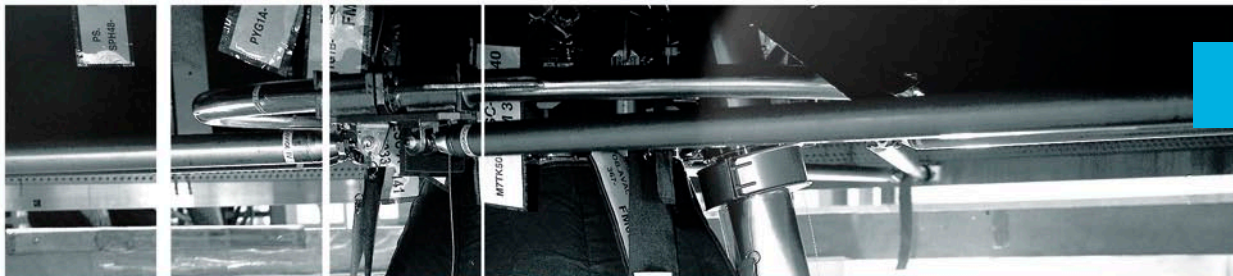


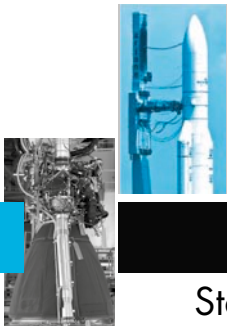
July
2015



VA 224

Star One C4
MSG-4





VA 224

Star One C4 - MSG-4



THIRD ARIANE 5 LAUNCH OF THE YEAR

On its sixth launch of the year and third Ariane 5 launch from the Guiana Space Center in French Guiana, Arianespace will orbit two satellites, one for telecommunications and the other for meteorology: Star One C4 for the Brazilian private operator Embratel Star One, the largest satellite operator in South America, and MSG-4 for EUMETSAT, the European organization dedicated to weather, climate and environmental monitoring.

The latest mission with the heavy-lift Ariane 5 once again reflects international recognition by leading operators and manufacturers, and also illustrates Arianespace's dual responsibility: to guarantee independent access to space for Europe, and to maintain its position as a benchmark in the commercial launch services market.

Star One C4 and MSG-4 will be the 511th and 512th satellites to be launched by Arianespace.

Star One C4

Star One C4 will be the 10th satellite orbited by Arianespace for the private operator Embratel Star One; the latest launch for this company was the Star One C3 satellite in November 2012.

Embratel Star One is the largest satellite service operator in the South America region. Arianespace has teamed up with Embratel Star One for 30 years, and has launched all of the company's satellites.

Fitted with 48 active Ku-band transponders, Star One C4 will be positioned at 70° West. It will ensure the continuity of telephone, television, radio, data transmission and Internet services of the entire Brazilian territory and the expansion of the service to the Western South and Central America, as well as Mexico and mainland United States.

MSG-4

MSG-4 is the fourth and last Meteosat Second Generation (MSG) satellite. It is the 12th EUMETSAT satellite to be launched by Arianespace; the most recent launches for this company were MSG-3 and MetOp-B in July and September 2012 respectively.

The MSG series of geostationary satellites is vital to ensure the safety of lives, property and infrastructure, through its critical value for the nowcasting of high impact weather and the very short-range forecasting of high impact weather. MSG-4 will be stored in orbit after launch and commissioning. As Meteosat-11, it will ultimately bridge the gap between Meteosat-10 (launched in 2012) and the first MTG satellites, expected to be launched in 2019 and 2021.

Since being founded in 1981, Arianespace has worked closely with EUMETSAT. It has orbited all EUMETSAT satellites except Meteosat-1, which was launched in 1977.



