arianespace

esa

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Ariane gives European defense a boost

For its second launch of the year, Arianespace will boost two European defense satellites into geostationary transfer orbit: the Sicral military communications spacecraft for Italy, and Skynet 4F for the British Ministry of Defence.

This launch clearly reflects the strategic importance of Ariane, which gives European governments independent access to space. Arianespace continues to set the global standard in the launch of communications satellites. With this latest flight, Arianespace extends its proven competence and impeccable service to European defense missions.

Sicral, Italy's first military satellite, will provide communications services for the Italian ministry of defense. Leading the satellite program was the Italian consortium Sitab, including Alenia Spazio for the satellite, FiatAvio for propulsion systems and launch operations, and Telespazio for the ground segment.

Skynet 4F, built by Astrium Ltd. in Stevenage, U.K., will provide strategic and tactical communications services for the British armed forces. Predecessors Skynet 4B, 4C and 4E were launched by Arianespace in December 1988 (Flight 27), August 1990 (Flight 38) and February 1999 (Flight 116), respectively.

Flight 139 will use an Ariane 44L, the version of the European launcher equipped with four liquid-propellant strap-on boosters.

1 - ARIANESPACE Flight 139 mission.
2 - Range operations :
ARIANE 44L – SICRAL – SKYNET 4F.
3 - Countdown and Flight events.
4 - Flight 139 trajectory.
5 - The ARIANE 44L launch vehicle.
6 - The SICRAL satellite.
7 – The SKYNET 4F satellite

Annexes
1 - Flight 139 key personnel.
2 - Launch environment conditions.
3 - Synchronized sequence.
4 - ARIANESPACE orderbook.
5 - ARIANESPACE, ESA and CNES.

1 - ARIANESPACE Flight 139 MISSION

The 139th Ariane launch (Flight 139) is scheduled to place the SICRAL and SKYNET 4F satellites into a geostationary transfer orbit using an ARIANE 44L launch vehicle equipped with four liquid strap-on boosters (PAL). This will be the 103rd Ariane 4 launch and the 31st 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 4 552 kg (10 014 lb) of which 4 085 kg (8 987 lb) represent the mass of the spacecraft to be separated on the injection orbit.

INJECTION ORBIT

Perigee	***225 km***
Altitude Apogee	***36 010 km at injection***
Inclination	***7° degrees***

The ARIANE 44L launcher liftoff for Flight 139 is scheduled on the night of February 7 to 8, 2001 as early as possible within the following launch window :

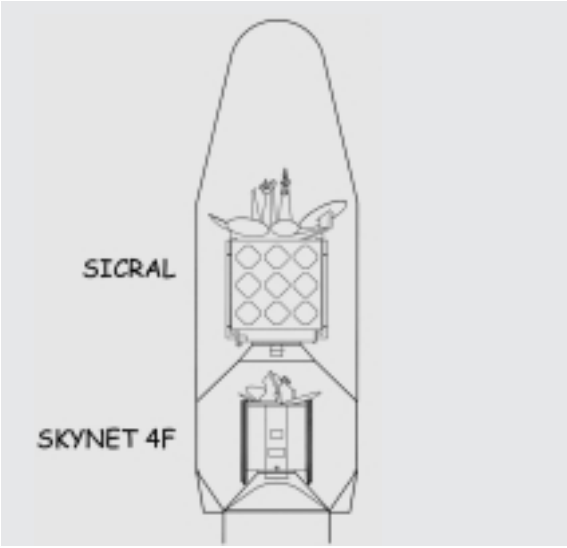
LAUNCH OPPORTUNITY

	GMT	Paris and Rome time	London time	Washington time	Kourou time
From	*10:28 pm*	*11:28 pm*	*10:28 pm*	*05:28 pm*	*between 7.28 pm*
to	*11:28 pm*	*12:28 am*	*11:28 pm*	*06:28 pm*	*and 8:28 pm*
on	*February 7, 2001*	*February 7/8, 2001*	*February 7, 2001*	*February 7, 2001*	*February 7, 2001*

