

arianespace

ARIANESPACE
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 EUTELSAT

VOI 132

Kourou 2000

W1

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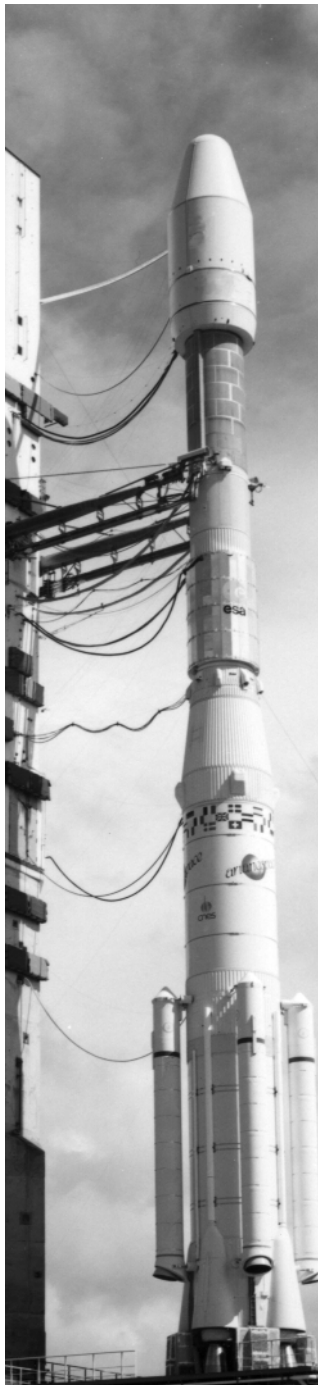
ARIANE LAUNCHER BOOST EUROPE'S TELECOMMUNICATIONS AND MULTIMEDIA CAPABILITIES

For nearly 20 years, Arianespace has supported the development of space-based telecommunications throughout Europe, adding multimedia capabilities in recent years.

W1 is the 13th out of 14 satellites that Eutelsat, the European Telecommunications Satellite Organization, has entrusted to the European launch system. Built by Astrium in Toulouse, southwest France, it will join the family of Eutelsat broadband satellites that provide multimedia transmission services throughout Europe. Positioned at 10 degrees East, and also featuring a steerable beam, the W1 satellite could serve additional markets, such as southern Africa.

Arianespace is already slated to launch another Eutelsat satellite, Eurobird, in 2001.

For its sixth launch of the year, Arianespace will use an Ariane 44P, equipped with four solid-propellant strap-on boosters.



- 1 - ARIANESPACE Flight 132 mission.
- 2 - Range operations :
ARIANE 44P - W1.
- 3 - Countdown and Flight events.
- 4 - Flight 132 trajectory.
- 5 - The ARIANE 44P launch vehicle.
- 6 - The W1 satellite.

ANNEXES

- 1 - Flight 132 key personnel.
- 2 - Launch environment conditions.
- 3 - Synchronized sequence.
- 4 - ARIANESPACE orderbook.
- 5 - ARIANESPACE, ESA and CNES.

1 - ARIANESPACE FLIGHT 132 MISSION

The 131st Ariane launch (Flight 132) is scheduled to place the W1 satellite into a geostationary transfer orbit using an ARIANE 44P launch vehicle equipped with 4 solids strap-on boosters (PAP). This will be the 98th Ariane 4 launch and the 13th in the ARIANE 44P configuration.

It will be launched from the Ariane launch complex n°2 (ELA2), in KOUROU, French Guiana.

The launch vehicle performance requirement is 3332 kg (7330 lb) of which 3250 kg (7150 lb) represent the mass of the spacecraft to be separated on the injection orbit.

INJECTION ORBIT

Perigee altitude :	300 km
Apogee altitude:	35 786 km at injection
Inclination :	7° degrees

The ARIANE 44P launcher liftoff for Flight 132 is scheduled on the night of september 6 to 7, 2000 as early as possible within the following launch window :

KOUROU TIME

Between **07:33 pm** and **08:47 pm**
on **September 6, 2000**

LAUNCH OPPORTUNITY (GMT)

From :	10:33 pm
to :	11:47 pm
on September 6, 2000	

PARIS TIME

00:33 am
01:47 am
on September 6-7, 2000

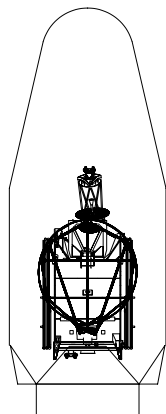
WASHINGTON TIME

06:33 pm
07:47 pm
on September 6, 2000

ARIANE PAYLOAD FLIGHT CONFIGURATION

ARIANE
Fairing O1

Satellite
in launch
configuration



The W1 satellite was built by ASTRIUM in Toulouse (France) for European operator EUTELSAT.

