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West Europe Report

(FOUO 30/81)

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WEST EUROPE REPORT

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CONTENTS

OTOMACH 2: ALL-ITALIAN SUPERSONIC ANTISHIP MISSILE

Paris AIR & COSMOS in French 30 May 81 p 46

[Text] The Italian companies OTO Melara SpA and Alfa Romeo Avio SpA just announced this past 14 April that they have signed an agreement for the joint development of a new supersonic antiship missile--completely Italian designed and built. The "Otomach 2" missile, capable of flying at Mach 2 (as its name indicates) is slated for the Italian Navy. Based on the Franco-Italian "Otomat" developed by OTO Melara and Matra, it will be propelled by an 800 to 1,000 kg high-efficiency turbojet perfected by Alfa Romeo Avio and derived from the AR 318 engine. It will be fitted-out with a four-stage axial compressor and a two-stage turbine. The Italian firm FIAT Aviazione will take part in development of the engine via a private agreement with Alfa Romeo Avio.

Overall performance characteristics of the new missile are not available, however it is known that the advantages of a supersonic missile is its range as well as its near-target maneuverability. Note that the 200-plus km-range OTO Melara "Teseo" missile was an offshoot of the 180 km-range "Otomat" subsonic missile.

Photo caption: General configuration of the new "OTOMACH 2" Italian missile (sketch by our Italian counterparts at INTERARMA)

CSO: 3100/783

SPANISH, PORTUGUESE OIL DEPENDENCY, ALTERNATIVE ENERGY SOURCES

Paris LA PENINSULE LUSO-IBERIQUE in French 1980 (signed to press 3rd quarter of 1980) pp 99-103, 219

[Text of Part 1 "Energy Dependence" of section entitled "Political and Economic Background" in the book "The Luso-Iberian Peninsula" by Alberto Santos, National Defense Studies Foundations Journal No 18, Supplement to Paris STRATEGIQUE in French issue No 8 (4th quarter of 1980) 235 pp]

[Text] Both the Portuguese and Spanish economies are heavily dependent on oil supplies.

While the Portuguese economy is 84.06 percent dependent on oil supplies,[1] has no deposit being exploited and is not engaged in serious prospecting either on the continent or on the continental shelf, Spain, which is, however, exploiting some deposits the production of which is declining year by year, is as dependent as its neighbor.

For example, in 1977 Spanish oil production totaled 1,630,000 tons, which dropped to 850,000 tons in 1978, an insignificant volume in comparison to the 47,600,000 tons imported in 1977.[2]

Portugal's economic vulnerability in terms of oil deliveries is the greater since the successive constitutional governments have pursued a most ambiguous foreign policy in relation to the Arab producer countries.

Portugal's relations with the Arab countries became somewhat cooler following the peremptory decision of Mr Soares to reestablish relations between his country and Israel.[3]

At the present time, relations with the Arab countries are far from reestablished, and the present government's policy of breaking off relations with Iran following the seizure of the American hostages in Tehran has not improved the situation. Moreover, Iran supplied 19 percent of the total oil imported and ranked third, after Iraq and Saudi Arabia, as a supplier of oil to Portugal.[4]

While Portugal has problems where a guaranteed supply of oil is concerned, Spain on the contrary has its supply assured because, in particular, of the continuity of a foreign policy which still does not recognize Israel. In brief, the oil crunch is much more of a constraint on Portugal than on Spain which, apart from its limited production of oil, has other domestic energy and raw material resources, while Portugal is very poorly endowed.

Spain, which supplied itself with energy during the dictatorship's autarchic period from its hydroelectric power plants scattered throughout the national territory and located along the rivers crossing the peninsula (Douro, Tagus, Guadiana, Minho, Lima, Mondego), as well as from the rich coal mines in Asturias and on the Leon Plateau, undertook to restructure its energy policy as soon as it glimpsed the development of its domestic market. Oil and gas imports increased considerably at the end of the 1950s and beginning of the 1960s, a period during which increasing interest could be seen in the building of nuclear power plants.[5] Hydroelectric energy, which is doubtless the cheapest energy and for which Spain has excellent conditions, flourished throughout the whole of the first phase of the economic boom period in the 1960s, while interest in coal began to decline. In 1950, hydroelectric energy supplied about 16.7 percent of total energy production, while by 1965 it supplied about 27 percent, beginning to decline as of the end of the 1960s and totaling only 13.4 percent in 1973-74.[6]

In the course of the years 1967 and 1968, there was a hiatus in the overaccumulation of dams, accompanied by stepped-up imports of hydrocarbons, coming almost entirely from the Middle East. Today, Spain still has 400 dams and ranks fourth in the world among the countries having the most sizable artificial water reservoirs.

