EUROFIGHTER WORLD
PROGRAMME NEWS & FEATURES • JULY 2014

Farnborough INTERNATIONAL AIRSHOW
14-20 JULY 2014

- AESA AT FARNBOROUGH
- ANATOLIAN EAGLE
- A SHOW OF FORCE
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NEW CAPABILITIES
"THE PARADIGM SHIFT"

Eurofighter Typhoon

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Title:
Computer generated image of the Eurofighter Typhoon

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EDITORIAL

Welcome to a special Summer issue of Eurofighter WORLD. If you are reading this in the UK, the chances are you are at the Farnborough International Air Show and you may well be aware of some of the major news stories surrounding the Eurofighter Typhoon. If you are reading it online, or somewhere else – then this issue should help you get up to speed with our latest news and some of the major events that our shaping our Programme.

Before I go any further, let me highlight two short statements in our news section which relate to recent incidents involving Eurofighter aircraft in Spain and Germany. Very sadly both these rare and tragic incidents involved loss of life. I know I speak for the entire aviation community when I say our thoughts are with the relatives, friends and loved ones. For obvious reasons, at this moment I am unable to make any further comment other than that which is in the statements.

This year's Farnborough International Air Show comes at a pivotal moment for the Eurofighter Programme. Not only have we reached some significant milestones – but we also have a major capability story to tell.

Let's get our heads around some numbers first. At the Show, the UK RAF will be revealing that they have now accumulated 100,000 hours of flying with the Eurofighter Typhoon – an incredible achievement. If that's not enough, we will be revealing that we have now flown 250,000 flying hours over the whole Programme – and it follows, of course, that Eurojet, who provide the twin EJ200 engines for the Eurofighter, are celebrating 500,000 flying hours. It all adds up to quite a story.

With 410 aircraft already delivered and 571 on order across a base that now spans seven customers, the Eurofighter Typhoon is now without doubt, effective, proven and trusted.

And now we can add still more positive news to the story. By the time you read this the Farnborough International Air Show will have seen the first unveiling of a Captor-E AESA radar fully fitted into a Eurofighter Typhoon. This is a major development for the Programme. We are now well on the road to securing the necessary contract, together with all the appropriate agreements to move this capability through to deployment across our customer base as and when they want it.

Make no mistake, although M-Scan radar has proved hugely successful, and remains so, E-Scan adds a new set of capabilities and real competitive advantage. You'll find the full story inside these pages.

While the new radar will clearly have grabbed some headlines, the capability story continues to deliver in other areas too, and at both the recent ILA Berlin Airshow and at Farnborough we have been briefing stakeholders and the media on our recent P1EB capability upgrade which brings with it a 'Paradigm Shift' in capability. You can read all about this too in this issue.

I have no doubt that we can now offer a potent, highly flexible asset with a unique range of capabilities able to cater for a wide range of military requirements. We offer exceptional levels of support to our customers and we are in the best possible position to share the experience and knowledge we have when it comes to knowledge transfer and skills-development across our international supply base. It's a major advantage for customers wanting confidence in the capability we deliver.

Finally, before thanking all those who have contributed to this issue of Eurofighter WORLD, whether it is with accounts of recent exercises, or in simply just giving us an insight into the Programme, I would like to wish you all a safe and successful Summer.

Yours

Alberto Gutierrez
CEO Eurofighter

BRIMSTONE STUDY WORK UNDER WAY

Work is currently underway in the UK to evaluate the integration of the MBDA Brimstone 2 air-to-ground precision weapon with the Typhoon aircraft.

The aim of the study is to assess the aerodynamic properties of carrying the weapon through a series of wind tunnel tests.

Brimstone 2 will further add to the swing-role capability of the Typhoon aircraft as it's effective against the most challenging, high speed and manoeuvring targets over land and sea.

The initial study contract, valued at £5 million was awarded by the UK Ministry of Defence to BAE Systems.

"With a proven track record on RAF Tornados, the Brimstone 2 weapon offers uncompromising precision and a flexible capability that meets the emerging threats of modern warfare." says Mark Bowman, Chief Test Pilot for BAE Systems.

"The Typhoon pilot will be able to confidently engage a wide range of target types including fast moving vehicles. When integrated Brimstone 2 will be another significant development step for Typhoon, enhancing the aircraft's credentials and relevancy going forward."

Alongside delivering an effective route to Brimstone 2 integration for the UK Royal Air Force (RAF) by 2018, the study is also set to deliver wider benefits through the exploration of a common launcher approach which could also be used for other multiple weapons stores such as SPEAR 3.

As a low collateral, close air support weapon Brimstone is already combat proven in Afghanistan and Libya by the RAF. The study contract will transition the Dual Mode Brimstone capability that is combat proven on Tornado GR4 to Typhoon utilising the Brimstone 2 missile.

IN MEMORIAM

■ In June Eurofighter GmbH was made aware of the tragic fatal accident involving a Eurofighter of the Luftwaffe, and a Learjet aircraft which crashed in the area of Olsberg in Nordrhein-Westfalen, Germany.

Airbus Defence and Space confirmed that the Learjet was owned by GFD GmbH which is a wholly owned subsidiary of Airbus Defence and Space. At the time of going to press no further details could be confirmed.

Our thoughts are with those affected by this accident. Eurofighter and Airbus Defence and Space have pledged provide their full support to the investigation.

■ "It is with great regret that Eurofighter learned 9th June 2014, of the tragic loss of ***Capitán Fernando Lluna Carrascosa*** of the Spanish Air Force, when the Eurofighter Typhoon he was flying crashed close to the Moron Air Force Base in Spain shortly after 1400hrs Central European Time.

The full details behind this are still unknown and a full investigation will, of course, take place.

Our thoughts at this time are with the family and friends of the pilot and, on behalf of all of us in the Eurofighter Programme, I would like to offer our sincere condolences.

No further information is available at this time."

Alberto Gutierrez
CEO Eurofighter Jagdflugzeug GmbH

EUROFIGHTER, EURORADAR – AND THE UK RAF REACH MILESTONE NUMBERS

- **100,000 FLYING HOURS FOR UK RAF TYPHOON FLEET**
- **250,000 FLYING HOURS FOR THE EUROFIGHTER TYPHOON FLEET**
- **500,000 FLYING HOURS FOR THE EJ200 ENGINES**

The Eurofighter Typhoon Programme has achieved a series of notable milestones with the aircraft racking up 250,000 Flying Hours, resulting in 500,000 engine flying hours for the EJ200 engine across six Air Force fleets. At the same time, the United Kingdom's Royal Air Force has confirmed its Typhoon Fleet has now reached 100,000 Flying Hours.

The news was released on Tuesday 15th July at the Farnborough International Air Show a day after the UK RAF announced its Typhoon Milestone reached during this year's Air Display.

At Farnborough, Eurofighter passed on congratulations to its UK Customer on reaching the historic milestone in the life of the UK Fleet. The Programme has been proud to support the Royal Air Force every step of the way.

Overall the Eurofighter Programme has now accumulated 250,000 Flying Hours across the 410 aircraft which have been delivered to customers – a fantastic tribute to the suppliers and support services who have helped deliver unprecedented levels of reliability. Most notable, of course, is the reliability of the incredible EJ200 engines provided by Eurojet which have now accumulated over half a million hours of faultless operation.

Already in Germany the Flying Hours total for Eurofighter Typhoon has reached close to 52,000 Flying Hours and in Italy 52,000. In Spain the total is now almost 25,000 Flying Hours.

The Eurofighter Typhoon, powered by twin EJ200 engines, is currently in operation in the fleets of the Air Forces of Germany, the United Kingdom, Italy, Spain and Austria and the Kingdom of Saudi Arabia, all of whom have contributed to achieving this landmark figure.

The multi-role combat aircraft was introduced into service of the core programmes Air Forces in 2003 and is presently operated by 20 units across these six nations. With the addition of the Sultanate of Oman as the programme's third export customer this number is set to rise.

FLIGHT TESTS WITH **TAURUS MISSILE** STARTED

A key discriminator for the Eurofighter Typhoon over other platforms out there at the moment is the fact it can carry out air-to-air and air-to-surface strikes at the same time. In the future it will build on this ability with the introduction of new weaponry.

Evidence of this process was provided earlier this year when Airbus Defence and Space started a series of flight tests on Taurus stand-off precision missiles on the Instrumented Production Aircraft 7 (IPA7), operated by Eurofighter Project Pilot Chris Worning.

The first flight took place at Manching Military Air Systems Center in the north of Munich.

The intensive flight test programme included flutter tests, air data system large store interference assessment and aerodynamic data gathering.

The activities took place as part of the Storm Shadow integration programme. Concurrent testing of these two similar missiles optimises the Storm Shadow integration and facilitates the future airframe integration of Taurus.

Taurus KEPD 350 is a German/Swedish missile that is manufactured by Taurus Systems GmbH, a partnership between MBDA Germany and Saab Dynamics.

10TH **BIRTHDAY** FOR THE EUROFIGHTER TYPHOON IN THE **SPANISH AIR FORCE**

Ten years ago the Ala 11 of the Spanish Air Force received its most modern weapon system: The Eurofighter Typhoon!

It was the 27th of May 2004, when the first three Eurofighter Typhoons, assembled in the Construcciones Aeronáuticas (a subsidiary of the EADS-CASA) Plant in Getafe, landed at the Moron Air Base to start their service.

The beginning of the Eurofighter Typhoon Final Assembly Phase at Getafe was marked in July 2001 by EADS-CASA Military Aircraft, where production was expected to be up to seven Typhoon wings per month and 12 aircraft per year. EADS CASA is producing the right wing for the Eurofighter and assembling 87 aircraft for the Spanish Air Force.

