arianespace

vol 140

Kourou 2001

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EUTELSAT

BSAT-2

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ARIANE 5 TO LAUNCH SATELLITES FOR TWO LONG-STANDING CLIENTS: EUTELSAT & B-SAT

Arianespace continues to set the global standard in launch services for operators in Europe, the Americas and Japan.
For its third launch of the year, Arianespace will use an Ariane 5 to orbit communications satellites for two long-standing customers: Eurobird for Eutelsat, and BSAT-2a for B-SAT of Japan, as part of a turnkey contract with Orbital Sciences Corp. of the United States.

EUROBIRD™ is the 14th Eutelsat satellite to opt for the European launch system. Built by Alcatel Space in Cannes, southern France, it will be positioned at 28.5 degrees East as part of Eutelsat's fleet of satellites providing communications services for Europe, North Africa and the Middle East.
Two more Eutelsat satellites are slated for Arianespace launches in 2001.

BSAT-2a will be the third B-SAT satellite launched by Arianespace, following BSAT-1a on Flight 95 and BSAT-1b on Flight 108. Today, more than 16 million households receive programs broadcast by these two satellites.
BSAT-2a is the 15th satellite to be launched by Ariane for Japan.
Out of 24 commercial satellite launch contracts open for bid in Japan, Arianespace has won 18. In addition, Ariane launched the Japanese experimental satellite LDREX for Japanese space agency NASDA on Flight 138.
A second satellite, BSAT-2b is scheduled for launch on Flight 141 in June 2001.
BSAT-2a and 2b are both built by Orbital Sciences Corp.

1. ARIANESPACE FLIGHT 140 MISSION

The 140th Ariane launch (Flight 140/Ariane 509) will use an Ariane 5 to place 2 satellites into geostationary transfer orbit: the EUROBIRD™ and BSAT-2a telecommunications satellites. The launch will be carried out from the ELA 3 launch complex in Kourou, French Guiana. For Arianespace, this marks the sixth commercial mission of the new Ariane 5 launcher. Arianespace has performed 2 other launches this year (2 ARIANE 4).
The Ariane 509 launcher will carry a dual payload of 5,297 kg (10,594 lb), including 4,367 kg (9,607.4 lb) for the satellites.

INJECTION ORBIT

Perigee altitude	***860 km***
Apogee altitude	***35 786 km at injection***
Inclination	***2° degrees***

The launch was previously slated for March 2, 2001, but was delayed to perform complementary checks. The lift-off is scheduled on the night of March 8 to 9, 2001 as soon as possible within the following launch window :

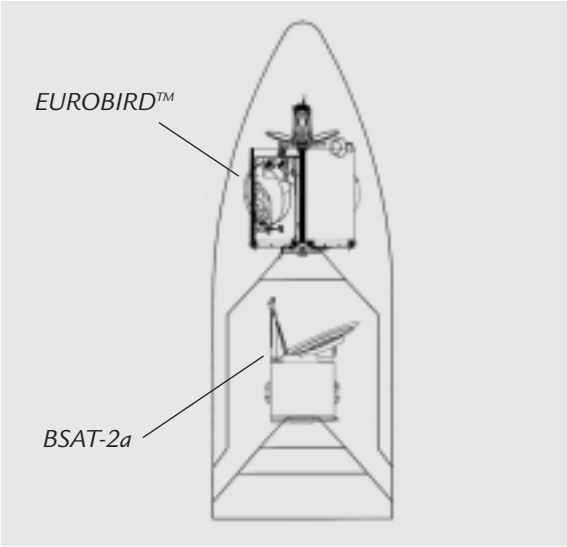
LAUNCH OPPORTUNITY

	Universal time (GMT)	*Paris time*	*Tokyo time*	*Washington time*	*Kourou time*
Between	*10: 51 pm*	*11: 51 pm*	*07: 51 am*	*05: 51 pm*	*07:51 pm*
and	*11: 47 pm*	*12: 47 am*	*08: 47 am*	*06: 47 pm*	*08:47 pm*
on	*March 8, 2001*	*March 8/9, 2001*	*March 9, 2001*	*March 8, 2001*	*March 8, 2001*

ARIANE 509 PAYLOAD CONFIGURATION

The EUROBIRD™ satellite was built by Alcatel Space in Cannes, France, for Eutelsat.
Orbital position: 28.5° East, over Central Africa.

