

22nd launch for Intelsat

Arianespace's tenth launch of the year will orbit the Intelsat 906 communications satellite. Intelsat 906 will be the 22nd Intelsat satellite launched to date by Ariane. This is the sixth spacecraft in Intelsat's new generation IX series, and this launch provides further confirmation of Intelsat's confidence in Arianespace.

The Intelsat IX generation is providing two to three times the power of the satellites being replaced, offering customers all around the world better quality services and the ability to implement more cost-effective ground facilities.

Built by Space Systems/Loral in Palo Alto, California, it will be positioned at 64.15 degrees East. Intelsat 906 joins the Intelsat fleet of satellites providing Internet, broadcast, telephony and corporate network solutions services for the Americas, Europe, Africa and the Middle-East.

The first series IX satellite, Intelsat 901, was launched by Arianespace Flight 141 in June 2001. Intelsat 902 was orbited by Flight 143 in August 2001, Intelsat 904 in February 2002 (Flight 148) and Intelsat 905 on June 5, 2002 (Flight 152).

One more Intelsat IX satellites is scheduled for launch by Arianespace.

For Flight 154, Arianespace will use an Ariane 44L, the version fitted with four liquid-propellant strap-on boosters.

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1. Arianespace Flight 154 mission

The 155th Ariane launch (Flight 154) is scheduled to place the Intelsat 906 satellite into a geostationary transfer orbit using an ARIANE 44L launch vehicle equipped with four liquid strap-on boosters (PAL). This will be the 114th Ariane 4 launch and the 38th in the 44L configuration.

It will be launched from the Ariane launch complex n°2 (ELA2), in Kourou, French Guiana. The launch vehicle performance requirement is 4,765 kg (10,483 lb) of which 4,723 kg (10,390 lb) represent the mass of the spacecraft to be separated on the injection orbit.

Injection orbit

Perigee	200 km
Altitude Apogee	35 956 km at injection
Inclination	7° degrees

The ARIANE 44L launcher liftoff for Flight 154 is scheduled in the morning of September 6, 2002 as early as possible within the following launch window :

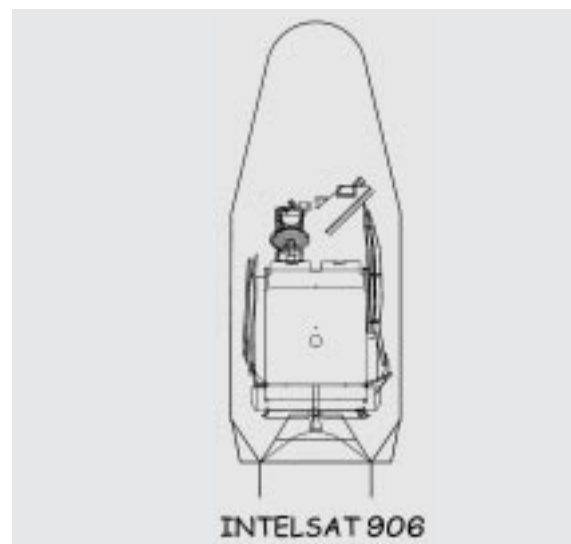
Launch opportunity

GMT	Paris time	Washington time	Kourou time
From 6:44 am	8:44 am	2:44 am	3:44 am
to 7:44 am	9:44 am	3:44 am	4:44 am
on September 6, 2002	September 6, 2002	September 6, 2002	September 6, 2002

Ariane payload configuration

The Intelsat 906 satellite was built by Space Systems/Loral in Palo Alto (California), for the international operator Intelsat.

Orbital position: 64.15° East, over the Indian Ocean.



2. Range operations campaign: ARIANE 44L – INTELSAT 906

The actual work for satellite range operations lasts 15 working days for Intelsat 906 from its arrival in Kourou (before encapsulation).
The ARIANE 44L preparation campaign lasts 25 working days.

