

### 1 - Arianespace Flight 148 - to be launched February 23 with the INTELSAT 904 satellite

To allow additional routine checks on the Ariane 44L launcher in Kourou, Arianespace has rescheduled Flight 148 from the original February 20 launch date.

Liftoff of Flight 148 using an **ARIANE 44L** is now scheduled for **Saturday, February 23**, at the opening of the following launch window:

#### Launch opportunity

GMT	Paris time	Washington time	Kourou time
From 06:59 am	07:59 am	01:59 am	03:59 am
to 07:59 am	08:59 am	02:59 am	04:59 am
on February 23, 2002	February 23, 2002	February 23, 2002	February 23, 2002

### 2. Range operations campaign: ARIANE 44L – INTELSAT 904

The actual work for satellite range operations lasts 24 working days for Intelsat 904 from its arrival in Kourou (before encapsulation).

The ARIANE 44L preparation campaign lasts 25 working days.

#### Satellite and launch vehicle campaign calendar

Ariane activities	Dates	Satellite activities
	January 7, 2002	Intelsat 904 arrival in Kourou and beginning of its preparation in S1B building.
Campaign start review	January 11, 2002	
First stage erection	January 11, 2002	
Second stage erection	January 17, 2002	
Third stage erection	January 18, 2002	
Liquid strap-on boosters erection	January 14-18, 2002	
	February 3, 2002	Intelsat 904 transfer from S1B to S3B building.
	February 5, 2002	Beginning of Intelsat 904 filling operations.
Roll-out to launch pad	February 6, 2002	
D-7	Saturday, Feb. 9, 2002	Start of combined operations
	Monday, February 11	Additional checks on AR 44L
	Friday, February 15	
D-6	Saturday, Feb. 16	Satellite encapsulation operations.
D-5	Sunday, Feb. 17	Satellite composite transfer to the launch pad.
D-4	Monday, Feb. 18	Satellite composite mating onto launcher and overall checks.
D-3	Tuesday, Feb. 19	Launch Rehearsal
D-2	Wednesday, Feb. 20	Launch Readiness Review (RAL) and launcher arming.
D-1	Thursday, Feb. 21	Filling of 1st stage, and 2nd stage, and liquid boosters with UH 25 and N2O4.
D-0	Friday, Feb. 22	Launch Countdown including 3rd stage filling with liquid oxygen and liquid hydrogen.
H-0	Saturday, Feb. 23	

### **20<sup>th</sup> Intelsat launch**

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Arianespace's second launch of the year will orbit the Intelsat 904 communications satellite. Intelsat 904 will be the 20th Intelsat satellite launched to date by Ariane. This is the fourth 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 60 degrees East. Intelsat 904 joins the Intelsat fleet of satellites providing Internet, broadcast, telephony and corporate network solutions services for Europe, Africa, Central Asia, the Far East and Australia.

The first series IX satellite, Intelsat 901, was launched by Arianespace Flight 141 on June 9, 2001. Intelsat 902 was orbited by Flight 143 on August 30, 2001.

Three more Intelsat satellites are scheduled for launch by Arianespace.

For Flight 148, Arianespace will use an Ariane 44L, the version fitted with four liquid-propellant strap-on boosters.

- 1 - ARIANESPACE Flight 148 mission.
- 2 - Range operations :  
ARIANE 44L - Intelsat 904.
- 3 - Countdown and Flight events.
- 4 - Flight 148 trajectory.
- 5 - The ARIANE 44L launch vehicle.
- 6 - The Intelsat 904 satellite.

#### **Annexes**

- 1 - Flight 148 key personnel.
- 2 - Launch environment conditions.
- 3 - Synchronized sequence.
- 4 - ARIANESPACE orderbook.
- 5 - ARIANESPACE, ESA and CNES.



## 1 - Arianespace Flight 148 mission

The 147<sup>th</sup> Ariane launch (Flight 148) is scheduled to place the Intelsat 904 satellite into a geostationary transfer orbit using an ARIANE 44L launch vehicle equipped with four liquid strap-on boosters (PAL). This will be the 109<sup>th</sup> Ariane 4 launch and the 34<sup>th</sup> 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 4 722 kg (10 388 lb) of which 4 680 kg (10 296 lb) represent the mass of the spacecraft to be separated on the injection orbit.