To commemorate the anniversary, the unit organized an all day long event to which both civil and military personnel linked to the C.16 was invited, as well as people from the Eurofighter programme.

Activities included a photography exhibition, videos of the last 10 years and speeches from those responsible within Airbus Defence and Space, ITP, INDRA and the EF2000 Programme Office.

Colonel José María Juanas García thanked everybody for the support and said that he is keen for this collaboration to continue.

EUROFIGHTER TYPHOON **AMATEUR PHOTO COMPETITION** – STILL TIME TO ENTER

Amateur aviation photographers from around the world once again are enjoying the chance to get 'up close and personal' with the world's most advanced swing-role fast-jet fighter as part of a unique prize package for the winner of the Eurofighter Typhoon Amateur Photography Competition 2014.

The winner of the Competition will be offered a personal tour around the Eurofighter Typhoon by a leading Test Pilot. He or she will also be given an opportunity to see how the aircraft is made inside one of the four Final Assembly Facilities operated by the Eurofighter programme in Italy, Spain, Germany and the UK.

Last year's Competition attracted hundreds of entries with Dan Kemsley's dramatic image of a Eurofighter in extremis capturing the imagination of judges and securing him pride of place in the calendar which reaches a worldwide audience.

IT COULD BE YOUR TURN...

Eurofighter PR and Communications launched the quest to find Dan's successor as this year's winner. In Spring, the Competition is attracting a high level of interest with images of the Eurofighter Typhoon coming in from a worldwide collection of keen and skilled amateur photographers.

The Competition will run until 30th September 2014 and the winner will have their image featured in the 2015 Eurofighter calendar. Lead judge, and an acknowledged expert of Typhoon photography, will be Geoffrey Lee of Plane Focus. He says: "This is the perfect platform to prove that amateur photography can indeed be extraordinary." Geoffrey points to Dan's image, the front cover of the 2014 Eurofighter calendar as a stunning example of an atmospheric photograph.

This year's winner will be announced at the close of the Competition. The judging panel, which will include Dan, will meet at Eurofighter in Germany to choose the winning photograph.

The judging panel for the competition will be Geoffrey Lee from Plane Focus Ltd – Eurofighter's leading photographer; Andreas Westphal – Managing Director of images.art.design. Werbeagentur GmbH; the Team of PR & Communications from Eurofighter Jagdflugzeug GmbH and Dan Kemsley. Original images of the Eurofighter Typhoon will be accepted from any amateur photographer in accordance with the terms and conditions provided.

Please send all entries either via email to communications@eurofighter.com or in the post:

Eurofighter Jagdflugzeug GmbH
PR and Communications Department
Am Söldnermoos 17
85399 Hallbergmoos
Germany

TERMS AND CONDITIONS:

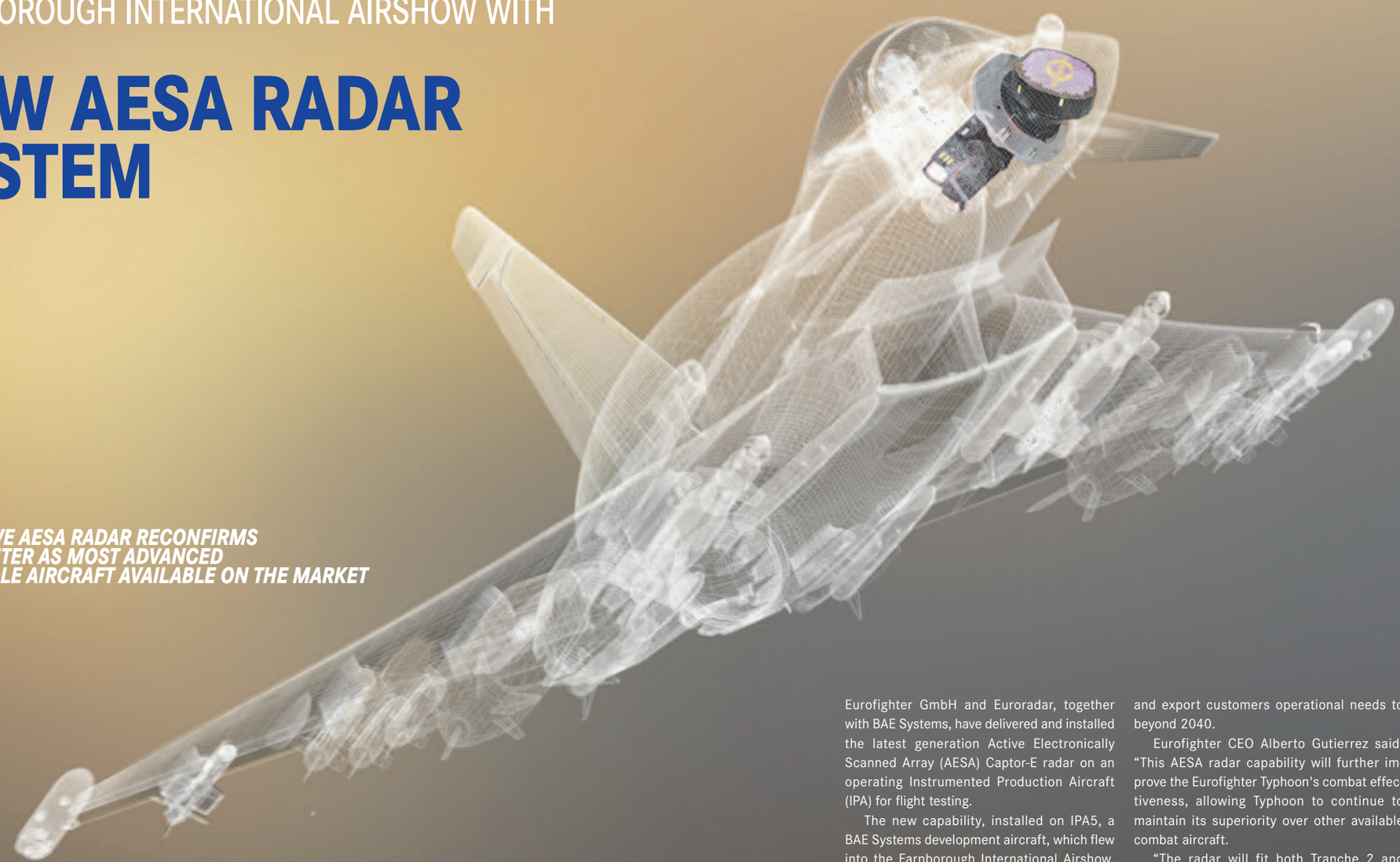
The 2014 Eurofighter Typhoon Amateur Photography Competition began in April 2014 and runs to the 30th September 2014. The winner must be an amateur photographer which by definition means: "A person who engages in photography as a pastime rather than as a profession". The picture must include or relate to the Eurofighter Typhoon aircraft. Employees of Eurofighter Jagdflugzeug GmbH are not eligible for this Competition.

The competition entry is limited to one photograph per person. The image size should be minimum DIN A3 (420mm x 297mm) and must be at a minimum 300dpi in quality. The competition entrants need to supply the original camera file (RAW, NEF etc.) for authenticity. No enhancement or digital enhancement as to the photograph is allowed.

The winner will receive a guided tour of the Eurofighter Typhoon from a Eurofighter pilot and have their image featured in the 2015 Eurofighter calendar. The winner will also receive a framed copy of their winning image, signed by a pilot, and be invited to sit on the 2015 judging panel. In addition, the top three photographs will be published in Eurofighter World magazine, on the www.eurofighter.com website and will all receive a 2015 calendar. The 'Panel's Choice' prize will again be awarded to the best young Eurofighter Typhoon photographer for entries from those under the age of 16.

EUROFIGHTER TYPHOON FLIES INTO FARNBOROUGH INTERNATIONAL AIRSHOW WITH

NEW AESA RADAR SYSTEM



INNOVATIVE AESA RADAR RECONFIRMS EUROFIGHTER AS MOST ADVANCED SWING-ROLE AIRCRAFT AVAILABLE ON THE MARKET

Eurofighter GmbH and Euroradar, together with BAE Systems, have delivered and installed the latest generation Active Electronically Scanned Array (AESA) Captor-E radar on an operating Instrumented Production Aircraft (IPA) for flight testing.

The new capability, installed on IPA5, a BAE Systems development aircraft, which flew into the Farnborough International Airshow, made history when it was showcased for the first time on a Eurofighter Typhoon in a special facility at the Show on Tuesday 15th July 2014.

This major development milestone underpins the commitment of the stakeholders to delivering a radar that will fully meet the requirements of the Eurofighter Partner Nations and export customers operational needs to beyond 2040.

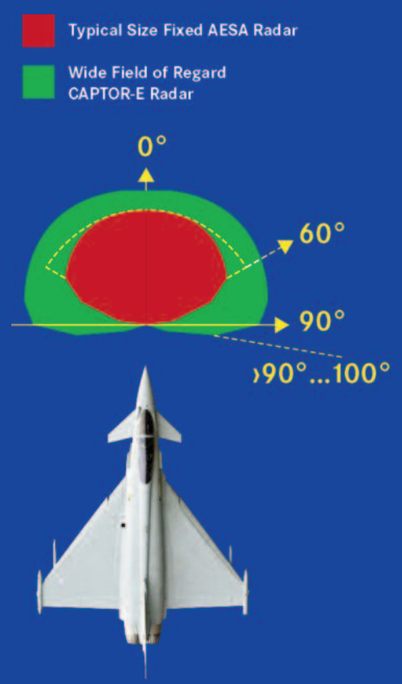
Eurofighter CEO Alberto Gutierrez said: “This AESA radar capability will further improve the Eurofighter Typhoon's combat effectiveness, allowing Typhoon to continue to maintain its superiority over other available combat aircraft.

