

**Eurofighter**

# REVIEW

- **NETMA: Managing the Programme**
- **Production Exchange Workshops**
- **Air-to-Ground Weapon Release**

A review of ILA 2006

## **Eurofighter Typhoon in Berlin**



**Eurofighter  
Typhoon**

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May 2006:  
A Royal Air Force Eurofighter Typhoon from 29 (F) Squadron, on a training sortie over East Anglia, UK. 29 (F) Sqn are based at RAF Coningsby.



## 06

The Airshow calendar began in Berlin



## 16

Improved vision for Eurofighter Typhoon

**Eurofighter Review is published by**  
Eurofighter GmbH, PR & Communications  
Am Söldnermoos 17, 85399 Hallbergmoos  
Tel: +49 (0) 811-80 1587

**Editorial representative**  
Wolfdietrich Hoeveler  
VP PR & Communications

**Editor**  
Phillip Lee

**Photography**  
Eurofighter GmbH, Eurofighter Partner Companies,  
Geoffrey Lee, Planefocus

**Design & Production**  
images.art.design.  
Andreas Westphal  
www.iad-design.de

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

**Eurofighter Review on the Internet**  
www.eurofighter.com

If you would like to request additional copies of Eurofighter Review, please contact the PR & Communications Department at Eurofighter GmbH



IPA1 has begun flight testing with Phase 5 FCS

## First Flight Success

### Phase 5 Flight Control Software Airborne

Representing the next step towards swing-role capability, Instrumented Production Aircraft One (IPA1) took off from BAE Systems Warton loaded with Phase 5 Flight Control Software (FCS). This inaugural flight, on 24 May, marks the first time that Eurofighter Typhoon has flown carrying a software package dedicated to handling an air-to-surface payload.

The aircraft was fitted with six Paveway II weapons, with pilot Will Jonas commenting that the aircraft "handled beautifully!"

The Phase 5 FCS represents the Final Operational Clearance standard of the aircraft control laws and will enter into service in 2007. The new software introduces, for the first time in a production standard software package, the ability to fly all air-to-air and air-to-ground store configurations to essentially the full flight envelope, and allows the aircraft's full 'swing role' capabilities to be explored.

Whilst air-to-ground stores have been flown with earlier standards of control laws, they were limited either in terms of flight envelope or store carriage capabilities, as

these earlier software standards were designed specifically to allow rapid turn around from start of design to end of flight testing, and to allow specific risk reduction activities to be performed. Phase 5 FCS however, builds upon that earlier experience and adds considerable additional capabilities. In particular, it allows two major areas of development flight testing to be progressed with air-to-ground stores fitted, namely stores release and jettison, and carefree handling. Both of these sets of trials will begin shortly as the pace of Phase 5 flight testing picks up.

Although the major capability increase introduced with Phase 5 FCS relates to air-to-ground stores, air-to-air aspects will also be improved. Air-to-air configurations have already been extensively tested, fully proven, and cleared for carefree service use, but Phase 5 software will build upon that and see further increases in air-to-air agility.

**Aloysius Rauen**  
CEO Eurofighter GmbH



Dear Reader,

The first half of 2006 is now behind us and it has already been quite a year.

The testing of air-to-ground capabilities is moving at a tremendous rate, the United Kingdom forming their first operational squadron, and the start of the Summer exhibitions calendar putting a renewed emphasis into Export, are just some of the highlights of the year so far.

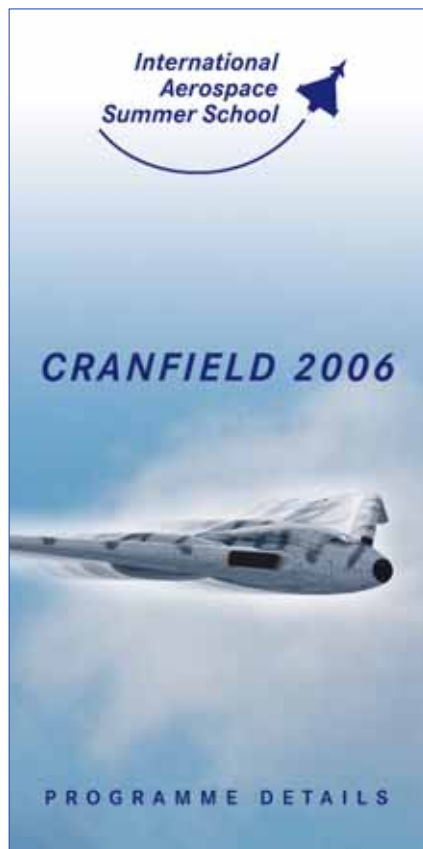
At the ILA Berlin Airshow, in particular, the event gave us the opportunity to meet with high-ranking customer representatives to promote the successes that are elevating our programme to new levels. We also held good discussions with our Austrian customer officials, and welcomed important delegations from the other Nations where we are actively marketing Eurofighter Typhoon.

This year we will see the decisions of some Nations outside of the Eurofighter community, for example Turkey, Denmark or Norway, who are assessing their participation in various other aircraft projects. The outcomes of these decisions could have a very positive impact on our programme.

The US analysts' assessment in Forecast International, declaring Eurofighter Typhoon the international Market Leader in the global fighter business, emphasised that the potential is there to record further Export contracts in the future. This statement will be a welcome boost to our Marketing colleagues in the Partner Companies and at Eurofighter HQ.

A lot of work still has to be done, but progress in the programme is good and the better we perform, the easier it will be to agree the Future Capability Programme with our core customer. This represents the next major challenge in the programme and we all hope for contract signature this year.

Aloysius Rauen  
CEO Eurofighter GmbH



The competition winner will be announced in August

## International Aerospace Summer School

### Competition moves into final stages

The twelve teams from across the globe competing in the Eurofighter sponsored International Aerospace Summer School have submitted their final proposals.

The teams, representing the Eurofighter Nations of Germany, Italy, Spain, United Kingdom and Austria, plus entrants from Denmark, Greece, Norway, Singapore, South Africa, Switzerland and Turkey, delivered their suggestions, for a stealthy transport aircraft for military use, at the end of May, and now progress to a "week of aerospace" at Cranfield University, England, in August. The stay will consist of briefings on a variety of aerospace topics, plus allowing the student the opportunity to fly light aircraft and helicopters. The groups will also be given a special guided tour of the Eurofighter Typhoon Main Operating Base at RAF Coningsby during their week-long visit.

The teams are competing for the Eurofighter Trophy, to be handed out to the winners at the end of their Cranfield excursion, following the judging process taking place throughout July. The purpose of the competition is to increase the level of interest in professional aerospace engineering as a potential career. Industry across Europe is looking for the next generation of talent to drive the aerospace sector forward into the next decade and beyond.

The winning entry will be published in the next issue of Eurofighter Review.

