

A boost for a new operator

Arianespace Flight 150 will orbit the NSS-7 communications satellite for New Skies Satellites N.V., one of only four fixed satellite service providers with truly global coverage.

NSS-7 will be positioned at 338.5 degrees East longitude over the Atlantic Ocean and will offer enhanced coverage of the Americas, Europe and Africa. It was built for New Skies by Lockheed Martin Commercial Space Systems in Sunnyvale, California.

The new satellite will replace NSS-K and enable NSS-803 to be re-positioned to 183 degrees East, where it will provide trans-oceanic connectivity between Asia and the United States. NSS-7 will combine the existing television and Internet services on NSS-K with the substantial video and data traffic on NSS-803, debuting with an established video, IP and telecom neighborhood

New Skies will return to French Guiana later this year for another Arianespace launch – the NSS-6 satellite will lift off to serve Asia from 95 degrees East longitude.

For its fifth launch of the year, Arianespace will use an Ariane 44L, the version of the launcher with four liquid-propellant strap-on boosters.

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1 - Arianespace Flight 150 mission

The 150th Ariane launch (Flight 150) is scheduled to place the NSS-7 satellite into a geostationary transfer orbit using an ARIANE 44L launch vehicle equipped with four liquid strap-on boosters (PAL). This will be the 111th Ariane 4 launch and the 36th in the ARIANE 44L configuration.

It will be launched from the Ariane launch complex n°2 (ELA2), in Kourou, French Guiana. The launch vehicle performance requirement is 4 753 kg (10 456 lb) of which 4 700 kg (10 362 lb) represent the mass of the spacecraft to be separated on the injection orbit.

Injection orbit

Perigee	200 km
Altitude Apogee	35 786 km at injection
Inclination	7° degrees

The ARIANE 44L launcher liftoff for Flight 150 is scheduled on the night of April 16 to 17, 2002 as early as possible within the following launch window :

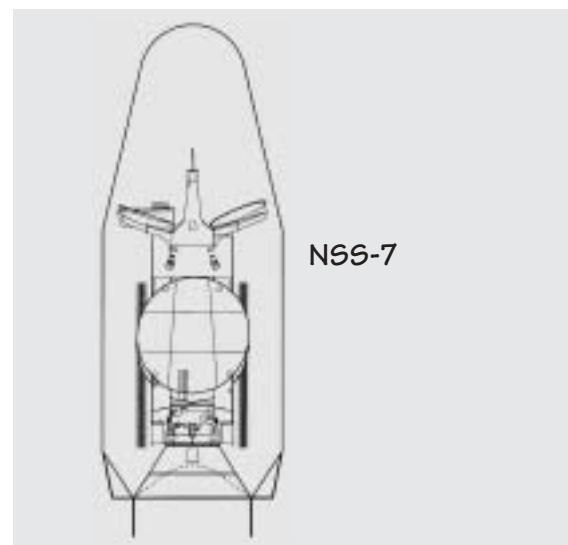
Launch opportunity

	GMT	Paris time	Washington time	Kourou time
From	10:53 pm	00:53 am	06:53 pm	07:53 pm
to	00:14 am	02:14 am	08:14 pm	09:14 pm
on	April 16/17, 2002	April 17, 2002	April 16, 2002	April 16, 2002

Ariane payload configuration

The NSS-7 satellite was built by Lockheed Martin Commercial Space Systems in Sunnyvale (California), for New Skies Satellites N.V.

Orbital position: 338.5° East, over the Atlantic Ocean.



2. Range operations campaign: ARIANE 44L – NSS-7

The actual work for satellite range operations lasts 16 working days for NSS-7 from its arrival in Kourou (before start of combined operations).
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	March 13, 2002	
First stage erection	March 13, 2002	
Second stage erection	March 14, 2002	
Liquid strap-on boosters erection	March 19-22, 2002	
	March 19, 2002	NSS-7 arrival in Kourou and beginning of its preparation in S3 buildings.
Third stage erection	March 22, 2002	
Flight 149	March 28, 2002	Launch of JCSAT-8 and ASTRA 3A
	March 30, 2002	Beginning of NSS-7 filling operations.
Roll-out to launch pad	April 4, 2002	
D-7 Saturday, April 6	Start of combined operations with NSS-7.	
D-6 Monday, April 8	Satellite encapsulation operations and fairing enclosure.	
D-5 Tuesday, April 9	Satellite composite transfer to the launch pad.	
D-4 Wednesday, April 10	Satellite composite mating onto launcher and overall checks.	
D-3 Thursday, April 11	Launch Rehearsal.	
D-2 Friday, April 12	Launch Readiness Review (RAL) and launcher arming.	
D-1 Monday, April 15	Filling of 1st stage, and 2nd stage, and liquid boosters with UH 25 and N2O4.	
D-1 Tuesday, April 16	Launch Countdown including 3rd stage filling with liquid oxygen and liquid hydrogen.	

