

 **Austria**



Typhoons affected by politics

In 2002, it came as a big surprise to many when Austria ordered two dozen Eurofighter EF-2000s from EADS (now Airbus Defence and Space) in a deal worth €24bn. This brave attempt to replace the 24 used Saab S-350E Mk 2 Drakens for the next 40 years beat off the Gripen and F-16.

The Tranche 2 Eurofighter deal was eventually agreed by NETMA – the NATO Eurofighter 2000 and Tornado Management Agency – and industry in 2004. However, political and media controversy over the deal continued, resulting in six aircraft being axed from the contract so funds could be diverted to Austria's recovery from severe floods later in the same year. The agreement led to Austria paying by instalments from 2007.

On July 12, 2007, the first of 15 single-seaters landed at their

new home, Zeltweg Air Base. Another three had already been axed by an incoming socialist defence-minister, whose party had promised to cancel the whole deal, but legally could not. What happened instead was 'mutilation' of the 15 aircraft, which by then comprised only Tranche 1s – of which six were ex-German Air Force aircraft with around 400 flying hours – while the PIRATE infrared search and track (IRST), Defensive Aids Sub System (DASS) self-defence kit and the type's main AIM-120 BVR armament were all chopped.

Today, for quick reaction alert (QRA) duties, aside from the 27mm gun, only single examples of around 20 analogue-integrated IRIS-T short-range air-to-air missiles are carried. As if things could not get any dafter, Austria

is now the only European country without 24/7 QRA coverage. Furthermore, after 15 years of limited but uneventful service, there have been no upgrades to Austria's Eurofighters. This has not been due to lack of funds, but because of politics, as it would always be a contentious election subject, so politicians have merely ignored the possibility of modernising the aircraft, to avoid any controversy.

In October 2020, it was revealed Indonesia had offered to buy all of Austria's 15 Eurofighters, but nothing more came of this proposal and instead Indonesia bought Rafales and is considering the F-15EX. The chairman of Austria's defence committee and military spokesman, Dr Reinhard Bösch, said after the announcement: "This is the right time to finally

bury all fantasies about the future of domestic air surveillance. Last year, the minister of defence had considered wanting to secure domestic airspace surveillance with 'international co-operation'. Airspace surveillance must be ensured by the Austrian Armed Forces – this is non-negotiable and also stipulated by the Austrian constitution."

The Eurofighters will obviously continue to play an important role in the national army strategy. Bösch, for cost reasons, wants to go back to a two-fleet strategy. Since the Saab 105 jets were retired, the Eurofighters have had to manage airspace surveillance alone, which is very expensive and for which the training abroad is also expensive. He continued: "The ÖVP [political party] has been putting the brakes on the



Austria's fleet of 16 Eurofighters have been subjected to years of political neglect Georg Mader



Below: The Pilatus PC-7s are fitted with machine guns and rocket pods for QRA to cover just the 'slow movers', or during times when airspace is temporarily closed for big state-like events Georg Mader

Order of battle

Air Surveillance Wing	Zeltweg
1st Squadron	Eurofighter EF-2000
2nd Squadron	Eurofighter EF-2000

Source: *AirForces Intelligence*

Inventory

Inventory	Delivered	Current
Eurofighter EF-2000	15	15

Source: *AirForces Intelligence*

successor decision for the Saab 105 for years because national defence is simply not important to them. There must therefore be a change of course here."

For many years there have also been unproven allegations of bribery surrounding the original Eurofighter deal. On January 8, 2021, Austrian Defence Minister Klaudia Tanner expressed interest in selling the Eurofighters as soon as possible, even though there had been no examination of any possible replacement.

Today, there are about 16 Austrian pilots fulfilling the daily air-policing role on the type, so far with no losses or major mishaps. Despite this, there is the belief among these pilots, expressed to the author only last October, that those coming up through the new pilot training will not show the proficiency and situational awareness required. Since the 50-year-old Austrian Saab 105OEs

were retired at the end of 2020 with no specific replacement, after initial Phase II pilot training on the PC-7 Mk II, students were sent abroad for further training. They went to Lecce and Decimomannu in Italy and Laage-Rostock in Germany for almost three years. But they had not flown the kind of squadron profiles needed in Austria with its unique phraseology, topography and meteorology. There is also reported to be a continuing critical lack of specialist ground personnel such as radar officers, military air traffic controllers and firefighters.

Technically, the 15 aircraft are at software level SRP 4.3, with the drop tanks and other elements of Tranche 2. They are currently receiving a replacement transponder, upgrading from Mode-3 to Mode-5, which is expected to be a mandatory requirement by 2023 due to new international airspace regulations. A unit cost of around €175,000 has been quoted for this work, with Leonardo a potential source. Replacement of the datalink-system is planned for this year too, once again due to international regulations.

The Ministry of Defence is well aware that night-vision goggles and recce/targeting pods, costing about €28m, are also needed. For maintenance-materiel and – increasingly harder in Tranche 1 – related replacement of individual components, costs of between €165m to €210m over the next ten years have been estimated. But recently a government-to-government-based agreement was struck with Italy, which is persevering with the Tranche 1s.

The support contracts with industry could switch to Italy from Germany, due to the former's alleged but never proven allegations of corruption in the deal with Austria. These contracts cover flaps, radar, canopy and ejection-seats; to be renegotiated this year. Eurojet engine contracts (with Avio, MTU or RR) run until 2023 or 2025. **Georg Mader**



Busy F-16 fleet

The remaining fleet of 45 F-16AM (MLU) and eight F-16BM (MLU) Fighting Falcons out of the 184 purchased by Belgium is entering the final phase of its operational life. That's when the aircraft reach their Lockheed Martin-certified 8,000 flight hours and are retired. In terms of flying hours, the Belgian F-16MLU fleet is one of the oldest in Europe, with the last aircraft due to be retired from the fleet in 2028.

The introduction of the 250lb GBU-39 bomb was the last major investment in these aircraft. The bombs were used for the first time during Operation Desert Falcon (ODF) out of Al Azraq in Jordan, which ran from October 1, 2020, to September 30, 2021. Four Fighting Falcons manned the third

one-year det after ODF 2014-2015 and ODF 2016-2017. This last deployment saw the F-16s fly 302 missions for a total of 3,047 flying hours. The detachment comprised about 100 personnel. With two missions per day, six days per week, a total of approximately 250 flight hours per month were flown.

These ODF missions were Belgium's main contribution to Operation Inherent Resolve

(OIR), launched by the US in October 2014. Since the fall of the Islamic State caliphate, armed interventions over northeast Syria (15%) and Iraq (85%) have decreased significantly, from 324 for ODF 2014-2015 and 675 for ODF 2016-2017 to 29 for ODF 2020-2021. The F-16s that flew these missions came from Florennes and Kleine-Brogel, with a mix of pilots from the four

squadrons. For maintenance reasons, the aircraft had to return to Belgium every 300 flying hours and replaced by other fighters.

From December 1, 2021, until March 31, 2022, four F-16s were deployed to Amari in Estonia as part of NATO's enhanced Air Policing (eAP) mission.

On October 26, 2018, Belgium signed a purchase contract for 34 Lockheed Martin F-35A Lightning II aircraft worth €3.6bn. Production of the first Belgian aircraft is scheduled to start in 2022, with deliveries to commence at the end of 2023 and spanning seven years. Lockheed Martin (LM) will work closely with the Belgian government to ensure that the necessary equipment (including simulators, support equipment,

Order of battle

2 Tactical Wing	Florennes
1 Sqn	F-16AM/BM (MLU)
350 Sqn	F-16AM/BM (MLU)
10 Tactical Wing	Kleine-Brogel
31 Sqn	F-16AM/BM (MLU)
349 Sqn	F-16AM/BM (MLU)

Source: AirForces Intelligence



Four Belgian F-16MLUs, with two aircraft equipped with AIM-120B AMRAAM missiles and AIM-9M Sidewinder missiles for QRA missions in the foreground All images: Benoît Denet

spare mission equipment and helmets) is provided to support the Belgian aircraft.

The training of the first pilots is planned at Luke AFB, Arizona, in co-operation with the USAF and LM. From 2024 to 2028, eight aircraft will be based at the facility, just outside Phoenix with 48 pilot training slots that will be filled by former F-16 Mid-Life Update (MLU) pilots and young pilots with basic training without F-16AM/BM (MLU) experience. These 48 trainees will form the initial cadre of operational pilots, with this number expected to increase after 2029 to 60 pilots.

Together with the Netherlands, the Belgian Air Component continuously monitors the Benelux airspace 24 hours a day, 365 days a year. Since January 2017, these missions are alternated with the Royal Netherlands Air Force (RNLAf).

At the moment, the RNLAf is in charge of the QRA. However, the control and reporting centres of each country (Beauvechain in Belgium and Nieuw-Milligen in the Netherlands) operate separate radar coverage.

For this QRA mission, the Belgian Air Component (when in charge) has two F-16s equipped with a pair of AIM-120B AMRAAM missiles, two AIM-9M or X Sidewinder missiles and a 20mm gun loaded with 510 bullets.

The Belgian Air Force (BAF) has



This F-16AM (MLU) is equipped with a 250kg GBU-54 Laser Joint Direct Attack Munition (LJDAM) and AIM-120B AMRAAM missiles

Inventory

Inventory	Delivered	Current
F-16AM (MLU)	72	45
F-16BM (MLU)	18	8
Originally 136 F-16As and 24 F-16Bs delivered between 1979-1991, with 72 F-16As converted to AMs and 18 F-16Bs converted to F-16BMs. A total of 37 F-16s have been lost in service.		
Source: AirForces Intelligence		

decided that its four squadrons operating the F-16MLU – 31 Sqn and 349 Sqn at Kleine-Brogel AB and 1 Sqn and 350 Sqn at Florennes AB – will be converted to the F-35A. The investment plan for the construction of infrastructure at these two bases is being prepared by the Belgian government. The first F-35As will arrive at Florennes in mid-2025 and at Kleine-Brogel in mid-2027. On each of the two bases, four full flight simulators (FFS) will be installed and, in the

future, the concept of Live Virtual Constructive Training (LVCT) is being studied. This concept will allow a mix of virtual and live connected training between the two bases and other countries.

The Belgian F-35As will be delivered in Block 4 standard with advanced computer systems, sensors and weapons integration capabilities that meet current and future operational requirements. For air-to-air and air-to-ground armament, Belgian Defense wants to recover as much as possible of the stocks from the F-16AM/BM (MLU) during the operational transition period. To meet future requirements, a specific weapons acquisition programme is currently being considered.

Discussions between the Joint Program Office and the US government will determine the maintenance requirements to support the Belgian fleet. BAF will perform most of the work (O and O+ maintenance), but major modifications (depot level maintenance) requiring specialised equipment will entail the F-35As being sent to a heavy airframe maintenance, repair, operation and upgrade (MRO&U) facility.

On January 21, 2022, the Belgian government decided to increase its defence budget to 1.54% of GDP by 2030. Nevertheless, the purchase of 11 additional F-35As requested by NATO, as well as the decision to arm the four MQ-9B SkyGuardian drones, was not approved.

Benoît Denet



Belgian Air Force armourers load an unarmed GBU-31 Joint Direct Attack Munition (JDAM) onto an F-16BM (MLU) during training

Bulgaria



Cold War vets soldiering on

The Bulgarian Air Force (BVVS – Bulgarski Voennovazdushni Sili) fields an air defence fighter fleet of 11 non-upgraded single-seat and three two-seat MiG-29s. Taken on strength in 1989-1990, the *Fulcrums* are serving with the single air squadron of the 3rd Aviobaza (Air Base) at Graf Ignatievo near Plovdiv.

The base offers Bulgaria's most important contribution to the NATO Integrated Air and Missile Defence System (NATINAMDS). Two MiG-29s – plus a back-up *Fulcrum* – are kept on 24/7 quick reaction alert (QRA) duties for the air policing mission of the country's airspace and the adjacent area of responsibility over the Black Sea.

QRA-tasked MiG-29s are armed with two R-73E (AA-11 *Archer*) short-range heat-seeking air-to-air missiles and carry one 1,500lit external tank, enabling the *Fulcrum* to stay in the air for up to an hour and a half when engaged in long-range operations over the Black Sea.

However, no upgrades have been implemented and the ageing MiG-29 fleet in Bulgarian service still retains its 1980s-vintage mission and flight/navigation avionics. The *Fulcrums* have suffered badly from maintenance underfunding since the early 2010s.

The latest effort to improve the MiG-29's declining airworthiness rates by the Bulgarian Ministry

of Defence (MOD) dates from late 2017, when it entered into a framework support agreement directly with RSK MiG, the MiG-29's original equipment manufacturer (OEM), priced at BGN81.3m (US\$49.2m). It covers deep airframe inspections, deliveries of spare parts, provision of engineering services and training in addition to repairs and overhauls

of various components and systems, but the results were far from expectations. This year, the MoD looks set to continue with the effort to maintain the *Fulcrum* fleet under contracts with the OEM.

The main argument behind the Bulgarian government's multiple decisions to continue investing in the maintenance of its aged MiG-29 fleet – an increasingly costly undertaking in the near to mid-term – is that the fighter is being regarded as Bulgaria's principal contribution to NATINAMDS. The type is set to continue playing this important role in the foreseeable future, until its complete replacement by the F-16 Fighting Falcon, but this is not due to happen before 2026.

According to the latest MOD plans, unveiled in 2018, the MiG-29 fleet is scheduled to remain in service until the second half of this decade, albeit in reduced numbers. The Bulgarian MOD also said proposals for switching to maintenance support provided by Ukrainian and Polish

Order of battle

3rd Fighter Air Base	Graf Ignatievo
2/3 Fighter Squadron	MiG-29/MiG-29UB <i>Fulcrum</i>
22nd Air Base	Bezmer
22 Air Attack Squadron	Su-25K/Su-25UBK <i>Frogfoot</i>

Source: *AirForces Intelligence*

Inventory

Inventory	Delivered	Current	Notes
MiG-29 <i>Fulcrum-A</i>	18	12	
MiG-29UB <i>Fulcrum-B</i>	4	3	
Su-25K <i>Frogfoot</i>	6	6	
Su-25UBK <i>Frogfoot</i>	2	2	
F-16C Block 70	-	-	Six on order, for delivery 2024
F-16D Block 70	-	-	Two on order, for delivery 2024

Source: *AirForces Intelligence*

Despite constantly increasing maintenance costs, the BVVS is set to keep in service its ageing MiG-29 fleet. The Soviet-era fighters provide Bulgaria's contribution to the NATO Integrated Air and Missile Defence System

All images: Alexander Mladenov



industry are unrealistic, as they lack all the capabilities needed.

In July 2019, the MOD placed an order for eight newly built F-16C/D Block 70 Fighting Falcons. Valued at US\$1.265bn, the Foreign Military Sale covers delivery of six single-seat F-16Cs and a pair of two-seat F-16Ds to Bulgaria, with a small package of air-to-air munitions comprising AIM-120C-7 and AIM-9X missiles, Sniper advanced targeting pods (ATPs) and Mk 82 unguided freefall bombs, plus pilot and maintenance personnel training, ground support equipment and logistical support.

The announced delivery schedule at the time of placing the order called for the first two aircraft to arrive in Bulgaria in November 2023, followed by



Primary missions assigned to the upgraded Su-25 fleet of 22nd Aviobaza at Bezmer are provision of close air support and interdiction in addition to support of naval operations in the littoral zone

four more in April 2024, while the last two examples were to be taken on strength in August 2024.

