EUROFIGHTER

WORLD

PROGRAMME NEWS & FEATURES
DECEMBER 2016

- GROSSETO EXCLUSIVE
- BALTIC AIR POLICING
- A CHANGING AIR FORCE

FIT FOR THE FUTURE

Eurofighter Typhoon

Title:
Eurofighter Typoon with P3E weapons fit.

Picture: Jamie Hunter

Eurofighter World is published by
Eurofighter Jagdflugzeug GmbH
PR & Communications
Am Söldnermoos 17, 85399 Hallbergmoos
Tel: +49 (0) 811-80 1587
communications@eurofighter.com

Editorial Team
Theodor Benien
Martina Schmidmeir
Adam Morrison
Becky Taylor
Miranda Watton

Contributers
Airbus Defence and Space
BAE Systems
LEONARDO Finmeccanica
EUROJET Turbo GmbH
Viva PR

Photography
Eurofighter Jagdflugzeug GmbH
Eurofighter Partner Companies
Geoffrey Lee, Planefocus Limited, UK
Doris Staudenmeyer

Design & Production
images.art.design. Werbeagentur GmbH
www.iad-design.de

Printed by
ESTA Druck GmbH
www.esta-druck.de

Eurofighter World on the Internet
www.eurofighter.com
Follow us on:

If you would like to request additional copies of Eurofighter World, please contact the PR & Communications Department:
communications@eurofighter.com

December 2016

CONTENTS

EUROFIGHTER WORLD
PROGRAMME NEWS & FEATURES
DECEMBER 2016

WELCOME

In our world we are constantly looking to the next horizon – in search of innovation, new capabilities and, of course, new customers. Not surprisingly, this is a theme that runs throughout this edition of Eurofighter WORLD.

With Eurofighter Typhoon competing strongly in a global market for customers and contracts, we have a clear focus on giving customers – both existing and new – exactly what they need.

Essentially, this boils down to delivering new capabilities. Whenever we speak to customers, it's what they tell us they want. Of course, the specific capabilities may vary from customer to customer, but the general point remains the same. They all need the aircraft to be capable of doing continously more to fulfil their national and international deployments and operations.

That's why we have a clear capability road map – covering the introduction of new weapons, and also sensors like the E-Scan radar. It's also why we have a plan beyond the road map that will help us to introduce more and futher develop the abilities of the aircraft.

In this edition, you can read more about how Eurofighter is planning ahead through our Long Term Evolution initiative, to deliver for our customers not just for next year but for the decades to come.

There's also an interview with the UK RAF's Typhoon Force Commander Ian Duguid and now Eurofighter will remain 'the backbone of the RAF's combat air power' until at least 2040.

Sticking to the capability theme, we also take a look at the relationship with one of our key partners LEONARDO, and the work being done to bring the E-Scan radar to the aircraft.

Looking to the future, Eurofighter Typhoon plays a vital role for our present customers. This edition of Eurofighter WORLD features the first of a two-part article on Grosseto Air Base – home to the Italian Air Forces 9th and 20th Squadrons.

There's plenty more interesting features, including journalist David Cenciotti's first hand experience of witnessing an Italian Air Force training mission from the back seat of a Typhoon and a look at the Baltic Air Policing role being carried out by the German Air Force.

I hope you enjoy the read and, as ever, I welcome any feedback you may have.

Yours

Volker Paltzo
CEO
Eurofighter Jagdflugzeug GmbH

AT THE HEART OF **NEW MIX**

On the record with

AIR COMMODORE
IAN DUGUID

The RAF is evolving, changing to meet new demands. Tornado – for decades a lynchpin of the UK´s force mix – is heading out of service. At the same time, preparations are taking place to say hello to the new kid on the block, the F-35, when it enters into service before the end of the decade. Meanwhile Typhoon is going through an intense period of development with weapons and E-Scan radar integration. In this edition of Eurofighter WORLD, we speak to UK RAF Typhoon Force Commander Air Commodore Ian Duguid about the changing shape of the Royal Air Force and ultimately what it means for the role of Typhoon. >>

Photo by: SAC Megan Woodhouse(RAF). © UK MOD Crown Copyright 2015

>> AT THE HEART OF NEW MIX

Goodbye Tornado. Hello upgraded Typhoon and the F-35. Two aircraft – one fundamental job – providing a nation's air power. Given this state of flux there's a question about the role of Typhoon in the coming decades in the context of UK Air Power. From his vantage point at Typhoon Force HQ in RAF Coningsby, Air Commodore Ian Duguid is very clear about this.

▲ Photo by: Craig Sluman

"The simple answer is that it is going to be really important for a couple of reasons. First, while we all recognise the capability of the F-35 as a low observable, modern fighter with a highly capable sensor, the bottom line is that the backbone of the RAF's combat air power is going to be provided by Typhoon.

"That's going to be the case for at least the next two and a half decades because the UK Government's Strategic Defence Spending Review of 2015 saw an extension of Typhoon's life out to 2040, and that's really good news.

"Typhoon will be hugely important and it will remain relevant for two main reasons: firstly, because of its capability, and secondly, because of the relative size of the forces we will have. The RAF aspires to have eight Typhoon squadrons by the early 2020s, by contrast the F-35 Lightning Force will comprise two front line squadrons. You can see straight away, from that ratio, Typhoon will be hugely relevant.

"But it's not just a question of numbers, the important bit is capability. Typhoon will bring an awful lot to the party and Typhoon and F-35 will complement one another."

This idea that the two in tandem will offer the UK force a capability that is greater than the sum of the individual parts is fundamental to the UK's air power strategy. The man who heads up the RAF's Typhoon Force says interoperability is already a key focus.

"We are doing a lot of work with F-35 over the coming months, even though we haven't formally introduced it in the UK yet. For example, there will be a squadron of Typhoons deploying to the United States on an exercise where it will be working with F-35. In addition, we are already working in the simulators to understand and develop our tactics and procedures.

"In one sense it's not a question of how important or relevant Typhoon will be but how important the force mix will be in the future. The prospect of the two aircraft, working together looks incredibly exciting."

The work to mature the Eurofighter platform in both the Air-to-Surface and Air-to-Air domains is developing with real intensity. Tests are taking place for the integration of Storm Shadow, Meteor and Brimstone, as well as the dawning of E-Scan radar for Typhoon. These are all vital for the UK, with Typhoon being expected to step forward and carry out the heavy lifting in the Air-to-Surface domain in the RAF´s post Tornado era. The RAF's Project Centurion is designed to ensure a seamless transition between Typhoon and Tornado capabilities when Tornado goes out of service for the RAF in early 2019.

"Typhoon is in a really good place right now – with its current capabilities it is one of the most advanced 4th gen aircraft in the world. But it's going to get even better over the next few years. That will absolutely underpin its utility for the next 25 years of its life.

"We know that Typhoon already offers an excellent multi-role capability. That is manifest through our direct support of the two current operations, Operation SHADER, countering the Islamic State forces in Iraq and Syria, and the NATO Baltic Air Policing mission, ensuring the integrity of Estonian air space. Both of these operations are different and extol the virtues of Typhoon as a multi-role platform. However, the aircraft's growth plan, in terms of capability, amplifies and develops the role.

"Project Centurion will deliver a stand off air-launched cruise missile capability through the introduction of Storm Shadow; it will introduce the Brimstone 2 Air-to-Surface missile, as well as the highly capable Meteor Air-to-Air missile, which will produce significant beyond-visual-range capability over and above what we have right now.

"These are really positive steps forward in their own right but when you also add to that E-Scan radar and, potentially, the introduction of a stand off Air-to-Surface weapon capability such as Spear Cap3, then Typhoon will move into a whole new world of capability.

"There is a clear road map that will deliver the new capabilities and we are living it now. Project Centurion will set the conditions for Typhoon into the next decade. Then, the introduction of other capabilities like E-Scan radar, will see the aircraft out to 2040."

Many aircraft go through midlife upgrades in order to extend their life, but the Force Commander believes it may not be necessary for Typhoon thanks to the existing road map.

He says: "Typhoon is continually undergoing incremental upgrades – indeed we currently fly three different Tranche of aircraft – and there will always be continuous upgrades. For example, in the early 2020s we may potentially look at upgrades to the displays within the cockpit and start to examine the next generation of head up display or whether we go to a helmet-mounted system. These are things we are already discussing and putting onto a 'possible capability' road map. But as for a traditionally defined midlife upgrade I would argue that the delivery of Project Centurion and E-Scan radar is effectively like that anyway, except it isn't coming midlife."

Photo by: Geoffrey Lee, Planefocus

▲ Typhoons training with F-35

Typhoon's future capability is not simply cast around being a replacement for Tornado but as a fundamental part in a team of assets. Not surprisingly, a lot of thought and planning has gone into the question of how Typhoon will operate alongside other manned and unmanned aircraft in the years ahead.

"For me it's not a case of 'how will they' but 'how do they' because that is exactly what we are doing right now. We are already setting some really good conditions for developing future tactics and operating procedures. Right now our pilots are flying operations over Iraq and Syria, working hand in glove with unmanned Reapers, through their ability to generate situational awareness for the Typhoons.

"Equally the Typhoon Force has exercised regularly with the US Air Force F-22s, a 5th gen platform which has similar characteristics to the F-35 (though it's more an air superiority, air dominance capability). Typhoon has worked really well with it. We've been able to develop really good systems and functions working with F-22 that we are going to take into the F-35 work. >>

>> AT THE HEART OF NEW MIX

"We are also doing co-operative work in the simulators. Right now we are carrying out highly demanding and testing operational missions in the simulator, so we are able to fully expand the envelope and capitalise on the sensor suite and capabilities of F-35 and Typhoon to develop our interoperability procedures.