## Eurofighter Typhoon Miniature

### Model enthusiast and his 200mph aircraft

Steven Moore and his Eurofighter Typhoon miniature



Steven Moore has been flying radio-controlled model aircraft in the UK for nearly 11 years, having flown all sorts of aircraft, from small sports models all the way up to multi-engine large scale aircraft. His latest model is the Eurofighter Typhoon - a 1:6 scale replica constructed using fibreglass and carbon fibre materials. The model itself weighs around 26lb, but the engine used

to power this agile aircraft produces around 40lb of thrust, so its power to weight ratio is awesome! The airspeed has not been measured but it is thought to be in excess of 200mph. The gas turbine engine is a Merlin MKII engine, and uses A1 jet fuel (identical to that of full size turbine engines). The idle RPM (revolutions per minute) of this engine is 35000, however at max power the RPM is in the region of 117000! Exhaust gas temperature is approximately 575°C.

Steve will be displaying flying his Eurofighter Typhoon at many of the UK model airshows throughout the 2006 season, and will also be displaying at the Belgium Jets over Pampa airshow in July 2006.

## Latest Fuel Software

### Flight testing for the new system

The latest version of Fuel System software, designated PSP 3a, has now started flight testing on IPA1.

The updated software, incorporating additional functionality, will allow an upgraded version of external fuel tanks to be flown later this year. Modifications are also included to deal with fuel system control and monitoring issues identified during earlier rig and flight testing.

## A Hellenic Arrival

### EADS welcomes Greek Delegation to Manching

Headed by President Panagiotis Kammenos (6th from left), members of the Standing Committee for National Defence and Foreign Affairs of the Hellenic Parliament visited EADS Military Air Systems in Manching on 15 May. The visit was centred around the Eurofighter Typhoon, with Erwin Obermeier, Campaign Director for Greece, delivering a comprehensive briefing on the status of the programme. The group was also given an

insight into the capabilities of the Business Unit and the Manching site. After the briefing, Kammenos and the delegation took the opportunity to visit the Eurofighter final assembly line and to talk to pilots regarding the ongoing flight test activities. The Greek Delegation encompassed members of both parties, NEA Dimokratia and PASOK, as well as the Hellenic Consul General in Bavaria.



The programme status was presented to the Greek Delegation at EADS Manching

6,000 hrs clearance milestone achieved with the IFRP

## Cleared for Refuelling

### Green light for the IFRP

The Eurofighter Typhoon In-Flight Refuelling Probe (IFRP) has successfully completed its full life 6,000 cycles / 6,000 hour clearance test.

The IFRP is a complex mechanism. Controlled and monitored by relay logic, the deployment and retraction are controlled by a hydraulic actuator, and achievement of full life is particularly significant because the design of the probe has been extremely demanding due to the intricate movements required during deployment and retraction, as a result of the limited storage space available. Consequently, a number of issues were experienced during development which forced several design iterations demanding significant effort from areas including General Systems, Front Fuse Integrated Project Team, Air Vehicle team, Environmental Test Laboratory and Development Manufacturing Workshop, as well as support from a number of other teams across the organisation.

The concluding design solution successfully completed:

- Over 12,000 test cycles on the Endurance Test Rig in 23 Hangar at Warton.
- Over 6,000 flying hours clearance on the Vibration Test Rig - conducted at the Environmental Test Lab on Southside at Warton.
- Successful flight testing on IPA5.

A Review of ILA 2006

# Eurofighter Typhoon in Berlin

Surpassing its own records in terms of attendances, ILA 2006 firmly positioned the Berlin-based airshow as one of the most important European and international aerospace events on the exhibitions calendar.

Over a quarter of a million visitors descended onto the southern section of Berlin-Schönefeld airport, and for those looking for outstanding capability, the Eurofighter Typhoon exhibition did not disappoint. The centrepiece of the Eurofighter presence took to the skies daily to perform a breathtaking aerial display, effortlessly pulling manoeuvres demonstrating the tremendous agility and awesome power of the jet. The aircraft at ILA were a mixture of single-seat and twin-seat German Air Force Eurofighter Typhoons out of Jagdgeschwader 73 "Steinhoff", with the flying display aircraft flown out of Laage by EADS Test Pilots Chris Worning and Heinz Spoelgen alternatively. Additionally, enthusiasts were given the chance for a close-up view of the world's best-selling next generation combat aircraft at the German Air Force static park, where a second jet from JG73 was stationed alongside Tornado and the C-130 transport aircraft.

On the public weekend, two Eurofighter Typhoon aircraft formed part of a combined Luftwaffe display together with reconnaissance and fighter bomber Tornados, plus F-4 Phantoms.

As the Eurofighter Typhoon dominated the skies over ILA, the VIP Business Pavilion offered the Official Delegations the opportunity to be briefed on the force-multiplying benefits that the aircraft delivers. The central theme running through the presentation in the Pavilion highlighted Eurofighter Typhoon's role in Combined Air Operations. This Network-Centric approach was supported by a three-screen cinema, wall graphics, and the Eurofighter Cockpit Demonstrator. On hand to brief the Delegations were representatives from the Partner Air Forces of Germany, Italy and the United Kingdom.

above: EADS pilots Chris Worning and Heinz Spoelgen alternated in flying the German Air Force aircraft for the ILA Aerial Display

below: The Eurofighter exhibition attracted VIPs and public alike



above: The German Air Force formed a huge part of the Static Display at ILA



## German Minister of Defence and Chief of Air Force visit Eurofighter

The 2005 Election victory for the CDU party brought several new faces to key positions within the German Ministry of Defence. Making his first ILA appearance in his new role, Franz-Josef Jung, accompanied by General Klaus-Peter Stieglitz, German Chief of Air Force, Aloysius Rau, Eurofighter CEO (far left), and Tom Enders, EADS Co-CEO (far right), was keen to show his support for industry while highlighting the benefits of the Eurofighter programme to the end-user. Dr. Jung made a full tour of the Eurofighter Pavilion, taking in the cockpit demonstrator, while finding time for the assembled media in front of the Eurofighter Typhoon Full Scale Replica.



Dr. Franz-Josef Jung, Minister of Defence for Germany (centre left), General Klaus-Peter Stieglitz, Chief of German Air Force (centre right)

More ILA VIPs on the next page...



**Markus Gygax**, Chief of Air Force Operating Staff and Deputy Commander of the Air Force, Switzerland

Switzerland's plans for fleet modernisation have yet to reach full speed, but talks are ongoing with a variety of potential candidates, including Eurofighter Typhoon through EADS. At ILA, Aloysius Rauhen briefed Mr Gygax on the capability and industrial benefits of the programme, before German Air Force pilots Ralf Brandis and Georg Pepperl talked him through the aircraft's cockpit functionality.



**PK Mehra**, Air Marshal Indian Air Force  
As Eurofighter Typhoon is officially registered in the procurement competition in India, Mr Mehra's visit to ILA gave Industry a chance to promote the aircraft direct to the end-user. Mat Molineaux of the Royal Air Force, guided Air Marshal Mehra through a simulated mission scenario, demonstrating the key discriminators that have made Eurofighter Typhoon the best-selling next generation combat aircraft.



**Antonio Purini**, Italian Ambassador  
This was Mr Purini's first visit to ILA since becoming Ambassador in 2004. Guided through the Eurofighter exhibition by Rocco Ortuso, Eurofighter Procurement Director, Mr Purini was briefed on the aircraft's capabilities, before Italian Air Force pilot Max Federico showed him a simulated mission in the cockpit demonstrator.

