AIRforces Monthly August 2019 Issue 377

Amendola

The Italian Air Force is making huge strides with its F-35 Lightning IIs, joining a number of international exercises and flexing the muscles of its new fighters, as **David Cenciotti** discovers.

***Above:** Serial MM7360 – wearing the code '32-10' – is the tenth Italian F-35A, seen recovering to Amendola after a local training sortie. The badge on the fin is that of the 32° Stormo: an eagle baring its talons, ready to strike. This aircraft completed its maiden flight at Cameri on June 14 last year. David Cenciotti **Right:** A 32° Stormo pilot carries out final pre-flight checks in the cockpit of his F-35A before departing on a Joint Stars 18 mission. During this exercise, Italian F-35As also flew as aggressors, alongside T-346As, in missions against F-2000 Typhoons. Italian MoD*

The Aeronautica Militare (AM, Italian Air Force) has been leading the way – to say the least – when it comes to the F-35 Lightning II. It became the first service in Europe to declare initial operating capability (IOC) with its new stealthy fighters, on November 30 last year. During a media briefing at the time, AM chief of staff Lt Gen Alberto Rosso said: "Today is an important day for the Italian Air Force." He was speaking at the Tactical Leadership Programme (TLP) exercise at Amendola air base in southeast Italy, and added: "With [IOC] we are the first in Europe to achieve a real operational capability with a fifth-generation aircraft; it means we have multiple aircraft, we have crews properly trained to operate the platform and long-term maintenance and logistic support."

While many see the various F-35 IOC declarations as symbolic gestures, they are a clear indicator of progress in terms of assets and manpower and, for the 13° Gruppo (13th Squadron) of the 32° Stormo (32nd Wing), it signalled a clear preparedness to start meaningful operations.

The 32° Stormo at Amendola is a unique wing. It operates four different types of aircraft: the F-35A, the MB339, plus the Predator A and Predator B unmanned aerial systems (UAS). Of the three squadrons under the control of wing commander Col Davide Marzinotto, only the 13° and 28° are actually based at Amendola. The recently formed 61° Gruppo operates its Predators from Sigonella, Sicily.

Amendola is almost clinically clean, with modern buildings that comply with stringent energy saving and anti-seismic criteria, and four distinct operative zones, including

a pioneers

the 'F-35 citadel' – home of 13° Gruppo. Preparations for the F-35's arrival here date back to 2012 and today it's literally a base within an air base. The advent of the F-35 has introduced a whole new culture in the AM – there's no place for so much as a whiff of a laissez-faire attitude towards security here.

Up and running

Italy is a major player on the European F-35 scene and on December 3, 2015 the AM received its first F-35A (AL-1, serial MM7332/'32-01') at the Final Assembly and Checkout (FACO) facility at Cameri, in northwest Italy. It was the first F-35 to be assembled and delivered outside the US. This aircraft completed the Lightning II's very first transatlantic crossing on February 5, 2016 to Naval Air Station Patuxent River, Maryland,

Right: ***Soon after 13° Gruppo was officially included in the Italian air defence system (SSSA), the squadron deployed four aircraft to Decimomannu to start its first training detachment. F-35A '32-10' is seen on the ramp at the Sardinian base, with weapon bay doors open.*** *Alessandro Caglieri* ***Below:*** ***A brace of 32° Stormo Lightning IIs prepare to depart Amendola. In the foreground is MM7359 '32-09'. For rotational quick reaction alert (QRA) duties, the base maintains two aircraft armed with AIM-120C-5 AMRAAM missiles.*** *David Cenciotti*

supported by a KC-767A from the 14° Stormo, which had become the first non-US tanker to complete certification trials with the F-35.

While the aviation media awaited the delivery of the first F-35I Adir to Nevatim, Israel, on December 12, 2016 the 13° Gruppo quietly received its first two F-35As at Amendola, making Italy the first country to take delivery of the aircraft outside of the US. The jets arrived from the FACO facility with Italian pilots in the cockpits. Local flying got under way the following January 11, as the first steps were taken towards IOC.

In a little under two years and more than 2,000 flying hours, the Italian F-35s took part in their first large-scale multinational exercise in October 2017 – Vega 2017. They performed several Tango (training) scrambles as well as joint drills with other AM assets including Eurofighters, the G550 Conformal Airborne Early Warning (CAEW) and T-346 trainers. This was in preparation for them to support the Servizio di Sorveglianza dello Spazio Aereo (SSSA, Airspace Surveillance Service) on quick reaction alert from March 1, 2018 with a standard conventional load (SCL) that includes the AIM-120C-5 AMRAAM (Advanced Medium-Range Air-to-Air Missile). Detachments to the AM air base at Rivolto for Operation Lightning added experience in the Polygone electronic warfare range in Bann, Germany. There was also a pair of unit-level visits to the Reparto Sperimentale e di Standardizzazione al Tiro Aereo (RSSTA, the Air Gunnery Experimentation and Standardisation Unit) at Decimomannu, Sardinia, in April and October last year.