“The radar will fit both Tranche 2 and Tranche 3 aircraft offering customers the freedom to retrofit their existing Eurofighter Typhoon aircraft when required. In terms of competitive advantage, there is no doubt at all that this is a major step forwards for us and it puts us in a very strong position with regard to existing and future opportunities.”

Although the current Mechanically Scanned (M-Scan) radar is considered to be best in class, indeed it outperforms many smaller AESA radars fitted in contemporary aircraft, the Captor-E will see the Typhoon's radar capabilities developed much further. This AESA radar will offer a variety of benefits over M-Scan, including increased detection and tracking ranges, advanced air-to-surface capability and enhanced electronic protection measures.

The new radar retains the key features of the existing Captor radar architecture in order to exploit the maturity of the current system and will use latest generation technology to concurrently execute a full complement of air-to-air and air-to-surface tasks. →

→ AESA RADAR SYSTEM



The Re-Positioner for Wide Field of Regard provides an advanced angular coverage combined with optimum range performance

The key discriminators of the Captor-E are the very large array size and the repositioner which gives an extremely Wide Field of Regard (WFoR). The 200 degree field of regard is significantly larger than typical 'fixed plate' AESA radars giving Typhoon a significant tactical advantage in air combat and greater situational awareness. The larger antenna allows a greater number of TRMs (transmitter receiver modules) thus greater power and reception leading to earlier target detection and greater utility across the EW spectrum.

"Put simply," said the Eurofighter CEO, "we have now bonded a sensor with an unique combination of power and field of view to the outstanding performance of the Typhoon platform. Couple all this with full swing role and multi-role capability and the flexible stores options available on the Eurofighter and it now becomes clear why the Eurofighter Typhoon has now reached a state of maturity which makes it a highly desirable aerial asset."

Both Eurofighter and Euroradar have confirmed that the radar has significant growth potential and both existing and new customers will be able to participate in tailoring the radar to meet their individual operational requirements.

Earlier this year the BAE Systems Instrumented Production Aircraft 5 (IPA5) was successfully flight-tested with a 'dummy' E-Scan fitted. The next stage of the process will be to put IPA5 through a series of test flights. In Germany a twin-seat Eurofighter Typhoon, IPA8, is also being used as a key part of the E-Scan development programme.

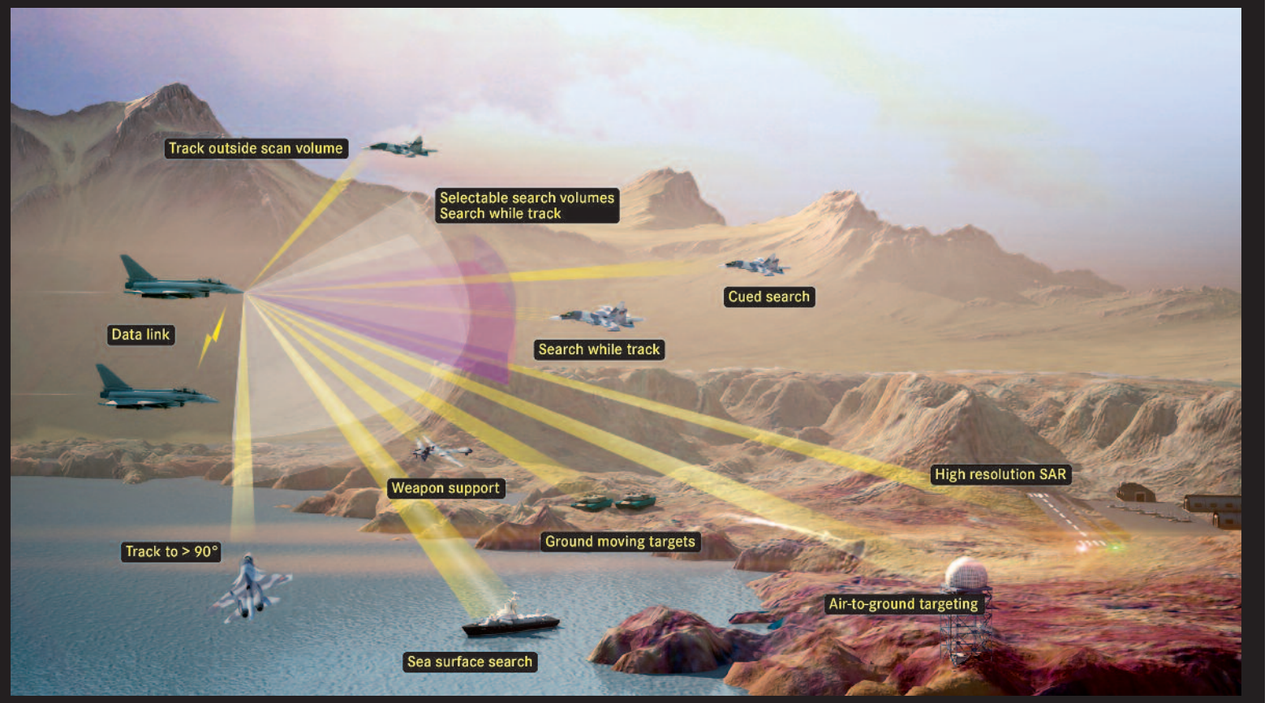
Euroradar is a multi-national consortium lead by SELEX ES, a Finmeccanica Company, alongside Airbus Defence & Space and Indra.

PRODUCT CAPABILITY

The Captor-E next generation AESA radar builds upon technology developed in the Technology Demonstrator Programme and for the M Scan radar, relying heavily on the existing 'back-end' processor and receiver with an optimised large array featuring the addition of an innovative re-positioner.

This extends the radar's field of regard to +/-100 degrees which is some 50% wider than traditional 'fixed plate' AESA radars.

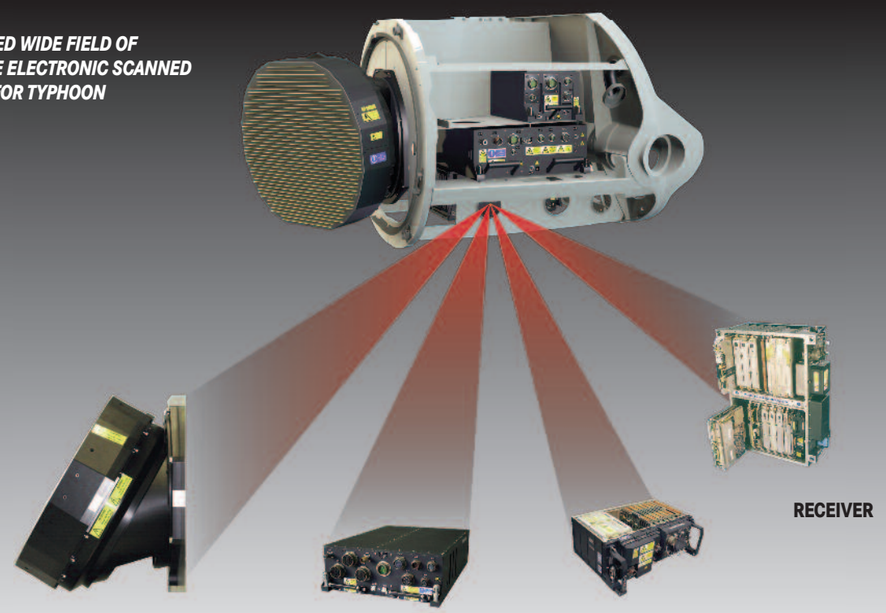
The very large Typhoon aircraft nose allows for a very high power aperture antenna coupled with a wide field of regard to offer unmatched performance in the export market place. →



Complex Airborne Threats Multimode E-Scan Operation

CAPTOR-E

MOST ADVANCED WIDE FIELD OF REGARD ACTIVE ELECTRONIC SCANNED ARRAY RADAR FOR TYPHOON



AESA ANTENNA AND RE-POSITIONER

ANTENNA POWER SUPPLY AND CONTROL UNIT

ADVANCED MODULAR PROCESSOR

RECEIVER

→ AESA RADAR SYSTEM

KEY 'ALL WEATHER' RADAR CAPABILITIES INCLUDE:

- Multimode A/A and A/G fire control and weapon support
- Increased air-to-air range
- Faster detection and tracking of multiple targets
- Improved tracking performance
- Simultaneous air-to-air and air-to-ground modes
- Extended missile guidance
- Increased operational performance and availability
- Reduced life cycle cost
- Ground Moving Target Indication (GMTI) search and track
- Sea surface search

The wide field of regard provides significant benefits in both air to air and air to ground engagements allowing the Typhoon to turn away from, but still engage, target aircraft and carry out high resolution Synthetic Aperture Radar (SAR) imaging whilst maintaining a safe distance from enemy forces.

FUTURE DEVELOPMENTS

The Captor-E AESA provides an extremely solid foundation for future growth over the lifetime of the Typhoon aircraft. This growth includes non-radar modes such as data linking and Electronic Support Measures (ESM). The Captor-E radar will be offered to the air forces of the existing customer countries as a retrofit option and also to future export customers.

CONCLUSION

The Captor-E wide field of regard AESA radar will be unmatched in the export market place.

This will provide further discriminating performance for the Eurofighter Typhoon, which is already the world's most advanced swing-role combat aircraft available on the market.

TECHNICAL DESIGN FEATURES

Available AESA Technology

- The Euroradar partner companies have over the years developed powerful AESA technologies and demonstrated during the European AMSAR project in several campaigns the design capabilities for Active Electronic Scanned Array radars.
- CAESAR – CAPTOR AESA Radar Euroradar funded demonstrator program 2002-2007 New AESA frontend with CAPTOR-M backend. Successful flight demonstrations on Eurofighter Typhoon in May 2007
- CECAR
  GE and UK MoD funded program, performed by Airbus Defence and Space and Selex ES to de-risk an E-Scan development based on early analysis of recorded E-Scan radar data.

