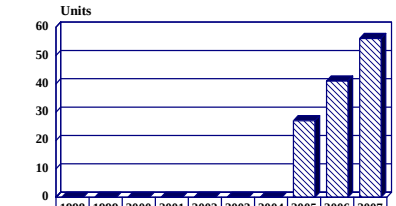
Anti-Navires Supersonique - Archived 6/99

Outlook

- Original ANS development effort terminated or at least indefinitely suspended
- France expected to meet its near-term supersonic anti-ship missile needs with a modified version of the nuclear ASMP, designated Anti-Navires Nouvelle Generation (ANNG)
- Production of a new supersonic anti-ship missile system could commence around 2005

10 Year Unit Production Forecast
1998 - 2007



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ANNG	0	0	0	0	0	0	0	27	41	56

Orientation

Description. A third-generation supersonic anti-ship missile.

Sponsor. Initially, the Anti-Navires Supersonique (ANS) program was internally funded between the two contractors; however, since early 1983, the governments of France and the Federal Republic of Germany have jointly supported the program.

Contractors. Euromissile, Paris, France, is managing this program for the German and French governments. The ANS was under joint development by Aerospatiale Missiles, Paris, France, and Deutsche Aerospace A.G. (DASA), Defense & Civil Systems Group, Dynamics Systems Division, Munich, Federal Republic of Germany. Formerly, German ANS work was managed by Messerschmitt-Bolkow-Blohm (MBB) Defense Systems Group, Dynamics Division. Aerospatiale has been selected as the lead contractor on the new Anti-Navires Futur (ANF) program.

Major Subcontractors. Aerospatiale/ONERA, Bayern Chemie and Dassault Electronique (formerly Electronique Serge Dassault).

Status. Original ANS development effort terminated; new options are being explored under the Aerospatiale-led Anti-Navires Futur (ANF) program. Both Germany and France vacillated in their support of the ANS program. Funding problems caused the system's production start-up date to be repeatedly delayed. The initial in-service date had been slipped to 1999 for the French Armed Forces and 2000 for their German counterpart. The initial version developed was to be for shipborne operations, with an air-launched system following. Production of the ship-launched ANS was expected to commence in 1998-1999, to be followed within two or three years by the air-launched variant.

Total Produced. Production never commenced. The ANS could have entered service with the French and Federal German navies by the latter 1990s, with estimate ranging focusing on 1999 and 2000, respectively. The ANS was expected to be fitted to ships, fighter aircraft, patrol planes and heavy helicopters in both the French and German navies. Germany planned to procure between 280 and 300 ANS missiles. If the air-launched ANS version was procured, it was to replace the German inventory of Kormoran 2 missiles around the year 2010.

Application. A third-generation anti-ship missile with supersonic sea-skimming performance.

Price Range. Taking into account the known data from the defunct ASSM II project along with the estimated data for this new project, the Anti-Navires Supersonique missile is estimated to cost $1.25-1.5 million (Fiscal 1993 dollars).

Technical Data

Design Features. All data for the ANS were provisional. In the case of performance, at sea-skimming altitude, the maximum speed of the ANS was expected to be around Mach 2.

	Metric	US
Dimensions		
Missile Length	557 cm	18.70 ft
Missile Diameter	35 cm	13.78 in
Missile Weight	850 kg	1,870 lb
Performance		
Speed (max)	Mach 2.5	Mach 2.5
Range (min)	6 km	3.24 nm
Range (max)	190 km	102.59 nm
Maneuver Capability	10-to-15g+	10-to-15g+