Satellite and launch vehicle campaign calendar

<i>Ariane activities</i>	<i>Dates</i>	<i>Satellite activities</i>
Campaign start review	June 4, 2002	
First stage erection	June 4, 2002	
Second stage erection	June 5, 2002	
Third stage erection	June 6, 2002	
Liquid strap-on boosters erection	June 7 - 11, 2002	
Flight 153	July 5, 2002	Ariane 5 Launch: Stellat 5 and N-STAR c
	August 8, 2002	Intelsat 906 arrival in Kourou and beginning of its preparation in S1B building
	August 20, 2002	Intelsat 906 transfer from S1B to S3B building
	August 21, 2002	Beginning of Intelsat 906 filling operations
Roll-out to launch pad	August 23, 2002	
D-7 Monday, August 26	Start of combined operations	
D-6 Tuesday, August 27	Satellite encapsulation operations	
Flight 155	August 27, 2002	Ariane 5 Launch: Atlantic Bird™ 1 and MSG-1
D-5 Thursday, August 29	Satellite composite transfer to the launch pad	
D-4 Friday, August 30	Satellite composite mating onto launcher and overall checks	
D-3 Monday, September 2	Launch Rehearsal	
D-2 Tuesday, September 3	Launch Readiness Review (RAL) and launcher arming	
D-1 Wednesday, September 4	Filling of 1st stage, 2nd stage and liquid boosters with UH 25 and N2O4	
D-0 Thursday, September 5	Launch Countdown including 3rd stage filling with liquid oxygen and liquid hydrogen	
H-0 Friday, September 6		

3. Launch countdown and flight events

The final launch countdown runs through all the final launcher and satellite related operations. It configures the vehicle and its payload for ignition of the first stage and PAL engines at the selected launch time, as soon as possible within the launch window authorized by the spacecraft.

A synchronized sequence (see Appendix 3), controlled by the Ariane ground check-out computers, starts at H0 - 6mn and concludes the countdown.

Should a hold in the countdown delay the H0 time beyond the launch window, the launch is postponed to (in days) D + 1 or D + 2 (or later) depending on the source of the problem and the time to resolve it.

Time	Events
- 12h 30 mn 00 s	Start of final countdown
- 5 h 35 mn 00 s	Start of gantry withdrawal
- 3 h 35 mn 00 s	Start of the 3rd stage filling operations with liquid hydrogen and liquid oxygen
- 1 h 5 mn 00 s	Activation of launcher telemetry, radar transponders, telecommand
- 6 mn 00 s	"Green status for all systems" to authorize start of synchronized launch sequence
- 3 mn 40 s	Spacecraft switched to on-board power (latest time)
- 1 mn 00 s	Launcher equipment switched to on-board batteries
- 09 s	Inertial platform release
- 05 s	Release command to cryogenic arms retraction system
H0	Ignition of first stage and liquid strap-on boosters engines
+ 4.4 s	Lift-off
+ 16 s	End of vertical ascent phase of pitch motion (10 s duration)
+ 2 mn 30 s	Liquid strap-on booster jettison
+ 3 mn 31 s	First stage separation
+ 3 mn 34 s	Second stage ignition
+ 4 mn 24 s	Fairing jettison
+ 5 mn 43 s	Second stage separation
+ 5 mn 48 s	Third stage ignition
+ 6 mn 30 s	Launcher acquired by Natal station
+ 12 mn 30 s	Launcher acquired by Ascension Island station
+ 17 mn 30 s	Launcher acquired by Libreville station
+ 18 mn 49 s	Third stage shutdown sequence
+ 20 mn 57 s	Intelsat 906 separation
+ 21 mn 08 s	Start of the third stage avoidance maneuver
+ 22 mn 30 s	End of Arianespace Flight 154 mission