Ariane payload configuration

The SICRAL satellite was built by SITAB (Alenia Spazio), for the Italian Ministry of Defence.
Orbital position: 16,2° Est, over Congo

The SKYNET 4F satellite was built by ASTRIUM Ltd., in Stevenage (Great-Britain), for the British Ministry of Defence.
Orbital position: 1° West or 6° Est, over the Gulf of Guinea



2. RANGE OPERATIONS CAMPAIGN : ARIANE 44L – SICRAL & SKYNET 4F

The actual work for satellite range operations lasts 40 working days for SICRAL from its arrival in Kourou (before encapsulation).
The actual work for satellite range operations lasts 70 working days for SKYNET 4F from its arrival in Kourou (before encapsulation).
The ARIANE 44L preparation campaign lasts 25 working days.

SATELLITES AND LAUNCH VEHICLE CAMPAIGN CALENDAR

Ariane activities	*Dates*	*Satellites activities*
	October 25, 2000	*SKYNET 4F arrival in Kourou and beginning of its preparation in S1A building.*
	December 8, 2000	*SICRAL arrival in Kourou and beginning of its preparation in S1B building.*
Campaign start review	*January 4, 2001*	
First stage erection	*January 4, 2001*	
Second stage erection	*January 5, 2001*	
Third stage erection	*January 12, 2001*	
Liquid strap-on boosters erection	*January 9-12, 2001*	
Launch flight V137 : EURASIASAT 1	*January 10, 2001*	
	January 10, 2001	*SICRAL transfer from S1B to S3B building.*
	January 10, 2001	*SKYNET 4F transfer from S1A to S3A building.*
	January 11, 2001	*Beginning of SICRAL filling operations.*
	January 12, 2001	*Beginning of SKYNET 4F filling operations.*
Roll-out to launch pad	*January 25, 2001*	

D-9	*Thursday, January 25, 2001*	*Start of combined operations*
D-6	*Tues, January 30*	*Satellite encapsulation operations.*
D-5	*Wed, January 31*	*Satellite composite transfer to the launch pad.*
D-4	*Thurs, February 1*	*Satellite composite mating onto launcher and overall checks.*
D-3	*Fri, February 2*	*Launch Rehearsal*
D-2	*Mon, February 5*	*Launch Readiness Review (RAL) and launcher arming.*
D-1	*Tues, February 6*	*Filling of 1st stage, and 2nd stage, and liquid boosters with UH 25 and N2O4.*
D-0	*Wednesday, February 7*	*Launch Countdown including 3rd stage filling with liquid oxygen and liquid hydrogen.*