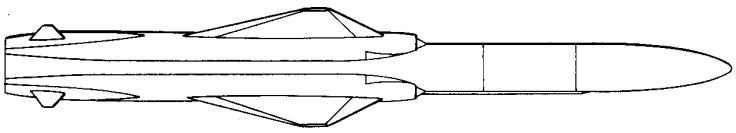
Propulsion. The first flight test vehicles were powered by the Aerospatiale/ONERA liquid-fuel ramjet. Propulsion on production missiles was previously expected to be by the Bayern Chemie solid-fuel rocket ramjet using boron as a cone fuel component. However, other sources stated that air-launched production missiles would use an Aerospatiale high-density liquid propulsion system, which was to provide greater control, based on the ASMP propulsion system (see separate report). The Germans had wanted a solid-fuel propulsion system in order to incorporate longer shelf life. The other engine option could be used in a supersonic gunnery training target. Ship-launched missiles were to employ two solid rocket boost motors. DASA was to undertake production of the entire propulsion system. This solution was to serve both French and German requirements, as agreed in the MoU of 1983.

Control & Guidance. This missile was to use inertial/command guidance with active radar guidance in the terminal phase, with the seeker provided by Dassault Electronique (formerly Electronique Serge Dassault). A sophisticated radar altimeter was also to be fitted. A high resistance to electronic countermeasures was being incorporated into the guidance system. The ANS was to have a maneuverability level of 10 to 15 g's, but would not have any mid-course update. The missile was also to be equipped with a new type of countermeasures, allowing it to fly false trajectories, diversifying attack axes and pseudo-random trajectories during the middle of its flight path, in order to induce error in many enemy estimations regarding true objective of the missile's target. No loss in speed was expected to be encountered. This was accomplished through the use of a double guidance system. The automatic guidance system was to have two phases: a phase of inertial navigation during cruise, and a terminal guidance phase using an ADAC-ANS active radar homing device. The missile used an SFIM strapdown gyro, dubbed Silans for Strapdown Inertial ANS. The system used dry tuned gyros (DTG), associated microprocessor and three accelerometers.

At about 30 km from the designated target, the missile would descend to final attack profile. The high altitude element of the missile's flight profile was not necessary for the air-launched variants of ANS, where the speed of the aircraft itself should have been sufficient to achieve high-supersonic-flight velocity. Therefore, the air-launched missiles could be pre-programmed to follow either sea-skimming or Lo-Hi-Lo trajectories.

Launcher Mode. Air- and shipborne launch capability was projected. An actual shipborne firing installation was expected to be similar to the MM40 Exocet. The ships equipped with a lightweight firing installation (ITL) for launching MM38 or MM40 missiles would have been easily adapted for the ANS.

Warhead. An enhanced high-explosive, semi-armor-piercing warhead of approximately 180 kg (440 lb) weight was to have been used; Messerschmitt-Bolkow-Blohm was the warhead contractor.



Anti-Navires Supersonique

Source: Aerospatiale

Variants/Upgrades

The ANS was expected to be manufactured in an air-launched and shipborne configuration. A submarine-capable ANS was not planned. No upgrades were mentioned prior to the suspension of the program.

Program Review

Background. The Anti-Ship Euromissile consortium was established in 1976 to develop the next generation of anti-shipping missiles envisioned by the Federal Republic of Germany, France and the United Kingdom. Aerospatiale and Messerschmitt-Bolkow-Blohm, which had formed the Euromissile partnership, were joined by Hawker-Siddeley Dynamics (now British Aerospace) to bring the ideas of the three nations to fruition. The new missile was to be designated ASSM II.

The Advanced Surface-to-Surface Missile II (ASSM II) was an operational objective of the NATO Surface Warfare Group, NATO Naval Armaments, NATO Project Group 16 (PG-16). The participating nations were France, the United Kingdom, the Federal Republic of Germany, The Netherlands, Italy, Norway and the United States. NATO PG-16 was also referred to as the ASSM (Anti-Ship Supersonic Missile and Advanced Surface-Surface Missile) consortium.

NATO PG-16 prepared an operational goal in August 1975 for a second-generation anti-ship missile. This was followed by a feasibility study that was drafted in 1977 and a detailed study which was completed in July 1978. The contract was let to the Anti-Ship Euromissile consortium under the executive management of the Federal Republic of Germany's Bundesamt fur Wehrtechnik und Beschaffung, which functioned as program manager of the three national prime contractors. The Anti-Ship Euromissile consortium finished the basic study in 1978 under contract to the ASSM consortium. Fundamentally, it outlined the parameters for an ASSM II and the specific operational characteristics that it must demonstrate.

