

FOXTHREE

DASSAULT AVIATION - SNECMA - THALES **N°10**

OMNIROLE

PIEMA 21b - Photo F. Robineau - Dassault Aviation

RAFALE
INTERNATIONAL 

Rafale carries out different complex combat assignments simultaneously. This makes it different from so-called "multirole" or "swing-role" aircraft. Higher systems integration, advanced data fusion, and inherent low observability all make Rafale the first true omnirole fighter. Able to fight how you want, when you want, where you want. *Rafale. The OMNIROLE fighter* ■



Editorial

In the 10th issue of FOX THREE, the Rafale Team is proud to report on the French Air Force first operational Rafale squadron at Saint-Dizier Air Base, on the final evaluation of the Standard F2 and on the first flight of a Standard F3 Rafale. We will conclude with a thrilling look at *Flottille 12F's* international Air Defence Week, at Landivisiau Naval Air Station. Enjoy the reading!

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FIRST FRENCH AIR FORCE RAFALE SQUADRON OPERATIONAL

Escadron de Chasse 1/7 "Provence", the first French Air Force squadron to operate the Dassault Aviation Rafale omnirole fighter, attained full operational capability at Saint-Dizier Air Base on 27 June 2006, during a ceremony attended by French Prime Minister Dominique de Villepin, Defence Minister Michèle Alliot-Marie and other senior government and Air Force officials. This largely symbolic event took place the day after two of the squadron's aircraft handled their first Quick

Reaction Alert air-defence mission from Mont-de-Marsan air

base, in southern France, where they had deployed.



FIRST FRENCH AIR FORCE RAFALE SQUADRON OPERATIONAL



Escadron de Chasse 1/7 "Provence" operated the Jaguar from Saint-Dizier in the ground-attack role until June 2005 when it started its conversion process. By the end of 2006, it will be equipped with a total of 20 Standard F2 Rafales. A second Rafale squadron, this time tasked with the nuclear deterrence / strike role, will stand up at Saint-Dizier in 2008 with a further 20 aircraft, bringing the Air Wing there to full complement. It has now been announced that the third Rafale squadron will form at Mont-de-Marsan. In all, the French Air Force will receive 234 Rafales, split between Rafale B two-seat and Rafale C single-seat versions. To date,

120 Rafales have been ordered for both services, and 35 have been delivered to both the Air Force and the Navy. The Air Force order covers a total of 82 aircraft (44 single-seaters and 38 two-seaters) with an additional 38 Rafale Ms – all single-seaters - for the Navy. Under current plans, production is to continue until 2023.

In the meantime, the French Navy has taken delivery of its first Standard F2 Rafale, with a second one to leave the Dassault production line before the end of the year. Another fourteen will enter service in 2007 / 2008. They will bolster the first batch of ten Standard F1 Rafale M fighters that spe-

cialise in air-to-air operations with *Flottille 12F*, the first French Navy Rafale unit which became fully operational at Landivisiau Naval Air Station in June 2004. Standard F2 aircraft are equipped with an improved radar offering air-to-surface modes, with a Link 16 datalink for network-centric operations with other French and foreign assets, with infrared-guided Mica IR and radar-guided Mica EM air-to-air missiles, and with Scalp long-range cruise missiles as well as AASM fire-and-forget modular precision weapons. Eventually, the French Navy will operate 60 Rafale M single-seaters.





NEW MILESTONES FOR THE RAFALE TRIALS

With the final evaluation of the Standard F2 by the French Flight Test Centre, the first flight of the Standard F3 variant from the Dassault Aviation premises and the recent firing of the first guided AASM missile, the Rafale test programme is moving forward at unprecedented rate.

Rigorous evaluation

From mid-May to early June 2006, the French Flight Test Centre successfully conducted the final evaluation of the Standard F2 Rafale. Prior to the qualification of the Standard F2 and its official acceptance by the Defence Procurement Agency, French Air Force and French Navy test pilots and engineers flew the variant in a demanding environment to make sure that it could enter

service without any restrictions. Two aircraft were involved in a series of complex sorties, simulating various mission profiles: deep strikes with Scalp cruise missiles, close air support attacks with AASM precision weapons, battlefield air interdiction bombings (also with AASMs), and air-to-air engagements with radar and infrared-guided Mica missiles. Severe electronic warfare environments were replicated, and the Rafales were pitted against

a wide range of opponents: Mirage 2000-5F fighters, Crotale surface-to-air missiles and the threat generators / simulators of the multinational electronic warfare training range, in Eastern France. The French AWACS fleet actively participated in the trial campaign, and the Rafale aircrews routinely utilised their Link 16 datalink to exchange data with both the AWACS and their wingmen.