However, in January 2022, it was formally revealed by the capital Sofia that delivery would be delayed by "several months" as a result of the pandemic. Bulgarian Defence Minister Stefan Yanev announced the news during a hearing in front of the defence committee of the Bulgarian Parliament. He said he had received information from the manufacturer citing delays in the supply chain that would affect all customers of the newly produced F-16s. Yanev hinted he expected the delay to be measured in months, but added that the forecast would be discussed in the second half of February with a US delegation arriving in Sofia.

The BVVS's current development plans call for the fielding of a single squadron equipped with the type, with a fleet of 16 aircraft, in an effort to fully replace the MiG-29 fleet at Graf Ignatievo. To initiate the process for the procurement of the second batch, in August 2021 the Bulgarian MOD

released a letter of request (LOR) for a letter of offer and acceptance (LOA) for eight more F-16 Block 70s, together with an air-to-air and air-to-ground weapons package, as well as logistics, training and aircraft maintenance equipment. The US response, in the form of an LOA, was expected to arrive in Sofia by March 2022, but the unfavourable financial situation in Bulgaria – due to COVID-19 and energy issues – threatened postponement of the second batch purchase for an indefinite time period.

A programme for return to service of eight BVVS Su-25 Frogfoot attack aircraft was completed with the delivery of the eighth and last aircraft in February, last year. The first two were re-delivered in September 2020, following overhaul and upgrade performed at 558 Aircraft Repair Plant (ARZ) in Baranovich, Belarus.

The contract, inked in December 2018, was priced at BGN82.51m (\$49.2m) and provides a new lease of life for six Su-25K single-seaters and two Su-25UBK two-seaters.

After the upgrade, the attack aircraft were certified as good for a further 800 flight hours and at least eight years of service, with their service life extended to 40 years – enabling the Soviet-era armoured attack aircraft to be flown in Bulgaria without restrictions until 2028, provided there is a proper logistics support system in place. Thus, Bulgaria is the only NATO member still fielding the Soviet-era Frogfoot, equipping a squadron at the 22nd Aviobaza at Bezmer.

The upgrade part of the deal – apparently set out to resolve a number of obsolescence issues of the Su-25's analogue avionics and self-protection suites – was centred around integration of the all-new flight display system using two newly added 6in x 8in colour multi-functional displays, a back-up display and a head-up display, replacing the conventional analogue flight and navigation instruments in the existing cockpit. The navigation system is also new and uses a digital computer and a satellite navigation receiver with a 14-channel dual GPS/GLONASS capability in addition to the VOR/ILS/DME and TACAN receivers. The self-protection suite is enhanced by integration of the dual-pod Satellit-M2 radar jamming system.

The new PS-25 targeting system provides information for the pilot to use the Su-25's existing air-to-surface arsenal in addition to the newly added S-13 122mm rockets fired from B13L five-round packs (up to eight) and R-73E (AA-11 Archer) air-to-air missiles for self defence and intercepts of slow-speed air targets. The targeting system offers greatly improved accuracy for aiming and delivery of unguided weapons.

Alexander Mladenov and Krassimir Grozev



The Bulgarian MoD is currently assessing options to enter a new long-term maintenance agreement for the MiG-29 fleet, to be kept in active service until the F-16 is declared operational – but this is not expected to take place before 2026

Croatia



Rafale will bring challenges

On May 28, 2021, it was announced that the Dassault Rafale had been selected as the new multi-role fighter for the Zrakoplovstvo Nezavisne Države Hrvatske (HRZ, Croatian Air Force). Later in the year, on November 25, the Croatian government finalised the deal by signing four contracts worth a total of €999m.

The government-to-government contract covers the transfer of 12 second-hand Rafale fighters plus weapons and equipment from the Armée de l'Air et de l'Espace (AAE, French Air and Space Force), as well as training HRZ personnel. The logistics contracts cover all support resources, including a one-year warranty for each aircraft, its components and additional spare parts, provided over a three-year period.

There are ten single-seat Rafale C aircraft and two dual-seat Rafale B aircraft, the latter

provided by the 4e Escadre de Chasse (EC, Fighter Wing) at Saint-Dizier AB, the former by the 30e EC at Mont-de-Marsan AB. All of them will be up to 14 years old and will be delivered in the F3-R standard, with approximately 3,800 flight hours of service life remaining (out of a total of 7,000hrs) and an option to extend the total service life up to 9,000hrs. The HRZ estimates that this would be sufficient for the aircraft to remain in service up to 2050-2060.

Specific details on the aircraft's weapons and equipment have not been released, except that a flight simulator, a basic air-to-air and air-to-ground weapons package and all support equipment will be included. Unofficially, cruise missiles or anti-ship missiles are not part of the deal.

A total of 12 Croatian pilots will be trained on a 'train-the-trainer' basis, and the HRZ is scheduled to take possession of the first six aircraft in late 2023 in France, just prior to the first batch of six pilots

(which will include current MiG-21 pilots) being trained. That is set to start in January 2024 and the six pilots are intended to fly the six Rafales to Croatia in mid-2024.

A second batch of six PC-9 pilots will be sent to France to train on the Rafale in 2024. They will begin their training on AAE PC-21s before transitioning to the Rafale and are expected to fly the next six Rafales to Croatia by early 2025.

Although this finally puts an end to the saga of finding a replacement for the obsolete ex-Soviet MiG-21 *Fishbed* aircraft currently operated by the HRZ, it will present a whole new set of challenges, and – as we will see – time is of the utmost essence if everything is to go as scheduled.

First of all, this is a direct transition from a Cold War-era second-generation fighter to a state-of-the-art, fourth-generation fighter and, as such, it involves

Order of battle

91st Wing	Zagreb-Pleso
191st Fighter Aircraft Squadron	MiG-21bisD/UMD

Source: *AirForces Intelligence*

Inventory

Inventory	Delivered	Current
MiG-21bisD	13	4
MiG-21UMD	4	3

Source: *AirForces Intelligence*



training not only the HRZ pilots, but also ground crews and the whole maintenance/logistics support branch of the Air Force. As the MiG-21 is slated to remain in service until 2024, the entire conversion process must be finished on time in order for the HRZ to reach initial operational capability (IOC) on the Rafale by late 2024 to ensure a smooth transition between the two types.

The HRZ unit set to receive the Rafales – 191 Eskadrila Lovackih Aviona (191 ELA, 191st Fighter Aircraft Squadron) based at the Zagreb International Airport (also known as Pleso) – operates a total of 12 MiG-21s (eight single-seat MiG-21bisDs and four two-seat MiG-21UMDs). They are running dangerously out of resources. To exacerbate matters,

only seven of them are currently operational (four MiG-21bisDs and three MiG-21UMDs), with the rest in storage.

The ten-year post-overhaul resources of the aircraft will begin to expire in 2023 – when the first MiG-21s are supposed to be withdrawn from service – with the process ending in late 2024. Even the newest HRZ MiG-21s are now 40 years old and attempting to keep them in service any longer than 2024 would be an unnecessary gamble – especially in a situation when spare parts are no longer being made. This means that any delay in the introduction of the Rafales could leave HRZ without a fighter and having to rely on neighbouring countries to cover air policing duties until the Rafales finally

reach IOC. Also included in the deal is a requirement to upgrade all the facilities and infrastructure to operate the Rafales, so new facilities will have to be built and existing ones adapted or upgraded. Without any doubt, the timely implementation of this project is also very important to avoid delaying the introduction of the new fighter.

Hopefully, the HRZ has learned that lesson following the delivery of their new UH-60M Black Hawk helicopters, two of which arrived on February 3. Due to the fact that the new hangar for them and all the other required infrastructure at the Lucko airfield has yet to be built, they are having to be temporarily operated out of Pleso.

Vladimir Trendafilovski

*Left: This MiG-21bisD is one of four currently flying. It's shown performing low-level aerobatics during a commemorative event at Gornja Stubica in September 2021
Right: A MiG-21bisD armed with a pair of R-60MK IR-guided air-to-air missiles as part of the QRA pair, lands at Pleso in February 2022
Below: The two-seat MiG-21UMD has limited combat capability and is seen here being used for bombing practice using concrete bombs
All images: Chris Lofting*





Slick Gripen operator

The first six Czech Air Force (CzAF) Gripen Cs landed at Čáslav Air Base, the 21st Tactical Air Force Base, on April 18, 2005. Lt Col Petr Mikulenk (the current CzAF commander) and Lt Col Michael Boruvka were the first to fly Gripens in Czech airspace. The first six aircraft (serials 9234, 9235, 9236, 9237, 9239 and 9240) were followed by 9241, 9242, 9243, 9244, 9245 and 9246 on August 17-18, 2005, with two dual-seaters (9819 and 9820) arriving on August 31, 2005.

Their delivery to 211 Taktická Letka (Tactical Squadron) came after a deal to lease 12 single-seat JAS 39Cs and two dual-seat JAS 39Ds was signed on June 14, 2004. A new agreement on May 16, 2014, extended the lease until 2027, with an option for an additional two years.

The CzAF had originally wanted two squadrons of Gripens – 24 aircraft – and a draft agreement was even drawn up for that number in 2002.

However, flooding in the Czech Republic during 2003 saw funds being diverted from the budget to repair the devastating effects that days of rain had inflicted on the country.

Over the past 17 years, the CzAF has worked wonders with such a small fleet of jets, and in late-2020 were manning two Quick Reaction Alert (QRA) sites for five countries. From August 30 to December 30, 211 Sqn had five Gripen Cs at Āmari, Estonia, for Baltic Air Policing (BAP) duties, to defend the skies of Estonia, Latvia and Lithuania, while back at Čáslav, four Gripen Cs were manning the QRA, not just to defend Czech aerospace but also Slovakia under an agreement between the two countries.

One senior pilot told *AFM*: “Having just 14 jets means it was quite a burden – five deployed to Estonia, another four at Čáslav and two on overhaul saw our Gripen fleet really stretched.”

Keeping the Gripen C/D fleet at such a high-level of readiness

is testimony to the engineers and technicians of 211 Sqn. A sentiment echoed by the Swedish Air Force Commander, Maj Gen Carl-Johan Edström, during a Gripen gathering at Ostrava Airshow, Czech Republic, in September 2020, when he said: “We strive to match the high availability rates of the Czech Gripens, with their high flying hours.”

Routinely, two pairs of Gripen Cs man the Quick Reaction Alert (QRA) at Čáslav Air Base armed with a pair of infrared AIM-9M Sidewinders and Mauser BK-27 gun. One of each pair is fitted with a Litening IV laser designation pod (LDP) for long-range air-to-air detection. The pod became part of the Gripen’s Mission System (MS) 20 enhancement in 2017.

This method of identifying aircraft was used throughout the BAP 2020 deployment, which occurred against a backdrop of Russian fighter and bomber pilots being agitated by NATO fighters

coming close to identify them. The LDPs were also used at night, although the pilots couldn’t read numbers. The Combined Air Operations Centre (CAOC) advised the Czech detachment that safety was paramount and an already tense situation should not escalate. Lt Col Pavel ‘Speedy’ Pavlik told *AFM* in early 2021: “All they wanted was us to track the aircraft, make the interception, take a picture and then fly away.”

The previous CzAF Commander, Maj Gen Petr Hromek, told the author that MS 20 has provided a lot: “We are now operating with Litening pods, Have-Quick radios and Link-16 and night vision goggles. Today, the Link-16 and night vision goggles are part of the CzAF Gripen make-up.”

One of the biggest headaches for the fleet is getting pilots current in the air-to-air refuelling (AAR) mission. Without a tanker, they are reliant on other NATO air forces which are busy keeping their own pilots current. However,



Five Gripen Cs carrying live AIM-120C-5s AMRAAMs and AIM-9M Sidewinders sit on the ramp at Čáslav being prepared for the ferry flight to Āmari, Estonia, for BAP duties on August 30, 2020. Czech Gripens will once again be heading for BAP duties, based at Šiauliai in Lithuania, this summer. All images: Alan Warnes

Order of battle

21st Tactical Air Base	Čáslav
211 Tactical Squadron	JAS 39C/D Gripen
212 Tactical Squadron	L-159A/T1 ALCA
213 Training Squadron	L-159A/T1 ALCA

Source: AirForces Intelligence

Inventory

Inventory	Delivered	Current
JAS 39C Gripen	12	12
JAS 39D Gripen	2	2
L-159A ALCA	72	16
L-159T1 ALCA	6	5

Source: AirForces Intelligence

that all may be changing as a CzAF Gripen completed AAR certification flight trials with a German Air Force A400M last September, allowing Czech Gripen pilots to train with the A400M. The CzAF signed up for 100 hours to NATO's Multinational Multirole Tanker Transport Fleet (MMF) in October 2020, allowing Gripen pilots to work with the A330-243MRTT once the pairing has been certified, which should take place in early 2022.

The Czech Gripens are equipped with the AIM120C-5 Advanced Medium-Range Air-to-Air Missile (AMRAAM) generally only used for overseas deployments. The 211th has deployed three times to

BAP (2009 and 2012 at Šiauliai, Lithuania, and 2020 at Āmari, Estonia) and a similar number of times to Keflavik for the Iceland Air Patrol, officially known as the Airborne Surveillance and Interception Capabilities to meet Iceland's Peacetime Preparedness (ASICIPPN). In 2018, deployments to Iceland came under the Allied Air Command, which meant it came under the control of NATO's CAOC at Uedem in Germany.

Deploying five aircraft to BAP and also manning the QRA at Čáslav meant a lot of preparation as 'Speedy' explained: "A four-month deployment [for such a small fleet] is just enough for

these missions. Eight months or a year would have been different. We obviously would like more aircraft but let's see how the budgets work out."

With the leased Saab contract up for renewal in 2027 or 2029, Lockheed Martin is now offering the F-16 Block 70/72 or F-35A as an alternative option to the Saab Gripen C/D or Gripen E/F. A detailed request for proposals for 24 aircraft is set to be issued later this year that will drive the aircraft finally proposed by both sides. A decision is expected to be made in 2023/24.

The CzAF also operates 16 Aero L-159A Advanced Light Combat Aircraft (ALCA) and five dual-seat L-159T1s, with the latter having been extensively upgraded between 2017 and 2020. No 212 Tactical Squadron and 213 Training Squadron operate the L-159s in the light attack/close air support role, although 213 is predominantly used as an operational conversion unit, training pilots for the L-159 and ultimately the Gripen.

Unfortunately, none of the L-159s have been upgraded to any large scale, or given a mid-life upgrade, so they are effectively operating with the same systems and software version of Grifo radar that they were delivered in 2004. Aero Vodochody is understood to have offered the CzAF three upgrade options, varying in complexity, and discussions are ongoing. Aero's L-159T2EX, which should return to the air again soon, is likely to be the pattern aircraft for any solution.

Whatever the future for the CzAF L-159s, they still make good aggressor aircraft, courtesy of their small Grifo radar. US-based Draken has acquired 18 L-159s (plus three spares) for the adversary air (ADAIR) role with the US Air Force.

In May 2019, Aero Vodochody signed a CZK1.6bn deal with the Czech MOD to overhaul the 16 L-159As, known as PP-16, with work commencing almost immediately – the last few aircraft are now going through the Aero MRO facility.