Series Production of Transmit/Receive Modules

- European sources are the basis for powerful Gallium Arsenide technology and advanced highly reliable frontend designs
- Proven series production for space (TerraSAR), airborne (Vixen E), naval and ground (MEADS, BÜR) application in mass quantities

Multiple Radar Modes of Operation

- Simultaneous/interleaved A/A and A/G radar modes
- Air-to-Air search and track/search while track
- Air-to-Ground real beam ground map as well as high resolution modes for surveillance and reconnaissance
- Ground moving target indication search and track
- Sea surface search
- Pilot workload reduction by efficient radar resource management

Integration/ Installation Aspects

- Easy integration in Typhoon
- Highly reliable AESA antenna with graceful degradation
- Obsolescence robust design with low life cycle cost

Future Growth Potential

- Non Radar Modes like Data link, ESM and ECM support
- Multi channel adaptive beam forming including Space Time Adaptive Processing (STAP)
- Bistatic operation

THE FIRST ITALIAN BUILT EUROFIGHTER TRANCHE 3 TAKES TO THE SKIES

The first Eurofighter Tranche 3 assembled by Partner Company Alenia Aermacchi has successfully completed its first flight. The aircraft performed "very well", according to Alenia Aermacchi test pilot Mario Mutti. The multi-role jet flew for about an hour. “All flight controls were exercised with the systems and aircraft performing as expected”, said Captain Mutti.

The aircraft is the 64th Eurofighter for the Italian Air Force and embodies a number of under the skin changes that effectively allow a full exploration of the most advanced present and future capabilities of the platform and of its on-board systems and sensors.

Eurofighter Tranche 3 aircraft, with their 100s of modifications, changes and additions, represent a major achievement in the evolution of the world’s leading combat aircraft.

The Tranche 3 standard embodies a number of changes that effectively enhance the aircraft’s performance and which allow for future upgrades making it more attractive to current and potential export customers.

Under the Tranche 3A contract signed in 2009, a total of 112 aircraft have been ordered for the four European partner nations of Germany, Italy, Spain and the UK, with 21 aircraft bound for the Italian Air Force.

Alessandra Saroglia, Alenia Aermacchi Eurofighter programme manager, said: “The first Eurofighter Tranche 3 is a major stepping stone in our production programme. The aircraft embodies a number of changes with respect to previous production tranches making it even more operationally capable and also a series of provisions allowing it to take on additional capability in the future. For example, the Tranche 3 aircraft has been built with power, cooling and electronics to allow for the fitting of the new E-Scan radar.”

Alberto Gutierrez, Chief Executive Officer of Eurofighter, said: “The Eurofighter programme continues to build momentum while serving our customers’ air forces. Ours is a story of intelligent evolution built around listening to the needs of our customers and then delivering against those needs. Our Tranche 3 aircraft will be the most potent yet offering unmatched flexibility at a time when every asset has to prove that it can earn its place day in and day out.”

The first flight followed engine tests at Turin-Caselle and the aircraft will be delivered within the first half of this year.

IL CAPITANO
ILARIA RAGONA
ITALIAN AIR FORCE
INTERVIEW

Here Capitano Ilaria Ragona, who flies from the Grosseto Air Base in Tuscany explains her involvement with the Tactical Leadership Programme (TLP) and her motivation to fly the Eurofighter Typhoon...

What inspired your career choice?

Since I was a child I always loved flying, even though at the beginning I was just able to enjoy the view of small airplanes and sometimes military airplanes flying close to my house, back in my hometown. So when I grew up, I definitely wanted to become a military pilot, or at least try to.

Do you have a history of flying in the family?

No at all, and that's why at the beginning everybody around me was pretty surprised with my choice.

How challenging has it been to go through the training on the Eurofighter Typhoon?

Training on the Typhoon is always challenging for a pilot who just graduated from "pilot training", even though during the advanced training phase we fly modern jets avionics-wise which are able to deliver high level performances. Despite this, facing for the first time the advanced avionics of the Typhoon has been a big step ahead and its performances as well were beyond what a pilot might face during the training. The different missions that you fly are built in a way to force you to work out ways to maximize the use of both the avionics and the airplane as a flying platform per se. so it was definitely a big change.

What do you love most about operating the Eurofighter Typhoon?

I love the fact that it's a high performance jet able to provide a great thrust ratio within seconds and that its handling characteristics allow you to focus on the use of weapons and inboard systems while the avionics itself give you a great help in taking care of the basic flying.

TLP (Tactical Leadership Programme):

Can you explain what the TLP program is about?

TLP course challenges leadership skills of students both during the planning and the flying phases. This is obtained by having the pilots planning and then flying demanding operational scenarios, managing complex packages made up of many different types of assets in a truly multinational environment.

What is the output of the programme?

The output of the programme is a standardized mission planning, in order to facilitate the conduct of complex package operations. During the course we all sit and plan in the same room, something that in real life would be unlikely to happen, and this gives us the chance to bring something different to the process. You learn a common mission planning and management that will allow you to work in a standardized way even if you take off from different parts of the world.

What do you expect to find most challenging during TLP?

It's the integration of many different assets from many Countries. But the added value of TLP is right this: sharing knowledge, expertise and experience to better integrate assets in the sky.

What battlefield threats will be simulated?

To maximize platforms' capabilities and pilots' abilities, scenarios are based on Lessons Identified/Lessons Learned from real life operations, and than tailored on the assets participating to TLP.

What do you love most about operating Typhoon?

The TLP has been a really good scenario to test the capabilities of the platform, in an environment that it's rare to reproduce at home. The feedbacks were really good cause the systems were capable to provide a really good situational awareness to the pilot and to allow a really good proficiency in the role.

The thrust developed by the airplane was also able to allow the use of very high altitudes and speeds in order to maximize the weapon employment.

The combination of the two elements provided a really good and reliable platform with which to operate in the presented scenario.

What would you say to other women associated with fighter aircraft- what would you recommend?

What I say to everybody is to follow your dreams. I had the luck to make my dream become my daily work. This makes me feel satisfied, even though doing the job of your dreams doesn't mean that you don't have to sacrifice a lot to make it real.

Are there any advantages unique to women in the jet business?

Actually...not that I know of.

What is your message of encouragement?

As I said before try live your dream, whatever it might be.

What are your future goals considering your profession?

To continue training with my Squadron and improve my skills as a fighter pilot and an Air Force Officer so to live up to the challenges we face now and in the future.

STORM SHADOW FLIES ON EUROFIGHTER

A flight test campaign to clear the MBDA Storm Shadow cruise missile on the Eurofighter Typhoon which started in late November 2013 at the Alenia Aermacchi Flight Test Centre at Decimomannu Air Base, in Sardinia, Italy continues to deliver.

It began with flutter tests and an air-data system large store interference assessment, using Instrumented Production Aircraft 2 (IPA2) update to the Phase 1 Enhancement standard.

These flight tests are intended to assess the Storm Shadow in flight and to achieve clearance for full integration on the Eurofighter Typhoon.

The start of flight testing followed completion of ground tests of Storm Shadow and the Taurus System KEPD 350 cruise missile.

PRODUCTION AIRCRAFT 2 (IPA2) UPDATED TO THE PHASE 1 ENHANCEMENT STANDARD

Eurofighter's CEO ***Alberto Gutierrez*** explained: *"The successful start of the flight tests is good news for our programme. This is one of a number of enhancements that are coming on stream and there are many more to come.*

STORM SHADOW is a major step forward significantly increasing the air-to-ground capabilities of the Eurofighter TYPHOON."

This is a new addition to the Eurofighter Typhoon's potent simultaneous multi-/swing-role capabilities. Powered by a turbo-jet engine, with a range in excess of 250km, the STORM SHADOW missile weighs approximately 1.300kg and is just over 5m long. It will be available to operators when the Eurofighter TYPHOON Phase 2 Enhancements become operational.

STORM SHADOW will provide a significant leap in the Eurofighter TYPHOON's operational capabilities, enabling the platform to deploy multiple weapons at a very long range well clear of danger from air defences.

The STORM SHADOW, already in service with the Italian Air Force and RAF TORNADOs, is a conventionally armed, stealthy, long-range stand-off precision weapon designed to neutralise high value targets. The new weapons systems will add the capability to strike in day or night in all-weather conditions, well-defended infrastructure targets such as port facilities, control centres, bunkers, missile sites, airfields and bridges that would otherwise require several aircraft and missions.

STAYING AHEAD OF THE COMPETITION

The major capability enhancement package, unveiled at the 2014 ILA Berlin Air Show and re-enforced at the Farnborough International Air Show 2014 with the announcement of AESA capability, has secured the Eurofighter Typhoon's position as the most powerful and reliable swing-role combat aircraft on the planet.

Described as a 'paradigm shift in capability', the suite of new capabilities introduced by the Eurofighter Typhoon Phase 1 Enhancement Programme (P1E) have been developed on the back of operations in Libya, and will cement Typhoon's place as the most effective flying partner for allied aircraft.

But what exactly are these new enhancements? And why are they so important in the evolution of the Eurofighter programme?

Thanks to enhanced computing power, sophisticated software weapons system integration advancements, and improved Sensor Suites the Eurofighter can now make even more of its potency whether tasked with air-to-air work, air-to-ground or surface work - or a combination of both during a single mission.

The P1E enhancement package will enable a single pilot, in a single aircraft to simultaneously attack six different targets in one pass.

Former RAF Pilot Paul Smith, now a Capability Manager for Eurofighter, explains the significance of this new technology.

