

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100030015-1

1 - 1

FOR OFFICIAL USE ONLY

JPRS L/8312

6 March 1979

FRANCE: NUCLEAR, MISSILE, AND SPACE DEVELOPMENTS  
FOUO No. 454



WEST



EUROPE



U. S. JOINT PUBLICATIONS RESEARCH SERVICE



FOR OFFICIAL USE ONLY

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

COPYRIGHT LAWS AND REGULATIONS GOVERNING OWNERSHIP OF  
MATERIALS REPRODUCED HEREIN REQUIRE THAT DISSEMINATION  
OF THIS PUBLICATION BE RESTRICTED FOR OFFICIAL USE ONLY.

<b>BIBLIOGRAPHIC DATA SHEET</b>		1. Report No. JPRS L/8312	2.	3. Recipient's Accession No.
4. Title and Subtitle FRANCE: NUCLEAR, MISSILE, AND SPACE DEVELOPMENTS, No. 454			5. Report Date 6 March 1979	6.
7. Author(s)			8. Performing Organization Rept. No.	
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No.	
			11. Contract/Grant No.	
12. Sponsoring Organization Name and Address As above			13. Type of Report & Period Covered	
			14.	
15. Supplementary Notes				
16. Abstracts  The serial report contains information primarily from French major daily newspapers and pertinent specialized journals on French nuclear, missile, and space technology, research and development.				
17. Key Words and Document Analysis. 17a. Descriptors  France Weapons Aeronautics Missiles Nuclear Technology				
17b. Identifiers/Open-Ended Terms				
17c. COSATI Field/Group 16D, 18I, 19F, 22B				
18. Availability Statement For Official Use Only. Limited Number of Copies Available From JPRS.			19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 19
			20. Security Class (This Page) UNCLASSIFIED	22. Price

FORM NTIS-88 (10-70)

USCOM-DC 40328-P71

FOR OFFICIAL USE ONLY

JPRS L/8312

6 March 1979

FRANCE: NUCLEAR, MISSILE, AND SPACE DEVELOPMENTS

FORM No. 454

CONTENTS	PAGE
Naval Crotale Missile Deliveries for 1979 Noted (Pierre Langereux; AIR & COSMOS, 3 Feb 79) .....	1
Ariane Erected at Guiana Space Center (Pierre Langereux; AIR & COSMOS, 3 Feb 79) .....	3
SLBM Test in 1980 Planned (AIR & COSMOS, 3 Feb 79) .....	6
Ariane Prelaunch Preparations Detailed (Pierre Langereux; AIR & COSMOS, 13 Jan 79) .....	8
Ariane 1979-1980 Test Schedule Reviewed (Pierre Langereux; AIR & COSMOS, 27 Jan 79) .....	15

- a -

[III - WE - 151 FOUO]

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

NAVAL CROTALE MISSILE DELIVERIES FOR 1979 NOTED

Paris AIR & COSMOS in French 3 Feb 79 p 32

[Article by Pierre Langereux: "Four Naval Crotale Weapon Systems To Be Delivered in 1979"]

[Text] Four Crotale naval surface-to-air weapon systems built by Thomson-CSF will be delivered to the French Navy this year. The first system will equip the frigate Duguay-Trouin (F67 class).

Late last year, sea trials of the naval Crotale entered the phase in which the missiles are launched against targets under operational conditions. This second test phase is to continue throughout the coming weeks with additional firings. Upon completion of these test firings this summer, the naval Crotale system will be placed in operational service.

This new test series follows a series conducted with the first two Crotale systems installed on the French Navy's test ship Ile d'Oleron and the destroyer Georges Leygues (C70 class). These initial tests were designed to check the Crotale's fire control system, its missile shipboard storage and loading system developed by the DTCN [Technical Directorate for Naval Architecture and Marine Engineering], and fire dummy missiles to check operation of the launchers. All these systems performed satisfactorily.

