaneously launching two payloads and handling a complete range of missions, from launches of commercial satellites into geostationary orbit, to dedicated launches into special orbits.

Yahsat Y1A will be the first United Arab Emirates satellite to be launched by ArianeSpace.

Built by Astrium and Thales Alenia Space, Yahsat Y1A will provide services for both government and commercial customers in the Middle East, Africa, Europe and Southeast Asia. Yahsat Y1A will be positioned at 52.5 degrees East, and will offer its customers innovative broadband solutions for Internet, business data and high-definition television (HDTV) services. It has a design life of 15 years.

New Dawn will be the 52nd satellite launched by ArianeSpace for Intelsat, the world's leading satellite operator.

The satellite will weigh about 3,000 kg at liftoff, and offers a design life exceeding 15 years. Built by Orbital Sciences Corporation, the New Dawn satellite is fitted with 28 C-band and 24 Ku-band 36 MHz transponders. Positioned at 32.8 degrees East, it will offer a wide range of services for Africa, including telephony, Internet, media and data networks.

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## 1. Mission profile

The 201st Ariane mission will place two communications satellite into geostationary transfer orbit: Yahsat Y1A for Al Yah Satellite Communications Company PrJsc (Yahsat) of the United Arab Emirates, and Intelsat New Dawn for New Dawn Satellite Company Ltd., a joint venture between Intelsat and Convergence Partners.

This will be the 57th Ariane 5 launch.

The launcher will be carrying a total payload of 10,064 kg, including 8,965 kg for the Yahsat Y1A and Intelsat New Dawn satellites, which will be released into their targeted orbits.

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

### *Injection orbit*

<i>Perigee altitude</i>	<b>250 km</b>
<i>Apogee altitude</i>	<b>35,962 km at injection</b>
<i>Inclination</i>	<b>6° degrees</b>

The lift-off is scheduled on the night of April 22 to 23, 2010 as soon as possible within the following launch window:

### *Launch opportunity*

	<i>Universal time (GMT)</i>	<i>Paris time</i>	<i>Kourou time</i>	<i>Washington time</i>	<i>Abu Dhabi time</i>
<i>Between</i>	9:37 pm	11:37 pm	6:37 pm	5:37 pm	1:37 am
<i>and</i>	10:41 pm	12:41 am	7:41 pm	6:41 pm	2:41 am
<i>on</i>	April 22, 2011	April 22-23, 2011	April 22, 2011	April 22, 2011	April 23, 2011

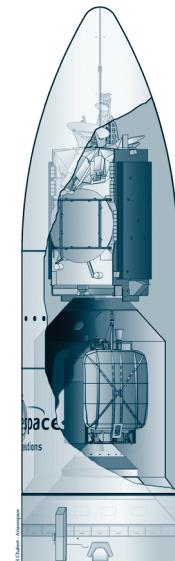
## 2. Configuration of Ariane payload

The Yahsat Y1A satellite was built by Astrium and Thales Alenia Space for the operator Al Yah Satellite Communications Company PrJsc (Yahsat).

*Orbital position: 52,5° East*

Intelsat New Dawn was build by Orbital Sciences Corporation in Dulles, Virginia for the operator New Dawn Satellite Company Ltd.