### Injection orbit

Perigee	200 km
Altitude Apogee	35 947 km at injection
Inclination	7° degrees

The ARIANE 44L launcher liftoff for Flight 148 is scheduled on the morning of February 20, 2002 as early as possible within the following launch window :

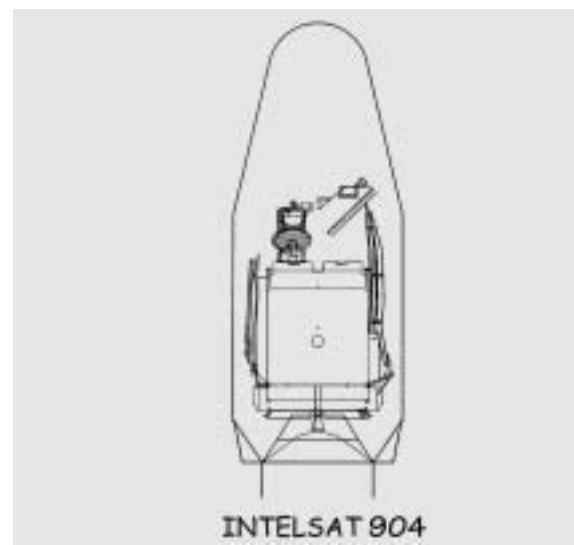
### Launch opportunity

GMT	Paris time	Washington time	Kourou time
From 06:59 am	07:59 am	01:59 am	03:59 am
to 07:59 am	08:59 am	02:59 am	04:59 am
on February 20, 2002	February 20, 2002	February 20, 2002	February 20, 2002

## Ariane payload configuration

**The Intelsat 904 satellite** was built by Space Systems/Loral in Palo Alto (California), for the international operator Intelsat.

*Orbital position: 60° East, over the Indian Ocean.*



## 2. Range operations campaign: ARIANE 44L – INTELSAT 904

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	February 5, 2002	Beginning of Intelsat 904 filling operations.
Roll-out to launch pad	February 6, 2002	
D-7	Saturday, Feb. 9, 2002	Start of combined operations
D-6	Monday, Feb. 11	Satellite encapsulation operations.
D-5	Tuesday, Feb. 12	Satellite composite transfer to the launch pad.
D-4	Wednesday, Feb. 13	Satellite composite mating onto launcher and overall checks.
D-3	Thursday, Feb. 14	Launch Rehearsal
D-2	Friday, Feb. 15	Launch Readiness Review (RAL) and launcher arming.
D-1	Monday, Feb. 18	Filling of 1st stage, and 2nd stage, and liquid boosters with UH 25 and N2O4.
D-0	Tuesday, Feb. 19	Launch Countdown including 3rd stage filling with liquid oxygen and liquid hydrogen.
H-0	Wednesday, Feb. 20	

## 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.

<b>Time</b>	<b>Events</b>
- 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.
<b>H0</b>	<b>Ignition of first stage and liquid strap-on boosters engines</b>
+ 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 22 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 51 s	Third stage shutdown sequence.
+ 20 mn 58 s	Intelsat 904 separation.
+ 21 mn 10 s	Start of the third stage avoidance maneuver.
+ 22 mn 32 s	End of Arianespace Flight 148 mission.