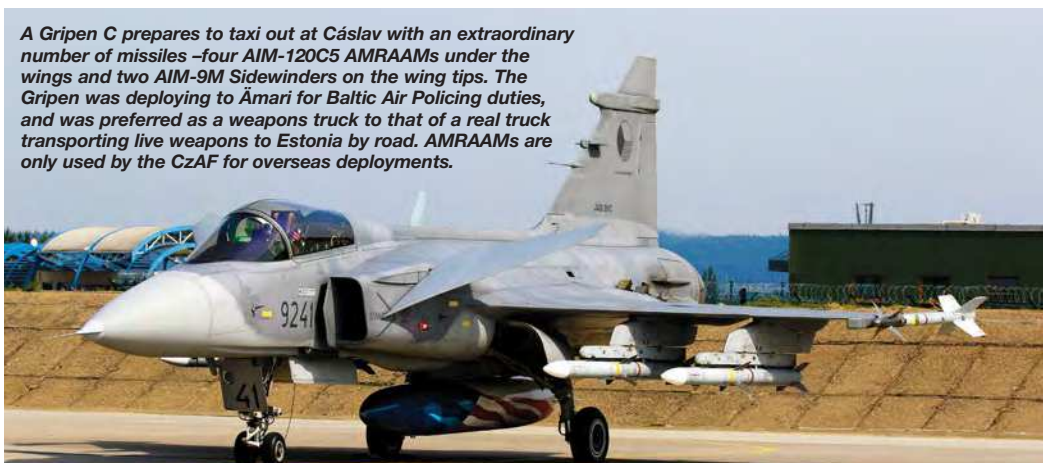
The single-seaters could remain in service for another eight years, but it's likely they will be replaced by the aircraft that wins the CzAF fighter competition mentioned above.

Alan Warnes

One of the two dual-seat Gripen Ds lifts off at a pretty sharp angle, from Pardubice on July 23, 2020, when Čáslav's runway was receiving attention.



A Gripen C prepares to taxi out at Čáslav with an extraordinary number of missiles –four AIM-120C5 AMRAAMs under the wings and two AIM-9M Sidewinders on the wing tips. The Gripen was deploying to Āmari for Baltic Air Policing duties, and was preferred as a weapons truck to that of a real truck transporting live weapons to Estonia by road. AMRAAMs are only used by the CzAF for overseas deployments.



Denmark



Up tempo ops for F-16s

The Royal Danish Air Force (RDAF) currently operates 43 F-16AM/BM Fighting Falcons – 30 of which are operational at any one time. These fly out of Fighter Wing Skrydstrup, located in the southern part of the Jutland peninsula. Since 2006, the RDAF had operated two F-16 squadrons, Eskadrille (Esk – squadron) 727 and Esk 730. However, on January 1, 2020 Esk 730 was temporarily disbanded and the pilots were transferred to Esk 727. So now all the F-16s are housed at Esk 727's area of the base, allowing Esk 730's buildings and shelters to be demolished, and brand new buildings to be set up to house the F-35 Lighting IIs. On February 2 this year, it was announced that Esk 727 would be the home for the new F-35s when they arrive. This will mark the end of Esk 730, after more than 50 years serving the RDAF.

There is a mixture of MLU M6.5 upgraded F-16s and MLU M6.0

F-16s serving the RDAF. The former aircraft are only used for local training flights and for quick reaction alert (QRA) duties.

Four F-16s are on a 24/7 alert status at Skrydstrup. Two are primary jets and the other two act as spares. A further two to four aircraft are on standby, in case of major issues with both a primary and a spare aircraft.

MLU M6.5-upgraded aircraft, are capable of carrying the latest JDAM, EGBU-12 and Small Diameter Bombs (SDBs), as well

as the AIM-120D AMRAAM and AIM-9X Sidewinder air-to-air missiles. The RDAF F-16s also utilise the LITENING advanced targeting pod, which gives pilots the ability to detect, identify and track targets at very long range. The MLU M6.5 upgraded aircraft are used on international missions. In recent years, the RDAF F-16s have been quite active internationally. In 2018, four F-16s deployed to Siauliai Air Base in Lithuania to fulfil NATO's Baltic Air Policing (BAP)

mission. While there, another four RDAF F-16s deployed to Keflavik airport in Iceland, to fly in NATO's Iceland Air Policing mission. This meant the RDAF, for a period, had manned the QRA over five different nations.

On August 31, 2021 the RDAF returned to Siauliai Air Base, to take over the BAP mission for the eighth time and taking the role of 'lead' nation, with Portugal the 'enhanced' nation. The four jets and around 50 personnel returned to Denmark on November 30 last year. During the deployment, the four F-16s flew more than 55 Tango scrambles and 13 Alpha scrambles. The Alpha scrambles included a variety of Russian aircraft, including the Su-27 Flanker, Tu-160 Blackjack, Il-76 Candid and TU-134 Crusty.

The four F-16s were kept fully armed 24/7, with a load-out consisting of two AIM-9M Sidewinder air-to-air missiles on the outermost underwing pylons,

Order of battle

Fighter Wing Skrydstrup	Esk 727	F-16AM/BM
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Source: AirForces Intelligence

Inventory

Inventory	Delivered	Current
F-16AM (MLU)	53	33
F-16BM (MLU)	12	10
F-35A	7	7

27 F-35As on order, with deliveries to Denmark commencing in late-2023.

Source: AirForces Intelligence



*Left: Two of the F-16s deployed to Siauliai in 2022. E-017, nearest the camera, is painted in a one-off environmentally friendly test paint, which is slightly more matt than the normal paint used Soren Augustesen
Below: In April 2018, these four F-16s flew NATO's Iceland Air Policing mission, guarding the airspace over Iceland. This brought the total number of nations under RDAF protection to five at the time Soren Augustesen*



two AIM-120C AMRAAM air-to-air missiles on the wingtip pylons, two 370-gal fuel tanks under the wings and a LITENING targeting pod on the right side of the intake. During the Tango scrambles, the Danish F-16 would train with many of the other NATO air and ground assets deployed in the region.

This included dissimilar air combat with the Italian Air Force Typhoon based at Ämari Air Base in Estonia, and ground attack training with Joint Terminal Attack Controllers (JTAC) from different nations, including Lithuania, the US and Italy. Less

than two months after returning from BAP, the deteriorating situation in Ukraine led to four F-16s returning to Siauliai Air Base on January 10 to take over the role of 'enhanced' nation, the 'lead' being the Polish Air Force. The jets and the contingency of about 50 personnel arrived back in Lithuania on January 29, 2022. By February 20, they had flown a total of 14 Tango missions and one Alpha scramble.

As a further response to the escalating situation in Ukraine and in the Baltic Sea, two F-16s were deployed to the Danish Baltic Sea island of Bornholm, to provide an

extra QRA force. This will enable the RDAF to react faster to any Russian violation of Denmark's eastern airspace. Following the Russian invasion of Ukraine, the RDAF sent two F-16s to Poland to bolster NATO's forces in the country.

Like so many other NATO countries, the RDAF's future is now the F-35. In June 2016, the Danish government announced its decision to purchase 27 F-35 Lightning IIs to replace the F-16.

It was a decision that had been postponed several times, forcing the F-16 fleet to soldier on longer than originally expected. Of the 27 aircraft, six will remain at Luke

AFB in Arizona initially, where they will be used to convert current F-16 pilots to the F-35, as well as train new pilots.

The first F-35 Lightning II aircraft (L-001) was handed over to the RDAF during a rollout ceremony at Lockheed Martin's factory in Texas on April 7, 2021. Less than two weeks later, the first two RDAF F-35s (L-001 and L-002) were flown from the Forth Worth factory to Luke AFB, where they will be part of the RDAF training flight at the base.

By February 2022, the RDAF had received four F-35s, serialised L-001, L-002, L-003 and L-004. The numbering system of 'L-XXX' was chosen to keep in line with a numbering policy in place since the 1960s – using one letter, followed by the last three digits of the aircraft serial or build number. The specific letter 'L' was selected to align with the Lightning part of the F-35's official name.

On May 5 last year, the Danish test pilot who uses the pilot name "Mon", became the first of Denmark's pilots to fly an F-35 (L-002) owned by the country. Earlier, on January 14 that year, "Kin" became the first Danish pilot to fly the F-35, piloting one belonging to the 308th Fighter Squadron 'Emerald Knights'.

Danish instructors will be ready in early 2023 and the initial batch of F-16 pilots begin conversion training next April, ready to fly the fifth-gen jet when the first of the 21 arrive at Skrydstrup in late 2023. **Soren Augustesen**

A Royal Danish Air Force F-35A Lightning II assigned to the 308th Fighter Squadron lands on April 13, 2021 at Luke Air Force Base, Arizona. The first two of seven RDAF F-35s arrived there just as Danish pilots were preparing to start the F-35 training programme USAF / Airman 1st Class Dominic Tyler



Finland

A Finnish Air Force F/A-18D Hornet from Fighter Squadron 31 fitted with an AIM-9X Sidewinder training round on the wingtip. A centreline fuel tank is often carried on training flights.
Perttu Karivalo



F-35As to replace Hornets

Finland's Hornet replacement programme, known as the HX Campaign, had been running for years. Candidates included the Boeing Super Hornet/Growler, Dassault Rafale, Eurofighter Typhoon, Lockheed Martin F-35A and Saab Gripen E.

Requirements for the five potential Hornet replacements were an Initial Operations Capability (IOC) in 2026 and Full Operational Capability (FOC) in 2030. IOC is reached when air-to-air capability is achieved and FOC when all air-to-ground/surface weapons are integrated and capability is also available. The last Finnish Air Force (FAF) Boeing F/A-18C/D Hornets will leave service in 2030 when FOC of the new fighter is achieved.

Currently, the FAF Hornet fleet boasts the most capable legacy Hornet in service by initially undergoing Mid-Life Upgrade – MLU1 (2006-10) and then MLU2 (2012-16). MLU1 concentrated on improving air-to-air capability with a helmet-mounted cueing system, plus new AIM-9X and AIM-120C-7 missiles. The Litening targeting pod was also introduced during the MLU1 phase, until then with MLU2 the Finnish Hornets gained an air-to-ground capability. Also with MLU2, new weapons were

Order of battle

Fighter Squadron 11	F/A-18C/D Hornet	Rovaniemi
Fighter Squadron 31	F/A-18C/D Hornet	Kuopio-Rissala

Source: *AirForces Intelligence*

integrated to the fleet – Joint Direct Air Munition (JDAM), AGM-154C and AGM-158 Joint Air-to-Surface Standoff Missile (JASSM). The new Link-16 datalink system was also installed as part of MLU2 to provide better compatibility with NATO air forces.

Finnish Defense Minister Antti Kaikkonen announced on December 10, 2021, that the Lockheed Martin F-35A Lightning II had won the HX competition. Finland will purchase 64 F-35A Block 4 with F135 engines. It was also announced that the air-to-ground/surface weapons for the F-35A will be bought by 2031. Requirement was that FOC should be achieved by 2030. Does this have an effect on the Hornet fleet retirement? The Finnish Air Force has said the Hornet air-to-ground/surface weapons JDAM, AGM-154C and

AGM-158 JASSM will be used to achieve F-35A FOC 2030 and new weapons will be purchased/integrated later.

One aspect which might affect the Hornet retirement schedule is F-35A IOC. Finland has purchased the F-35A Block 4 with the current F135 engine, but the USA's latest General Accounting Office (GAO) report on January 14, 2022, stated that development of Block 4 was delayed and at the earliest it would not be available in the US until 2026, or even later. Also, Block 4 requires more electricity and cooling and without a new engine not all Block 4 capabilities will be possible. To achieve IOC in 2026, the FAF will have to use Block 3F aircraft.

The first F-35A deliveries are planned for 2025, when training is expected to commence in the US and the first aircraft will arrive

in the country around 2026. This means Finland will receive the Block 3F aircraft, which need to be upgraded when Block 4 becomes available.

The Finnish Hornet fleet will remain in full service until the first F-35A is delivered to Finland around 2026 and achieves IOC. After that, the Hornet will be progressively retired as new F-35As are delivered.

Russia has based the newer more capable Su-35S *Flanker* close to Finland, soon to be followed by the Su-57, so the Finnish Air Force had to keep up with its neighbours and the F-35A was deemed to be the aircraft to achieve that.

Perttu Karivalo *AFM*

Inventory

Inventory	Del	Current
F/A-18C Hornet	55	55
F/A-18D Hornet	7	7

Prior to the mid-life upgrade in 2012-16, the FAF had lost a single F-18C. Another F-18D was damaged in an accident and rebuilt as a dual-seat F/A-18D.

Source: *AirForces Intelligence*

European Fighter Survey

France



This Rafale B from the 4 Escadre de Chasse (Fighter Wing) at St Dizier-Robinson prepares for a mission to strike ISIS targets from Prince Hassan Air Base in Jordan. Note the aircraft is equipped with SBU-38 and SBU-54 'Hammer' precision-guided smart bombs (images Frédéric Lert)

Dassault Dominance

France currently operates four main types of fighter aircraft: the Mirage 2000-5F, the Mirage 2000C/D and Rafale – all developed and produced domestically by Dassault Aviation.

While the Mirage 2000C is about to be withdrawn from service, the fly-by-wire fighter offered France a huge technological leap forward when it entered the scene 38 years ago.

On July 2, 1984, the Dijon-based Escadron de Chasse 1/2 (EC 1/2, Fighter Squadron 1/2) reached initial operational capability with what was then France's most modern fighter aircraft. Today, EC 2/5 at Orange-Caritat is the sole remaining Mirage 2000B/C unit of the Armée de l'Air et de l'Espace (AAE, French Air and Space Force).

France received 124 Mirage 2000Cs, but only 12 single-seat 2000Cs remain in service. The type will be formally retired from service this June. Once revolutionary, the Mirage 2000C is now seen as almost obsolete in a modern war scenario.

EC 2/5 still flies seven two-seat Mirage 2000Bs, which will soldier on as combat-trainers for Mirage 2000D crews. Looking forward, it is possible that the single-seat 2000Cs could find a second lease

of life with a private contractor for adversary air or 'Red Air' operations after they leave AAE service.

Facing delays with its Rafale programme, France opted to develop an interim solution to meet its fighter requirements in the late 1990s and thus the Mirage 2000-5 (a new-generation variant of the Mirage 2000C) was born. Compared with the 2000C, the 2000-5 brought with it several drastic improvements in avionics.

It received the Thomson-CSF RDY multi-mode pulse-doppler radar, which – in conjunction with the MICA air-to-air missile – allowed simultaneous tracking of eight targets and firing of four missiles. The new aircraft also received a full glass cockpit and a new electronic countermeasures (ECM) suite. France upgraded 38 2000Cs to this standard.

The first Mirage 2000-5 was handed over to EC 1/2 on November 30, 1997 and the unit continues to fly the type from Luxeuil in eastern France. Four Mirage 2000-5Fs are also operated by EC 3/11 in Djibouti.

The platform is typically tasked with air superiority missions, although their two 30mm DEFA cannons can also be used in the air-to-ground role.

Inventory

Type	Delivered	Current
Mirage 2000-5F	38	28
Mirage 2000B	30	7
Mirage 2000C	124	12
Mirage 2000D	86	70
Rafale B	58	58 (see notes)
Rafale C	48	48 (see notes)
Rafale M	46	42

Notes: Deliveries of Rafale B/Cs continue to the AAE. The air arm plans to acquire 118 examples of the multi-role fighter in total, with 69 on order at present (split between B/C has yet to be confirmed). An additional 12 new-build examples will also be delivered to the AAE after France sold the same number of second-hand Rafale B/Cs to Greece in 2021. The remaining Mirage 2000Cs will be retired in June 2022, while the seven 2000Bs will continue in AAE service. Attrition losses for all types are: Rafale 2000-5F (8); Mirage 2000B (4); Mirage 2000C (14); Mirage 2000D (12); Rafale B (1); and Rafale M (4).