Boeing Aerospace, representing the US for the ASSM consortium, contributed the requirement for a vertical launch capability for US operational needs. The US Navy, under PE#63310N (Surface-to-Surface Missile Development - new start in Fiscal 1979), provided minimal support funding for the ASSM II concept. Planned funding through August, 1983 was originally scheduled at $7.3 million. Fiscal 1981 DoD documents indicated that through FY80 this was reduced to $1.121 million. Research information was sanitized and, officially, no funding has been provided through the mid-eighties.

Test Firing. The test firings of the ANS powered by a liquid-kerosene motor were successfully completed on May 27, 1987. The missile completed a full trajectory at an altitude of 150 m and at over Mach 2. This enabled continuous tracking and telemetry to proceed for test purposes. The missile also conducted evasive maneuvers under a simulated threat. MBB has suggested that a similar test be conducted with the alternative, solid-propulsion motor. ANS has now completed its pre-development phase.

ASSM II. As conceived, the missile would possess a range capability of at least 180 km (97.13 nm). This requirement lent itself to the premise that an integral rocket ramjet would have had the best chance of powering an ASSM II prototype. This was based on the then current technology that limited rocket engines to a maximum effective range of 110 km (59.36 nm). Additionally, an afterburning turbojet was considered inefficient below 200 km (107.92 nm).

An operational requirement for the missile was formulated to end the project definition phase during Fiscal 1980. Engineering development began in late 1984 and continued through 1985. Full-Scale Engineering Development was planned to be initiated not later than late 1986, with low-rate prototype production in 1987 for subsequent operational evaluations during 1988-89. An IOC was thought to be attainable in 1990.

The propulsion contenders were Aerospatiale/ONERA and Messerschmitt-Bolkow-Blohm's subsidiary Bayern Chemie. It is now known that Engins Matra of France was also well along in the development of an integral rocket ramjet engine for competitive consideration. Nevertheless, Bayern Chemie was responsible for the power plant and since the demise of the ASEM consortium, work has been continuing on an air-breathing, solid-fueled ramjet for Aerospatiale.

The Demise of ASEM. British Aerospace worked with Microturbo to develop the P3T Sea Eagle, while Aerospatiale has been awarded a contract by the French Government for the development of the ASMP (a French acronym for Air-to-Surface Medium Range). The ASMP is a ramjet-powered, nuclear-armed air-to-

surface missile, and its initial application will be as a stand-off anti-radar/anti-air defensive weapon.

Because the ASEM members were individually working on similar programs, the consortium's work was weakened. Budgetary restrictions forced the United Kingdom and Federal Republic of Germany to eliminate funding for ASEM projects. This left France, already heavily involved in the ASMP program. The obvious result of these actions was the termination of the consortium in September 1981.

The ASSM II was seen as the logical follow-on to the subsonic Exocet, MARTEL, Kormoran and Sea Eagle missile programs. Longer range appears to have been the prime consideration, with supersonic speed as a by-product. The ASEM consortium had the technical expertise and combined talent to shorten the development time considerably. However, pragmatic politics presented obstacles to an equitable share of the markets. Given the interim IOC of 1989 for ASSM II, the ASEM consortium could have produced a second-generation, supersonic cruise missile that combined multiple-launch capabilities with modular interoperability and might have been a worldwide best seller.

Aerospatiale/MBB ANS Program. It appears that even before the official demise of ASEM, Aerospatiale and Messerschmitt-Bolkow-Blohm were planning to go ahead independently on a new anti-ship missile. Apparently, Aerospatiale was the driving force behind this strategy; Messerschmitt-Bolkow-Blohm was brought in because of Bayern Chemie's advanced work on a solid fuel ram-rocket. Another factor was the interest expressed by the Federal Republic of Germany in a new anti-ship missile to replace or complement Kormoran. The guidelines laid down by PG-16 are being followed, and survivability by means of supersonic sea-skimming flight and 10 g (upwards of 15 g) maneuver capability is being stressed.