Phillip Lee

## Checking for a Pulse

# Eurofighter Typhoon comes through EMP testing

In October last year, the first of two trials was conducted in order to gauge the aircraft's behaviour when subjected to strong electromagnetic pulses.

The equipment, loaned from the German military, was erected close to the north runway of the Military Technical Centre WTD 61 at Manching. Two wooden supports,

between which the pulse generator was suspended, were positioned approximately 30m apart. The generator then delivered numerous very strong yet short pulses, the type of which occur after nuclear explosions, to examine the aircraft's resistance to jamming. In a major part of the tests, measurements were taken of the current injected

into the wiring harnesses of the aircraft with electrical power down. For this purpose, before the start of testing, special clamp-on ammeters were installed in the jet, giving a visualisation of the current injected into the wiring harness on a measuring

unit, allowing conclusions to be drawn about possible jamming effects.

Measurement results from past EMP tests were made available by QinetiQ and BAE Systems, which allowed direct on-site plausibility checks to be made on the newly acquired data and, where necessary, measurements to be repeated at short delay.

This method of conducting the test has been unique in Europe up to now. The involvement and coordination of a wide range of experts, companies and authorities in such a complex test sequence required enormous effort, but was in the end worthwhile. Along with the Eurofighter Partner Companies and those responsible in Manching, QinetiQ and WIS - the latter representing the Customer - provided support for the tests. The experience gathered will form the basis for a second test, which is due to be held in Manching in the Summer of 2006.



The aircraft will undergo a series of EMP tests



top: Eurofighter Typhoon in RAF No.3 (F) Squadron markings

above and top right: In formation with two GR7 Harriers from No.3 Squadron

## Tertius Primus Erit

# First Operational RAF Typhoon Squadron Formed

Taking place the day before the Royal Air Force celebrated its 88th Anniversary, a ceremony marking the formation of the first operational Typhoon squadron was held at RAF Cottesmore, UK.

No.3 (F) Squadron, whose motto is "Tertius Primus Erit - The third shall be the first", completed the handover from Harrier to Typhoon in a change that marks a key milestone in the transition of the Royal Air Force to a more agile, capable and flexible expeditionary force, better equipped to meet the operational demands of the future.

No.3 (F) Squadron will operate from RAF Coningsby and will be assigned Quick Reaction Alert duties from the Tornado F3 force, while leading the work-up towards the declaration of a deployable air defence capability.

Defence Secretary, John Reid, said: "The introduction of Typhoon today marks our commitment to invest in effective fighting power, and to keep the British Armed Forces at the forefront when it comes to military capability."

Chief of Air Staff, Air Chief Marshal Sir Jock Stirrup, said: "Tomorrow marks 88 years of the RAF, and it is fitting that the changes being implemented across the Service... will bring into service one of the most potent aircraft that has ever flown."

## History of No.3 Squadron

No.3 Squadron, RFC, was formed at Larkhill on 13 May 1912 from No.2 (Aeroplane) Company. It deployed to France as part of the BEF in August 1914 on spotting duties. Late in 1917, Camels were received and the Squadron became a fighter/scout unit. After the Armistice in 1918, the Squadron disbanded and through the 1920s spent many short-lived periods at a variety of locations before arriving at Upavon in 1924 with Sopwith Snipes. During their ten

year stay, the Squadron flew Woodcocks, Gamecocks and Bulldogs and also deployed to Sudan during the Abyssinian crisis in 1935. Upon its return, No.3 Sqn introduced the Gladiator into RAF service and just as the Second World War started received Hurricanes at Biggin Hill.

A brief stint as part of the BEF in France was followed by relocation to Scotland on night-patrol duties. During 1943, the Squadron replaced the Hurricanes with Typhoons and switched to the anti-shipping and intruder roles. A switch to Tempests in 1944 saw No.3 Sqn destroy 288 V1 flying bombs, and move on to the Continent as part of the advance towards Germany. The Squadron remained in Germany, converting to Vampires in 1948, Sabres in 1953 and the Hunter in 1956. A short time with Javelin fighters was followed by a long period of Canberra flying, before the Squadron received Harriers in the early 1970s. In 1977 the unit moved to Gütersloh near the old East German border, before relocating to Laarbruch with Harrier GR7s. Following the decision to close Laarbruch, No.3 Sqn returned to the UK in the Spring of 1999, to be based at RAF Cottesmore in Rutland.

Since then, the squadron - along with its sister RAF Harrier and Royal Navy Sea Harrier units - combined to form Joint Force Harrier and has undertaken a number of deployments on board aircraft carriers including an operational tour to Sierra Leone as part of Operation Basilica. Most recently, elements of No.3 Squadron were involved in Operation Telic.

No.3 Sqn is now based at RAF Coningsby as the first operational Typhoon squadron.

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## Simulation Specialists

# Reiser Systemtechnik GmbH

**Precision training is essential in being able to pilot one of the most advanced cockpits in the world. Reiser Systemtechnik GmbH, through their key contributions to the Eurofighter programme, is providing exactly that.**

## Company Profile

The forerunner to Reiser Systemtechnik, Elektrotechnik Wolfgang Reiser, was founded in February 1980 and prospered as a company dealing with cable packing, mounting of heat exchangers and producing the controls for laser equipment. In 1988, Elektrotechnik Wolfgang Reiser expanded by adding the production of mechanical components for heat exchangers, mechanics for control units and front panels, while the expansion of facilities allowed for all design and development to be completed in-house.

The company, and its workforce of six, relocated to Höhenrain, 25 km south of Munich, in 1990 and, as expected the company continued to prosper over the following years. This steady growth presented the company with the opportunity for expansion, with the up and coming fields of simulation techniques and test systems becoming new additions to the company portfolio. In 1993, the Bavarian Ministry of State for Economic Affairs and Transportation bestowed upon Elektrotechnik Wolfgang Reiser the Innovation Prize for Environmental Technology, and in May 1997, the company was certified, and continues to be re-certified, according to DIN ISO 9001.

Today, Reiser Systemtechnik GmbH employs 40 specialists in serial, mechanical and technical production and design, with simulation technology and test equipment manufacturing accounting for 75% of business volume. The remaining 25% are earned by the production of laser systems for industrial applications.

Modern technologies are implemented through the networking of CAD work stations with the in-house production as well as with an inscription laser used for panel front face production. Additionally, an electronic laboratory for development, and a testing station, are at hand.

Reiser Systemtechnik GmbH supplies to all leading aircraft manufacturers in Europe as well as customers in the United States and Australia.

Reiser Systemtechnik's involvement with the Eurofighter programme lies with the provision of training equipment to both the pilot and groundcrew training programmes.

## Interim Training Device (ITD)

The company has manufactured four Interim Training Devices prior to the completion of the full Eurofighter Typhoon flight simulators for ASTA. Two cockpits are located at EADS facilities for development purposes, with the remaining two having been in service for the purpose of Air Force pilot training for more than two years in Laage and Manching.