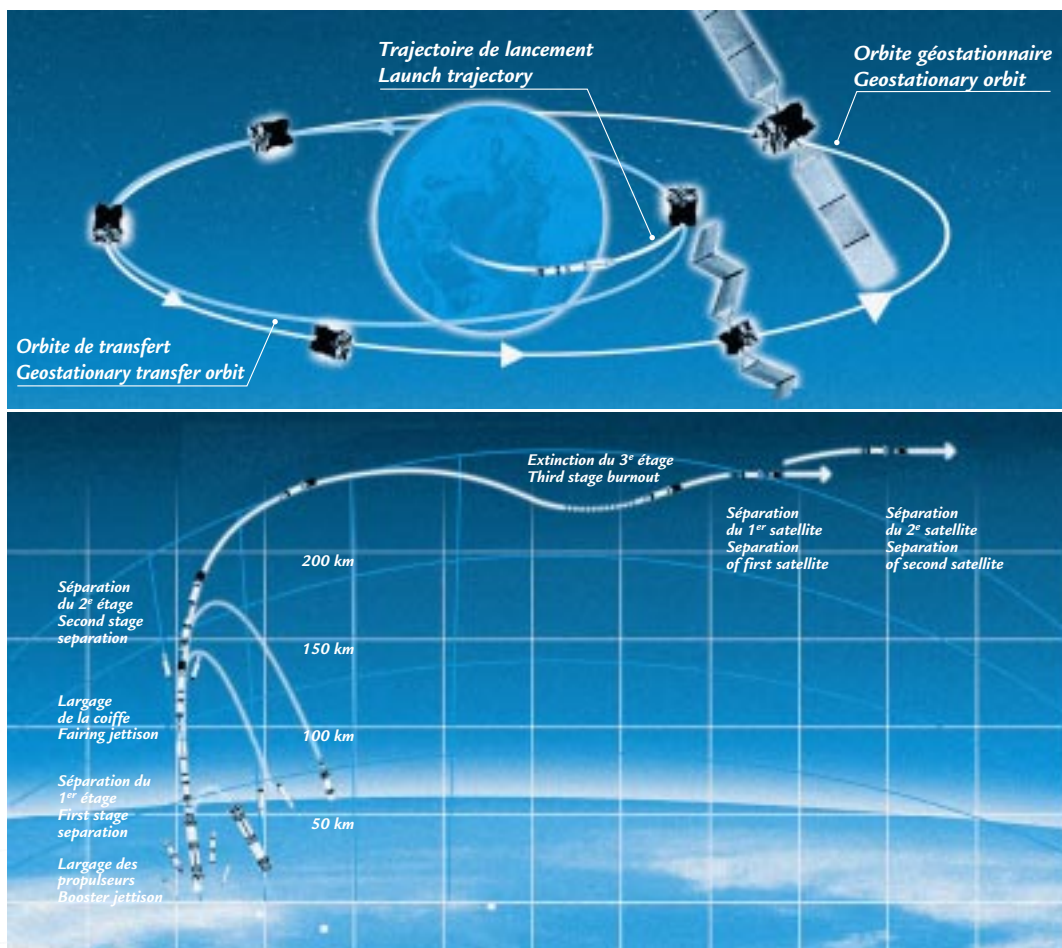
4. Flight 154 Trajectory

The launcher ascends vertically from lift-off to H0+16 sec. During a period of 10 sec. after this vertical ascent, the launch vehicle tilts in the pitch plane defined by the trajectory and pre-calculated by the on-board computer.

