

## **Aermacchi M-311 ‘A large small one...’**

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The choice for a new standard trainer is these days dominated more and more by its capability in trainings possibilities. Not just thinking about the ultimate aerodynamics, but rather the electronic settings. Combine this with economical maintainance and the cost of use in general, and the market lies on your feet ! Alenia Aermacchi sets foot upon this market, helped by the experience of many years.

### **Experienced consortium**

Aermacchi has a name to save on this territory, thinking on the succesfull MB-339. With this project many things were learned, more or less a knowledge provider. Many things were taken out of this concept, but as important also many things could be improved. This need was clearly indicated by another market, being the market of the advanced jet-fighter. These two have to be integrated seamless and therefore highly advanced avionics are needed today in a trainer. Alenia Aermacchi covers these two segments in the market with the M-346, a plane that – being an advanced trainer – can match in aerodynamic aspects with the latest generation advanced fighterjets.

The M-311 can - aerodinamicly seen - also match as ‘small giant’ among the standard trainings planes. Actually the design dates from the early eighties and is produced by SIAI Marchetti as the S-211 and has been delivered to the airforces of Singapore and the Phillipines. Aermacchi bought the rights for production and after that the plane was completely modified. The mainframe was strengthened and aerodynamically improved, which gave it a much better manoeuvrable. These adjustments are to be seen on the amongst others under the wingtips, and the two stabilisors-fins under the belly. A much more economic engine with a 30% more power is mounted, and the M-311 is provided with a glass cockpit and HOTAS operational functionality. But ofcourse much attention is paid to the specific trainings items of the plane.

### **A trainer with dimension**

This new approach also has a name: Embedded Tactical Simulation. It’s provided by the Israelian company BVR, and is called Embedded Virtual Electronics (EVA) and it can be used for training pilots as well as Weapon System Officers (WSO’s). The fine thing of this system is that it works with virtual modes, where the pilot can train apart from the instructor in the backseat. These can be complexe tactital situations that are imitated where also the acuratesse or the fired arms can be measured as well in air-to-air as air-to-ground scenario’s. this all happens, while real weapon systems are not on board, and don’t have to be taken as well, which offers the operator of this type of plane an enormous operational and logistical reduce of cost. In this virtual way the cockpit management is trained which is absolutely necessary to become later on a professional fighter-jet pilot. The movements that the pilot makes with his plane, the actual flightdata have a real-time interaction with the virtual scenario which is offered. Next to that the student-pilot can practice with a raster/stroke ‘Sparrowhawk’ Head-Up Display (HUD), multifunctional dysplay’s, Digital Moving Map, an Electronic Warfare Suite and real multimode fire-radars ! The instructor has a HUD-repeater at his disposal and he is able to optional configure the cockpit virtually in the normal-mode, or temporarily join the student-pilot tactically.

You don't have to purchase such a plane for offensive tasks, but yet you can train these tasks virtual. The option is open for an attack-plane in such a complete edition in avionics and five hardpoints capable to carry 1000 kilograms. The customer can have the plane adjusted for own needs, even the virtual part. You cannot think of what kind of virtual situation or the computer will simulate it for you; enemy environment with triple-A, tanks, presence of naval-units, interceptors or AWACS in the neighbourhood, a scenario where the instruments fail, you name it.

### **Who bid's ?**

The plane has also been constructed for the comfort of the pilots with an Environmental Control System (ECS) which manages the correct air-pressure and airconditioning and a modern On Board Oxygen Generating System (OBOGS). This can also be said for the technicians with a two-level maintenance concept which is called 'Organisation and Intermediate'. In comparison with the S-211 in the maintenance-management there is a much better position and better way to reach the separate parts by means of the so called 'Health and Usage Monitoring System'. (HUMS). This way there is a monitoring of the airframe, the engine and electronic systems which provides a much more efficient maintenance profile. The extra strengthened airframe is set on a lifetime of minimum 15.000 hours. The engine is a Pratt & Whitney Canada JT15D-5C Turbofan which is extremely economical while by the way a part of the avionics comes from Canada. The plane really deserves a recommendation as it comes to reducing cost in general, in purchase, represented in the segment of the present turboprop trainers who have 'jet-like' characteristics. July 2007 special 'hot weather' tests in the Emirates, who also showed their interest in this plane. Next to this, Australie, Jordania, Tunesia, Libia and Chile, also showed interest. The Philipines and Singapore will also have to renew their fleet once, and Aermacchi also looks at the Turkish and English needs and market for trainers. A promise to expect more, so to say !

Kees Otten en Wim Das

### **M-311 in short**

Wingspan:	8.47m.
Length:	9.85m.
Height:	3.74m.
Wingsurface:	12.6 square meter
Weight (empty)	2300 kg.
Max. Start weight (trainer):	3200 kg.
Max. Weaponload:	1000 kg.
Max. Start weight (incl. weapons):	4100 kg.
Motor:	Pratt & Whitney Canada JT15D-5C Turbofan
Max. Impulsive force	1447 kg.
G-limits (without armament)	+7G, -3.5G
G-limits (with armament):	+5G, -2.5G
Internal fuel capacity:	696kg.
Drop tanks:	2 x 270 L. Tanks
Maximum speed:	mach 0.80
Min. runway length for start:	450m.
Min. runway length for landing:	460m.