"There are bound to be some challenges out there and we are determined to overcome them because we have to make this force mix fully interoperable and we are working hard to do just that. Those challenges are not insurmountable, some will be hard, but we can overcome them.

"The idea of working together means you have to be able to communicate across the airways – be that over the radio, data link or visual – and we will use all three to create the interoperability we desire. But the important thing to note is that the F-35 procured by the UK has been designed as a global joint strike fighter with interoperability in mind.

"I have worked on the F-35 programme and I know what it is going to bring. In addition, Typhoon has gone through upgrades that added to what was already an awesome capability. Adding the two together is going to mean there are some really exciting times ahead as we develop tactics and prove them on operations.

"Clearly we now have the baseline for the next two decades from a combat air power perspective –Typhoon and F-35, along with all of the situational awareness and intelligence provided by unmanned and remotely piloted air vehicles. That combination is relatively well set. It's a baseline that will definitely see the Royal Air Force continue to be considered as one of the most capable air forces in the world."

So what will the future of UK combat air power actually look like – how will the different assets all work together? What kind of scenarios are being looked at in the simulators and how will these be fine-tuned when the F-35 enters operational service in the UK? Well, what the RAF already knows is that they'll have many more options.

"Obviously I can't say too much about the details of the tactics and techniques that are being worked through in the current interoperability trials, but in broad terms it (the combination) gives us real options.

"We have a Typhoon that flies at supersonic speeds high in the atmosphere, add to that E-Scan radar with a Meteor missile and a considerable amount of munitions and a sensor suite that would work with F-35. The F-35 would be able to share a lot of its information. In some scenarios it might go out in front of a package of Typhoons to sense the air and ground environment and pass that information on.

"Equally there may be times and missions that mean the combination is the other way round – with Typhoon out there in front, high and fast, with F-35 coming in behind.

"The new force mix will certainly provide greater choice for the air commander about how they want to exploit these capabilities and how they want to deal with particular situations, whether that's a question of how we hit particular targets or how we create certain conditions.

"Of course, a lot of what we have been talking about relates to high end warfare options but there will be times and places where the different aircraft are working separately, like the Typhoon squadron in the Baltic Air Policing role it does now, or in Iraq and Syria."

As well as its role in an integrated force mix, Typhoon will still own one key task.

"Ultimately Typhoon will continue to provide Quick Reaction Alert (QRA) for at least the next 24 years and QRA is the backbone of UK air defence.

"QRA gets overlooked at times and to some degree that's a good thing. People can rest easy at night knowing we are out there protecting the UK's air space and assuring the security people crave and are entitled to.

"But the flipside is that it is also important to remind everyone from time to time that QRA is what we do and we do it very well. The very notion that 24/7, for 365 days a year, we have aircraft and crews that are ready to scramble to assure the integrity of the UK's air space is important."

And there's no doubt in the Force Commander's mind that no matter what, there's nothing more suited to this particular job than Typhoon.

"When you consider going from a static start scramble in the middle of the night to almost Mach 2 over the North Sea in order to intercept a potential threat to UK air space then no other aircraft in the world could do it as well, or as quickly, as Typhoon. That might sound like an advert but I genuinely think that's the case."

So while the arrival of F-35 might be grabbing headlines, it's clear what will be at the heart of the RAF.

"Typhoon has never been more relevant than it is now and it's going to be that way over the next two decades. It is doing the jobs it is being tasked to do and doing them exceptionally well. It's world class. Look at Operation SHADER and QRA, Typhoon is doing two fundamentally different jobs. We are working really well and delivering what is being asked of us... but it doesn't stop there.

"It's looking really good further down the line. And that's exciting." <<

"TYPHOON IS DOING THE JOBS IT IS BEING TASKED TO DO AND DOING THEM EXCEPTIONALLY WELL. IT'S WORLD CLASS."

Photo by: Jamie Hunter

EUROFIGHTER TYPHOON
OUTSTANDING PERFORMANCE AND ABILITY

The ability to patrol and intercept hostile aircraft is known as Quick Reaction Alert. Across Europe and beyond, the Eurofighter Typhoon is on 24/7 standby. With outstanding performance and ability to get airborne quickly, it's perfect for the job.

ENHANCED SITUATIONAL AWARENESS

- Even while still on the ground, the pilot can keep a check on the position of the aircraft to be intercepted via its Data-Link (a two-way radio-controlled data exchange).
- Once in flight, the avionic system helps by calculating available range and endurance and constantly displays the information to the pilot.
- Merging all available information together through data sensor fusion technology helps to give the pilot the best and most accurate information available.

QUICK TURN AROUND

- Optimized ground procedures ensure quick turn around after previous flight with only a small amount of specialists needed.

RADAR

- The radar's special visual identification modes help the pilot make a safe and efficient interception of the target.

SENSORS

- As well as aiding Air-to-Surface operations, the pod gives the pilot the ability to perform an identification beyond visual range and saves the images as digital data.
- During night operations, the Forward Looking Infa Red (FLIR) allows for identification capability.

ENGINE START-UP

- The automated engine start-up, combined with several dedicated QRA-modes for the navigation system, allows for an extremely short time frame from scramble to wheels off the ground.
- The auxiliary power unit can be started by ground crew while the pilot is entering the cockpit after scramble, again gaining precious time.

ENGINE PERFORMANCE

- The Eurofighter's twin EJ 200 engines give outstanding climb performance. It takes about 1 minute 30 seconds after take-off to reach more than 30,000 feet, all the while maintaining intercept airspeed.
- With a best in class thrust to weight ratio – more than 1.5 – the Eurofighter boasts unmatched climb performance.
- The aircraft's Supercruise capability gives the Eurofighter the ability to intercept possible targets with supersonic speed, without the need to use reheat abilities (its afterburner), which optimizes fuel consumption.

Photo by: SAC Megan Woodhouse (RAF). © UK MOD Crown Copyright 2015

EVOLVING THE EUROFIGHTER

FIT AND FLEXIBLE FOR THE FUTURE

No-one knows exactly what the world will look like in the 2040s, but one thing we do know is that the Typhoon will still be in service, which is why Eurofighter's 'Long-term Evolution' initiative has already started.
For at least the next two decades Eurofighter is on a journey of capability development.


Photo by: Jamie Hunter

If a complex design development journey can ever justifiably be summed up in one word, it's probably this: flexibility.

"The central idea is not to make a big bang change, rather introduce changes that will facilitate ongoing refreshes quickly and affordably. That's one of the guiding principles," says Rob Wells, Eurofighter Weapon System Manager, who along with Filippo Danubio, Vice President Weapon System Development, is part of the team pulling together the plan.

"We know that the threats – aircraft, Surface-to-Air missiles and other types of weapons systems that are coming into play – are all evolving. We need to be able to counter that. So we will have to evolve too and we will firstly have to be able to do it quickly, and secondly, as you're not actually sure exactly what's around the corner, we have to plan for the unplannable." >>

In some senses then, the future capability journey is an acceleration of what has characterised Typhoon's operational life to date. Over the past decade it has already shown an incredible amount of adaptability. Fortunately, the original design team did an excellent job creating a fantastic design template, which has been able to grow. So in a very real sense, the machine has been transformed in line with the needs of its various air force users.

Through the Long-term Evolution initiative, the team is pro-actively looking at future capability needs and they're aiming to repeat this success, but this time by introducing greater flexibility.

Rob says: "It's not about changing the platform completely, but making a series of refreshes to maintain the tactical performance."

When aircraft from earlier generations went through an update programme, they often came out of it looking a little different than their predecessors. They were given a new nose job, or perhaps the fin was a different shape, or maybe the wings were bigger. But this isn't going to be the case with the Eurofighter Typhoon. The airframe with the engines is fixed because the team who came up with it pretty much aced it from the outset – it's at its optimum.

Eurofighter's combination of high thrust-to-weight ratio, manoeuvrability at all speeds, 65,000-foot service ceiling, supercruise capability, powerful radar and large missile load ensures that it is a world-class operational fighter aircraft with a reputation few can rival.

So why now – what's driving the activity? According to the authors of the Long-term Evolution initiative there are three main factors:

- Longer service life: Air Forces have already expressed an interest in flying longer than the original design life of the aircraft. The original specification was 25 years and 6000 flying hours, but Eurofighter Typhoon will comfortably exceed that. However, now that the customer wants to fly for longer, the question is how do you enable the jet to do that?

- Evolving threats: As Eurofighter is a top of the range fighter, the threats it has to deal with are evolving too. Hence, it can't stand still, it needs to evolve as well.

- Advancing technology: One of the opportunities is not just to introduce new technology simply because it's new or to avoid obsolescence, but to use it in a way that enables updates to be carried out quickly, cheaply and flexibly.

This last point is crucial. While the Eurofighter of the 2040s will look pretty much the same as it does today – it will have two engines and fly at certain speeds within its design envelope – its sensors and the weapons will evolve to enhance its operational effectiveness.

So the next phase of the evolution will build on the foundation but take place largely 'under the surface' because, in the second half of its service life, Eurofighter Typhoon will be increasingly dependent on its avionics rather than on the traditional systems. But what it won't be is one big data dominated midlife refresh. Indeed, that notion is regarded as being folly.

