A DUAL LAUNCH FOR DIRECT BROADCAST AND COMMUNICATIONS SERVICES

Arianespace will orbit two satellites on its fifth Ariane 5 launch of the year: ASTRA 2F, which mainly provides direct-to-home (DTH) broadcast services for the Luxembourg-based operator SES, and the GSAT-10 communications satellite for the Indian Space Research Organization, ISRO.

The choice of Arianespace by the world's 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.

Arianespace and SES have developed an exceptional relationship of mutual trust over more than 20 years. ASTRA 2F will be the 36th satellite from the SES group (Euronext Paris and Luxembourg Bourse: SESG) to use an Ariane launcher. SES operates the leading direct-to-home (DTH) TV broadcast system in Europe, based on its Astra satellites, serving more than 135 million households via DTH and cable networks.

Built by Astrium using a Eurostar E3000 platform, ASTRA 2F will weigh 6,000 kg at launch. Fitted with active Ku- and Ka-band transponders, ASTRA 2F will be positioned at 28.2 degrees East. It will deliver new-generation DTH TV broadcast services to Europe, the Middle East and Africa, and offers a design life of about 15 years.

GSAT-10 will be the 15th ISRO satellite to have chosen the European launcher. Since the launch of the Apple experimental satellite on Flight L03 in 1981, Arianespace has orbited 14 Indian satellites.

Designed, assembled and integrated by the Indian Space Research Organization in Bangalore, India, GSAT-10 will weigh about 3,400 kg at launch and offers a design life exceeding 15 years. The satellite is fitted with 18 C-band and 12 Ku band transponders and GPS aided Geo Augmented Navigation (GAGAN) payload. Positioned at 83 degrees East, it will provides Telecommunication, direct-to-home broadcasting and radio-navigation services.

1 - The ARIANESPACE mission - ASTRA 2F & GSAT-10
2 - Range operations campaign: ASTRA 2F & GSAT-10
3 - Launch countdown and flight events - ASTRA 2F & GSAT-10
4 - Flight Trajectory
5 - The ARIANE 5 launch vehicle
6 - The ASTRA 2F satellite
7 - The GSAT-10 satellite

Appendix
1. Flight key personnel
2. Launch environment conditions
3. Synchronized sequence
4. ARIANESPACE, its relations with ESA and CNES

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

1. Mission profile

The 209th Ariane mission will boost two satellites into geostationary transfer orbit: ASTRA 2F for the Luxembourg-based operator SES, and the GSAT-10 communications satellite for the Indian space agency, ISRO.

This will be the 65th Ariane 5 launch.

The launcher will be carrying a total payload of 10,211 kg, including 9,401 kg for the Astra 2F and GSAT-10 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	***249.5 km***
Apogee altitude	***35,937 km at injection***
Inclination	***6° degrees***

The lift-off is scheduled on the night of September 21 to the morning of September 22, 2012 as soon as possible within the following launch window:

Launch opportunity

	Universal time (GMT)	*Paris time*	*Kourou time*	*Washington time*	*Bangalore time*
Between	*9:20 pm*	*11:20 pm*	*6:20 pm*	*5:20 pm*	*2:50 am*
and	*10:09 pm*	*00:09 pm*	*7:09 pm*	*6:09 pm*	*3:39 am*
on	*September 21, 2012*	*September 21, 2012*	*September 21, 2012*	*September 21, 2012*	*September 22, 2012*

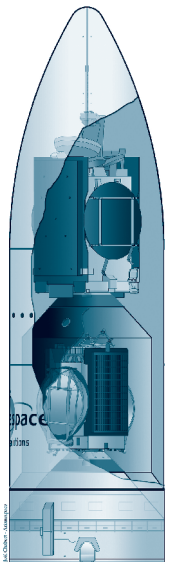
Payload configuration

The Astra 2F satellite was built by Astrium in Toulouse, France, for the Luxembourg-based operator SES.

Orbital position: 28.2° East

The GSAT-10 satellite was built by ISRO (Indian Space Research Organization) for meeting the national requirements.