*Orbital position: 32,8° East*



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

HO	Events	ALT (km)	V. rel. (m/s)
+ 7,05 s	<i>Ignition of solid boosters</i>	0	0
+ 7,3 s	<i>Liftoff</i>	0	0
+ 12,8 s	<i>End of vertical climb and beginning of pitch rotation (10 seconds duration)</i>	0.097	38.7
+ 17,1 s	<i>Beginning of roll manoeuvre</i>	0.339	754
+ 2 mn	<i>Jettisoning of solid boosters</i>	66.5	1995
+ 3 mn	<i>Jettisoning of fairing</i>	105.2	2217
+ 7 mn	<i>Acquisition by Natal tracking station</i>	170	5417
+ 8 mn	<i>Shut-down of main cryogenic stage</i>	168.3	6888
+ 8 mn	<i>Separation of main cryogenic stage</i>	168.4	6914
+ 9 mn	<i>Ignition of upper cryogenic stage (ESC-A)</i>	168.4	6916
+ 13 mn	<i>Acquisition by Ascension tracking station</i>	156	7550
+ 18 mn	<i>Acquisition by Libreville tracking station</i>	186	8339
+ 23 mn	<i>Acquisition by Malindi tracking station</i>	408	9021
+ 25 mn	<i>Injection</i>	656.7	9354
+ 27 mn	<i>Separation of Yahsat Y1A satellite</i>	469.9	9093
+ 33 mn	<i>Separation of Sylda 5</i>	2253	8162
+ 35 mn	<i>Separation of Intelsat New Dawn satellite</i>	2546	8544
+ 46 mn	<i>End of Arianespace Flight mission</i>	5319	7198

## 4. Flight trajectory of Yahsat Y1A & Intelsat New Dawn

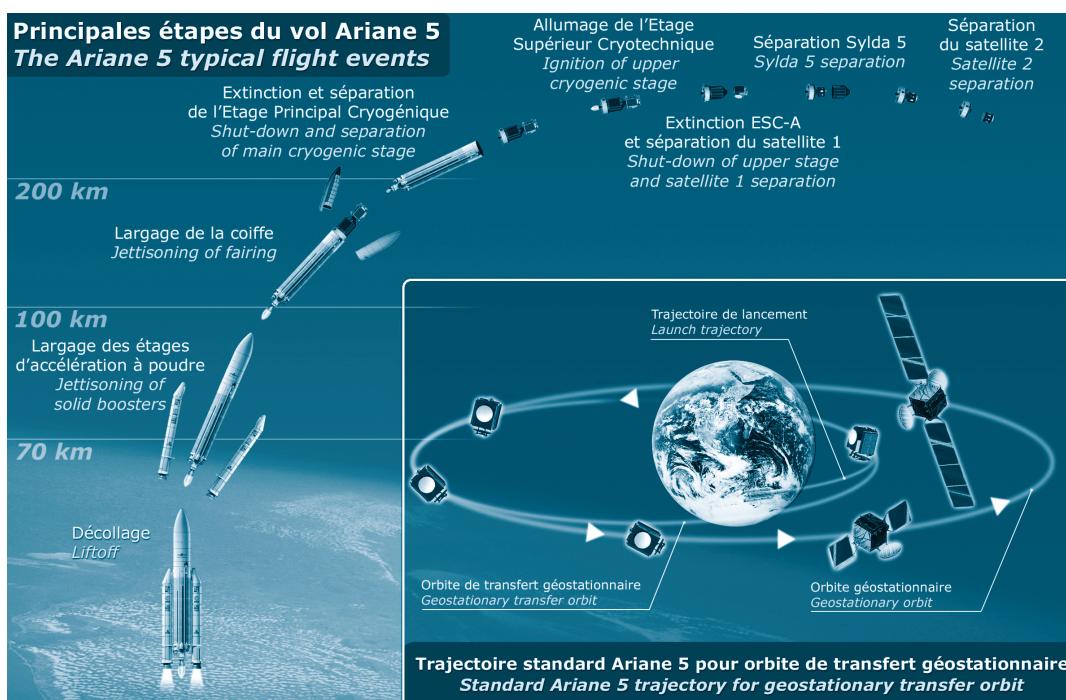
The launcher's attitude and trajectory are totally controlled by the two onboard computers, located in the Ariane 5 vehicle equipment bay (VEB).

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).