Source: AirForces Intelligence



The Mirage 2000D has been on the front line over the Sahel region of North Africa since 2013 and the beginning of Operation Serval. These aircraft are now operating non-stop from Niamey Air Base, Niger, alongside a detachment of Mirage 2000-5Fs

Since 2016, Mirage 2000-5Fs have also been involved in NATO's Baltic Air Policing operations from Estonia. When the Mirage 2000C is retired in June, the 2000-5F fleet will remain as the AAE's only Mach 2-capable fighter until it is also withdrawn from service, which is currently planned for 2027-2028.

The Rafale M was the first variant of the multi-role fighter to enter French service, with the initial aircraft landing at Landivisiau on December 4, 2000. However, the French Navy did not acknowledge the arrival of its F1 standard Rafales at an operational level (with an air-to-air capability only) until June 24, 2004. The navy was expected to receive 86 aircraft, but this was reduced when plans for a second aircraft carrier and two simultaneous air groups were shelved. In total, 42 Rafale Ms are operated by three Landivisiau-based flotillas: 11F, 12F and 17F.

The AAE's Centre d'Expérience Aérienne Militaire (CEAM, Military Air Expertise Centre) received its first Rafales in 2004. Based at St Dizier-Robinson, EC 1/7 was the first frontline unit to receive the new F2 standard fighter in June 2006. These aircraft were capable of conducting air-to-air and air-to-ground missions. Approximately 100 aircraft have been delivered to the AAE, equipping seven units across three air bases: St Dizier-Robinson (EC 1/4, 2/4 and ETR 3/4); Mont-de-Marsan (EC 2/30, 3/30 and ECE 1/30) and Al Dhafra in the UAE (EC 1/7).

As early as 2002, 12F-operated Rafale Ms flying from the French Navy aircraft carrier, FS *Charles de Gaulle* (R91), were engaged in Operation Herakles over Afghanistan. In March 2007, the air force entered the fray with three Rafales based at Duchane in Tajikistan, which later moved to Kandahar, Afghanistan.

In March 2011, Rafales from both French services supported coalition efforts over Libya during Operation Harmattan, proving the multi-role effectiveness of the fighter. During the conflict, the Rafales flew air defence, close air support (CAS) and reconnaissance sorties and even some high-profile missions using the SCALP-EG air-launched cruise missile.

After Libya came Mali and the Sahel – Operation Servat and Operation Barkhane. The mission against so-called Islamic State (Operation Chammal) was launched in September 2014, with

Order of battle

AAE		
Al Dhafra, UAE (BA 104)		
EC 1/7 'Provence'	Rafale B/C	N/A
St Dizier-Robinson (BA 113)		
EC 1/4 'Gascogne'	Rafale B/C	4 Escadre de Chasse (Fighter Wing)
EC 2/4 'La Fayette'	Rafale B/C	4 Escadre de Chasse
Escadron de Transformation Rafale 3/4 (ETR 3/4, Transformation Sqn Rafale 3/4) 'Aquitaine'	Rafale B/C/M	4 Escadre de Chasse
Orange-Caritat (BA 115)		
EC 2/5 'Île-de-France'	Mirage 2000B/C	2 Escadre de Chasse
Luxeuil (BA 116)		
EC 1/2 'Cigognes'	Mirage 2000-5F	2 Escadre de Chasse
Mont-de-Marsan (BA 118)		
EC 2/30 'Normandie-Nièmen'	Rafale B/C	30 Escadre de Chasse
EC 3/30 'Lorraine'	Rafale B/C	30 Escadre de Chasse
EC 4/40 (Qatari Rafale training unit)	Rafale B/C	30 Escadre de Chasse
Escadron de Chasse et d'Expérimentation 1/30 (ECE 1/30, Fighter and Experimentation Sqn 1/30) 'Côte d'Argent'	Mirage 2000-5F Mirage 2000B/C/D Rafale B/C	CEAM
Nancy-Ochey (BA 133)		
EC 1/3 'Navarre'	Mirage 2000D	3 Escadre de Chasse
EC 2/3 'Champagne'	Mirage 2000D	3 Escadre de Chasse
EC 3/3 'Ardennes'	Mirage 2000D	3 Escadre de Chasse
Ambouli IAP, Djibouti (BA 188)		
EC 3/11 'Corse'	Mirage 2000-5F Mirage 2000D	N/A
French Navy		
Landivisiau Air Base		
11F	Rafale M	N/A
12F	Rafale M	N/A
17F	Rafale M	N/A

Source: AirForces Intelligence

the first Rafale to be engaged in combat coming from Al Dhafra Air Base in the UAE. As of March 2022, Operation Chammal continues, but Rafale combat missions over North Africa's Sahel region have been by the Mirage 2000s based at Niamey, Niger.

Most of the French Rafales have now been upgraded to F3R standard, fully capable of using Thales' new-generation targeting pod and MBDA's Meteor beyond-visual-range air-to-air missile (BVRAAM), along with increased capabilities in digitally-aided CAS.

After the F3R will come the F4 standard, development of which is well under way and testing is due to begin next year at Mont-de-Marsan. This variant will have an upgraded RB2E active electronically scanned array (AESA) radar; improved helmet-mounted displays and will be more effective in network-centric warfare, with more data and satellite capabilities.

France's other main fighter is the Mirage 2000D. Introduced as an interim aircraft, the delta-wing fighter-bomber remains a key

component of the AAE, which is upgrading the platform.

The Mirage 2000D was adapted from the Mirage 2000N, which fulfilled the country's nuclear requirements, to conduct a more conventional air-to-ground mission set. An order for 110 examples was planned, but reduced to 86 aircraft for budgetary reasons. Due to its commonality with the now-retired Mirage 2000N – especially in the electronic warfare field – the 2000D was never exported.

The conventional fighter-bomber is linked with Nancy-Ochey Air Base, which hosts three Mirage 2000D units: EC 1/3, EC 2/3 and EC 3/3. The type is also operated by EC 3/11 from Ambouli, Djibouti.

Operations in Afghanistan played an essential role in the evolution of the Mirage 2000D, which received new equipment for the CAS mission. In line with NATO coalition capabilities, the French Mirages were progressively fitted with new systems, including the ROVER modem; Link-16 datalink; VHF/FM radios; encryption boxes; and an EPAK terminal – linked to the 500lb GBU-49 Enhanced

Paveyay II laser-guided bomb. The Mirages were heavily involved in Operation Harmattan in 2011 and continue to be at the forefront of Operation Barkhane, while the Rafales have taken the lead in Middle East deployments.

After the Mirage F1CRs were withdrawn from service in 2014, the 2000D inherited the platform's electronic intelligence (ELINT) mission with the ASTAC pod – four of them still operational.

While the Mirage 2000N was retired and scrapped in 2018 – although some parts can be used by its sister variant – the Mirage 2000D has a bright future. Thirty years after it entered operational service, the fighter-bomber is now the subject of a Rénovation M Vie (RMV, Mid-Life Update), allowing it to remain in service until 2035.

France had planned to upgrade almost its entire Mirage 2000D fleet, but the 2019-2025 French military programming law limited the number of aircraft that would go through the RMV process to 55. Most of the modernisation effort concerns the type's avionics and the evolution of its navigation and armament system, with the most prominent addition being a large 12in (30.5cm) touchscreen installed in the rear cockpit.

The Mirage 2000 RMV can still carry the SCALP-EG cruise missile – to be replaced by the SCALP-EGR. It can also be fitted with Mk 82 unguided general-purpose bombs, GBU-12/GBU-16 Paveyay II laser-guided bombs and their enhanced GBU-48/GBU-49 equivalents, GBU-22/BDU-22s with Paveyay III guidance kits and the 2,000lb GBU-50 Enhanced Paveyay II dual-mode GPS/laser-guided bombs. The laser-guided GBU-24 Paveyay III, which had quickly replaced the Matra (now MBDA) BGL-1000 smart bomb in the early 1990s, no longer presents any operational interest following the arrival of the GBU-50. France's major interest in the RMV upgrade is in the capability of mixing these weapons and their launching sequence.

The Mirage 2000D RMV will also have a CC-422 gun pod carrying a 30mm DEFA 550 cannon (from the Mirage F1C) and 180 shells, while the Magic II short-range air-to-air missile will be replaced with the MICA-IR. The first upgraded examples are already flying from Nancy-Ochey and will receive their baptism of fire over the Sahel this year. **Frédéric Lert**

Germany

The PE2b upgrade for the Luftwaffe's Eurofighter fleet included the capability to equip and deploy the MBDA Meteor BVRAAM. This aircraft (serial 31+50) carries a full loadout of four Meteors, two AIM-120 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs) and two IRIS-T short-range air-to-air missiles



Modernising the Luftwaffe

Order of battle

TaktLwG 31 'Boelcke'	Nörvenich
311/312 Staffel (Squadron)	EF-2000 EF-2000T
TaktLwG 33	Büchel
331/332 Staffel	Tornado IDS Tornado IDS(T)
TaktLwG 51 'Immelmann'	Jagel/Schleswig
511/514 Staffel	Tornado ECR Tornado IDS Tornado IDS(T)
TaktLwG 71 'Richthofen'	Wittmund
711/712 Staffel	EF-2000 EF-2000T
TaktLwG 73 'Steinhoff'	Rostock/Laage
731/732 Staffel	EF-2000 EF-2000T
TaktLwG 74	Neuburg/Donau
741/742 Staffel	EF-2000 EF-2000T
WTD 61	Ingolstadt/Manching
N/A	Tornado ECR Tornado IDS

Source: AirForces Intelligence

The Luftwaffe (German Air Force) operates a fast-jet fleet comprising two different types: the Eurofighter EF-2000 and Panavia Tornado

IDS/ECR. Since 1982, Tornados have been the backbone of dedicated air-to-ground operations, while the Eurofighters – which entered service in 2005

– were designed and initially used solely for air-to-air missions. However, this clear differentiation starts to disappear as Germany's EF-2000 fleet matures in its multi-role capabilities.

Germany's latest Eurofighter was handed over on December 17, 2019, completing the delivery of 143 aircraft. But two Tranche 2 examples were lost in a tragic mid-air collision in 2019 and a further five Tranche 1s had already been withdrawn from service due to their age.

To keep the fleet up to strength, Germany ordered an additional 38 Tranche 4 Eurofighters on November 11, 2020, under Project Quadriga. These aircraft are set to fully replace the older Tranche 1s and will notably feature a new active electronically scanned array (AESA) radar. Deliveries are scheduled to begin in 2025 and should continue over the following five years.

The Eurofighters are currently assigned to four Taktisches Luftwaffengeschwadern (TaktLwG, Tactical Air Wings);

TaktLwG 31 'Boelcke' at Nörvenich; TaktLwG 71 'Richthofen' at Wittmund; TaktLwG 73 'Steinhoff' at Rostock/Laage and TaktLwG 74 at Neuburg/Donau. At present, the 'Richthofen' jets are co-located with TaktLwG 73, due to construction activities at their home base.

While all the air wings are called 'tactical' and their pilots are able to perform so-called multi-role operations, this equalisation is not universally valid. Each wing retains a specialisation: TaktLwG 73 is responsible for the largest part of aircrew training for German and Austrian Eurofighter pilots; TaktLwG 71 and 74 cover Germany's domestic quick reaction alert (QRA) mission and therefore excel in the air-to-air role; and TaktLwG 31 follows its Tornado heritage and leads the way in air-to-ground operations.

The 1,000lb GBU-48 Enhanced Paveway II GPS and laser-guided bomb has been declared operational on the Luftwaffe's Eurofighter fleet in recent years, and the platform is now able to carry the Rafael-developed RecceLite pod for reconnaissance tasks.

The first operational 'recce' mission was performed by a TaktLwG 31 EF-2000 in July 2021, following widespread flooding in the Ahr valley region of western Germany.



In addition to the GBU-48, Germany acquired 2,290 guidance kits for the 500lb GBU-54 Laser Joint Direct Attack Munition (LJDAM) in 2020, with deliveries scheduled to start from the end of 2021.

The LJDAM provides a combination of INS/GPS navigation with laser guidance and can only be employed by the Tornado at present, but the munition will be integrated on the Tranche 4 Eurofighters under Project Quadriga.

Future plans also called for the introduction of the highly specialised Dual Mode Brimstone lightweight air-to-ground missile on the Luftwaffe's Eurofighter force, but talks surrounding the integration of this capability have been rather quiet of late. Despite this, it may still be included in a future capability upgrade.

The more tangible headlines for the German EF-2000 fleet relate to its air-to-air role. With the upgrade to the new Phase 2 Enhancements B (P2E) standard, the MBDA-developed Meteor beyond-visual-range air-to-air missile (BVRAAM) has been integrated. TakLwG 74 took the lead for this upgrade, which did not only include hardware modifications to carry the missile, but also a software update to the Eurofighter's radar and avionics systems in order to provide improved support for the

Meteor's datalink. Subsequently, the P2Eb upgrade also improved the fighter's Defensive Aids Subsystem (DASS) and its overall electronic warfare (EW) capabilities. The integration of the Meteor BVRAAM and the accompanying improvements in the EF-2000's air-to-air capability are viewed as a major milestone by the Luftwaffe.

Currently, this upgrade programme is strictly enforced to be able to provide the most up-to-date Eurofighters as part of NATO's Air Policing missions in Eastern Europe and have been seen conducting combat air patrols in defence of the alliance's eastern flank following Russia's unprovoked invasion of Ukraine in late February.

Future upgrades (most likely within P3Eb/c) will see an enhancement of the Eurofighter's communications systems – including the Multifunctional Information Distribution System (MIDS) – as well as an upgrade of the platform's Identification Friend-or-Foe (IFF) system.

Despite the Eurofighter's growing multi-role capability, the Tornado fleet is still the Luftwaffe's workhorse for its air-to-ground operations. In total, 85 aircraft are split between two air bases: Jagel/Schleswig in northern Germany and Büchel in the Eifel region.

TakLwG 51 'Immelmann' at Jagel/Schleswig operates a mixed fleet of the ECR (electronic combat and reconnaissance) and IDS (interdictor/strike) versions of the Tornado and has a focus on EW and reconnaissance operations. Its aircrews are trained to deploy and operate with the AGM-88B High-speed Anti-Radiation Missile (HARM) for suppression/destruction of enemy air defence (SEAD/DEAD) missions, as well as to use the RecceLite pod for tactical reconnaissance purposes.

TakLwG 33 at Büchel specialises in air-to-ground operations with guided munitions

Inventory

Type	Delivered	Current
EF-2000	112	>110
EF-2000T	30	30
Tornado ECR	35	20
Tornado IDS	255	50
Tornado IDS(T)	67	15

Notes: Eurofighter EF-2000 entered service in April 2005. Two EF-2000s were lost to attrition in a mid-air collision in June 2019 and at least five Tranche 1s have reportedly been withdrawn from use. Two-seat EF-2000T variant entered service in January 2004. Tornado ECR joined the Luftwaffe in 1990. Two examples have been lost to attrition, three have been withdrawn from use and nine are in storage. Tornado IDS fleet has suffered 36 losses and 169 examples have been withdrawn from use since the early 1980s. Germany has lost ten Tornado IDS(T) aircraft and 42 examples have been retired from use (at least 13 have been scrapped and three are used as ground-based instructional airframes).