Aerospatiale and Messerschmitt-Bolkow-Blohm internally financed this project through early 1983. At that time, France and the Federal Republic of Germany signed a memorandum of understanding whereby both countries supported the development program. Bayern Chemie was continuing the development of its motor while acting as a risk-sharing subcontractor to Aerospatiale. Aerospatiale stated that the three-year initial development period would cost approximately $36 million. Total costs of the program were estimated at that time to be $180 million.

New ASH Effort. With the demise of the ANS program, Aerospatiale and Daimler-Benz Aerospace again began considering possible alternatives. This new French government-initiated effort is called Anti-Navires Futur (ANF), and should not be confused with a private Matra-led program of the same name. Both Matra (supposedly under its ANF designation) and Aerospatiale submitted proposals for this new anti-ship missile requirement.

Aerospatiale's feasibility studies, supposedly launched under the title Anti-Navires Nouvelle Generation (ANNG), involved both subsonic and supersonic options. The subsonic option centered on the further modification of the Exocet Block 2 which could incorporate technology from the now-canceled ANS program (such as its seeker and warhead). The supersonic options involved both a modification effort and the design of an all-new weapon. Supposedly, of these options, Aerospatiale was concentrating its energies on the latter, since it continued to believe that a supersonic capability would be highly desirable in the next century.

In 1995, the French Ministry of Defense announced it had selected a version of the Aerospatiale ASMP, the ANNG, to meet the ANF requirement. This decision may have been influenced by the selection of Matra as lead contractor for the Arme de Precision Tres Grande Portee (APTGP) program (see separate APACHE report). Aerospatiale's ANNG will combine technology from the ANS program (its warhead and seeker, although other sources have said that the ADAC Mk 2 seeker will be taken from the MM40 Exocet Block 2), with the airframe from the ASMP. The ASMP will provide the new missile's supersonic propulsion system, and the existing production line will help to reduce costs. The missile will fly at Mach 2+ and have a range of over 150 km (possibly in the area of 200 km). The ASMP's air-intake configuration will be revised to optimize it for evasive maneuvering at sea-skimming altitudes. Aerospatiale claims that the missile will be compatible with existing Exocet launchers, and would cost no more than its predecessor. Both airborne and submarine-launched versions are also planned.

In late 1997, France awarded Aerospatiale a multi-year contract to design, develop and test the ANNG/VESTA missile. Flight tests of the VESTA are to be completed by 2002, with five ANNG flight tests taking place between 2002-2004. Full-scale development of the ANNG, which will capitalize on the VESTA project, could commence before the end of this year (1998), with the missile entering service in 2005.

Aerospatiale believes it would be able to develop the ANNG/VESTA for FFr 5-6 billion, as opposed to FFr 10-12 billion for an all-new development effort. The company sees a sales potential in Europe in excess of 1,000 units. The ANNG also forms the basis of Aerospatiale's bid for the UK Royal Navy's SSGW (Surface-to-Surface Guided Weapon) requirement,

which is competing against the OTOMAT Mk 3, Harpoon and RBS15 Mk 3.

Funding

Funding shortfalls continuously plagued the ANS program, first from Germany and then from France. The ANS financial agreement stipulated that the German and French governments agreed to each provide 25 percent of the program's funding, while Aerospatiale and DASA provided the remaining 50 percent. The companies spent some FFr 1 billion ($160 million) of their own money on ANS development and a further FFr 3 billion ($500 million) was yet to be found. Germany was planning to purchase between 280 and 300 missiles for DM 228 million. France's requirement is for 225 missiles.