Operational on orbit position : 10° East, above Gabon.

2 - RANGE OPERATIONS CAMPAIGN : ARIANE 44P - W1.

The actual work for satellite range operations lasts 27 working days for W1 from its arrival in Kourou (before encapsulation).

The ARIANE 44P preparation campaign lasts 25 working days.

SATELLITE AND LAUNCH VEHICLE CAMPAIGN CALENDAR

ARIANE ACTIVITES	DATES	SATELLITE ACTIVITES
	July 26, 2000	W1 arrival in Kourou and beginning of its preparation in S1B building.
CAMPAIGN START REVIEW and First stage erection	August 3, 2000	
Second stage erection	August 4, 2000	
Third stage erection	August 11, 2000	
Flight 131 launch : Brasilsat B4-Nilesat 102	August 17, 2000	
	August 18, 2000	W1 transfer from S1B to S3B building.
	August 22, 2000	Beginning of W1 filling operations.
Launcher Roll-out to launch area	August 23, 2000	
Solid strap-on boosters erection	August 25-26, 2000	

D-8 MON, AUGUST 28 START OF COMBINED OPERATIONS

D-7	Tues, August 29	Satellite encapsulation operations (cont'd).
D-6	Wed, August 30	Satellite enclosed in fairings.
D-5	Thurs, August 31	Satellite composite transfer to the launch pad.
D-4	Frid, September 1	Satellite composite mating onto launcher and overall checks
D-3	Sat, September 2	LAUNCH REHEARSAL.
D-2	Mon, September 4	LAUNCH READINESS REVIEW (RAL) and launcher arming.
D-1	Tues, September 5	Filling of 1st stage and 2nd stage with UH 25 and N ₂ O ₄ .
D-0	Wed, September 6	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 satellite related operations. It configures the vehicle and its payload for ignition of the first stage 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 HO - 6mn and concludes the countdown.

Should a hold in the countdown delay the HO 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
- 14 h 30 mn	Start of final countdown.
- 5 h 55 mn	Start of gantry withdrawal.
- 3 h 35 mn	Start of the 3 rd stage filling operations with liquid hydrogen and liquid oxygen.
- 1 h 05 mn	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.
9 s	Inertial platform released.
5 s	Release command to cryogenic arms retraction system.

HO	IGNITION of first stage
+ 4.2 s	Ignition of solid strap-on boosters.
+ 4.4 s	Lift-off.
+ 11 s	End of vertical ascent phase of pitch motion (10 s duration).
+ 1 mn 12 s	Solid strap-on boosters jettison.
+ 3 mn 33 s	First stage separation.
+ 3 mn 34 s	Second stage ignition.
+ 4 mn 26 s	Fairing jettison.
+ 5 mn 44 s	Second stage separation.
+ 5 mn 47 s	Third stage ignition.
+ 6 mn 40 s	Launcher acquired by Natal station.
+ 12 mn 40 s	Launcher acquired by Ascension Island station.
+ 17 mn 50 s	Launcher acquired by Libreville station.
+ 18 mn 47 s	Third stage shutdown sequence.
+ 18 mn 49 s	Injection into the required orbit.
+ 20 mn 09 s	W1 separation.
+ 20 mn 14 s	Start of the third stage avoidance maneuver.
+ 21 mn 38 s	End of Arianespace Flight 132 mission.