3. Launch countdown and flight events

The final launch countdown runs through all the final launcher and satellites 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.

<i>Time</i>	<i>Events</i>
- 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 released.
- 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 30 s	First stage separation.
+ 3 mn 31 s	Second stage ignition.
+ 4 mn 17 s	Fairing jettison.
+ 5 mn 43 s	Second stage separation.
+ 5 mn 46 s	Third stage ignition.
+ 6 mn 30 s	Launcher acquired by Natal station.
+ 12 mn 35 s	Launcher acquired by Ascension Island station.
+ 17 mn 45 s	Launcher acquired by Libreville station.
+ 18 mn 52 s	Third stage shutdown sequence.
+ 20 mn 50 s	NSS-7 separation.
+ 20 mn 54 s	Start of the third stage avoidance maneuver.
+ 24 mn 01 s	End of Arianespace Flight 150 mission.

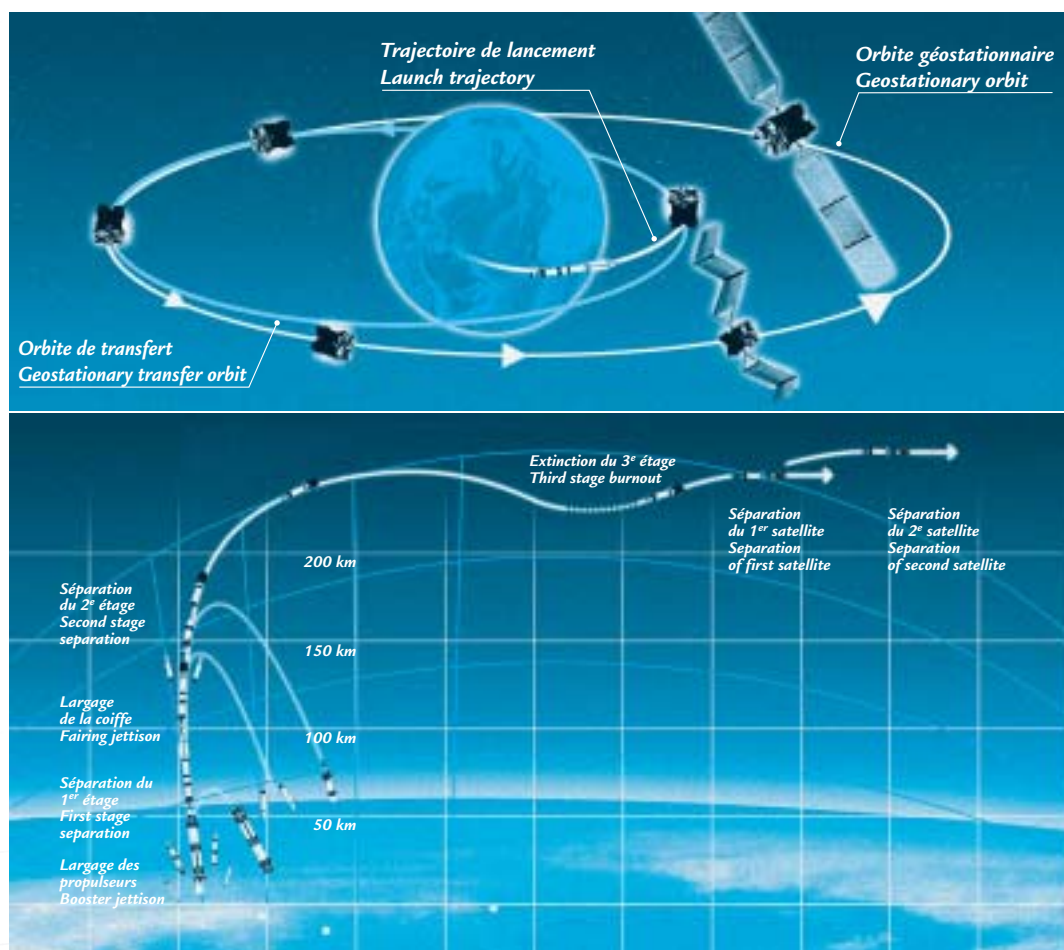
4. Flight 150 Trajectory

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.