Standard F3

In May 2006, two-seater B302, the second production Rafale, was rolled out from the Dassault Aviation facility, at Istres, after a short conversion programme that brought it to full Standard F3 configuration. Under current plans, Standard F3 Rafales will enter service with the French Air Force and the French Navy in 2008. They will offer expanded combat capabilities thanks to the introduction

of the Exocet anti-ship missile, of the ASMP-A nuclear missile, of the Pod Reco NG reconnaissance pod and of various improvements to the Thales RBE electronic-scanning radar and to the Thales Spectra self-defence suite.

Flight testing of the improved standard started in May 2006, and initially focused on the radar / digital terrain following modes. By October 2006, the in-flight testing of the new Pod Reco NG will have begun, and

trials with Exocet missiles will follow soon afterwards. Four Rafales, B301, B302, C101 and M02, will take part in the Standard F3 development programme, with 400 test sorties to be logged between May 2006 and early 2008.





AASM

The Rafale programme reached a significant milestone on Wednesday 26 July 2006 when single-seat Rafale C101 fired an AASM stand-off weapon off the French Missile Test Centre, in the South-West of France. The revolutionary AASM (Armement Air-Sol Modulaire, or Modular Air-to-Surface Armament) is a low-cost, all-weather, fire-and-forget weapon optimised for high-accuracy attacks at long ranges. Designed and produced by Sagem, the AASM can be utilised for an extremely large

range of strike missions. Thanks to its modular architecture, it offers unmatched destructive capabilities against soft and hard targets. Depending on the tactical situation, the required precision to avoid collateral damage, and the importance of the target, the Air Force and Naval commanders can choose between two types of state-of-the-art guidance kits:

- a combined Inertial Measuring Unit / GPS receiver navigation system for all-weather attacks with a 10 m class accuracy
- a combined Infrared Imager seeker / Inertial Measuring

Unit / GPS receiver for day and night attacks with metric precision.

For long distance engagements, the AASM is equipped with a bolt-on tail unit / range extension kit which comprises a solid rocket motor and flip-out wings. Range exceeds 50 km for a high-altitude release, or 15 km for a low-level firing. Even more significant is the capability to engage targets at high off-bore-sight angles: with the AASM, the Rafale does not have to overfly the target to carry out its attack with deadly accuracy, and it can safely remain out of reach.

Test firing

The firing was completed off the French Atlantic Coast and the overall trial was under the responsibility of the *Centre d'Essais en Vol*, the French Flight Test Centre of the *Délégation Générale de L'Armement*, the Defence Procurement Agency. The weapon was of the INU / GPS variant that offers 10 m-class precision. Commandant Sylvain Guiraud, a test pilot from the French Air Force Evaluation Centre, flew the

26 July sortie and carried out the firing. "We wanted to test the AASM in an operational environment, with representative delivery profiles that will be used by French Air Force and French Navy front-line Rafale squadrons, he said. Our main goal was to test a fully functioning instrumented round to make sure that the armament and the aircraft could share targeting data in a satisfactory way."

Rafale C101 took off from Cazaux Air Base at 11 h 00 local. "The AASM was fired

at low-level over the sea, at 1500 feet and 450 knots in level flight, explained Sylvain Guiraud. The weapon hit the target with surgical precision. Prior to the attack, the coordinates of the target had been transferred to the Rafale via the Link 16 datalink. I used the Rafale's Front Sector Optronics system to watch the impact in real time. In a combat scenario, the FSO could be used for battle damage assessment."



INTERNATIONAL AIR DEFENCE WEEK

From 03 to 07 July 2006, Flottille 12F, the first French Navy Rafale unit, organised for the first time a week-long intensive air defence exercise from its Landivisiau Naval Air Station home-base, in Brittany, Western France. « From Landivisiau, we routinely train with the Super Etendard strike fighters of the French Carrier Air Wing, but in order to be fully proficient, air-defence pilots need to regularly train against other air defence assets such as F/A-18 Hornet, F-16 Fighting Falcon, Mirage 2000 and Typhoon fighters, stresses Commander Jérôme Puech, Officer Commanding Flottille 12F.

But we are rather isolated in Brittany. For instance, for a two-hour sortie, we only have 20 to 25 minutes of 'playtime' in the TSA 43 area, in Central France, due to the distance involved. It is not a very effective way to train. There are only two solutions to this problem: either travel to outside bases, or invite other squadrons here and fight in our superb training areas. »

Encouraging results

For the 2006 edition of the Flottille 12F Air Defence Week, three units and a total of eight aircraft deployed to Landivisiau: - two French Air Force Mirage 2000Cs from Escadron de Chasse 1/5 'Vendée'

- four Belgian F-16 MLUs belonging to 349 Fighter Squadron
- two Royal Navy Sea King ASaC Mk 7s from 849 Naval Air Squadron.