3. LAUNCH COUNTDOWN AND FLIGHT EVENTS :

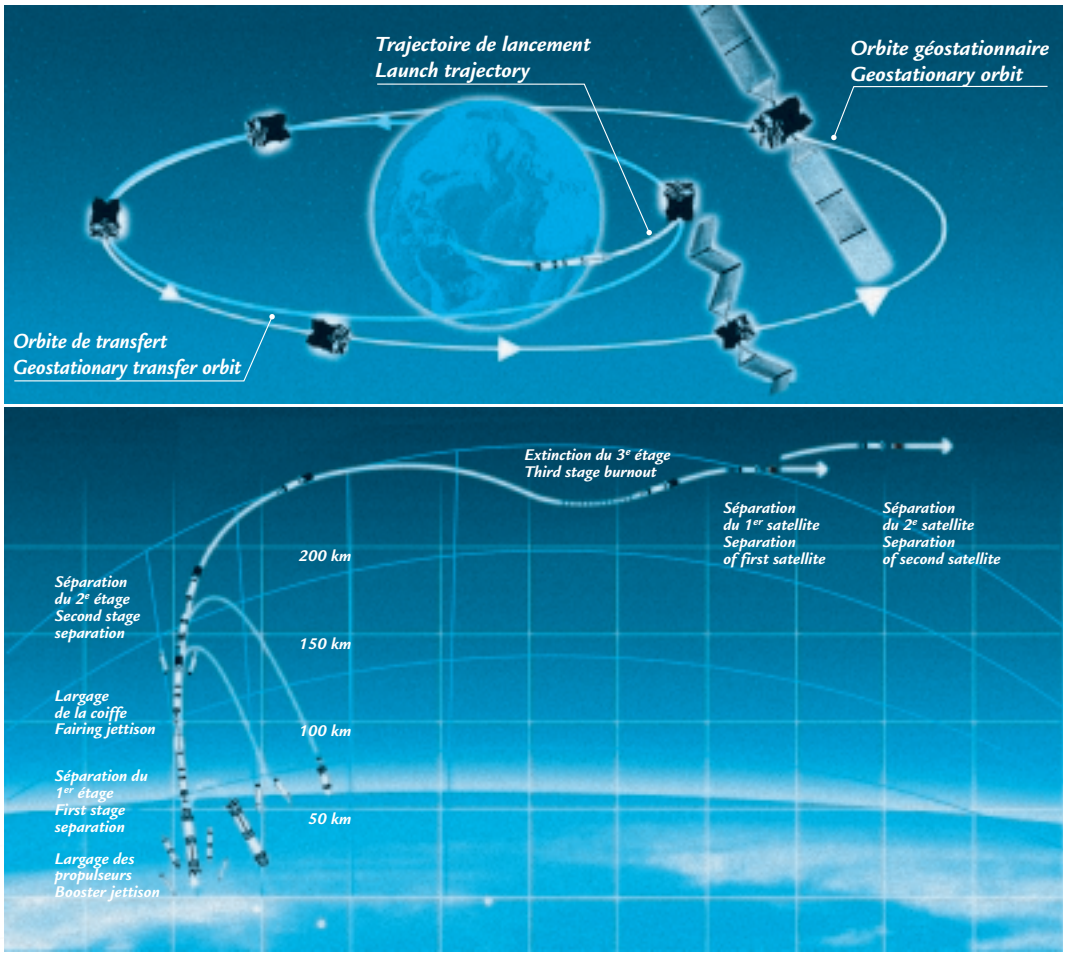
The final launch countdown runs through all the final launcher and satellites related operations. It configures the vehicle and its payload for ignition of the first stage and PAL engines at the selected launch time, as soon as possible within the launch window authorized by the spacecraft.
A synchronized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

Time	***Events***
– 14h 30 mn 00 s	*Start of final countdown.*
– 5 h 55 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 28 s	*Liquid strap-on booster jettison.*
+ 3 mn 32 s	*First stage separation.*
+ 3 mn 35 s	*Second stage ignition.*
+ 4 mn 02 s	*Fairing jettison.*
+ 5 mn 44 s	*Second stage separation.*
+ 5 mn 48 s	*Third stage ignition.*
+ 6 mn 30 s	*Launcher acquired by Natal station.*
+ 13 mn 26 s	*Launcher acquired by Ascension Island station.*
+ 18 mn 06 s	*Launcher acquired by Libreville station.*
+ 19 mn 16 s	*Third stage shutdown sequence.*
+ 20 mn 55 s	*SICRAL separation.*
+ 21 mn 01 s	*Composite orientation*
+ 25 mn 53 s	*SKYNET 4F separation.*
+ 26 mn 33 s	*Start of the third stage avoidance maneuver.*
+ 30 mn 43 s	*End of ARIANESPACE Flight 139 mission.*