## Company Fields of Expertise

### Specialised technical production

Development and design of mechanical and electronic components and systems for simulation technology of vehicles and aircraft

### Manufacturing of test facilities

Modification and construction of instruments for simulation applications

### Serial production

Manufacturing of laser components e.g. heat exchangers, panels and power distributions

### Mechanics

Manufacturing of prototypes and limited series items

### Laser marking

Marking of front panels, operating consoles and other devices



The Weapon Loading Simulator was designed in cooperation with EADS



The MST offers the Air Force maintenance personnel a realistic replica of the actual cockpit

## Maintenance Simulator Trainer (MST) with HOTAS

In parallel to the Interim Training Device, Reiser Systemtechnik have manufactured highly sophisticated and realistic replicas of the Eurofighter Typhoon cockpit to serve as training aids for the maintenance personnel of the German and Italian Air Forces.

As a spin-off of the Eurofighter Simulation Programme, the company has equipped several classrooms with stick and throttle (HOTAS) units. This Computer Based Training (CBT) equipment has been delivered to all nations participating in the Eurofighter programme.

## Demo-Cockpit

For demonstration and teamwork training purposes, Reiser Systemtechnik developed a replica of the cockpit with an obstacle-free architecture incorporating an optimal view for spectators and students while maintaining the complete functionality. One of the major advantages of this architecture is the simplicity of its connectivity. The training device, as a self-contained element, does not require any additional constructional installations and therefore can be deployed in any classroom with a 230V bus bar. Additionally, its lightweight construction allows for single-person handling and positioning.

The obstacle-free Demo Cockpit combines optimal spectator viewing with complete functionality

## Weapon Loading Trainer (WLT) Eurofighter

In cooperation with the Eurofighter maintenance teams of the German Air Force and with EADS, Reiser Systemtechnik developed a Weapon Loading Training (WLT) device, comprising a 1:1 full scale mock-up of the aircraft (length 16m, wingspan 11m) together with an external cockpit incorporating replicas of all elements needed to control the weapon system. Sensors built into the device provide the status of the weapon loading and is displayed in the external cockpit. This cooperation between a Federal Government enterprise and civil industry turned out to be a successful pilot project for both parties. The training device is ready for service at the Kaufbeuren Air Force Maintenance School.

The ambition that drives Reiser Systemtechnik is their desire to become a major contributor to the aerospace industry in terms of simulation and avionics testing. The company is currently involved in several negotiations concerning panels and simulator shells for the NH-90 NATO Frigate helicopter. Further talks concerning simulators for the Pilatus PC-21 Training Aircraft, the Sikorsky CH53 helicopter and the Lockheed Martin P-3 Orion, will look to cement a position for Reiser Systemtechnik in the future of the aerospace simulation industry.

*Wolfgang Schlederer,  
Reiser Systemtechnik GmbH*





NETMA

## NETMA: Managing the Programme

# NATO Eurofighter and Tornado Development, Production and Logistics Management Agency

As a key stakeholder in the Eurofighter programme, there is a temptation to assume that their history, reasons for formation, and role in the wider Eurofighter programme, are common knowledge. This is not always the norm. In a special article for Eurofighter Review, NETMA unveils the significant part it plays and answers the question: What is NETMA?

## Formation of NAMMO - Tornado

In 1967, the Nations of Germany, Italy and the United Kingdom identified a requirement to replace some of their older in-service aircraft. After concept studies at both Government and Industry level, the conclusion was drawn that the different requirements of the three Nations were reconcilable and a single design for a Multi Role Combat Aircraft (MRCA) was viable.

A Memorandum of Understanding (MoU) to collaborate on a joint Programme to develop and produce a totally new combat aircraft was signed in 1969 but, as neither the Governments nor industry had worked on such a collaborative programme before, the Nations agreed that no single Nation or Company would lead it, and that all significant project decisions would require tripartite agreement.

The formation of NAMMO, the NATO MRCA Management Organisation, dedicated to coordinate the customer requirements, place contracts and manage the programme now known as Tornado, soon followed. As the Tornado programme evolved, the Charter that regulates the agency organisation was also amended to reflect the extra

responsibilities of the newly-named NATO MRCA Development, Production and In-Service Support Management Agency.

## Formation of NEFMO - Eurofighter

Based on this challenging but successful experience, the Ministers of Defence from France, Germany, Italy, Spain and the United Kingdom, agreed to work together on a 1984 joint feasibility study for a new European Fighter Aircraft (EFA) to meet their future requirements for a high performance air superiority aircraft.

The study concluded that a common five Nation solution was not possible and, in 1985, Germany, Italy, Spain and the United Kingdom decided to cooperate on EFA whilst France withdrew to pursue a national programme.

## Formation of NETMA

Since the initial EFA General MoU was signed by the four Partner Nations in 1986, a number of other MoUs have been signed to cover different phases of the Programme, and it's reorientation with newly defined military requirements (including Air-to-Ground capabilities).

In 1987, NEFMO (NATO European Fighter Aircraft Development, Production and Logistic Management Organisation) was founded to manage the procurement of the EFA aircraft, engines, logistic support and system enhancements in accordance with the Nations' requirements.

In 1995, NAMMO and NEFMA, the two formerly separate NATO agencies, based on NAMMO and NEFMO, were merged to form NETMA (NATO Eurofighter and Tornado Development, Production and Logistics Management Agency) for improved efficiency and effectiveness.

NETMA is responsible to the Partner Nations for all aspects of Tornado and

**In support of NETMA's Mission to "Deliver and sustain Tornado and Eurofighter Typhoon Capability", the agency's roles are:**

- Harmonisation of Nations' requirements
- Preparation and signature of Procurement Contracts
- Programme management
- Workshare monitoring
- Budget planning and commitment control
- Payments and accounting



left: Peter Worrall following a rear seat flight in Eurofighter Typhoon

below: NETMA work closely with Industry to deliver world class capability



Eurofighter Typhoon procurement. Programme management responsibilities are allocated on the Partner Nations' side to NETMA, who ensure that Industry fulfill their contracted responsibilities through agreed systems of maintained close control and guidance.

The operation of the Agency and its structure are prescribed in an MoU signed between the four Nations in 1995. This is reflected in a NATO Charter for the Agency approved by the NATO Council, and the General Manager's contract makes him personally responsible for the operation of the Agency and the day-to-day management of the two programmes.

The governing organisation is headed by a Joint Steering Committee (JSC), composed of a senior Two-Star representative from each Partner Nation, ensuring decisions are taken unanimously. The JSC has delegated the responsibility for the daily oversight of the two programmes to the two Boards of Directors (BoDs) at One-Star level, with each BoD representing the Partner Nations. The Agency GM reports formally to the BoDs, in addition to the JSC. The Partner Nations are responsible for defining their requirements for each task and authorising the projects to proceed. They also provide funding needed to pay for work carried out by Industry and their share of the Agency running costs.

The BoDs meet several times a year to address all major issues concerning the programme, advise the JSC and direct NETMA in the management of the programme.

The General MoUs for the Tornado and Eurofighter programmes define the princi-

ples which NETMA must apply in managing the projects and the formal relationships between the national Governments and the Agency. NETMA's role is reflected in an Agency Management Plan which is approved annually by the BoDs. This sets the objectives or performance goals which NETMA is required to achieve in the years ahead.