Recent Contracts

In late 1997, France was said to have awarded Aerospatiale a multi-year contract to design, develop and test the ANNG/VESTA missile. The contract is worth FFr 750 million ($127.5 million) over a five-year period and calls for completion of flight tests by 2002. As the same time, Germany awarded a DM45 million ($30 million) contract for the ANNG program.

No announcements were made concerning the awarding of the ANS contracts.

Timetable

Month	Year	Major Development
	1976	ASEM consortium formed
	1977	ASSM II design conceived
	1978	Research and development initiated
	1981	Engineering development of ASSM II
Jun	1981	Aerospatiale/MBB announced agreement to produce new anti-ship missile
Sep	1981	ASEM consortium terminated
	1981	Anti-Navires Supersonique components tested
	1983	France and Germany sign MoU for development of ANS
	1984[(a)]	Sea-skimming trials
	1984[(a)]	Power plant decision
	1985-87[(a)]	Full-scale engineering development, initial flight tests
	1986	Final propulsion selection, further flight tests
	1991	Full-scale development decision made
	1993-94	ANS program finally terminated
	1994	Alternatives being examined
	1998[(a)]	Full-scale ANNG development to commence
	2005-2006[(a)]	ANNG/ANF system introduced

[(a)]estimates

Worldwide Distribution

France and Germany could be the first operators of the ANNG system. Exports could be limited at first to the NATO alliance members, but there is pressure to make this missile available to a wider number of customers.

User Country(s). France could be the first operator of any ANNG missile developed by Aerospatiale.

Forecast Rationale

Full-scale development approval for France's latest supersonic anti-ship missile is expected to be granted before the end of this year (1998). Under the designation Anti-Navires Nouvelle Generation (ANNG), a modified version of the ASMP will be used to meet the French navy's Anti-Navires Futur (ANF) requirement. This could mean that France will deploy a supersonic anti-ship missile sometime during 2005, if all goes according to schedule. Funding could be a problem for both France and Germany, but so far each appears to be committed to this system's procurement.

The ANNG, however, is not expected to provide a long-term solution to the French navy's anti-ship missile need. Instead, this supersonic missile is seen more as an inexpensive stop-gap effort to provide the French fleet with a supersonic anti-ship missile capability until a true next-generation solution can be found. The development of an all-new missile may be necessary since the incorporation of ASMP technology, a nuclear-capable delivery system, could artificially narrow the ANNG's market scope to NATO alliance members, only.

France could opt for the development of an enhanced subsonic system, possibly a further Exocet upgrade package, while manufacturing a small number of supersonic ANNGs. A subsonic system would allow France to develop a missile with extremely small radar cross-section and capable of very low-altitude flights using serpentine paths. Since development of an enhanced subsonic anti-ship missile will likely precede any supersonic development program, a true next-generation supersonic missile will not be introduced until after 2005.

NOTE: Projections for a French Advanced Anti-Ship Missile can be found within the separate Exocet report. No forecast has been provided for an Advanced Supersonic Anti-Ship Missile (SASH), since such an ANS-type system will not likely be available within the next 10-year period.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level			Good Confidence Level			Speculative				
Missile	(Engine)	thru 97	98	99	00	01	02	03	04	05	06	07	Total 98-07
AEROSPATIALE													
ANNG	ALAIN	0	0	0	0	0	0	0	0	27	41	56	124
Subtotal - AEROSPATIALE		0	0	0	0	0	0	0	0	27	41	56	124
EUROMISSILE													
ANS (a)	UNSPECIFIED	10	0	0	0	0	0	0	0	0	0	0	0
Subtotal - EUROMISSILE		10	0	0	0	0	0	0	0	0	0	0	0
NOT SELECTED													
FRENCH ADV. SASH	UNSPECIFIED	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - NOT SELECTED		0	0	0	0	0	0	0	0	0	0	0	0
Total Production		10	0	0	0	0	0	0	0	27	41	56	124

(a) Thru years include components for flight tests (incomplete missiles), initial flight test missiles (pre-prototypes)