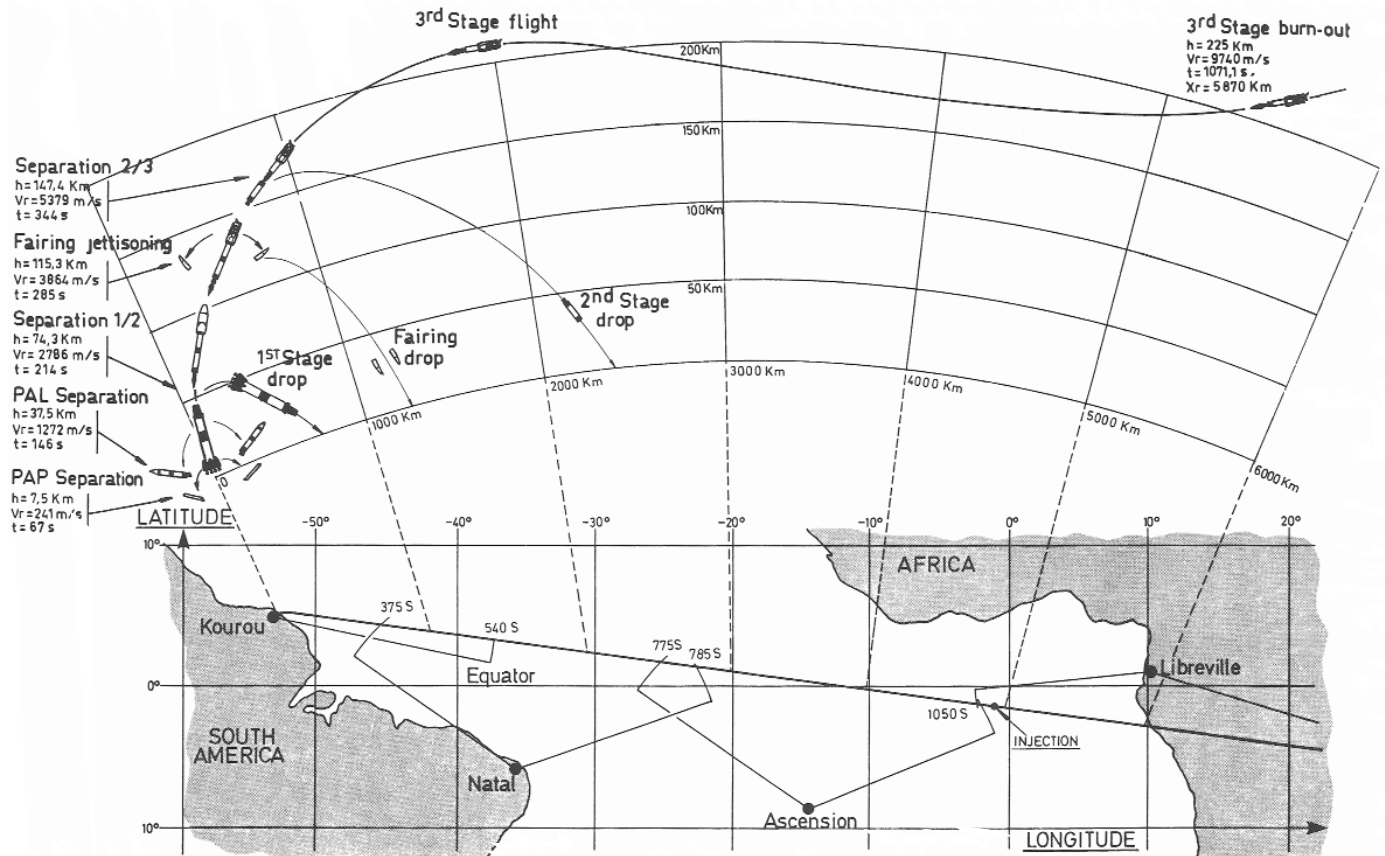
4 - FLIGHT 132 TRAJECTORY :

The launcher ascends vertically from lift-off to HO+13 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 178 kg (391 lb). This ensures reaching this orbit with a probability of 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



Down-range stations

In French: Guiana	KOUROU (Montagne des Pères) And CAYENNE (Montabo)
In Brazil :	NATAL
Atlantic Ocean :	ILE D'ASCENSION
In Gabon :	LIBREVILLE