A strong start

The F-35 is a complex programme, with regular 'pulses' of new technology. Col Marzinotto told *AFM*: "Whilst Block 3i provided an initial capability, 3F has further extended the flight envelope and enabled the employment of all the types of armament. Even though the US Marine Corps and US Air Force decided to declare IOC with 3i software, our choice was to declare readiness with a broader capability package." He explained that 3F offered "maturity of the sensors and more consistent sensor fusion, along with a higher level of interoperability."

Marzinotto said those decisions were taken at "national level" and were centred upon having a specific number of aircraft equipped with a self-protection suite and weapons payload required to carry out all types of missions simultaneously. The AM is insistent in saying the F-35 must be considered an omni-role fighter – a term that it says should not be confused with the concept of multi-role, suitable for

Virtual challenges

Live, virtual and constructive (LVC) training modes allow connected aircraft and simulators to train via data links in highly complex scenarios. But cyber security concerns mean such technology cannot yet be employed operationally and hybrid scenarios are not currently part of the training process for Italian F-35 pilots.

Requesting his name not be mentioned on security grounds, 'Driver', the commander of the 13° Gruppo, explained: "This machine is very simple to fly, but very difficult to operate." The squadron boss, whose background is with the AMX and who flew the A-10 as an exchange pilot in the USAF, added: "At the moment, only pilots with considerable experience have been assigned to the F-35, but it is only a matter of time before we take advantage of the presence of an advanced trainer such as the T-346 at Lecce.

In the future we will also have ab initio tracks, with pilots coming to the F-35 straight out of flight school."

The current Gen III F-35 pilot helmet is extremely complex, providing essential flight and weapon aiming information in the visor, as well as integrated night and infrared sensor fusion. 'Driver' continued: "With previous-generation aircraft I could carry out a mission that involved the use of NVGs [night-vision goggles] only if I had them with me on board.

"If a daytime mission extended beyond sunset, I was faced with a choice: either return to base or continue without NVGs. With the F-35 I no longer have this problem because the night vision is integrated."

legacy platforms such as the Eurofighter. "In the case of a fourth-generation platform, if I'm tasked with a certain mission, I have to carry a specific pod and armament," said Marzinotto. "But, once in the air, the ability to re-task the aircraft to perform different missions is limited by what I decided to bring with me. The F-35 is not made this way. The type of sensors and the intrinsic characteristics of the pods are always available on the aircraft and, thanks to the data links, I can be re-tasked to carry out air-to-air, air-to-ground missions, electronic warfare or electronic warfare tactical suppression. An F-35 can take off with a certain configuration and perform all the missions and the 3F software allows that.

"The basic architecture has growth capability by design," the CO continued. "Software releases will greatly expand the capabilities

***Left:** A profile view of '32-09' as it taxies down the Amendola flight line. The Italian F-35As have all been upgraded to Block 3F software standard with the same capabilities of those in service with the USAF. David Cenciotti **Below:** F-35A MM7337 '32-13' leaves its shelter for a night mission during Joint Stars 18. This was the second time that Italian Lightning IIs had participated in this complex exercise. Italian MoD*

Second Italian F-35B in the US

In common with the UK and US Marine Corps, Italy is procuring the short take-off and vertical landing (STOVL) F-35B variant. The second example to be produced at the Final Assembly and Checkout (FACO) facility at Cameri, BL-02 (MM7452/'4-02'), has now joined the first example at Marine Corps Air Station Beaufort, South Carolina, where it will train Marina Militare (Italian Navy) pilots. The jet is seen landing at Cameri after a test flight on May 29, wearing Marina Militare markings and squadron badge, but still lacking its individual code: '4-02'. The aircraft first flew last October 15, but only resumed test flights around six months later.

The first Italian-built F-35B, BL-01 (MM7451/'4-01') took to the air at Cameri on October 24, 2017.

After a series of 'confidence flights' from the base, it was flown to Naval Air Station Patuxent River, Maryland, the following January by an Italian pilot. Following electromagnetic compatibility tests there, it relocated to Beaufort to join the multinational training effort.

The Cameri FACO is due to assemble 60 Italian F-35As and 30 F-35Bs for the Aeronautica Militare and Marina Militare.

Paolo Rollino

of the aircraft. It will be possible to integrate new armament by simply updating the software – it is designed to maintain constant capability growth. The development of a new aircraft requires 15 to 20 years: so, when the aircraft enters service there is a discrepancy between its capabilities and the operational scenario. It is therefore important to guarantee flexibility since it's difficult to predict our operational needs in 20 years' time."