The BSAT-2a satellite was built by Orbital Sciences Corporation in Dulles, Virginia (USA), for Orbital Sciences Corp for Japanese operator, B-SAT.
Orbital position: 110° East, above the Island of Borneo.



2. RANGE OPERATIONS CAMPAIGN : ARIANE 5 – EUROBIRD™/ BSAT-2a

The actual work for satellite range operations lasts 22 working days for EUROBIRD™ from its arrival in Kourou (before beginning combined operations).
The actual work for satellite range operations lasts 16 working days for BSAT-2a from its arrival in Kourou (before beginning combined operations).
The ARIANE 5 preparation campaign lasts 32 working days.

SATELLITES AND LAUNCH VEHICLE CAMPAIGN CALENDAR

Ariane activities	*Dates*	*Satellites activities*
Campaign start review	*January 17, 2001*	
EPC Erection	*January 18, 2001*	
EAP transfer and positionning	*January 22, 2001*	
Integration EPC/EAP	*January 23, 2001*	
EPS Erection	*January 25, 2001*	
Integration equipement bay	*January 29, 2001*	
	January 25, 2001	*Arrival in Kourou and beginning of EUROBIRD™ preparation campaign in S1B building.*
	January 31, 2001	*Arrival in Kourou and beginning of BSAT-2a preparation campaign in S1A building.*
	February 9, 2001	*Transfert of EUROBIRD™ into the S3B building.*
	February 9, 2001	*Transfert of BSAT-2a into the S3A building.*
	February 9, 2001	*Beginning of EUROBIRD™ filling operations in S3B building.*
	February 10, 2001	*Beginning of BSAT-2a filling operations in S3A building.*
	February 13, 2001	*ROLL-OUT FROM BIL to BAF*

SATELLITE AND LAUNCH VEHICLE CAMPAIGN FINAL CALENDAR

J-10	*Saturday, Feb 17*	*EUROBIRD™ integration on Sylda.*
J-9	*Monday, Feb 19*	*BSAT-2a integration on launcher.*
J-8	*Thursday, Feb 22*	*Mating of upper composite (Sylda + Eurobird™ + fairings) on launcher.*
J-6	*Monday, Feb 26*	*Filling of SCA with N2H4.*
J-5	*Wednesday, Feb 28*	*Filling of EPS stage with MMH and N2O4.*
J-4	*Thursday, March 1*	*LAUNCH REHEARSAL and presurization of EPC and EPS spheres.*
J-3	*Monday, March 5*	*Launcher arming.*
J-2	*Tuesday, March 6*	*LAUNCH READINESS REVIEW (RAL) and final mechanical preparation of launcher.*
J-1	*Wednesday, March 7*	*ROLL-OUT FROM BAF to LAUNCH AREA and filling of the EPC Helium sphere.*
J-0	*Thursday, March 8*	*LAUNCH COUNTDOWN including EPC filling with liquid oxygen and liquid hydrogen.*

3 - LAUNCH COUNTDOWN AND FLIGHT EVENTS :