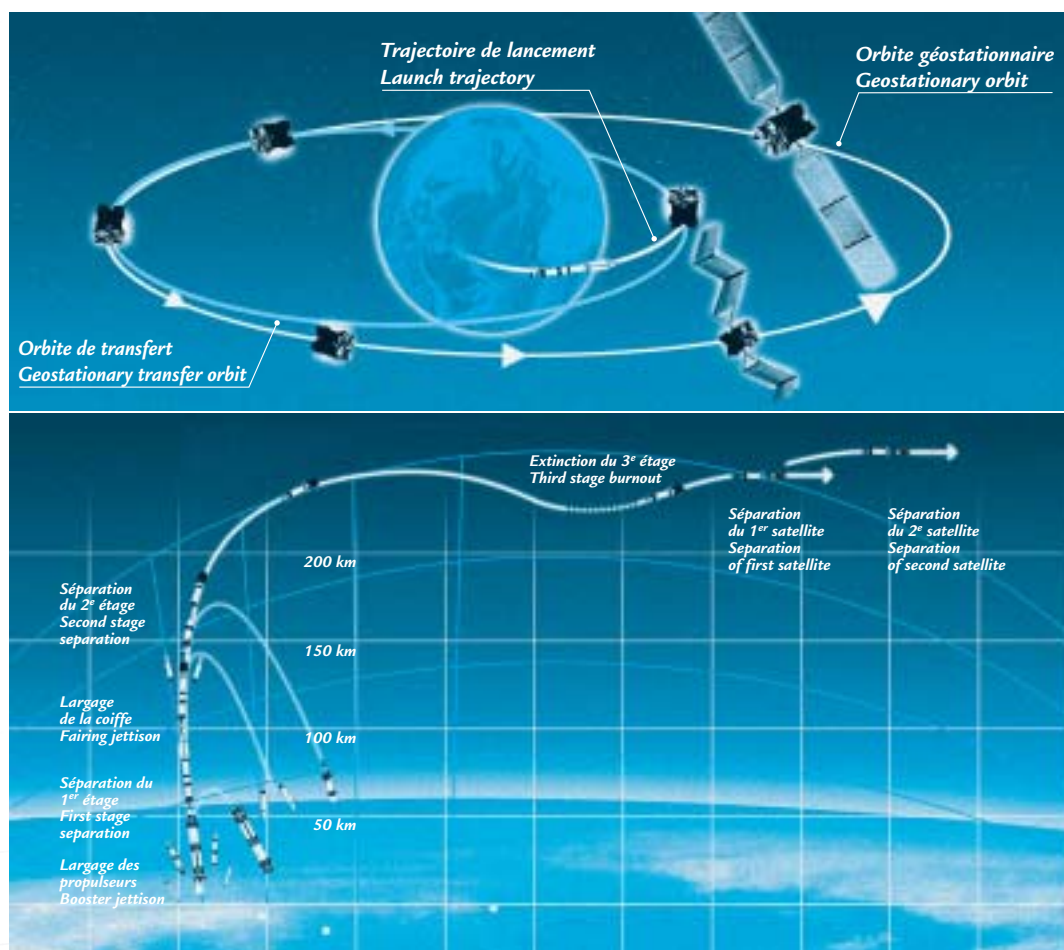
## 4. Flight 148 Trajectory

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.

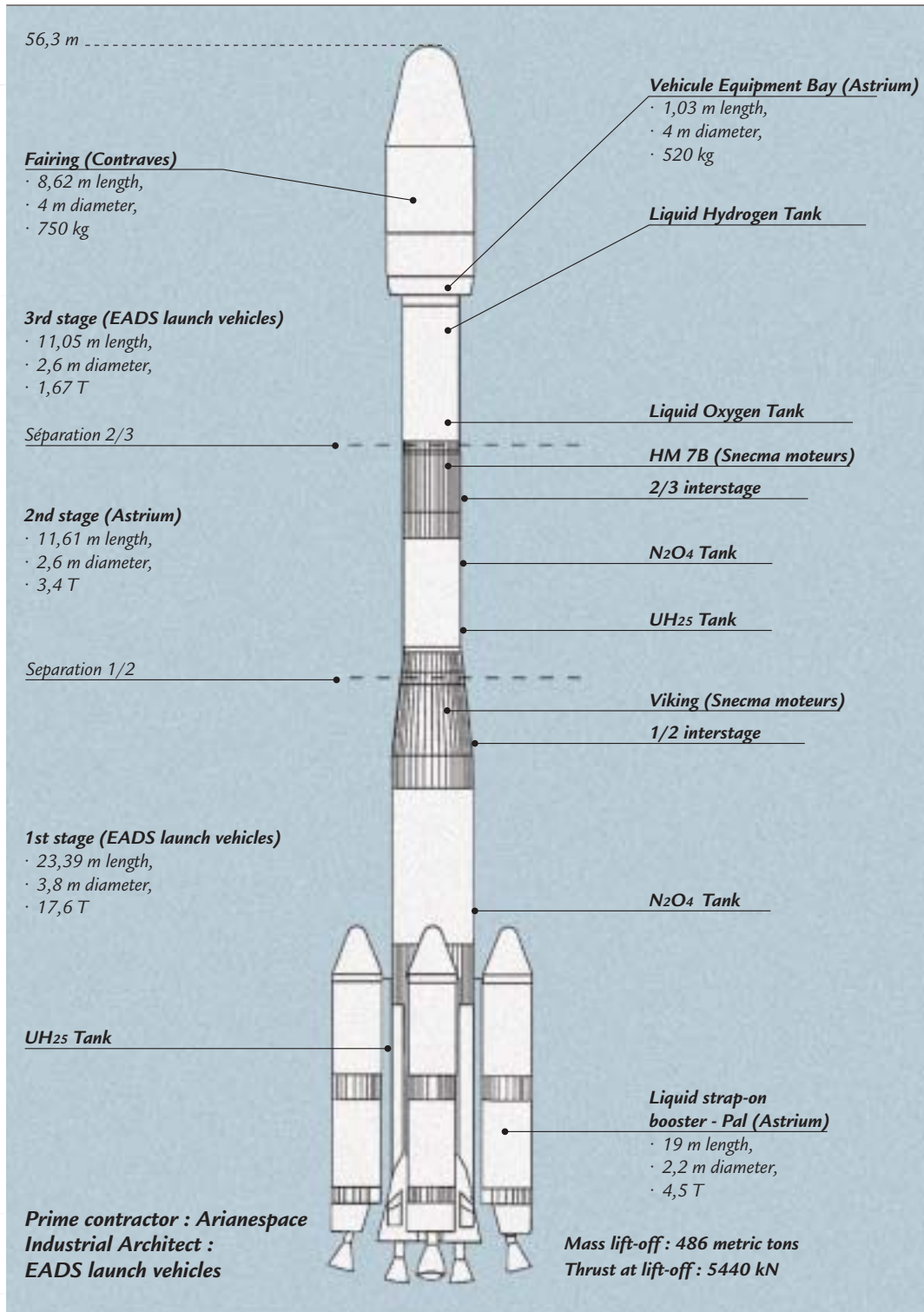
The vehicle's attitude is commanded by a predetermined law. The guidance phase is initiated 10 sec. after ignition of the 2nd stage. The attitude law in the pitch-and-yaw plane is optimized in order to minimize the 3rd stage propulsion time necessary to reach the target orbit with a performance margin of about 160 kg (352 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.