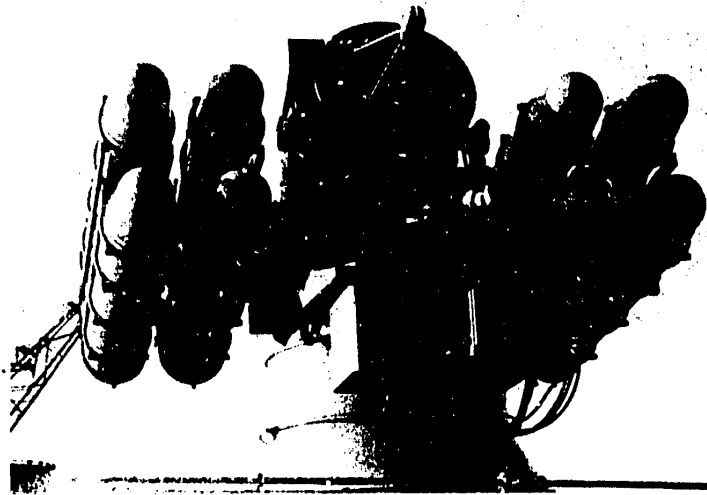
In one of these test firings conducted during December at the Mediterranean Test Center, the Crotale missile intercepted a CT-20 target drone. For this particular firing, the missile's warhead had been replaced by a telemetry unit. The missile hit and destroyed the target--simulating an attack on the test ship Ile d'Oleron--at a range in excess of 6,000 meters. This direct hit from a ship subjected to the platform movements of a medium-state sea, demonstrated the effectiveness of the servocontrols of the mount for the radar that stabilizes the line of sight and guides the missile. These two functions use the same programmable digital computer.

The naval version of the Crotale missile is identical to the French Air Force's Crotale and uses the same subassemblies as missiles designed for the new "10-kilometer surface-to-air systems," including the Shahine, developed

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

by Thomason-CSF. The Crotale missile is normally equipped with an infrared proximity fuse and armed with a 15-kilogram warhead producing a burst of fragments localized in time and space, the fragments retaining the same lethality within a radius of 8 meters. The naval Crotale's specific characteristics coupled with an efficient fire control system whose excellence was recently demonstrated anew, make this weapon system unquestionably effective out to long ranges.



Thomson-CSF Crotale naval surface-to-air weapon system mount with eight ready-to-fire missiles (in air-tight containers) on launchers. Missile is radar-or TV camera-guided, as the case may be.

COPYRIGHT: AIR & COSMOS, Paris, 1979

8041  
CSO: 3100

FOR OFFICIAL USE ONLY

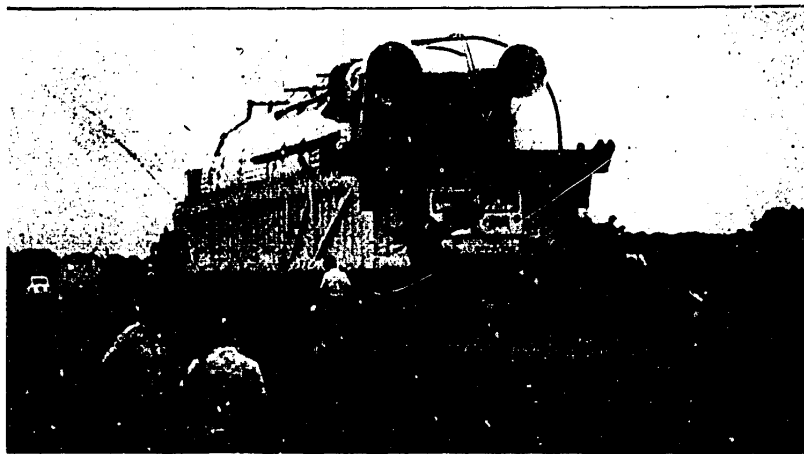
FOR OFFICIAL USE ONLY

ARIANE ERECTED AT GUIANA SPACE CENTER

Paris AIR & COSMOS in French 3 Feb 79 p 33

[Article by Pierre Langereux: "Ariane in Guiana"]

[Text] For the first time ever, an Ariane rocket now towers above its launch pad in Kouru, French Guiana. This European launch vehicle is more than 47 meters high and weighs 207 tons when fueled. It was erected inside the launch tower in January. Newsmen and representatives from member countries of the European Space Agency will visit the installation in early February. This version of the Ariane is the "fueling mockup" that will be used to test automatic and manual fueling procedures until 15 March, then to conduct vibration tests on the launch pad until late April, and finally, to qualify the entire Ariane launch site--launch pad, launch control center, radars, etc--in May and June. These operations are part of the Guiana Space Center's operational qualification. The center is preparing for the first firing of the Ariane launcher now set for 3 November 1979. CNES [National Center for Space Studies] is responsible for the Ariane program. Principal French contractors include Aerospatiale, SEP [European Propulsion Company], Matra, Air Liquide, etc.