"The enhancements we are showing represent a paradigm shift in the capability of the Eurofighter Typhoon.

"The second element of the Phase 1 Enhancements package, known as 'P1Eb', takes Typhoon multi-role capability to a whole new level.

"This allows Typhoon to realise both its air-to-air and air-to-ground capability to full effect. It's a significant advancement for the Programme."

Drawing on lessons learned from the operations that took place in Libya, the new enhancements have been designed to significantly increase Typhoon's air-surface capabilities and completely revise the Human Machine interface for multirole operations.

Then add to this the fact that the Eurofighter is now capable of switching from air-to-air through to air-to-ground mode within seconds – and that weapons can be re-targeted in the air – and you begin to see the real potency of this world-leading weapons system.

"This package paves the way for the Eurofighter to deploy deep strike stand-off weapons that can target high value, highly protected surface targets," explains Paul.

"We are already deep into the integration and flight test of the Storm Shadow stand-off weapon. Storm Shadow has a proven combat record of penetrating the most highly defended target areas. The stealth is in the weapon; minimising the risk to pilot and aircraft.

"The underlying advantage of the Eurofighter Typhoon is that it is a hugely powerful and agile platform. Ally this significant kinetic advantage with the most advanced sensors, and the most potent weapons, and that delivers a combat advantage that really counts. This is why we are integrating the uniquely potent Meteor Beyond Visual Range Air-to-Air Missile (BVRAAM).

"The Meteor BVRAAM has a much higher average speed than legacy missiles and when combined with Eurofighter's kinetics, this delivers a 'no escape zone' greater than three times that of comparable weaponary." That's not all.

The P1Eb enhancement package also brings a suite of capability upgrades for the aircraft's Defensive Aids Sub System (DASS), and the latest interoperability updates for the fighter's Multifunction Information and Distribution Systems (MIDS), which together ensure the Eurofighter Typhoon remains the most effective aircraft in the skies.

→

THE EUROFIGHTER TYPHOON HAS JUST GOT EVEN BETTER

In June 2014 this Eurofighter Typhoon won the BEST PAINTED AIRCRAFT at the NATO Tigermeet 2014 at Schleswig, Germany where 12 nations participated and over 60 aircraft of different types worked together on an exercise in interoperability.

→ **STAYING AHEAD** OF THE COMPETITION

NEW ENHANCEMENTS DELIVER NEW CAPABILITY

STAND-OFF STEALTH

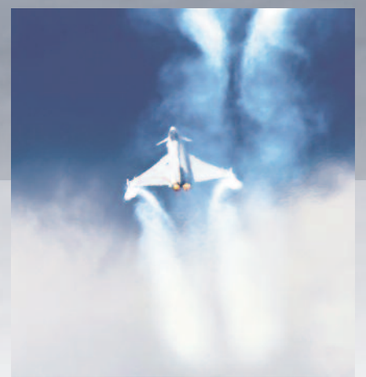
Get in there and try not to be seen. Or stand-off and fire something which is almost certain not to be seen. The two key approaches to the challenge of a stealthy presence in theatre. One puts your major asset at risk – the other doesn't. And 'standing off' means your major asset can be much more easily loaded with the capability it needs.

Eurofighter is now well advanced with the in-flight testing of both Taurus and Storm Shadow stand-off missiles. This capability turns the stealth debate on its head.

THE HIGHEST KINETIC EFFECT

High-kinetic effect, through massive performance capability has always been a trump card for the Eurofighter Typhoon. The next step in capability based upon the P1Eb package will realise that performance potential when it is further boosted through the ability to deploy the Meteor Beyond Visual Range Air-to-Air Missile. With a 'no escape' zone three times greater than an AMRAAM and a potential to reach speeds in excess of Mach 2 when launched from a Eurofighter, it makes this combat platform an essential asset for genuine reach and survivability.

Eurofighter Typhoon climbing fully loaded into the sky.



AIR-TO-AIR DOMINANCE

Already the supreme air-to-air combat fighter, P1E significantly enhances the air-to-air weapons capability of the Eurofighter Typhoon with a new digital interface dramatically increasing 'High Of-Boresight' aiming capability. The combination of the HMSS helmet system and the wide missile seeker field of regard greatly expands the engagement envelope within which air-to-air missiles can be effectively deployed giving real advantage in the battlepace.

Further benefits include:

- An enhanced Defensive Aids Sub System (DASS) including Electronic Support Measures (ESM) and Jamming Capability.
- The latest interoperability updates for the Multifunction Information and Distribution System (MIDS) ensuring that Eurofighter Typhoon is the most effective flying partner for allied aircraft. →

Meteor
Meteor will consolidate Eurofighter Typhoon's air dominance by utilising the airframe's high kinetic effect to ensure the optimum launch both in terms of speed and altitude. As a Beyond Visual Range Air-to-Air Missile with a Mach 2+ performance potential when launched from Eurofighter the missile greatly enlarges the 'no-escape zone' when compared with conventional MRAAMS.

ASRAAM
For shorter range requirements, the ASRAAM is the quickest off the mark at the greatest range ensuring first shot advantage and deploying technologies that make escape from its stare improbable.

IRIS-T
IRIS-T (infra-red imaging system - tail / thrust vector controlled) is an air-to-air guided missile. The missile's imaging infra-red (IR) seeker with high-target tracking rate and intelligent image processing generates high-resolution images. IRIS-T offers 360° degree defence capability and targets can be assigned by the airborne radar or the helmet mounted sight.
The IRIS-T is also equipped with a proximity fuse and a high-explosive fragmented war head delivering anti-missile capability against incoming missiles. The lock-on-after launch feature allows the engagement of targets in the rear hemisphere.

Eurofighter Typhoon - perfectly equipped for interdiction...

→ **STAYING AHEAD** OF THE COMPETITION

AIR-TO-GROUND/SURFACE DOMINANCE

The Phase 1 Enhancement Programme means much greater flexibility in 'mission planning'. Previously it would be 'one pass' – 'one target'. Now it is 'one pass' – 'up to six targets'. The genius comes in the flexibility around this new capability. Bombs can be released simultaneously or sequentially. And the Weapons System Software can continuously recalibrate the shape and size of the 'release basket' (the area during flight in which the bombs can be released and still hit their target) allowing the pilot to be sure that the optimum approach path for each weapon is maintained in-flight mid-mission.

Further benefits include:

- Compatibility with dual-mode GPS/Laser guided bombs
- Attack trajectory selection capability
- Enhanced Identification Friend or Foe System (IFF)
- Improved Human Machine Interface with video Datalink communication to ground-based Forward Air Control (FAC)

TAURUS & STORM SHADOW

Stand-off long range missiles perform best when launched from a platform with a high kinetic effect. Here, Eurofighter Typhoon is a class leader. Trials with Taurus and Storm Shadow have already proved Eurofighter is the perfect platform for deployments of this kind. It has the power, climb rate and the altitude performance to make the best of the missile capability. Stealth, in this case, comes through power and reach.

PAVEWAY IV

The Paveway IV is a precision-guided 500lb bomb with laser-guidance and GPS capability ensuring both accurate targeting and all-weather capability. It is just one of the dual-mode stores that Eurofighter Typhoon can now harmonise into a single multi-target mission using the new software capabilities provided through the P1E enhancement programme.

BRIMSTONE 2

A low-collateral damage air-to-ground precision guided weapon, Brimstone will benefit from the weapons software systems that drive the Eurofighter to ensure it gets optimum use for maximum effect.

E-SCAN RADAR

Theatre Dominance comes through reach, vision and performance. The large-area nose of the Eurofighter Typhoon means the performance of the E-Scan radar now being test-fitted into the aircraft will be unmatched. More than a thousand Transmit Receive Modules and an innovative re-positioner will offer an exceptionally wide field of regard. As well as extended detection and tracking range, the system offers simultaneous multi-functional performance capability, Data-Link capabilities, electronic attack and electronic support measures.

4x Paveway IV on an RAF Typhoon

A SHOW OF FORCE

UNKNOWN AIRCRAFT APPROACHED THE NATO AIR POLICING AREA NORTH OF SCOTLAND

On Wednesday, April 23rd 2014 two unknown aircraft approached the NATO air policing area north of Scotland. Immediately Typhoon jets were scrambled and dispatched from RAF Leuchars. They intercepted, flew within visual range and identified them as Russian Tu-95 'Bear H' aircraft. For the next few hours the Typhoon pilots kept a close watch on the Bears before they departed. An MOD spokesman said that similar incidents had happened eight times during 2013. This one was unusual in that it made headlines in the media – with both traditional press and social media getting excited by the activity, particularly as it came amid geo-political concerns over the future of the Ukraine.

TYPHOON FORCE COMMANDER

AIR COMMODORE **GARY WATERFALL**

INTERVIEW

However, for Typhoon Force Commander Air Commodore Gary Waterfall April 23rd was just another day at the office. "It's what we do to maintain UK Sovereign airspace," he says in a matter of fact way that's rather reassuring.

At the time of writing Waterfall was about to be promoted to Air Vice Marshal, Air Officer Commanding No 1 Group where he would be taking over the reins from Air Vice Marshal Stu Atha.

It's a position that will effectively put him in command of the war-fighting arm of the Royal Air Force and among No 1 Group's priorities "keeping everyone in the country safe, night and day, and keeping the security of the sky secure" comes pretty high on the list.

"The on-going situation in the Ukraine heightened awareness among both journalists and the general public of aircraft coming towards the UK but, in truth, it is nothing new. It is something we are prepared for every day and every night, throughout the year. The Royal Air Force is ready to defend our airspace and skies against any possible rogue threat that may come into the country."