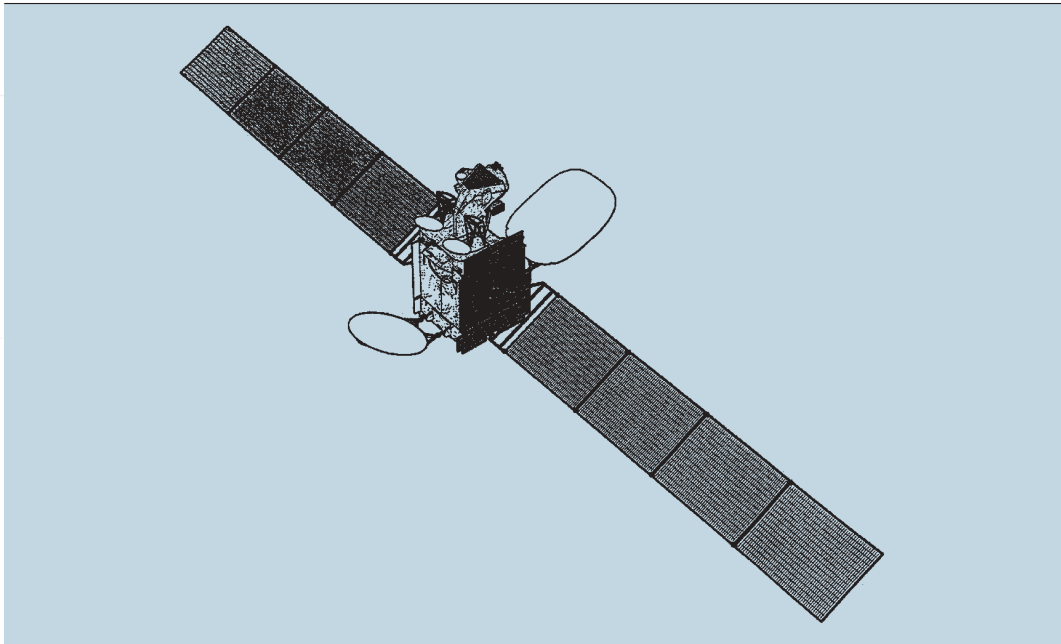
*Typical trajectory for standard geostationary transfer orbit and ground station visibility*