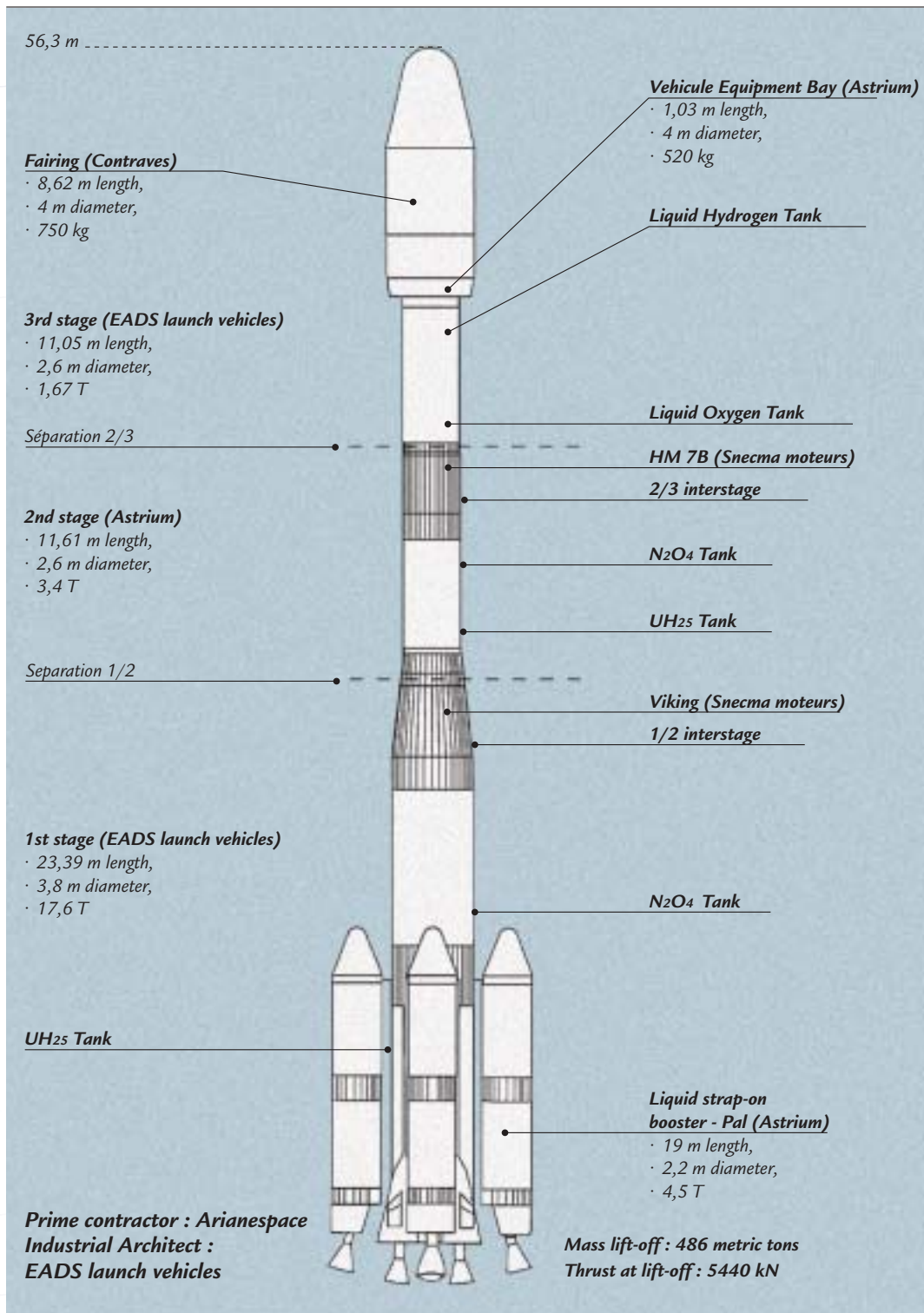
The vehicle's attitude is commanded by a predetermined law. The guidance phase is initiated 10 sec. after ignition of the 2nd stage. The attitude law in the pitch-and-yaw plane is optimized in order to minimize the 3rd stage propulsion time necessary to reach the target orbit with a performance margin of about 141 kg (310 lb). This ensures reaching this orbit with a probability of about 97.6% 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 NSS-7 satellite



Customer	NEW SKIES SATELLITES N.V.	
Prime contractor	Lockheed Martin Commercial Space Systems in Sunnyvale (California)	
Mission	Telecommunications	
Mass	Total mass (at lift-off)	4 700 kg (10 362 lb)
Stabilization	3 axis	
Dimensions	6.7 m x 3.62 m x 3.62 m	
Platform	A 2100 AX	
Payload	36 C Band transponders 36 Ku Band transponders	
On-board power	13.1 kW (beginning of life)	
Life time	12 years	
Orbital location	338.5° East, above the Atlantic Ocean	
Coverage area	Americas, Europe and Africa	

