A DUAL LAUNCH FOR MOBILE COMMUNICATIONS AND METEOROLOGY SATELLITES

Arianespace will orbit two satellites on its third Ariane 5 launch of the year: the Alphasat mobile communications satellite for operator Inmarsat, and the INSAT-3D meteorological satellite for the Indian Space Research Organization (ISRO).

Ariane 5 is the only commercial satellite launcher now on the market capable of simultaneously launching two payloads.

The Alphasat satellite is the result of a public-private partnership agreement between Inmarsat, the world's leading provider of mobile satellite services, and the European Space Agency (ESA), with support from French space agency CNES, to produce and launch the first satellite based on the new European platform, Alphabus. Built by Astrium as prime, in conjunction with Thales Alenia Space, the platform is being used on this mission to deliver commercial services and provide in-orbit validation of the most advanced space communications technologies developed in Europe. Alphasat will deliver advanced voice and data transmission services across Europe, Africa and the Middle East, for both commercial and government customers.

The long-standing relationship of mutual trust between Arianespace and Inmarsat reaches back to the launch of the first Inmarsat satellites. The British company has chosen Arianespace to launch seven of its satellites to date.

INSAT-3D (Indian National Satellite) will be the 16th ISRO satellite launched by Ariane. From the launch of the experimental satellite Apple on Flight L03 in 1981, Arianespace has already orbited 15 Indian satellites.

Designed, developed and integrated by ISRO in Bangalore, southern India, the Insat 3D meteorological satellite will weigh about 2,200 kg at launch, and offers a design life exceeding seven years. Insat 3D features a 6-channel imager, data relay transponder (DRT), sounder and a satellite-aided search and rescue (SASR) payload. Positioned at 82 degrees East, its coverage zone encompasses the entire Indian subcontinent.

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

1. Mission profile

The 214th Ariane mission will boost two satellites into geostationary transfer orbit: the Alphasat mobile communications satellite for operator Inmarsat, and the INSAT-3D meteorological satellite for the Indian Space Research Organization (ISRO).

This will be the 70th Ariane 5 launch.

The launcher will be carrying a total payload of 9,760 kg, including 8,770 kg for the Alphasat and INSAT-3D 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.

Targeted orbit

Perigee altitude	***248 km***
Apogee altitude	***35,945 km***
Inclination	***3,5 degrees***

The lift-off is scheduled on the night of July 25 to 26, 2013 as soon as possible within the following launch window:

Launch opportunity

	Universal time (GMT)	*Paris time*	*Kourou time*	*Washington time*	*Bangalore time*
Between	*7:53 pm*	*9:53 pm*	*4:53 pm*	*3:53 pm*	*1:23 am*
and	*9:11 pm*	*11:11 pm*	*6:11 pm*	*5:11 pm*	*2:41 am*
on	*July 25, 2013*	*July 25, 2013*	*July 25, 2013*	*July 25, 2013*	*July 26, 2013*

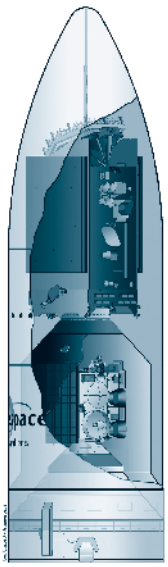
Payload configuration

The Alphasat satellite was built by Astrium in conjunction with Thales Alenia Space, for the operator Inmarsat.

Orbital position: 25° East.

The INSAT-3D satellite was built by the Indian Space Research Organization (ISRO) in Bangalore, India, which will also operate the satellite.

Orbital position: 82° East



2. Range operations campaign: ARIANE 5 - Alphasat & INSAT-3D

Satellites and launch vehicle campaign calendar

Ariane activities	*Dates*	*Satellites activities*
Campaign start review	*April 24, 2013*	
EPC Erection	*April 25, 2013*	
EAP transfer and positioning	*April 26, 2013*	
Integration EPC/EAP	*April 29, 2013*	
ESC-A and VEB Erection	*April 13, 2013*	
	June 11, 2013	*Arrival in Kourou of INSAT-3D and beginning of preparation campaign in building S5C*
	June 18, 2013	*Arrival in Kourou of Alphasat and beginning of preparation campaign in building S1B*
Roll-out from BIL to BAF	*June 26, 2013*	
	July 5-8, 2013	*Alphasat filling operations*
	July 5-9, 2013	*INSAT-3D filling operations*

