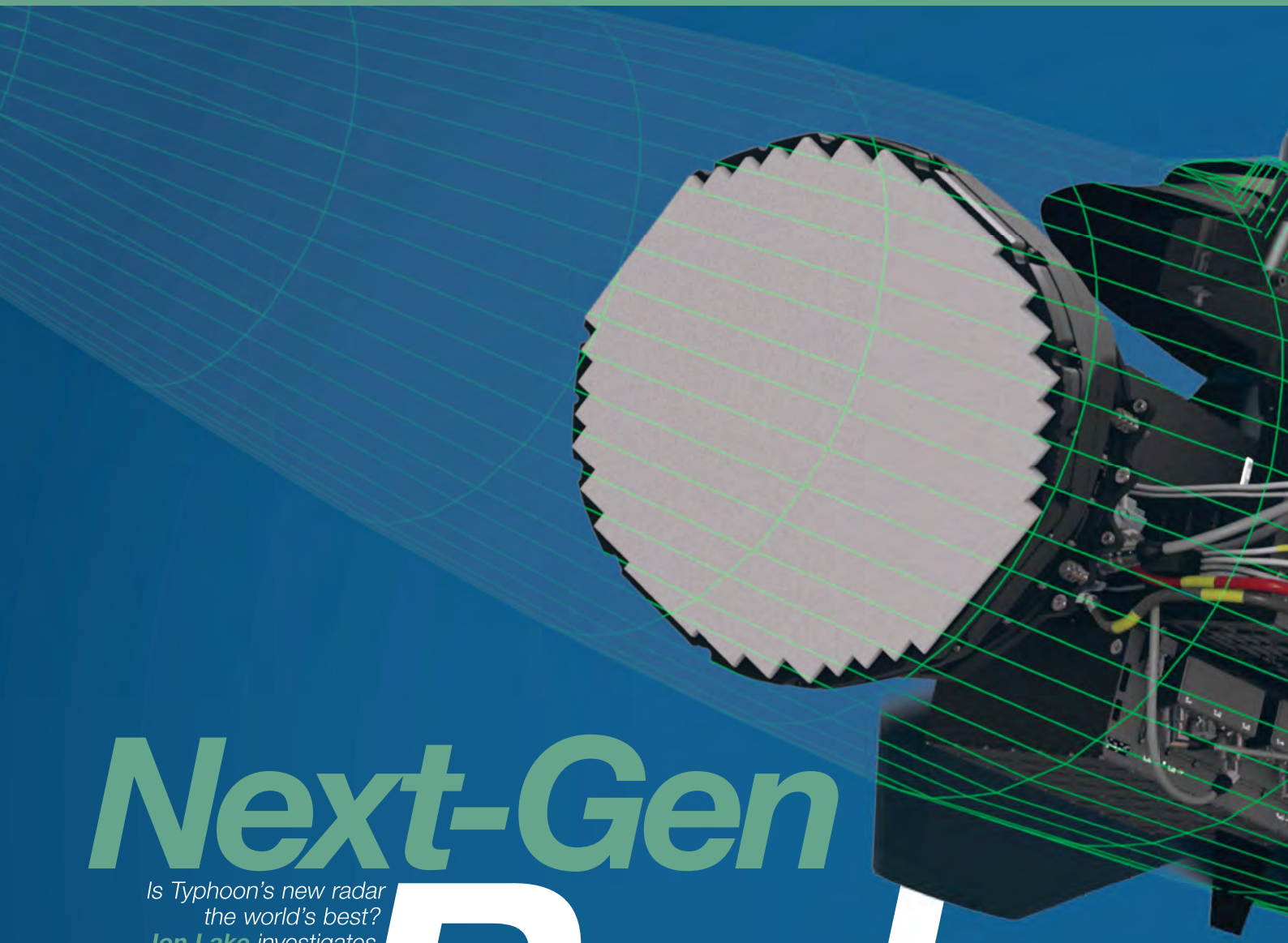


Next-Gen Radar

Is Typhoon's new radar the world's best? ***Jon Lake*** *investigates*

Typhoon's lack of AESA radar has been identified as a disadvantage on the export market. Now, however, multiple options are emerging for potential new and existing operators, while Typhoons retrofitted with the unique ECRS.Mk 2 radar are set to transform UK air power capability.

Leonardo is in the final stages of developing a revolutionary new radar for the Eurofighter Typhoon. Known as 'Radar Two', or more formally as ECRS Mk 2 (where ECRS is an abbreviation of European Common Radar System), it embodies advanced electronic attack (EA) and electronic warfare (EW) capabilities, and Leonardo has described it as the world's most advanced fighter radar.

It promises to enable the Typhoon to operate in even the most challenging contested environments, on its own and autonomously. This kind of environment would once have been thought the exclusive domain of stealthy, fifth-generation aircraft.

With the new radar, RAF Typhoon pilots will be able to locate and identify enemy air defence systems and suppress them using high-powered jamming – adding the suppression/destruction of enemy air defences (SEAD/DEAD) role to the aircraft's multi-role mission set.