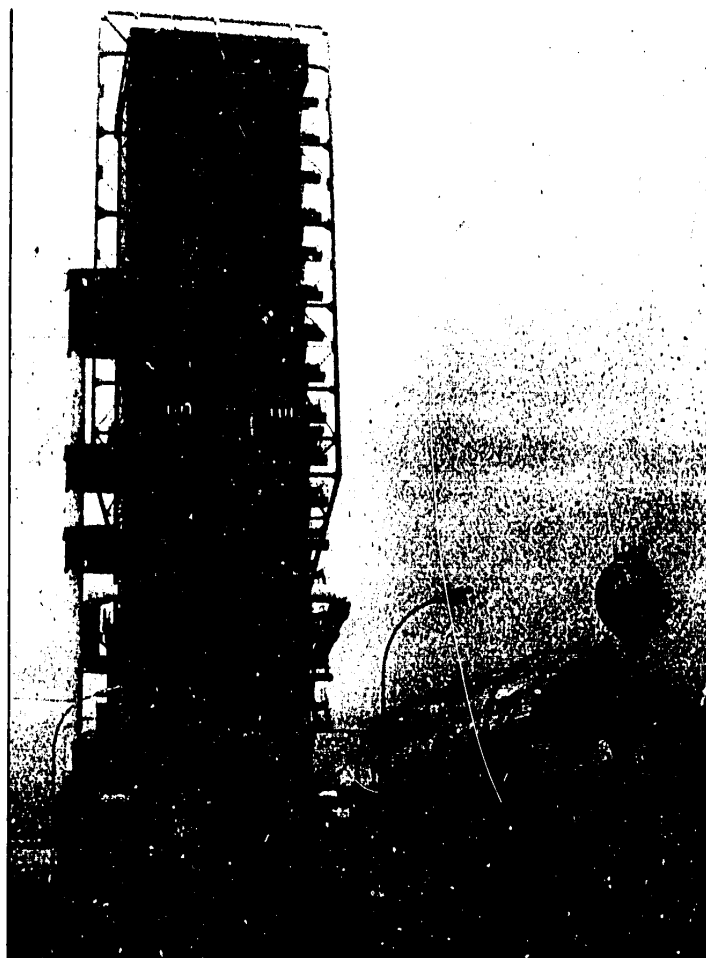


First stage arrives at Kouru in special container module.

FOR OFFICIAL USE ONLY



FOR OFFICIAL USE ONLY

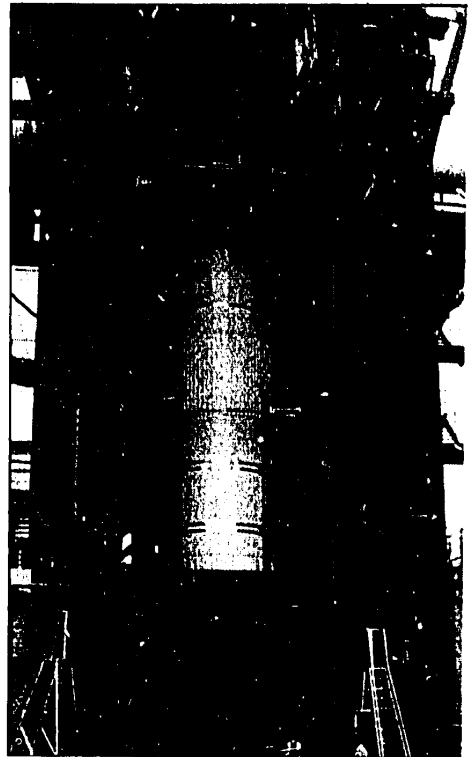


Air-conditioned Ariane launch tower

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

Erection of Ariane first stage in tower



Erection of Ariane second stage in tower

COPYRIGHT: AIR & COSMOS, Paris, 1979

8041

CSO: 3100

5

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

SLBM TEST IN 1980 PLANNED

Paris AIR & COSMOS in French 3 Feb 79 p 34

[Article: "First Firing of MSBS [SLMB] M4 in 1980"]

[Text] Aerospatiale's ballistic and space systems division has announced--in the company's magazine--that testing of the upgraded SSBS S3 (Strategic Surface-to-Surface Ballistic Missile) was completed in 1978 and that installation of these missiles on operational sites began that same year. It also



Test mockup of the M4 missile loaded in the tube of the submersible caisson at the CEM [Mediterranean Test Center] in Toulon

FOR OFFICIAL USE ONLY

revealed that final adjustment and qualification of subsystems for the new MSBS M4 [SLBM: Submarine Launched Ballistic Missile] will be completed this year in preparation for the first flight test scheduled for 1980. The M4 is the first French strategic ballistic missile armed with multiple warheads. It will have greater range and accuracy than the present SLBM's--M2 and M20--as well as greater resistance to enemy defenses. The M4 will be put into service in 1985 on-board the new nuclear powered missile launching submarine (SNLE) called L'Inflexible. The latter will be the French Navy's sixth SNLE and the first to carry the M4 missile. L'Inflexible will be able to launch its missiles from a much greater depth. It will also have a new faster and more secure firing system. It will be recalled that in 1980 France will have five SNLE's in service. Standing operating procedure will call for four of these to be manned at all times. This will enable a minimum of two SNLE's to always be at sea no matter what happens.