Satellites and launch vehicle campaign final calendar

J-10	*Thursday July 11, 2013*	*Alphasat integration on adaptor (PAS) and transfer to Final Assembly Building (BAF)*
J-9	*Friday July 12, 2013*	*Alphasat integration on Sylda and INSAT-3D integration on adaptor (PAS)*
J-8	*Monday July 15, 2013*	*Fairing integration on Sylda and transfer INSAT-3D < to Final Assembly Building (BAF)*
J-7	*Tuesday July 16, 2013*	*INSAT-3D integration on launcher*
J-6 J-5	*Wednesday July 17 and Thursday July 18, 2013*	*Upper composite integration with Alphasat on launcher and ESC-A final preparations*
J-4	*Friday July 19, 2013*	*ESC-A final preparations and Launch rehearsal*
J-3	*Monday July 22, 2013*	*Arming of launch vehicle*
J-2	*Tuesday July 23, 2013*	*Arming of launch vehicle Launch readiness review (RAL) and final preparation of launcher*
J-1	*Wednesday July 24, 2013*	*Roll-out from BAF to Launch Area (ZL), launch vehicle connections and filling of the EPC liquid helium sphere*
J-0	*Thursday July 25, 2013*	*Launch countdown including EPC and ESC-A filling with liquid*

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*
- 4 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)*
+ 7,05 s	*Ignition of solid boosters*	*0*	*0*
+ 7,3 s	*Liftoff*	*0*	*0*
+ 12,6 s	*End of vertical climb and beginning of pitch rotation (10 seconds duration)*	*0,1*	*36,0*
+ 17 s	*Beginning of roll manoeuvre*	*0,3*	*73,9*
+ 2 mn 22 s	*Jettisoning of solid boosters*	*67,3*	*2013*
+ 3 mn 17 s	*Jettisoning of fairing*	*107,1*	*2261*
+ 7 mn 53 s	*Acquisition by Natal tracking station*	*170,7*	*5479*
+ 8 mn 54 s	*Shut-down of main cryogenic stage*	*168,9*	*6890*
+ 9 mn 00 s	*Separation of main cryogenic stage*	*168,9*	*6916*
+ 9 mn 04 s	*Ignition of upper cryogenic stage (ESC-A)*	*168,9*	*6918*
+ 13 mn 38 s	*Acquisition by Ascension tracking station*	*154,3*	*7576*
+ 18 mn 20 s	*Acquisition by Libreville tracking station*	*198*	*8319*
+ 23 mn 01 s	*Acquisition by Malindi tracking station*	*474,5*	*9010*
+ 25 mn 10 s	*Injection*	*719,4*	*9298*
+ 27 mn 45 s	*Separation of **Alphasat** satellite*	*1133*	*8961*
+ 29 mn 35 s	*Separation of Sylda 5*	*1479*	*8697*
+ 32 mn 48 s	*Separation of **INSAT-3D** satellite*	*2172*	*8214*
+ 44 mn 53 s	*End of Arianespace Flight mission*	*5192*	*6594*

4. Flight trajectory of Alphasat & INSAT-3D

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

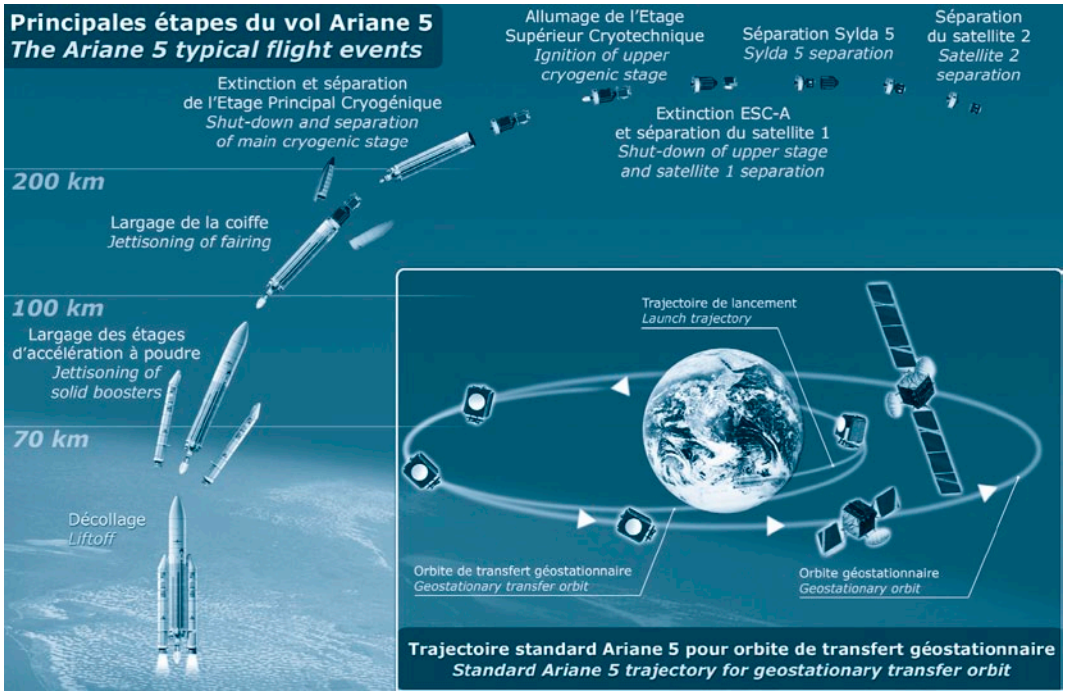
7.05 seconds after ignition of the main stage cryogenic engine at T-0, the two solid-propellant boosters are ignited, enabling liftoff. The launcher first climbs vertically for 6 seconds, then rotates towards the East. It maintains an attitude that ensures the axis of the launcher remains parallel to 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).