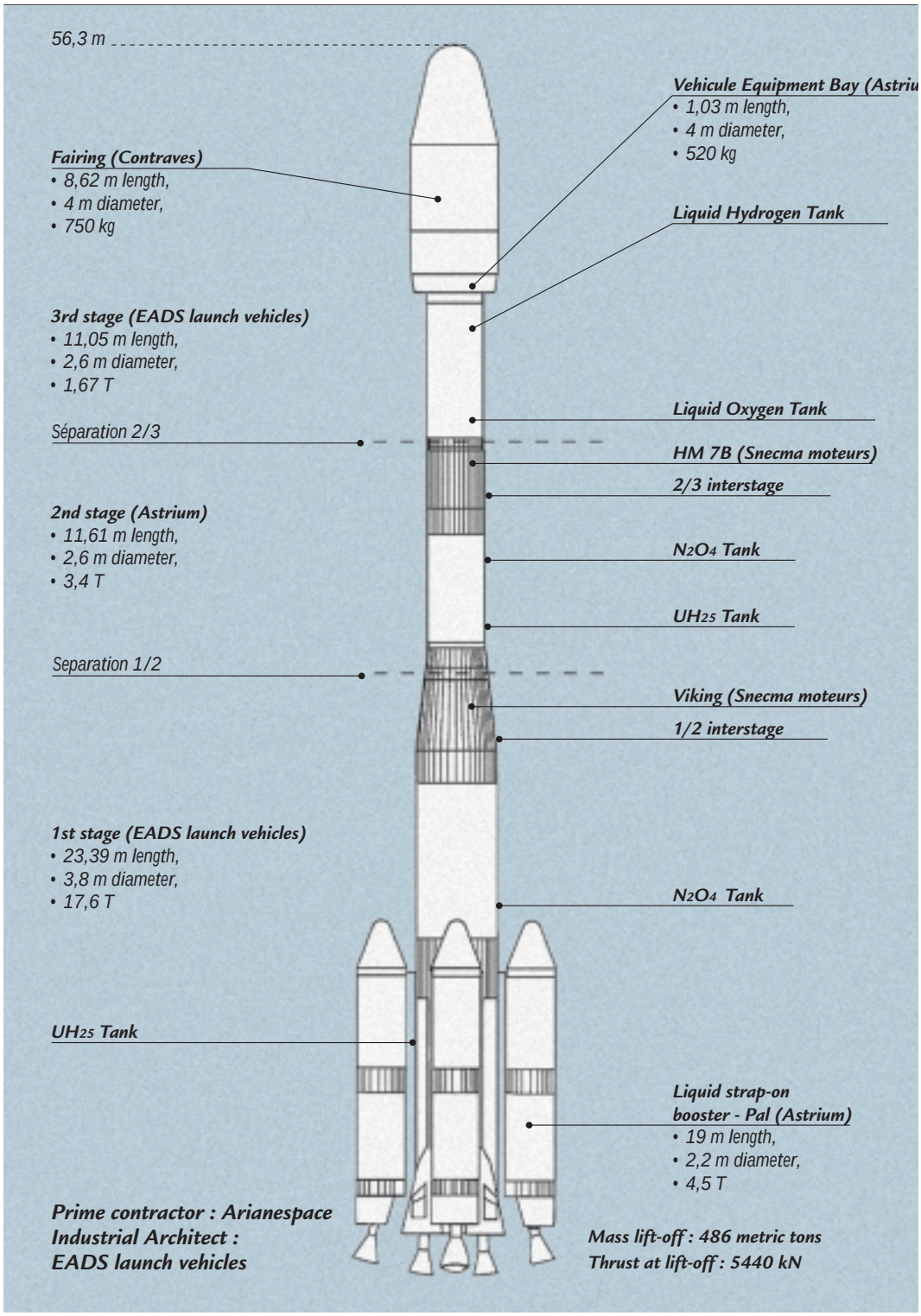
4. Flight 139 TRAJECTORY :

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 190 kg (418 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.