COPYRIGHT: AIR & COSMOS, Paris, 1979

8041

CSO: 3100

FOR OFFICIAL USE ONLY

ARIANE PRELAUNCH PREPARATIONS DETAILED

Paris AIR & COSMOS in French 13 Jan 79 pp 34-36

[Article by Pierre Langereux: "'Ariane': The First Flight is Postponed until October or November 1979 but the Operational Availability Remains Set for Late 1980"]

[Text] The next meeting of the project "Ariane" Board of Directors will be 17 January 1979 at ESA [European Space Agency] headquarters, and will be an important step for the European launch vehicle.

ESA and CNES [National Center for Space Studies], the program managers, will present to the Board the results of the launch project review which had been approved a few months ago ("AIR & COSMOS" No 740, page 39). The Board of Directors is made up of representatives from the countries that are participating in the project, and will be the first to be informed of the complete situation and of project details of at least a year after the first launch of the new European rocket.

Also to be announced to the Board 17 January is the new schedule of "Ariane" rocket test flights during 1979-1980, as well as the newly revised plan of operational missions for the European launch vehicle during 1981-1985. This will necessitate making several additional launchers beyond the first five rockets of the series ordered by ESA. These series rockets, like the test rockets, are produced under the auspices of CNES using the industry of 10 European countries; the principal French contractors being Aerospatiale, SEP European Propellant Company, and Matra & Air Liquide.

Three Crucial Problems Resolved

The "Ariane" project review presented to the Board of Directors will stress that three of the four identified problems have been, or are about to be solved in a satisfactory fashion. The inertial reference of the "Ariane" rocket guidance system is now perfected, after adjustments that took much longer than was expected. However, the French LRBA Ballistic and Aerodynamic Research Laboratory has been charged with confirming by a new series of tests this qualification of the Ferranti inertial reference.

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

That will finish the qualification of the first stage of "Ariane", the qualification for the second stage being already completed. The fourth test of the first stage in flight configuration, made 5 December 1978 at Vernon (Eure), verified the good working order of the propulsion assembly, which is made of four "Viking" engines that develop a total thrust of 240 metric tons during 142.9 seconds, corresponding to the duration of nominal flight (142.5 seconds). This test has especially demonstrated the good holding power, under normal conditions, of the new substance SEPHEN 301. It is a phenol and silicon resin which will be used on all the future nozzle collars of the "Viking" engines of all the "Ariane" rockets (test rockets and series rockets). A new test to confirm the earlier results on the first stage propulsion assembly equipped with SEPHEN 310 nozzle collars was previewed this week. It will have a duration limited to about 50 seconds.

The adjustments to the "Ariane" launching assembly at Kourou (French Guiana) are completed. The test program for the "fuels simulation" is in progress, with a true "Ariane" rocket to verify the functioning of the fueling, drainage, and pressurization systems. It began at the Guianan Space Center with the erection of the first stage on 6 December 1978, followed by the second stage on 12 December. The test schedule, interrupted by the Christmas and New Years holidays started again in January 1979 with the building of the third stage. At the end of January the three stage launcher will be standing complete on the Kourou launch pad. It will be the very first time a complete "Ariane" rocket will be seen, set up as for launching. There will even be a retraction of the launch tower, but not a firing. In addition the members of the "Ariane" Board of Directors will go to the Kourou site in early February to witness the event. The fuel supply tests for the stages (UDMH and N104 for the first and second stages, liquid hydrogen and oxygen for the third stage) will progress during the first quarter of this year. ESA predicts the fueling simulation tests will be finished early April 1979.

Difficulties with the Third Stage

A single crucial problem remains: the perfection of the third stage with cryogenic propulsion. However, it is a large problem, for some unforeseen difficulties (the explosion of an engine on the test pad) that recently arose are going to delay completion of the rocket and increase costs.

During a test (EP2) of the third stage propulsion assembly, conducted on 28 November 1978 at Vernon, an abnormal accumulation of hydrogen gas in the cryogenic engine's combustion chamber caused an explosion which damaged the engine and its propulsion framework; the stage's main tank and the test pad (PF43) having been miraculously preserved.

The incident has brought about a reorganization of the third stage test pad schedule. The "battleship" tests (with heavy tanks) continue at the rate of one per month on the other cryogenic test pad (PF42) at Vernon. But the EP2 propulsion assembly tests are suspended for several months; long enough to replace the damaged stage and modify some of the test pad safety precautions, especially the burner for burning off any abnormal accumulation of hydrogen so as to avoid all risk of explosion.