"Computing power is growing at an exponential rate, so even if we changed all the computers today, they'd be old within two years – the pace of change is so rapid. Therefore, rather than focusing exclusively on new computers, increasing memory and processors, we want to concentrate on how we can perform a refresh of the weapon system in a way that will allow us to accommodate faster insertions of new capability throughout its remaining life."

One thing is for certain, information – in terms of data– is going to be key.

Rob explains: "The rapid evolution in technology means there's an expectation that more information will be exploited by Typhoon in the future. Whether that's higher bandwidth, more pictures, videos, colour, and so on. Of course, all of this is going to take up more space, and on a fast jet space isn't something you have an unlimited supply of.

"One key task to look at is how you can get as much information on board as possible, how you use that information in a proactive manner and how you can pass the information to other users, whether it be in the air or on the ground. And it's about doing all this in real time.

"We will look into opportunities for increased information flow within the existing space available. This may mean changes to the avionics architecture to optimise that performance, because we will be working with 5th gen aircraft, which have their own rules of engagement, and to be able to interoperate with them will mean certain new requirements.

"Arguably, of course, we will also be operating against military 5th gen threats, which will also need a certain methodology and techniques to prevail against."

Understanding how threats may evolve involves a certain amount of crystal ball gazing, but there is a degree of common thinking. Speakers at international fighter conferences often describe a future where aircraft will be working in congested and contested airspace.

"Our position in industry is if that's the customer's expectation we will continue to develop the jet to meet that need. Of course, nobody really knows for certain what the future will bring. It could be, arguably, that air forces continue operating Typhoon in the same way as it has since it entered service. It will, for example, always perform QRA duties. But current demands are not as high when compared to operating in the perceived contested battlefield.

"One factor that is gaining more and more importance is cyber resistance. Ensuring the aircraft is immune to cyber attacks through what's variously called cyber hardening or cyber resilience is being taken seriously and forms part of our plans for the future."

Photo by: Jamie Hunter

WHAT WILL CHANGE LOOK LIKE

Key candidates for upgrades, enhancements and new capabilities will be sensors and weapons.

"Avionics is the area where web technology is evolving quickest, and all key sensors are within avionics. Radar, the DASS (Missile warner, laser warner), and the Data Link are all sensors and they are all evolving," says Rob.

"We are likely to need more Data Links than we have today – covert data links, high bandwidth data and so on. The Laser Designator Pod is a sensor too (though it's equipment that you plug in) and it will have to interface with the aircraft.

"The world of sensor development, sensor exploitation, is often driven by either evolving threats, (for example shoulder-mounted missiles whose frequencies can be changed overnight), or because the rules of engagement are changing as well as a focus on low collateral damage and so on. It all comes from sensor information technology, digitised information."

With weapons the story is slightly different. What the team is trying to do as part of the initiative is to make weapons easier, cheaper and faster to integrate. They confidently expect the weapons portfolio to continue to expand, even within the Typhoon's eight-strong customer community, as customer requirements are continuously evolving.

"In general that means getting smaller weapons rather than bigger weapons and potentially using multiple weapons on a station, so things like Brimstone and the introduction of a Common Weapon Launcher, which by definition would carry more than one weapon on that launcher. In essence we're moving away from one store per station to multiple stores per station, usually with small warheads, all individually targetable, therefore the amount of information is multiplied. They could be data driven, they will certainly be data hungry and it will be necessary to get data to the weapon quickly. That's the sort of challenge facing us." >>

Another area they are looking to address is turnaround times. Rob says: “If you need to land your jet, refuel, load up your weapons and get data on them before you take off again then the transmission of that information needs to be done quickly. The aim is to give the right amount of information to the pilot so that he’s got the optimum number of choices available for the weapons on board. And when the pilot fires them that they’ve got maximum accuracy.”

Also up for discussion is the potential for a new cockpit design that would allow the pilot to exploit any new sensors and weapons to their full potential. Initial discussions have already started on what a prototype would look like.

Rob says: “Because the cockpit is one of the systems on the aircraft and it has a lot of equipment in it, it is one of the candidates for change. This enhancement is being driven by the need to ensure mission effectiveness – in other words the pilot’s situational awareness and decision making. Over time, the existing cockpit configuration will reach its limit, in terms of the amount of information a pilot can deal with.”

WHEN DOES THE PROCESS START?

Eurofighter’s Long-term Evolution initiative is being forged in three distinct phases:

PHASE ONE:

This is an analysis of the weapon system as it will be by around 2020-21 with the addition of the new capabilities that are already being built into the existing capability road map. This includes on-contract items like E-Scan radar, Meteor, Brimstone and Storm Shadow. These give a predictable and reliable baseline. From there the team is investigating the areas that could benefit from technological change. The report examines options for the developmental opportunities for the 20 years thereafter.

PHASE TWO:

Start a system definition with the aim of developing the enablers for the key areas of refresh that have been identified, including the plan for development of technology demonstrators.

▶ Instrumented Production Aircraft - IPA6 preparing for take-off

PHASE THREE:

Prioritise and develop the changes with a phased approach. The aim is that some early work would commence in parallel with E-scan radar integration. However, rather than firing a starting gun to change everything, it’s the start of the iterative process designed to build in more flexibility.

Rob adds: “In terms of timings we would need to work out what would be operationally sensible because an air force commander won’t want to hand over all their aircraft for six months.

“We will have to phase things in in a manner that means customers will still have aircraft on call when they need them, but they can rotate those back into industry to carry out changes that are appropriate for the role that the aircraft is going to do, in a manner that’s also affordable.

“Therefore, probably the optimum time for a refresh will be within the next 10 years. That’s based on the time left in service, the maturity of evolving technology and the exploitation of the roles that the aircraft is expected to perform.

POTENTIAL FOR VARIANTS

To date, the Eurofighter Typhoon has been developed with what’s nominally a ‘one size fits all’ policy where, in other words, all aircraft can do all things for all their various air forces. But, that may change with the possible arrival of different variants.

Rob says: “Looking ahead, the aircraft will still be able to do what it does today and more. However, there is the prospect of developing variants as you shouldn’t necessarily expect all the jets to do all the things, all of the time.

“That’s important because, firstly, not all the pilots are trained to carry out all the roles, and secondly, if you don’t have to apply a modification across an entire fleet it can reduce costs.

“The idea of having different variants is something that’s been happening throughout aviation history. Indeed, even variants are often further subdivided. So we recognise that, while it should still be a multi-role aircraft and will continue to be so, there will be some potential niche roles that a ‘mini-fleet’ will be able to fulfil.” <<

▼ IPA6 on take-off for flight trials with Brimstone II

2,000 HOURS

TYPHOON PILOT ACHIEVES NEW MILESTONE

A pilot has created a piece of Eurofighter Typhoon history after becoming the first in the world to reach 2,000 flying hours. >>

Flight Lieutenant **Richard Watts** – a UK Royal Air Force pilot – achieved the milestone earlier this year, during a training sortie in a Typhoon from 29(Reserve) Squadron at RAF Coningsby.

Following the flight, the 55-year-old taxied back in style through a stunning arc of water in a salute to his achievement.

He was met by Typhoon Force Commander, Air Commodore Ian Duguid and RAF Coningsby Station Commander, Group Captain Jez Attridge, who presented him with a bespoke 2,000 hours flying patch – the only one of its kind!

"I have been tremendously fortunate to have been involved with the Typhoon fleet since its introduction into RAF service. It has been a privilege to observe at close-hand its development into the world-class aircraft that it is today," he said.

Incredibly, Flt. Lt. Watts also amassed over 2,000 hours on the Tornado F3, putting him in a very unique club of fighter pilots who have achieved this feat on two different aircraft types.

He transferred to the Typhoon in 2005, and has served as an Instructor Pilot on 29 Squadron for the last 11 years, making him one of the most experienced Typhoon Instructor Pilot in the world.

Flt. Lt. Watts joined the RAF in March 1983 and, three years later, was given the opportunity to fulfil his childhood dream when he was posted to 43(Fighter) Squadron at RAF Leuchars to fly Phantoms, clocking up nearly 700 hours.

In 1989, he transferred to the Tornado F3, where he served for over 15 years on 5, 25, 29, 56 and 229 Squadrons. He also served five tours on Operation Southern Watch, enforcing the No-Fly-Zone over Southern Iraq as well as numerous detachments to the Falkland Islands.

His first exposure to military aviation came in 1966 when he went as a six-year-old to Farnborough Air Show. His love for flying was cemented during his time attending the Combined Cadet Force (CCF) at Maidstone Grammar School, where he was fortunate enough to receive a Flying Scholarship. He later attended Bristol University, and became a keen member of the University Air Squadron (UAS). <<

Air Commodore Duguid (left) presents Flt. Lt. Watts with his 'patch'

"I HAVE BEEN TREMENDOUSLY FORTUNATE TO HAVE BEEN INVOLVED WITH THE TYPHOON FLEET SINCE ITS INTRODUCTION INTO RAF SERVICE."

Photos by: SAC Jack Welson (RAF). © UK MOD Crown Copyright 2016

Photo by: Dr. Stefan Petersen

GERMAN EUROFIGHTERS **ON PATROL IN THE BALTICS**

Germany took over NATO's Baltic Air Policing (BAP) mission in September, with five Eurofighters from the Tactical Air Wing 74 in Neuburg, Bavaria deployed to Estonia. >>

Photos by: Dr. Stefan Petersen

It's the third time the German Air Force has taken charge of BAP duties. The aircraft are part of the Luftwasse´s 74th Tactical Air Force Wing, based at Neuburg Air Base in Bavaria.