CONTENTS

The Launch:

> Mission VA 224 - Star One C4 - MSG-4	PAGE 1
> Star One C4	PAGE 3
> MSG-4	PAGE 4

Further information:

> Ariane 5-ECA launch vehicle	PAGE 5
> Launch campaign	PAGE 6
> Countdown and flight	PAGE 7
> VA 224 mission profile	PAGE 8
> Arianespace & the Guiana Space Center	PAGE 9

Press contacts

Claudia Euzet-Hoyau
c.hoyau@arianespace.com
01.60.87.55.11

Isabelle Veillon
i.veillon@arianespace.com
01.60.87.60.04



#va224



@arianespace



@arianespaceceo



arianespace.tv



youtube.com/arianespace

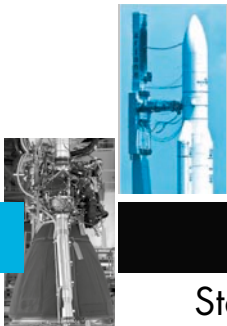


arianespace



@arianespace

For more information, visit us on www.arianespace.com



VA 224

Star One C4 - MSG-4



MISSION DESCRIPTION

The 224th Arianespace launch will place the Star One C4 and MSG-4 satellites into a geostationary transfer orbit.

This will be the 80th launch of an Ariane 5.

The launcher will be carrying a total payload of 8,587 kg. including 7,608 kg. for the Star One C4 and MSG-4 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	: 249.1 km
Apogee altitude	: 35,904 km
Inclination	: 4 degrees

Liftoff is planned on **Wednesday, July 15, 2015**

as soon as possible within the following launch windows:

- Between 06:42 pm and 07:19 pm, Kourou time
- Between 05:42 pm and 06:19 pm, Washington DC time
- Between 09:42 pm and 10:19 pm, Universal Time (UTC)
- Between 11:42 pm and 00:19 am, Paris time.

The launch at a glance

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

About seven seconds after start of the 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.

The fairing protecting the Star One C4 and MSG-4 spacecraft is jettisoned at T+220 seconds.

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 9,365 meters/second, and will be at an altitude of about 643.2 kilometers.

Payload configuration

Star One C4 was built by SSL using a 1300 series platform and will weigh about 5,560 kg. at launch.

Orbital position: 70° West

Star One C4 has an operational life of approximately 15 years

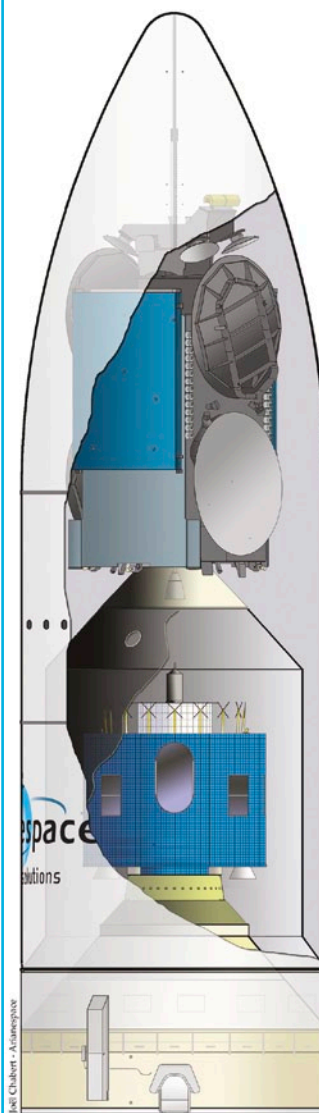
Star One C4 is the 50th geostationary platform built by SSL (and its predecessors), to be orbited by Arianespace.

The MSG-4 satellite was built by Thales Alenia Space using an MSG FM4 platform for ESA and EUMETSAT, and will weigh about 2,040 kg. at launch.

Orbital position: 3.4° West

MSG-4 has an operational life of approximately 7 years

MSG-4 is the 142nd satellite built by Thales Alenia Space to be launched by Arianespace.



Mission length

The nominal length of the mission (from liftoff to separation of the satellites) is