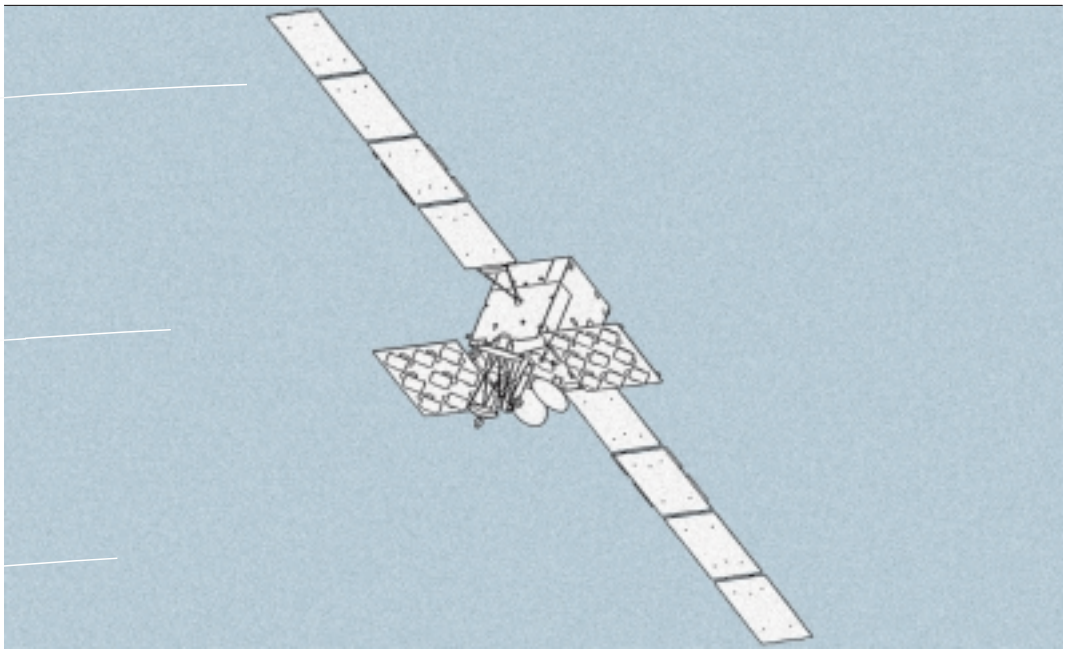
TYPICAL TRAJECTORY FOR STANDARD GEOSTATIONARY TRANSFER ORBIT AND GROUND STATION VISIBILITY



5. THE LAUNCH VEHICLE :



6. THE SICRAL SATELLITE



Customer	***Italian Ministry of Defence***	
Prime contractor	*ALENIA SPAZIO*	
Mission	*Military telecommunications*	
Mass	*Total mass (at lift-off)*	*2 596 kg (5 711 lb)*
Dry mass		*1 253 kg (2 756 lb)*
Stabilization	*3 axis*	
Dimensions	*Height*	*2,79 m*
Structure		*3,43 m x 4,93 m*
Span in orbit	*24,50 m*	
Payload	*9 SHF, UHF and EHF Band transponders*	
On-board power	*3280 W (beginning of life)*	
Life time	*10 years*	
Orbital location	*16,2° Est, above Congo*	
Coverage area	*Global with beams over Italy, Europe and the Middle-East*	

Press Contact for SICRAL

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Alenia Spazio
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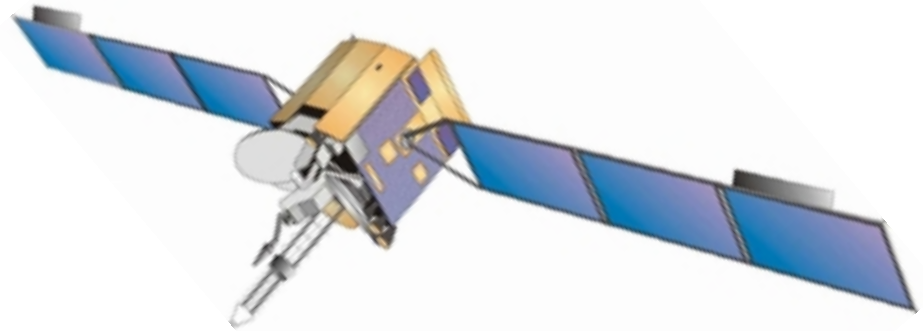
e-mail : panaccia@rmmail.alespazio.it

7. THE SKYNET 4F SATELLITE



Customer	***British Ministry of Defence***	
Prime contractor	*ASTRIUM*	
Mission	*Military telecommunications*	
Mass	*Total mass (at lift-off)* *Dry mass*	*1489 kg (3 276 lb)* *830 kg (1 826 lb)*
Stabilization	*3 axis*	
Dimensions	*Height* *Structure* *Span in orbit*	*1,45 m* *1,76 m x 1,91 m* *16,05 m*
Payload	*8 transponders (4 SHF, 2 UHF and 2 S Band transponders)*	
On-board power	*2000 W (beginning of life)*	
Life time	*8 years*	
Orbital location	*1° West or 6° Est, above the Gulf of Guinea*	
Coverage area	*Global with beams*	