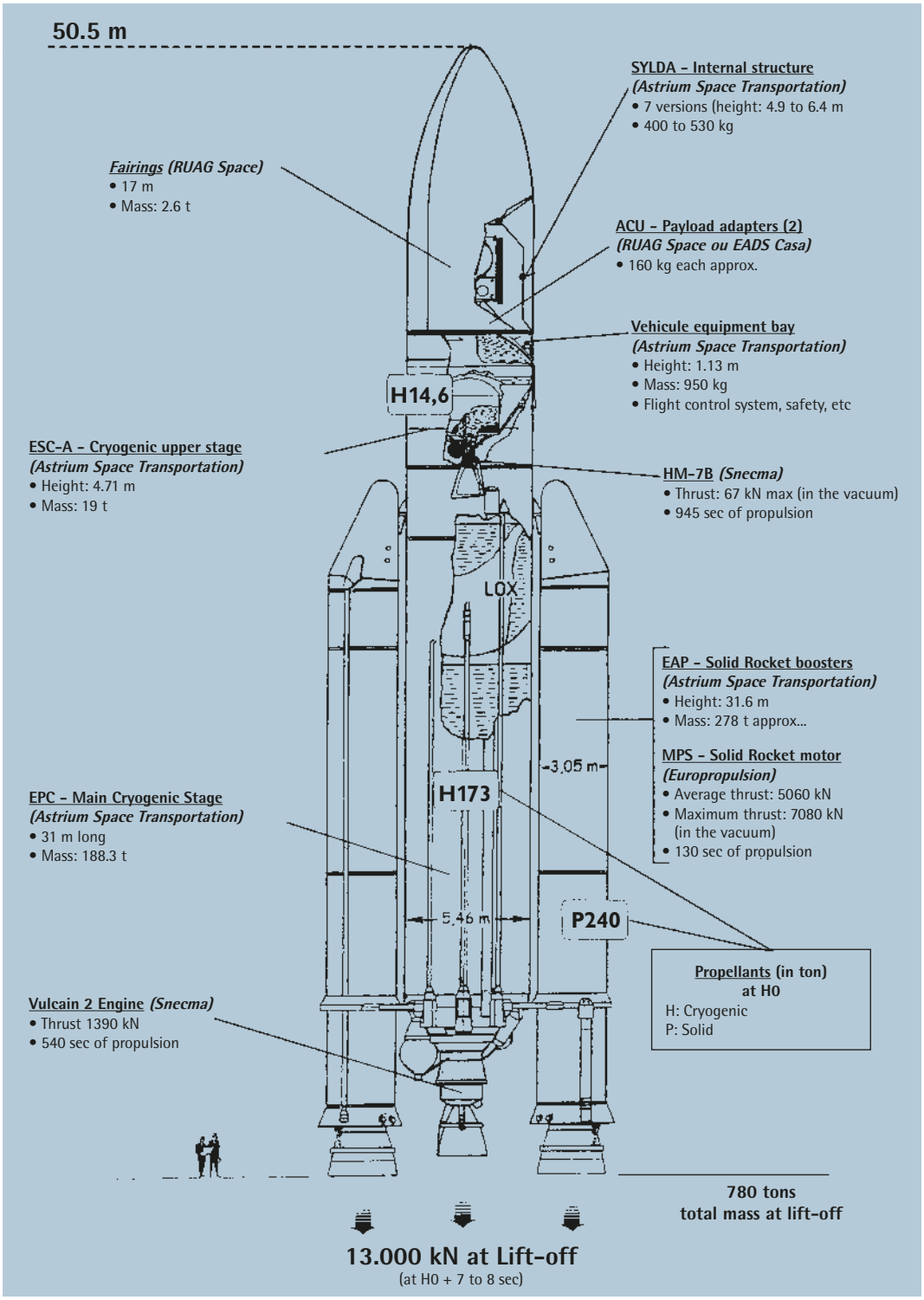
On orbital injection, the launcher will have attained a velocity of approximately 9,298 meters/second, and will be at an altitude of about 719.4 kilometers.