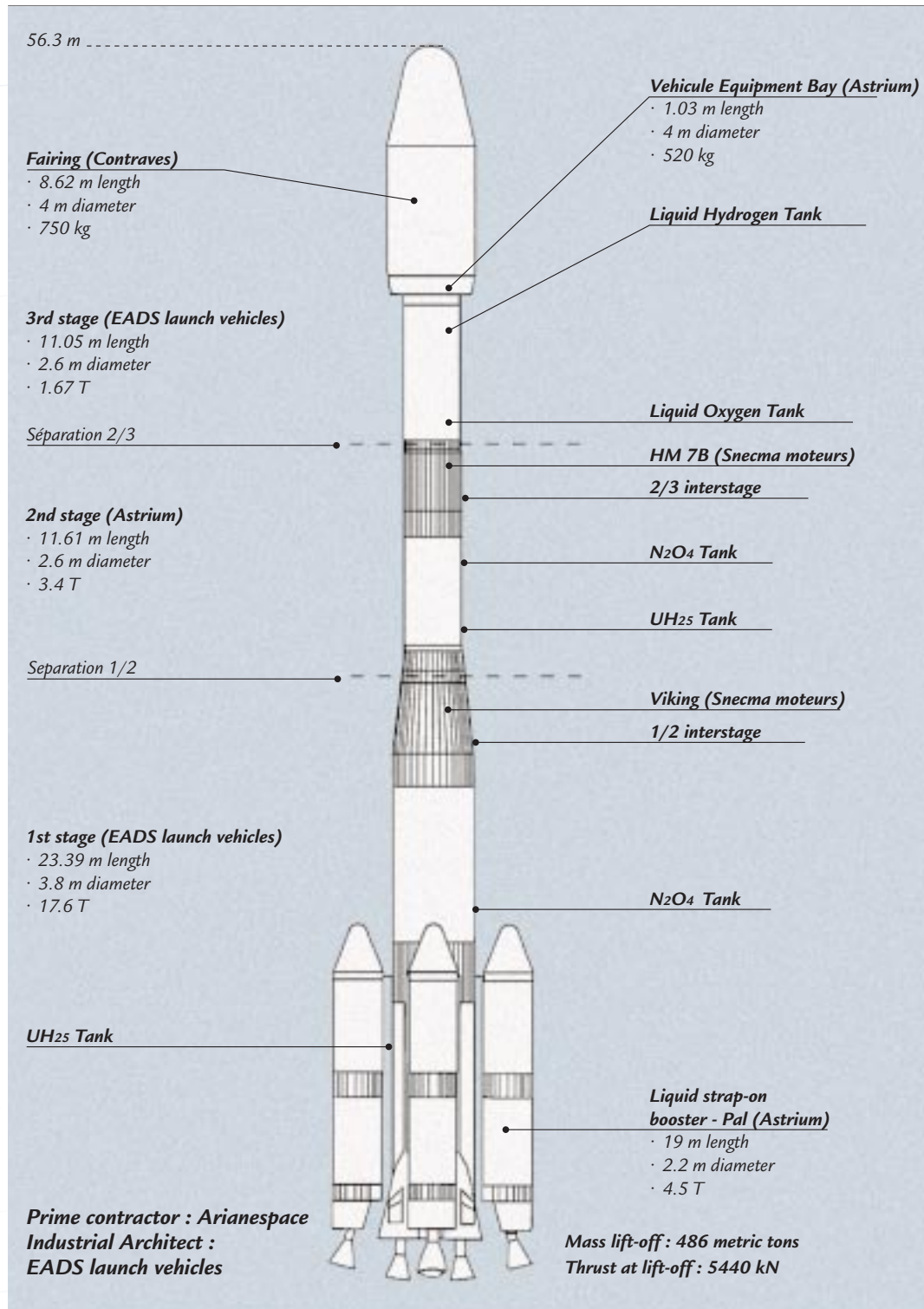
The vehicle's attitude is commanded by a predetermined law. The guidance phase is initiated 10 sec. after ignition of the 2nd stage. The attitude law in the pitch-and-yaw plane is optimized in order to minimize the 3rd stage propulsion time necessary to reach the target orbit with a performance margin of about 164 kg (360 lb). This ensures reaching this orbit with a probability of about 99% before the exhaustion of third stage propellant.

The roll law is applied so as to improve the launcher/ground station radio link budget.

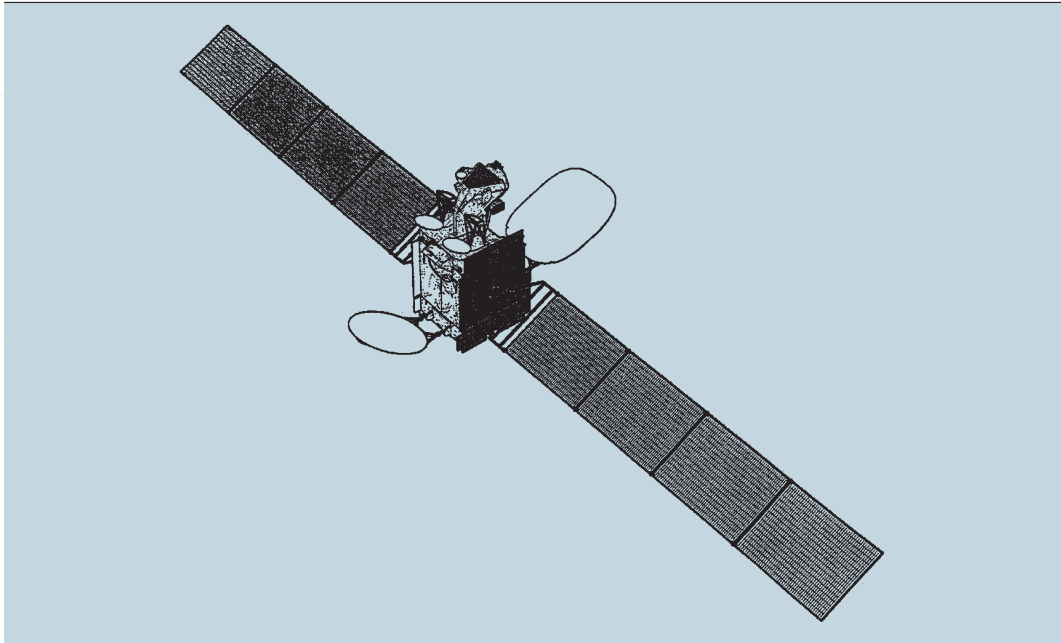
Typical trajectory for standard geostationary transfer orbit and ground station visibility