Orbital position: 83° East



2. Range operations campaign: ARIANE 5 - ASTRA 2F & GSAT-10

Satellites and launch vehicle campaign calendar

Ariane activities	*Dates*	*Satellites activities*
Campaign start review	*July 20, 2012*	
EPC Erection	*July 20, 2012*	
EAP transfer and positioning	*July 23, 2012*	
Integration EPC/EAP	*July 24, 2012*	
ESC-A and VEB Erection	*July 26, 2012*	
	July 31, 2012	*Arrival in Kourou of GSAT-10 and beginning of preparation campaign in building S5 C*
	August 21, 2012	*Arrival in Kourou of ASTRA 2F and beginning of preparation campaign in building S1B*
Roll-out from BIL to BAF	*August 22, 2012*	
	August 25-29, 2012	*GSAT-10 filling operations*
	September 1-8, 2012	*ASTRA 2F 2 filling operations*

Satellites and launch vehicle campaign final calendar

	Monday September 3, 2012	*GSAT-10 integration on adaptor (ACU)*
	Tuesday September 4, 2012	*GSAT-10 transfer to Final Assembly Building (BAF)*
J-11	*Saturday September 8, 2012*	*ASTRA 2F integration on adaptor (ACU)*
J-10	*Monday September 10 2012*	*ASTRA 2F transfer to Final Assembly Building (BAF) and GSAT-10 integration on launcher*
J-9	*Monday September 10, 2012*	*ASTRA 2F integration on Sylda*
J-8	*Wednesday September 12, 2012*	*Fairing integration on Sylda*
J-6	*Friday September 14, 2012*	*Upper composite integration with ASTRA 2F on launcher and ESC-A final preparations*
J-5	*Saturday September 15, 2012*	*ESC-A final preparations*
J-4	*Monday September 17, 2012*	*Launch rehearsal*
J-3	*Tuesday September 18, 2012*	*Arming of launch vehicle*
J-2	*Wednesday September 19, 2012*	*Arming of launch vehicle* *Launch readiness review (RAL) and final preparation of launcher*
J-1	*Tuesday September 20, 2012*	*Roll-out from BAF to Launch Area (ZL), launch vehicle connections and filling of the EPC liquid helium sphere*
J-0	*Friday September 21, 2012*	*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*

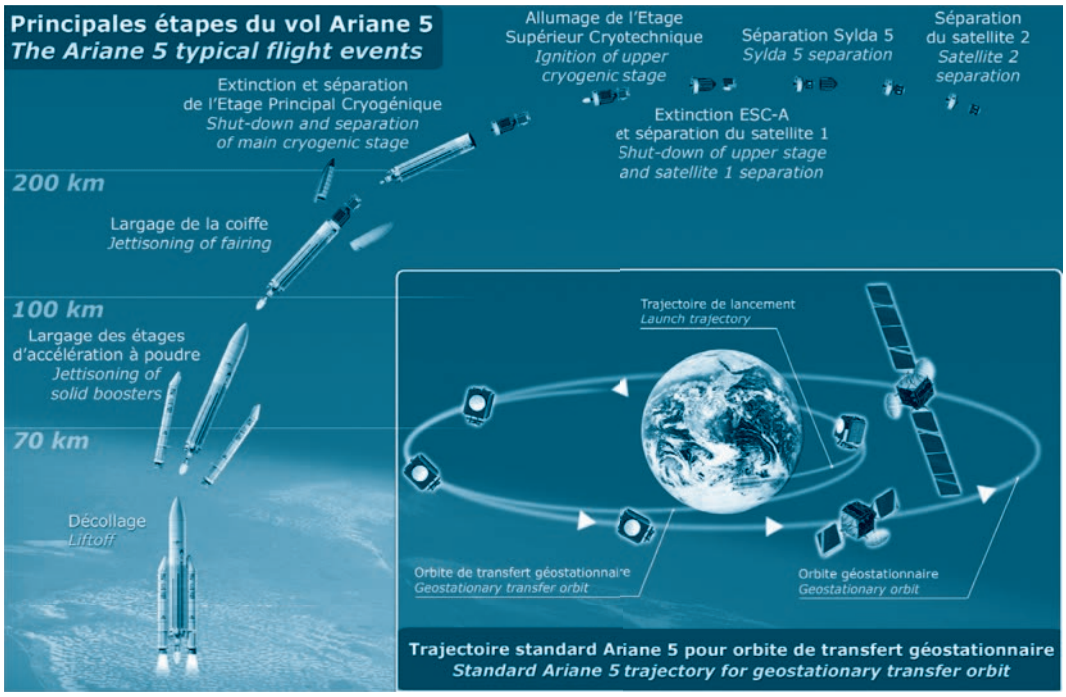
H0	*Ignition of the cryogenic main stage engine (EPC)*	*ALT (km)*	*V. rel. (m/s)*
+ 7,05 s	*Ignition of solid boosters*	*0*	*0*
+ 7,3 s	*Liftoff*	*0*	*0*
+ 12,6 s	*End of vertical climb and beginning of pitch rotation (10 seconds duration)*	*0.090*	*37.4*
+ 17 s	*Beginning of roll manoeuvre*	*0.339*	*75.6*
+ 2 mn 21 s	*Jettisoning of solid boosters*	*67.5*	*2003*
+ 3 mn 17 s	*Jettisoning of fairing*	*109.7*	*2252*
+ 8 mn 02 s	*Acquisition by Natal tracking station*	*167.4*	*5528*
+ 8 mn 59 s	*Shut-down of main cryogenic stage*	*164.7*	*6907*
+ 9 mn 05 s	*Separation of main cryogenic stage*	*164.8*	*6933*
+ 9 mn 09 s	*Ignition of upper cryogenic stage (ESC-A)*	*164.8*	*6935*
+ 13 mn 45 s	*Acquisition by Ascension tracking station*	*151.0*	*7583*
+ 18 mn 28 s	*Acquisition by Libreville tracking station*	*183.0*	*8330*
+ 23 mn 12 s	*Acquisition by Malindi tracking station*	*427.1*	*9045*
+ 25 mn 20 s	*Injection*	*660.7*	*9350*
+ 27 mn 44 s	*Separation of ASTRA 2F satellite*	*968.7*	*9093*
+ 28 mn 54 s	*Separation of Sylda 5*	*1233.3*	*8884*
+ 30 mn 45 s	*Separation of GSAT-10 satellite*	*1598*	*8612*
+ 46 mn 09 s	*End of Arianespace Flight mission*	*5351*	*6521*