The fairing protecting the Alphasat and INSAT-3D spacecraft is jettisoned shortly after the boosters are jettisoned at about T+197 seconds.

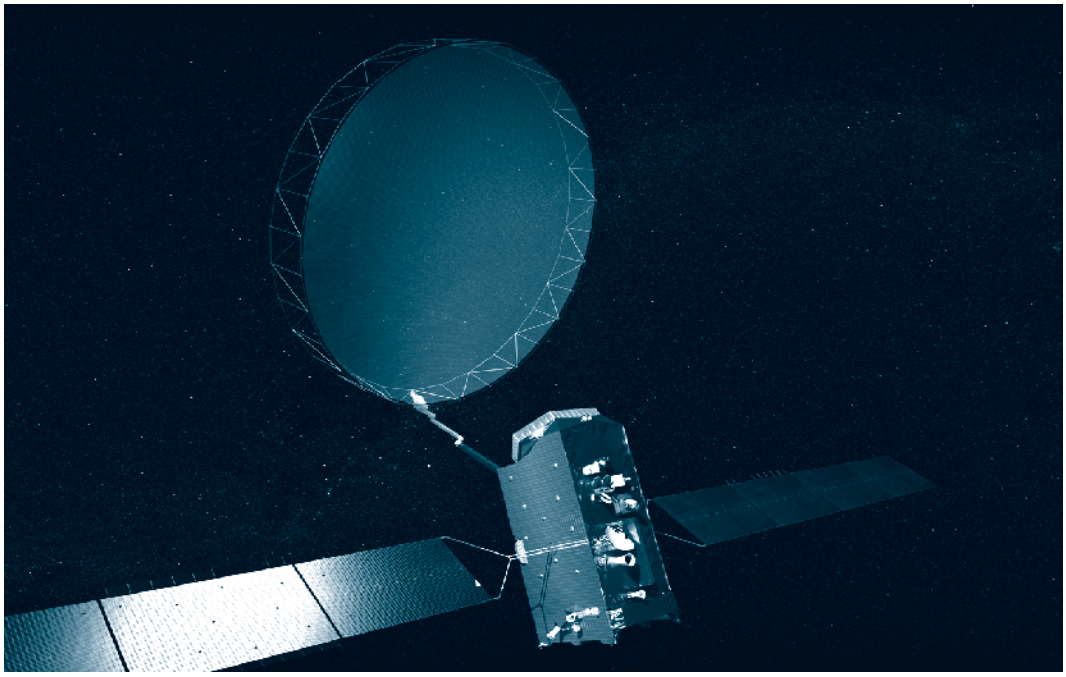
Standard Ariane 5 trajectory for geostationary transfer orbit



5. The Ariane 5-ECA (Industrial prime contractor: Astrium Space Transportation)



6. The Alphasat satellite



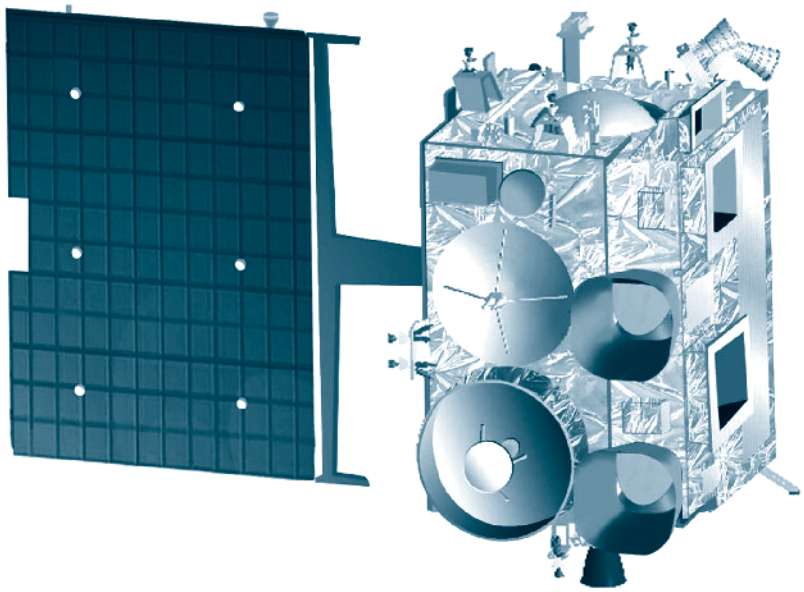
Customer	*INMARSAT*
Prime contractor	*Astrium satellites*
Mission	*Mobile Communications*
Mass	*Total mass at lift-off approx. 6,650 kg*
Stabilization	*3 axis stabilized*
Dimensions *Span in orbit*	*7.1 x 2.5 x 2.8 m* *40 m*
Platform	*ALPHABUS*
Payload	*Mobile spotbeams in L-band, 4 technological demonstrators*
On-board power	*12 kW (early life)*
Life time	*15 years*
Orbital position	*25° East*
Coverage area	*Europe, Africa and Middle-East*