## Structure

To strengthen the management of the Tornado and Eurofighter programmes, NETMA was recently reorganised with separate divisions now responsible for each function and for each of the Programmes in relation to its relevant phase. Co-ordination between these functions is achieved through integrated working procedures at desk level and central control at General Manager/Deputy General Manager/Director level. The Agency Management Plan objectives are also reflected in the division level Management Plans for internal progress monitoring.

Since its creation, NETMA has been part of NATO. This status enables NETMA, as a legal entity, to place contracts on behalf of the Partner Nations.

Apart from this relationship in practical terms, it is important to highlight the importance attached to the fact that NATO has an Agency responsible for the control and management of two of the most important armament programmes providing significant capability that supports the major European Air Forces. In this way, NETMA directly contributes to NATO's goals.

The industrial counterparts of NETMA in the Eurofighter programme are two international consortia, Eurofighter GmbH and Eurojet GmbH, who are the co-signatories with NETMA of the two main development contracts.

Both consortia are linked together with an associated contractor's agreement and an interface control document, ensuring the inter-relationship of both development programmes to achieve the weapon system design and performance specification as a whole.

Anyone who has worked on a collaborative project will vouch for the challenges it presents. However, despite the challenges, collaborative projects can work successfully and provide cutting-edge capability, at reduced cost per Nation, with improved interoperability compared to a single Nation programme. For more than 30 years a group of like minded European Nations, first with Tornado and later with the Eurofighter Typhoon, have been working very closely together with their industries to overcome the challenges and deliver world class capability. NETMA are proud to have been part of this success and will continue to strive to ensure that such success continues into the next decade.

Peter Worrall OBE  
NETMA General Manager



Establishing a best practice across the Eurofighter community

# Production Exchange Workshops

Production and Final Assembly of Eurofighter Typhoon is a complicated and logistically-challenging process. A new initiative is seeking to build a greater understanding of the differences of the national processes.

In January, the senior Final Assembly managers met to discuss ways to improve the cooperation between the Eurofighter Partner Companies (EPCs). Over the course of these discussions, the idea of 'Operator

Exchanges' was developed, where the production teams from each of the EPCs are given the chance to work alongside their programme counterparts from other nations, looking at the methodology and

The first exchange took EADS-Deutschland engineers to the final assembly hangar at Getafe, Spain



The exchanges will look to compare methods in order to find a best practice

tooling used by other teams. Upon agreeing the project outlines, a mission statement was formulated collectively: "Reduce Cost, Lead-Time and Improve Product Quality in Final Assembly."

The start-up meeting for the exchange programme was held at Getafe, Spain, in March, where the project managers agreed the Terms of Reference. The production process was divided into three stages, with teams assigned to oversee the exchanges at each stage of aircraft production. Team One, headed by Phil Jeffrey, dealt with structural build, focusing on how each of the EPCs complete the 'marry-up' process - front fuselage, to centre, to rear fuselage, plus right and left wing installation. The objective for Team Two, coordinated by Manfred Mehr, was to look at Stage B System Integration Testing, while the attention of Jürgen Herold's Team Three was centred on



Eurofighter Typhoon in final assembly at Alenia

Stage C Production Flight Acceptance Tests (PFATs) and Aircraft Acceptance.

In the first exchange, a team from EADS Deutschland visited the Final Assembly facility at EADS CASA's Getafe plant, Spain. The aim, as with all of the planned exchanges, was to compare methods and to try and establish best practices that could be adopted by all EPCs. The results and feedback were extremely encouraging, with the experiences from the exchange having led to the

engineers involved advising management on improvements to existing wing installation tooling.



BAE Systems' final assembly facility at Warton, UK

One of the critical factors in ensuring success for the Operator Exchange programme is the availability of feedback from those involved. Although the central programme language at senior management level is English, many of the hands-on engineers at the national Final Assembly hangars speak only their native language. To overcome this barrier and to encourage more feedback, the check sheets used by the visiting personnel were issued in their mother tongue, offering more flexibility in detailing their experiences.

The exchanges themselves are scheduled to run throughout the Summer, ending in September, but further trips will be organised on request.

The whole Operator Exchange programme has been well supported by the EPCs from conception to implementation, and has so far proved to be very successful. The benefits to the Eurofighter programme can only be positive as the initiative seeks to fulfil the promise laid out in the mission statement.

For more information, contact:

Philip Jeffrey, Senior Project Leader, Production  
philip.jeffrey@eurofighter.com

Phillip Lee

## AESA Promises Increased Capability for Eurofighter Typhoon

# Improved Vision

### Airborne Radar in Europe

CAPTOR is the first combat radar developed and built in a European co-operation. The Euroradar consortium, made up of SELEX Sensors & Airborne Systems (UK), EADS Defence Electronics (Germany), INDRA (Spain) and Galileo Avionica (Italy), have developed a radar that represents the pinnacle of performance that can be achieved from a system which utilises a mechanically scanned antenna and Travelling Wave Tube (TWT) transmitter.

The basic functional requirement for advanced airborne radars is the scanning of the airspace in front of the aircraft to detect and track multiple air and ground targets. For this purpose, a mechanically scanned antenna must follow a predefined search pattern and very quickly cover, at regular intervals, the identified spatial positions of the targets to be tracked. The acceleration required for this puts extremely high demands on the servo motors used to drive the antenna. This involves very high mechanical stress for the antenna and the supporting aircraft structure. An additional

improvement in performance, in particular with regard to multi-target capabilities, can only be achieved by progressing to radar systems with an Active Electronically Scanned Array (AESA) radar system.

### European AESA Technology Base

As early as 1995, a European programme for developing an AESA radar demonstrator for combat aircraft was initiated in the UK, France & Germany. Since then, a consortium comprising the companies SELEX, Thales and EADS, has been working on the AMSAR (Airborne Multi-mode Solid state Active array Radar), which is a generic demonstrator for developing the technology required for an AESA radar and finally for proving the relevant AESA capabilities. AMSAR has an array with a diameter of 60 cm equipped with some 1,000 Transmit/Receive/Modules (whose key components are Gallium-Arsenide semi-conductors)

operating in the X band range. As part of the current programme phase, ground and flight tests are scheduled after completion of the antenna and systems integration.

In addition to AMSAR, a number of government and industry funded technology programmes have been underway in each of the four Eurofighter Partner Nations to develop and de-risk key elements of AESA technology ranging across systems concepts, processing algorithms and critical components.

In the AESA Radar, the central transmitter is replaced by transmitting and receiving amplifiers distributed throughout the antenna and connected one-to-one to the antenna radiating elements. Adding variable gain and phase shifting elements to amplifiers and encapsulating them, produces a complete, self-contained Transmit/Receive Module (TRM). In functional terms, they contain the power amplifier of the transmit path, a low-noise preamplifier for the receive signal, the phase and amplitude actuators for both paths together with the electronics required for their activation, and finally, the radiator element behind the transmit/receive filter. Such TRMs only generate a relatively low output power, but the entire radiated AESA energy results from the total of the individual output of 1,000 or more such modules. An electronic antenna control unit (ACU) activates each of these TRMs with a

phase and amplitude input signal in accordance with the predefined antenna viewing direction. In the AESA far field, a radiation diagram is generated that is directed at the desired space angle.

