

Satellite launches for Japan and the United States

On its fifth launch of the year, Arianespace will orbit two communications satellites, primarily intended for cable and direct TV broadcast services: Superbird-7 for Japanese operator Space Communications Corporation (SCC) in the scope of a turnkey contract with Mitsubishi Electric Corporation (MELCO) and AMC-21 for SES AMERICOM, the American operating company of the SES group.

The choice of Arianespace by major satellite communications operators and manufacturers is clear international recognition of the company's top-quality launch services.

Ariane 5 is the only commercial launcher in service today capable of simultaneously launching two payloads, while giving Arianespace's customers unexcelled performance, flexibility and competitiveness.

Superbird-7 was built by Mitsubishi Electric Corporation, the leading constructor of commercial satellites in Japan, at its plant in Kamakura, using a DS 2000 platform, within the scope of a turnkey contract with operator Space Communications Corporation. Weighing about 4,820 kg at launch, it will be positioned in geostationary orbit at 144 degrees East. Superbird-7 is fitted with 28 Ku-band transponders, and is designed to provide mobile terminal, cable TV and direct TV broadcast services in Japan and communications services for the entire Asia-Pacific region.

Superbird-7 will be the seventh SCC satellite launched by Ariane, and the 23rd Japanese satellite orbited by Arianespace.

AMC-21 is the 20th satellite from the SES group (Euronext Paris and Luxembourg Bourse: SESG), one of the world's leading satellite operators, to use the European launcher. The AMC-21 satellite will be operated by SES AMERICOM.

Built by Thales Alenia Space using a Star-2 platform from Orbital Sciences Corporation, AMC-21 will weigh about 2,500 kg at launch.

Fitted with 24 high-power Ku-band transponders, AMC-21 will offer a minimum design life of 15 years. It will deliver broadcast television and broadband connectivity or services in the United States, the Gulf of Mexico, the Caribbean and Central America from its orbital position at 125 degrees West.

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1. Mission profile

The 185th Ariane mission will launch two communications satellites, primarily intended for cable and direct TV broadcast services: Superbird-7 for Japanese operator Space Communications Corporation (SCC) and AMC-21 for SESAMERICOM the American operating company of the SES group.

This will be the 41st Ariane 5 launch

The launcher will be carrying a total payload of 8,101 kg, including 7,276 kg for the two satellites, which will be released separately into their targeted orbits.

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

Injection orbit

Perigee altitude	250 km
Apogee altitude	35 938 km at injection
Inclination	2° degrees

The lift-off is scheduled on the night of August 12 to 13, 2008 as soon as possible within the following launch window:

Launch opportunity

	Universal time (GMT)	Paris time	Tokyo time	Kourou time	Washington time
Between	08:44 pm	10:44 pm	5:44 am	5:44 pm	4:44 pm
and	09:35 pm	11:35 pm	6:35 am	6:35 pm	5:35 pm
on	August 12, 2008	August 12, 2008	August 13, 2008	August 12, 2008	August 12, 2008

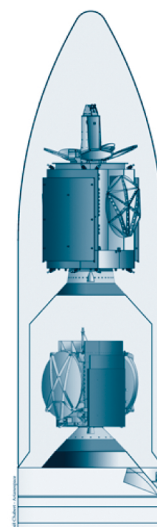
Configuration of Ariane payload

Superbird-7 was built by Mitsubishi Electric Corporation (Melco) within the scope of a turnkey contract with operator Space Communications Corporation.

Orbital position : 144° East.

AMC-21 was built by Thales Alenia Space using a Star-2 platform from Orbital Sciences Corporation, on behalf of SES AMERICOM

Orbital position: 125° West.