But the second half of the 1960s was characterized above all by a commitment to the building of nuclear power plants. The first plants on which construction was undertaken in Spain are beginning to be productive. The first plant commissioned was that in Zorita, located 66 km from Madrid, in 1968, followed by that in Santa Maria de Garona, near Burgos. The other plants commissioned in the early 1970s are located nearer the periphery of the country: those in Vandellos, near Barcelona; Lemoniz, near Bilbao; Almaraz, on the Tagus, 70 km from the Portuguese frontier; Asco, near Tarragona; Coffrentes, near Valencia; and Sayago, on the Douro, 15 km from the Portuguese frontier.[7]

Spain's nuclear potential thus increased substantially during the 1970s. In 1972, Spain had already moved ahead of Italy, Switzerland, Sweden, the Netherlands and Belgium, and was producing about half as much as the FRG.[8] In 1974, it ranked eighth or sixth in the world, depending on whether or not plants under construction, the number of which has not ceased to increase, were taken into account. In 1979, the Spanish government authorized the construction of two new plants, one the central part of Spain at Trillo, and the other on the Guadiana, at Val de Caballeros, near the Portuguese frontier, in the province of Badajoz.[9]

The rapid development of nuclear energy production beginning in the second half of the 1960s did not, however, immediately alleviate Spain's vulnerability in the energy sector. It continues to import an increasing volume of oil from the Arab countries, and most important, in order to keep its own nuclear power plants functioning, it is becoming increasingly dependent on the United States, its main supplier of enriched uranium.

Spain is a country which is moderately rich in uranium. In 1975, it had 7 uranium-bearing deposits located along the vertical frontier line stretching from the north (Chaves) to the south (Elvas) between Spain and Portugal. It has other deposits located in the Morena Mountains, on the western plateau, in the Carnena and Andujar regions, etc.

Today it ranks ninth among the nations of the world and its reserves are estimated at 200,000 tons,[10] but it still does not produce enriched uranium.

The uranium extracted from the Spanish subsoil is sold to Canadian and American firms which process it before reselling it. At the end of the 1960s and during the 1970s, the United States made massive sales of enriched uranium to Spain, with which it has nuclear cooperation agreements, although its own legislation prohibits it from selling nuclear materials to countries which are not signatories of the 1968 treaty on the nonproliferation of nuclear weapons.

In 1976, Spain had 1,100 nuclear reactors in operation and 7,200 under construction, which would allow it to reach a capacity of about 8,300 megawatts by 1985. This capacity is close to that of England and equal to more than half that of the USSR.[11] Estimates by Spanish government bodies, which in our view are optimistic, predict that Spain will be self-sufficient in the energy field by about 1993.[12] The reactors in service at all of the Spanish nuclear power plants with the exception of Vandelos[13] are American reactors manufactored by Westinghouse or General Electric.

Recently, substantial Spanish public credit has been allocated for the construction of the uranium processing plant in Ciudad Rodrigo, located about three km from the Portuguese frontier. However, this plant seems to be faced with problems of fuel supply and storage, despite the aid provided by American technicians.

The facts which have just been set forth, despite their brevity, show that development in the nuclear field is one of the key axes in Spain's energy policy. Moreover, the Spanish leaders have expressed their intention to make a nuclear power of their country if necessary: the national defense program and the military policy adopted by the first UCD [Democratic Center Union] congress in October of 1978 bear witness to this intention. American specialists say, moreover, that Spain has the capacity to produce 166 bombs per year[14] and the Spanish government leaders, for their part, express the desire to make an atomic bomb of a tactical nature which could be transported by the Spanish air force operational next year.[15]

Where Portugal is concerned, one of the errors with the most serious consequences made by the six provisional governments and the six constitutional governments which have followed one upon the other since 25 April 1974 was the indefinite shelving of the energy policy, which the country nonetheless needed. In fact, imports of energy raw materials come to about 90 percent of the total, and 15 percent of the population still does not have electricity.[16]