Above: ***The clearest photo yet of Radar Two, with its innovative single-axis re-positioner, in a representative Typhoon forward fuselage structure*** *Leonardo*

The Typhoon's relatively wide nose can accommodate a large radar dish, and this in turn allows an antenna to feature a large number of transmit-receive modules (TRMs), arranged in groups forming transmit-receive elements. Leonardo claims that ECRS Mk 2 has significantly more transmit-receive elements than other fighter radars. Because a large dish with a high number of transmit-receive elements generates considerable beam agility, ECRS Mk 2 will have impressive levels of focused power, and, as the Typhoon provides all of the electrical power and cooling that is needed, it will have the ability to generate some

Radar Two shown in situ in the nose of a Eurofighter Typhoon
Leonardo

exceptionally high-powered, focused electronic attack capability. The new radar will also feature greater sensitivity, for unparalleled passive detection and a very long reach.

This means that an ECRS Mk 2-equipped aircraft will detect and engage targets while remaining beyond the reach of threat systems – and will be able to jam enemy radars even when their main lobe may be looking in another direction. The ECRS Mk 2 will also enable the Typhoon to use future data-driven weapons, employing these to combat rapidly evolving air defences and ensuring UK Typhoons will be able to continue dominating the battlespace for many years to come.

In addition to its formidable wide-band EW functionality, and apart from unlocking a real SEAD/DEAD capability, the new radar can simultaneously 'see' further than previous fighter radars, provide the pilot and weapons system with more precise and accurate (weapons quality) target tracking and scan a much bigger 'cake slice' – looking out at much greater azimuth angles and providing greater range at these higher off-boresight angles.

In a typical beyond visual range missile engagement, this will allow Typhoon pilots to get the 'first look' and the 'first shot' and enable them to 'crank' harder, turning further away from the enemy fighter. This will leave the Typhoon less vulnerable to a return missile shot, while still keeping the target in the radar's scan and continuing to support a missile in flight with mid-course updates.

Leonardo claims that ECRS Mk 2 will be the world's most capable active electronically scanned array (AESA) fighter radar, and says it promises to make Typhoon the ideal partner in any fourth/fifth-generation and unmanned force mix for decades to come.

It was once expected that many leading air forces would move to an all-stealth, all-fifth generation force structure, and that fourth-generation fighters would have no part to play. But the growing vulnerability of stealth aircraft to new and developing counter-stealth systems, coupled with their high cost, has led to a growing emphasis on operating fourth- and fifth-generation fighters together, in a more complementary and synergistic fashion. This is

Above: ***One of two released images showing ECRS Mk 2 in the nose of an unmarked Typhoon. The RAF will be the first user of Radar Two, but export orders seem likely*** *Concept artwork courtesy Leonardo*
Below: ***This view of Captor-E shows the innovative dual swashplate re-positioner used on the Mk 0 and Mk 1 versions. The limited single plane of movement does not induce the same unreliability as a traditional radar scanner and brings huge advantages over a fixed AESA array*** *BAE Systems*

what lies behind the resurgence of the Block III Super Hornet and Growler, and also the development of Boeing's advanced F-15EX.

Silent assassin

The ECRS Mk 2 promises to help create a Typhoon standard that enhances the RAF's F-35 force – not merely carrying additional weapons to the fight, but bringing its own advanced capabilities that improve the F-35's survivability and effectiveness. A Typhoon equipped with ECRS Mk 2 will be a very survivable platform, so, while the enemy may know that the aircraft is 'in the area', it will be able to operate as what one programme insider described as a "brute squad", its pilot not having to worry about the aircraft's signature. The Typhoon will carry large numbers of weapons and "rain down electronic attack and the world's supply of SPEAR Capability III or SDBs or whatever weapon you want to use, while the fifth-gen aircraft is acting as a silent assassin, sliding around the back to slip the knife in!

"This is going to be an asset that people are going to want to have there. Just like they want Growlers now, they're going to want Typhoon with ECRS Mk 2, because of the things that it's going to be able to do in the really challenging contested environment, and because of the way it complements and enhances the capability of fifth-generation and unmanned platforms.

"The force mix, the combination of Typhoon with ECRS Mk 2 and F-35, is greater than the sum of their parts. Leonardo's electronic warfare division at Luton are literally at the top of the premier league within the EW market, so we've got something that genuinely adds capability value, even if you're operating as part of a coalition with the US."

This impression of a world-leading, world-beating UK radar might surprise the armchair experts who built up a jaundiced and sceptical view of UK radar capabilities. Many may sympathise, having some memory of (or read about) a number of failed radar programmes from the 1970s and 1980s. For example, the saga of the Nimrod AEW programme has often been portrayed simply as a scandalous and costly failure. The truth is more nuanced, since while GEC-Marconi's radar did fail to meet some parts of the RAF's ASR400 requirement, so too did the APY-1 radar of the E-3 and some of the UK radar's problems were the result of being 'swamped' by vehicular traffic when looking at slow-moving, low-flying helicopters – a capability virtually absent in the E-3!

Under the radar

One of Britain's last big fighter radar programmes – the Tornado ADV's AI.24 Foxhunter – suffered similarly 'bad press'. Technical problems, cost inflation and hold-ups plagued the early Foxhunter, delaying service entry for so long that early F2s were delivered with ballast in their noses. This actually consisted of metal weights, but urban legend had it that the aircraft had concrete ballast, or 'Blue Circle', fitted. (Blue Circle is a well-known cement brand, while UK radar equipment had always used colour-related 'rainbow' code names, such as Green Satin or Blue Shadow, leading to the joke.)