4. Flight trajectory of ASTRA 2F & GSAT-10

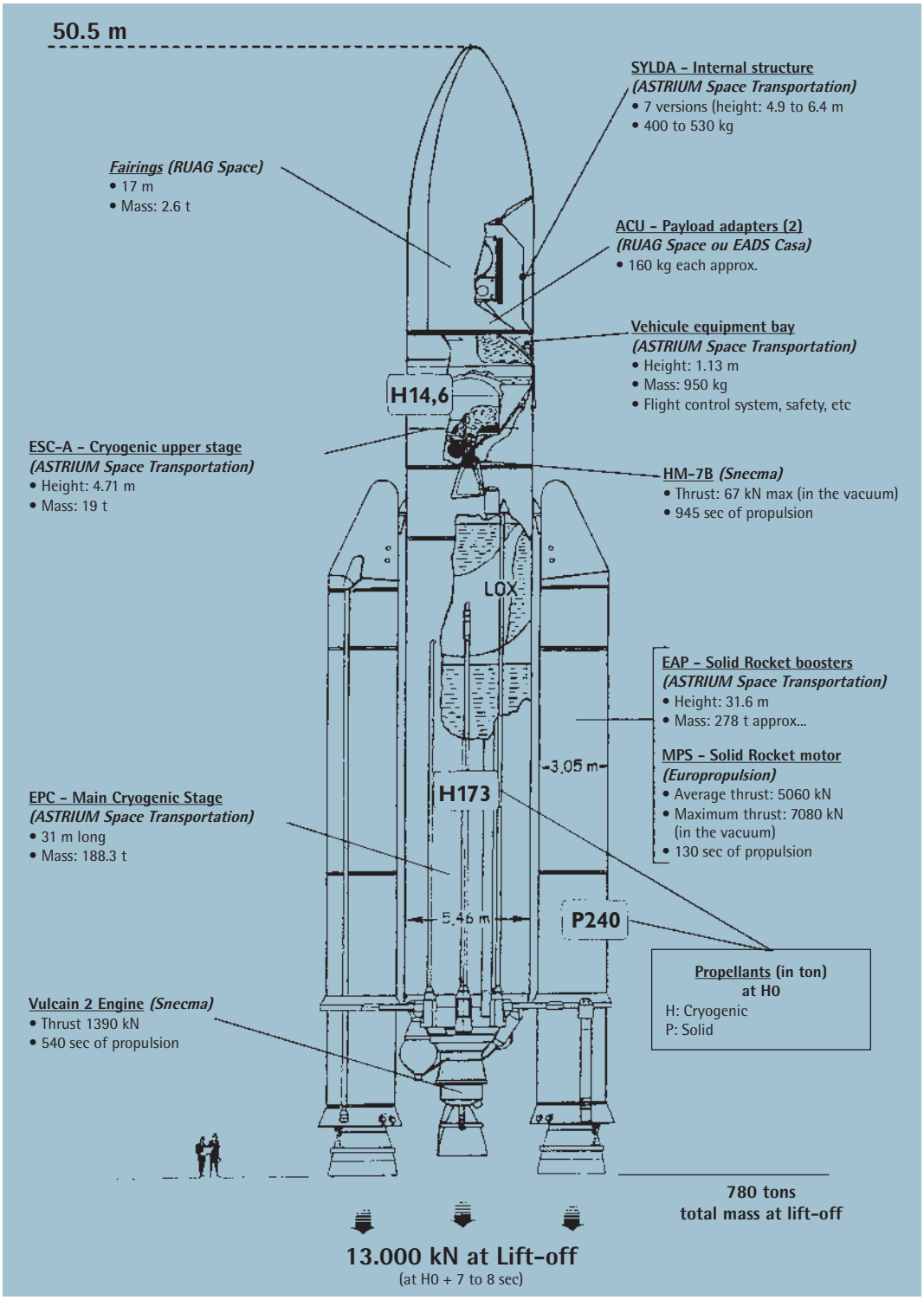
The launcher's attitude and trajectory are totally controlled by the two onboard computers, located in the Ariane 5 vehicle equipment bay (VEB).
7.05 seconds after ignition of the main stage cryogenic engine at T-0, the two solid-propellant boosters are ignited, enabling liftoff. The launcher first climbs 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 9350 meters/second, and will be at an altitude of about 660 kilometers.
The fairing protecting the ASTRA 2F and GSAT-10 spacecraft is jettisoned shortly after the boosters are jettisoned at about T+197 seconds.