The coal resources of Portugal are also very limited. They account for 2 percent of the energy flow while hydroelectric energy accounts for about 75 percent. Portuguese hydroelectric energy still falls far short of the vigorous development of that of Spain, and is in part dependent on this neighboring country, for it is derived from rivers a part of whose course flows through Spain. Since the Vilarinho Das Furnas and the Carrapatelo dams were commissioned at the end of the 1960s and early in 1970, no dam has been built in Portugal, with the exception of the launching of the construction of Alquelva, a major dam on the Guadiana, the work on which was suspended in 1979 by a decision of the IMF, which deemed it too costly. Hydroelectric energy, although efficient, accounts for five-sixths of the country's electricity consumption.[17]

Where uranium production is concerned, Portugal produces about 90,000 tons, i.e., 0.3 percent of the world production, which puts it in 11th place. Prior to the military undertaking of the captains in April of 1974, the National Uranium

Enterprise (ENU) exported about 1,500 tons of uranium oxide (U_3O_8), basically to the United States which, having assisted in mining prospecting, also provided support for the establishment of the Portuguese Nuclear Industries Company (CPIN) in 1958. As far as we know, there has been a hiatus in the production of uranium, and above all in the export of this raw material, since 1974.

Unlike Spain, where nuclear plants and uranium processing plants are proliferating, in particular along the Portuguese frontier, which entails the risk of making Portugal into a sort of nuclear garbage can, since it has no protection against failures in the necessary maintenance of safety at the plants, this country has not one single nuclear plant.

Currently, the building of a plant in the Peniche region, at Ferrel, is being discussed again. The proposal had already been put forth at the time of the 1973 oil crisis. The resumption of this project seems to be supported by the International Bank for Reconstruction and Development (IBRD), which has indicated interest since 1976 in the sale of nuclear power plants to Portugal.

This rapid survey of the energy resources existing in the two countries reveals that we are dealing on the one hand with a country, Spain, with a potential where resources are concerned and which is pursuing an energy policy based above all on the development of nuclear energy, without neglecting hydroelectric energy; the building of fossil fuel plants, and prospecting for possible oil deposits, although not seeming to pursue any precise long-term planning; and with another country, Portugal, on the other hand, which is not only poor in resources but in which the successive governments have also shown a disturbing lack of interest where the implementation of a consistent energy policy is concerned.

Although the future seems more viable for Spain than for Portugal in the energy sector, we are dealing with two countries which are very dependent on foreign sources, and they cannot alleviate this dependence except by launching suitable exploitation of the natural conditions on their continental and insular territories, which are particularly rich in the sources of such new forms of energy as geothermal and solar energy, sources provided by swamps, sea waves, wind, etc.

FOOTNOTES

1. Henri Baguenier, "Some Energy Policy Problems in Portugal," ECONOMIA E SOCIALISMO, 48-49, 1980.

2. United Nations Bureau of Mines, ANNALS OF MINES, 1979.

3. Recognition of Israel and the establishment of diplomatic relations with that nation constituted one of the first steps taken by the Soares government. This decision, due in part to pressure from Washington, caused something of a stir within the government team, in particular between the prime minister and Minister of Foreign Affairs Ferreira, who expressed concern about the consequences this might have in terms of relations with the Arab countries, in particular those supplying Portugal with oil.

4. Saiz De Bustamante, "The Nuclear Industry in Spain," ECONOMICA INDUSTRIAL, 1974. According to Bustamante, the development of nuclear programs will be such that by 1993, nuclear energy will account for about 36 percent of the total production of electricity. The remaining 64 percent will be distributed between hydroelectric power (34 percent) and fossil fuel plants (30 percent).

5. In 1951, Franco created the Nuclear Energy Board, a body with the purpose of prospecting for uranium-bearing reserves in Spain and training technicians in the nuclear field. This organization is supported by the United States and since the beginning it studied the possibility of building nuclear plants in Spain. Among the works on nuclear development, see R. Tamanes, "Introduction to the Spanish Economy," Alianza Editorial, 6th edition, 1971.

6. Seven reactors, producing 6,302 MWe, were under construction in 1979. See Sipri Yearbook, World Armaments and Disarmament, 1980, Taylor and Francis, Ltd., London, 1980.