2. Range operations campaign: ARIANE 5 - SUPERBIRD-7 & AMC-21

Satellites and launch vehicle campaign calendar

Ariane activities	Dates	Satellites activities
Campaign start review	June 26, 2008	
EPC Erection	June 26, 2008	
EAP transfer and positioning	June 26-27, 2008	
Integration EPC/EAP	June 30, 2008	
ESC-A and VEB Erection	July 2, 2008	
	July 3, 2008	Arrival in Kourou of SUPERBIRD-7 and beginning of preparation campaign in building S5 C
	July 15, 2008	Arrival in Kourou of AMC-21 and beginning of preparation campaign in building S5 C
	July 17 & 22, 2008	AMC-21 filling operations in S5 A building
Roll-out from BIL to BAF	July 26, 2008	
	July 25 & 28, 2008	SUPERBIRD-7 operations in S5 B building

Satellites and launch vehicle campaign final calendar

J-11	Tuesday, July 29	SUPERBIRD-7 integration on adaptor (ACU)
J-10	Wednesday, July 30	SUPERBIRD-7 transfer to Final Assembly Building (BAF)
J-9	Thursday, July 31	SUPERBIRD-7 integration on Sylida and AMC-21 integration on adaptor
J-8	Friday, August 1	Fairing integration on Sylida - AMC-21 transfer to Final Assembly Building (BAF)
J-7	Saturday, August 2	AMC-21 integration on launcher
J-6	Monday, August 4	Upper composite integration with SUPERBIRD-7 on launcher
J-5	Tuesday, August 5	ESC-A final preparations and payloads control
J-4	Wednesday, August 6	Launch rehearsal
J-3	Thursday, August 7	Arming of launch vehicle
J-2	Friday, August 8	Arming of launch vehicle
	Saturday, August 9	Launch readiness review (RAL) and final preparation of launcher
J-1	Monday, August 11	Roll-out from BAF to Launch Area (ZL), launch vehicle connections and filling of the EPC liquid Helium sphere
J-0	Tuesday, August 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.

<i>Time</i>	<i>Events</i>
- 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

<i>HO</i>	<i>Ignition of the cryogenic main stage engine (EPC)</i>	<i>ALT (km)</i>	<i>V. rel. (m/s)</i>
+ 7,0 s	Ignition of solid boosters	0	0
+ 7,3 s	Liftoff	0	0
+ 12,5 s	End of vertical climb and beginning of pitch rotation (10 seconds duration)	0.085	36
+ 17 s	Beginning of roll manoeuvre	0.335	74
+ 2 mn 20 s	Jettisoning of solid boosters	65.5	1974
+ 3 mn 12 s	Jettisoning of fairing	104.9	2178
+ 7 mn 05 s	Acquisition by Natal tracking station	195.0	4418
+ 8 mn 55 s	Shut-down of main cryogenic stage	204.4	6764
+ 9 mn 01 s	Separation of main cryogenic stage	204.7	6791
+ 9 mn 05 s	Ignition of upper cryogenic stage (ESC-A)	204.8	6793
+ 13 mn 14 s	Acquisition by Ascension tracking station	187.0	7371
+ 18 mn 32 s	Acquisition by Libreville tracking station	189.0	8256
+ 23 mn 39 s	Acquisition by Malindi tracking station	435.1	9198
+ 24 mn 56 s	Shut-down of ESC-A / Injection	563.8	9432
+ 25 mn 52 s	Separation of SUPERBIRD-7 satellite	682.0	9329
+ 28 mn 37 s	Separation of Sylva 5	1111.3	8977
+ 30 mn 06 s	Separation of AMC-21 satellite	1387.0	8765
+ 41 mn 04 s	End of Arianespace Flight mission	3952.0	7178