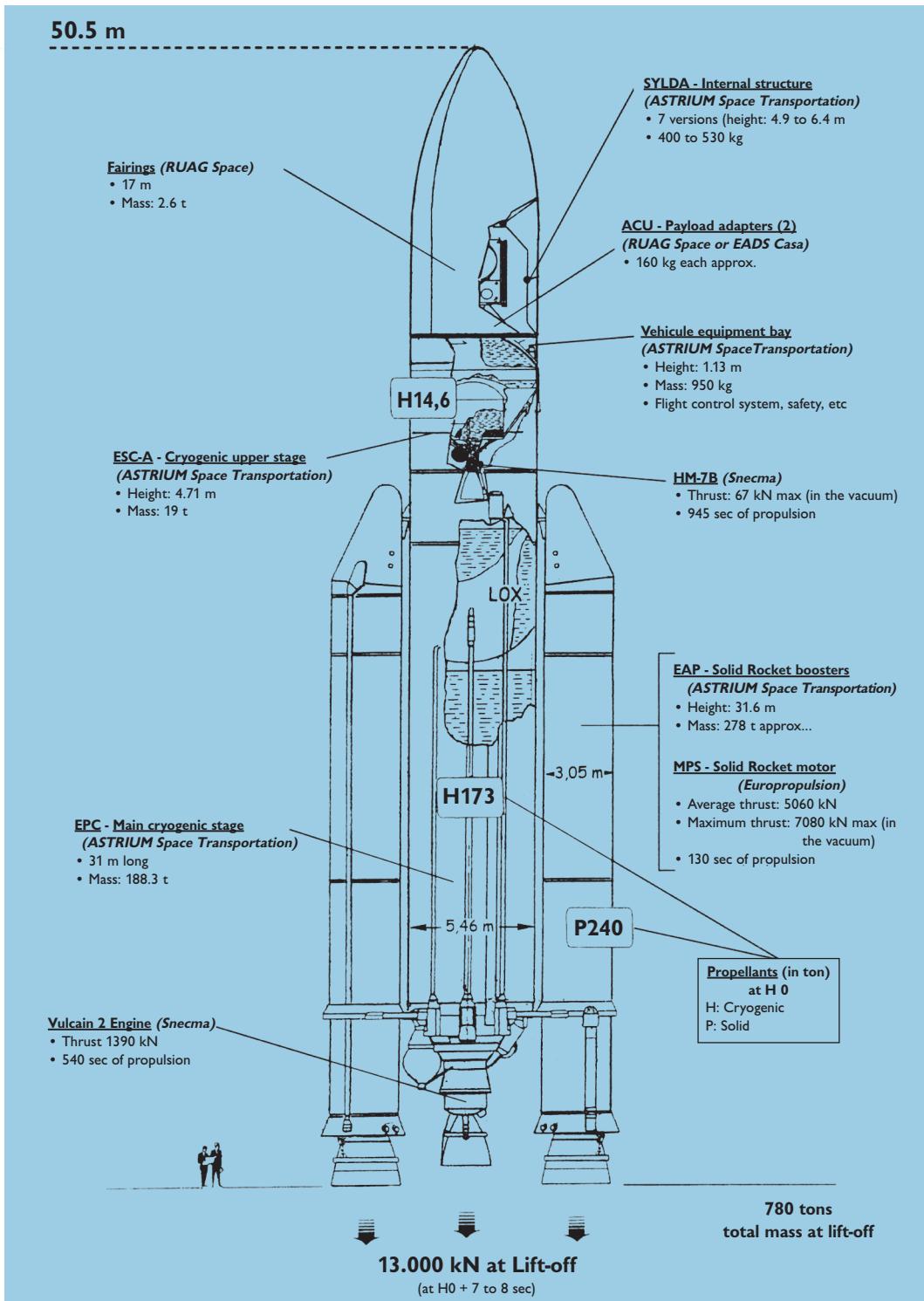
On orbital injection, the launcher will have attained a velocity of approximately 9354 meters/second, and will be at an altitude of about 656 kilometers.