7. "United Nations, World Energy Supplies 1969-72," Statistical Papers, Series J, Table 20, pp 150-157. The period studied shows in particular the great nuclear boom in the United States, which quadrupled its nuclear capacity in that period.

8. The majority of the officials elected in the region, both on the left and the right, opposed the building of this nuclear power plant.

9. United Nations Bureau, op. cit.

[Footnotes 8 and 9 as published; apparently they were transposed in the original.]

10. Spain, which with South Africa and Egypt maintains certain nuclear activities which are not under the protection of the IAEA [International Atomic Energy Agency], was already capable in 1975 of producing 166 bombs per year. See NUCLEAR NEWS, February 1976.

11. The Vandellos plant functions with natural uranium according to the French model.

12. At the United Nations Assembly on Disarmament in June 1978, and then before its General Assembly in October of the same year, Mr Oreja, Spanish minister of foreign affairs, confirmed that Spain would not sign the nuclear nonproliferation treaty. Among the reasons the Spanish government presented, it was stated that Spain would not a priori forgo its potential, and that it would develop its nuclear capability in order to acquire a greater independence from the outside. See EL PAIS, 7 June 1978, p 15.

13. According to experts, Spain will produce about 8,300 MWe in 1985, which will permit it to make an average of 166 atomic bombs per year. In effect, according to experts, each portion of 1,000 MWe is used in such a way so as to be able to produce 200 kg of plutonium, and to make a bomb 10 kg of plutonium is sufficient: 1,660 kg (8.3 x 200) divided by 10 equals 166 bombs a year.

14. See INFORMACIONES of 12 August 1979. Unfortunately, despite our persistence, in the interviews we had with Spanish military and political officials we were not able to obtain the least bit of further information on this question fundamental to the future of Europe itself. See also the article published in LE MONDE of 24 August 1979 entitled "The Spanish Government Would Like To Have the Atomic Bomb."

15. With the exception of a conference held in Porto in November 1975, the indifference of Portuguese rulers toward energy problems is almost total. For information respectively on the country's potential and its current energy policy, see Jose Gaspar Teixeira: "Da energia que temos a energia que queremos," COLLECAO ESTUDOS PORTUGUESES, 1976, as well as the weekly O JORNAL of 14 March 1980.

16. Op. cit. Henri Baguenier.

17. Op. cit. United Nations, Bureau of Mines.

5157
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MILITARY FRANCE

FLYING, SERVICING OF NAVAL UNIT'S AIRCRAFT DISCUSSED

Paris AIR & COSMOS in French 2 May 81 pp 25, 27, 29

[Article by Jean de Galard]

[Text] Previously equipped with Etendard IV Ms to carry out priority attack missions, the 17F Flotilla based at Hyeres-Le Palyvestre was the last of the three attack flotillas of the National Navy, after the 11F and 14F, both based at Landivisiau, to receive Super Etendards.

The first four that it received were delivered in September 1980; it was not a question on that occasion of new planes fresh from the factory, but of aircraft passed on from the 11F and 14F flotillas where, however, they had only logged a few flight hours. Later on, the 17F received several planes directly from the factory; the most recent to be delivered, bearing the number 50, joined the flotilla last January. It is notably equipped with the automatic-automanette pilot tandem with which all production line planes are equipped today.

Currently, the 17F possesses only 9 Super Etendards; it will have its full complement--12 aircraft--before next summer. On 31 March 1981 it had totaled 1,740 flight hours including 242 night hours and 271 deck landings.

It was in February, 1980 at Landivisiau, in the Technical Instruction Center (SIT) of the base, a particularly effective unit in terms of training, that the training of the first 20 mechanics and the first 4 pilots of the 17F, the latter all former Etendard IV M pilots, began. The training course for ground mechanics lasted from 2 to 6 weeks according to their specialization. The theoretical instruction course for pilots lasted around 3 weeks.

This entire first contingent of 17F pilots and mechanics then transferred to the 14F for practical training while a second contingent of 17F mechanics went to SIT at the Landivisiau base to begin in its turn theoretical training.

On the other hand, until July, no other 17F pilot was sent to SIT at Landivisia. On 27 June 1980, the last flight in formation of the 17F Etendard IV Ms took place before mothballing and at the beginning of the following month, seven other flotilla pilots went in their turn to Brittany (owing to works which made the Landivisiau runway unusable, the activity of the 14F had then been transferred to the Lann-Bihoue naval airbase).