4. Flight trajectory of SUPERBIRD-7 & AMC-21

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

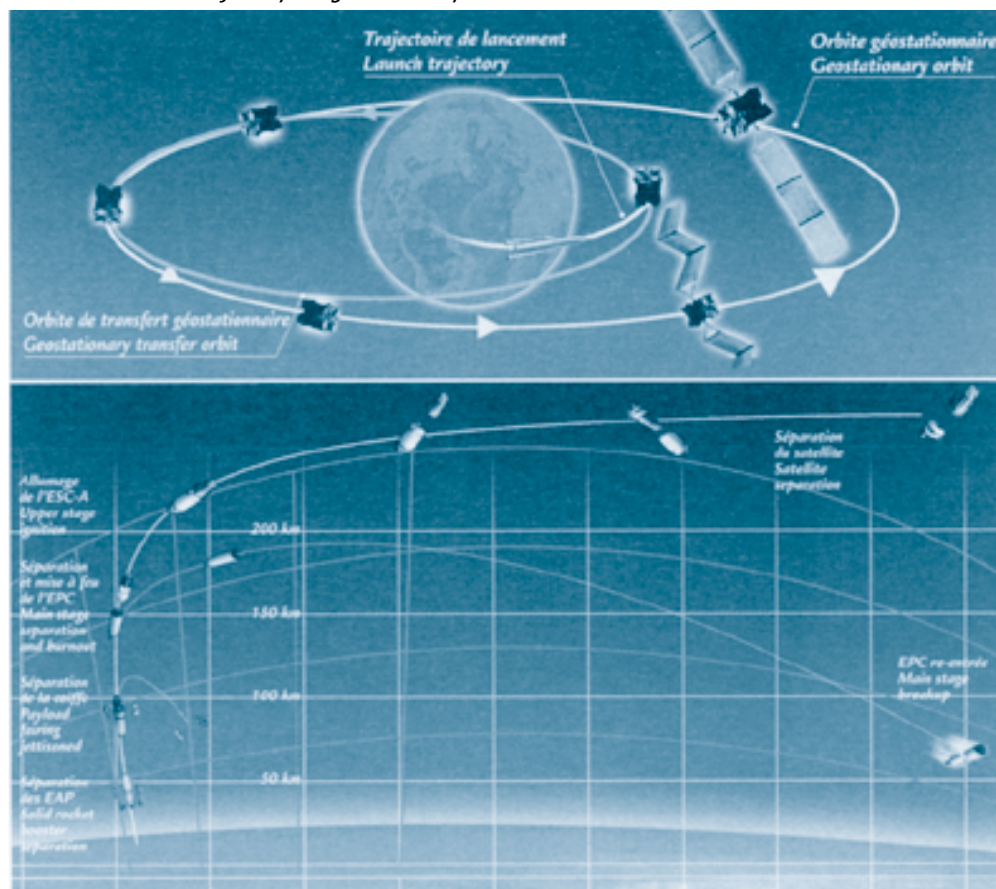
7.05 seconds after ignition of the main stage cryogenic engine at T-0, the two solid-propellant boosters are ignited, enabling liftoff. The launcher first climbs vertically for 6 seconds, then rotates towards the East. It maintains an attitude that ensures the axis of the launcher remains parallel to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

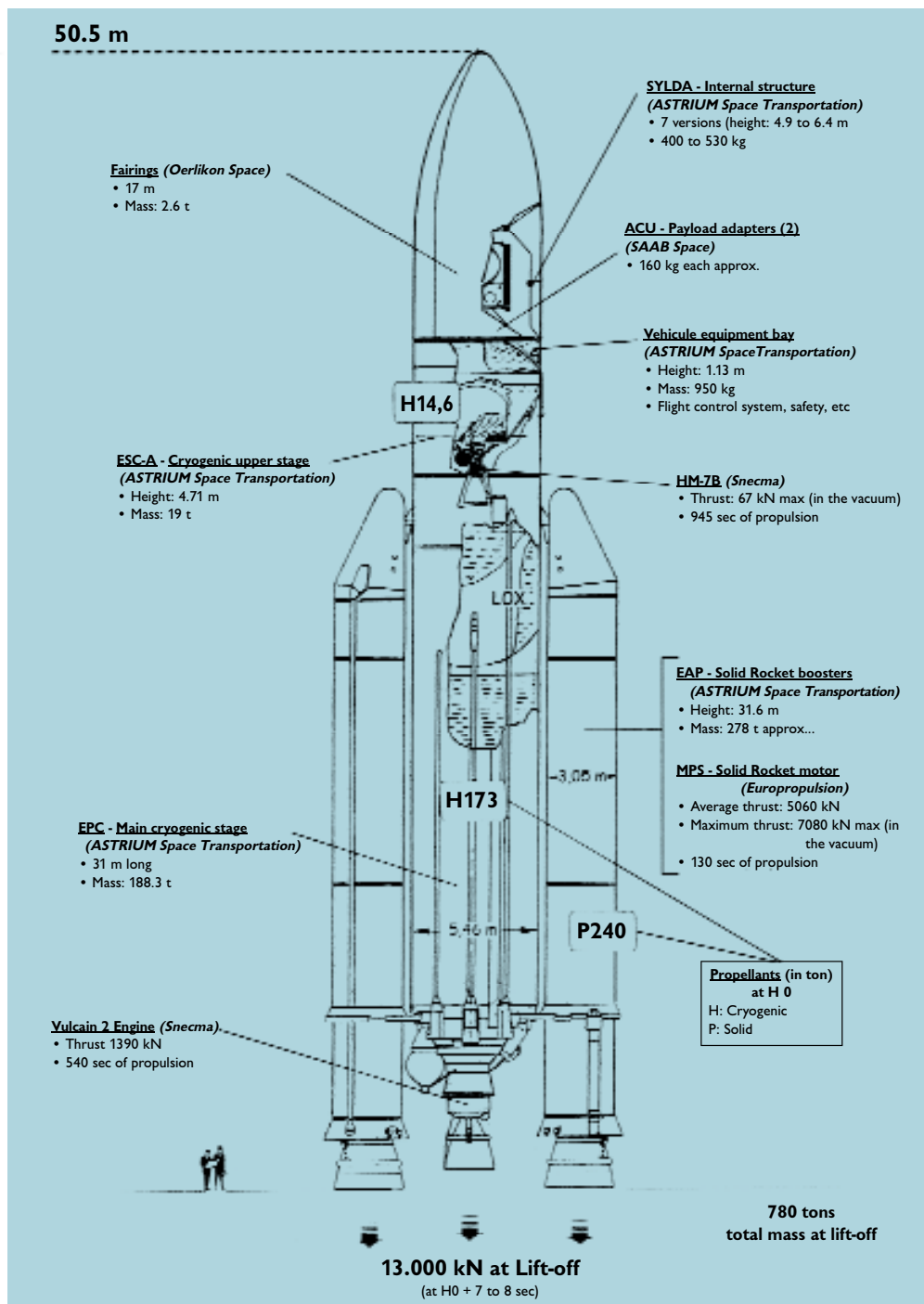
On orbital injection, the launcher will have attained a velocity of approximately 9432 meters/second, and will be at an altitude of about 564 kilometers.