But while Foxhunter's trials and tribulations became well known, subsequent programme progress was much less well publicised and many are unaware of how well regarded the AI.24 radar eventually became. The Foxhunter, was, in any case, something of an aberration.

The ECRS Mk 2 radar owes more to the Leonardo Raven radar fitted to the Gripen E (and tested on the Gripen Demo, seen here) than it does to the original Captor, using the same innovative single-axis re-positioner *Leonardo*

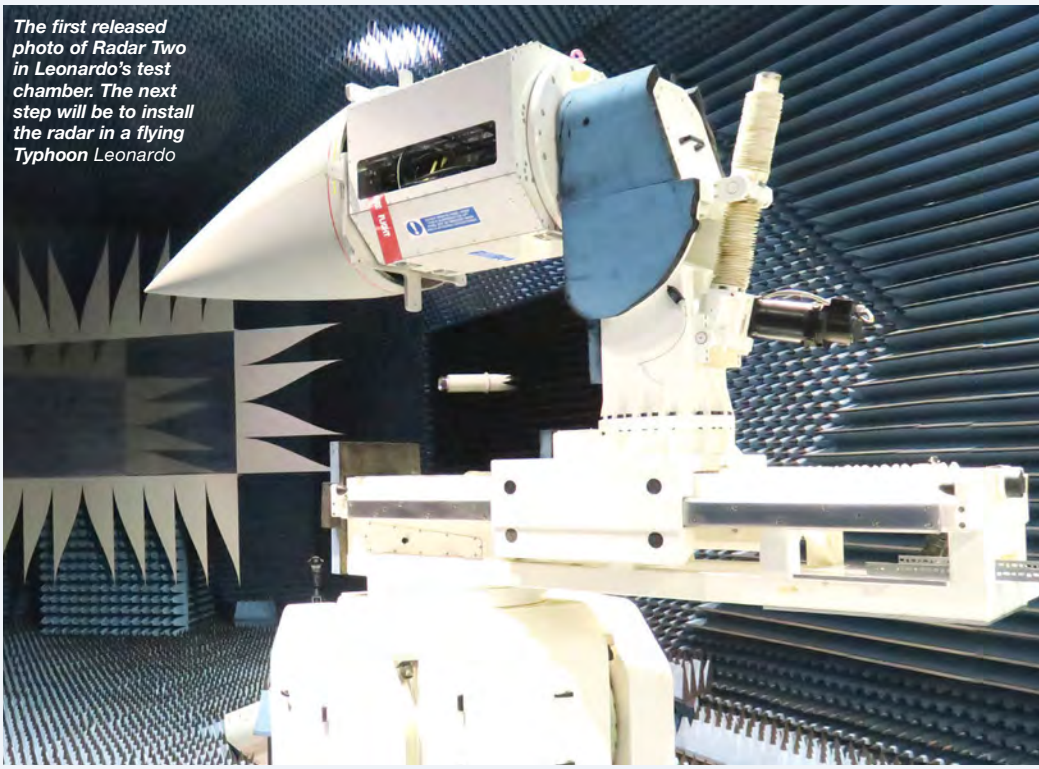
The Blue Vixen (ARI 50019) radar for the second-generation BAe Sea Harrier was regarded by many as being a better fighter radar than the contemporary AN/APG-73 used by later F/A-18 Hornets. Famously, when it was first used on operations in Bosnia, there were claims that it had picked up contacts that could not be detected by AWACS.

Blue Vixen subsequently formed the basis of the Eurofighter Typhoon's original, mechanically scanned (M-scan) Captor radar, developed by the Euroradar consortium, and which soon gained an equally enviable reputation. The Captor-C was fitted to Tranche 1 aircraft, while Captor-D had new PowerPC processors and a new chip architecture, and was designed with later AESA retrofit in mind. The E-scan ready Captor-D version also featured a 0.3m resolution synthetic aperture radar (SAR) mode and improved electronic counter-countermeasures (ECCM) as well as full air-to-ground modes that were not all available for Captor-C.

For some years, there has been a move towards the use of AESA radars, which tend to offer more accurate tracking, better reliability, improved resistance to electronic jamming and greater simultaneous multi-role functionality.

At the same time, the advantages of AESA can be overstated and a few frontline pilots still believe that a high-performance mechanically scanned radar is more than good enough, particularly for some specialised roles.

Development of an AESA radar for the Typhoon began some years ago, though the excellence and impressive operational capabilities of the M-scan Captor were such that it was not accorded a high priority and was initially funded largely by industry.



The first released photo of Radar Two in Leonardo's test chamber. The next step will be to install the radar in a flying Typhoon *Leonardo*

A number of enhancements are being studied for Typhoon. A new large-area display could accompany ECRS Mk 2, along with the new Striker 2 helmet, which would render a traditional head-up display unnecessary BAE Systems

A British/French/German Airborne Multi-Mode Solid-State Active-Array Radar (AMSAR) research and development programme was launched in 1993, which fed into the 2002 British and German industry Captor E-sCAn Risk reduction (CECAR) project. This aimed to develop an AESA derivative of the existing Captor, adding a new AESA antenna to the Captor-D 'back end', but retaining the interface and capabilities of the original system.

A Captor AESA Radar (CAESAR) demonstrator flew aboard a UK Ministry of Defence-operated (MoD) BAC One-Eleven on February 24, 2006 and was later flown on the Eurofighter Development Aircraft DA5, beginning on May 8, 2007, for a four-flight test phase. At this point the proposed CAESAR-based AESA solution for the Eurofighter incorporated a fixed antenna (like most AESA designs), but the UK, in particular, felt that such an antenna would be handicapped by a more limited scan in azimuth and by reduced range at the edges of azimuth coverage.