After a brief sojourn at SIT and some dozen flight hours with the 14F, the 17F pilots obtained their Super Etendard certification and set out for Landivisiau, to which the 14F flotilla was also returning. It was at the end of the stay in Landivisiau that an accident which was to plunge the 17F into mourning occurred: during a training flight, under circumstances and for reasons not yet completely explained, one of the recently certified pilots was killed and his plane destroyed.

At the end of July 1980, the 17F pilots and mechanics who were still at Landivisiau returned to their Hyeres base. Seventy percent of the flotilla mechanics were then certified for Super Etendard service; the pilots for their part continuing the progression until the 17F was declared autonomous with respect to the Super Etendard on 5 September 1980; at that time it numbered four aircraft and 11 certified pilots.

The latter began intensively carrying out their first night flights at the end of September, and the following month the 17F participated in its first large exercise: this involved a joint Franco-Spanish attack at sea, which included the use of fictive AM-39 air-to-sea missiles.

In November 1980 some ten 17F pilots received their deck-landing certification operating on the aircraft carrier Clemenceu, at the same time moreover as other 11F and 14F flotilla pilots. There followed quite naturally an on-board period of over 2 weeks, in order to carry out operational flights in conjunction with other ships of the Mediterranean Fleet. Last December the 17F participated in the traditional French-American exercise La Fayette, which brings into play every year the units of the U.S. Navy's Sixth Fleet and the French Mediterranean Fleet. With its seven Super Etendards the 17F was the leader of an attack formation which included, in addition, six Jaguars, and was escorted by eight Mirage F1's.

Last March, for its second campaign at sea, the 17F embarked for the first time with its full personnel complement; 10 of the flotilla's Super Etendards have taken part in the various training exercises which brought together in the Atlantic a part of the National Navy's two fleets.

The 17F's manpower today totals 146, including 18 pilots, 9 of whom are officers. Last year, each pilot accumulated in 12 calendar months 165 flight hours, or 16.5 hours a month if the truly active period is reduced to 10 months; for this year, 180 hours per pilot are planned, or 18 hours a month for an active period of 10 months.

Next month, the 17F is to carry out in Cazaux the first air-to-air firing campaign, using SECA PEM panel targets towed by two Super Etendards carrying a special cylinder mounted under the right wing. The 17F, in spite of particularly unfavorable weather conditions, has passed a good portion of the present month getting themselves into a "precampaign" readiness. For 3 weeks next month, the entire 17F personnel and equipment will be present at Cazaux for a series of training firing.

As regards flotilla maintenance of the Super Etendard, there is no major problem. Equipment which potentially might fail is immediately discarded and replaced: it is sent to the Airship Service Department of the Naval Air Base which uses ATEC test and verification benches in order to examine and determine the nature of the breakdown or of the malfunction of the replaced equipment. It is the duty of the flotilla maintenance team to carry out, among certain engines from the first to come off the SNECMA [National Aircraft Engine Study and Manufacturing Company] production line, certain specific periodic check-ups every 25 hours; this frequency is going to be quickly raised to 50 hours after modification and standardization of these first engines. Involved on this occasion are simple, quick check-ups which require neither removal of the engine nor removing the aircraft from use. Every 100 hours, still with respect to the flotilla, the engine requires a more thorough verification and check-up by eddy currents. When an engine reaches 200 hours, the plane is immediately turned over to the SEA [Airship Service Department] which carries out the periodic inspection (every 200 hours) of the 8K50.

At the request of operations, discussions are underway between the parties involved so that Super Etendard pilots who, in their decklanding pattern, see a light signal appear, indicating an engine malfunction, may be able to determine unambiguously--which is not presently the case--whether or not the malfunction is serious enough to endanger the safety of the aircraft (or its pilot) on landing. In this case, the need to take no risks in peacetime has occasionally led the command to give deviation orders which could have been avoided if the malfunction could have been unequivocally diagnosed by the pilot.

It is of course planned to install a flight simulator in Hyeres. Its delivery by the manufacturer LMT depends upon completion at the base of the building which is to house it. Until it is installed, the 17F pilots will doubtless go to Landivisiau to make use of the one which was installed there last year and which works entirely satisfactorily.