FOR OFFICIAL USE ONLY

The "Ariane" Board of Directors will be told on 17 January of the consequences of this incident, of the delays in the development schedule, and of the cost of the development program. The modifications and repairs to the stage and test pad--as well as the development delays--up to the first test flights--are going to be reflected by some extra expenditures, whose exact amount will not be known until late February.

Cost of Completion within the Allowed Limits

ESA will establish a new estimation of the "cost of completion" for the launcher "Ariane". This new cost will consume part of the Fr 412 million (1973 price) which is a 20 percent financial margin for technical difficulties calculated at the beginning of the project on the basic development cost without difficulties, which was established at Fr 2,060 million (1973). In spite of the new difficulties that were met on the third stage, CNES estimates that the new total completion cost of project "Ariane" will remain "sharply lower" than the total authorized amount (120 percent), which still leaves an available financial margin in case of technical difficulties during the test flights. Therefore, the completion of the new launcher development is not threatened.

Let us remember that in mid-1978, well before the last incidents with the third stage, the project "Ariane" completion cost was estimated at 104.7 percent of the basic cost without problems (Fr 2,060 million). Let us also remember that 5 December the "Ariane" Board approved the 1979 project budgets (in payment credits) which included 143,042 million credit units for launch vehicle development and 37.849 million credit units for production of the first rocket series.

Delay of the First Shots

A new schedule of test flights for the "Ariane" rocket will be announced 17 January to the Board of Directors, taking into account the favorable results of the project review and the difficulties encountered on the third stage.

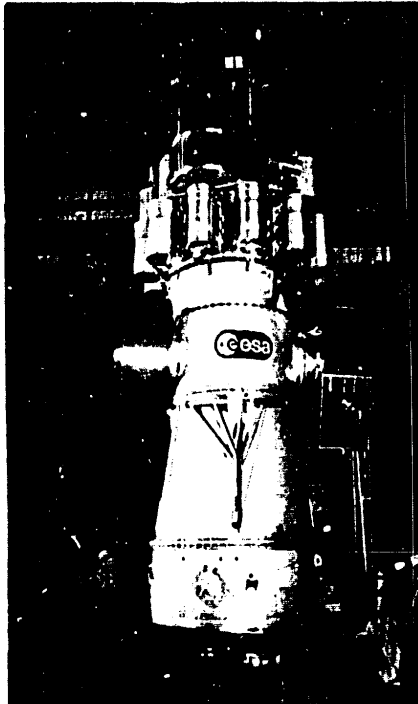
This new schedule is conceived to compensate, before the end of the test flights, for the bad effects of the last incidents so that the operational date of the launcher won't be affected. Don't forget that is still the most important part of the operation. The delays which are going to be announced to the Board on 17 January preserve the ultimate goal of the project without risking coming to a dead end sooner or later over some crucial problems that must be solved.

The new schedule has a rather long delay (about 3 months) of the first and second flights, the third flight being hardly affected, and the fourth not at all.

The date of the first test flight (Lol) already slightly pushed back (from mid-June to late July 1979) a few months ago, this time is going to be set for late October or early November 1979, but certainly before the end of this year.

FOR OFFICIAL USE ONLY

The second test shot (Lo2) planned for early December 1979, will now be at the beginning of 1980. The third shot (Lo3) scheduled for early May 1970 would be put off no more than a month. As for the fourth shot (Lo4), it would stay at the date set initially, which is mid-October 1980.



"Lo2" payload: "Firewheel" satellite on top of "CAT" and "Oscar 9" satellite on the side.

First Payloads Unchanged

The first payloads placed on three of the four test flight rockets will undergo no changes. The four rockets are all carrying the "Ariane Capsule Technology" (CAT), which will be in fact a small satellite (about 200 kg) placed in a geosynchronous transfer orbit after having monitored the functioning of the launch vehicle during the entire flight. The first rocket will carry no other payload (except ballast). On the other hand, the three other rockets will carry at least five satellites launched free of charge by special exception.



FOR OFFICIAL USE ONLY

The second rocket (Lo2) will launch two small German satellites--the amateur radio satellite "Oscar 9" and the scientific satellite "Firewheel"--which will be placed in a geosynchronous transfer orbit at 200-3600km inclined 17.5 degrees over the equator. The third rocket will also launch two satellites: the European meteo satellite "Meteosat 2" and the Indian telecommunications satellite "APPLE". This will be the first satellite placed in a geostationary orbit by "Ariane". Finally, the fourth rocket (Lo4) will place into geostationary orbit the European maritime telecommunications satellite "MARECS A". If it proves unnecessary to add a shock absorber for the Pogo effect (vibrations of the liquid fuel pipes caused by propulsion, and also affecting it) for the launch, the (Lo4) rocket will serve to test in flight the functioning of the "double launch system" (SYLDA) which will ultimately launch two satellites simultaneously.