## 5. The launch vehicle



## 6. The Intelsat 904 satellite



<b>Customer</b>	<b>Intelsat</b>	
<b>Prime contractor</b>	Space Systems/Loral in Palo Alto (California)	
<b>Mission</b>	Internet, broadcast, telephony and corporate network solutions	
<b>Mass</b>	Total mass (at lift-off)	4 680 kg (10 296 lb)
<b>Dry mass</b>		2 350 kg (5 170 lb)
<b>Stabilization</b>	3 axis	
<b>Dimensions</b>	2,80 m x 3,50 m x 5,56 m	
<b>Span in orbit</b>	31 m	
<b>Platform</b>	FS1300 Extended	
<b>Payload</b>	76 C Band transponders (in 36 MHz equivalent units) 22 Ku Band transponders (in 36 MHz equivalent units)	
<b>On-board power</b>	8,5 kW (beginning of life)	
<b>Life time</b>	13 years	
<b>Orbital location</b>	60° East, above the Indian Ocean	
<b>Coverage area</b>	Global with beams over Europe, Central Asia, Far East and Australia.	

### Press Contact for Intelsat

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## Annex 1 - Arianespace flight 148 key personnel

### ***In charge of the launch campaign***

<i>Mission Director</i>	<i>(CM)</i>	<i>Bruno GERARD</i>	<i>ARIANESPACE</i>
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### ***In charge of the launch service contracts***

<i>Intelsat 904 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 90 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>Erick LEVINE</i>	<i>SPACE SYSTEMS/LORAL</i>
<i>Satellite Preparation Manager</i>	<i>(RPS)</i>	<i>Don GRIFFITH</i>	<i>SPACE SYSTEMS/LORAL</i>

### ***In charge of the launch vehicle***

<i>Launch Site Operations Manager</i>	<i>(COEL)</i>	<i>André SICARD</i>	<i>ARIANESPACE</i>
<i>Ariane Production Project Manager</i>	<i>(CPAP)</i>	<i>Jean-Marie CHOMMELOUX</i>	<i>ARIANESPACE</i>

### ***In charge of the Guiana Space Center (CSG)***

<i>Range Operations Manager</i>	<i>(DDO)</i>	<i>Michel DEBRAINE</i>	<i>CNES/CSG</i>
<i>Flight Safety Officer</i>	<i>(RSV)</i>	<i>Isabelino DENIS</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 194 satellites and 38 auxiliary payloads have been launched by Arianespace. Out of the 244 launch services contracted since 1981 by Arianespace and before Flight 148, 41 satellites and 9 ATV missions remain to be launched (2 confidential contracts at the request of customers).

### Europe 13 satellites

- Astra 1K, X, 3A
- e-Bird
- Envisat-1/PPF
- Hot Bird 6 & 7
- MSG-1 & 2
- Rosetta
- Spot 5
- Stentor
- Syracuse III

+ 9 ATV launches

### International organizations 9 satellites

- Ameristar (Worldspace)
- Inmarsat 4
- Intelsat 904, 905, 906, 907
- New Skies Satellites 6 & 7
- Stellat

### Middle-East and Africa 1 satellite

- Amos 2

### Americas 8 satellites

- Anik F2 (Canada)
- Galaxy 12 (USA)
- Galaxy VR & IRR (USA)
- GE TBD (USA)
- Loralsat 3 (USA)
- Wild Blue 1 & 2 (USA)

### Asia 8 satellites

- B Sat 2C (Japan)
- Insat 3A & 3E (India)
- JCSat 8 (Japan)
- L-Star A & B (Thailand/Laos)
- N-Star C (Japan)
- Optus C1 (Australia)

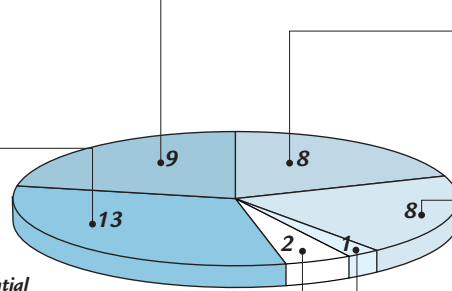
### International

- Inmarsat
- Intelsat
- New Skies
- Stellat
- Worldspace

### Europe

- ESA
- Eumetsat
- Eutelsat
- France
- Luxembourg

Confidential  
at the request of customers



### Asia

- Australia
- India
- Japan
- Thailand/Laos

### Americas

- Canada
- USA

### Middle East and Africa

- Israel

## Appendix 5 - Arianespace, its relations with ESA et CNES

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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 21<sup>st</sup> 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.