It is to the Airship Service Department of the Hyeres Naval Air Base, itself a part of the Technical Division, that maintenance work of the third degree on the Super Etendards (and also on the other types of aircraft in service at the base) falls. A special feature of SEA at Hyeres is that it is responsible not only for the technical support of the 17F Super Etendards but also of that of the other flotillas' Super Etendards when they are carrier-based.

As for the airframe, the formula adopted is that of inspection of the IREF (inspection, repair by fractional upkeep) type. An IREF inspection is carried out every 33 months; the third IREF inspection corresponds in fact to an inspection of the fourth degree, after 9 years of service.

Periodic (200 hour) inspections of the Atar 8K50 are carried out by SEA at Hyeres, which, since the putting into service of the Super Etendard, has carried out three of them; each inspection takes around 2 weeks. The motor is taken apart and the entire compressor portion plus the hot parts are checked. General 800 hour overhauls are of the purview of the "Ateliers industriels de l'Air" or of the "Atelier de la Marie de Cuers."

SEA makes generous use of ATEC for checking the working of the subassembly of the SAVEM navigation and attack inertial system. The ejectable seats are checked every 4-1/2 months. SEA receives for the Super Etendard the benefit of excellent technical assistance from Dassault-Breguet and SNECMA.

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MILITARY FRANCE

NAVY HAS RECEIVED 51 OF 71 SUPER ETENDARD AIRCRAFT

Paris AIR & COSMOS in French 2 May 81 p 24

[Article by Jean de Galard]

[Text] In 1973, the National Navy ordered from Dassault-Breguet 71 Super Etendard carrier-based planes equipped with an SNECMA [National Aircraft Engine Study and Manufacturing Company] Atar 8K50 turboreactor of 5,000 kp. To date, 51 planes have been delivered to Aeronavale which actually possesses only 49, since 2 of them were destroyed in accidents in 1980. The entire group of Super Etendards delivered totaled, on 31 March, 13,600 flight hours including 1,600 night hours and 1,900 deck landings of which 160 were carried out at night. For 1980 alone, the 11F and 14F flotillas, based in Landivisiau, which were declared autonomous with respect to the Super Etendard on 11 September 1978 and 1 June 1979 respectively, have totaled nearly 6,000 flight hours including 740 night hours and about a thousand deck landings of which 150 were carried out at night.

The 17F Flotilla, based in Hyeres, the third and last Navy flotilla to be equipped with Super Etendards (normal equipping of a flotilla is 12 aircraft), was declared converted only in September 1980; its activity last year is therefore not significant.

For Rear-Admiral Montpellier, who took command on 1 December 1980 of carrier, based aviation and the group of aircraft carriers, the process of integrating Super Etendards into carrier-based aviation has entered a fundamental phase: henceforth the number of certified Super Etendard pilots (contrary to a qualified pilot, a certified pilot can fly his craft even if there is no landing space, even if there is no other recourse at the end of his mission than for him to deck land on his take-off platform) is henceforth qualified as satisfactory. This simple fact may be construed as proof of the good average reserve of the aircraft, it being understood that the reserve on board aircraft carriers is generally higher than it is on land.

At this date, only the 11F Flotilla is considered operational at night. It was also a cause for satisfaction for the admiral commanding carrier-based aviation that the Super Etendard has proved to be easy to handle at night. Additional grounds for satisfaction: the very good performance of the SAGEM inertial system, which, on the operational level, has brought about a leap 20 years forward, and the excellent capabilities of the Super Etendard in heavy seas, evidenced during the joint exercises of the two squadrons in the Atlantic last March.

The firing campaigns of every type which have been carried out with the 11F and the 14F (the 17F will have its first campaign next month) have been judged satisfactory; with the AM-39, to date only simulated flotilla exercises have been carried out. Exercises have also taken place in a nuclear environment.

Admiral Montpellier considers air-to-air firing to be very important for Super Tendard pilots, concerning which he says that it is a very delicate discipline; a firing round should have the same accuracy as a deck-landing pattern (cf page 31, 3rd column).

One slight cloud, however, in this picture; a passing cloud, Admiral Montpellier hopes, who recalls that the Super Etendard is still in a developmental phase: maintenance, alleviation of which is desirable.