First Operational Shot in 1981

Given these conditions, and unless there is a new serious problem, the operational availability of the launch vehicle "Ariane"--forecast at the present for the beginning of 1981--perhaps even December 1980--should not be affected by the present technical difficulties.

The first five "Ariane" rockets in the series have been ordered by ESA for operational shots beginning in 1981 (L5 to L9). The first of these "promotion series" rockets could be available by December 1980. The second should be delivered 3 months later (March 1981) and the following at 3-month intervals in 1981 (June, September, December).

One of the rockets will remain permanently in reserve. The four other series rockets are destined to put 5 satellites in geostationary orbit (with a double launch). These are the European satellites "Exosat", "MARECS B", "ECS 1", and "Sirio 2", as well as the French satellite "SPOT". The launch of the scientific satellite "Exosat" is scheduled for April 1981, that of the maritime telecommunications satellite "MARECS B" is scheduled for mid-1981, and the telecommunications satellite "ECS 1" launch is set for late 1981. The scientific satellite "Sirio 2" should be put in orbit (for free) in a double launch (thanks to SYLDA) with "MARECS B" or, in case of delay, with "ECS 1". Besides, it is possible that this will be the first use of "SYLDA" even though ESA still plans a test flight of it previously on Lo4. As for the fourth launcher of the promotion series, it will be used to put into geostationary orbit the first French teledetection satellite "SPOT", scheduled for late 1983 or early 1984.

Additional Needs for Series Rockets

A certain number of additional rockets of the series (above L9) should, moreover, be ordered during the coming month to take care of the new missions already approved or considered as probable. The manufacture of "Ariane" rockets to be used before the end of 1983 should in fact be approved early this year, production beginning during the second half of 1979.

FOR OFFICIAL USE ONLY

ESA has established a new schedule of operational missions with "Ariane" from 1981 to 1985. It obviously includes the first four launches already mentioned, as well as a certain number of new missions.

The new missions definitely forecast for 1981-1983 will need at least four additional series rockets (L10-L13). They are all involving telecommunications satellites. This includes a rocket for the European satellite "ECS 2" (launch in the third quarter of 1983), two rockets for the new French satellites "Telecom 1 and 2" (second half of 1982 and mid-1983) and a rocket for the sixth Intelsat organization satellite "Intelsat 5" (with option for a second rocket). The launch of this "Intelsat 5" by "Ariane" is predicted for July 1981, which leads to a conflict of dates with the other launches (of European satellites) that are also set for 1981. Nevertheless, this conflict can be easily resolved.

Among the possible prospects uniquely corresponding to European needs, at least six other series rockets (L14-L19) can be predicted over and above these last missions. This is counting a rocket for a meteo satellite "Meteosat 3" (in 1982, a rocket for a direct television satellite "H-sat" or its replacement (in 1983 or 1984), two rockets for maritime telecommunications satellites "MARECS C and D" (in 1982), and two rockets for the telecommunications satellites "ECS 3 and 4" (in 1985 and 1986) whose production has just been approved ("AIR & COSMOS" No 745, page 40).

Twenty "Ariane" Rockets

This new mission program represents a total production and launching of about 20 "Ariane" rockets, including the test flight rockets. This is for only the missions involving placing satellites in geostationary orbit that are already approved or firmly predicted through the middle of the next decade. This does not count the prospects for exporting them outside Europe.

Now ESA certainly intends to offer "Ariane" abroad, especially for launches (scheduled after 1982) of geostationary telecommunications satellites on behalf of various countries. These include the Arab States ("Arabsat" satellite), Indonesia ("Palapa 2"), and Columbia ("Satcol").

"Ariane" will also be a candidate for launches of other national or regional satellites in Europe, like the future Scandinavian direct TV satellites "Nordsat" (toward 1984). The European launch vehicle will obviously be used to launch future scientific and utilitarian ESA satellites (teledetection, etc.).

Some of these satellites--notably "Arabsat"--could profit by a double launch from "Ariane", thanks to "SYLDA". The European rocket will then be competitive with the NASA "Shuttle" for launching small satellites ("Delta" class), as it is already for launching large satellites ("Atlas-Centaur" class). This has been demonstrated by its being the choice of Intelsat. ("AIR & COSMOS" No 744, page 41).

FOR OFFICIAL USE ONLY

The prospect of an important improvement in "Ariane" performance (payload in geosynchronous transfer orbit 2300 kg instead of the present 1770 kg) is of a nature to interest the potential users and increase the European launcher's ability to compete with its principal rival, the American "Space Shuttle."