**40 minutes
and 20 seconds.**



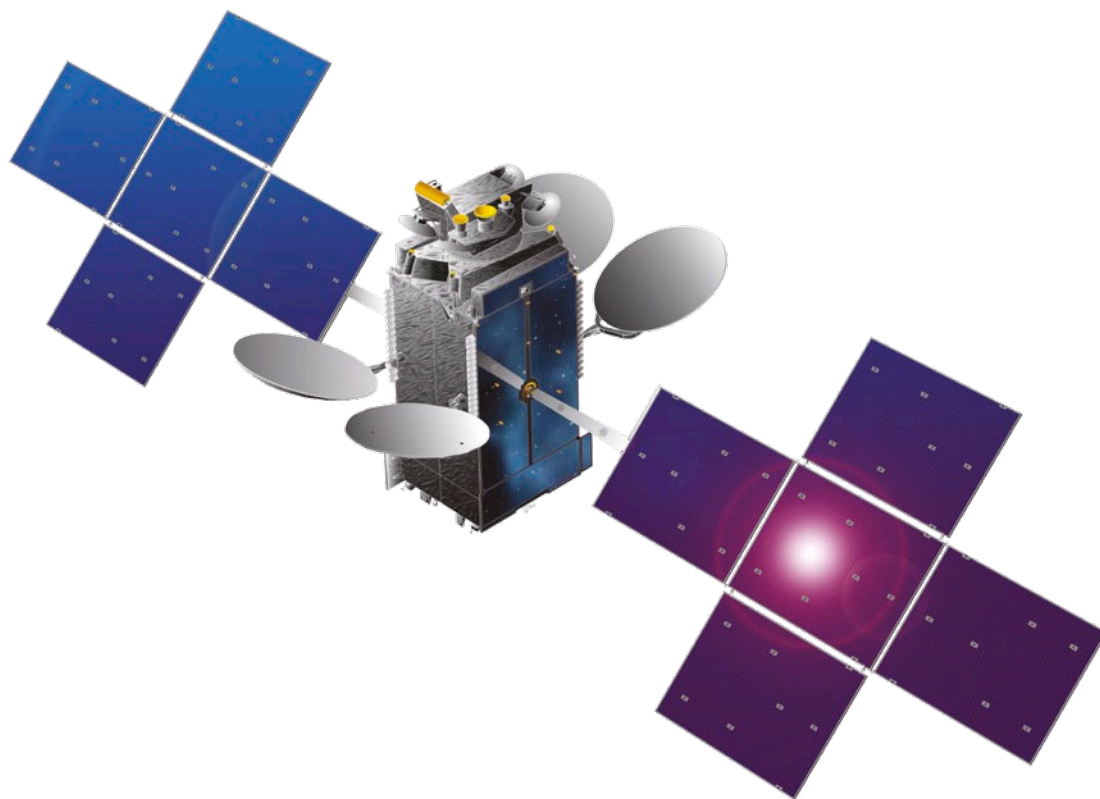


VA 224

Star One C4 - MSG-4



Star One C4



Customer	Embratel Star One
Prime contractor	SSL
Mission	Telecommunications
Mass	Total mass at liftoff approx. 5,565 kg
Stabilization	3 axis
Dimensions	5.10 x 2.35 x 2.20 m
Platform	1300 BUS
Payload	48 transponders
Onboard power	15 kW (end of life)
Design life	15 years
Orbital position	70° west
Coverage area	Brasil, Western South and Central America, Mexico and mainland United States

PRESS CONTACT:

PR Agency - Planin

Angélica Consiglio and team

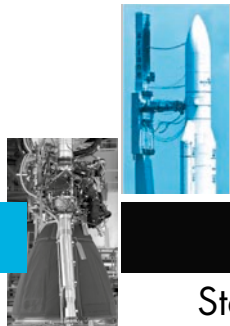
Tel: + 55 11 21388921

E-mail: embratel@planin.com



@arianespace

For more information, visit us on www.arianespace.com



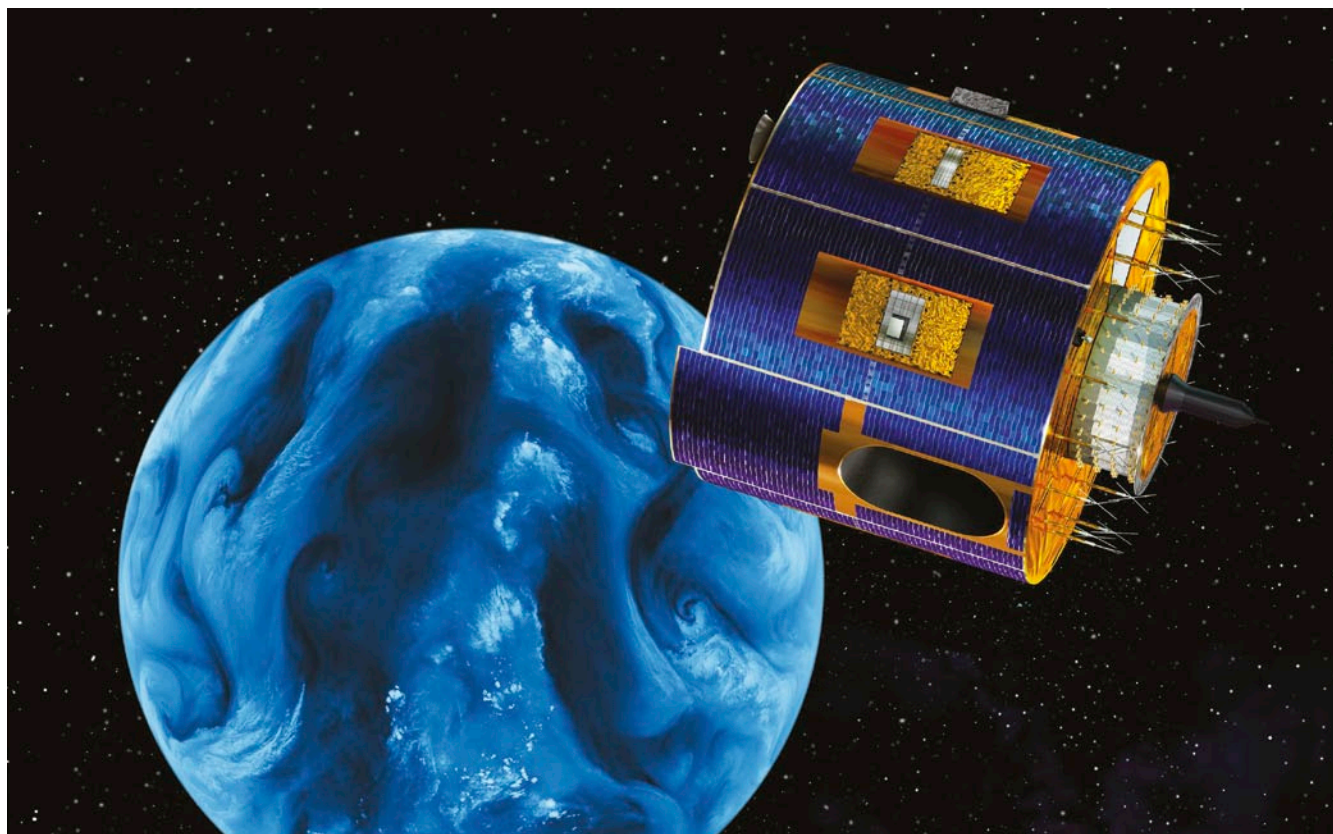
VA 224

Star One C4 - MSG-4

arianespace
service & solutions



MSG-4



Customer	EUMETSAT
Prime contractor	Thales Alenia Space
Mission	Meteorological satellite
Mass	Total mass at liftoff 2,043 kg
Stabilization	Spin stabilized
Dimensions	Ø 3.2 x 2.3 m at launch
Platform	MSG FM4
On-board power	0.7 kW (end of life)
Design life	7 years
Orbital position	3.4° west
Coverage area	Europe, Africa (including Reunion Island), Atlantic Ocean, eastern South America

PRESS CONTACT:

EUMETSAT Media Relations

E-mail: press@eumetsat.int

www.eumetsat.int

Twitter: [www.twitter.com/eumetsat](https://twitter.com/eumetsat)

YouTube: www.youtube.com/user/EUMETSAT1

Flickr: www.flickr.com/photos/eumetsat/



@arianespace

For more information, visit us on www.arianespace.com

VA 224

Star One C4 - MSG-4

arianespace
service & solutions

ARIANE 5-ECA LAUNCH VEHICLE

54.8 m

Fairing

(RUAG Space)
▼ 17 m
▼ Mass: 2.4 t

Star One C4

(Embratel Star One)
▼ Mass: 5.6 t

MSG-4

(EUMETSAT)
▼ Mass: 2.0 t

Vehicle Equipment Bay

(Airbus Defence and Space)
▼ Height: 1.13 m
▼ Mass: 970 kg.