A testing of two Super Etendards in a hot-weather country, probably at Djibouti, is going to be carried out with pilots and mechanics of the 17F, accompanied by representatives of the CEV [In-Flight Testing Center], the manufacturers, and the Navy. It will be particularly interesting in respect to maintenance: heavy or light.

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MILITARY FRANCE

HELMET-MOUNTED ARTILLERY AIMING DEVICE DESCRIBED

Paris AIR & COSMOS in French 25 Apr 81 p 34

[Article by Gerard Collin]

[Text] With the "DALDO" System, the SV2 has developed an original helmet-mounted aiming device which appears to have no counterpart in the Western world. For the company, this system marks an important stage in its development.

DALDO signifies "Device Aiding in Target Designation. It is intended to improve appreciably the performance of anti-aircraft artillery batteries (20-millimeter guns). The development contract awarded SV2 by the official agencies (DTAT/EFAB-Bourges) concerns more specifically CERBERUS 76-T-2 anti-aircraft artillery batteries, manufactured conjointly by France, West Germany and Italy. Each battery has two 20-millimeter guns operated by a gunner, each of the batteries being connected with a "battery chief." The latter, in contact with the command centers, watches out for and visually spots attacking airplanes. The batteries' function is to ensure the protection of airbases against high-speed, low-flying (i.e., 100 feet/500 knots) airplanes which might have avoided detection by radar or other means.

Currently, under optimum conditions, 10 seconds are required between visual detection and the first firing: during this time, the detected airplane will have already covered some 3,000 meters. As the effective range of the gun is on the order of 1,500 meters, it is evident that ideally the enemy must be detected at 4,500 meters, which is at the extreme limit of human spotting and detection possibilities.

The DALDO system meets the objective of appreciably reducing target acquisition time. In order to accomplish this, the piece chief has available an aiming device mounted on his standard helmet: this device provides the operator with a reticle collimated to infinity. At the time of detection, the piece chief's head is "pointed" via this reticle toward the objective: the movement of the piece chief's head brings under control (it will be shown how) the 20 millimeter bitube in the direction of the objective. Then, the battery is automatically aimed for bearing and altitude toward the target, independently of the gunner (who thus in the initial minutes does not himself control his piece's movements). This orientation of the battery thus automatically brings the target into the

field of the aiming device: the gunner then takes over direct control of his battery and opens fire.

It is thus in this first phase that DALDO is of interest, for at that time it reduces by half the object acquisition time (that is to say the time needed to bring the target within the battery's line of sight), compared with the present, nonautomatic method (simple guidance by radio contact). DALDO should thus make it possible, either to ensure firing on a plane detected late or to ensure several rounds of fire at the target.

DALDO's difficulty consists chiefly in the development of position finders on the piece chief's helmet, in the absence of any particular ground infrastructure. To accomplish this, SV2 has proposed a solution calling for two-finders: a 2-axis accelerometer and a 3-axis magnetometer. Schematically, let us say that the accelerometer is used, referring to gravity, to plot the altitude while the magnetometer plots the bearing and thus the target (centered in the reticle).

The complete system includes:

--a cover of rigid material attached to the helmet and housing the magnetometer, the accelerometer, the reticle collimating optics and also the transmitting-receiving assembly for telephone communication,

--a control unit on the chest that is connected up with the cover on the helmet;

--all this is connected to an encased unit on the ground which includes a computer (a Motorola 6800 microprocessor). The latter takes care of parallax corrections (the distance between the piece chief and the battery can be as much as 800 meters), and various error corrections. It determines the battery's aiming cosines from this. The entire system takes into consideration the target's angular speed as followed by the reticle, as well as its nodal distance (the estimated distance of the target during its lateral passage).

SV2 is the holder of the DTAT/EFAB contract, Crouzet is the industrial program contractor; the participation of the Sfena [French Air Navigation Equipment Company] and Courzet firms is equal. The operation is carried forward conjointly with the Italian firm Galileo which produces the fire control system. Ultimately, SV2 estimates that the French Air Force might order 150 to 200 units. The series will be introduced in 1982. Additionally, DALDO might be of interest to partners in the double-barreled 20 millimeter [gun]. Fov SV2, this product is the second focus of industrial development after that of tank navigation devices (Sydade, Navyx), thus giving concrete form to the start-up of SV2 weapons activity. In the longer term, great hopes are pinned by SV2 on the manufacture of this helmet-mounted aiming device.

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CSO: 3100/744

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