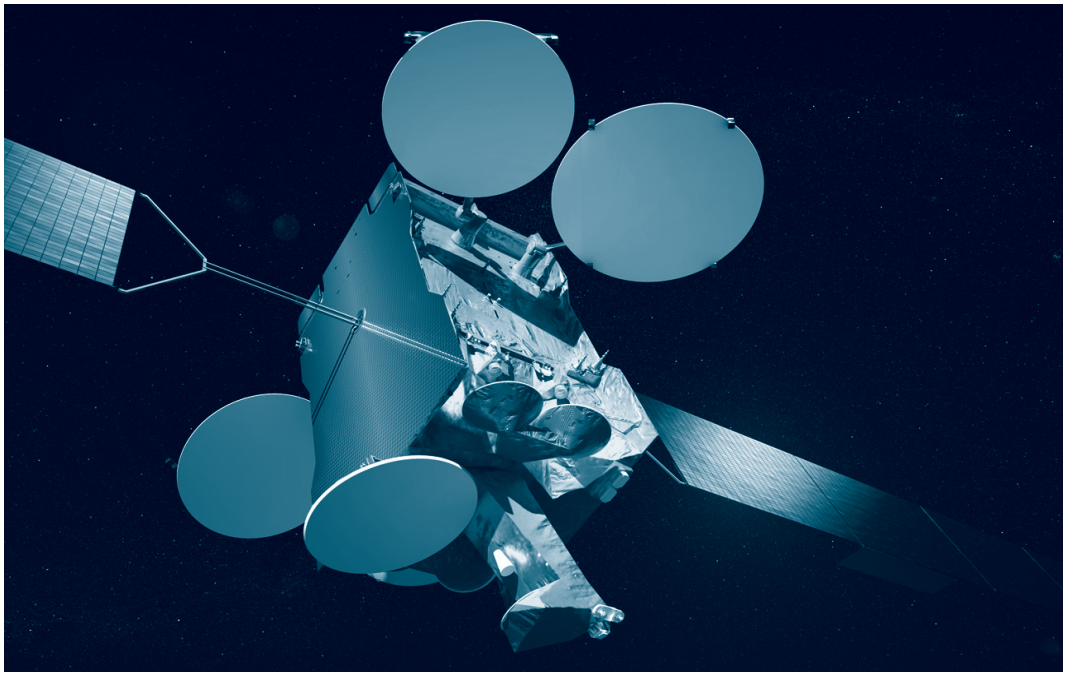
Standard Ariane 5 trajectory for geostationary transfer orbit



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



6. The ASTRA 2F satellite



Customer	*SES*	
Prime contractor	*Astrium*	
Mission	*Direct broadcast satellite (DTH)*	
Mass	*Total mass at lift-off* *Dry mass*	*6,000kg* *2,660 kg*
Stabilization	*3 axis stabilized*	
Platform	*Eurostar - E3000*	
Payload	*Ku-band and Ka-band transponders*	
On-board power	*13 kW (end of life)*	
Life time	*15 years*	
Orbital position	*28.2° Est*	
Coverage area	*Europe, Middle East and Africa*	