### The Need For AESA Radar

The AESA radar on board a combat aircraft offers capabilities that could not be reached up to now. This means, for example, that the search process is no longer dependent on a pre-determined search pattern but can take place using freely selectable sequences of beam positions, making own-ship detectability considerably more difficult. The tactical requirement for simultaneously scanning a certain volume of space in front of the aircraft and tracking the trajectories of as many identified targets as possible (known as Track-while-Scan or TWS) can be fulfilled to higher performance levels by an AESA radar than by a conventional radar. Its beam lobe can be switched to a target and the target's coordinates identified without the search process being interrupted. In addition, almost simultaneous surveillance of air and ground sectors is possible.

The full flexibility with regard to spatial and temporal performance management of the AESA radar is achieved by partitioning the antenna into sub-arrays together with a corresponding multi-channel receiver. This enables a technique known as adaptive beam forming (ABF) to, for example, create

CAESAR completed its maiden flight in February 2006



Simultaneous tracking of multiple targets is fulfilled to a higher performance level with an AESA radar

a null on the radiation pattern in the direction of a jammer, thus "gating" it out. Moreover, various different and independent lobes can be created simultaneously or sequentially concurrent with primary radar operation. These lobes can provide data links to launched missiles or even to other aircraft. It is also possible to emit signals with a wide azimuthal lobe while they are being received with several narrow lobes which are optimised for detecting fast moving targets crossing the trajectory of the aircraft, such as helicopter rotors or stealth targets. By using state-of-the-art data processing, previously unknown potential for the suppression of confusing clutter or jammers can be realised.

As to the reliability of an AESA radar, the large number of TRMs deployed in connection with one central transmitter offers an enormous advantage. Even in the event of failure of 5 to 10% of the modules, the pilot will not perceive any restriction in the radar performance. This inherent feature of an AESA radar, which is called "Graceful Degradation", allows much longer servicing intervals than with TWT based transmitters.

### From Demonstrator to Product

In April 2002, the Euroradar consortium started developing an AESA radar designated "CAESAR" (CAPTOR Active Electronically Scanned Array Radar). The companies

pooled their expertise and funding in order to demonstrate that the path from a mechanically scanned CAPTOR to an electronically scanned CAPTOR derivative could be readily accomplished in a fast, low risk programme.

The design focus was that, on the one hand, CAESAR should be fully adapted to the installation environment of the Eurofighter Typhoon platform and, on the other hand, should keep essential components of the existing CAPTOR radar in view of constant system evolution. To achieve this, CAESAR uses the Receiver and Processor of the CAPTOR and, in addition, has a new power supply adapted to the AESA, an ACU (Antenna Control Unit) and the actual AESA antenna. In a period of slightly more than three years, the new LRIs (Line Replaceable Items) have been developed, tested and integrated into the overall system. There followed the installation in the BAC 1-11 trials aircraft and the ground testing of the system.

February through April 2006 the practical test took place: CAESAR completed its maiden flight on board the trials aircraft flying over the South-West of the UK. During the following flight campaign lasting five weeks and involving seven individual flights, CAESAR spent more than 20 hours in the air without registering any failures. After completion of the flight tests, an enormous quantity of data is undergoing evaluation. The initial analysis shows that CAESAR by far exceeded expectations.

For the remainder of 2006, a further test series is planned with the BAC 1-11 and also several flights on board the Eurofighter Typhoon - this event is being eagerly awaited, and not only by the radar development team.

This success of CAESAR has paved the way for using an AESA radar in the Eurofighter Typhoon. Euroradar has laid the foundations for further evolution of the CAPTOR, through the production of CAESAR, which will give front-line pilots radar capability which will match all future requirements and threats.

Carl Graham,  
SELEX Sensors and Airborne Systems



The graphic shows how CAESAR will fit into the aircraft



AESA is the future for Eurofighter Typhoon

## Austrian Media Invited to EADS Manching

# Press Briefing

Since the Austrian Government signed the procurement contract for the purchase of 18 Eurofighter Typhoon aircraft in Summer 2003, the agreement has been the source of considerable political and media debate in Austria. With the 2007 delivery deadline on the horizon, delegations from the Austrian Government, Air Force and media, were invited to EADS Manching to see for themselves the progress that has been made.

Leading the welcoming committee from Industry, Eurofighter CEO, Aloisius Rauen and EADS Military Air Systems CEO, Johann Heitzmann, re-emphasised the importance of Austria as the first Export customer, and how the success of their procurement programme will deliver credibility to the core programme and will be crucial in securing future Export contracts. Günther Platter, Minister of Defence for Austria, re-iterated his confidence in the



Günther Platter, Minister of Defence for Austria, welcomes the journalists to Manching

procurement decision, while the Undersecretary of State for Transport, Innovation and Technology, Eduard Mainoni, highlighted the advantages that Eurofighter Typhoon will bring to Austria's industrial capability by the already accepted 400 million euro of offset agreements out of the 2 billion euro total.

The main presentations began with Peter Maute, Austria Programme Director at Eurofighter GmbH, focusing on the status of both the core and Austria programmes, followed by EADS Senior Vice President for Eurofighter, Berndt Wünsche, briefing the gathered journalists on the milestones achieved in the final assembly of the first Austria-bound aircraft. The presentations continued with the Head of the Eurofighter Programme in the Austrian Ministry of Defence, Karl Hofer, talking the media through the preparations for entry into service and how Eurofighter Typhoon will be incorporated into the military infrastructure.

The Chief of the Austrian Air Force, Major General Erich Wolf, made a surprise visit to Manching, in which he described his many flights in Eurofighter Typhoon as "to use the language of the youth, awesome!". Chris Worning, EADS Test Pilot, delivered his verdict on the aircraft's capabilities, before the journalists were allowed to see for themselves the first Austrian aircraft in the final assembly hangar.

The news reports the following day in Austria reflected the event in a positive manner, with the final assembly progress thoroughly highlighted across the media.



above: Günther Platter with Industrial and Air Force figures present AS001, the first Eurofighter for Austria right: (from left to right) J. Heitzmann, G. Platter, E. Mainoni, A. Rauen



## A New Support Concept for the EJ200

# ILS Innovation

The EJ200 engine was designed to give equal priority to performance and life cycle cost, therefore high attention was given to reliability, maintainability and testability.

Its modular design, comprised of 15 fully interchangeable modules, allows the application of "on condition maintenance". The EJ200 engine also provides comprehensive access for boroscopic inspections and, in order to make maximum use of life limited



The new support concept allows for closer working relations between Air Force and Industry

parts, the Engine Monitoring system calculates cyclic life consumption related to mission profile and engine usage.

Eurojet Turbo GmbH, the European military engine consortium, offers Integrated Logistic Support (ILS) concepts for the EJ200 engine through the provision to the customer of information and services to address the following elements: spares, support and test equipment, technical documentation, training and repair service.