The fairing protecting the Yahsat Y1A and Intelsat New Dawn spacecraft is jettisoned shortly after the boosters are jettisoned at about T+191 seconds.

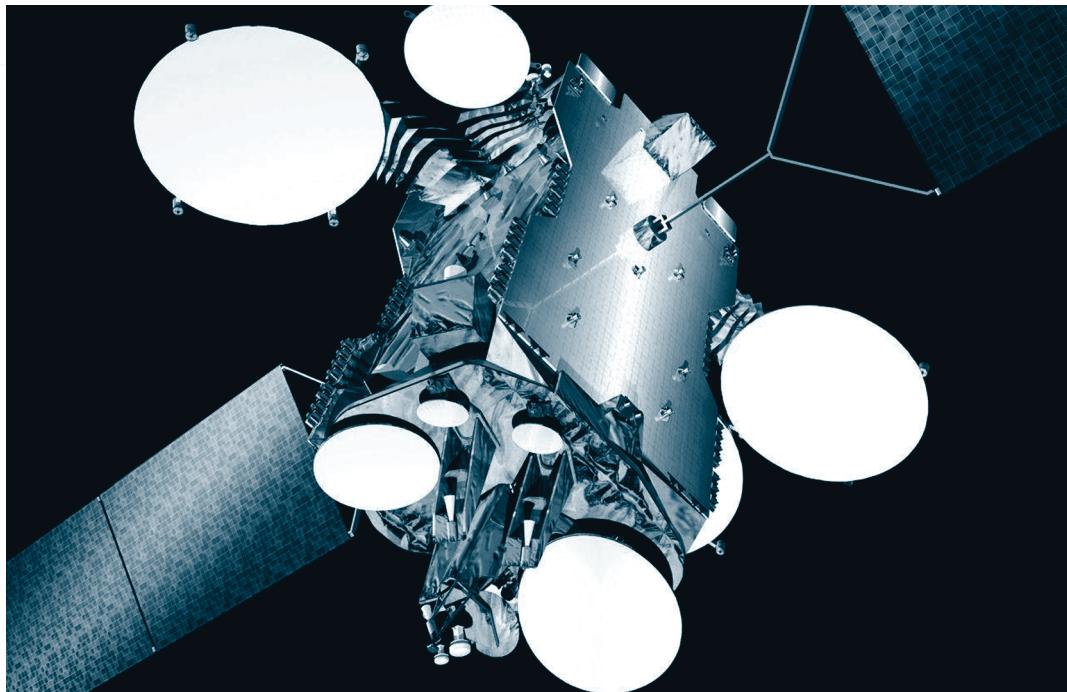
### Standard Ariane 5 trajectory for geostationary transfer orbit