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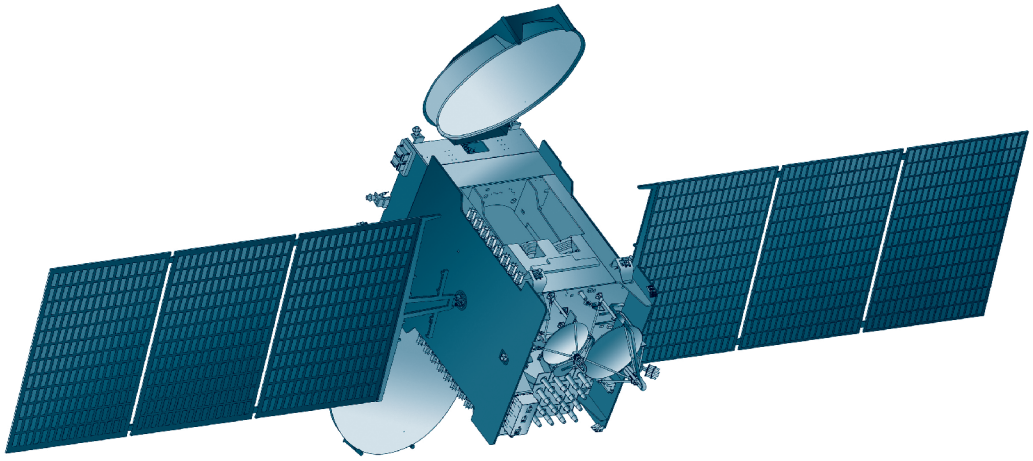
7. The GSAT-10 satellite



Customer	*ISRO*	
Prime contractor	*ISRO / ISAC*	
Mission	*Telecommunications*	
Mass	*Total mass at lift-off* *Dry mass*	*3400.5 kg* *1493.5 kg*
Stabilization	*3 axis stabilized*	
Dimensions	*3.1 m x 1.77 m x 2.0 m*	
Platform	*3000 Kg Class (I-3K)*	
Payload	*18 C-band transponders, 12 Ku-band transponders and GPS aided Geo Augmented Navigation (GAGAN) payload*	
On-board power	*6.100 kW (end of life)*	
Life time	*15 years*	
Orbital position	*83° East*	
Coverage area	*India land mass and wide coverage.*	

Contact Person

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Appendix 1. Arianespace - ASTRA 2F & GSAT-10 launch key personnel

In charge of the launch campaign			
Mission Director	*(CM)*	*Philippe ROLLAND*	*ARIANESPACE*
In charge of the launch service contract			
Program Director ASTRA 2F	*(CP)*	*Michael CALLARI*	*ARIANESPACE*
Program Director GSAT-10	*(CP)*	*Christophe BARDOU*	*ARIANESPACE*
In charge of ASTRA 2F satellite			
Satellite Mission Director	*(DMS)*	*Denis HUYLER*	*SES*
Satellite Program Manager	*(CPS)*	*Frédéric ROCHARD*	*ASTRIUM*
Satellite Preparation Manager	*(RPS)*	*Stephane REYNAL / Cedric PEZ*	*ASTRIUM*
In charge of GSAT-10 satellite			
Satellite Mission Director	*(DMS)*	*Tumkur ANURADHA*	*ISRO*
Satellite Program Manager	*(CPS)*	*Siddamallaiah JAYANANDA*	*ISRO*
Satellite Preparation Manager	*(RPS)*	*Rajendra PRASAD*	*ISRO*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*Klaus SELL*	*ARIANESPACE*
Ariane Production Project Manager	*(CPAP)*	*Frank VASSEUR*	*ARIANESPACE*
Launcher Production Quality Manager	*(RQLP)*	*Delphine SOTINEL*	*ARIANESPACE*
Launch Campaign Quality Manager	*(CQCL)*	*Geneviève DEDE*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Thierry VALLEE*	*CNES/CSG*
Range Operations Deputy	*(DDO/A)*	*Joël EGALGI*	*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 305 satellites. More than two-thirds of the commercial satellites now in service worldwide were launched by Arianespace. The company posted sales of 1013 million euros in 2011.

At January 1, 2012, Arianespace had 330 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.