Day-to-day flying has involved regular interaction with existing fourth-generation aircraft and Marzinotto reflected that a lot of effort has focused on "finding the right balance in the sharing of information". He said: "The information flow that the F-35 can generate is impressive, but it's not always appropriate or effective to share all of it with other platforms."

The term 'game changer' is used frequently around the F-35 community, and its attributes have clearly led to a re-thinking in the employment of air power. One of today's goals is strategic awareness, where aircraft can achieve their aims by leveraging information superiority.

The F-35's low-observable (LO) characteristics and its ability to operate in contested airspace while collecting valuable data are critical. Marzinotto sees a shift in the balance of skills for the pilot, from handling the aircraft to operating the systems, and he was quick to praise the embedded synthetic training modes. "The F-35 is so advanced it needs to be continuously challenged within a complex scenario that includes many adversaries and threats. However, it is not always possible to create sufficiently complex situations within a real flight. In this regard, virtual reality is extremely important because it allows us to generate challenging scenarios. Obviously, the simulator – however realistic – is not enough. It is therefore important to find the right balance between real and virtual activity. Complex exercises, such as TLP, serve to give us sophisticated and challenging training opportunities for this aircraft."

Sensor fusion

Unlike legacy platforms in which each individual sensor has to be monitored and interpreted, sensor fusion in the F-35 presents information that's already been melded into a complete 'picture' that's relevant to the mission at hand. Col Marzinotto told *AFM* that sensor fusion allows systems such as the radar and electronic warfare suite to generate critical information for the pilot. The goal is to enable the pilot to close the OODA (observe, orient, decide, act) loop as quickly as possible. For example, if the F-35 is flying in enemy airspace the sensor fusion creates a tactical picture that is relevant to the current mission. The blending of information takes place in real time, transforming raw data into obvious and intelligible information for the pilot. That raw data is stored and can be exploited post-flight. Marzinotto said: "The fusion 'engine' is so effective because all the systems are integrated. Previously, the systems were independent and federated, with greater fragmentation. With the F-35 this doesn't concern a single sensor, but the whole weapon system."

The ability to share this information is of equal importance. "The F-35 is a node of command and control," continued Marzinotto. "It has both MADL [Multifunction Advanced Data Link] and Link 16, which we consider only as a 'backdoor' that allows us to communicate with legacy aircraft. The connections available to this aircraft are not comparable to previous ones. The available bandwidth capacity allows us to transfer much more information."

Sovereign capability

The question of data sovereignty in the F-35 programme regularly attracts media attention. There is the thorny issue of sharing sensitive data between partners by means of the Autonomic Logistics Information System (ALIS) and its centralised support equipment. "The architecture of ALIS provides an approach to logistics and global support that is innovative for the military world," explained Marzinotto. "On the one hand there is the need to satisfy the needs of logistic support, making economies of scale, sharing spare parts or resupply processes; on the other hand, there is the need to guarantee the containment of information. Imagine the case that one of my aircraft is grounded, waiting for a spare part – it is quite normal that I need to expose the need if I want to access a warehouse that resides outside of Italy. At the same time, I must protect information that is not

Italian F-35s have already operated with Italian Army Joint Terminal Attack Controllers (JTACs) using digitally aided close air support (CAS) techniques to exchange digital messages.
Italian MoD

inherent or relevant and that is not appropriate to be conveyed outside national borders.

"In a few months, we will be the first outside the US to receive a series of packages that will allow us to regulate, on the basis of a purely national choice, certain information that is aimed at satisfying logistic needs," said Marzinotto. The changes will allow ALIS partners to customise the information flow, selecting what to share and what to keep secure. It's an interesting development, especially given the issues surrounding the flow of spare parts around the various F-35 operators. Marzinotto concluded: "It should also be remembered that one of the initial requirements of ALIS was the use of a PHM [prognostics and health management] capability, which envisaged the possibility that F-35s in flight would communicate certain aspects of diagnostics or prognostics back to base in order to prepare the planned maintenance interventions or start the provisioning of the spare parts." While the AM doesn't consider such a capacity relevant at the moment, Marzinotto noted that it could be implemented in the future. *AFM*

Above: ***The discreet badge worn on the engine intake of '32-09' is that of the 13° Gruppo – a spear-wielding Don Quixote. The squadron is currently building up to its full complement of 15 aircraft.*** *David Cenciotti* ***Below:*** ***F-35A MM7334 '32-03' launches from Decimomannu. The Sardinian deployments also allowed the air force to verify the effectiveness of the Autonomic Logistics Information System (ALIS) when operating away from the home base.*** *Alessandro Caglieri* ***Bottom:*** ***The Italian Air Force F-35A achieved initial operational capability during last November's TLP at Amendola, during which F-35A '32-10' is seen rolling for take-off while a Luftwaffe Tornado ECR awaits its turn.*** *Italian MoD*