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



## 6. The Yahsat Y1A satellite

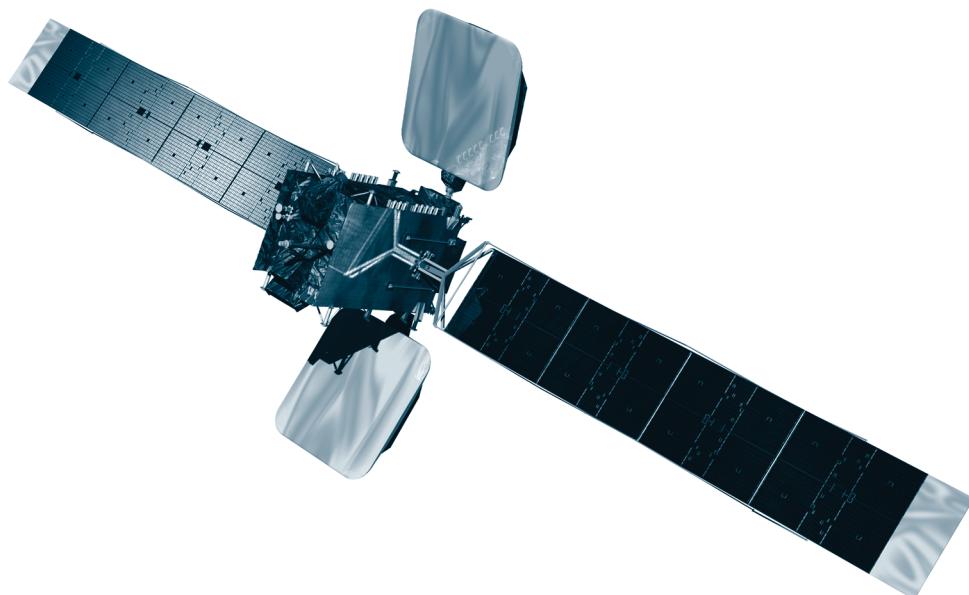


<b>Customer</b>	AL YAH Satellite Communications Company
Prime contractor	ASTRIUM and THALES ALENIA SPACE
Mission	Telecommunications
Mass	Total mass at lift-off 5 935 kg
Stabilization	3 axis stabilized
Dimensions	5.5 x 2.1 x 2.3 m
Span in orbit	39.4 m
Platform	Eurostar E3000
Payload	25 Ku-band and 14 C-band transponders
On-board power	14 kW (end of life)
Life time	15 years
Orbital position	52,5° East
Coverage area	The Middle East, Africa, Europe, South West Asia

### Press Contact

Salma Al Mansouri  
PR & Communications Manager  
Yahsat  
Tél : + 9712 406 11 11  
Fax : + 9712 406 11 00  
Email : smansouri@yahsat.ae

## 7. The Intelsat New Dawn satellite



<b>Customer</b>	<b>INTELSAT</b>	
Prime contractor	ORBITAL SCIENCES CORPORATION	
Mission	Telecommunications	
Mass	Total mass at lift-off	3 000 kg
	Dry mass	1 283 kg
Stabilization	3 axis stabilized	
Dimensions	4.9 x 2.5 x 3.1 m	
Span in orbit	25.6 m	
Platform	STAR-2	
Payload	24 Ku-band transponders and 28 C-band transponders	
On-board power	6750 W (end of life)	
Life time	15 years minimum	
Orbital position	32.8° East	
Coverage area	Africa	

**Press Contact**

Dianne J. VanBeber  
Vice President, Investor  
Relations and Communications  
Intelsat  
(o) +1 202 944 7406  
(m)+1 703 627 5100

**Press Contact**

Alex Horwitz  
Director, Corporate  
Communications  
Intelsat  
(o) +1 202 944 8606  
(m)+1 202 679 9161

**Press Contact**

Frederic Cornet  
Partner  
College Hill  
(o) + 27 11 447 3030  
(m)+ 27 083 307 8286