Source: AirForces Intelligence

(GBU-24 Paveway III and GBU-54 LJDAM) and cruise missiles (Taurus KEPD 350). It also forms a key component of Germany's contribution to NATO's nuclear sharing policy.

While this special role is not acknowledged publicly, the Tornado IDS has recently been listed by the US National Nuclear Security Administration (NNSA) as becoming a certified carrier platform for the upgraded B61-12 LEP (Life Extension Program) nuclear gravity bomb. Also, Sandia National Laboratories reports that a four-week flight test campaign of the B61-12 was successfully completed with NATO's Tornado IDS aircraft recently – bearing in mind that the platform is operated by both Germany and Italy (see p60-62).

The Luftwaffe's Tornado fleet is currently equipped with ASSTA 3.1 software, which included new cockpit displays and the integration of Saab's BOZ-101 jammer and dispenser pod. Its upgrade to ASSTA 4 standard will involve the integration of the AGM-88E2 Advanced Anti-Radiation Guided Missile (AARGM) and the laser-guided, all-weather capable GBU-54(V)2 LJDAM as an extension to the existing capability to deploy the 500lb GBU-38 JDAM. Further planned modifications include an improved MIDS/Link-16 datalink capability and a new

self-defence system.

In the years to come, new cryptographic units for secure communication, a new head-up display (HUD), main computer and the IFF Mode 5 system are set to be included in the upgrade to ASSTA 5 standard, which aims to maintain the Tornado's relevancy and its status as a valuable NATO asset.

The Tornado's out-of-service date is planned for the 2030 timeframe, meaning the Luftwaffe may become the final operator of the type. As a replacement option, the German government announced on March 14, 2022, that it will acquire up to 35 F-35A Lightning II, especially within the context of NATO's nuclear sharing policy. This puts recent discussions regarding the procurement of the F/A-18E/F Super Hornet and its EA-18G Growler derivative off the table, as purchase of 15 more Eurofighters was also announced, with specific mention of the in-development ECR variant, which will boast significant EW and electronic attack (EA) capabilities.

A timeframe for delivery of the F-35A has not been settled yet, nor has an official order been placed, but the German Tornado fleet has begun the Service Life Enhancement Programme to assure its availability until 2030.

Dr Andreas Zeitler



The Taurus KEPD 350 stand-off cruise missile is rarely flown in Luftwaffe units. This example is fitted to a Tornado IDS (serial 98-77) from the WTD 61 test unit
Images: Dr Andreas Zeitler

European Fighter Survey

Greece

The Hellenic Air Force (HAF) currently operates 208 fighter aircraft, which are in service with 11 squadrons across five different air bases.

Greece recently accepted its first six Dassault Rafale DG/EG multi-role fighters from France and is actively receiving its initial six Lockheed Martin (LM) F-16C/D Block 72 Fighting Falcons, which have been upgraded to F-16V standard by Hellenic Aerospace Industries (HAI) and LM.

The HAF will field a fleet of 83 F-16Vs and 18 Rafale DG/EGs by 2026. In addition, the nation has just ordered six more Rafales and looking to buy at least 20 LM F-35A Lightning II fifth-generation multi-role stealth fighters as a successor for the HAF's ageing fleet of 23 McDonnell Douglas F-4E (AUP) Phantom IIs.

Of the 208 fighters in Greek service, 155 are Fighting Falcons, comprising 116 single-seat F-16Cs

and 39 two-seat F-16D combat-trainers of various blocks. These aircraft are operated by eight units from four different air bases: 335 and 336 Mira (Squadron) at Araxos, 330, 341 and 347 Mira at Néa Anghialos, 340 and 343 Mira at Souda-Chania and 337 Mira at Lárisa. Cheap to maintain and operate, these F-16C/Ds boast the highest operational readiness and availability rate within the squadrons they currently serve. Of the 153 F-16C/Ds in service, 83 are Block 52+ standard, which form the backbone of the HAF's strike capability and will be upgraded. These aircraft are operated by 335, 336, 337, 340 and 343 Miras.

In 2019, HAI and LM began upgrading the F-16C/D Block 52M/+ Fighting Falcons to F-16V Block 72 standard under a \$1.3bn programme. This project aims to enhance the combat capability of the fighter by replacing its current APG-67(V)9 pulse doppler radar



An initial batch of six Dassault Rafale DG/EGs was delivered to the HAF on January 19, 2022. At present, a pair of two-seat Rafale DGs and four single-seat Rafale EGs are operational with 332 Mira 'Gerak' at Tanagra Air Base, including this single-seater (serial 411)

with the state-of-the-art APG-83 scalable agile beam radar (SABR). The active electronically scanned array (AESA) radar doesn't just enhance air-to-ground mission capabilities, but also makes the F-16V capable of countering the threat of modern stealth fighters.

Once the Block 52M/+ aircraft have been modernised to F-16V standard, the HAF will retire its 32-strong F-16 Block 30 fleet (comprising 28 F-16Cs and four F-16Ds), which are operated by 330 Mira. Following their retirement and the unit's subsequent disbandment, its personnel will be absorbed by 341 and 347 Mira – which operate 31 F-16C and seven F-16D Block 50s in total – with the parts and equipment removed from the surplus Block 30s being used to keep the Block 50s operational. Some of the HAF's F-16 units

have parallel mission sets that distinguish them from any others. For instance, 341 Mira (an operator of 16 F-16C and three F-16D Block 50s) and 343 Mira (which employs 11 F-16C and four F-16D Block 52+ Fighting Falcons) are tasked with the suppression of enemy air defence (SEAD) mission. For this purpose, 130 AGM-88B high-speed anti-radiation missiles (HARMS) were delivered to the HAF in 1998 and are available for use by both squadrons.

While the F-16C/D Block 30s are scheduled to be phased out of service over the next couple of years, the HAF's 38-strong fleet of Block 50 Fighting Falcons (comprising 31 F-16Cs and seven F-16Ds) will continue to serve Greece until the end of the decade. HAI has proposed to upgrade the Block 50s, using leftovers from the Block 52M/+ examples that are themselves being modernised, including their APG-68(V)9 radars. Since January 19, 2022, a pair of two-seat Rafale DG combat-trainers and four single-seat Rafale EG fighters have been operated by 332 Mira at Tanagra Air Base. By the end of 2024, the squadron will have received 12 further

Guarding Greece



In total, 23 McDonnell Douglas F-4E (AUP) Phantom IIs are in operational HAF service. These aircraft are assigned to 338 Mira 'Aris' at Andravida Air Base and are primarily tasked with carrying out air-to-ground operations
All images: Babak Taghvaei

Order of battle

110th Combat Wing (CW)	Lárisa
337 Mira 'Fantasma'	F-16C/D Block 52
111th CW	Néa Anghialos
330 Mira 'Keravinos'	F-16C/D Block 30
341 Mira 'Velos'	F-16C/D Block 50
347 Mira 'Perseus'	F-16C/D Block 50
114th CW	Tanagra
331 Mira 'Aegeas'	Mirage 2000-5BG/EG Mk II
332 Mira 'Geraki'	Rafale DG/EG
115th CW	Souda-Chania
340 Mira 'Aleppou'	F-16C/D Block 52
343 Mira 'Asteri'	F-16C/D Block 52
116th CW	Araxos
335 Mira 'Tigris'	F-16C/D Block 52+
336 Mira 'Olymbos'	F-16C/D Block 52+
117th CW	Andravida
338 Mira 'Aris'	F-4E (AUP) Phantom II

Source: AirForces Intelligence

Rafales, including six new-build examples. With the primary task of air defence, the unit will continue the missions previously carried out by the Dassault Mirage 2000BGM/EGMs, which includes anti-shipping operations using the French-developed AM.39 Exocet anti-ship missile.

Following the delivery of the initial six Rafales, the final six operational Mirage 2000BGM/EGM fighters in service with 332 Mira were retired. The withdrawal of these aircraft leaves 331 Mira at Tanagra as the sole remaining Mirage 2000 unit in HAF service. The squadron currently operates 19 single-seat Mirage 2000-5EG Mk IIs and five

two-seat Mirage 2000-5BG Mk II combat-trainers.

The Mirage 2000-5BG/EG Mk IIs form the core air defence capability of the HAF's fighter fleet. Four of them – armed with MICA-IR short-range infrared-guided air-to-air missiles and MICA-ER medium-range radar-guided air-to-air missiles – have always been available for Quick Reaction Alert (ORA) at Tanagra on a 24/7 basis. The same number of Mirage 2000-5EGs on deployment to Skyros Island provide the same capability over the Aegean Sea region.

In addition to their air-to-air mission set, 331 Mira's Mirage 2000-5s are capable of launching

MBDA-developed SCALP-EG air-launched cruise missiles (also known in UK as Storm Shadows). In total, 56 of these weapons have been part of the HAF's inventory since 2007 and more will be ordered for use on the Rafale DG/EG fleet.

Back in 2018, the HAF began considering plans for modernising its fleet of 24 Mirage 2000-5 Mk IIs to allow them to remain in service for at least two further decades. As part of the programme, the fleet was to be equipped with a new radar and avionics system. However, this will never happen now, as the Greek government approved the plans to procure the Rafale DG/EGs instead.

The HAF is one of the world's last four operators of the legendary F-4E Phantom II all-weather multi-role fighter. In total, 33 F-4E (AUP) Phantom IIs are currently available to the HAF, 23 of which remain operational with 338 Mira at Andravida. These aircraft are primarily tasked with air-to-ground missions, with a limited air-to-air capability by means of AIM-9J/P Sidewinder short-range air-to-air missiles and AIM-120A/B advanced medium-range air-to-air missiles (AMRAAMs).

Greece's Phantom fleet was modernised to F-4E Avionics Upgrade Programme (AUP) standard under the Peace Icarus 2000 programme. These upgraded aircraft are equipped with Hughes'

AN/APG-65Y pulse doppler radars, making them capable of using AIM-120A/B AMRAAMs.

In addition to the radar, they are also fitted with a GEC digital air data computer, Elbit Systems' fire-control computer, a Mil Std 1553 databus, Honeywell's H-764-G INS/GPS system, a Litton AN/ALR-68(V)2 digital radar warning receiver, colour multifunctional displays, Hazeltine's AN/APX-113(V) identification friend-or-foe system, hands on throttle-and-stick (HOTAS) controls and a new head-up display.

Despite being modernised, the F-4Es are scheduled to be retired from Greek service once a suitable replacement has been procured. Government and military officials from Greece and the US have been negotiating the purchase of between 18 and 24 F-35A Lightning IIs for use by the HAF as a replacement for its ageing Phantoms from 2024. Until these negotiations bear any fruit, the HAF will continue operating its F-4Es, which form the backbone of the air arm's air-to-ground capability.

A fleet of up to 132 fourth- and fifth-generation fighters, comprising 24 Rafale DG/EGs, 84 F-16C/D Block 72s (F-16Vs) and 24 F-35As, could be in HAF service by 2030.

Not to just protect Greece, but to be used to counter the threat of any Turkish fighters or air defence systems, such as the Russian-made S-400 (SA-21 Growler) SAMs. **Babak Taghvaei**

Inventory

Type	Delivered	Current
Mirage 2000-5BG Mk II	5	5
Mirage 2000-5EG Mk II	20	19
Rafale DG	2 (see notes)	2
Rafale EG	4 (see notes)	4
F-4E (AUP) Phantom II	35	33 (23 operational)
F-16C Block 30	34	28
F-16D Block 30	6	4
F-16C Block 50	32	31
F-16D Block 50	8	7
F-16C Block 52M	40	37
F-16D Block 52M	20	18
F-16C Block 52+	20	20
F-16D Block 52+	10	10
F-16C/D Block 72 (F-16V)	0 (84 planned)	0
F-35A Lightning II	0 (up to 24 planned)	0

Notes: One Mirage 2000-5EG was lost to attrition on April 12, 2018. In terms of F-16C/D losses, eight Block 30s (six F-16Cs and two F-16Ds) have been lost, along with two Block 50s (one F-16C and one F-16D). Five Block 52s have also been lost to attrition (three F-16Cs and two F-16Ds). 35 examples of the 84 F-4E Phantom IIs were upgraded to AUP standard in the late 1990s – two have been lost to attrition. Of the 33 F-4Es available to the HAF, just 23 remain operational. The Block 52/52+ standard Fighting Falcons are being upgraded to Block 72 (F-16V) configuration. Greece plans to purchase 24 Rafales in total, but the split between two-seat DGs and single-seat EGs has yet to be determined. An order has yet to be placed in the planned F-35A purchase.

Source: AirForces Intelligence



This LM F-16D Block 52+ Fighting Falcon (serial 602) is operated by 340 Mira 'Aleppou' from Souda-Chania Air Base. The Block 52+ examples of Greece's vast F-16 fleet is currently being upgraded to Block 72 (F-16V) standard



The HAF continues to operate 24 Dassault Mirage 2000-5BG/EG Mk II fighters, including this single-seat example (serial 553). Greece's remaining Mirages are assigned to 331 Mira 'Aegeas' at Tanagra Air Base

Hungary

Hungary became the second export customer of the Saab Gripen after taking delivery of its 12 single-seat JAS 39Cs and two dual-seat JAS 39Ds between 2006 and 2007. These aircraft serve the 59th 'Szentgyörgyi Dezso' Air Base at Kecskemét, with 1 Tactical Fighter Squadron 'Puma'.

In an agreement with Saab, the aircraft were supplied under a ten-year lease, which was extended in 2016 by another decade to 2026 (Hungary will then own the aircraft). As a result, it's unlikely these Gripens will be withdrawn from use much before 2035. There has even been some suggestion that, like the Czech Air Force, the Hungarian Air Force (HuAF) would welcome another squadron but, while the Czechs are considering the F-16 and F-35 too, the HuAF would definitely settle on the Gripen.

Every three years, the Hungarian Gripens deploy to Šiauliai, Lithuania, for Baltic air-policing (BAP) duties, just as they will on August 1, as the lead nation. Having just 14 jets to protect the skies of Hungary and Slovenia, as well as the three Baltic states – Estonia, Latvia and Lithuania – is a burden.

The last deployment to Šiauliai (from May 1 to August 30, 2019) was the HuAF's third BAP deployment, led by Brig Gen Ugrik Csaba, the Base Commander at Kecskemét. The four Gripens manned the quick reaction alert (QRA) role, armed with two AIM-120-C5 AMRAAMs and two AIM-9M Sidewinders. They were very active – racking up 488 sorties and 534 flight hours. These included 110 Tango scrambles when the Gripens were training with live missiles and 50 Alpha scrambles – real intercepts

with live weapons that led to more than 50 Russian aircraft being intercepted. It was one of the highest tallies at the time.

Capt David Szentendrei, who has flown more than 500 hours on the Gripen since converting to the Swedish fighter in 2014, told AFM: "I have been fortunate enough to intercept all the Sukhoi family based up here – Su-24, Su-27, Su-30, Su-34 and Su-35."

The Gripens are equipped with the Litening III laser designator pod (LDP), for long-range air-to-air detection, which means pilots don't have to fly their jet in so close to the target – this is particularly handy at night. In August 2020, Szentendrei said: "We generally look down while working the LDP, and [I] fly with my hands but if I have time, and

the conditions are right, then I will engage auto-pilot."

The Gripens also have Link 16 (NATO data link), which provides the Hungarians with all the situational awareness they crave as soon as they get in the air. Being on a 15-minute scramble doesn't always allow the pilot to prepare for what he or she might encounter once in the air.