Operating from the Ämari Air Base in Estonia, the German Air Force took over the role from the UK Royal Air Force.

The handover was marked by a ceremony at Ämari which was attended by former Estonian President Arnold Ruutel, Defence Minister Hannes Hanso, Commander of the Estonian defense forces Lt. Gen. Riho Terras, Germany's Charge d'Affaires Reinhard Wiemer and the RAF Typhoon Force Commander, Air Commodore Ian Duguid.

Defense Minister Hannes Hanso said: "As recently as three years ago there were no rotating allied troops at Ämari and we were living in a totally different security situation.

Let me assure you that your presence is sending a strong signal of the unity and adaptability of NATO and we definitive don't see your contribution as taken for granted."

Meanwhile, German and Latvian troops recently took part in a joint exercise in Latvia, not far from the Russian border, as part of a broader initiative by NATO to bolster air defences. Germany deployed close to 80 troops and 400 tonnes of equipment, which included a mobile control centre, for the exercise.

Lieutenant General Karl Muellner, chief of the German Air Force, said the exercise would help German and Latvian troops practice the complex interplay of technology, personnel and unfamiliar terrain ahead of any potential real deployment.

The joint operations are part of NATO's "Persistent Presence" exercise and involve Germany's Deployable Control and Reporting Centre, which is patrolling a section of Baltic airspace using its own and several Baltic radars.

Earlier this year, NATO leaders agreed to move four battalions totaling more than 3,000 troops to the Baltic States and Eastern Poland for the first time, and increase air and sea patrols. <<

SINA HINTEREGGER

Sina Hinteregger is a Eurofighter Typhoon aircraft mechanic based in Zeltweg, Austria. Away from work Sina, who was born in November 1996, also happens to be one of her nation's best triathletes. She competes in both regular and cross triathlons, the latter is an off-road version of triathlon and usually combines a 1km swim, a 20-30km bike ride and a 6-10km trail run. >>

Photo by: Markus Zinner

SINA'S HONOURS

2016
WINTER TRIATHLON WORLD CHAMPIONSHIP
WOMEN ELITE UNDER 23s IN AUSTRIA

2014
WORLD CHAMPIONSHIP CROSS TRIATHLON
3RD PLACE IN GERMANY

2013
EUROPEAN CHAMPIONSHIP CROSS TRIATHLON
2ND PLACE IN AUSTRIA

Q & A WITH SINA HINTEREGGER

What attracted you to the role as an aircraft technician on the Eurofighter?
It's a job that really appealed to me – I mean how many people get the opportunity to work on an incredible aircraft like the Eurofighter Typhoon?

How did you come to get the role?
I'm lucky because my home town Zeltweg is where the Austrian air base Fliegerhorst Zeltweg is located, so I knew a lot about the aircraft. But I was attracted to working as a technician on the Eurofighter because I have always had a keen interest in technology.

What characteristics do you like best about the Eurofighter?
That's hard to say. From an engineering point of view, I really do find the entire aircraft really fascinating, but I'm especially interested in the engine.

Is it hard to combine sport with your job?
Yes, unfortunately it is. I work full-time on the Eurofighter and therefore I am only able to train for my sports in my free time.

Where do you see yourself in 10 years from now - in terms of your sports and your job?
In my job I would like to pursue a career in the engine maintenance programme of the aircraft. In sporting terms, I would like to be at world class level in the women's cross triathlon.

Are there any parallels between your sporting life and your career?
Yes, they both demand a great deal of discipline and accuracy. <<

GROSSETO AIR BASE

A COMMANDING VIEW

Colonel Marco Lant is only one month into his posting as 4th Wing Commander for the Italian Air Force, but he already has a unique perspective on the work being carried out at Base Aero Grosseto.

Colonel Lant is in an exceptional position: on the one hand he's the leader of more than 1,000 men and women, and on the other he's a 'student', part of a cohort of pilots going through Eurofighter Typhoon Conversion Training with the base's 20th Squadron. >>

COLONEL MARCO LANT
4th Wing Commander for the Italian Air Force

"THE AIRCRAFT IS AN EXCELLENT MACHINE AND WE ARE VERY PLEASED WITH IT. IT REALLY SUITS OUR NEEDS."

>> A COMMANDING VIEW

It's akin to a Michelin-starred chef being served as a customer in his own restaurant every day. Aside from giving Colonel Lant a cockpit view of the capabilities and performance available from a Typhoon seat, it's allowed him to get under the skin of the base and see it from the eyes of a 'user', not just a leader.

This twin role came about, in part, thanks to an air force initiative designed to give leaders contrasting experiences. Immediately prior to this posting Colonel Lant was based at the Logistics Department in the Air Force headquarters in Rome for a couple of years. He'd actually started his career as a Tornado pilot and then spent around 10 years with the world-renowned Frecce Tricolori aerobatic team.

"I was actually carrying out a totally different role before taking up this position, but in recent times the Air Force has been trying to put people with different backgrounds in charge of things," he says. "The thinking is that you will approach the job with fresh energy as well as bringing a different mind-set and experience to the role. It's not easy, but I consider myself very lucky, because of my team here. They're very professional, very well prepared and very dedicated. It really is an incredible experience because of all the different aspects, not least the fact that there are something like 1,200 people here."

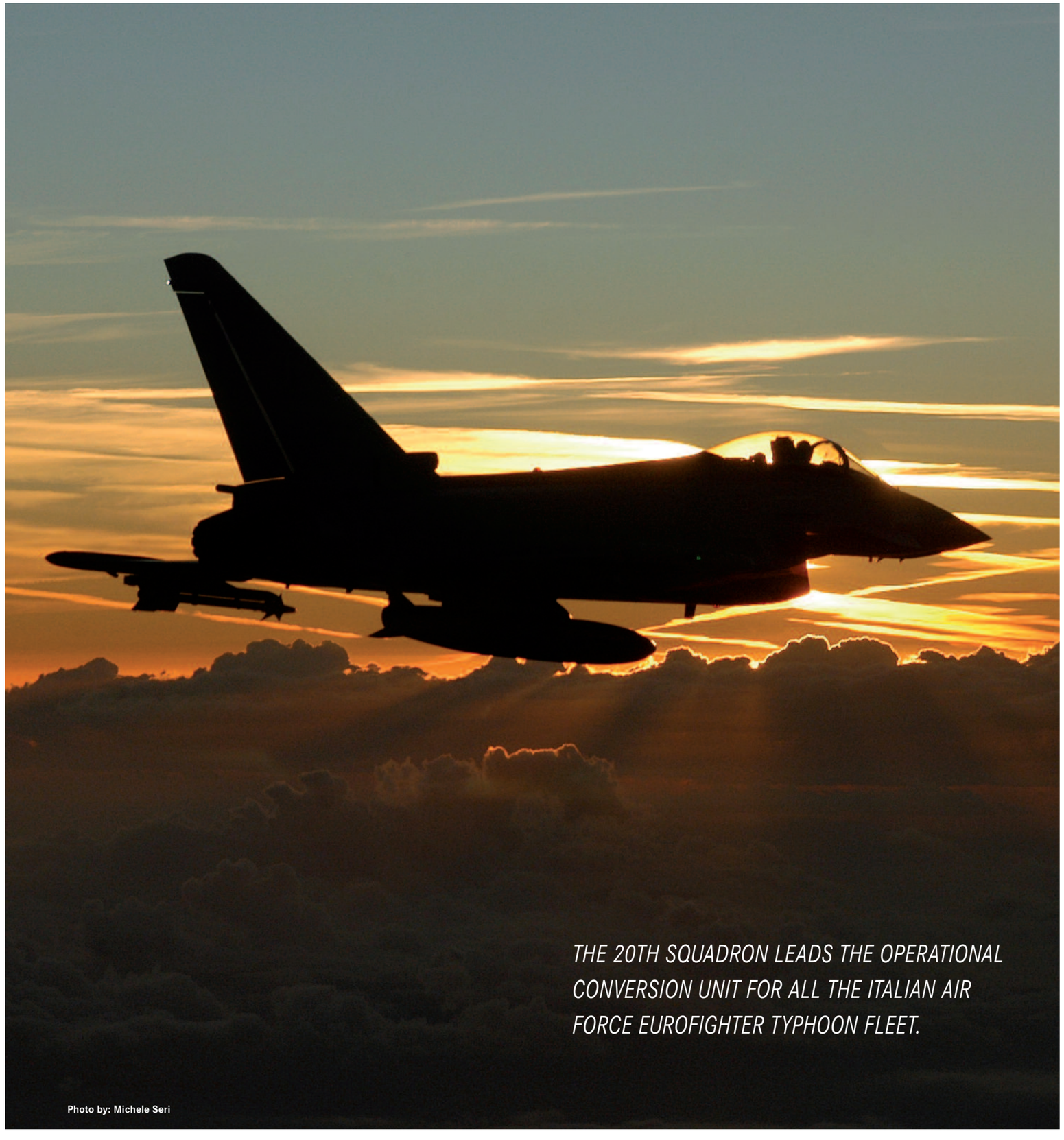
The one real gap on his CV was Eurofighter Typhoon and that's what Grosseto is exclusively about. So about three months prior to taking up his command, he joined up with the rest of the students.

"The funny thing is that I was enrolled in a class of guys straight out of the Academy, so there are about 20 years between me and the rest of the students. At the beginning it was a little bit awkward so I had to straighten things out from day one and we had a little talk where I told them: 'Look, I am just one of you.'