5. The launch vehicle



6. The Intelsat 906 satellite



Customer	Intelsat	
Prime contractor	Space Systems/Loral in Palo Alto (California)	
Mission	Internet, broadcast, telephony and corporate network solutions	
Mass	Total mass (at lift-off)	4.723 kg (10,390 lb)
Dry mass		1.955 kg (4,364 lb)
Stabilization	3 axis	
Dimensions	2.80 m x 3.50 m x 5.56 m	
Span in orbit	31 m	
Platform	FS1300 Extended	
Payload	72 C Band transponders (in 36 MHz equivalent units) 22 Ku Band transponders (in 36 MHz equivalent units)	
On-board power	10 kW (beginning of life)	
Life time	13 years	
Orbital location	64.15° east, over the Indian Ocean	
Coverage area	Indian Ocean	

Press Contact for Intelsat

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Appendix 1 - Arianespace Flight 154 key personnel

In charge of the launch campaign

<i>Mission Director</i>	<i>(CM)</i>	<i>Didier CASSE</i>	<i>ARIANESPACE</i>
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In charge of the launch service contracts

<i>Intelsat 906 Mission Manager and Ariane Payload Manager</i>	<i>(RCUA)</i>	<i>Steve HALL</i>	<i>ARIANESPACE</i>
<i>Deputy Mission Manager</i>	<i>(RCUA/A)</i>	<i>Michael CALLARI</i>	<i>ARIANESPACE</i>

In charge of Intelsat 906 satellite

<i>Satellite Mission Director</i>	<i>(DMS)</i>	<i>Terry EDWARDS</i>	<i>INTELSAT</i>
<i>Satellite Project Manager</i>	<i>(CPS)</i>	<i>E. LEVINE</i>	<i>SPACE SYSTEMS/LORAL</i>
<i>Satellite Preparation Manager</i>	<i>(RPS)</i>	<i>M. WAHDY</i>	<i>SPACE SYSTEMS/LORAL</i>

In charge of the launch vehicle

<i>Launch Site Operations Manager</i>	<i>(COEL)</i>	<i>Philippe HERS</i>	<i>ARIANESPACE</i>
<i>Ariane Production Project Manager</i>	<i>(CPAP)</i>	<i>Manuel SANCHEZ</i>	<i>ARIANESPACE</i>

In charge of the Guiana Space Center (CSG)

<i>Range Operations Manager</i>	<i>(DDO)</i>	<i>Bruno GILLES</i>	<i>CNES/CSG</i>
<i>Flight Safety Officer</i>	<i>(RSV)</i>	<i>Dominique POULAIN</i>	<i>CNES/CSG</i>

Appendix 2 - Launch environment conditions

The allowable weather conditions for gantry withdrawal depend on the Ariane stage pressurization values. Wind speed has to be below 17 m/s.

Acceptable wind speed limit at liftoff is 9,5 m/s for any wind direction. For safety reasons, the wind speed on the ground (at Kourou) and at a high altitude (between 10,000 and 20,000 m) also is taken into account.

Appendix 3 - Synchronized sequence

The synchronized sequence starts at H0 - 6 min. This sequence is used for final preparation of the launcher, and for checkout operations related to switchover to flight configuration. The sequence is fully automatic, and is controlled in parallel, up to H0 - 5 sec., by two computers in the Ariane Launch Center (CDL). All resources used for launch are synchronized on a common countdown sequence.

One computer configures fluids and propellants for flight and performs associated checks. The other computer executes final preparation of the electrical systems (initiation of flight program, start-up of servomotors, switchover from ground power to flight batteries, etc.) and corresponding checkout operations.

After H0 - 5 s. and retraction of the cryogenic arms retraction from the launcher, a majority logic sequencer delivers the main timing pulses for :

- first stage & liquid booster engine ignition (H0).
- engine parameter checkout (conducted in parallel by the two computers, starting at H0 + 2.8 s.).
- opening of the launch table clamps (releasing the launch vehicle between H0 + 4.1s. and H0 + 4.6 s.) as soon as engine parameters are judged as nominal by one of the computers.

Any hold in the synchronized sequence before H0 - 5 s. automatically resets the launcher to the H0 - 6 min. configuration

Appendix 5 - ARIANESPACE, ESA and CNES

From a production base in Europe, ARIANESPACE, a private company, serves customers all over the world.