The fairing protecting the SUPERBIRD-7 & AMC-21 spacecraft is jettisoned shortly after the boosters are jettisoned at about T+192 seconds.

Standard Ariane 5 trajectory for geostationary transfer orbit



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



6. The SUPERBIRD-7 satellite

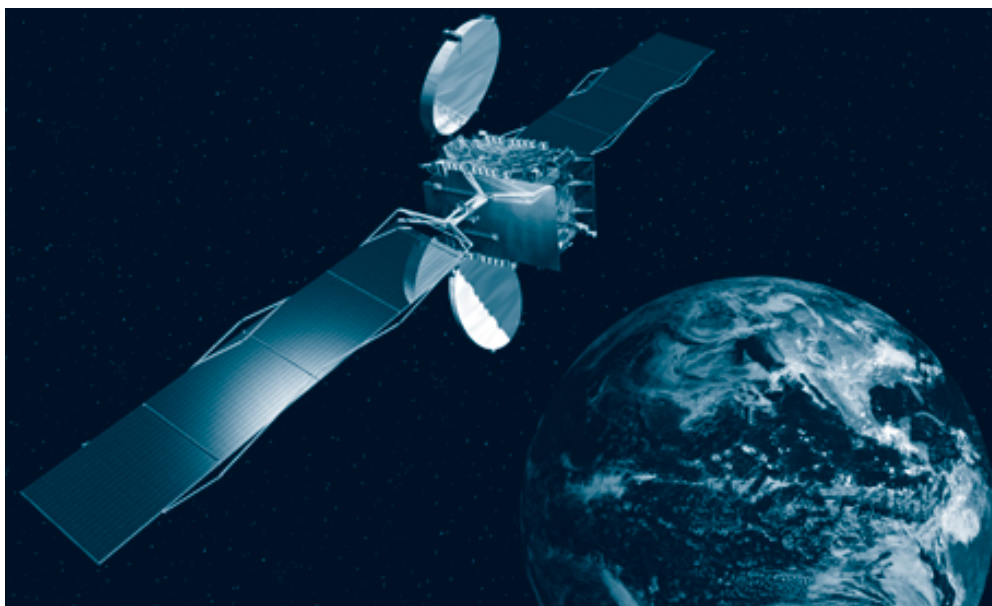


Customer	Mitsubishi Electric Corporation (MELCO) for Space Communications Corporation (SCC)	
Prime contractor	Mitsubishi Electric Corporation (MELCO)	
Mission	Broadcasting and broadband Internet	
Mass	Total mass at lift-off	4,820 kg
	Dry mass	2,018 kg
Stabilization	3 axis stabilized	
Dimensions	6.3 x 3.7 x 3.0 m	
Span in orbit	31.6 m	
Platform	DS 2000	
Payload	28 Ku-band transponders	
On-board power	8 kW (end of life)	
Life time	15 years	
Orbital position	144° East	
Coverage area	Asia - Pacific Region	