To overcome this limitation, Euroradar explored a number of 'moving AESA' designs, using a single or double swashplate wide field of regard (WFoR) re-positioner to provide much wider scan limits. The eventual Captor-E was developed using just such a double swashplate re-positioner.

Plans originally called for the incorporation of an AESA radar on all Tranche 3 Eurofighters and these were built with increased electrical power generation capability, improved cooling and structural provision for a heavier AESA antenna.

Typhoon's AESA roadmap

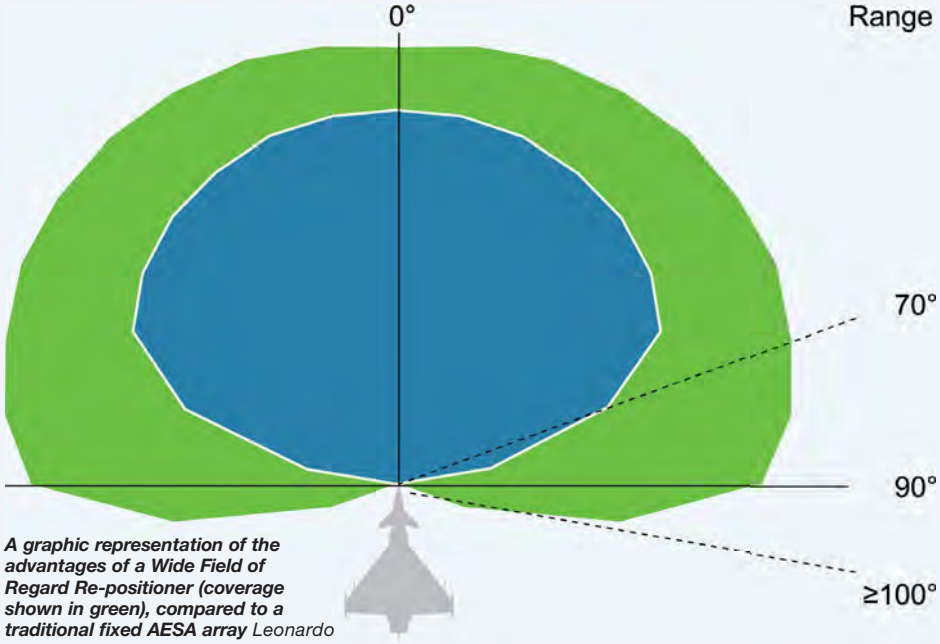
Competing visions of a Typhoon AESA led to delays, but Eurofighter finally established an AESA radar roadmap in 2012, and Eurofighter and the NATO Eurofighter and Tornado Management Agency (NETMA) signed a €1bn contract to develop the electronically scanned Captor-E radar on November 19, 2014. Initially, several versions of the basic Captor-E were envisaged to meet different customer requirements, as variants of what was referred to as a European Common Radar System (ECRS).

The baseline Captor-E AESA radar was developed on a four-nation basis, with Leonardo in the UK and Italy leading the Euroradar consortium that now also included Hensoldt in Germany and Indra in Spain, and leading the design of the radar system.

Also in the UK, BAE Systems had equipment design responsibility, integrating the radar into the aircraft. The AESA antenna, including the WFoR re-positioner, was built from components supplied by all four partner nations, while the processor and receiver were the responsibility of the UK and Germany, and the antenna power supply and control system was from Italy and Spain.

The resulting Captor-E was a minimum-change version of the M-scan Captor-D radar, combining a new AESA antenna with the existing Captor back end. The antenna was mounted on a dual-swashplate re-positioner, meaning that the radar 'beam' was steered both mechanically and electronically, allowing higher off-boresight angles to be reached, and improving range at high azimuth limits.

Work on Captor-E began using industry funding and an initial radar was fitted to a UK-based Typhoon test aircraft, Instrumented Production Aircraft (IPA) 5 (ZJ700), in time



A graphic representation of the advantages of a Wide Field of Regard Re-positioner (coverage shown in green), compared to a traditional fixed AESA array Leonardo

to be shown on static display at the 2014 Farnborough International Airshow. Flight trials began on July 8, 2016, out of BAE Systems' Warton aerodrome. A German Tranche 3 Eurofighter, IPA8, operated by Airbus Defence and Space, joined the test programme from September 2016, flying from Manching.

All Captor-E antennas were produced by Hensoldt. Some were equipped with TRMs from the UK and some with TRMs from Hensoldt. The antennas flown on IPA5 and IPA8 were both equipped with UK TRMs, however.

Flight testing (using production-standard AESA radar sets) confirmed the tactical advantage conferred by the radar's re-positioner. It was found to provide a 50% wider field of regard than conventional fixed E-scan antenna systems.

Gathering momentum

The AESA programme accelerated after Eurofighter and Finmeccanica (now Leonardo) signed an US$8.7bn contract with Kuwait in April 2016 for the delivery of 28 aircraft, followed by Qatar signing a contract with the UK for 24 Typhoons in December 2017. Both new export customers ordered AESA-equipped aircraft and integration of the AESA radar became part of the fighter's Phase 3B Enhancements (P3Eb) programme.