Eurojet are proposing to implement a two-level maintenance

concept as the most economic solution for engine support. This concept replaces the traditional practices whereby engine maintenance was broken down into four levels [see Figure 1]. Whereas the customer was responsible for on-aircraft and off-aircraft maintenance, the new concept only requires customer tasks at Maintenance Level One.

The application of a two-level Maintenance model compared to a traditional concept involves significant cost savings with respect to the In-Service Support infrastructure and resources, and avoids the requirement for an engine test cell at the Customer's facilities. This new maintenance philosophy has been selected by three of the Partner Nations (Germany, UK, Italy).

### Principle of a Cooperative Model in Germany

In Germany, the support concept for the EJ200 is within the so-called cooperative model. Under this practice, maintenance activities are co-located at industry, where industry personnel, military staff and civilian Air Force employees are working shoulder-to-shoulder. The cost benefit gained by industry in using military personnel for engine repairs will be credited to the customer. In this way, the Air Force retain their maintenance knowledge and a duplication of resources and personnel is avoided.

### EJ200 Support Concept Overview for the Core Programme



The German Air Force staff are working at the MTU Aero Engines facility, an economically advantageous partnership for the German military in that indispensable military skills are preserved and help to secure employment for the Air Force. This model focuses on resources, reduces inventory requirements and shortens lead times, saving the German Air Force some 40 million euros over the next ten years.

In contrast to the German approach, the Spanish support tasks are entirely performed by the Air Force in the traditional method. The United Kingdom and Italy have adopted similar approaches to Germany, however the proportion of maintenance work performed by their Air Forces is higher.

### The UK EJ200 Support Concept

In the UK, support is provided by Rolls-Royce under a Mission Ready Management Services (MRMS) contract, where Rolls-Royce and the RAF (Royal Air Force) work in partnership to minimise the overall support cost. Under this arrangement, Rolls-Royce guarantees availability of serviceable engines to the RAF fleet and is responsible for the management of all off aircraft maintenance activities, whether these be performed within industry or on the RAF base. This model provides similar benefits compared to the German approach, but also transfers much of the responsibility for the support activities to Rolls-Royce.

### Product Support in Italy and Spain

In Italy, the Air Force performs all 'on aircraft' and some 'off aircraft' maintenance at the Squadron level. All other maintenance is carried out by Industry (Avio).

In Spain, the Air Force maintenance work covers levels one and two, and level three for some modules. All other maintenance work is carried out by ITP.

High Definition

# Eurofighter Typhoon on the big screen

An important strategic trans-national pipeline has become vulnerable in an increasingly unstable region. A former super-power breakout state with suspected backing, has illegally taken control of this pipeline by invading its neighbouring country. A coalition task force has been sent to the region...

This is the situation facing the squadron commanders in the latest Eurofighter Typhoon mini feature film. "In An Uncertain World..." emphasises the aircraft's ability to operate in combined air operations using Network-Centric technology, i.e. the Multi-functional Information Distribution System (MIDS).

The film is the second installment showing Eurofighter Typhoon in an operational environment, following the award-winning success of "Nothing Comes Close" in 2004. Produced by UK-based Impact Image Ltd, the scale of the promotional films has evolved from their early material in 2002. "We have always tried to keep Eurofighter at the cutting edge of what we call 'infotainment'" says Bob Hayes, Production Director at Impact Image. "We were the first to film in-cockpit and air-to-air in 3D, embracing new camera technology at the time." Impact Image were among the first to use High-Definition TV to produce cinema type images which were packed with special effects, winning them a Gold award at the USA film festival.

The storyboard for "In An Uncertain World..." demanded the inclusion of multiple Eurofighter Typhoon squadrons, satellites, E-3 Airborne Early Warning and Control Systems (AWAC), Unmanned Aerial Vehicles (UAVs), Surface-to-Air Missile (SAM) launchers, hostile aircraft and high-octane explosions. The film is presented in a three-screen format, shot with High-Definition cameras, and the multi-national theme called for on-location filming at the Main Operating Bases of the four Partner Nations.

The majority of the air-to-air footage was recorded using a modified Learjet with an under-body periscope camera system, at Decimommanu Air Force Base, Sardinia.

Alenia Chief Test Pilot, Maurizio Cheli, took to the air with Development Aircraft Seven (DA7) and the team gathered all the required film in just one 50 minute sortie.

In the UK, RAF Spadeadam is where Impact Image were able to source working SAM 8 and SAM 6 launchers. To simulate a missile launch, computer-generated images were used to complete the sequence. The special effects team also relied on computing power in constructing the scenes featuring aircraft other than Eurofighter Typhoon. The A-50 Airborne Early Warning Aircraft and Su-35 Flankers, that were engaged by the Eurofighter Typhoon force, were digitally created. So too was the terrain over which the Storm Shadow stand-off weapon flies. "Computer-generated effects and computing power which five years ago were the preserve of Hollywood are now far more available" says Hayes.

Impact Image used specialist tracking software that tracks over 2,000 points every frame enabling overlaid foreground images to take on exactly the same camera movements as the background.

All in all the project took six months, with the early version making its debut at the Le Bourget airshow in Paris, in 2005. The updated version was presented to both VIPs and public at the ILA exhibition in Berlin in May this year, and will be screened in the United Kingdom at Farnborough International in July.

"Technology is always the driving force behind pushing the boundaries of production values", says Hayes. "We thrive on it and it's a privilege to work with such a great product."

"In An Uncertain World..." is available for download on:

[www.eurofighter.com/MediaLibrary/Video](http://www.eurofighter.com/MediaLibrary/Video)

Phillip Lee

Scenes out of the new Eurofighter Typhoon mini-film "In An Uncertain World..."



Air-to-Ground Weapon Release

# A Step Closer to Multi-Role Capability

Since Instrumented Production Aircraft Three (IPA3) began the heavy loads campaign in February (EF Review: Issue1), the Flight Test programme has been building momentum towards an air-to-ground weapon release.

In early May, IPA1 took off from BAE Systems' Warton facility loaded with six Paveway II, two AIM-9L Sidewinders and a centreline 1,000l fuel tank. The aim of the tests was to prove the aerodynamic stability of the aircraft in a heavy loads configuration. IPA1 successfully completed a series of 'flutter trials' during this first flight, ensuring that a major milestone was achieved by the team at BAE Systems. Mark Bowman, Typhoon Project Pilot, commented: "The advanced flight control system of Typhoon means that even with this heavy war load, the pilot is still able to manoeuvre the aircraft as a 'carefree' fighter, safe in the knowledge that the computers will be wringing out every last ounce of turning and rolling performance."

Just a few days after the IPA1 flights, the EADS CASA-controlled IPA4 took off from Morón Air Base going for a programme-first release of an air-to-surface weapon. Accompanied by an F-18 chase aircraft from the Spanish Air Force, pilot Alfonso de Castro made several approaches to the planned impact point, checking release procedures and ensuring functionality of on-board cameras for the flight test documentation, before

going for the hot-run and store jettison. The success of the GBU-16 release from the starboard wing centre pylon demonstrates Eurofighter Typhoon's swing-role capability.

