

## Rafale Aircraft—the Untold Story—Part II



### **Cdr Jayakrishnan N Nair (Retd)**

In an air combat mission, the man behind the machine matters the most. Wg Cdr Abinandan Varthman Vrc, the ace pilot from Indian Air Force, has proved this. How good a weapon system can complement a pilot is also important in a mission. This series looks into the potency of weapons being carried by Rafale and their role in combat missions.

### **Weapon Package**

The weapon-carrying capability defines the potential of a fighter jet. Rafale comes with a good bouquet of weapons. The weapon package available with the aircraft is listed below. The aircraft has 14 hard points below the wings and belly for mounting weapons for the Air Force version of the aircraft. What India has contracted for is confidential as of now.



Sl	Weapon	Name	Remarks
(a)	Air-to-air missile	MICA	Beyond Visual Range (BVR), Manufactured by MBDA (Matra BAE Dynamics Alenia Systems)
(b)	Long-range air-to-air missile	METEOR	Manufactured by MBDA, BVR guided by radar
(c)	Rocket-boosted air-to-ground precision guided weapon	HAMMER	Developed by Sagem (Safran Electronics and Defence).

(e)	Long-range stand-off missile	SCALP	Cruise missile by MBDA
(f)	Anti-ship missile	AM39 EXOCET	Subsonic French-made missile
(g)	Laser-guided bombs	(Classified)	500–2,000 lbs heavy
(h)	Cannon/Gun	30M791 30 mm	By NEXTER 2500 rounds/minute
(i)	Nuclear missile	(Classified)	(Classified)
(j)	Classic bombs non-guided	----	-----

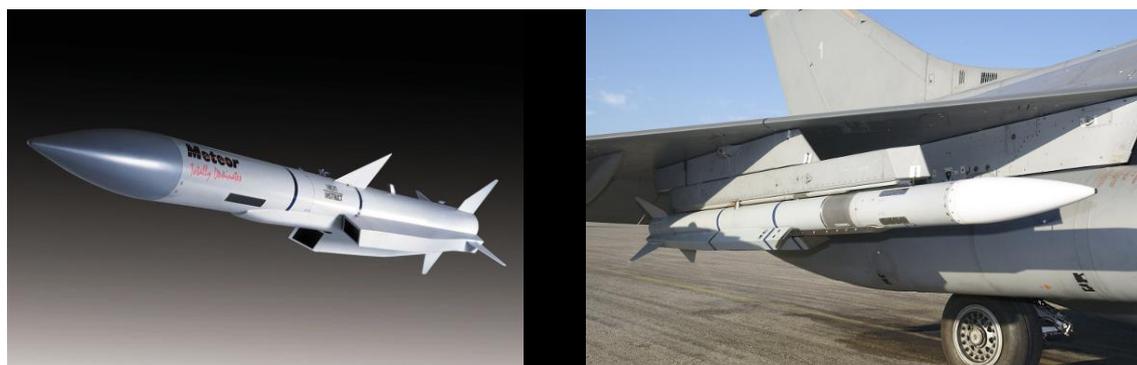
### Air-to-Air Missile—MICA

MICA is an air-to-air “Beyond Visual Range” (BVR) supersonic cruise missile with both Infra-Red (IR) heat-seeking and Electro Magnetic (EM) active radar homing. MICA can be used within visual range (WVR) and BVR. The weapon has been developed by MBDA, a joint venture by the merger of the guided missile divisions of Airbus, Leonardo and BAE Systems. It is one of the major missile developers and manufacturers in Europe. The missile has a length of 3.1 m, diameter of 0.16 m, weighs 112 kg with 12 kg warhead, max speed of 4 Mach (4930 kmph) and range up to 80 km for horizontal launch and range up to 20 km for a max speed of 3 Mach (3700 kmph) for vertical launch.



### Long-range Air-to-Air Missile—METEOR

Meteor is an active radar-guided BVR air-to-air missile used against long range manoeuvring air targets like jets, UAVs and cruise missiles. It is developed by MBDA and has an operational range of km with a 150speed up to Mach 4. It weighs 190 kg, has a diameter of 178 mm with 3.7 m length and runs on ram jet propulsion. The missile is equipped with both impact and proximity fuses and a fragmentation warhead that detonates on impact or at the optimum point of intercept to maximise lethality. It is capable of operating in highly cluttered and Electronic Counter Measure (ECM) environments.