This meant that the first production variant of the new Captor-E AESA radar (known as Radar One Plus and later as ECRS Mk 0) was developed primarily to meet the requirements of Kuwait and Qatar. Hensoldt delivered the first production antenna on December 5, 2018, stating it was confident of keeping the delivery cadence at 'full production rate capacity'.

The new radar successfully completed two flight campaigns at BAE Systems Warton and Airbus Defence and Space in Manching, in the spring of 2018. These were basic mechanical and electrical integration test flights, and allowed the radar to meet the requirements of the critical design review exactly on schedule.

The first Typhoon in Kuwait Air Force configuration – Instrumented Series Production Aircraft (ISPA) 6 – joined the test effort on December 23, 2019. It conducted the so-called 'E-scan XCR#1' flight test campaign between March 3 and 27, using other Typhoons as radar targets. That completed E-scan entry-into-service flight tests and the overall P3Eb flight test campaign, readying the way for deliveries to Kuwait, though these were then delayed by COVID-19.

It was once expected that the export radar would be equivalent in performance to the M-scan unit, while the core nation version of the radar would offer increased detection and tracking ranges in comparison with the standard M-scan Captor, plus expanded air-to-ground capabilities, including high-definition SAR mapping. Export and four-nation standards have since converged on the Radar One Plus (Radar 1+) standard, with the same hardware, software and performance, so that the basic Radar 1+ performance baseline is equal for all customers, and with additional functionalities required by some covered by further software releases.

There was thus an expectation that the four-nation Radar 1 version of Captor-E for the original Eurofighter partner air forces would use the same hardware as the export standard Radar 1+, but with additional documentation and performance data to satisfy the four-nation requirements set down by NETMA.

Instead, a new version of Captor-E is being developed to meet German and Spanish requirements. Germany has a requirement to retrofit AESA radars to 110 of its Tranche 2 and Tranche 3 Eurofighters and to equip the

An AESA array will allow the fullest exploitation of MBDA's ultra-long range Meteor air-to-air missile, seen here during a live QRA scramble from RAF Lossiemouth *Royal Air Force*

This remains the only released photo of the Typhoon's Captor-E without a security cover. The photo has been manipulated to prevent anyone from counting the number of TRMs on the array. The aircraft is the UK test asset IPA5, which has been flying with production standard ECRS Mk 0 hardware and software *BAE Systems*

38 new-build aircraft being acquired to replace Tranche 1 machines under Project Quadriga. Spain plans to retrofit 19 of its Eurofighters.

Hensoldt was awarded a €1.5bn contract by Airbus Defence and Space to develop and produce a new ECRS Mk 1 AESA radar for the German and Spanish Eurofighter fleets. The ECRS Mk 1 is a development of the Kuwait/Qatar standard Mk 0 and will be fitted with a new digital multi-channel receiver and new transmitter/receiver modules to be developed by Hensoldt. The German and Spanish aircraft will initially be fitted with the same Mk 0 radar as that supplied to Kuwait and Qatar, but their radars will subsequently be upgraded to Mk 1 standard by retrofitting the new equipment.

Hensoldt will be the design authority for the Mk 1 radar, drawing on its years of partnership with Leonardo in producing the current Typhoon radar. Airbus will have equipment design responsibility for the new variant. Leonardo will provide a significant level of support to enable Hensoldt to assume design authority and will also continue to provide the processor for the German radar.

Radar Two for the UK

Though UK companies had leadership of the Captor-E project, there was never any chance that the baseline Mk 0 radar would be used by the RAF. Its corporate heart was always set on a more capable and more advanced radar, which would incorporate extensive electronic attack and electronic warfare capabilities.