Arianespace is the world's first commercial space transportation company, created in 1980 by 36 leading European aerospace and electronics corporations, 13 major banks and the French space agency CNES (Centre National d'Etudes Spatiales).

Arianespace is a European venture, the direct result of the participating nation's commitment to bringing the Ariane family of launch vehicles from the drawing board to the launch pad. To do so, they turned to the European Space Agency (ESA) and mobilized the scientific and technological expertise of CNES.

The shareholder partners in Arianespace represent the scientific, technical, financial and political capabilities of 12 countries: Belgium, Denmark, Germany, France, Great Britain, Ireland, Italy, Netherlands, Norway, Spain, Switzerland and Sweden.

In order to meet market needs, Arianespace is present throughout the world: in Europe, with its head office located near Paris, France at Evry; in North America with its subsidiary in Washington D.C.; and in the Pacific Region, with its representative offices in Tokyo, Japan, and in Singapore.

Arianespace employs a staff of 380. Share capital totals 317 M€.

As a space transportation company, Arianespace:

- markets launch services to customers throughout the world;
- finances and supervises the construction of Ariane expendable launch vehicles;
- conducts launches from Europe's Spaceport in Kourou in French Guiana;
- insures customers for launch risks.

Personalized reliable service forms an integral part of Arianespace's launch package. It includes the assignment of a permanent team of experts to each mission for the full launch campaign. Our customers appreciate the time and cost savings made possible by our efficiency and flexibility.

Most of the world's commercial satellite operators have contracted to launch at least one payload with Arianespace. This record is the result of our company's realistic cost-effective approach to getting satellites into orbit.

Relations between ESA, CNES and Arianespace

Development of the Ariane launcher was undertaken by the European Space Agency in 1973. ESA assumed overall direction of the ARIANE 1 development program, delegating the technical direction and financial management to CNES. The ARIANE 1 launcher was declared qualified and operational in January 1982. At the end of the development phase which included four launchers, ESA started the production of five further ARIANE 1 launchers. This program, known as the "promotion series", was carried out with a management arrangement similar to that for the ARIANE 1 development program.

In January 1980, ESA decided to entrust the commercialization, production and launch of operational launchers to a private-law industrial structure, in the form of ARIANESPACE, placing at its disposal the facilities, equipment and tooling needed to build and launch the ARIANE vehicles.

Ariane follow-on development programs have been undertaken by ESA since 1980. They include a program for developing updated versions of the launcher: Ariane 2 and Ariane 3 (qualified in August 1984); the program for building a second ARIANE launch site (ELA 2) (validated in August 1985); the Ariane 4 launcher development program (qualified on June 15th, 1988); and the preparatory and development program of the Ariane 5 launcher (qualified in October 21st 1998) and its new ELA 3 launch facility. All these programs are run under the overall direction of ESA, which has appointed CNES as prime contractor.

In general, as soon as an updated version of the launcher has been qualified, ESA makes the results of the development program together with the corresponding production and launch facilities available to ARIANESPACE.

ESA is responsible (as design authority) for development work on the Ariane launchers. The Agency owns all the assets produced under these development programs. It entrusts technical direction and financial management of the development work to CNES, which writes the program specifications and places the industrial contracts on its behalf. The Agency retains the role of monitoring the work and reporting to the participating States.

Since Flight 9 Arianespace has been responsible for building and launching the operational Ariane launchers (as production authority), and for industrial production management, for placing the launcher manufacturing contracts, initiating procurements, marketing and providing Ariane launch services, and directing launch operations.

Use of the Guiana Space Center

The "Centre Spatial Guyanais" (CSG), CNES' launch base near Kourou, has all the equipment needed for launching spacecraft: radar tracking stations, telemetry receiving stations, a meteorology station, a telecommand station, safety facilities, etc.

It became operational in 1968 for the purpose of the French National Space Program.

ESA built its own launch facilities, the ELA 1 and ELA 2 complexes (for Ariane 4) and ELA 3 (for Ariane 5) and the EPCU payload preparation complex. These facilities comprise Europe's Spaceport. The use of these facilities requires CSG's technical and operational resources, especially during launch operations. The French Government has granted ESA the right to use the CSG for its space programs. In return, ESA shares in the costs of operating the CSG.

Arianespace directly covers the costs of use, maintenance and upgrading of the Ariane launch sites and the payload preparation complex.