"Getting used to one another was fun, and actually, from a serious point of view, it gave me the opportunity to test the Operational Conversion Unit from a real end user point of view: I could see the syllabus right from within the system, which has been very valuable.

"That's really precious as a commander. You approach problems and challenges from the other side, and from the management side it gives you an idea what the guys go through because, after all, together with the QRA service, the Conversion Unit is the main business of the 4th Wing."

The 20th Squadron leads the Operational Conversion Unit for all the Italian Air Force Eurofighter Typhoon fleet. New pilots arrive at Grosseto from all over Italy and are trained to a high level before joining the operational squadrons. The main mission of the 4th Wing is the Quick Reaction Alert service – taking care of airspace all over northern Italy – which is the job of the 9th Squadron.



THE 20TH SQUADRON LEADS THE OPERATIONAL CONVERSION UNIT FOR ALL THE ITALIAN AIR FORCE EUROFIGHTER TYPHOON FLEET.

Photo by: Michele Seri

For the new 4th Wing Commander the aim is clear: "My main, personal objective is to allow people to work and achieve results in a coordinated way – to bring everybody on board, try to fulfil our mission.

"Around the two squadrons you have all the infrastructure that usually surrounds flying activity and that brings to the base 1,200 people or so working on it. We are very busy here; busy carrying out deployments; on other engagements; and our regular commitments that we have. The whole wing is actively fulfilling a range of different commitments.

"As wing commander your job is to manage everything. You are in charge of everything from the operational part, the logistics through to the administrative with all the paperwork. My goal over the next two years is to do this in a coordinated way without wasting energy, or time – by trying to do this in an efficient way. For me that's important. It's not enough for us to achieve results but the way which we achieve them is important. You can achieve a result in many ways."

The importance of the role is underlined by the incredible collection of memorabilia in Colonel Lant's office. It's a room packed with images and symbols that trace the roots of the 4th Wing to their earliest days. Indeed, while the 4th Wing was founded in 1931 – and the original flag from 1931 is preserved and displayed in a special case – its story goes back well before then. Alongside the flag there's a picture of Francesco Baracca, Italy's World War One fighter ace.

"Baracca used to fly with the rampant horse insignia (the Cavallino Rampante) on his aircraft in tribute to his former cavalry regiment and when he became part of the 91st squadron, the insignia became the insignia of the squadron. After his death, his family later gave the same insignia to Ferrari but with one change – the tail of the horse. We have the original one, the Ferrari one has flipped the tail upwards.

"Next year the 9th squadron will celebrate its 100th anniversary. It's the oldest squadron in Italy. It actually dates back to the era even before the air force was formed because they were part of the army. So the whole history of the Wing is really fascinating to me."

All around the base there are lots of reminders of that rich past with versions of the Cavallino Rampante everywhere. Living up to such an illustrious lineage must be a challenge for today's 4th Wing standard bearers. But Colonel Lant's early impression of the work being carried out is favourable: "I am very pleased because the 'Grosseto' machine is working very well and we provide an excellent service. I knew that people here would be very busy and I didn't really need confirmation of that, but lately, with a number of new commitments, it's been more difficult than ever to keep up with things. As a new person that's the most difficult part – bringing all the >>

pieces of the puzzle together and trying to preserve the thing that I believe is the most important resource – our human resources."

His biggest challenge has been taking in all the information that's come his way; 'like trying to drink from a water hose', is how he describes it.

While relatively new to Typhoon, Colonel Lant has already joined the pilot fan club. "The aircraft is an excellent machine and we are very pleased with it. It really suits our needs. It's very easy to adapt to, even for somebody like me, not born and raised around the Eurofighter. It's very easy to get used to, and gives you lots of information – sometimes too much for a brand new pilot to take in – so again you have to select the pieces of information that you really need. But it's a fascinating aircraft and you soon get addicted to it.

"From a QRA perspective Typhoon is perfect for the job because of its performance and information levels."

The next two years will undoubtedly be a busy period for the 4th Wing Commander, with a number of deployments being planned, which will build on the work already carried out.

"Earlier this year we completed our first Red Flag which was a milestone for the aircraft and for the fleet because of the logistic endeavour and the operational effort that was put into it. This wasn't Grosseto on its own, it was a whole fleet effort and it was very well managed. We are very pleased with the outcome and we learned a lot. In fact we are still in the process of exploiting what we learned." <<

THE IMPORTANCE OF GROSSETO

Base Aero Grosseto in Tuscany has enjoyed a key strategic value for the Italian Air Force for many years. Its location north of Rome allows today's QRA pilots from the 9th Squadron to reach all of northern Italy. But it's also an ideal home from a training perspective too.

"It's next to the biggest military air space in Italy. All of the regular flying areas are pretty much between Italy and the islands of Sardinia and Corsica and all of the other air bases are there. You can fly supersonic up to 60,000 feet," explains Col. Lant.

This proximity allows the 4th Wing pilots to join up with the other Wings from the Aeronautica Militare, team together, then go back to their respective bases and review the sorties. The area was used for NATO's major Trident Juncture exercise last year.

"Our working areas are excellent. We are six miles from the sea and we take off sea-bound which means the base is conveniently located from an environmental view which is important. Flying-wise it's excellent because usually the weather is really nice. In fact, Grosseto is named as a standard diversion for all the other airfields.

"Our regular training area sits right above the base. It's limited a little bit height-wise because right above us is the terminal area leading into Rome so we have a height cap. But we also have the Apennines close by for low level work and there are a couple of tactical areas very close too so it's an excellent location training-wise. It allows us to carry out different scenarios very quickly which saves money, time and resources and maximises the training output.

"Partly because of the fact that every Typhoon pilot trains here, everybody in the force has a link to Grosseto. And there is an excellent relationship between me, the other commanders and the Wing itself."

LION HEARTS AND BRAIN POWER

You can't fail to notice the Latin motto of the 20th Squadron. It's there in bright yellow letters above their HQ entrance, it's on the flight suit badges, on walls, mugs ... you name it, you'll see it. 'Unus Sed Leo.' It means 'Only one, but a lion', and there are pictures of lions throughout the corridors, offices and mess. There's even a little white plaster one guarding the entrance.

However, it's also fair to say that the qualities the Squadron looks for go beyond the strength and courage of a lion. They seek out the very brightest too.

And that's because the 20th Squadron's core role is Typhoon training and the skills needed to be a Eurofighter pilot go far beyond muscle power.

Intelligence is key for successful Typhoon pilots, says Lt. Col. Morgan L, 20th Squadron Commander, whose surename we cannot publish in line with air force policy. "It's not a machine that requires brute force to fly, it's a flying computer so it demands brain power to control it."

The fundamental business of the 20th Squadron Conversion Unit is responsible for training Eurofighter Typhoon pilots for >>

▶ Lt. Col. Morgan, 20th Squadron Commander

Photo by: Michele Seri

>> LION HEARTS AND BRAIN POWER

the entire Italian Air Force. Some 125 pilots have graduated through the 20th Squadron since it started working with Typhoon in 2004. The unit also carries out training for QWIs (Qualified Weapon Instructors).

In addition, the squadron is also involved in the operational evaluation of the weapon system, meaning it gets the first serious look at any upgrades carried out by the industrial partners and puts them to the test.

In short, it's a very busy Squadron, as Lt. Col. Morgan L explains. "We carry out basic training, training for the QWIs and then also operational evaluation activities for the Typhoon, and we also carry out training for the operational squadrons. So we train the instructors for the operational squadrons and help pilots get up to the required level of competence if they've been away from flying duties for any length of time."

For new pilots, their basic flying training takes place in Lecce or the United States, and in both cases they go through Lecce for their fourth phase training – some train on the MB346, and others on the MB339. But Typhoon represents a significant step up, hence the need for conversion training, which is tailored to each individual.

"The syllabus is essentially the same for everybody, but as soon as each student starts the course we assess their individual proficiency and then, if they are good enough, we can condense the training by cutting some missions," adds Lt. Col. Morgan.

"It's a performance-based syllabus so, as long as they gain the required standard at each phase we can push ahead. We have almost 10 years' experience training on the Typhoon and know when an individual meets the required standard. Once they meet the requirements or go above that standard we push forward with the training."

The course usually lasts around six to seven months, depending on an individual's progress, and consists of a number of different phases. It starts with the basic transition to the jet, which prepares the pilots for solo flying.

"This element is aimed at making sure they are able to take off, land, and navigate safely and have the ability to fly in all emergency situations. The next stage is Radar Training, then they progress to Basic Intercepts. These are simple One v One scenarios and from there the pilots move on to Quick Reaction Alert training, taking in Two vs One intercepts. Towards the end of the course the scenarios get ever more complex, with Many vs Many missions, which can consist of anything up to four aircraft against many others.

"Every mission is a building block. We become progressively more and more advanced, it's all designed to improve the skills of the student."

A lot of the flying is carried out at night, as much as 25 per cent, to ensure the pilots are proficient in all the conditions they may come up against in the real world. For the new pilots straight out of the academy, the challenge tends not to be about handling the flying, they're proficient at that, rather it's coping with all of the information that comes their way. Which is why brain power is a prerequisite.

Lt. Col. Morgan says: "They have to have the ability to handle all the data that comes their way in the Typhoon. You have so much information inside the cockpit. You need to know exactly where to find specific information, at any time, and know what the quickest way to do or find something is. You have data in lots of different places inside the cockpit. So to help them get used to it a lot of the initial work takes place on the simulator to let them get accustomed to the environment.