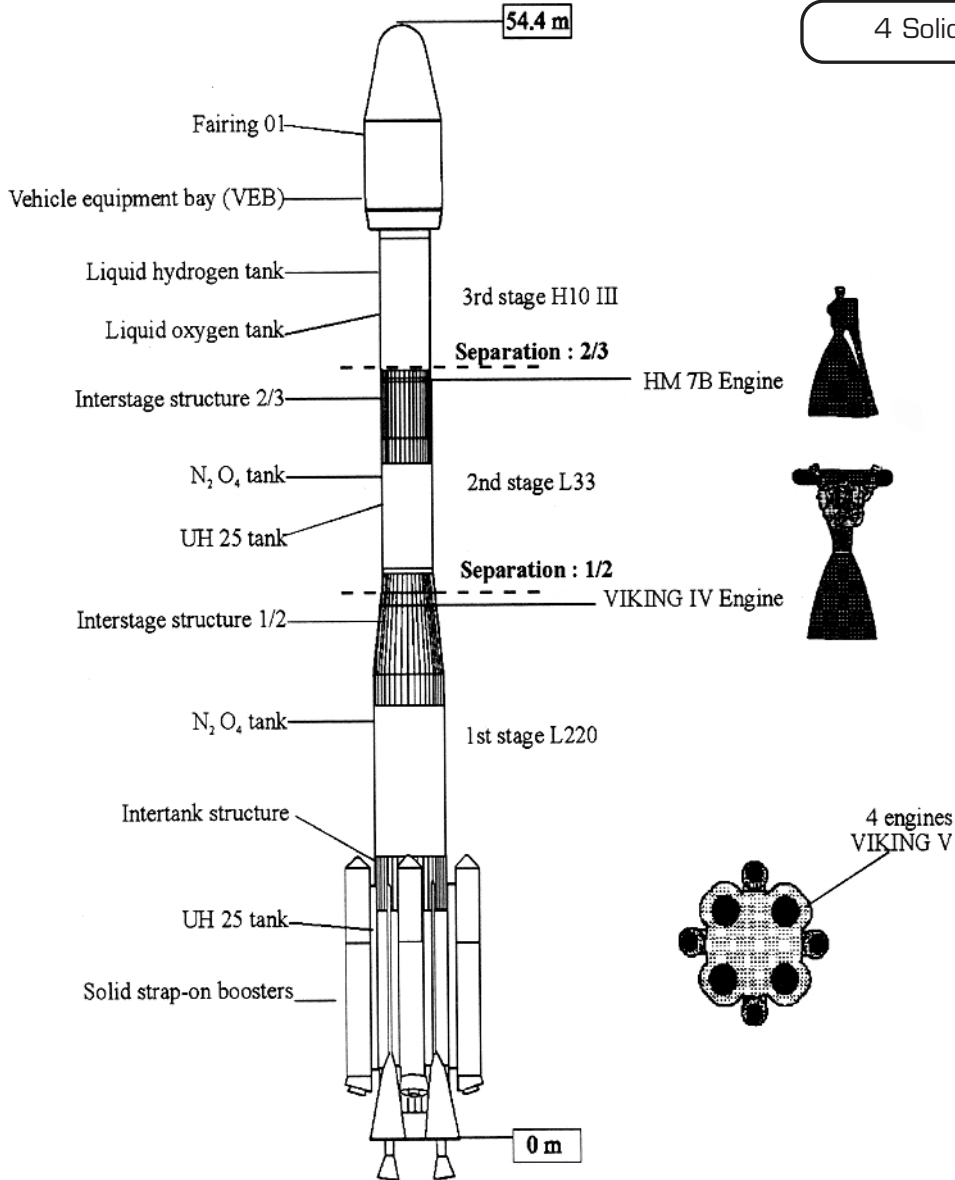
Launch main events

1 :	First stage separation.
2 :	Fairing jettison.
3 :	Second stage separation.
4 :	Third stage shutdown.

5 - THE LAUNCH VEHICLE :