A proposal for improvement of this aspect of the launch vehicle ("AIR & COSMOS" No 734, page 35) was already presented last December to the ESA Board. It has in turn asked the "Ariane" Board of Directors to make a recommendation with the goal of starting the necessary work this summer.

A Program to Produce and Commercialize "Ariane"

France has now under study the possibility of creating a "program" intended to ensure, in cooperation with its European partners, the production and commercialization of the launcher "Ariane", to be developed by ESA along with some already approved projects.

This program, which would be named "Transpace" (space transport) should protect the interests of the governments and industries participating in the production and sale of the launcher and at the same time be dynamic enough to ensure the promotion of "Ariane" against the foreign competition, especially the American "Shuttle."

The French Ministry of Industry and CNES, project "Ariane" overseer, are looking for the formula most suited to accomplish these tasks, in consultation with the other French Ministries concerned. France may present the conclusions of these studies to its European partners in ESA by late January.

COPYRIGHT: Air & Cosmos, Paris, 1979

9374  
CSO: 3100

FOR OFFICIAL USE ONLY

**ARIANE 1979-1980 TEST SCHEDULE REVIEWED**

Paris AIR & COSMOS in French 27 Jan 79 pp 39-40

[Article by Pierre Langereux]

[Text] The new dates for the test flights of the European Ariane rocket were revealed on 17 January, at the 23rd meeting of the board of directors of the Ariane program.

The rearrangement of the schedule for the Ariane test flights is the result of the incident that occurred on 28 November, during the test of the propulsion unit of the third (cryogenic) stage of the rocket. According to the conclusions of the investigation carried out by CNES [National Center for Space Studies], this incident was due to the malfunction of a safety device on the ground (a torch-holder on the test bench), and it does not bring into question the design of the stage itself, the European Space Agency states.

The new schedule implies, as we have already written (AIR & COSMOS No 748), a rather large delay (around 3 months) for the first two test flight launches, a little less (1 month) for the third launch, and none at all for the fourth and last test flight.

The first launch (LO1) of the Ariane rocket from Kourou is now set for the beginning of November -- more exactly, 3 November 1979 (instead of mid-June 1979). The second launch (LO2) is now planned for the beginning of March 1980 (instead of the beginning of December 1979). The third launch (LO3) has been put back to June 1980 (instead of the beginning of May 1980). The fourth launch (LO4) has not been changed; it is still planned for mid-October 1980.

Thus this rearrangement does not change the date planned for the end of the test flights, and it allows the date for the operational availability of the European launch rocket to be kept at December 1980, as originally planned. This makes it possible to keep a margin of 4 months with respect to the first operational launch, that of the European scientific satellite Exosat, which is scheduled to be put into orbit in April 1981.

The delays produced by the technical problems encountered in the final tests of the third stage do not, therefore, compromise the beginning of Ariane's use.

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

Unless there is another serious incident between now and the end of the test flights, the operational launches will be able to take place on the dates planned by Ariane's users. And, in particular, by the first foreign user -- the Intelsat organization -- for putting one or more Intelsat 5 telecommunications satellites into geostationary orbit. The contract for the first launch of an Intelsat 5 satellite by the Ariane rocket is to be signed very soon by ESA [European Space Agency] and Intelsat. Moreover, ESA is planning a meeting at the end of February to present the situation of the Ariane program to Intelsat.

First Stage: Shortened Firing on 11 January

An incident that took place during the second test-bench firing of the propulsion unit of the first stage on 11 January 1979 at Vernon caused the test to be shortened. A central pressure drop in the combustion chamber of one of the four Viking engines of the first stage automatically caused the test to be ended after only 8 seconds of operation (instead of the 80 seconds planned). The causes of the incident are not yet known exactly; the engine is being taken apart. But CNES stated at the outset that the incident is not connected with the behavior of the nozzle throats in SEPHEN 301. It seems that the pressure drop was caused by a poor feed of the engine's gas generator, due to crystals that formed following the decontamination of the tanks, carried out immediately after the first test-bench firing of this stage on 5 December 1978. The filters of the gas generator are believed to have been fouled by the crystals resulting from the cleaning of the tanks with methanol.

The decontamination operation is used only for test-bench trials, in order to clean the remainder of the hot pressurization gases out of the tanks after a long-duration firing, especially in view of the long time that may elapse between two test-bench firings with the same propulsion unit. This procedure will not be used during the test flights and the operational launches at the Guyana Space Center, where the operations take place differently. The Ariane rocket is designed to remain fueled on the launch pad for up to a month, with ergol in the tanks. In case of an aborted launch, the rocket remains on the ramp and the operation of the first-stage motors stops automatically after 3.5 seconds. Then there is little hot acid and pressurization gas; thus there is no need to empty the tanks or to decontaminate them before being able to attempt another firing in the following 7 days.