"By the time they come to us their airmanship is really good, it's the capability to handle all the data. That's the problem I had the first time when I flew the aircraft. I came from flying F-14 and F-16s and these were a little bit less complex than this one."

Senior instructor Lt. Col. Stefano P adds: "The aircraft is complex but getting used to it is just a matter of time. When you understand how it works and where to find all the information you need, it's straightforward. The big difference when compared to older aircraft was that the pilot was a stick and rudder pilot but, with Typhoon you are a Weapons System Manager. The aeroplane flies by itself, you just need to make more focus on the management. Basically, it's like a flying desk, and your job is to process all the information, and handle all the different systems, but, in terms of flying, the aeroplane flies by itself."

For a student, a typical day in the office starts three hours in advance of flying. They are given a thorough brief before going off to the aircraft for the mission. The flight itself typically takes place over an hour and a half.

"What happens during the flight depends on the phase of training a student is at. It can range from a simple radar-to-radar, intercept at medium and high altitude in a relatively easy environment, and then we go down to low level. In this timeframe, we also put in some 'special' unscripted events that are aimed to improve the skills, perhaps requiring a special kind of manoeuvre.

"If it's a special, for example the first of a particular phase, it's often flown in a twin-seat aircraft, with the instructor in the back seat. The instructor isn't there to intervene, they just try to stay quiet and let the student make mistakes and then see how they are able to handle those mistakes. We observe. We look at the timeframe that goes between a mistake and a correction and, basically, we don't touch the aeroplane unless there is a safety issue. If we talk it's to improve the feedback and quality of training the student will gain from the mission.

Photo by: Geoffrey Lee, Planefocus

"We try to let them fly the aeroplane alone. If, for example, they make a mistake, they might find a solution I would not necessarily have adopted in that situation but, as long as they find a safe solution, that's good enough. Then we can talk on the ground about what they might do in the future. That's the way it works."

All the planning and the flying builds up to one key session. The debrief.

"Everything is done at the debrief. We replay the mission through our systems, and we may focus on a particular error and then propose a solution. This is the most crucial period in the whole training phase. It allows instructors to give the pilots feedback and for students to add to their understanding."

The facility has two full mission simulators which are linked and can work on a network, which is a big advantage for training, because it allows the instructors to simulate two-ship (two aircraft) environments.

Lt. Col. Morgan says: "With the simulators you can create a situation that's hard to replicate in a training flight. You can create all sorts of emergency situations, which is obviously a plus in training and that's useful even for the experienced pilots. The simulators also mean we can create more complex scenarios that are not allowed in real flying due to either airspace constraints, or cost. You can do whatever you want inside there.

"Typically in the transition phase, we will have the student in the simulator and the instructor monitoring the missions from the console. In more complex scenarios, we have the student flying the simulator as the wingman and we have the instructor in the other aircraft. We can then 'fly' a mission just like we do in the real world. Then when we jump out of the simulator we carry out the debrief just as we would if we had flown the aeroplane in the real world.

"Of course you're not in real danger but after just a few minutes flying the simulator, you think exactly like you would be flying a real jet and you only realise that when you land. Your brain gets immersed in the problem solving."

▲ Senior instructor Lt. Col. Stefano

The mission training mix of live flying and simulators is split about 50/50. However, training doesn't take place exclusively in the aircraft or the simulator. The 20th Squadron's impressive facility also houses a couple of conventional classrooms for the students to study the inner workings of the jet in detail. There are rows of desks and computers, whiteboards and wall charts.

"It's important for them to have an intimate understanding of what they are flying and what's under the skin of the aircraft," says Lt. Col. Stefano.

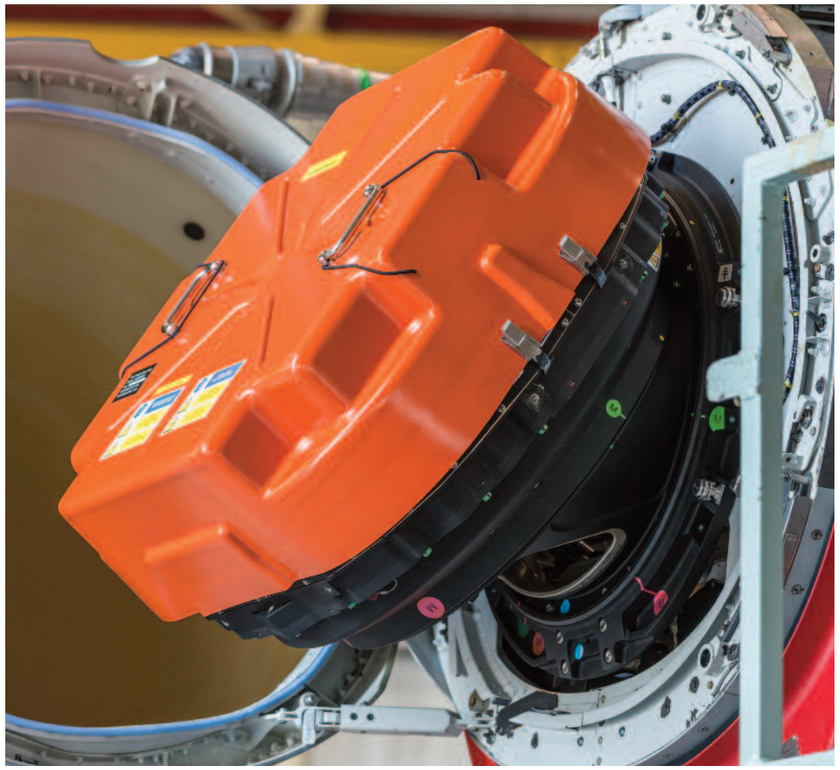
This underscores their need for more than lions. Welcome to the world of 20th Squadron, where lion hearts combine with brain power to produce Italy's finest. <<

LEONARDO
AIRCRAFT

AN ESTABLISHED PARTNER WITH A NEW NAME

INTEGRAL TO THE FUTURE OF TYPHOON

Italy's Leonardo-Finmeccanica led the successful campaign that brought Kuwait into the Eurofighter family. Eurofighter WORLD takes a closer look at the company and how its involvement is helping to keep the Typhoon competitive in a tough global market. >>



Think of any part of the Eurofighter Typhoon, and there's a good chance that Leonardo has had a hand in its development and manufacture. The company, which delivers around 35 per cent of every platform from its Aircraft and Airborne and Space Systems divisions, provides parts of the fuselage, contributes to almost every avionic system on the aircraft, leads the consortium which deliver all of the Typhoon's main sensors and provides a major part of the fighter's cockpit instruments.

Through its share in MBDA, the company has a hand in the delivery of the Typhoon's advanced weapons systems. Allowing the Typhoon to see further with its Captor radar and PIRATE IRST, protecting the life of the pilot with its Praetorian defensive aids suite and distinguishing friend from foe via its IFF system, Leonardo's technology is the backbone of the advanced avionic capability on Typhoon.

It is perhaps this comprehensive involvement in, and understanding of, the Typhoon programme that allowed Leonardo to make a success of its campaign in the State of Kuwait, which led to the nation ordering 28 aircraft. Much like Leonardo's work on Typhoon, the deal is wide-ranging, including logistics, operational support and the training of flight crews and ground personnel. Kuwait will be brought on board as a full-fledged Eurofighter partner nation, receiving the Typhoon in its most advanced configuration which will include the new Captor-E AESA radar. It will be an international partnership that Leonardo, with its extensive global footprint, is well-placed to facilitate.

AROUND THE WORLD

With more than 47,000 employees worldwide, largely based in Italy, the UK and the US, Leonardo is among the world's top ten global aerospace, defence and security companies and Italy's largest aerospace manufacturer. Previously known as Finmeccanica, the company was unified and subsequently re-named this year under the direction of its current CEO and General Manager, Mauro Moretti.

Originally established as a financial holding company in Italy in 1948, today's Leonardo is the successor to a number of instantly recognisable names including Agusta, Oto Melara and Officine Galileo. In the early 2000s, the company expanded significantly into the UK, merging its Italian helicopter business with Westland Helicopters to create AgustaWestland and setting up a number of defence electronics companies which eventually unified under the Selex ES brand.

In January this year, Leonardo-Finmeccanica became a single industrial company by integrating the activities of its subsidiaries AgustaWestland, Alenia >>

Aermacchi, Selex ES, Oto Melara and WASS. The firm also holds a 25 per cent stake in Europe's missile manufacturer MBDA which provides a number of the Typhoon's weapons systems.

Its Aircraft division is responsible for airframe design, manufacture and assembly and testing of the aircraft and on board systems, while its UK sites lead development of the Typhoon's latest Captor and Praetorian sensor systems. In both countries, engineers and project managers work closely with current and potential future users on a daily basis to make sure they're designing and developing exactly what customers need.

"The Eurofighter Typhoon programme is absolutely a partnership, not just between the different international companies delivering the aircraft but also between those building the various elements of Typhoon and those who will use it on operations," says Andrew Cowdery, Chairman of both Euroradar and EuroDASS, who oversees some of the key avionic aspects of the Typhoon programme for Leonardo. "When the success of the programme is so important to our company, and the contribution of our company is so important to the programme, working in an open, transparent and collaborative way is really the only way of ensuring success."