## **Appendix 1. ArianeSpace Yahsat Y1A & Intelsat New Dawn launch key personnel**

### ***In charge of the launch campaign***

<b>Mission Director</b>	(CM)	<i>Daniel MURÉ</i>	<b>ARIANESPACE</b>
<b>In charge of the launch service contract</b>			
<b>Program Director Yahsat Y1A</b>	(CP)	<i>Luca CHIECCHO</i>	<b>ARIANESPACE</b>
<b>Program Director Intelsat New Dawn</b>	(CP)	<i>Thomas PANZZO</i>	<b>ARIANESPACE</b>
<b>In charge of Yahsat Y1A satellite</b>			
<b>Satellite Mission Director</b>	(DMS)	<i>Jean-Baptiste TINTURIER</i>	<b>THALES</b>
<b>Satellite Program Manager</b>	(CPS)	<i>Jacques NERON</i>	<b>ASTRIUM</b>
<b>Satellite Preparation Manager</b>	(RPS)	<i>Stéphane REYNAL</i>	<b>ASTRIUM</b>
<b>In charge of Intelsat New Dawn satellite</b>			
<b>Satellite Mission Director</b>	(DMS)	<i>Brian SING</i>	<b>INTELSAT</b>
<b>Satellite Program Manager</b>	(CPS)	<i>Susanne SCHROLL</i>	<b>OSC</b>
<b>Satellite Preparation Manager</b>	(RPS)	<i>Jim MOONEY</i>	<b>OSC</b>
<b>In charge of the launch vehicle</b>			
<b>Launch Site Operations Manager</b>	(COEL)	<i>Patrick LUCET</i>	<b>ARIANESPACE</b>
<b>Ariane Production Project Manager</b>	(CPAP)	<i>Pierre-Yves TISSIER</i>	<b>ARIANESPACE</b>
<b>Launcher Production Quality Manager</b>	(RQLP)	<i>Maël MATTOX</i>	<b>ARIANESPACE</b>
<b>Launch Campaign Quality Manager</b>	(CQCL)	<i>Véronique DELON</i>	<b>ARIANESPACE</b>
<b>In charge of the Guiana Space Center (CSG)</b>			
<b>Range Operations Manager</b>	(DDO)	<i>Antoine GUILLAUME</i>	<b>CNES/CSG</b>
<b>Range Operations Deputy</b>	(DDO/A)	<i>Aimée CIPPE</i>	<b>CNES/CSG</b>

## **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 and the Guiana Space Center

ArianeSpace was founded in 1980 as the world's first launch Service & Solutions company. Today, ArianeSpace has 21 shareholders from ten European countries (including French space agency CNES with 34%, Astrium with 30%, and all European companies participating in the construction of Ariane launchers).

Since the outset, ArianeSpace has signed more than 300 launch contracts and launched 290 satellites. More than two-thirds of the commercial satellites now in service worldwide were launched by ArianeSpace.

The company posted sales of 1046 million euros in 2009.

At January 1, 2011, ArianeSpace had 331 employees, working at the company's headquarters in Evry (near Paris), the Guiana Space Center in French Guiana, where the Ariane, Soyuz and Vega launch pads are located, and offices in Washington, D.C., Tokyo and Singapore.

ArianeSpace offers launch Service & Solutions to satellite operators from around the world, including private companies and government agencies. These Service & Solutions call on three launch vehicles:

- The Ariane 5 heavy launcher, operated from the Guiana Space Center in Kourou, French Guiana.
- The Soyuz medium launcher. Currently in operation at the Baikonur Cosmodrome in Kazakhstan under the responsibility of Starsem, a Euro-Russian subsidiary of ArianeSpace, it will be launched from the Guiana Space Center starting in 2011.
- The Vega light launcher, to be launched from the Guiana Space Center starting in 2011.

With its family of launchers ArianeSpace won over half of the commercial launch contracts up for bid worldwide in the last two years. ArianeSpace now has a backlog of more than 40 satellites to be launched.

### 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 base operations, such as radars, telecom network, weather station, receiving sites for launcher telemetry, etc.
- Payload processing facilities (EPCU), in particular the 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 Astrium, which contribute to the production of Ariane 5 elements. A total of 40 European manufacturers and local companies are involved in operations.

The Guiana Space Center is preparing to welcome two new launch vehicles, Soyuz and Vega. The Soyuz launch complex (ELS) and the Vega launch complex (SLV) are now under construction.

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.

ArianeSpace supervises the integration and functional checks of the Ariane launcher, built by Astrium as production prime contractor, in the Launcher Integration Building (BIL). It then carries out acceptance tests of the launcher at the same time as satellite preparations in the Payload Preparation Complex (EPCU), operated by the Guiana Space Center (CSG). ArianeSpace next oversees final assembly of the launcher and integration of satellites in the Final Assembly Building (BAF), followed by transfer of the launcher to Launch Zone No. 3 (ZL3), and then final countdown and liftoff from Launch Complex No. 3 (CDL3). 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.