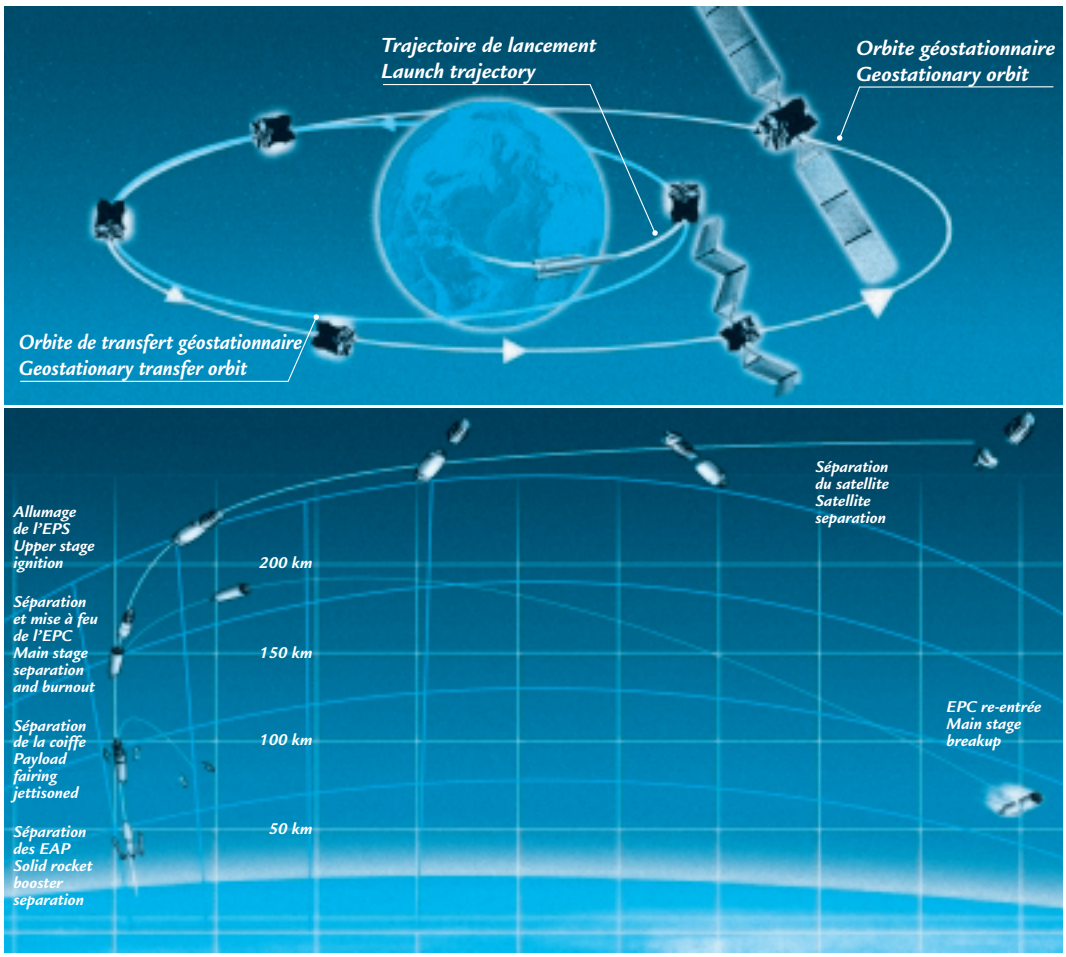
The countdown comprises all final preparation steps for the launcher, the satellites and the launch site. If it proceeds as planned, the countdown leads to the ignition of the main stage engine, then the two solid boosters, for a liftoff at the targeted time, as early as possible in the satellites launch window.
The countdown culminates in a synchronized sequence (see appendix 3), which is managed by the control station and onboard computers starting at T-6 minutes 30 s.
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.