This collaborative approach has led to concrete successes for Leonardo, not only in the design and construction of Typhoon, but in the delivery of innovative support and service solutions. The maintenance service for Italian Air Force Typhoons, based on aircraft availability, sees support provided directly at the Italian Air Force's Typhoon base of operations through the CMA, standing for Centro di Manutenzione Avionica (Avionic Maintenance Centre).

The CMA's guaranteed turnaround time has, since 2009, ensured a high level of service readiness for the Typhoon while at the same time reducing costs for the air force. Leonardo is preparing to roll out this successful model to other platforms with which it is involved. Most recently, the company announced in July a 'Joint Avionics Solution' for UK Typhoons, a support arrangement which will see Leonardo working alongside BAE Systems to support the Typhoon's avionics equipment for at least the next 10 years.

UNDER THE SKIN OF TYPHOON

Of utmost importance to the Typhoon's combat capability is its Captor radar, with the current, operationally-proven, Captor-M model seen as best-in-class. However, with fighter technology constantly advancing, so too is Typhoon, which is why the Euroradar consortium, led by Leonardo in Edinburgh, is hard at work developing the new 'Captor-E' AESA (E-Scan) radar. Once testing is complete, Kuwait will be the first nation to be equipped with a Captor-E Radar, providing advance >>

WHAT AND WHERE?

FUSELAGE

- Caselle (Turin) and Venegono (Varese) – Leonardo's engineers in Caselle build the Typhoon's left wing and, with BAE Systems, are responsible for the design and manufacture of the aircraft's rear fuselage.
- The site is where all Italian Air Force Typhoons undergo final assembly, likewise for all 28 aircraft earmarked for Kuwait. The site's employees are also responsible for the design and integration of on board systems including those for weapons management and navigation and integrate the jet's propulsion system.
- In Venegono, Leonardo designs and produces sub-wing pylons, wing-fuselage fairings and titanium fairings. The site also helps deliver the Typhoon's Ground Support Equipment (GSE) including auxiliary power.

SENSORS

- Nerviano (near Milan), Caselle, Ronchi dei Legionari (near Trieste), Pomezia (near Rome), Genoa, L'Aquila, Montevarchi (near Arezzo), Luton (UK) and Edinburgh (UK) – Lead the delivery of the Typhoon's sensors and avionics.
- The company's Edinburgh site heads up the EuroRADAR consortium which provides the Typhoon's current Captor-M radar and will deliver the new Captor-E AESA radar.
- Meanwhile, Leonardo in Nerviano leads the EuroFIRST consortium, which provides the aircraft's PIRATE infrared search and track sensor.
- The company's facility in Luton leads EuroDASS, the consortium responsible for the Typhoon's Praetorian defensive aid suite.
- All these sites are part of Leonardo's Airborne and Space Systems division, which also produces the Typhoon's Identification Friend or Foe system (IFF) for friend/enemy identification; the MIDS Interface Unit (MIU); the Crash Survivable Memory Unit (CSMU); the Microwave Landing System/MultiMode Receiver (MLS/MMR) and the Distance Measuring Equipment-Precision (DME-P) navigation system.

COCKPIT INSTRUMENTS

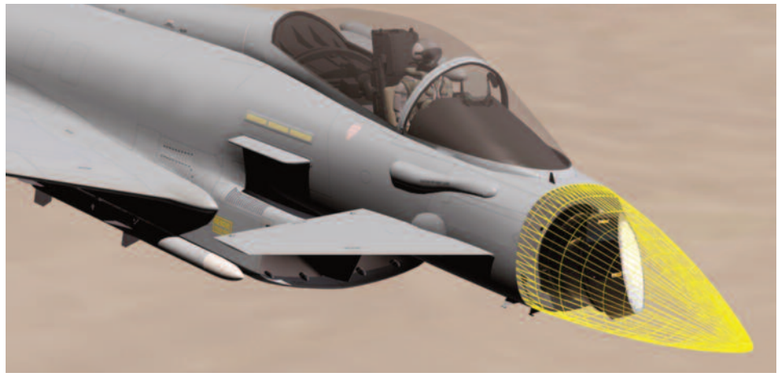
Montevarchi (near Arezzo) – Provides a majority of the Typhoon's cockpit instruments including control panels, multi-functional keypads and displays.

fighter radar capabilities with a full suite of digital Air-to-Air and Air-to-Surface modes.

Leonardo's Edinburgh site in the UK, which recently celebrated 60 years of history in radar design and manufacture dating back to the Second World War, is uniquely positioned to bring the Captor-E radar into service. One of the first companies in Europe to invest in AESA technology and the first to exploit AESA radar technology for surveillance purposes, Leonardo's Scotland-based engineers have worked with teams across Europe to design and develop the Captor-E radar.

It's a game-changing technology for Typhoon, as Andrew Cowdery explains: "The new radar underpins the current and future capability evolution of the Typhoon. With significantly more power than competing systems and the ability to move the radar antenna to provide a field of view of 200 degrees, pilots will see real benefits in both Air-to-Air and Air-to-Surface engagements."

Flight trials of the E-Scan radar began in June, following successful completion of ground tests on a UK Typhoon test aircraft. The path is now clear towards full integration



of the radar and Leonardo and its Euroradar partners say that they're on track to provide the new radar to Kuwait.

With all of the recent good news, Leonardo is optimistic about the future of the aircraft. "With a new member of the Eurofighter family in Kuwait, a new radar well underway and more nations expected to join soon, we're positive that the Typhoon will continue to be a success," concludes Cowdery. <<

“DARDO 03”

AN ITALIAN JOURNALIST DESCRIBES WHAT LIFE ABOARD THE EUROFIGHTER TYPHOON IS LIKE

by

DAVID CENCIOTTI

It’s January 28th, 2016, and I’m sitting in the briefing room of the IX Gruppo (9th Squadron) at Grosseto Air Base, home of the 4° Stormo (Wing), the most experienced Typhoon unit of the Aeronautica Militare (Italian Air Force). >>

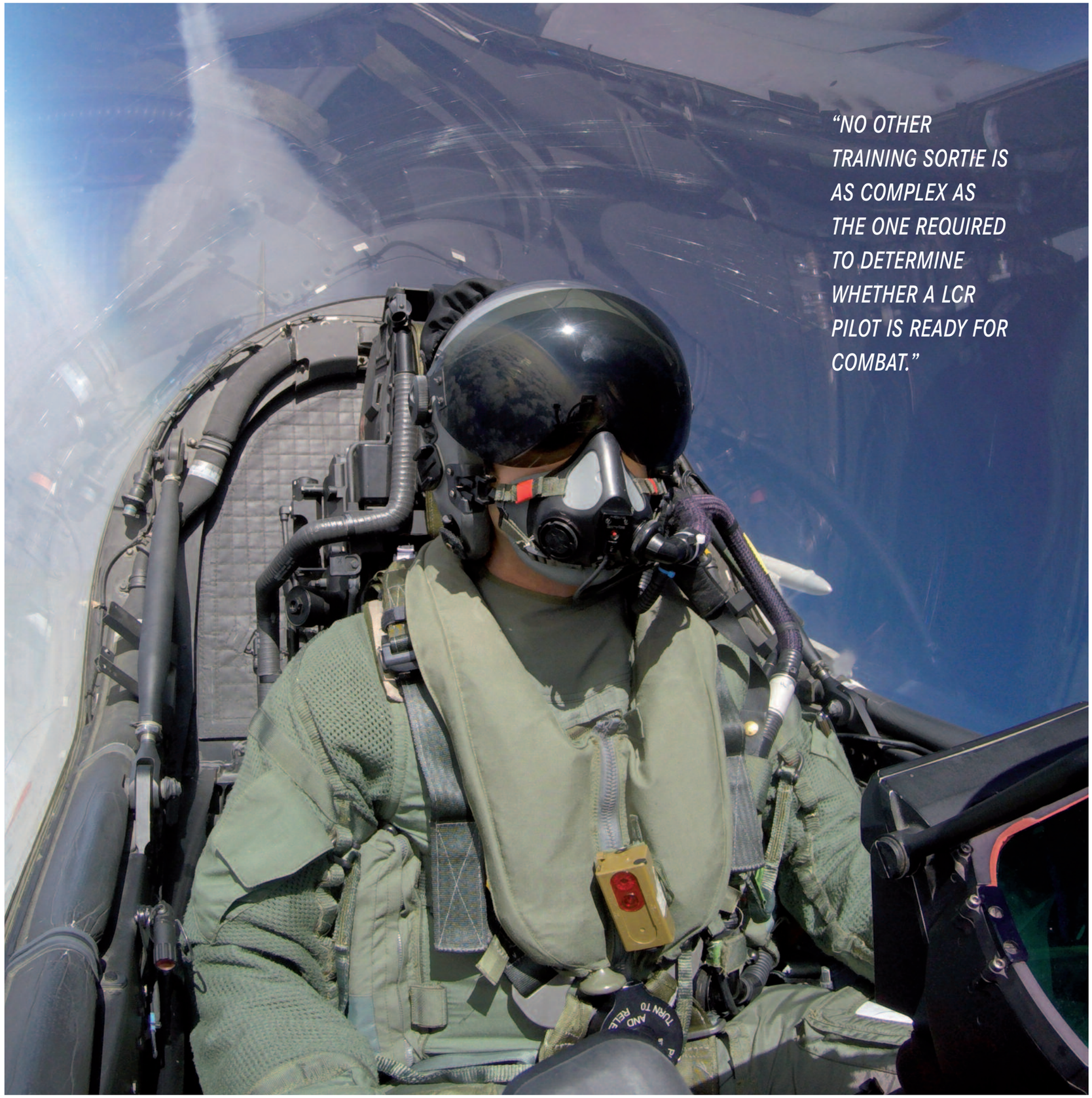
This is the ‘Dardo 02-03’ briefing, an air defence training mission. I am being given a unique opportunity to observe from a really privileged point of view: the backseat of the TF-2000A, as Italian two-seaters are designated. It is piloted by ‘Federico’, the 9th Gruppo Commander.