Press Contact

Jonathan Sinnatt
Inmarsat
jonathan.sinnatt@inmarsat.com
T: +44 (0)20 7728 1935 / M:+44 (0)788 960 5272

Neville Rawlings
Bell Pottinger for Inmarsat
nrawlings@bell-pottinger.co.uk
T: +44 (0)20 7861 2502 / M: +44 (0)7990 540100

7. The INSAT-3D satellite



Customer	*ISRO*	
Prime contractor	*ISRO / ISAC*	
Mission	*Meteorology services*	
Mass	*Total mass at lift-off*	*2,120 kg*
Stabilization	*3 axis stabilized*	
Dimensions	*2.4 m x 1.6 m x 1.5 m*	
Platform	*1-2Kbus*	
Payload	*Six channel imager, sounder, Data Relay Transponder, SASR*	
On-board power	*1164 W (end of life)*	
Life time	*7 years*	
Orbital position	*82° East*	
Coverage area	*India land mass*	

Press Contact

Deviprasad Karnik
Director, P and PR
ISRO Headquarters
New BEL Road, Bangalore 560 095
Tel: (91 80) 23415275
Fax: (91 80) 23412253

Appendix 1. Arianespace - Alphasat & INSAT-3D launch key personnel

In charge of the launch campaign			
Mission Director	*(CM)*	*Ignazio GORI*	*ARIANESPACE*
In charge of the launch service contract			
Program Director Alphasat	*(CP)*	*Pierre-Yves BERTIN*	*ARIANESPACE*
Program Director INSAT-3D	*(CP)*	*Luca CHIECCHIO*	*ARIANESPACE*
In charge of Alphasat satellite			
Satellite Mission Director	*(DMS)*	*Ruy PINTO*	*INMARSAT*
Satellite Program Manager	*(CPS)*	*Michel ROUX - René FOURNIER*	*ASTRIUM*
Satellite Preparation Manager	*(RPS)*	*Nicolas BOUGE*	*ASTRIUM*
In charge of INSAT-3D satellite			
Satellite Mission Director	*(DMS)*	*SC RASTOGI*	*ISAC / ISRO*
Satellite Program Manager	*(CPS)*	*PRAKASHARAO*	*ISAC / ISRO*
Satellite Preparation Manager	*(RPS)*	*Mohammed Ali A*	*ISAC / ISRO*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*Christian LARDOT*	*ARIANESPACE*
Ariane Production Project Manager	*(CPAP)*	*Pierre DESTAING*	*ARIANESPACE*
Launcher Production Quality Manager	*(RQLP)*	*Isabelle LECLERE*	*ARIANESPACE*
Launch Campaign Quality Manager	*(COCL)*	*Franciska DEMBINSKA*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Frédéric ADRAGNA*	*CNES/CSG*
Range Operations Deputy	*(DDO/A)*	*Laura APPOLLONI*	*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 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, they handle 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 350 launch contracts and launched 314 satellites. More than two-thirds of the commercial satellites now in service worldwide were launched by Arianespace. The company posted sales of 1329 million euros in 2012.

At January 1, 2013, Arianespace had 320 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 and the Guiana Space Center.
- The Vega light launcher, launched also from the Guiana Space Center.

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 (ECPU), in particular the S5 facility.
- Ariane, Soyuz and Vega launch complexes, comprising the launch zones 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.

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 is responsible for the development of the Ariane, Soyuz and Vega programs at the Guiana Space Center. Once these launch systems are qualified, ESA will transfer responsibility to the operator 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, Soyuz and Vega rockets throughout their trajectories.
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.