ARIANE 44 P

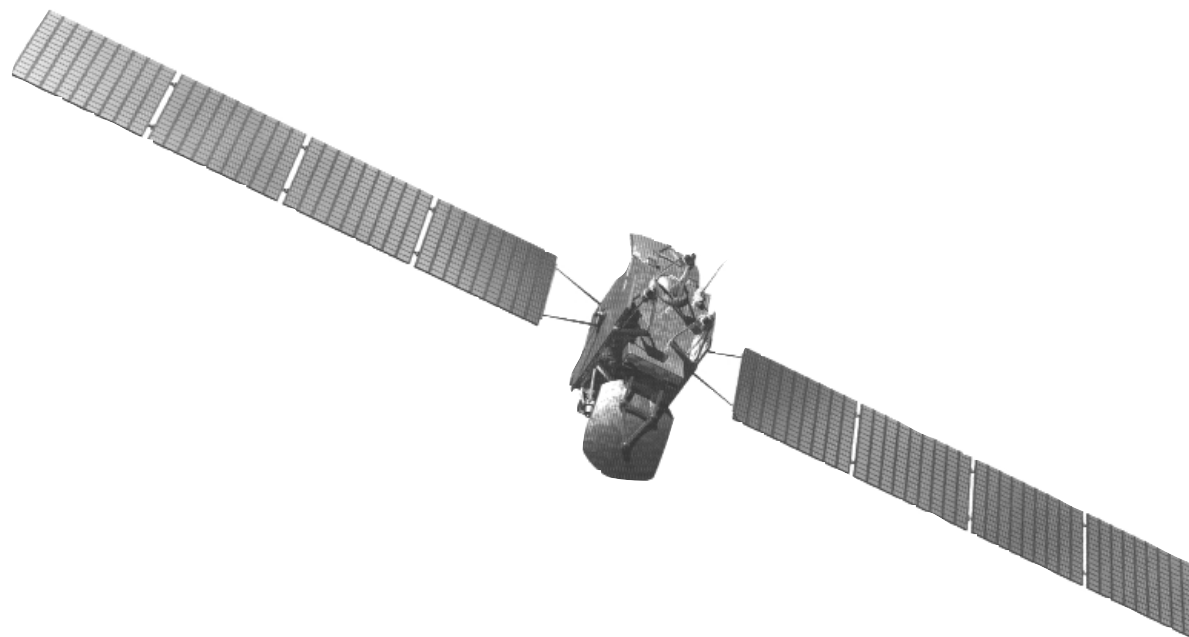
4 Solid strap-on Boosters



Production authority
ARIANESPACE
 Industrial Architect
EADS LAUNCH VEHICLES

	Length	σ	Dry mass	Prime
FAIRING	8,62 m	4,0 m	750 kg	CONTRAVES
VEB	1,03 m	4,0 m	520 kg	ASTRIUM
3rd stage	11,05 m	2,6 m	1,67 T	EADS LAUNCH VEHICLES
2nd stage	11,61 m	2,6 m	3,40 T	ASTRIUM
1st stage	28,39 m	3,8 m	17,60 T	EADS LAUNCH VEHICLES
PAP	12,50 m	1,1 m	3,10 T	FIAT AVIO
VIKING IV, V, VI				SNECMA
HM 7B				SNECMA

6 - THE W1 SATELLITE :



Customer : EUTELSAT

Prime contractor : ASTRIUM SAS Toulouse (France).

Mission : Communications and Multimedia

Mass : Total mass (at lift-off) 3 250 kg (7,150 lb).
Dry mass 1 430 kg (3,146 lb).

Stabilization : 3 axis.

Dimensions : Dimensions at launch 2,5 m.
Main body 3,4 m x 5 m.
Span in orbit 31,7 m.

Platform : EUROSTAR 2000+

Payload : 28 Ku-band transponders.

On-board power : 7,0 kW (end of life).

Life time : more than 12 years.

Orbital location : 10° East, above Gabon.

Footprint : Europe + steerable beam

Press Contact :

Vanessa O'CONNOR - EUTELSAT

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ANNEX 1 - ARIANESPACE FLIGHT 132 KEY PERSONNEL

In charge of the launch campaign

Mission Director	(CM)	Gilles TRIAY	ARIANESPACE
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In charge of the launch service contracts

W1 Mission Manager and ARIANE Payload Manager	(RCUA)	Claude BERNA	ARIANESPACE
ARIANE Payload Deputy Manager	(RCUA/A)	Baard EILERTSEN	ARIANESPACE

In charge of W1 satellite

Satellite Mission Director	(DMS)	Jean-Jacques DUMESNIL	EUTELSAT
Satellite Project Manager	(CPS)	Philippe MATHON	EUTELSAT
Satellite Project Manager	(CPS)	Arnaud de ROSNAY	ASTRIUM
Satellite Preparation Manager	(RPS)	Eric PERROT	ASTRIUM

In charge of the launch vehicle

Launch Site Operations Manager	(COEL)	Pierre-François BENAITEAU	ARIANESPACE
ARIANE Production Project Manager	(COEL)	Bernard THEVENOT	ARIANESPACE

In charge of the Guiana Space Center (CSG)

Range Operations Manager	(DDO)	Philippe MAUBERT	CNES/CSG
Flight Safety Officer	(DDO)	Pierre-yves TOURNEAU	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 HO -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 HO-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 HO - 5 s. and retraction of the cryogenic arms retraction from the launcher, a majority logic sequencer delivers the main timing pulses for :

- first stage engine ignition (HO)
- engine parameter checkout (conducted in parallel by the two computers, starting at HO + 2.8 s.)
- opening of the launch table clamps (releasing the launch vehicle between HO + 4. 1s. and HO + 4.6 s.) as soon as engine parameters are judged as nominal by one of the computers and solid boosters ignition.