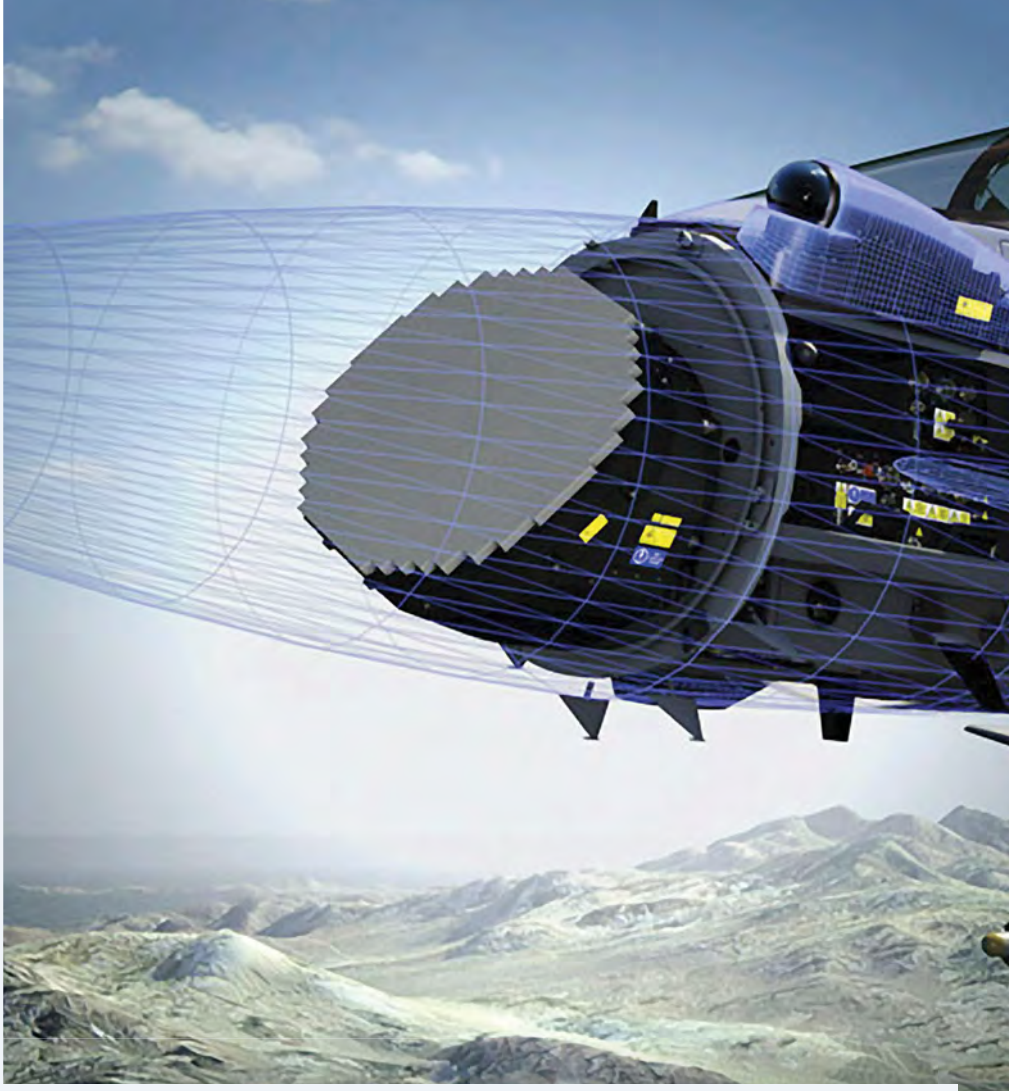
The UK always resisted pressure to adopt what was once hoped to be a four-nation AESA programme, insisting that the RAF needed a more advanced set, known as Radar Two, or ECRS Mk 2. This led to a divergence in AESA radar development for the Eurofighter.

The British ECRS Mk 2 is derived in part from the Advanced Radar Targeting System (ARTS) and Bright Adder technology demonstrators, not from the original Captor-C/D radar or the AESA-equipped Captor-E.

The ARTS effort began in February 2006, when the UK MoD awarded a contract to QinetiQ to demonstrate the advanced targeting capability offered by E-scan radar technology. Electronic attack was a key part of the ARTS programme. QinetiQ teamed with Selex Sensors and Airborne Systems (now Leonardo) and BAE Systems Customer Solutions & Support to integrate the Advanced Radar Targeting System (ARTS) on Tornado GR4A ZG707 – the Tornado Research Exploitation Vehicle, or TREV, for assessment by the RAF in 2007.

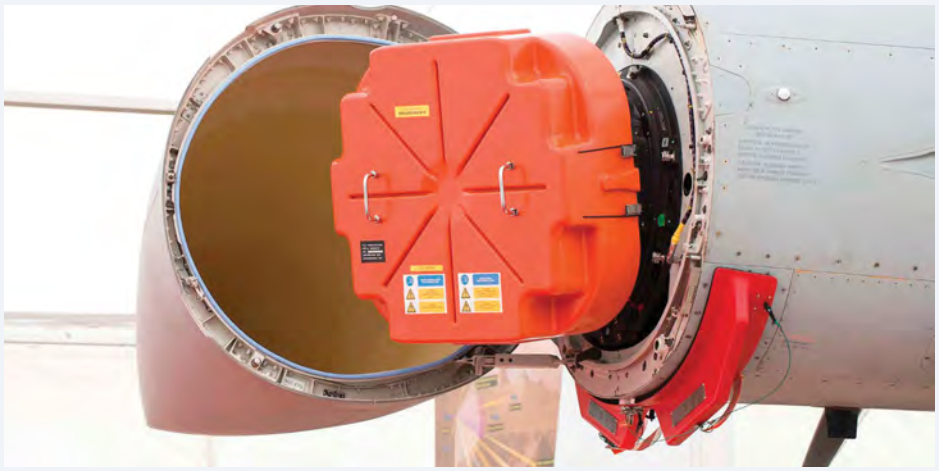
The eventual aim was an AESA upgrade for the Tornado GR4, replacing its 1970s-era mechanically-scanned terrain following/ground mapping radar system. This was to meet a requirement known as Reforger, and had a planned in-service date of 'soon after 2010'. Though Reforger was cancelled, ARTS formed the basis of UK efforts to provide an AESA for the Typhoon, primarily via the Bright Adder Technology Demonstration Programme (TDP).