In January this year, Saab announced that FMV had successfully completed negotiations for the MS 20 Block 2 capability upgrade to the Hungarian Gripen fleet. This will widen the scope of the jets' capabilities, with a radar upgrade to the PS-05/A Mk4, which, according to Saab, means the air-to-air target tracking range, as well as the

Order of battle

59th 'Szentgyörgyi Dezso' Air Base

1 Tactical Fighter Squadron JAS 39C/D Gripen

Source: AirForces Intelligence

- Hungary upgrades Gripens



A Hungarian Air Force JAS 39C Gripen returns to the QRA hut after a Tango scramble from Šiauliai, Lithuania, in September 2019, during its third Baltic air-policing deployment. All photos: Alan Warnes, unless stated otherwise



A clean (no tanks, no weapons) JAS 39C taxis to the end of the runway at Ostrava, Czech Republic, in 2020, for the short hop to Kecskemét

performance, will increase significantly. This will allow a better detection capability of small air-to-air targets; improve clutter suppression, and will bring growth potential for further developments in the air-to-air and air-to-ground modes.

There will also be a wider selection of weapons to fit to the Gripens – the IRIS-T infrared within-visual-range (WVR) air-to-air missile; GBU-49 Enhanced Paveway II dual-mode GPS and laser-guided 500lb bomb, which is designed

for attacking stationary and moving targets; and Meteor, the most advanced long-range, radar-guided, beyond-visual-range air-to-air missile (BVRAAM) in the world.

The upgrade will bring a true multi-role capability to the HuAF Gripens. It will also increase communication capabilities by enhancing Link 16 functionality and updated voice communication to the latest NATO secure communication standard.

The capability to identify coalition aircrafts will also be improved with

In 2019, Hungarian Gripens intercepted more than 50 Russian aircraft, including these two Su-30SMs, while on the BAP deployment to Lithuania HuAF



the introduction of the latest IFF (identification friend or foe) NATO Mode 5.

At the time of writing, the first Hungarian Gripens were due to go through the upgrade in Sweden from early April 2022.

During the heightened state of alert on Europe's eastern flank, two Gripens are dedicated to the NATO commitment, while two fulfil the national air defence needs, armed with Sidewinders and a Mauser cannon. The current situation in Ukraine has also cast doubt over whether Exercise Load Diffuser will be held this year. The exercise is currently planned to take place at Kecskemét from May 9-23, with Ohio ANG F-16C/Ds. A decision is expected to be reached in mid April.

Like the Czech Air Force, the HuAF Gripen fleet lacks any air-to-air refuelling (AAR) capability

but, unlike the Czechs, it has not joined NATO's Multinational Multi-Role Tanker and Transport Fleet (MMTF), so will not work with the A330 MRTTs. However, the HuAF has a solution of its own, as it plans to welcome delivery of two Embraer KC390s in 2024.

While Gripen and A330 MRTT integration has been drawn out, the contract with Embraer includes integration of the Gripen before the KC390s are delivered. Meanwhile, the HuAF does have the option of air-to-air tanker training with German Air Force A400Ms, once the integration trials that were completed last September have been officially signed off. NATO pilots need to train in the AAR role, for the occasions they might be flying on combat ops, and the likes of Baltic air policing.

Alan Warnes



Inventory

Type	Delivered	Current
JAS 39C Gripen	12	12
JAS 39D Gripen	3	2

Notes: An attrition loss occurred on May 19, 2015, when a JAS 39D (42) overran the runway at Caslav in the Czech Republic, and was declared a write-off. It was replaced on July 1, 2016.

Source: AirForces Intelligence



A Lightning Revolution

Order of battle

4° Stormo	Grosseto
9° Gruppo	F-2000A
20° Gruppo	F-2000A TF-2000A
6° Stormo	Ghedi
102°/154° Gruppo	Tornado IDS [A-200C] Tornado IDS(T) [TA-200B]
155° Gruppo	Tornado ECR [EA-200D] Tornado IDS [A-200C]
32° Stormo	Amendola
13° Gruppo	F-35A Lightning II
36° Stormo	Gioia del Colle
10°/12° Gruppo	F-2000A TF-2000A
37° Stormo	Trapani-Birgi
18° Gruppo	F-2000A TF-2000A
51° Stormo	Istrana
132° Gruppo	AMX ACOL Ghibli [A-11B] AMX-T ACOL Ghibli [TA-11B] F-2000A
Reparto Sperimentale Volo (RSV, Experimental Flight Department)	Pratica di Mare
311° Gruppo	F-2000A TF-2000A Tornado IDS [A-200C] AMX ACOL Ghibli [A-11B] AMX-T ACOL Ghibli [TA-11B]
Italian Navy	Grottaglie
GRUPAER	AV-8B+ Harrier II TAV-8B+ Harrier II F-35B Lightning II

Notes: For training purposes, the AM maintains two F-35As at Luke AFB, Arizona, while the MM has two F-35Bs embedded with VMFAT-501 at MCAS Beaufort, South Carolina. After transitioning to the F-35B, the GRUPAER will be relocated to Amendola.

Source: *AirForces Intelligence*

Italy's fast-jet force still comprises five different types of aircraft: Eurofighter F-2000A/TF-2000A; Panavia Tornado IDS/ECR (A-200C/EA-200D); AMX International AMX ACOL Ghibli (A-11B/TA-11B); Lockheed Martin F-35A/B Lightning II; and McDonnell Douglas AV-8B+/TAV-8B+ Harrier II.

In terms of numbers, Italy's most important combat aircraft is the Eurofighter – 95 examples (comprising 81 single-seat F-2000As and 14 two-seat TF-2000As) were acquired, with the last being delivered to the Aeronautica Militare (AM, Italian Air Force) on October 23, 2020. Just one F-2000A has been lost to attrition, following a fatal crash during an air show in 2017.

Introduced into operational service in 2004, the type has reached full maturity as a weapons system in the air-to-air, air-to-ground, 'recce' and swing roles. The older Tranche 1 aircraft have been upgraded to Tranche 1 Evolution Package 1 standard and

can perform air-to-air, 'recce' (with the Rafael-produced RecceLite pod) and bombing missions with laser-guided bombs (LGBs), if the targets are illuminated by other systems. On the contrary, the more multi-role capable Tranche 2/3 examples follow the Eurofighter development path and are now undergoing the Phase 2 Enhancements B (P2Eb) upgrade programme, which enables the use of the MBDA-developed Meteor beyond-visual-range air-to-air missile (BVRAAM). In the future, the AM – in line with the Royal Air Force (RAF) – plans to integrate the Captor-E or European Common Radar System (ECRS) Mk 2 active electronically scanned array (AESA) radar onto its Eurofighter fleet.

Italy is a partner in the development of this system. In addition, the fleet will also receive the Storm Shadow cruise missile by 2024/2025 with the Phase 3 Enhancements B (P3Eb) configuration, along with the capability to operate



A pair of F-35As from 32° Stormo's 13° Gruppo fly together in formation over Iceland during a NATO Icelandic Air Policing mission in October 2019. A second Lightning II unit will be activated by the AM in 2023/2024. All images: Riccardo Niccoli

AM – were acquired, before 16 of them were later converted to the electronic combat role (ECR) configuration – known locally as the EA-200 – starting from 1993.

Withdrawal of this fleet began gradually in 2012, but around 44 examples of the IDS – comprising 37 A-200Cs and seven TA-200Bs, or IDS(T) – should still be operational with 6° Stormo's 102°, 154° and 155° Gruppo at Ghedi. In addition, 155° Gruppo also operates the AM's remaining 15 ECR (EA-200D) aircraft.

Starting in 2002, a selected number of airframes underwent a mid-life upgrade (MLU) programme, with the first modified aircraft being returned to the AM two years later. The project was a bit complicated, as it included three different upgrade steps to standards called Retrofit Enabling Task 6 (RET-6), RET-7 and RET-8. Altogether, the MLU involved 43 IDS/IDS(T) airframes (subsequently redesignated A-200Cs and TA-200Bs, respectively) and 15 ECR aircraft (becoming EA-200Ds), which were destined to soldier on until the end of the type's operational service – scheduled for 2025.

However, the slow pace of the F-35's introduction into service has forced the AM to reschedule the Tornado's final retirement, extending it to at least 2030. The

final RET-8 upgrade started in 2013 and the last modified aircraft (an ECR) was returned to 155° Gruppo in 2018.

The RET-8 standard included several improvements. In the cockpit, a new display for the terrain-following radar, Multifunctional Information Distribution Systems (MIDS), a colour TV/TAB head-down display (HDD) and other avionics systems were added.

The Tornado fleet also received new weapons, including the precision-guided GBU-39 Small Diameter Bomb, GBU-24(V)/B Enhanced Paveway III and GBU-32(V)/B Joint Direct Attack Munition (JDAM), along with the Storm Shadow cruise missile and AGM-88E Advanced Anti-Radiation Guided Missile (AARGM). Integration of the Litening III and RecceLite pods were part of the initial RET-6 modification package.

A platform that is in the twilight of its operational career is the AMX ACOL Ghibli (designated the A-11B/TA-11B by the AM), The type entered service in 1988, with 136 examples acquired in total – comprising 110 single-seat A-11s and 26 two-seat TA-11s (AMX-Ts).

From 2007 to 2010, 55 aircraft (43 A-11s; 12 TA-11s) were upgraded to Aggiornamento Capacità Operative e Logistiche

(ACOL, Logistic and Operational Capability Upgrade), which introduced Litening II and RecceLite pods, along with Lizard LGBs and JDAMs to the fleet, allowing it to operate with effectiveness in the Libyan and Afghan theatres.

The fleet has gradually been reduced, with squadrons at Amendola and Istrana having been disbanded. Today, the only unit flying the type is 51° Stormo's 132° Gruppo at Istrana, which operates roughly a dozen aircraft. The squadron is unique as it is the only unit to operate two fighter types (Eurofighter/AMX).

Initially, the withdrawal of the AMX was scheduled for 2016, but this has been delayed several times. The AM plans to keep it in service for as long as possible (due to the F-35's slow delivery pace) and at least until 2023, so it can be part of the air arm's centenary celebrations. After its retirement, 132° Gruppo will only operate the Eurofighter.

The most advanced combat aircraft in Italian service is now the F-35A/B Lightning II, which has been acquired for both the AM and Marina Militare (MM, Italian Navy). Italy aims to procure a total of 60 F-35As and 15 F-35Bs for the AM, along with a further 15 F-35Bs for the MM. These aircraft are being assembled at the F-35

the RecceLite and Litening 5 reconnaissance/targeting pods.

The AM's Eurofighter force is assigned to six squadrons: 4° Stormo's (Wing) 9° and 20° Gruppo (Squadron) at Grosseto; 36° Stormo's 10° and 12° Gruppo at Gioia del Colle and 37° Stormo's 18° Gruppo at Trapani-Birgi. The AM's youngest Eurofighter unit – 51° Stormo's 132° Gruppo at Istrana – started to receive its aircraft in September 2019.

The standard complement of aircraft per squadron should be 16, but the units at Trapani and Istrana have reduced numbers. Depot maintenance for the type is performed by 1° Reparto Manutenzione Velivoli (RMV, Aircraft Maintenance Department) at Cameri, which also manages the Tornado fleet.

Italy's Tornado IDS/ECR fleet remains operational and the AM will celebrate the 40th anniversary of the type's introduction this year. In total, 99 examples of the interdicator/strike (IDS) variant – designated the A-200 by the

An F-2000A from 37° Stormo taxis back to its shelter after arriving back at Trapani-Birgi following a mission. The Eurofighter is now operational with six squadrons across four AM wings that cover all of Italy's domestic airspace



European Fighter Survey

Final Assembly and Check Out (FACO) factory at Cameri, which is the only production facility for the type in Europe.

Italy's first F-35A completed its maiden flight in September 2015. In February 2016, this aircraft conducted the type's first-ever transatlantic flight, travelling to NAS Patuxent River, Maryland, for a series of tests, before being transferred to Luke AFB, Arizona, for training purposes in May 2016.

It was followed by another three aircraft, before the fifth and sixth examples were delivered to Amendola in December 2016 – making the AM the first air arm outside the US to operate the type from home soil. They were assigned to 32^a Stormo's reactivated 13^a Gruppo (a former AMX unit), which remains to be the AM's sole F-35 squadron.

The MM received its first F-35B in January 2018. While it is destined to join the Gruppo Aerei Imbarcati (GRUPAER, Carrier Aircraft Squadron) "Wolves", the first two examples were flown to MCAS Beaufort, South Carolina, to operate within Marine Fighter Attack Training Squadron 501 (VMFAT-501) "Warlords" in the training role.

The third F-35B was assigned to the AM and joined 13^a Gruppo alongside its sister F-35As at Amendola in February 2020. In July 2021, the MM received its third F-35B – the first to remain in Italy – and is based on the Italian aircraft carrier, ITS *Cavour* (550).

The MM will have to relocate the GRUPAER from Grottaglie, which cannot accommodate the F-35B, to Amendola.

The AM maintains two F-35As at Luke AFB, while the rest of its fleet (approximately 14 aircraft so far) is at Amendola.

On March 1, 2018, the fleet adopted Italy's domestic quick reaction alert (QRA) role and it was assigned to the NATO QRA mission on February 1, 2022. Since September 2019, Italian F-35As have supported NATO's Air Policing mission – having been deployed twice to Iceland and once to Estonia. It has also participated in several domestic and overseas exercises, including 'Iniochos' in Greece, 'Blue Flag' in Israel and 'Red Flag' in the US.

The AM declared Initial Operational Capability (IOC) on the type in November 2019. A second F-35A unit is set to be established under 6^a Stormo at Ghedi in 2023/2024, as the AM starts to replace its Tornado IDS/ECR fleet. The AM should receive its final F-35 in 2030.

In March 2021, the MM carried out F-35B sea trials aboard the *Cavour*, which sailed to the US to be qualified for carrier operations with the Lightning II by Lockheed Martin and the US Navy.

The *Cavour*'s first international exercise with the type took place in November 2021, when the Italian ship carried out joint operations in the Mediterranean

A Tornado ECR (EA-200D) and IDS (A-200C) from 6^a Stormo fly together during a training mission. The venerable Tornado is scheduled to remain in Italian service until at least 2030

Below:
An AV-8B+ Harrier II from the MM's GRUPAER powers down on the deck of the Italian aircraft carrier, ITS *Cavour* (550), after a mission. Italy's Harrier II fleet will be formally retired at the end of 2024, replaced by the F-35B Lightning II

Inventory

Type	Delivered	Current
AMX Ghibli (A-11)	110	9 (A-11B)
AMX-T Ghibli (TA-11)	26	3 (TA-11B)
F-2000A	81	80
TF-2000A	14	14
F-35A Lightning II	12	12 (60 planned)
F-35B Lightning II	3	3 (30 planned - AF/Navy)
Tornado ECR (EA-200)	16	15 (EA-200D)
Tornado IDS (A-200)	71	37 (A-200C)
Tornado IDS(T) (TA-200)	12	7 (TA-200B)
AV-8B+ Harrier II	16	14
TAV-8B+ Harrier II	2	2

Notes: Tornado IDS/ECR and AMX ACOL Ghibli fleets will be replaced by the F-35A, while MM will replace its AV-8B+ Harrier IIs with the F-35B. The AM and MM will each receive 15 F-35Bs. 16 Tornado ECRs were converted from the 87 Tornado IDS fleet.

Source: AirForces Intelligence

with F-35s from the AM, MM, RAF and USMC.