ESC-A - Cryogenic upper stage

(Airbus Defence and Space)
▼ Height: 4.71 m
▼ Mass: 19 t

EPC - Cryogenic main stage

(Airbus Defence and Space)
▼ Height: 31 m
▼ Mass: 188 t

EAP - Solid Rocket Boosters

(Airbus Defence and Space)
▼ Height: 31.6 m
▼ Mass: 277 t approx.

Vulcain 2 Engine

(Snecma)
▼ Thrust: 1,390 kN (in vacuum)
▼ 540 sec of propulsion

780 tons

(total mass at liftoff)

ACU - Payload adaptor (2)

(RUAG Space or Airbus Defence and Space)
▼ Mass: approx. 140 kg each

SYLDA - Internal structure

(Airbus Defence and Space)
▼ 7 versions (Height: 4.9 to 6.4 m)
▼ Mass: 400 to 530 kg.

HM-7B engine

(Snecma)
▼ Thrust: 67 kN (in vacuum)
▼ 945 sec of propulsion

Propellants (in metric tons) at T-O

H : Cryogenic
P : Solid

MPS - Solid Rocket Motor (SRM)

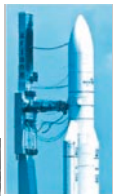
(Europropulsion)
▼ Average thrust: 5,060 kN
▼ Maximum thrust: 7,080 kN (in vacuum)
▼ 130 sec of propulsion

13,000 kN at Lift-off
(at T+7.3 sec.)



@arianespace

For more information, visit us on www.arianespace.com



VA 224

Star One C4 - MSG-4



LAUNCH CAMPAIGN: ARIANE 5 - Star One C4 - MSG-4

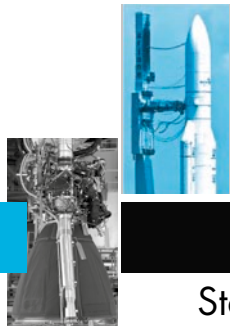
Star One C4 - MSG-4 and launch vehicle campaign calendar

Date	Satellite activities	Launch vehicle activities
April 28, 2015	Arrival in Kourou of MSG-4, beginning of preparation in building S1B	
May 11, 2015		Campaign start review
May 12, 2015		EPC erection
May 13, 2015		EAP transfer and positioning
May 15, 2015		EPC/EAP integration
May 19, 2015		ESC-A erection and equipment bay integration
May 22, 2015	Arrival in Kourou of Star One C4, beginning of preparation in building S5C	
June 5, 2015	MSG-4 transfer to S5B	
June 16, 2015		BIL-BAF transfer
June 17, 2015	Star One C4 transfer to S3B	
June 17-20, 2015	MSG-4 filling operations	
June 20-23, 2015	Star One C4 filling operations	
June 24, 2015	Star One C4 integration on adaptor ACUH and functional test	
June 25, 2015	MSG-4 integration on ACUB and Star One C4 transfer to Final Assembly Building (BAF)	
June 26, 2015	Star One C4 integration on SYLDA	
June 27, 2015	MSG-4 transfer to Final Assembly Building (BAF)	
June 29, 2015	MSG-4 integration on launcher	

Star One C4 - MSG-4 launch vehicle campaign final calendar

Date	Satellite activities	Launch vehicle activities
Monday, July 6, 2015	Fairing integration on SYLDA	
Tuesday, July 7, 2015	Composite integration with Star One C4 on launcher	
Wednesday, July 8, 2015		Completion of composite integration on launcher
Thursday, July 9, 2015		ESC-A final preparations and launch rehearsal
Friday, July 10, 2015		Arming of launch vehicle and launch readiness review (RAL)
Saturday, July 11, 2015		Final preparation of launcher
Monday, July 13, 2015		Rollout from BAF to Launch Zone, launch vehicle connections and filling of the EPC liquid helium tank
Wednesday, July 15, 2015		Start of launch countdown, EPC filling with liquid oxygen and liquid hydrogen





VA 224

Star One C4 - MSG-4



▼ COUNTDOWN AND FLIGHT

The countdown comprises all final preparation steps for the launcher, the satellites/spacecraft 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.

The countdown culminates in a synchronized sequence, 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 nominal liftoff window, then the launch will be delayed by one, two or more days, depending on the problem involved, and the solution developed.