As if flying in one of the world’s most advanced combat planes isn’t enough, the mission that I will take part in is particularly crowded. Seven aircraft will be involved in a 4 vs 3 scenario; a set up that was planned as the final Full Combat Readiness check for two Limited Combat Readiness (LCR) pilots of the Squadron.

“This is going to be a complex mission!” says Federico. “No other training sortie is as complex as the one required to determine whether a LCR pilot is ready for combat. You will take part in the mission that represents the top of the training carried out at the Gruppo: it includes multiple real-life scenarios that require the two examinees to successfully conduct Beyond Visual Range (BVR) intercepts, visual identifications on the ‘bogeys’, as well as Within Visual Range (WVR) air combat against three Typhoons. We will be flying one of the latter ones, emulating the flying characteristics and tactics of the “super-maneuverable” Su-30 Flanker, whilst the two examinees, flying as wingmen (#2 and #4) to two experienced pilots within ‘Blue Air’, will have to engage us.”

The plan is thus: the ‘Red Air’ will depart first as a three-ship formation (‘Dardo 03’) and head towards D115, the designated training area located over the Tyrrhenian Sea, east of Sardinia, an area suitable for supersonic activities like this. The 4-ship ‘Blue Air’ will take off some minutes later and face up to the aggressors inside the area.

Moreover, whereas we will be wearing the standard Gentex ACS (Aircrew Combat System) lightweight, dual visor HGU-53/P derivative helmet, the “good guys” will have the opportunity to leverage the futuristic >>



“NO OTHER TRAINING SORTIE IS AS COMPLEX AS THE ONE REQUIRED TO DETERMINE WHETHER A LCR PILOT IS READY FOR COMBAT.”

>> DARDO 03

HMSS Mk2, the helmet that provides the essential flight and weapon aiming information through line of sight imagery: aircraft airspeed, altitude, weapons status, aiming and all the standard symbology projected on the visor (the HEA – Helmet Equipment Assembly), enabling the pilot to look out in any direction with all the required data always in his field of vision. Cool device.

The briefing, with the seven pilots of the IX Gruppo that will take part in the FCR exam, is long and detailed and covers the basic details of the flight – everything from weather, launch and recovery procedures, and emergencies, through to tactical call signs, radio channels, IFF codes.

But this is just part of the mission preparation: after completing the common part, the two teams split for the classified tactical briefing, during which the 'Red' and 'Blue Air' decide how to engage the adversaries.

Since I can't attend the classified briefing, I'll spend this time dressing like a real pilot. Besides the flight helmet, I'm given the EFA/ACS oxygen mask and the typical inflatable bladder system that acts on the nape and whose aim is to prevent the G-induced Loss of Consciousness (GLOC).

I also wear a survival jacket, the anti-g trousers and a "Tacconi" neoprene watertight suit, that will help me survive in the water until

▼ Italian Air Force Typhoons on a training sortie over Tuscany, Italy

▲ Two Italian Air Force Typhoons in close formation

a rescue chopper can recover me from the sea. Let's hope I won't need to test it today.

I'm ready. I jump into the bus that brings us to the apron where the Aggressors' Typhoons are parked. Minutes later I find myself strapped in. The mighty Typhoon that is taxiing towards the holding point of runway 21, followed by the other two F-2000A jets of the 'Red Air'.

"Dardo 03, Grosseto Tower, line up and wait". We enter the runway, align and quickly perform the engine checks. All is fine, this is a go! We will take off in sequence, with 10 seconds separation between us, then we will climb in RAT (Radar Assisted Trail).

"Tower, Dardo 03, ready for take-off," Federico radios from the front seat. The answer is prompt: "Dardo 03, Grosseto Tower, you are cleared for a high-performance take off, wind is calm."

Let's rock! The throttle goes to the stops igniting the afterburners. The Typhoon jumps ahead, rolling fast, really fast, in spite of the two drop tanks that we carry on the underwing pylons. In less than 10 seconds we are at 120 knots and rotate. We are airborne!

The landing gear comes in while the nose continues to go up until the pitch attitude is 50 degrees over the horizon. Wow. We are thundering towards the clouds with a target altitude of Flight Level (FL) 310 to be reached inside Grosseto CTR (Control Zone) in accordance with the assigned Standard Instrumental Departure (SID).

The rate of climb is impressive. We break the clouds and reach the blue skies. The view is stunning. Time to get accustomed to the Typhoon's glass cockpit. The TF-2000's backseat is quite large and comfortable.

I can easily move and look around. In front of me there is the wide-angle HUD (Head Up Display) with the typical green color over the whole screen. This is fed by a camera in the front cockpit: I get the video streaming of the forward HUD that provides me an unobstructed forward view.

Three full-colour multi-function head down displays (MHDDs), that can be arranged at will to show the system status, the nav menu, the weapons selection, as well as the moving map, occupy the front panel. We continue climbing in fighting wing formation until we reach the cruising altitude of FL360 that we maintain until entering D115, about 30 minutes after taking off from Grosseto.

We're now flying southbound towards the southern border of the area and, in the meantime, we perform the 'G check', an essential test to assess whether we are ready for the fight. A test of my own ability to cope.

Federico pushes the throttle forward and when we reach 480 knots of indicated air speed, we make a right 90-degree turn pulling 5 G, followed by a left 90-degree turn back, pulling another 5 G. It's now that the low-breathing resistance of the mask, along with the helmet's inflatable bladder, prove to be particularly useful: I survive the test meaning that I'm ready to start with the first BVR exercise.

We turn northbound to meet the 'Blue Air' that has just entered D115. Fight's on! As planned during the tactical briefing, the formation elements split: now we are spaced by several miles and fly at altitudes from 5,000 to 50,000 feet.

The friendly GCI controller provides continuous updates about the 'Blue Air' position, speed and altitude on the radio. The first exercise is fast and the two young examinees use the powerful Captor radar to shoot three simulated radar-guided missiles against us. Well done guys.

We move on to the second exercise. Once again we head towards the southern part of the area while the 'Blues' get the northern one. Once there is enough spacing between the two, we turn back again towards the 'furball'. We climb to FL460 and accelerate past Mach 1: a slight buffeting marks the transonic regime, then we go supersonic without any other kind of external feedback. Supercruising without reheat, we get to the merge with the enemies: during the subsequent WVR air combat the examinees can exploit the HMSS Mk2 to achieve a good kill on us in accordance with the Rules Of Engagement established for the mission.

Ok, we can prepare for the final exercise, during which we will start the engagement from low altitude, intruding the area of responsibility of the Combat Air Patrol stations of the "good guys" above us.

Following a preplanned route until the designated waypoint we 'pop up' from lower altitude as if we were climbing after launching from a QRA (Quick Reaction Alert) base.

The Typhoons patrolling the skies above us engage the threat and terminate the dogfighting. Mission accomplished. And it's time to head home.

We reach the apron of the 9th Gruppo after 1h 50 minutes of flight. I'm greeted by the ground personnel after my first flight in a Eurofighter Typhoon. What a memorable ride! Whilst the 4-ship 'Blue Air' arrives overhead with two newly qualified FCR pilots. Congratulations. <<

EUROFIGHTER SHINES AT AIRPOWER 16

Photo by: Hans Georg Schröder

The Eurofighter Typhoon was one of the star attractions for the 300,000 fans who flocked to the two-day AIRPOWER16, Austria's biggest Air Show. >>

▲ The Eurofighter Typhoon Zeltweg Team

▲ A German Air Force Eurofighter Typhoon with special liveries for its 60th Anniversary

▲ The Polish Orlik Aerobatic Team showing off their skills

The show took place at the Zeltweg Air Base – home of the nation's fleet of 15 Eurofighters.

In total AIRPOWER16 showcased 240 combat aircraft, transport aircraft, trainer aircraft and helicopters, from 20 nations.

Eurofighter Typhoons from the Austrian Air Force joined the flying displays throughout the two days and were among the stars of the show.

They were joined at Zeltweg by a Russian MiG-29, an American F-18, as well as the European Airbus A400M and a fantastic range of historic legacy aircraft – and they all attracted the attention of the general public and the aviation enthusiasts.

One of the real highlights of a AIRPOWER16 was a unique formation flight featuring all the jet aircraft which have ever been used by Austria's Armed Forces. This display comprised a De Havilland Vampire, a German Fouga Magister, a Swedish Saab J-29 Flying Ton and a Saab 35 Draken, a Swiss F-5 Tiger, a Saab 105 Ö and, of course, a Eurofighter Typhoon.

Organised by the Austrian Army (ÖBH), and supported by Red Bull and Styria, the show attracted more than 350 journalists from across the world.

There were also a number of high-level VIPs including Austria's Defence Minister Hans Peter Doskozil and his counterpart from Sweden Peter Hultqvist, as well as Austria's two Presidential candidates Alexander von der Bellen and Norbert Hofer. <<

Photos (top) by: Hans Georg Schröder
Photo by: Geoffrey Lee, Planefocus Ltd.


Eurofighter
Typhoon