With such a meaty job spec, you need a decent toolset. So the question to ask the Typhoon Force Commander is what he thinks of the hand he's been dealt and in this case what he thinks of Typhoon.

"Quite honestly, as the first person to command the Typhoon Force it has been a real honour," says the former Harrier pilot.

"My first real taste of Typhoon was in 2011 when I commanded the UK's air contribution to Operation Ellamy. What we achieved with Typhoon then was remarkable. We turned what was an air-to-air platform into an air-to-surface platform in just a few days. That in itself was nothing short of amazing but then to consistently deliver combat operations over Libya, without missing a heartbeat, was incredible.

"In 2012 the Typhoon Force was engaged in Operation Protego, keeping the skies safe over London so we could all enjoy the Olympic Games. A year later we found ourselves in Cyprus defending the sovereign base area against the escalation that was occurring in Syria. And today in 2014 Typhoon has gone to the Baltic to bolster the defence of the region for NATO, in response to events there."

It's clear then he's a huge fan of what the aircraft has achieved. But he also makes no secret of the fact that it's Typhoon's future that really excites him.

"I have considerable pride about what the aircraft has already achieved and the potential it has in the future. The Force is a decade old and it's doing some remarkable things but, at the same time, we are on a journey. The Tranche 1 Typhoon aircraft is the staple of what we are doing operationally and yet we already have Tranche 2 with P1EA, which means we are getting used to what multi role is going to look like.

And, in a few months, we are going to be flying with P1EB and that represents a step change in our capability.

P1EB is going to enable us to be precise during air-to-surface operations. Today we can be accurate - we can drop Paveway bombs and know they will hit a target, where we want to hit a target. That's what I mean by accurate.

But P1EB will bring in an era of precision. It enables the pilot to hit a target, how he needs to hit that target. The weapon will go to the right place within the target, at the right angle, with the fuse going off at the right place in order to deliver the 'precise' effect he needs."

Waterfall believes the next few years will continue to see further advances in Typhoon capability, continually improving what is already a world class aircraft.

"Of course we are cramming an awful lot of information onto the aircraft - the DASS, radar, sensors etc. The trick now is to fuse those sensors together to ensure the pilot is getting the right information to enable them to make decisions that could make the difference between life and death. So there is no way we can rest on our laurels. →

TRAINING AND THE APPLIANCE OF SCIENCE

One of the finest pilots of his generation, Gary Waterfall is a firm believer that synthetic devices will play an increasingly important part in training the men and women who follow in his footsteps.

"Over the last two years I have done a lot of work to really analyse the way we train," he says. "For many years we have known that our training regime is 'kind of' about right. I can give an aviator a number of flying hours each month and they will do a number of events and I know they will be good enough to contribute should I need them to. How do I know that? Well, because I have had a good gut feeling. But I have never balanced that instinct with science.

"Towards the end of the decade around half of our flying for Typhoon is going to have to be in synthetics and it's a similar picture with the F-35."

Waterfall has been working out what the RAF can and should do through live flying and what it can do synthetically.

"We have led a real change where it's not just a case of flying a number of hours because that feels about right but analysing exactly what we need to do, at what time, be it live or synthetic in order to deliver the requisite amount of training."

It's a change that's gaining acceptance among the men and women at the sharp end.

"Five years ago people would come out of the sim and say 'No thanks, it's rubbish, I'll just go flying.' We now have Typhoon pilots coming out of synthetic training devices saying 'This is the best training I could possibly get.' And that's true, for certain events. Of course synthetic training is never going to totally replace flying. You are always going to have to get into the aircraft to train but we need to ensure that when we do we are training for the right events. That means doing things you can't do in the simulator.

"The playground isn't big enough operationally. So the pilot can get more out of work in the sim where he has every tool that he would have operationally. He can do everything he would do as if it were in a war-fighting mission. In that respect he is far better placed than flying the aircraft. Of course he needs to be air aware, he needs airmanship and to be exposed to the rigours of 9G but he doesn't need to do some of that high end war-fighting in the skies."

Waterfall has been working closely with the team at BAE Systems to develop the thinking. He admits to having some of his assumptions challenged.

"I've been asked why we can't do certain things in the synthetic environment and these questions are right and proper. It's all about looking at better ways of working."

People assume that the drive for this search to find the right live-synthetic balance is all about money but Waterfall rejects that premise.

"We are going down this route not only because it may be more efficient and effective but because it is the right thing to do. We may also save some money but in some cases it's not necessarily cheaper because to get the right level of fidelity and the right training device it may actually be more expensive. However, if that device is able to give us better, more effective and efficient training than we ought be looking at using it."

There's a real step change in what synthetic devices can do.

"Simulators used to be the emergency trainers. We would fly them once or twice a month and carry out emergency procedures in them, so that if anything happened in the air we could deal with the problem. But we can now do far more than that. The capability upgrades we are putting onto the aircraft can now go onto the simulators at the same time. Indeed the company is now trying to get us a delivery actually in advance of the roll out of the new standard.

"Who knows where we can go with this but in time I would like to see us doing development work synthetically and getting to know the capability before we actually roll it out for real."

Our work is only just beginning to mature the platform in both the air-to-surface and air-to-air domain. By the end of the decade we should have Storm Shadow, Brimstone and we'll be looking at the dawning of E-Scan radar for Typhoon. I struggle to imagine Typhoon without an E-Scan radar. All of this is vital because right now we have Tornado carrying out the heavy lifting in the air-to-surface domain but we have just closed two squadrons and will close another in a year's time. So Typhoon has to step forward."

As that happens the RAF will be saying hello to the F-35, and making sure it can work seamlessly with Typhoon is high on the 'to do' list. That's one of the reasons why Typhoon has been going through its paces with the F-22 in recent years.

"We've been working with F-22 whenever we can because we want to learn as much as we can about working with 4th and 5th generation fighters together. The thing is when they work together, as we did with Tornado and Typhoon in Operation Ellamy, the sum is far greater than the individual component parts. In my view F-22 and Typhoon work extraordinarily well together.

"In Typhoon we have built one of the best fighters of the generation. We have some brilliant engines, it's highly reliable and amazingly compact. The airframe is an aeronautical gift. The aircraft can go very high and very fast and when you put that together with AMRAAM or Meteor then you have a really big stick, bigger than anyone else. It can go and poke people before it gets poked. At the same time the F-22 has great situational awareness and sensors. When you work that together with Typhoon, using its speed and height advantage, then you've got a formidable force."

It's a level of interoperability the RAF will be keen to achieve when F-35 is part of the force."

With almost three decades' service under his belt, Waterfall has been involved with BAE Systems for a number of years and has witnessed at close hand the relationship that has developed. He enjoyed a spell in charge of the 41 Squadron Operational Evaluation Unit at RAF Coningsby when it looked after Jaguar, Tornado, and Harrier, before going on to command Harrier Force. He selects his words with targeted precision when asked about how day to day workings between the company and the RAF have changed:

"Honestly, the day I walked into the job with Typhoon I did so with a little bit of nervousness about how the relationship might have matured.

Why nervousness?

"Well, from my time at Cottesmore I would say we were working together but we definitely had our differences. Certainly, I would never have described us as seamlessly delivering."

"However when I stepped into the Typhoon world I was delighted to find a seamless delivery of combat air from across the whole force, reservists, regulars and the company. The journey we have been on and the generational maturity we have now achieved is really quite remarkable. The company and the RAF are absolutely interlocked to ensure we are delivering the right amount of capability, to the right place, at the right time.

"We still look to get it even better and I recently looked at the contract we have this year and we are clearly looking to get the most efficient bang for our buck.

"But the message is clearly hitting home to everyone. At all of the forums I attend absolutely everybody is focussed on delivering capability. It is not about achieving Key Performance Indicators. It's not about achieving a bonus. It's not about achieving payment milestones. It is all about delivering capability. And that attitude and focus is just brilliant."

Heading up No 1 Group will mean Waterfall is the leader of more than 20,000 people and he describes it as a privilege while at the same time admitting to being a little daunted by the scale of the challenge and enormous level of responsibility at his doorstep.

"One of the reassuring things for me is the quality of people around me and that includes working with people in industry. I am sure that our work with BAE Systems will continue to go from strength to strength. I am fortunate to have had a background of working with the company and trusting the company. It takes a generation to build a bond and trust that we now enjoy. We couldn't have better foundations to build on and take this relationship further forward in the future. It is really healthy.

SPANISH AND BRITISH TYPHOONS ATTEND **EXERCISE ANATOLIAN EAGLE 2014-2**

BY DAVID CENCIOTTI

TWELVE EUROFIGHTER TYPHOONS BELONGING TO THE ROYAL AIR FORCE AND THE EJÉRCITO DEL AIRE (SPANISH AIR FORCE) TOOK PART IN THE INTERNATIONAL EDITION OF ANATOLIAN EAGLE, FROM JUNE 9 – 20 AT KONYA AIRBASE, TURKEY.

Held three times a year (with two national classes reserved for the Turkish Air Force units and one open to allied air forces) at Konya airbase, in the Central Anatolia Region of Turkey, Anatolian Eagle (AE) is a medium-scale air exercise inspired by the U.S. Red Flag and Maple Flag series, the aim of which is to train fighter pilots for the first few days of a modern conflict.

The first Anatolian Eagle exercise took place in 2001, in the wake of the participation in exercise "Deny Flight", "Deliberate Force" and Allied Force operations in the Balkans, during which the Turkish Air Force gained enough experience to be able to organize realistic war games, similar to those conducted in the airspace around Nellis Air Force Base, Nevada, to train its own squadrons as well as NATO and regional partners.