Time	***Events***
– 9 h 00 mn	*Start of final countdown.*
– 7 h 30 mn	*Check of electrical systems.*
– 5 h 20 mn	*Start of filling of main cryogenic stage with liquid oxygen and helium.*
– 3 h 20 mn	*Chilldown of Vulcain main stage engine.*
– 1 h 15 mn	*Check of connections between launcher and telemetry, tracking and command systems.*
– 6 mn 30 s	*"All systems go" report, allowing START OF SYNCHRONIZED SEQUENCE.*
– 35 s	*Start of automated ignition sequence.*
– 22 s	*Authorization for control handover to onboard computer.*
– 03 s	*Onboard systems take over.*
– 02 s	*Unlocking of inertial guidance systems to flight mode.*
HO	***IGNITION of the cryogenic main stage engine (EPC)***
+7,0 s	*Ignition of solid boosters.*
+7,3 s	*Liftoff.*
+ 13 s	*End of vertical climb and beginning of pitch rotation (10 seconds duration).*
+ 17 s	*Beginning of roll maneuver.*
+ 2 mn 25 s	*Jettisoning of solid boosters.*
+ 3 mn 14 s	*Jettisoning of fairing.*
+ 8 mn 30 s	*Acquisition by Natal tracking station.*
+ 9 mn 40 s	*Extinction of main cryogenic stage.*
+ 9 mn 46 s	*Separation of main cryogenic stage.*
+ 9 mn 53 s	*Ignition of storable propellant stage.*
+ 12 mn 51 s	*Acquisition by Ascension tracking station.*
+ 22 mn 16 s	*Acquisition by Malindi tracking station.*
+ 26 mn 37 s	*Extinction of storable propellant stage.*
+ 29 mn 13 s	*Separation of EUROBIRD™ satellite.*
+ 32 mn 29 s	*Separation of SYLDA 5 satellite.*
+ 36 mn 21 s	*Separation of BSAT-2a satellite.*
+ 51 mn 39 s	*End of ARIANESPACE Flight 140 mission.*

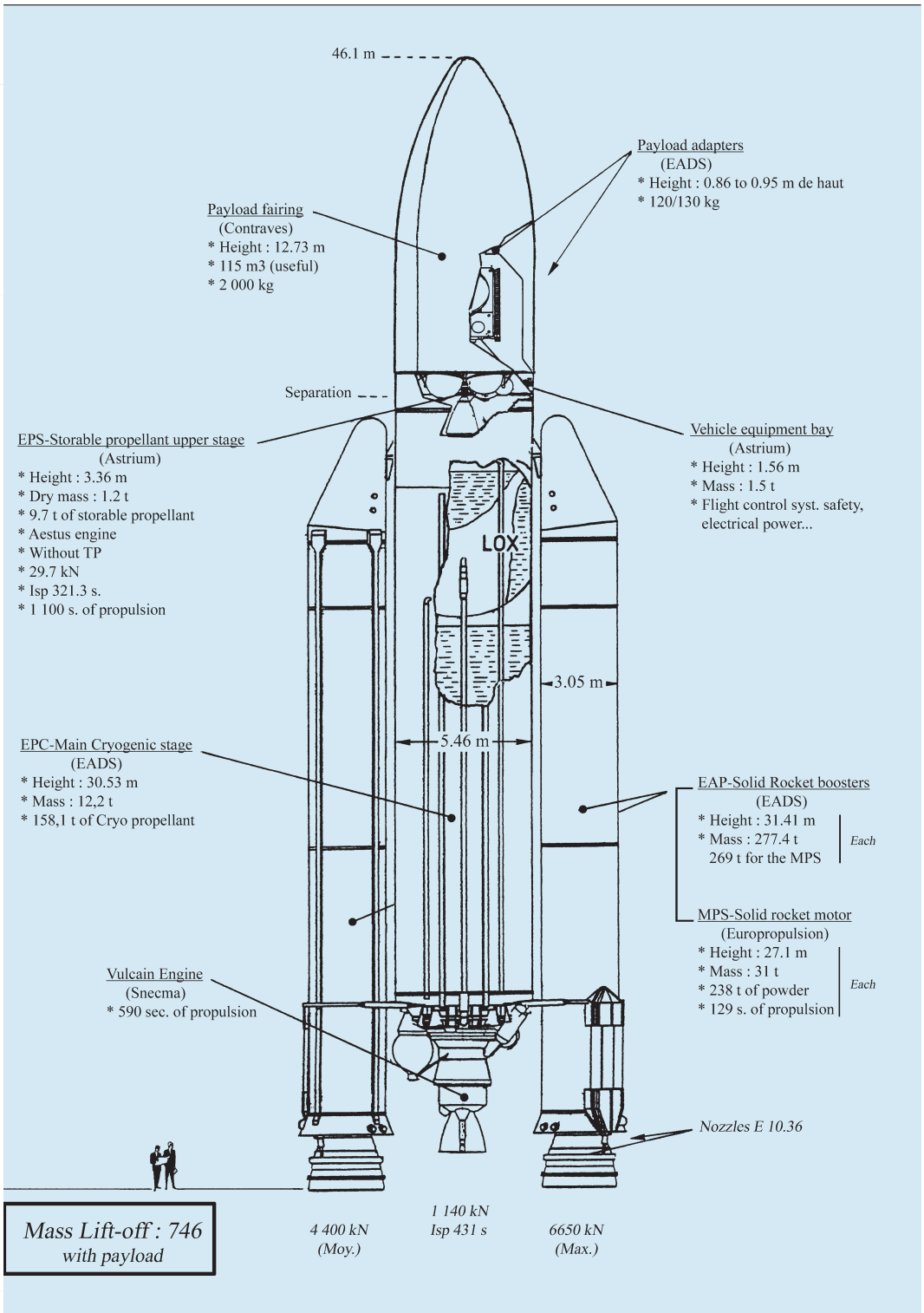
4 - FLIGHT 140 TRAJECTORY :