TIME	EVENT
- 11 h 30 mn	Start of final countdown
- 07 h 30 mn	Check of electrical systems
- 04 h 50 mn	Start of filling of main cryogenic stage with liquid oxygen and hydrogen
- 03 h 20 mn	Chilldown of Vulcain main stage engine
- 01 h 10 mn	Check of connections between launcher and telemetry, tracking and command systems
- 07 mn	"All systems go" report, allowing start of synchronized sequence
- 04 mn	Tanks pressurized for flight
- 01 mn	Switch to onboard power mode
- 05 s	Cryogenic arm opening command
- 04 s	Onboard systems take over
- 03 s	Two inertial reference systems switch to flight mode

T-O	Ignition of the cryogenic main stage engine (EPC)
+ 07 s	Ignition of solid boosters (EAP)
+ 07 s	Liftoff
+ 12 s	End of vertical climb, beginning of pitch motion
+ 17 s	Beginning of roll maneuver
+ 2 mn 22 s	EAP separation
+ 3 mn 43 s	Fairing jettisoned
+ 7 mn 55 s	Acquisition by Natal tracking station
+ 8 mn 49 s	End of EPC thrust phase
+ 8 mn 55 s	EPC separation
+ 8 mn 59 s	Ignition of ESC-A stage
+ 13 mn 21 s	Acquisition by Ascension tracking station
+ 18 mn 17 s	Acquisition by Libreville tracking station
+ 23 mn 14 s	Acquisition by Malindi tracking station
+ 24 mn 48 s	End of ESC-A thrust phase / Injection
+ 28 mn 15 s	Star One C4 satellite separation
+ 30 mn 56 s	Sylda 5 separation
+ 40 mn 19 s	MSG-4 satellite separation
+ 01 h 8 mn 16 s	End of Arianespace mission



VA 224

Star One C4 - MSG-4



Star One C4 - MSG-4 MISSION PROFILE

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

The synchronized sequence starts 7 minutes 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, the sequence 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:

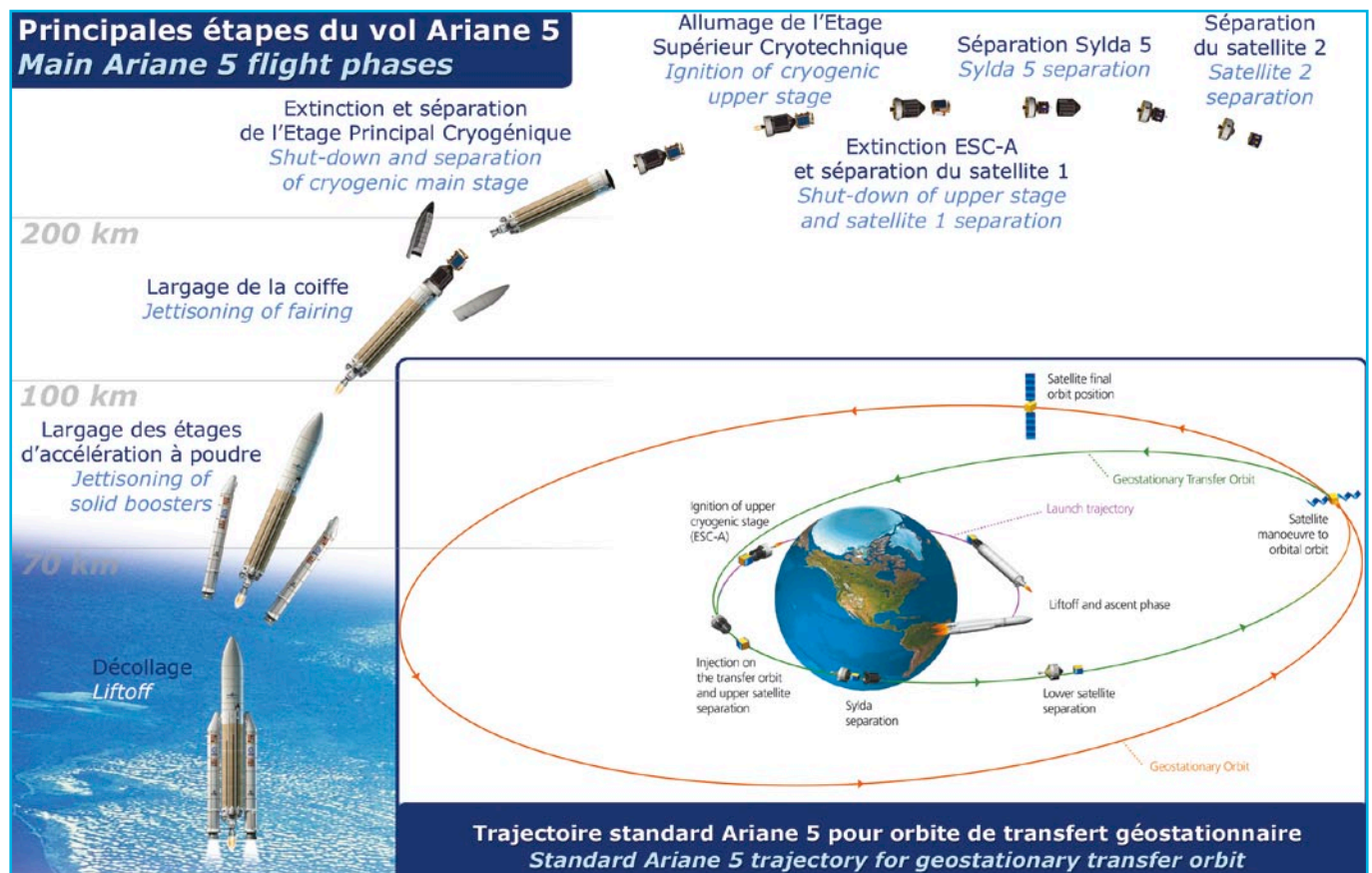
- Startup of water injection in the flame trenches and jet guide (T-30 sec).
- Hydrogen aspiration for chardown of the Vulcain engine in the jet guide (T-18 sec).
- Burnoff of hydrogen used for chardown (T-5.5 sec).