Nine Months from the First Launch

1979 will be the decisive year for Ariane. Plans for the next 9 months include: the qualification firings on the test bench of the first two stages of the rocket (those for the third stage will take place later); the qualifying tests of the Ariane launching complex at Kourou with the "ergol model"; the operational qualification of all the facilities at the Guyana Space Center; and the first qualifying flight launch of the launch rocket. The construction of this first Ariane rocket (LO1) will begin in mid-March in Mureaux, at the Launcher Construction Site (SIL) of Aerospatiale, the industrial architect of the launch rocket.

FOR OFFICIAL USE ONLY

The tests of the "ergol model," which began in January 1979, will be completed at the end of this April, with the stages of the dynamical model of Ariane already tested at the SIL. The main purpose of these tests is to verify the new system that automatically feeds liquid ergol into the rocket. Moreover, the European press will be invited at the beginning of February to witness the procedure in which an Ariane rocket will be erected for the first time on the Kourou launch pad, as if for a launch (but the engines will not be fired). The next meeting of the board of directors of the Ariane program will also be held at Kourou, from 6 to 8 February.

The procedure for the operational qualification of the Ariane launch complex at Kourou will take place from May to June, as part of the operational validation of all the CSG [Guyana Space Center] facilities, including the "downstream" facilities located in Brazil. This program will include, in particular, the launch of several sounding rockets (Eridan) from the CSG and the tracking of an American satellite (GEOS 3), in order to train the staff and test the center's equipment before the first launch.

The launch program for the first Ariane rocket (LO1) will begin at the end of August 1979, to prepare for the launch on 3 November.

A "flightworthiness review" will be held earlier -- in June 1979 -- by CNES and the principal industrial organizations involved (Aerospatiale, SEP [European Propulsion Company], Matra, Air Liquide, etc., in France). This meeting will be very important, because it will commit the participants to the launch program, and give the green light to the launch on 3 November.

#### Flight Qualification of the Third Stage

The test-bench qualifying tests of the three stages of the launch rocket should normally result in two successful firings with two propulsion units of each stage, in order for that stage to be declared "ready to fly." It was initially planned that the qualification of the three stages would be completed before the first launch (LO1). This is still true for the first two stages of the rocket.

The two qualification firings of the first stage will take place at the end of April and in mid-August 1979, respectively, at Vernon. Each test will include, first, a short-duration firing (around 5 seconds), followed by shutdown of the engines to simulate an aborted launch on the launch pad, and then a long-duration test representing the normal operation of the stage. All these qualifying tests for the first stage will of course be performed with Viking engines, whose nozzle throats will use the new material SEPHEN 301 (silica and phenolic resin) perfected by the SEP. Up to now, there have been only two firings of propulsion units with throats made of SEPHEN 301, but the results are considered very satisfactory, in spite of the incident that shortened the second firing (see second section, above). These tests have shown the good behavior of the new material over a total test duration greater than the nominal duration (142.5 seconds), and with two successive ignitions of the four Viking engines of the stage, which develop a thrust of 240 tons on lift-off. When x-rayed after the tests, the nozzle throats made of SEPHEN 301

FOR OFFICIAL USE ONLY

were almost in their initial state, like new. Moreover, these two firings with the same propulsion unit took place with more than a month between them, while the maximum delay between two successive ignitions planned for Guyana will be only 7 days.

The second stage of Ariane has already successfully undergone its first qualification test firing on the bench in October 1978. A second firing is planned for next February. If it is also successful, the stage will be considered flight qualified; if not, there will be a third test on the bench before the end of the summer.

For the third stage, on the other hand, the qualification tests will be delayed as a result of design difficulties. The tests on the Vernon PF 43 test bench (where the incident of 28 November occurred) will resume in mid-March 1979, with the installation of a new third-stage propulsion unit. The final tests of the stage will thus resume towards the end of May or the beginning of June. Under these conditions, the two qualification firings of the third stage on the test bench can no longer take place before the first launch of Ariane. They will take place at the end of 1979 and the beginning of 1980, after launch LOI; in practice, the first qualification of the stage will thus be performed in flight. However, CNES has imposed the requirement of verifying that the final tests of the stage have been satisfactorily completed and that the stage has been declared ready for qualification, before carrying out the first launch. Thus the final tests performed by SEP on the ground before launch will make it possible to check all the functions of the stage. This procedure, which is peculiar to the third stage, thus introduces only a slight risk for the success of the test flight. But CNES chose this solution in order not to delay putting the rocket into use.

COPYRIGHT: Air & Cosmos, Paris, 1979

8429  
CSO: 3100

END

FOR OFFICIAL USE ONLY