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 computer optimizes 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 upper (storable propellant) stage.
The main stage falls back off the coast of the Galapagos Islands in the Pacific Ocean. On orbital injection, the launcher will have attained a velocity of approximately 9,055 meters/second, and will be at an altitude of about 1,750 kilometers.
The fairing protecting the EUROBIRD™/BSAT-2a spacecrafts is jettisoned shortly after the boosters are jettisoned at about T+195 seconds.

STANDARD ARIANE 5 TRAJECTORY FOR GEOSTATIONARY TRANSFER ORBIT



5 - ARIANE 5 LAUNCHER



6 - THE EUROBIRD™ SATELLITE :

Customer	***EUTELSAT***	
Prime contractor	*Alcatel Space – Cannes (France)*	
Mission	*Telecommunications*	
Mass	*Total mass at lift-off*	*3 050 kg*
Stabilization	*3 axis stabilized*	
Dimensions		*3.48 x 3.35 x 2.26 m*
	Span in orbit	*29 m*
Plate-form	***Spacebus 3000***	
Payload	*24 Ku band transponders each with 90W power*	
	Bandwidth per channel	*72 and 33 MHz*
Frequency bands	*12.75 to 13 GHz*	
On-board power	*5,53 kW (at end of life)*	
Life time	*12.5 years*	
Orbital position	*28.5° East, above Central Africa*	

Press Contact :

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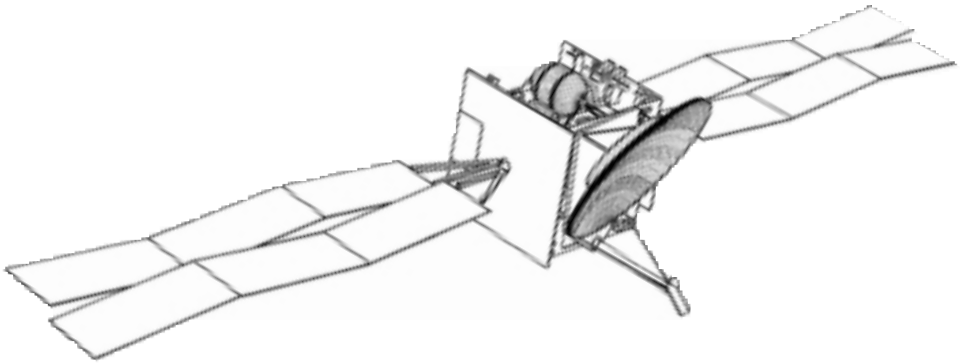
7 - THE BSAT-2a SATELLITE :