At T-4 seconds, the onboard computer takes over control of final engine startup and liftoff operations. It:

- Starts the ignition sequence for the Vulcain main stage engine (T-0).
- Checks engine operation (from T+4.5 to T+7.3 sec).
- Commands ignition of the solid boosters for immediate liftoff at T+7.3 seconds.

Any shutdown of the synchronized sequence after T-7 minutes automatically places the launcher back in its T-7 minutes configuration.

Ariane 5-ECA - Star One C4 - MSG-4 trajectory





ARIANESPACE AND THE GUIANA SPACE CENTER

Arianespace, the first launch services company in the world

Arianespace was founded in 1980 as the world's first launch Services & Solutions company. Arianespace now has 20 shareholders from ten European countries (including Airbus Safran Launchers, CNES and all European companies participating in the production of Ariane launchers). Since the outset, Arianespace has signed more than 450 launch contracts and launched more than 500 satellites. More than two-thirds of the commercial satellites now in service worldwide were launched by Arianespace. The company posted sales of 1.399 million euros in 2014.

As of March 1, 2015, Arianespace had 322 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 services to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:

- The Ariane 5 heavy launcher, operated from the Guiana Space Center in French Guiana.
- The Soyuz medium launcher, currently in operation at the Guiana Space Center and the Baikonur Cosmodrome in Kazakhstan.
- The Vega light launcher, also operated from the Guiana Space Center.

Building on its complete family of launchers, Arianespace has won over half of the commercial launch contracts up for bid worldwide in the past two years. Arianespace now has a backlog of more than 70 satellites to be launched.

The Guiana Space Center: Europe's Spaceport

For 40 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, Soyuz and Vega launch complexes, comprising the launch zones and launcher integration buildings.
- Various industrial facilities, including those operated by Regulux, Europropulsion, Air Liquide Spatial Guyane and Airbus Defence and Space, all involved in the production of Ariane 5 components. 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 Ariane, Soyuz and Vega development programs. Once these launch systems are qualified, ESA transfers 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.

The French space agency CNES has several main responsibilities at the Guiana Space Center. It designs all infrastructure 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 and 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.

Arianespace in Guiana

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 Airbus Defence and Space 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 (SNES/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 deploys a top-flight team and technical facilities to ensure the launchers and their satellite payloads are 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.