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7. The AMC-21 satellite



Customer	SES AMERICOM	
<i>Prime contractor</i>	<i>Thales Alenia Space and Orbital Sciences Corporation</i>	
<i>Mission</i>	<i>Television and Internet</i>	
<i>Mass</i>	<i>Total mass at lift-off</i>	<i>2,473 kg</i>
	<i>Dry mass</i>	<i>1,161 kg</i>
<i>Stabilization</i>	<i>3 axis stabilized</i>	
<i>Dimensions</i>	<i>2.3 x 3.2 x 2.3 m</i>	
<i>Span in orbit</i>	<i>22 m</i>	
<i>Platform</i>	<i>Star-2 by Orbital Sciences Corporation</i>	
<i>Payload</i>	<i>24 Ku band transponders</i>	
<i>On-board power</i>	<i>6 700 W (end of life)</i>	
<i>Life time</i>	<i>15 years</i>	
<i>Orbital position</i>	<i>125° West</i>	
<i>Coverage area</i>	<i>USA, Gulf of Mexico, the Carribean and Central America</i>	

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Appendix 1. Arianespace SUPERBIRD-7 & AMC-21 launch key personnel

In charge of the launch campaign

Mission Director	(CM)	Jean-Marc DURAND	ARIANESPACE
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In charge of the launch service contract

Ariane Payload Manager	(RCUA)	Jérôme RIVES	ARIANESPACE
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Ariane Deputy Mission Manager	(RCUA/A)	Alex MADEMBA-SY	ARIANESPACE
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In charge of SUPERBIRD-7 satellite

Satellite Mission Director	(DMS)	Makoto ASABA	MELCO
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Satellite Program Manager	(CPS)	Takatsugu NOMURA	MELCO
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Satellite Preparation Manager	(RPS)	Yukitoshi KATO	MELCO
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In charge of AMC-21 satellite

Satellite Mission Director	(DMS)	Dennis HUYLER	SES
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Space Systems & Operations	(SSO)	Rick STARKOV	SES
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Satellite Campaign Manager	(RCU)	Jacky TEISSEDE	THALES ALENIA SPACE
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Satellite Program Manager	(CPS)	James HARRY	OSC
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Satellite Preparation Manager	(RPS)	Jim MOONEY	OSC
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In charge of the launch vehicle

Launch Site Operations Manager	(COEL)	Patrick LUCET	ARIANESPACE
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Ariane Production Project Manager	(CPAP)	Olivier RICOUART	ARIANESPACE
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In charge of the Guiana Space Center (CSG)

Range Operations Manager	(DDO)	Thierry VALLEE	CNES/CSG
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Range Operations Deputy	(DDO/A)	Emmanuel SANCHEZ	CNES/CSG
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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 23 shareholders from ten European countries (including French space agency CNES with 34%, EADS with 30%, and all European companies participating in the construction of Ariane launchers).

Since the outset, Arianespace has signed 299 launch contracts and launched 261 satellites. More than two-thirds of the commercial satellites now in service worldwide were launched by Arianespace.

The company posted sales of more than 900 million euros in 2007, and stayed in the black for the fifth year in a row.

At January 1, 2008, Arianespace had 292 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 2009.
- The Vega light launcher, to be launched from the Guiana Space Center starting in 2009.

Arianespace has also signed a mutual backup agreement with Boeing Launch Services and Mitsubishi Heavy Industries, through an entity called the Launch Services Alliance. This arrangement guarantees that customers' payloads will be launched in case the chosen launcher is unavailable for technical reasons.

With its family of launchers and this backup agreement, 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 bas operation, 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 Regulux, 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.

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 EADS 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.