Customer	***ORBITAL SCIENCES CORP. (USA) for B-SAT Corp. (Japan)***	
Prime contractor	*Orbital Sciences Corp., Dulles, Virginia*	
Mission	*Telecommunications Direct Broadcasting.*	
Mass	*Total mass at lift-off*	*1,317 kg (2,897.4 lb)*
	Dry mass	*535 kg (1,177 lb)*
Stabilization	*3 axis*	
Dimensions	*Height*	*3.76 x 2.49 x 2.03 m*
	Span in orbit	*16,10 m*
Model	***STAR***	
Payload	*4 Ku band transponders*	
	Uplink	*17.25-17.65 GHz*
	Downlink	*11.65-12.05 GHz*
On-board power		*2,6 kW (at begining of life).*
Life time	*10 years*	
Orbital position	*110°Est, above the Island of Borneo*	
Coverage area	*Japan*	

Press Contact :

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ANNEX 1 - ARIANESPACE FLIGHT 140 KEY PERSONNEL

In charge of the launch compaign			
Mission Director	*(CM)*	*Daniel MURE*	*ARIANESPACE*
In charge of the launch service contracts			
BSAT-2a program director and ARIANE Payload Manager	*(RCUA)*	*Michael CALLARI*	*ARIANESPACE*
EUROBIRD™ program director and ARIANE Deputy Mission Manager	*(RCUA/A)*	*Véronique SEGUIN*	*ARIANESPACE*
In charge of EUROBIRD™ satellite			
Satellite Mission Director	*(DMS)*	*Jean-Jacques DUMESNIL*	*EUTELSAT*
Satellite Project Director	*(CPS)*	*Raphaël MUSSALIAN*	*EUTELSAT*
Satellite Preparation Manager	*(RPS)*	*Jean-Luc LELIEVRE*	*ALCATEL SPACE*
In charge of BSAT-2a satellite			
Satellite Mission Director	*(DMS)*	*David STEFFY*	*OSC*
Satellite Project Director	*(CPS)*	*Tim HEMKE*	*OSC*
Satellite Project Director	*(RPS)*	*Steven THIBAULT*	*OSC*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*Pierre-François BENAITEAU*	*ARIANESPACE*
ARIANE Production Project Manager	*(CPAP)*	*Jean-Marie CHOMELOUX*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Thierry BOUFFARD*	*CNES/CSG*
Flight Safety Officer	*(RSV)*	*Yves BORDES*	*CNES/CSG*

ANNEX 2 - LAUNCH ENVIRONMENT CONDITIONS

Acceptable wind speed limits at liftoff range from between 9 m/s. to 14 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 2.000 m) is also into account.

ANNEX 3 - THE SYNCHRONIZED SEQUENCE

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, it is fully automatic, and is performed concurrently by the onboard computer and by a redundant computer at the ELA 3 launch complex until T-5 seconds.
The computer commands the final electrical operations (startup of the flight program, servocontrols, switching from ground power supply to onboard batteries, etc.) and associated checks. It also places the propellant and fluid systems in flight configuration ans performs associated checks. In additionn, 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 Vulcain engine in the jet guite (T-18 sec) ;
- burnoff of hydrogen used for chilldown (T-7 sec).

At T-3 seconds, the onboard computer takes over control of final engine startup ans liftoff operations :

- It starts the ignition sequence for the Vulcain main stage engine (T-0) ;
- It checks engine operation (from T+4 to T+7 sec) ;
- It commands ignition of the solid boosters for immediate liftoff at T+7.5 seconds.

Any shutdown of the synchronized sequence up to T - 6 mn 30 seconds automatically places the launcher back in its T-6 min 30 sec configuration.