Additionally, Super Etendards from Flottilles 11F and 17F took part in the exercise on a daily basis, while Flottille 4F E-2C Hawkeyes and French Air Force E-3F AWACS were also heavily involved.

« Flottille 12F Air Defence Week seeks to familiarise aircrews with the employment of advanced air-defence tactics, explains Jérôme Puech. We knew we could host a fair number of aircraft at Landivisiau. This is why we invited quite a large number of French and foreign units: French Mirage 2000s, Spanish and Swiss F/A-18s, Belgian, Italian, Dutch

and Portuguese F-16s, British Typhoons and Hungarian MiG-29s. We wanted to make sure that every participant would get the best training opportunity: our goal was not to set up a bilateral squadron exchange, but to organise a large-scale multinational exercise with complex scenarios. This year, only three units responded positively, but this is really encouraging and we will do better next year. »

With its numerous training areas, Landivisiau Naval Air Station is perfectly positioned to accommodate such an exercise. « Our D12, D14 / D15, and D5 / D7 areas are just a few minutes flying time away, continues Commander Puech. We can fly at supersonic speeds without any risk of damaging private properties with our 'bangs', and we can use our flares and chaffs without any restriction. Moreover, our training areas are large enough to simulate long-range engagements, and we can split to accurately replicate tactics we use with our radar-guided, fire-and-forget Mica missiles. »





Obvious advantage

During their stay, each pilot flew several missions every day and, for all Mirage 2000 and F-16 aircrews involved, the exercise was their first encounter with the Rafale. Needless to say, they were all impressed by the latest Dassault fighter.

« In a dogfight, using only our guns and short range missiles, it is indeed very difficult for a Mirage 2000 pilot to win the day against a Rafale, admits Commandant Jean-Roch Piselli, the 'Boss' of EC 1/5 Detachment. Considering the imposed rules of engagement during the first phase of the exercise, our only real opportunity was to fire first, just after the crossover. Even though the Mirage 2000 is equipped with notoriously effective fly-by-wire controls, it does not offer the same level of performance in terms of manoeuvrability and engine thrust and response. We have to select full afterburner as soon as the fight begins while the Rafale pilot can throttle back and even remain in full dry, military power: we burn more fuel and our infrared signature is significantly higher whereas he can reaccelerate very rapidly if needed. »

Flottille 12F was declared fully operational in June 2004, and the Rafale pilots now perfectly know how to handle their aircraft to quickly win the fight: « we always devise a 'game plan' to exploit both the Rafale's fantastic acceleration and its outstanding agility, explains Lieutenant-Commander Pascal Cassan. Against a F-16, the Rafale is more powerful in the whole flight envelope, and is considerably more manoeuvrable below 300 knots. Ideally, after the crossover, I will climb into the sun to force him to slow down. I will constantly threaten him by pointing the Rafale's nose in his direction. That will force him to tighten his turn even more, and his speed will wash out very rapidly. On the contrary, the F-16 pilots will do what they can to keep their speed and energy up. » Numerous 'beyond visual range' (BVR) engagements were simulated during the week, and the Rafale proved as deadly in the long-range arena as in a dogfight: « I think that our RBE2 electronic scanning radar is very good, indicates Lieutenant Le Bars. Against a F-15 or a F-16, two aircraft types that have enormous radar cross-sections because of their massive air-intakes, our detection ranges

are excellent. In a BVR scenario, we always try to engage at high level and fire our lethal Mica missiles at high altitude to give them the longest possible range. Ideally, we will 'loft' the radar-guided Micas to boost their range before diving down to low level while simultaneously opening left or right. In doing so, we deny the opponent any opportunity to fire back. When in the 'merge', we quickly gain the upper hand against a F-16: with our large delta wing and our canard foreplanes, we have considerably more authority in pitch and we can turn more tightly, the Rafale offering better sustained turn rates than the F-16 at low, medium and high levels. Our Snecma M88-2 turbofans are so powerful that we often have to reduce power to avoid overtaking our prey. »

All participants agreed that this first edition of the Flottille 12F Air Defence Week was a total success. Flottille 12F specialists are already busy preparing the 2007 event which should attract a larger foreign contingent. By July 2007, the first four Standard F2 omnirole Rafale fighters will be in service with the unit, and they are likely to participate in the exercise too.