The fifth fast-jet type in Italian service is the AV-8B+/TAV-8B+ Harrier II, which entered MM service in 1991, with 16 single-seat AV-8B+ and two dual-seat

TAV-8B+ aircraft acquired. Assigned to the GRUPAER at Grottaglie, the Italian Harriers have received various upgrades during their career, including updates to the fleet's operating software (it currently uses release H6.0) and the integration of the Litening II advanced targeting pod, JDAM, GBU-54 Laser JDAM and Improved Triple Ejector Racks (I-TERs) for the use of smart munitions.

In 2012, the Harrier fleet entered

the Planned Maintenance Interval 1 (PMI-1) programme, which was performed by the Fleet Readiness Center East at MCAS Cherry Point, North Carolina.

Seven aircraft underwent the PMI-1 process – those destined to fly until Italy ceases operations with the type. The final example was returned to the MM in January 2020.

Italy began the Harrier retirement process in 2019 with the most 'worn out' aircraft. The final six operational aircraft are set to be formally withdrawn from service on December 31, 2024 – when the MM plans to have six operational F-35Bs, allowing the service to declare IOC with the type. **AFM**



This AMX ACOL Ghibli (A-11B) from 51^a Stormo prepares to touch down at Istrana – the type's home base. While fleet numbers have declined in recent years, the type is expected to remain in operational Italian service until 2023



Netherlands



Viper Out, Lightning In

The Royal Netherlands Air Force (RNLAF) is transitioning from a fourth- to fifth-generation air arm. This not only involves the introduction of the Lockheed Martin (LM) F-35A Lightning II, but also the purchase of other hardware.

The introduction of the Lightning II is progressing steadily. With the delivery of F-35As serials F-023 and F-024 at Leeuwarden Air Base (AB) in January, more than half of the 46 planned aircraft have been handed over – 37 of which have already been ordered.

F-024 is the first example for the RNLAF's second F-35A unit, No 313 Squadron, which will soon be stationed at Volkel AB. On April 8, 2022, the unit received another two examples (F-025 and F-026).

The first pair of Lightning IIs for the Netherlands were ordered

in 2009 and delivered in 2013. Another eight were handed over in 2019, followed by five in 2020 and seven in 2021. Recent deliveries have been somewhat delayed due to the COVID-19 pandemic, but the RNLAF still expects to receive its final F-35As in 2024.

The RNLAF's first two aircraft (serials F-001 and F-002) were assigned to the multinational operational test and evaluation (OT&E) team at Edwards Air Force Base (AFB), California. Following the completion of these tests, both were transferred to the Dutch F-35 training detachment embedded with the 308th Fighter Squadron 'Emerald Knights' at Luke AFB, Arizona. The eight aircraft assigned to this detachment were assembled on LM's F-35 production line in Fort Worth, Texas, with all remaining examples

Order of battle

	Leeuwarden AB, Friesland
No 322 Sqn	F-35A
	Volkel AB, North Brabant
No 312 Sqn	F-16AM/BM (MLU) – see notes
No 313 Sqn	F-35A – see notes
56th FW	Luke AFB, Arizona
308th FS 'Emerald Knights'	F-35A – see notes
162nd FW – Initial Qualification Training (IQT) Detachment	Tucson ANGB, Arizona
148th FS 'Kickin' Ass'	F-16AM/BM (MLU) – see notes

Notes: After ceasing F-16AM/BM operations, No 313 Sqn is scheduled to return to Volkel AB as the RNLAF's second frontline F-35A unit in June 2022. No 312 Sqn will itself transition to the F-35A once No 313 Sqn takes over the DCA mission. The F-16AM/BMs assigned to the 162nd FW will be handed over to Draken International in the near future. The 308th FS serves as a joint F-35A training squadron for the Netherlands, Denmark and the US.

Source: *AirForces Intelligence*





Above: In 2021, No 312 Squadron celebrated its 70th anniversary. It was the last unit to transition to the F-16 from the Lockheed F-104 Starfighter and will be the final squadron to be re-equipped with the F-35A

Left: The RNLAf's transition from the F-16AM/BM (MLU) Fighting Falcon to the F-35A Lightning II was more or less on schedule before Russian forces invaded Ukraine. Efforts to defend NATO's eastern flank could slow down the process
All images: Gert Kromhout

being built in partnership with Leonardo at the F-35 Final Assembly and Check Out (FACO) facility in Cameri, Italy.

With defence budgets set to increase vastly in the coming years and Russia's invasion of Ukraine still fresh in their minds, the prospect of more F-35s being ordered by the Netherlands cannot be ruled out. It was initially determined that 85 F-35As would be acquired to replace the RNLAf's outgoing LM F-16AM/BM (MLU) Fighting Falcon fleet and it is no secret that the air force still desires this quantity.

Initial operational capability (IOC) for No 322 Squadron – the first of three frontline RNLAf F-35A units – was declared on December 27, 2021. The passing of this important milestone allows the unit to deploy four aircraft on operations for short periods. No 322 Squadron received its first F-35A in October 2019, with the 15th and final aircraft (serial F-023) being delivered in January 2022.

No 313 Squadron's first six aircraft will initially be delivered to Leeuwarden, which is where the initial conversion process takes place. On June 30, these examples will arrive at Volkel

to join the RNLAf's second operational F-35A unit.

During this transition period, the quantity of Dutch F-35As will gradually increase until late 2024, as the number of F-16AM/BMs decreases. Paralleling this schedule, current F-16 personnel will be retrained on the F-35.

The RNLAf expects to declare full operational capability (FOC) on the F-35A in early 2024. It should then be able to protect Dutch airspace on a 24/7 basis and deploy with four aircraft for long durations. FOC will only be declared when the fighter can carry out all of the F-16's missions and when No 313 Squadron has taken over the dual capable aircraft mission of No 312 Squadron at Volkel, which means the F-35A can perform conventional and nuclear operations.

Eventually, the Dutch F-35As will conduct the following mission sets: defensive/offensive counter-air (DCA/OCA); non-traditional intelligence, surveillance and reconnaissance (NTISR); quick reaction alert (QRA); suppression/destruction of enemy air defence; air interdiction and close air support. The NTISR mission

involves intelligence collection through the F-35's sophisticated sensor package during reconnaissance missions. Sharing such information with allied forces via the aircraft's advanced network-enabled capabilities helps to enhance situational awareness across the battlespace.

Currently, RNLAf F-35As are equipped with AIM-9X Sidewinder short-range air-to-air missiles; AIM-120C advanced medium-range air-to-air missiles (AMRAAMs); Joint Direct Attack Munitions and GBU-39 small diameter bombs (SDBs). New medium- to long-range air-to-air missiles are being acquired, with a decision imminent on the new munition. From 2023, the Dutch Lightning IIs will receive the Drag Chute System, which was pioneered by their Norwegian counterparts (see p50-51).

The role of the F-16AM/BM as a frontline fighter has declined rapidly in recent years. In 2019, No 312 and 313 Squadrons were responsible for the RNLAf's QRA and DCA missions. These units were also deployable for short (eight aircraft) and long (four examples) periods. That was reduced to four F-16s for

both in 2020. No 313 Squadron ceased all F-16 operations at the end of 2020, after which No 312 Squadron absorbed part of that unit, pending F-35A conversion.

The F-16AM/BM still maintains the RNLAf's QRA and DCA tasks, but it – along with the F-35A – will no longer be deployed on missions for the defence and promotion of the international legal order and stability, due to budget cuts. However, both types can still be deployed to defend NATO territory, as has been seen following Russia's invasion of Ukraine.

Weeks before the Russians invaded Ukraine, the RNLAf announced it would deploy elements of No 322 Squadron to Bulgaria to support NATO's enhanced air-policing mission for two months, beginning in April. Soon after Russia launched its invasion, fighters from both No 312 and 322 Squadron started flying combat air patrols over Poland from their respective home bases. The RNLAf assigned four F-35As and four F-16AMs to this operation.

No 312 Squadron still had more than 30 F-16AM/BMs in its inventory as of early 2022, but that number will be reduced to 24 this summer. These will all be single-seat F-16AMs, because they are fully combat-capable, unlike the two-seat F-16BMs. By mid February, just two dual-seaters remained in use – serials J-368 and J-066. Once retired, the latter will go to a technical school.

As the drawdown to 24 single-seaters takes place, the final batch of Dutch F-16 pilots will have completed their training with the Arizona Air National Guard's 162nd Fighter Wing at Tucson ANGB. The ten RNLAf F-16s stationed there will not return to the Netherlands, instead remaining in the US after being purchased by Draken International.

Last November, Draken signed a contract to purchase 12 second-hand RNLAf F-16AM/BMs, with an option to acquire a further 28.

It is planned for the Dutch F-16 fleet to complete its final overseas deployment next year, when No 312 Squadron participates in Exercise Red Flag at Nellis AFB, Nevada. The unit is due to complete its transition to the F-35A in 2024, after No 313 Squadron has taken over the DCA mission. An initial cadre of personnel will form a flight under No 313 Squadron before returning to an F-35A-equipped No 312 Squadron. **Gert Kromhout** *AFM*



Inventory

Type	Delivered	Current
F-16AM (MLU)	114	40+ (see notes)
F-16BM (MLU)	25	2 (see notes)
F-35A	26	26 (see notes)

Notes: No 312 Squadron's F-16AM (MLU) fleet will be reduced to 24 aircraft this summer. The ten F-16AMs at Tucson ANGB will also soon be retired from operational service and given to Draken International in the US. After being withdrawn from service, No 312 Squadron's two remaining F-16BMs will find second lives. The first (serial J-066) will be delivered to a technical school, while the second (serial J-368) looks destined to join Draken. F-35A deliveries continue with 46 examples on order at present. The 23rd and 24th examples arrived at Leeuwarden in January 2022. The 25th and 26th examples were delivered on April 8, 2022. The RNLAf aims to acquire a total fleet of 85.

Source: AirForces Intelligence

Left: This F-16BM (serial J-368) is just one of two dual-seat Fighting Falcons that remain operational in the Netherlands



Two of the 32 RNoAF F-35As that have been delivered so far, in the typical flying conditions that the fifth-generation fighters will face
All photos: RNoAF, unless stated otherwise

Norway

Arctic F-35As

The Royal Norwegian Air Force (RNoAF) phased out its F-16 fleet earlier this year, with the last two making a final quick reaction alert (QRA) Tango (training) scramble on January 6. Bodø, from where they flew the last mission, has also lost its QRA status – this has been passed to Evenes, where it is being manned by the new F-35As.

The last F-16 flight came 42 years after the first of 72 F-16A/Bs were

delivered, having served with 331 and 332 Skvadron at Ørland. In the late 1990s, the surviving 47 of the original 60 F-16As received a mid-life upgrade (MLU) along with all ten F-16Bs. Two F-16AM (MLU)s were damaged (285 and 669) and never repaired.

All 55 surviving F-16s are now the property of the Forsvarets Materieell Avdeling (FMA) and stored at Kjeller Air Station. A deal

valued at €454m for 32 aircraft was agreed with Romania earlier this year – although, details of exact variants are unknown – to replace its retired MiG-21 LanceRs in 2023/24.

As a replacement for the RNoAF F-16 fleet, Norway selected the Lockheed Martin F-35A Lightning on November 29, 2008, with a plan to acquire 52 aircraft. However, it was not until June 15, 2012, that the Defence Ministry announced authorisation to fund the purchase of the first two F-35As, which were delivered to Luke Air Force Base in Arizona, on November 10, 2015. The US facility is where Norwegian Air Force pilot and groundcrew training takes place – there are ten

F-35As based there. Six F-35As will be delivered every year until 2024. Full operational clearance is expected in 2025 when all the aircraft will be delivered.

After the first three F-35As landed on Norwegian soil on November 3, 2017, the Norwegian Air Force set about testing the aircraft in Norway's harsh weather conditions. The aircraft are the most northerly based F-35As in the world, and, as such, will be faced with some extreme environments during their service.

On November 6, 2019, Norwegian Air Force Commander Major General Tonje Skinnarland declared Norway's F-35As had reached initial operational clearance. After that, the Norwegian Air Force conducted intensive operational testing and evaluation (OT&E) in winter, operations in the northern areas and co-operation with Norwegian Army, Navy and Special Forces. To conclude the test period, the Norwegian Armed Forces spent several days deploying aircraft and equipment from Ørland Air Station to Rygge Air Station.

This was the first time the fighter aircraft were operated from a base other than Ørland, where both 332 Skvadron and the Testing, Training and Tactics (TTT) Squadron are located with 22 jets.

The first operational unit, 332 Skvadron, stood up on August 1, 2018 and reached initial operational capability in 2019. A

Order of battle

332 Skvadron	Ørland
332 Skvadron QRA	Evenes
TTT Squadron	Ørland

Source: AirForces Intelligence



With the Russians being a persistent threat since 2014, the RNoAF quick reaction alert with F-35As is now residing at Evenes in northern Norway, closer to the action



The RNoAF F-35As are a regular feature of NATO exercises, most recently during Strong Resolve, which took place in March. Last autumn, they also participated in the Fighter Weapons Instructor Course at Leeuwarden Frank Crebas

Kongsberg Joint Strike Missile

In October 2021, the Norwegian Defense Materiel Agency (NDMA) awarded Kongsberg a \$472m contract for the delivery of joint strike missiles (JSMs). Eirik Lie, president of Kongsberg Defence & Aerospace commented: "The development of the missile has been ongoing since 2008, and the contract completes development and test, and enters the full-rate production phase."

JSM is part of the Block 4 suite of capabilities currently being integrated into the F-35 fleet, which entered the flight-test phase of its development with a first in-flight release of JSM from the F-35 in February 2021. A fifth-generation stealthy air-to-surface missile, the weapon has been developed to fulfil the F-35's anti-surface warfare and land attack capability needs. The missile can be carried internally, ensuring the aircraft's low-signature capabilities, and has superior performance against well-defended sea and land targets across long distances.

To date, Finland, Japan and Norway have selected the JSM for their F-35As but Australia is also considering the weapon for its F-35As. The Australian government is partnered with Norway on the development of the missile, and BAE Systems Australia is developing the passive radio frequency sensors (PRS) for the weapon.

operational department and will eventually become instructors for the next WIC in 2023.

Alan Warnes *AFM*

Inventory

Type	Ordered	Current
F-35A	52	32
Ten are based with the 56th Fighter Wing at Luke AFB, Arizona, for training		
Source: AirForces Intelligence		

second squadron, 331 Skvadron, will eventually stand up there too. The TTT Squadron tests and implements new tactics, weapons and systems for the F-35A and is also running the F-35 simulators. They do not have their own F-35s, but the F-35 pilots in the unit are still on active duty in addition to their roles with the TTT Squadron.

Ørland, in southern Norway, is the RNoAF's F-35 main operating base, and has undergone massive renovation and modernisation for the aircraft's arrival.

A RNoAF F-35A detachment deployed to Keflavik Air Base in February 2021 for a month. It was the second deployment of the F-35As to execute NATO's air-policing mission in Iceland. Four had also previously deployed from 332 Skvadron exactly a year earlier.

For four weeks, the detachment personnel worked with the Icelandic Coast Guard and NATO's Combined Air Operations

Centre at Uedem, Germany, to safeguard Allied airspace in the High North.

Lieutenant Colonel Tron Strand, the detachment commander for the NATO air-policing mission in Iceland, commented: "We have gained some very useful experiences related to the transfer of the F-35 and the implementation of operations and maintenance of quick reaction alert at another base."