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Annex 1 - Arianespace flight 150 key personnel

In charge of the launch campaign

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

<i>NSS-7 Mission Manager and ARIANE Payload Manager</i>	<i>(RCUA)</i>	<i>Jean-François LAUMONIER</i>	<i>ARIANESPACE</i>
<i>Deputy Mission Manager</i>	<i>(RCUA/A)</i>	<i>Michael CALLARI</i>	<i>ARIANESPACE</i>

In charge of NSS-7 satellite

<i>Satellite Mission Director</i>	<i>(DMS)</i>	<i>Doug CONLEY</i>	<i>NEW SKIES</i>
<i>Satellite Project Manager</i>	<i>(CPS)</i>	<i>Dave BROWN</i>	<i>LMCSS</i>
<i>Satellite Preparation Manager</i>	<i>(RPS)</i>	<i>Roy WELLER</i>	<i>LMCSS</i>

In charge of the launch vehicle

<i>Launch Site Operations Manager</i>	<i>(COEL)</i>	<i>Christel STURBOIS</i>	<i>ARIANESPACE</i>
<i>Ariane Production Project Manager</i>	<i>(CPAP)</i>	<i>Philippe PAINCHAUT</i>	<i>ARIANESPACE</i>

In charge of the Guiana Space Center (CSG)

<i>Range Operations Manager</i>	<i>(DDO)</i>	<i>Thierry WILMART</i>	<i>CNES/CSG</i>
<i>Flight Safety Officer</i>	<i>(RSV)</i>	<i>Patrice BENARROCHE</i>	<i>CNES/CSG</i>

Annex 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.

Annex 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.)

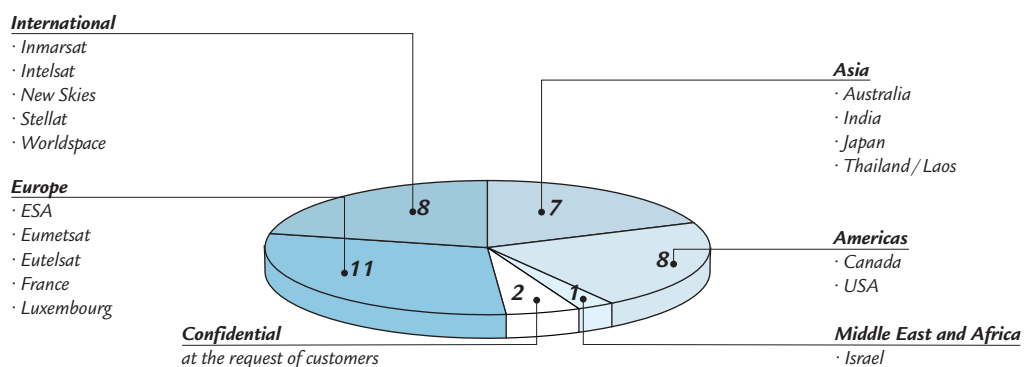
as soon as engine parameters are judged as nominal by one of the computers.

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

Annex 4 - Arianespace order book

To date 198 satellites and 38 auxiliary payloads have been launched by Arianespace. Out of the 244 launch services contracted since 1981 by Arianespace and before Flight 150, 38 satellites and 9 ATV missions remain to be launched.

Europe 11 satellites	International organizations 8 satellites	Americas 8 satellites	Asia 7 satellites
Astra Y, X	Ameristar (Worldspace)	Anik F2 (Canada)	B Sat 2C (Japan)
e-Bird	Inmarsat 4	Galaxy 12 (USA)	Insat 3A & 3E (India)
Hot Bird 6 & 7	Intelsat 905, 906, 907	Galaxy VR & IRR (USA)	L-Star A & B (Thailand/Laos)
MSG-1 & 2	New Skies Satellites 7 & 6	GE TBD (USA)	N-Star C (Japan)
Rosetta	Stellat	Loralsat 3 (USA)	Optus C1 (Australia)
Spot 5		Wild Blue 1 & 2 (USA)	
Stentor			
Syracuse III			
+ 9 ATV launches	Middle-East and Africa 1 satellite	Confidential contract at the request of customers 2 satellites	
	Amos 2		



Appendix 5 - Arianespace, its relations with ESA et 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 the 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's 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.