Attracting an increasing number of foreign air arms, AE has become a high-tech exercise that gives participating units the opportunity to assess their capabilities and readiness for war, to improve multinational cooperation, and to test new weapons systems: some extremely important tasks, especially for nations such as Turkey which face increasing instability, pressure and threats along their borders. →

The scenario, which increases in complexity and lethality through the two-week training, consists of two teams, Blue and Red. Blue forces are mainly tasked with Combined Air Operations (COMAOs) on tactical and strategic targets in Red lands, protected by air and ground assets, including Turkish F-16 aggressor aircraft and Surface to Air Missile (SAM) threats. NATO E-3A AWACS from the local Forward Operating Base and, for the first time, Turkish Air Force Boeing 737 AEW&C Peace Eagle aircraft, provided Airborne Early Warning support for the Blue team, delivering tactical information about air and ground assets by datalink. All missions, including air-to-air engagements, are monitored in real-time and recorded by Air Combat Manoeuvring Instrumentation (ACMI) sensors.

Along with Turkish assets, Anatolian Eagle 2014-2 featured combat aircraft from Jordan, Qatar, Spain and the UK; overall, approximately 80 aircraft of different types took part in the drills, including 12 Eurofighter Typhoons.

The Royal Air Force deployed six Typhoon FGR4s and a team consisting 13 pilots from 11 Squadron and 3(F) Squadron from RAF Coningsby, along with 117 ground support staff including engineers and communications specialists.

The 1,000 miles trip to Turkey gave the British Typhoons the opportunity to train jointly with the Turkish Air Force and international partners inside a large, segregated airspace measuring 200 x 150 Nautical Miles, most of which is available from ground to 50,000 feet - the ideal stage for simulated contingency operations.

RAF Typhoons flew swing-role missions, leveraging on the multi-role capabilities of the aircraft: carrying underwing RAIDS (Rangeless Airborne Instrumentation Debriefing System) pods to gather and transmit to ground station relevant flight data, the "Tiffies" flew high and fast to provide cover to the rest of the strike package during the ingress into the enemy airspace, dropped their simulated Precision Guided Munitions (PGMs) on targets designated with the centerline Litening III targeting pod, and escorted the package again during the egress and subsequent return to Konya.

Talking to the Royal Air Force website, newly appointed Typhoon Force Commander, Air Commodore Philip Beach, said: "The Typhoon Force is very much in demand, providing Quick Reaction Alert in the UK, the Falklands and in the Baltic region; it is on call 24/7 every day of the year. Typhoon is also a fundamental component of UK contingent operations and it is vital that we train with our NATO and international partners, in complex scenarios, to retain our competitive edge. This exercise provides the opportunity for us to further enhance interoperability with our allies and ensures that we maintain the highest levels of readiness for operations."

The Spanish Air Force brought a tactical air expeditionary group to Turkey made up of six Eurofighter Typhoon C.16 jets from Ala 14 based at Albacete for what was their first participation in an overseas multinational exercise, and six EF-18s from Ala 12, based at Torrejón. Along with the Hornets, two Typhoons deployed to Konya non-stop, taking fuel mid-air from an Italian Air Force Boeing KC-767A tanker; the remaining four C.16s made a stopover at the Italian Eurofighter base at Gioia del Colle.

The Spanish Typhoons were tasked with pure Fighter Sweep missions: their role was to conduct offensive counter air missions, destroying all the enemy aircraft within the area of responsibility and to clear the way for incoming attack planes. Depending on the length of the sortie, the aircraft flew with two or three drop tanks, an AIS (Airborne Instrumentation Sub-system) pod for the flight data downlink to the ground ACMI sensors, and a dummy IRIS-T air-to-air missile.

For the Ala 14 pilots, who were taking part in their first expeditionary experience with the Typhoon, their participation in Anatolian Eagle was an important opportunity to validate and enhance their reference tactics, share knowledge and improve cooperation with personnel from different nations, and fly the Eurofighter in a challenging scenario, with up to 60 aircraft flying at the same time, in a large, almost unrestricted airspace.

EUROFIGHTER TYPHOON - 20 YEARS STRONG

Europe's biggest defence programme marked a 20 year anniversary this year as it celebrates the first flight of the Eurofighter Typhoon.

Since that day in the Spring on 27th march 1994 in Manching, Germany, when Development Aircraft 1 (DA1) was flown by Test Pilot ***Peter Weger***, over 410 Eurofighter Typhoons have been delivered with six international customers operating the aircraft and a seventh signed up.

The milestone was marked at Eurofighter's main European offices close to Munich where Test Pilots from all the four nations that make up the Eurofighter programme came together to re-live the maiden flights made in Germany, the UK, Italy and Spain. They were joined by the General Manager of NETMA, Air Vice-Marshal Graham Farnell, the Chief Executive Officer of Eurofighter, Alberto Gutierrez, Board Members of both organisations and Eurofighter employees.

Alberto Gutierrez, said: We have built up a fantastic legacy in this aircraft and established the foundation of today's defence industry in Europe through unprecedented co-operation and a determined focus to build and deliver a world-class product.

"Twenty years ago, none of us could know how the world would change and few, if any of us, could have anticipated the challenges that this would bring. Now more than ever it is vital that we maintain and develop our European capabilities both in the commercial and military domains. It is in all our interests to do this."

The Spanish-born CEO added: "The Eurofighter Typhoon that Peter Weger first flew 20 years ago is very different to the one that flies today. From the outset, the aircraft was built with capability enhancement in mind and the process of enhancement is what delivers a long-term return on investment. The Eurofighter is now the backbone of a number of air forces and will be in service for decades to come. It is a significant European asset and one which showcases to the world the very best in technology and innovation."

NETMA's General Manager, Graham Farnell said: "The dream of our predecessors, some 30 years ago, of a world-class European Fighter Aircraft, became a reality on 27th March 1994. This success could not have been reached without a huge amount of hard work and dedication from so many people in so many organisations across Europe."

"The aircraft they built is now fully operational in the air forces of Germany, Spain, Italy, the United Kingdom and with our partners in Austria and the Kingdom of Saudi Arabia. Soon it will also be delivered to Oman. It is defending skies and providing a 24/7 watch over Europe, the Middle East – and around the Antarctic region. The challenges we face today are no less demanding than those which our predecessors had when they set out to develop this aircraft. We now need to show the same resolve, determination and vision that they had."

While it was DA1 that first flew in Germany in 1994, it was the British who next took to the air with DA2 a few days later on 6th April. Italy followed in June 1995 and Spain in August 1996. Today, Eurofighter Typhoon aircraft are built at Final Assembly Plants in all four countries.

In total more than 225,000 flying hours have been accumulated with unprecedented levels of reliability. The aircraft has also seen active service in Libya, has been used on Baltic patrol exercises and has recently been showcased at one of the world's leading air-to-air combat training events, Red Flag, at Nellis Air Force Base in Nevada.

Peter Weger, who flew that first flight said: "I had little idea when I made that maiden flight from Manching what an amazing story this would become. I knew I was piloting an incredible aircraft and we had something special. It is certainly one of those days that lives with you for the rest of your life."

TRANCHE 2 EUROFIGHTERS DEBUT ON 'RED FLAG'

BY JAMIE HUNTER

The Royal Air Force enjoys a strong bond with the US military. The 'special relationship' goes back many decades, and has reaped huge benefits on either side of the Atlantic for both nations.

Intrinsically linked to the bond between British and American combat air forces is the ability to train together, the ability to share thinking and ethos, and ultimately to go into battle together. For the RAF, the ability to train at the top end of the spectrum, to provide the litmus test for its existing and emerging capabilities has proved invaluable.

Exercise 'Red Flag' at Nellis AFB is famous throughout the world and is regarded by the world's top air forces as the ultimate test for its combat air assets. In fact, many would argue that aircraft and operators are tested harder here than they would be in actual combat. It epitomises the toughest air environment in which pilots can test their skills, as well as rubberstamp the capabilities of their mounts.

For a relative outsider to come to Nellis, to stand alongside the USAF's undisputed heavyweight champ' the F-22 Raptor, not to mention B-2s, F-16CJs, EA-18G Prowlers and F-15E Strike Eagles, is a daunting prospect. However, for the RAF, today it is a reality for its Eurofighter Typhoons. Not only does the US military invite the Typhoons to participate, it actively nurtures common tactics and training and seeks to cultivate joint operations – the USAF wants its Raptor pilots to fly alongside British Typhoon pilots.

The appearance of RAF Eurofighters at this year's first 'Red Flag' exercise in February may not have come as a noteworthy event for some observers. The coverage of the type's debut at Nellis for the March 2013 event drew huge coverage and universal praise. However, this year it was different. It marked the first 'blooding' of the all-new Tranche 2 standard aircraft. Led by No 6 Squadron from RAF Leuchars, pilots, Tranche 2 standard aircraft plus support teams from both this and sister unit No 1(F) Squadron, played a major role in this exercise from 27 January to 14 February. Building on the successful 'Red Flag' participation last year by No XI Squadron and its swing-role Tranche 1 jets, this year the Tranche 2 jets pushed the boundaries further, operating purely in the air-to-air role but as part of their proving ground and progress to becoming the RAF's main 'warfighting' aircraft.

As the year progresses the Tranche 2 jets of the Leuchars Wing will progressively work up with the multi-role P1E upgrade, which broadly involves the addition of capability with the Litening III targeting pod and versatile Paveway IV Precision-Guided Bomb. The wing will also relocate to RAF Lossiemouth during this year, with the aim of returning to Nellis in early 2015 for a full exercise with multi-role Tranche 2 capability.

The RAF is already looking ahead and is keen to build on this core standard of aircraft, with a clear growth path for these and the forthcoming Tranche 3 aircraft.