Press Contact for SKYNET 4F :

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e-mail : alistair.scott@astrium-space.com

ANNEX 1 - ARIANESPACE Flight 139 KEY PERSONNEL

In charge of the launch compaign			
Mission Director	*(CM)*	*Rémy KOCHER*	*ARIANESPACE*
In charge of the launch service contracts			
SKYNET 4F Mission Manager and ARIANE Payload Manager	*(RCUA)*	*Alexandre MADEMBA-SY*	*ARIANESPACE*
SICRAL Mission Manager	*(RCUA/A)*	*Michael CALLARI*	*ARIANESPACE*
In charge of SKYNET 4F satellite			
Satellite Mission Director	*(DMS)*	*David CROSS*	*ASTRIUM Ltd*
Satellite Project Manager	*(CPS)*	*Mike RISEBOROUGH*	*ASTRIUM Ltd*
Satellite Preparation Manager	*(RPS)*	*Jack MIKULLA*	*ASTRIUM Ltd*
In charge of SICRAL satellite			
Satellite Mission Director	*(DMS)*	*Mario CIAMPINI*	*ALENIA SPAZIO*
Satellite Project Manager	*(CPS)*	*A. GALAURCHI*	*ALENIA SPAZIO*
Satellite Preparation Manager	*(RPS)*	*Luciano DI NAPOLI*	*ALENIA SPAZIO*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*Philippe HERS*	*ARIANESPACE*
Ariane Production Project Manager	*(CPAP)*	*Manuel SANCHEZ*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Pierre RIBARDIERE*	*CNES/CSG*
Flight Safety Officer	*(RSV)*	*Pierre BENNAROCHE*	*CNES/CSG*

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 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 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 181 satellites and 37 auxiliary payloads have been launched by Arianespace
Out of the 231 launch services contracted since 1981 by Arianespace and before Flight 139, 39 satellites and 9 ATV launches remain to be launched.

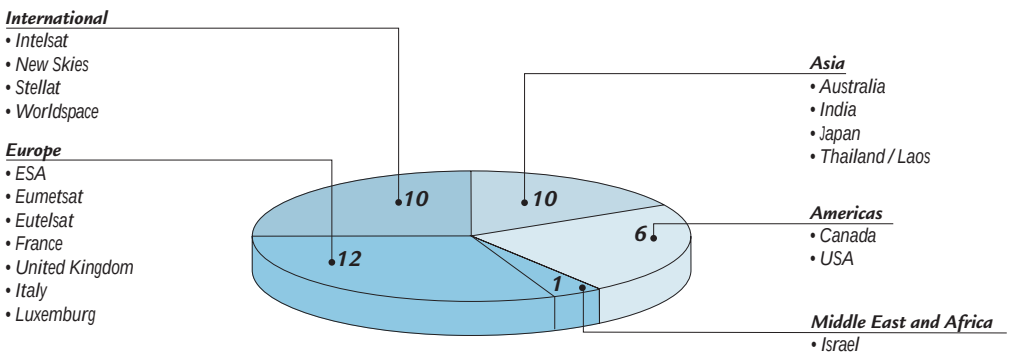
Europe **12 satellites**
Astra 1K, X
Envisat-1/PPF
Eurobird
Eutelsat TBDA, TBDB
MSG-1 & 2
Sicral 1
Skynet 4F
Spot 5
Stentor
+ 9 ATV launches

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 (Israel)

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

Asia **10 satellites**
B-SAT 2a & 2b (Japan)
Insat 3C, 3A & 3E (India)
JCSAT 8 (Japan)
L-Star A & B (Thailand/Laos)
N-STAR c (Japan)
Optus C1 (Australia)



APPENDIX 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).
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 FF 2,088 million.
As a space transportation company, Arianespace :
m markets launch services to customers throughout the world ;
m finances and supervises the construction of Ariane expendable launch vehicles ;
m conducts launches from Europe's Spaceport in Kourou in French Guiana ;
m 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 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 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 uprated 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.