Bright Adder was launched somewhere around 2010, based on the ARTS concept, but in a form factor suited to the Typhoon. It was intended to demonstrate capability better than that achieved with Typhoon's existing air-to-air radar modes, while also offering electronic attack capabilities. Bright Adder is reported



Above: ***Meggitt has secured a £4.2m contract for the supply of an innovative new nose radome technology to enable effective operation of the ECRS Mk 2 radar. The radome will be tailored to higher and broader bandwidths, but will follow the same outer mould line as the existing item*** *Meggitt Below:* ***Typhoon's first AESA was the CAESAR (Captor AESA Radar) demonstrator, which flew on board a UK-based BAC One-Eleven, before undergoing a brief series of trials fitted to the German Eurofighter test aircraft DA5. CAESAR had a fixed array*** *Author's collection*

Above: ***Typhoon's lack of an AESA radar has been a perceived weakness on the export market. Now, belatedly, three different AESA radars are being offered*** *Leonardo*
Below: ***The Captor-E made its public debut in a static display during the 2014 Farnborough International Airshow. The array itself was concealed behind a red security cover. Inexplicably, it would be another two years before flight trials began*** *BAE Systems*



The APG-79 radar of the Super Hornet is typical of older, fixed-antenna AESA radars. Fixed arrays rely entirely on phase shifting to steer the 'beam', and suffer reduced range at higher azimuth and elevation angles *Raytheon*

to have successfully demonstrated novel 'jamming through the radar' techniques and functionality. Although built as a flyable asset, the Bright Adder radar was not flown, however, instead being used in Leonardo's roof lab at Crewe Toll in Edinburgh.

By mid-2020, a test and evaluation contract for the previously little-known 'Radar Two' was widely anticipated to allow development of the radar to be completed. It was also predicted that a development contract would include the production of five radar sets for flight trials.

There were reports that a test version of the radar was being operated in Leonardo's Crewe Toll roof lab and that Radar Two formed part of the Eurofighter offering to meet the Finnish HX fighter requirement. Some sources even suggested that the radar had been demonstrated to Finnish personnel.

Investment pay-off

Finally, on September 3, 2020, UK Minister for Defence Procurement, Jeremy Quin, announced that a £317m contract had been signed, covering the integration of a new AESA or E-scan radar on the Typhoon, to meet RAF requirements. It revealed that the new ECRS Mk 2 had been developed by Leonardo and that it would be integrated by BAE Systems, the UK's prime contractor for the Typhoon.

The contract was the product of ten years of MoD investment in UK radar/EW programmes, although a further ECRS Mk 2 contract will be needed before the series production phase, even though some long-lead procurement and manufacturing was included in this latest one. While the September 2020 contract was far from being the final step in equipping RAF Typhoons with a new radar, it was a critical step in the long-term air capability plan.

It had been widely assumed that the UK's Radar Two would be an incrementally improved version of the baseline Captor-E, sharing maximum commonality with Radar 1+ in its hardware and operating interfaces, albeit probably with a different antenna. But in the wake of the contract announcement, more detailed information about the new radar emerged. It soon became clear that it has little in common with previous Euroradar AESA units, despite sharing the same ECRS designation prefix.

The ECRS Mk 0 fitted to Kuwaiti and Qatari Typhoons, and the ECRS Mk 1 being developed for the German/Spanish retrofit programme, are both derivatives of the M-scan Captor-C/D. They use the same back-end, married to a new AESA array mounted on a double swashplate re-positioner. They are collectively known as Captor-E variants.

The ECRS Mk 2 radar shares its platform and weapons-system interface with other Captor-E variants, via the German-supplied attack computer, and it uses the same power generation and cooling. However, the new version has no common hardware from the power supply forward, and is actually not based on Captor technology at all.

Instead, Radar Two uses a completely new open-architecture back end, married to what Leonardo has referred to as a 'revolutionary' multi-function array. This will incorporate both gallium arsenide (GaAs) and gallium nitride (GaN) semi-conductors, blending the strengths of these

two different technologies to cost-effectively provide a differentiating military capability.

The ECRS Mk 2's back end includes a completely new processor and receiver, a dedicated EW receiver and techniques generator. Its open architecture is intended to enable the rapid low-cost development cycles necessary for the radar to be adapted to counter dynamic and developing threats. The concept is that the whole radar will become what is being called 'mission ware', which can be changed with the same level of overhead and difficulty as it now takes to change mission data. Crucially this can be achieved without going back through the safety case every time the software is changed.

Radar Two also employs a completely different system for the antenna re-positioner, using a single rotating joint, like that used on the ES-05 Raven radar fitted to the Gripen E, rather than the double swashplate arrangement of the Captor-E. The aircraft will use a new radome tailored to support the ECRS Mk 2's wide bandwidth.

The initial plan is to retrofit all 40 of the UK's Tranche 3 Typhoons with ECRS Mk 2, although there is an option to re-equip Tranche 2 Typhoons as well. Both tranches have the necessary pre-mods to allow the retrofit, but the decision does not need to be made yet.