LEADING FROM THE FRONT

Wg Cdr Mike Baulkwill, is Officer Commanding No 6 Squadron. 'It's been great for us exercising the Tranche 2 Typhoons for the first time on 'Red Flag'. The jet has performed really well, as we'd expected, and the two months of training that we did before Christmas has paid huge dividends. The engineers have seen that producing aircraft at a high tempo has been hard work but very rewarding, and the pilots from Flt Lt to Wg Cdr have all learned a lot.' Wg Cdr Baulkwill continued: 'All aspects of the aircraft; from secure radios to our Link-16 have been great – and we have been able to explore the full capabilities of the jet. Our HEA (Helmet Equipment Assembly) has made a massive difference! When you lock a target with the radar and then need to find it visually you just look out of the cockpit and there it is – the HEA allows you to get your eyes on it very quickly. So you're seeing aircraft at twice the range you would normally. This really helps with the intercept, because you can set yourself up, put yourself in a better position to complete the intercept.'

Looking ahead, Wg Cdr Baulkwill was clear of the capabilities that are coming online, especially with multi-role. 'All of our work here at 'Red Flag' will translate across to P1E. Most of the guys on the squadron are already multi-role combat ready, they've flown the Tranche 1 jets and we've all dropped bombs. The big difference we will see with P1EA will be the introduction of the Paveway IV precision-guided bomb and slightly different modes for the targeting pod. Paveway IV allows us to do so much more with the weapon, and next year we will return here as a multi-role Tranche 2 standard squadron, so this exercise has served us well as an important stepping stone towards that.'

It is no secret that the RAF has seen a dramatic reduction in its fast jet force over the last decade. Therefore it is vital that the aircraft that it retains are absolutely of the highest standard available. Reflecting on the RAF's need to maximize what it has on hand, Wg Cdr Baulkwill commented: 'The force is beginning to exercise on 'Red Flag', and will continue to do so, and this is exactly what Typhoon needs. We have been flying out here with the Raptors to jointly 'clear up' the air picture, and our power and thrust, our ability to work at height – which other aircraft other than the Raptor can't – pays big dividends for us. This is about developing our relationship [with the Raptors], we have taken the great work that was done here last year and added to it. In the visual are-

nas, for example, we have clearly seen the benefit of the ASRAAM missile working in concert with the HEA – which gives us a dramatic increase in capability.'

Wg Cdr Baulkwill's right-hand man is squadron XO (Exec) Sqn Ldr Sam Cowan. Cowan is an experienced fighter pilot, having spent his early RAF years patrolling the UK's northern approaches in the Tornado F3. For him, the 'Red Flag' experience has etched some valuable lessons.

'We are becoming more practiced at working with fifth-generation platforms, ensuring we are using these and our Typhoons to their strengths (the lessons will prove invaluable to the RAF as the future F-35B comes online later this decade). 'Red Flag' is carefully managed to minimize risk, and fighters usually remain in specific airspace height blocks. But sometimes, if the fight is getting really aggressive, and the safety parameters can be adhered to, the aggressors will drop into their opponents' block for the proverbial knife fight in a telephone box.

Sqn Ldr Cowan was involved in one such engagement. 'I was involved in a merge, the likes of which I have never seen before. I was on a high-risk mindset and I literally had to do all I could to save our bombers. It was a sprawling fight with about 20 aircraft within five miles of each other all trying to kill each other. Some came out alive and were quite surprised, others didn't do so well...'

'The vast array of information we get in the cockpit can take a while to process. You're being looked at by SAMs (Surface to Air Missiles), as well as air-to-air missiles, there's jamming and you're always scanning the DASS (defensive aids sub-system). I hadn't used the HEA a whole lot before this exercise and the benefit for SA (situational awareness) is fantastic. If you have a 'Red Air' aggressor at long range you can select it with the radar, and if it's not in your HUD field-of-view, you can simply look at it and see a square or triangle where it is. The HEA also gives us other data such as our missiles that are remaining

The RAF, as well as the Royal Australian Air Force, was seamlessly linked into the exercise, with Typhoon pilots performing some of the most challenging roles afforded by the exercise. Sqn Ldr Cowan explained: 'We've had two overall mission commander slots and I've acted as escort package commander twice during this three-week exercise. We've got some very young and very capable pilots out here at Nellis. The Tranche 2 Eurofighter Typhoon is coming into its own and has proven itself as a fighter, and will similarly prove itself as a bomber as we advance into the multi-role regime.'

PROOF IS IN THE PLANNING

Of course, getting these eight aircraft and all of the infrastructure and personnel out to Nevada from Scotland takes quite some planning. Flt Lt Si Revell is the operations officer on No 1(F) Squadron, and was heavily involved in both the build-up and the execution of this year's event.

'Back home it's my job to ensure there are no stumbling blocks in requirements, I need to ensure that everything on the horizon is included in the flying programme, that may involve dealing with CAS (Close Air Support) training, affiliation training with other fighter agencies, and other events that are coming up. On Typhoon, everything is computerized, so the engineers know what they're doing.

However, coming here things are very different. For a start it is down to me to ensure that everything is in place, so the pilots don't have to worry about local procedures, etc, they just get on with planning their missions. 'Here at Nellis, if you're not a home unit you can't use the ranges, so we have to be sponsored. In this case, we're sponsored by 'Red Flag', and we fly in two block windows every day.

Flying two waves of six jets twice a day usually takes its toll on fighter squadrons. For the RAF Eurofighters, it was an interesting story. 'We have done well with serviceability,' Revell commented. 'As the exercise has gone on, serviceability has actually got better. In this, week three, of the exercise, we've not dropped a single sortie.'

As is usual with an exercise of this magnitude, the aircraft on the line each day are of the highest standard available. 'The aircraft we bought out here feature the latest enhancements to the DASS, the radar, the mission data, and they are Tranche 2 Drop 1 standard, which has effectively bought these aircraft up to the same broad standard as the current Tranche 1 jets. When we marry all of this up with P1E we will see the Tranche 2 Typhoons becoming the RAF's main warfighters.'

A YOUNG MAN'S GAME

The RAF has always been keen to expose its most junior fighter pilots to the rigours of exercises such as 'Red Flag'. Flt Lt Scott Holliday-Stevens is a 25-year old pilot on No 6 Squadron, and by all accounts, the pressures of flying his precious Eurofighter Typhoon over the skies of Nevada were taken very much in his stride.

'I always had a fascination with aircraft and I joined the Air Cadets when I was 13 years old. I was keen to build up an 'RAF CV' because I'd always wanted to join the RAF as a career. I did quite a bit of AEF (Air Experience Flight) flying and I was a staff cadet on 9 AEF at Church Fenton, which was fantastic for me as I got to work with some really talented pilots who'd flown a multitude of aircraft types – I was like a sponge soaking up wise words and experience. After earning a Flying Scholarship, Scott joined the RAF as a direct entrant. 'I finished my studies in June, had a month and a half off to get ready for joining the RAF, packed my bags and headed off to Cranwell.' Following early flight training, he was streamed to go on to fast jets. 'I went to Linton-on-Ouse and did the year-long basic fast jet training course, and then went straight to Valley for fast jet training on the Hawk.'

'I really fancied the Typhoon as it sounded fantastic – and at the end of the tactical weapons phase I found out that was exactly where I was going, which was amazing news.'

Scott completed the Typhoon Operational Conversion Unit in 2012 and we posted straight to No 6 Squadron. 'I was on the OCU and age 23, and here I am now at 'Red Flag' aged 25. Some of my colleagues have gone straight from the simulator to first solo in the Typhoon. However, my course made use of the simulators to augment the live flying. I can see how this will develop though, as the sim' is so lifelike and so effective.

'However, with the Typhoon, because of the performance, it can cause such physical effects, the g-force and acceleration is unlikely to be replicated in the simulator. The sim' is great for systems and tactical training, and I think it will ultimately be developed to always try to achieve more, it is a perfect controlled environment in which to make your mistakes.'

Like his compatriots at No 6 Squadron, Flt Lt Holliday-Stevens was well prepared for 'Red Flag'. 'On the squadron we are typically flying around a healthy 20 hours per month. We are totally engaged with a full range of training in both the air-to-air and air-to-ground roles, and I have already dropped a Paveway II laser-guided bomb off a Tranche 2 jet. We are taking a balanced approach to our multi-role aspirations.'

'The first thing that struck me at 'Red Flag' was the sheer scale of the thing. When you see 150 fast jets lined up on the huge piece of tarmac in Nevada it's almost overwhelming. Then off the back of that you go into your first mission brief and realize there's a 40v40 air battle about to happen – with everyone ready to have a monumental scrap in this piece of airspace – that's amazing. The level and realism of training you get out here is second to none. It is something I've never seen in terms of the intensity, with the aggressor threat in the air and on the ground, a full contested degraded environment to conduct operations in.

Safety is however paramount, and the minute-one plan is to play it safe. Looking at the radar and seeing a mix of F-15 and F-16 aggressors flying at me at 30 miles, and then when you look out of the cockpit with the HEA on, if you've got them radar locked you can see where they all are, you can use that fusion of the helmet and the radar to get a good look at where they are going to be in the sky. On that particular day, 4-5 of those contacts were high, so they were contrailing, so I used the radar and helmet together and I could see them easily. As soon as we have them on radar we can effectively target them.

'There's an RAF E-3D AWACS out here that is also giving us the air picture; how many aircraft we are facing, what formations they're in, distances, relative threats, etc. On one particular trip when I was flying with the XO, we achieved 9 kills between us! I got five of them, and they were all BVR (Beyond Visual Range) kills, albeit that some of them were really close in!'

ASRAAM heat-seeking missile

EJ200s – steadfastly delivering 40,000lb thrust

A pilot completes his pre-mission walkaround

The range pod enables realtime "kill" assessment

Eurofighter Typhoon