ANNEX 4 - ARIANESPACE ORDER BOOK

To date 183 satellites and 38 auxiliary payloads have been launched by Arianespace.
Out of the 232 launch services contracted since 1981 by Arianespace and before Flight 140, 38 satellites

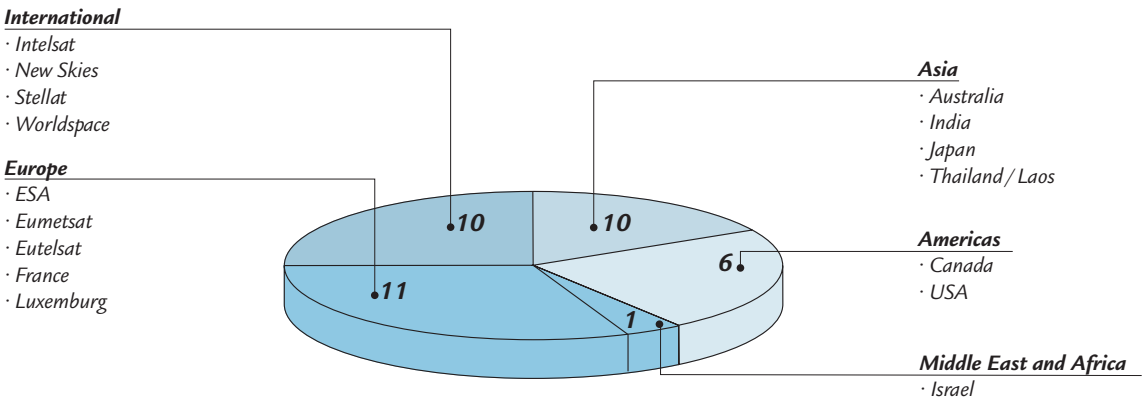
Europe ***11 satellites***
Artemis
Astra 1K, X
Atlantic Bird 2
Envisat-1/PPF
Eurobird
Hot Bird 6
MSG-1 & 2
Spot 5
Stentor
+ 9 ATV launches

International organizations ***10 satellites***
Ameristar (Worldspace)
Intelsat 902, 903, 904, 905, 906, 907
New Skies Satellites 6 & 7
Stellat

Middle-East and Africa ***1 satellite***
Amos 2

Américas ***6 satellites***
Anik F2 (Canada)
DirecTV-4S (USA)
GE TBD (USA)
Loralsat 3 (USA)
Wild Blue 1 & 2 (USA)

Asia ***10 satellites***
BSAT-2a *& 2B (Japan)*
Insat 3C, 3A & 3E (India)
JCSat 8 (Japan)
L-Star A & B (Thaïland/Laos)
N-Star C (Japan)
Optus C1 (Australia)



ANNEX 5 - ARIANESPACE, its relations with ESA et CNES

FROM A PRODUTION 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).
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 FF 2,088 million.
Arianespace is in charge of these main areas :
❍ markets launch services to customers throughout the world ;
❍ finances and supervises the construction of Ariane expendable launch vehicles ;
❍ conducts launches from Europe's Spaceport of Kourou in French Guiana ;
❍ insures customers for launch risks.
Personalized reliable service forms an integral part of Arianespace launch package. It includes the assignment of a permanent team of experts to each mission for the full launch campaign.

The world's commercial satellite operators habe contracted to launch with Arianespace. This record is the result of our company's realistic cost-effective approach to getting satllites 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 launching of operational launchers to a private-law industrial structure, in the form of ARIANESPACE company, placing at its disposal the facilities, equipment and tooling needed of producing and launching the ARIANE launchers.
Ariane follow-on development programs have been undertaken by ESA since 1980. They include a program for developing uprated 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 and its new launch facilities : ELA 3 (qualified on November, 1997). All these programs are run under the overall direction of ESA, which has appointed CNES as prime contractor.
In general, as soon as an uprated version of the launcher has been qualified 5 Oct, 1998, 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 has built its own launch facilities, the ELA 1 and ELA 2 and ELA 3 (for Ariane 5) complexes and the EPCU payload preparation complex inside the CSG compound, becoming the Europe Space Port. Using these launch pads requires, especially during launch operations, 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.