### Rocket Boosted Air-to-ground Precision Guided Weapon—HAMMER

Highly Agile and Manoeuvrable Munition Extended Range (HAMMER) is a new generation all weather smart weapon of 3 m long and can handle operations with 125 kg+ bomb bodies, which can even be reprogrammed during inflight. It is a rocket-boosted air-to-ground precision-guided weapon fitted with INS (Inertial Navigation System)/GPS (Global Positioning System) or INS/GPS/IIR (Imaging Infra-Red) guidance kits, or even INS/GPS/laser guidance. We can set it for very short range to very long range (70 km). The missile has multi-target simultaneous attack capability. It is immune to jamming to a larger extent and can navigate without GPS.



### Long-range Stand-off Missile—SCALP

The **SCALP** long-range stand-off cruise missile by MBDA is a precision long range ground attack missile, capable of taking out targets within a radius of 300 km. The missile has a length of 5.1 m and a body diameter of 0.48 m. It weighs 1,300 kg and has a range of more than 250 km. It is a deep strike weapon designed to attack high value fixed or stationary land targets.



### **Anti-ship Missile—EXOCET**

AM 39 EXOCET is an airborne subsonic anti-ship missile, with a range of up to 70 km. Range can vary depending the altitude and speed of the aircraft. It weighs 670 kg, 4.69 m long with 350 mm diameter. With Inertial guidance (INS) and terminal active radar homing, the missile has a sea skimming capability, if launched at a low altitude.



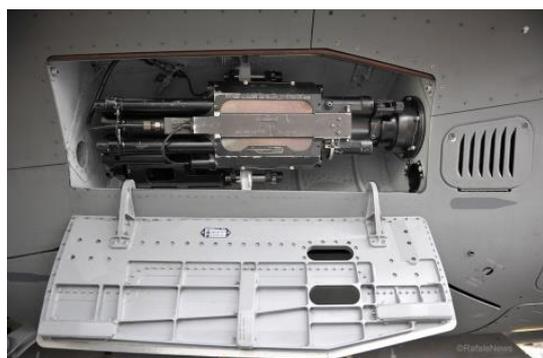
### **Laser-Guided Bombs (LGB)**

Currently, there are few state-of-the-art LGBs available in the market. GBU-12 Paveway II, Spice 2000 and the indigenous one 'Sudarshan' for integration. We do have a stock pile of Spice 2000 procured from Israel which was used during the 'Balakot Strike' from a mirage 2000 platform. LGB is a guided bomb that uses laser guidance to penetrate and strike a designated target with greater accuracy.



### **Cannon/Gun**

The 30 mm calibre internal gun manufactured by Nexter France can fire upto 2500 round in a minute. With a Muzzle velocity of m/s (3,360 ft/s) 1,025, it weighs 120 kg and is 2.4 m long. The gun is internal and integrated to the airframe.



## **Nuclear Missile**

Nuclear missile is comparatively heavier than the conventional missiles. These missiles can be engaged to the Rafale-designated hot points easily. The same is already been tested and proved by Dassault Aviation using dummy missile. We do have a nuclear second strike capability from sea/submarine. With Rafale, we will have the luxury of second strike from air also.

## **Deployment—Remote Locations for Operations**

In combat missions, it is equally important to look into the ease of operation from a detached location. It implies how easily we can turn around Rafale from unfriendly airstrips and bases. Rafale has the greatest possible autonomy during deployments since it requires minimum ground support equipment. It has an on-board oxygen generation system (OBOGS) which suppresses the need for liquid oxygen re-filling. Hence, ground support equipment for the production and transportation of oxygen is no longer required. It also has optronics cooling nitrogen circuit, which negates the need for a dedicated nitrogen supply. The built-in auxiliary power unit (APU) makes engine start-up possible without ground power cart. The ground support equipment are compactable and easily transportable. Only two types of carriages and cradles are necessary to perform all weapon/armament loading/unloading. Ease of maintenance and service is one of the key factors IAF considered while shortlisting Rafale.

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***Views expressed are personal and need not reflect or represent the views of Centre for Public Policy Research***

Note: The last part of this series (Part III) will deal with the Avionic systems of Rafale.

The reference sources for research, photos and tables are given below.

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