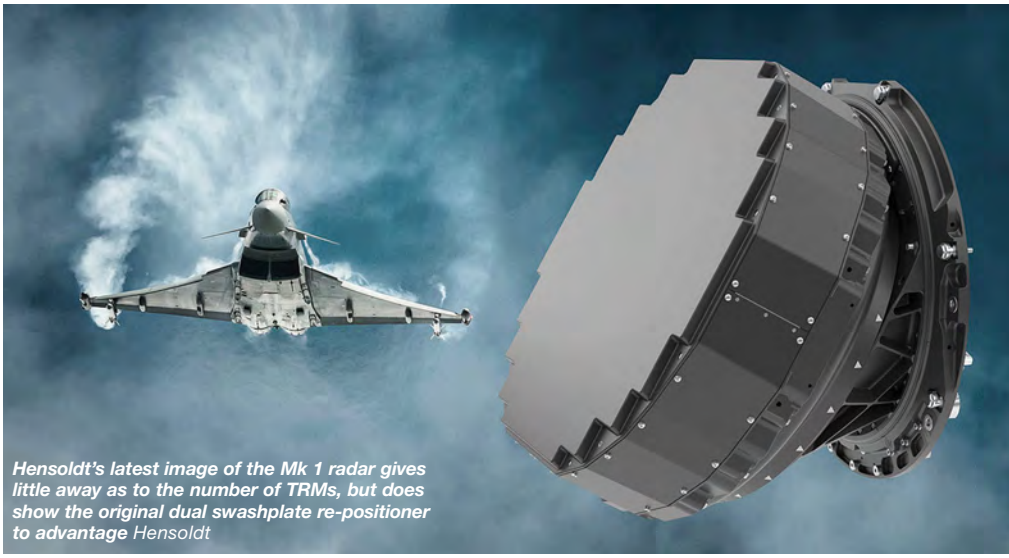
Testing timeline

A carefully co-ordinated test plan will ensure that an ambitious timetable is achieved, using a comprehensive array of airborne and ground-based test assets. The latter include Leonardo's Edinburgh roof lab and test facilities at Warton, where the radar can be operated 24 hours a day, seven days a week, if required. Synthetic and modelling assets will also be employed, reducing programme risk and flight test time. Flight testing is expensive and often limited by weather and asset availability, leading to delays.

The Bright Adder test radar will now fly on a Typhoon as part of the ECRS Mk 2 test and evaluation (T&E) effort, along with a number of other test radars and the first three production systems. The first Radar Two will fly in a Typhoon in 2022 and the T&E fleet will build steadily from there, achieving initial operational capability (IOC) for the ECRS Mk 2 soon after 2025.

A programme insider noted that the September 2020 contract was the fifth cycle of activity that he had personally seen on ECRS Mk 2, and that during those cycles, the schedule and planned timeline had been maintained, giving him confidence that the IOC will be achieved.

The ECRS Mk 2 forms a key part of the UK's long-term vision for Typhoon, establishing a cornerstone of the so-called Eurofighter long-term evolution. But it is also a critical building block for future combat air capabilities more widely and is part of the broader effort to mature key technologies and operational concepts, and capabilities for future combat air systems, perhaps including Tempest.



Hensoldt's latest image of the Mk 1 radar gives little away as to the number of TRMs, but does show the original dual swashplate re-positioner to advantage *Hensoldt*

The ECRS Mk 2 development contract presents employment opportunities and will sustain more than 600 highly-skilled jobs across the UK, including more than 300 at Leonardo's site in Edinburgh, 100-plus electronic warfare specialists at the company's site in Luton and 120 engineers at BAE Systems' sites in Lancashire, 100 at its facility in Dunfermline, Fife and 50 at sub-contractor Meggitt in Stevenage, Hertfordshire. It is hoped the ECRS Mk 2 programme will preserve some of the key skills needed to keep the UK at the forefront of the global combat air sector, which was a significant ambition of the broader UK 2018 combat air strategy.

Bidding for business

The new radar is also being offered to export customers. It promises to allow air forces to operate a single-platform Typhoon fleet, even when in the most challenging contested environments, and not simply as an adjunct to fifth-generation fighters.

Radar Two is known to form part of the Eurofighter bid in Finland, where the Typhoon offer is based on alignment with the RAF Tranche 3 aircraft standard. Radar Two is also likely to be included in any further Typhoon procurements by Saudi Arabia and Oman, where commonality with the RAF Typhoon is highly prized.

BAE Systems' former Finland Campaign Manager, Wg Cdr Anthony 'Foxy' Gregory, has said that ECRS Mk 2 "makes the case for Eurofighter in Finland more compelling". He says that Finland has "a predominantly defensive posture against adversaries, and is looking to protect a long land border", making the HX competition "predominantly a high-end air defence type of requirement, albeit operating in a high-threat environment, from the point of view of some of the adversary threat systems that might be deployed".

Gregory says that Typhoon offers advantages over the F-35 in terms of speed, range and reach, with greater autonomy and sovereignty in mission data and, thanks to Radar Two, enjoys a similar ability to operate and survive in a contested environment.

Ironically, in view of its selection of the ECRS Mk 1 for its Tranche 2/3 upgrade and Tranche 1 replacement requirements, Germany could still be a customer for ECRS Mk 2. It needs to replace some 85 surviving Tornados and may still opt for a split buy of Super Hornets and Eurofighters, divided between 30 Block III F/A-18E/Fs and 15 of the E/A-18G Growler EA and SEAD version, plus 40 Eurofighters, to replace the Tornado for strike missions, with an option for a further 15 aircraft for EA.

Alternatively, Germany could still opt for an all-Eurofighter solution. It has been reported that then-German defence minister Ursula von der Leyen may have favoured equipping these aircraft with Radar Two, though Airbus' unveiling of a dedicated SEAD variant (the so-called Eurofighter ECR) to meet the Luftgestätze Wirkung im Elektromagnetischen Spektrum (LUWES, or airborne action in the electromagnetic spectrum) requirement may make this option less likely. AFM

Radar Two will equip RAF Tranche 3 Typhoons, and promises to prove technology that will be used by the new Tempest *BAE Systems*


EUROPE
Eurofighter Typhoon – developed by Europe, for Europe.
Eurofighter Typhoon
www.eurofighter.com
Effective Proven Trusted