A second jettison was completed the following day, with both releases fully complying with all flight test objectives. Of utmost



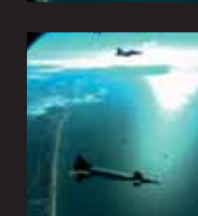
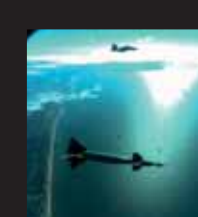
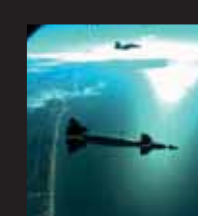
importance was the verification of safe separation of the stores from the pylons, and overall aircraft behaviour during and after the release sequences. Evaluation of the overall performance of the avionics and armament control system was also critical, and will contribute towards final GBU-16 clearance following further test sorties over the Summer months.

The GBU-16 is a 1,000 lbs. NATO-standard air-to-surface laser-guided precision bomb to be implemented by Eurofighter Partner Nations Spain and Italy. The Paveway II Enhanced store will be available to the United Kingdom as part of the 'austere capability' package. The weapon will enter into service with the Eurofighter Typhoon Block 5 aircraft.

Phillip Lee



The first GBU-16 release on IPA4



Recent flight test achievements

**IPA4**  
The Spanish Eurofighter Typhoon has completed further GBU-16 release trials as part of the ongoing campaign. First, the air-to-surface store was jettisoned from the right centre-wing pylon, followed by a drop from the right in-board pylon the next day.

**DA2**  
The British Development Aircraft completed key sorties aimed at clearing the towed decoy throughout the full range of the flight envelope. Two successful flights at the end of May took in testing at supersonic speeds, examining the functionality and aerodynamic behaviour of the defensive aid component, with a fully active campaign due to start over the coming weeks.

**IPA2**  
Operating out of Decimommanu, Sardinia, the second Instrumented Production Aircraft carried out an AMRAAM firing from the outboard station.

below: IPA4 taxiing prior to take-off at Morón Air Base, Spain





## Progress in the Advanced Simulation Training Programme

# ASTA

To fly a highly complex fighter aircraft like the Eurofighter Typhoon demands progressive and fully integrated pilot training. The

Aircrew Synthetic Training Aids (ASTA) programme, as one of the largest air systems simulation and training programme in the world, is rising to meet this challenge.

In April, Eurofighter GmbH announced the acceptance of the ASTA Eurofighter Cockpit Trainer (ECT) by NETMA, and two of the partner Air Forces. The devices, installed at the Main Operating Bases of Laage (Germany) and Morón (Spain), will be used primarily for procedural and basic flight training as part of the conversion to

type of the Air Force pilots. It is anticipated that the signature from the Italian Ministry of Defence will follow in due course with the ECT having successfully completed the technical elements of the Individual Acceptance at the Ronchi facility.

Dr. Matthias Hammer, ASTA Joint Team Leader, heralded the acceptances and stated: "This is a significant achievement for all involved in the ASTA Contract and I believe that the acceptance of the Eurofighter Cockpit Trainer will be a springboard for delivery of future devices and full functional capabilities."

In terms of capability, the ECT was conceived as a stand-alone skills trainer, enabling the student to apply classroom-based training knowledge and develop the necessary procedural skills in advance of full training in the Full Mission Simulator (FMS) or the Cockpit Trainer / Interactive Pilot Station (CT/IPS-E).

The functionality available in the ASTA ECT covers all basic flight systems, including the aerodynamic model, sufficient to support normal and emergency procedures training, and Instrument Flight Rules (IFR) training.

The acceptance in to service of the ECT is the start of the ramp-up towards full ASTA capability. At operational peak, ASTA will be at the cutting edge of advanced training technology. The ASTA programme offers a "train while fight" principle, with features such as networked multi-aircraft mission training and the integration of the Eurofighter mission planning tools. This synthetic training capability will lead to a reduction in the flight hours dedicated for training, saving costs while ensuring a higher level of aircraft availability.

*Andrew Leighton*



The ECT has been accepted by the German and Spanish Air Forces

## Tranche 2

# Progress with the Second Production Contract Phase

With a contract value of 13 billion euros, the December 2004 signature of the Tranche 2 Supplement 3 contract represents a significant investment in European defence capability.

In addition to the 236 aircraft and role equipment on order for the four Partner Nations, the contract allows for the production of the Eurofighter Typhoons bound for Austria, whilst also retaining a capacity to accommodate production of aircraft for future export customers. The Tranche 2 contract also focuses on the redesign of obsolete equipment, while huge sums are to be invested in ensuring Eurofighter Typhoon has the potential for future growth in terms of hardware capability and computation capacity. This will be an enabler for the integration of new weapons as required by the customer.



Components for over 35 Tranche 2 aircraft are in build

In the 19 months since contract signature, tremendous effort has been placed into converting plans into reality. In terms of tangible results, all four sub-contracts between Eurofighter GmbH and the Eurofighter Partner Companies have been signed. Components for over 35 Tranche 2 aircraft are in build, including 24 Front Fuselages and 28 Centre Fuselages which are already in the Assembly Jigs. Equipment assets for both the Development and Production Programmes are ordered with more than 600 Tranche 2 equipments delivered onto the development rigs and many more to production.



Enhanced laser guided weapons will be a feature on Tranche 2 aircraft

Significantly, the bench-testing of the software for the seven individual aircraft sub-systems has reached an adequate level of maturity to be able to begin the System Integration Risk Reduction phase. Commencing this phase before the full completion of the bench-testing demonstrates the availability of software functionality, and allows for more time to monitor the behaviour of the sub-systems' software as they begin to communicate with one another. The benefit of this approach is that should any communication problems arise during Risk Reduction, they can be investigated and solved prior to entering the formal qualification and certification phases.

The first Series Production Tranche 2 aircraft will be Block 8, with initial deliveries due in January 2008. In terms of Flight Test, the Supplement 3 contract provisions for the conversion of two Series Production Aircraft, BS031 (UK Tranche 1 aircraft) and GS029 (German Tranche 2 aircraft), to an

Instrumented Production Aircraft status, and designated IPA6 and IPA7 respectively. Whilst IPA6 will be used to support the Block 8 Entry into Service Clearance, IPA7 will be available as a backup aircraft. These aircraft, together with the IPA2 (Italian), and IPA4 (Spanish), which will be upgraded to a Block 8 equivalent Standard within 2008, will be available to the Flight Test programme for the progression of future enhancement flight test activities.

IPA6 is already in Final Assembly and its first flight is on schedule for May 2007.

*Phillip Lee*

# Eurofighter Typhoon



Visitors to the Eurofighter Typhoon pavilion at the Farnborough International 2006 Airshow in July will be greeted by some fresh and exciting imagery promoting the world's best-selling next generation fighter aircraft. The current set of promotional materials and advertising copy has been refreshed to develop the public's awareness towards Eurofighter Typhoon as a world-leading

product that is already delivering value to the four Partner Nations and Export customers alike.

New images and messages reinforce the strengths that Eurofighter Typhoon will bring to customers throughout its service life. And not just operationally, but through shared technology, industrial partnerships and skills development.

**nothing comes close**