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

ANNEX 4 - ARIANESPACE ORDER BOOK

To date **173** satellites and **34** auxiliary payloads have been launched by Arianespace

Out of the **211** satellites signed for launch since 1981 by Arianespace and **before** Flight 132, **38** satellites and **9** ATV launches remain to be launched.

EUROPE 14 satellites

ASTRA 1K, 2B, X, 2D
 ENVISAT-1/PPF
 EURASIASAT 1
 EUROBIRD
 MSG-1 & 2
 SICRAL 1
 SKYNET 4F
 SPOT 5
 STENTOR
W1
 + 9 ATV launches

37 %

OUTSIDE EUROPE 24 satellites

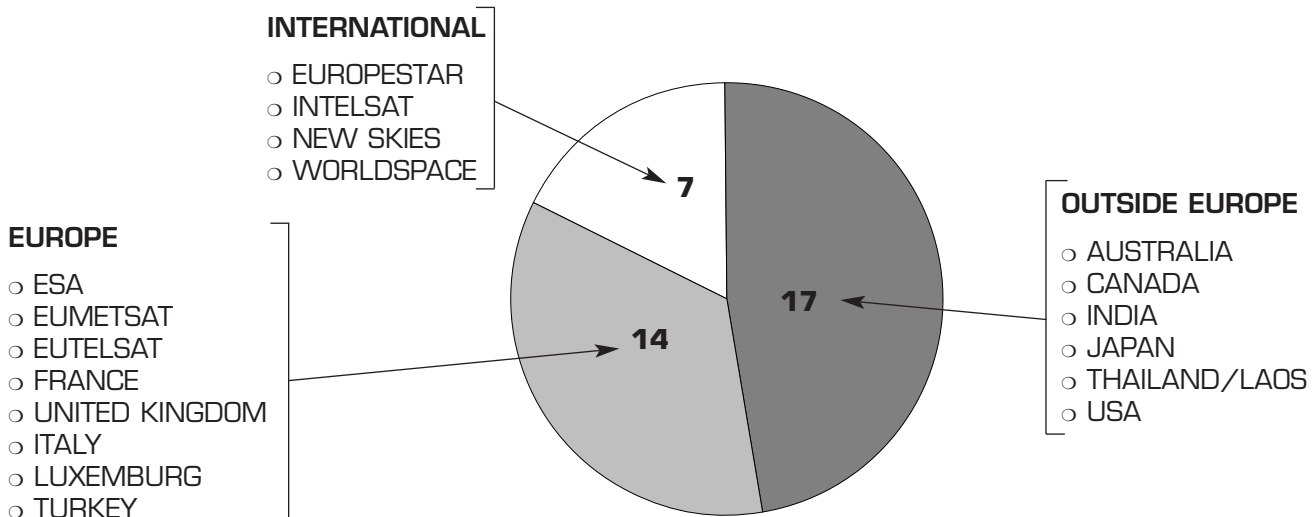
INTERNATIONAL ORGANIZATIONS : 7 satellites

AMERISTAR (Worldspace)
 EUROPESTAR FM1
 INTELSAT 902, 903, 904
 NEW SKIES SATELLITES KTV 1 & 7

OTHERS : 17 satellites

ANIK F1 & F2 (Canada)
 BSAT 2A & 2B (Japan)
 GE 7, 8, et TBD (USA)
 INSAT 3A (India)
 ISKY 1 & 2 (USA)
 JC SAT 8 (Japan)
 LORALSAT 3 (USA)
 L-STAR A & B (Thailand/Laos)
 N-SAT 110 (Japan)
 OPTUS C1 (Australia)
 PAS-1R (USA)

63 %



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 350. Share capital totals FF 2,088 million.

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 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.