Strand continued: "For quick reaction alert operations, the F-35 plays this role in exactly the same way as the F-16 used to. However, the F-35 can do so much more, and the aircraft gives the pilot a much better understanding of the situation."

RNoAF pilots and F-35As attended the Weapons Instructor Course (WIC) at Leeuwarden in the Netherlands last autumn. According to Lieutenant Colonel Eskild Kristiansen, commander of the TTT Squadron, it was the

most important thing the RNoAF did in 2021. The TTT Squadron is an operational support squadron for the 332 Skvadron and, in the longer term, 331 squadron, and is, among other things, aimed at ensuring tactical development for the F-35s

WIC is a six-month course that is conducted in both the Netherlands and Norway. The first part involved theory teaching, which was carried out in Leeuwarden, the Netherlands.

The second part was carried out at Ørland, where the students trained both in simulator and in F-35 fighter aircraft. During autumn 2021, students and instructors went with their F-35Bs to Leeuwarden to complete the third and final module of the course. Lieutenant Colonel Strand, who is also the commander of 332 Squadron, said: "WIC provides pilots with the highest operational training you can get as a fighter pilot. We use to say that they become the instructors of the instructors on the squadron."

When the students returned from the Netherlands after completing the WIC in October last year, they were transferred into the



Two F-16A MLUs taxi out for departure during the jets' last quick reaction alert from Bodo on January 6 this year

European Fighter Survey

Poland



A Lightning Ref

Poland's primary combat aircraft is the Lockheed Martin F-16C/D Block 52+ Jastrzab (Hawk) multi-role fighter, with 48 examples – comprising 36 single-seat F-16Cs and 12 two-seat F-16Ds – in service. These equip three squadrons: 3 and 6 Eskadra Lotnictwa Taktycznego (ELT, Tactical Air Squadron) of 31 Baza Lotnictwa Taktycznego (BLT, Tactical Air Base) in Poznan-Krzesiny, and 10 ELT of 32 BLT in Łask.

From November 30, 2021, to March 31, 2022, 3/6 ELT-operated F-16C/Ds – armed with AIM-120C-7 AMRAAM and AIM-9X Sidewinder air-to-air missiles – were deployed to Šiauliai, Lithuania, in support of

NATO's Baltic air-policing initiative. During this rotation, the detachment (known as Polish Military Contingent Orlik 10) flew more than 500 hours in defence of Baltic skies, completing more than 100 missions, including Alpha/Tango scrambles on quick reaction alert duty and close air support training operations with various ground forces.

Russian military aircraft traffic increased from January 30, when new Sukhoi Su-30SM2 fighters were delivered to Chernyakhovsk Air Base in Kaliningrad. On February 18, Polish F-16C/Ds intercepted a Russian Tupolev Tu-134 *Crusty* airliner, which was being escorted by two Mikoyan-Gurevich MiG-31 *Foxhounds* and two Su-27 *Flankers*.

The days following Russia's invasion of Ukraine were very busy for the detachment. From February 28 to March 6, Polish and Belgian F-16s were scrambled 18 times, with 16 launches between March 7-13. A further 31 scrambles took place between March 14 and April 3. When compared with previous rotations, there were a lot more Alpha scrambles during this deployment, due to the addition of a new mission – border patrol – with Polish F-16C/Ds conducting combat air patrols along the airspace border between the Baltic states and Russia/Belarus.

The Polish Air Force is currently working on proposals to modernise its F-16C/D fleet – focusing on

how it will best work with the 32 F-35A Lightning IIs that will enter operational service later this decade – and the project should be presented soon. As per this upgrade, the Polish aircraft will be fitted with a new AN/APG-83 Scalable Agile Beam Radar (SABR), with elements of the electronic warfare, onboard computer, infrared search-and-track (IRST) and command/communications systems being modernised.

According to the schedule, Poland's first F-35A Block IV will appear on the production line at Lockheed Martin's facility in Fort Worth, Texas, this September. For the third time, a group of Polish pilots (including two MiG-

Order of battle

21 BLT	Swidwin
(see notes)	Su-22M4/UM3K Fitter-K/G
22 BLT	Malbork
41 ELT	MiG-29A/UB Fulcrum-A/B
23 BLT	Minsk Mazowiecki
1 ELT	MiG-29A/UB Fulcrum-A/B
31 BLT	Poznan-Krzesiny
3 ELT	F-16C/D-52+
6 ELT	F-16C/D-52+
32 BLT	Łask
10 ELT	F-16C/D-52+

Notes: In 2010, two Polish Air Force Su-22M4/UM3K units (8 and 40 ELT) were merged to form a single unit, which goes by the 21 BLT name. The first operational F-35A unit will be based at Łask, with the first aircraft expected to arrive at the base in 2025/2026. A second frontline F-35A squadron will likely be formed at Swidwin, though it remains unclear if this will be 21 BLT or a new unit altogether.

Source: *AirForces Intelligence*



Above: Modification efforts on the Polish Air Force's Su-22M4/UM3K Fitter-K/G fleet helped enable the training of new pilots and to provide recurring training for senior aviators. Following the type's retirement, these crews will be transferred to other Polish combat aircraft units to be trained on the F-16C/D-52+ or F-35A Polish Ministry of National Defence

Left: Poland's F-16C/D-52+ fleet entered operational service in 2006, with 48 examples delivered. The multi-role fighter is known as the Jastrzab (Hawk) in Polish Air Force service Alan Warnes
Below: The Polish Air Force currently has a fleet of 29 MiG-29A/UB Fulcrum-A/Bs. The air arm will continue operating the ageing Soviet-era fighter until the type is replaced in operational service by the F-35A Lightning II. However, it is possible the type may leave Polish service sooner, if the conflict between Russia and Ukraine continues to escalate Khaleem Chapman



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29 Fulcrum pilots) recently flew to the US to get their 'feet wet' on the F-35 full mission simulator and to learn about the platform's capabilities. Candidate selection for Polish F-35 pilots and maintainers is still ongoing, with training due to start next year. Following the outbreak of conflict in Ukraine, the Polish Air Force's priority is to receive the F-35A on time and to achieve initial operational capability (IOC) without delay.

The first group to train on the F-35A will comprise 14 F-16C/D pilots. According to the pilots, this is the best solution, as it will be easier to transition from the F-16 to the F-35, given their similarities. However, this does not mean other combat aircraft pilots will not be trained on the Lightning II in the coming years. It is possible that young pilots or even current MiG-29A/UB Fulcrum-A/B or even Su-22M4/UM3K Fitter-K/G aviators will be trained to fly the F-16 (or even the F-35) to mitigate the capability gap created by F-16 pilots moving to the F-35.

According to Polish Air Force commanders, the only limitation in becoming an F-35A pilot is age – up to 35 years – but having the appropriate flight hours under their belt and a high-level of English language skills will certainly be taken into

account. Those who are selected to fly the F-35 must pass an English test before being sent to the US for training in 2023/2024.

It is assumed they will spend about two years in the US and will be trained using aircraft that have been manufactured for Poland. Pilots from this group will become instructors and will train the next Polish F-35A aircrews, after completing their mission qualification training course and attaining a combat-ready status. Once Poland has received its complement of Lightning IIs, training will begin in-country.

The first batch of six aircraft will be delivered in 2024, but these F-35As will likely be based at Luke Air Force Base, Arizona, to support the training of 24 pilots and 90 maintainers – some of them up to instructor level. Another batch will be delivered direct to Poland in 2025/2026 to equip the first operational squadron at Łask. This initial unit should declare IOC in 2026, with full operational capability (FOC) scheduled for 2030.

It is likely the second operating location for the F-35A will be 21 BLT in Swidwin, northwest Poland, which is currently home to a squadron equipped with 12 single-seat Su-22M4 Fitter-Ks and six two-seat Su-22UM3K Fitter-Gs. This unit was created in 2010, when 8 and 40 ELT were merged. The ground attack/strike aircraft

entered Polish service in 1984 and are set to stay in the Air Force's inventory until 2025.

The Polish Air Force also maintains a fleet of 28 MiG-29A/UB Fulcrum-A/Bs, which are operated by two squadrons: 1 ELT of 23 BLT at Minsk Mazowiecki and 41 ELT of 22 BLT at Malbork. These aircraft have been the subject of global attention, following Russia's invasion of Ukraine, when it was claimed by official representatives of the Ukrainian government that the Polish Fulcrums (along with other Soviet-era aircraft from Bulgaria and Slovakia) would be transferred

to Ukraine to support the war effort (see p24-27).

Poland's initial MiG-29A/UB aircraft entered operational service in 1989-90, with their numbers being boosted by the transfer of second-hand Fulcrums from the Czech Republic (1995-96) and Germany (2005). In recent years, the Soviet-era fighter has suffered from growing attrition rates and has been grounded several times. The fleet was modernised in the early 2010s, prolonging its service life until 2028, but the platform will eventually be replaced by the F-35A in Polish service.

Bartosz Głowacki *AFM*

Inventory

Type	Delivered	Current
F-16C-52+	36	36
F-16D-52+	12	12
F-35A	0 (see notes)	0
MiG-29A Fulcrum-A	18	22
MiG-29G Fulcrum-A	18	0 (see notes)
MiG-29GT Fulcrum-B	4	0 (see notes)
MiG-29UB Fulcrum-B	4	6
Su-22M4 Fitter-K	90	12
Su-22UM3K Fitter-G	20	6

Notes: Poland ordered 32 F-35As to replace its ageing MiG-29 fleet on January 31, 2020. The first batch of six are set to be delivered in 2024 (likely to Luke AFB for training). Regarding the Fulcrum fleet numbers, 12 aircraft (nine MiG-29As and three MiG-29UBs) were initially delivered in 1989. These were supplemented by a further ten second-hand examples (nine MiG-29As and one MiG-29UB) from the Czech Republic and 22 surplus MiG-29G/GTs from Germany, which entered service in 2005. The former Luftwaffe examples appear to be designated MiG-29A/UB in Polish service.

Source: AirForces Intelligence

Portugal



Sticking with Falcons

Portugal currently flies 25 Lockheed Martin F-16AM/BM (MLU) Fighting Falcons – comprising 21 single-seat F-16AMs and four two-seat F-16BMs – from Base Aérea N° 5 (BA-5; Monte Real Air Base). The Força Aérea Portuguesa (FAP; Portuguese Air Force) originally acquired a total of 45 F-16A/B Block 15s

under the Peace Atlantis I and II programmes. Delivered in 1994, the first batch comprised 20 new-build F-16A/B Block 15OCU (Operational Capability Upgrade) aircraft to equip Esquadra 201 (201 Squadron) ‘Falcões’. This comprised 17 single-seat and three dual-seat examples.

In 1999, the FAP received 25 ex-USAF Block 15OCUs (21

F-16As and four F-16Bs, five for use as spares) to establish Esquadra 301 ‘Jaguares’ at the same base. These were secondhand fighters with around 3,000 flying hours to be upgraded to the Mid-Life Update (MLU). The Portuguese technicians had to upgrade both the avionics system and the airframe structure under the Falcon Up/Structural Life Improvements Program (SLIP). Due to this, the first F-16AM/BM (MLU) squadron – Esquadra 301 – only became operational in November 2005, while Esquadra 201 didn’t receive its upgraded F-16s until 2011.

Since then, the fleet has received mission software updates M2, M4, M5, M6 and S1 and has been equipped with night-vision goggles (NVGs), a joint helmet-mounted cueing system (JHMCS), Northrop Grumman’s AN/AAQ-28(V)6 LITENING II advanced targeting pod, a night vision cueing and display (NVCD) system and GBU-12 Paveway II laser-guided bombs, GBU-31 joint direct attack munitions (JDAMs) and GBU-49 Enhanced Paveway II dual-mode GPS/laser-guided bombs. The last modification implemented was S1.1 and there is likely to be just

one further upgrade, given that the other European F-16 operators have opted to acquire the F-35A.

At an operational level, the FAP’s most important deployments have been in support of various NATO Air Policing missions in the Baltic region (in 2007, 2014, 2016, 2018 and 2021), Iceland (2012 and 2022), Romania (2015 and 2017) and Poland (2019).

The Portuguese F-16s have also been involved in operational qualification exercises, like the Tactical Leadership Programme (TLP) and the Fighter Weapons Instructor Training (FWIT) course. The former sees Portuguese pilots complete courses to obtain a Mission Commander qualification, while the latter is intended to confer a tactical instructor rating. In addition, FAP F-16s have been present at exercises in Portuguese territory, both with national and international forces. In this case, one highlight was NATO’s Exercise Trident Juncture, which last took place in Portugal in 2015.

Equally important was the NATO Tiger Meet 2021 held at Beja Air Base (BA-11) in southern Portugal and hosted by Esquadra 301, which was attended by seven flying squadrons from five

Inventory

Type	Delivered	Current
F-16A Block 15	21	0
F-16A Block 15OCU	17	0
F-16AM (MLU)	35	21
F-16B Block 15	4	0
F-16B Block 15OCU	3	0
F-16BM (MLU)	7	4

Notes: A total of 35 F-16A Block 15s and Block 15OCUs were upgraded to F-16AM (MLU) standard. All of Portugal’s two-seat Fighting Falcons were upgraded to F-16BM (MLU) standard. Romania has recently purchased 17 secondhand F-16AM/BMs from Portugal, leaving the FAP with just 25 Fighting Falcons in operational service.

Source: AirForces Intelligence

Order of battle

Air Command	Monte Real Air Base (BA-5)
Esquadra 201 ‘Falcões’	F-16AM/BM (MLU)
Esquadra 301 ‘Jaguares’	F-16AM/BM (MLU)

Source: AirForces Intelligence



Above: A Portuguese single-seat F-16AM (foreground) and two-seat F-16BM fly together in close formation during a local sortie over Portugal in January 2022. Note that the F-16AM (serial 15101) is equipped with a single AIM-9 Sidewinder short-range air-to-air missile Joe Campion

Right: This Portuguese F-16AM (MLU) pilot straps into his aircraft before completing the pre-flight checks and departing for a sortie over Portugal in January 2022 Joe Campion



Above: A quartet of Portuguese F-16AM (MLU) Fighting Falcons lined up on the flightline at Ovar AB during Exercise Hot Blade in 2012. Portugal has 21 single-seat F-16AMs remaining in operational service, along with four two-seat F-16BMs. These aircraft will remain in FAP service for the foreseeable future Austrian Armed Forces/Gorup Horst



Above: A pair of FAP-operated F-16AM (MLU) Fighting Falcons take up position on the runway before departing for a sortie from Ovar AB, Portugal, during Exercise Hot Blade in 2012 Austrian Armed Forces/Gorup Horst

allied countries and a NATO-operated E-3A Sentry airborne early warning and control (AEW&C) aircraft. For this, the FAP committed six F-16AM/BMs, as well as a P-3C CUP+ maritime patrol aircraft, an AW101 Merlin Mk.516 combat search and rescue helicopter and two AW119Kx Koala rotorcraft. The FAP was distinguished with the Best Operations and Best Tiger Painting awards, with the latter being applied to F-16AM (serial 15116) from Esquadra 301.

In recent years, Portugal has played an important role in the modernisation of the Romanian Air Force (RoAF) through the supply of several secondhand F-16AM/BMs. Romania received a total of 12 F-16s from Portugal between 2016 and 2017, ordering them in a €628m deal in 2013. In 2019, the nation announced the purchase of five more – which had already been delivered – for €130m.

The next two phases of the Romania contract are scheduled for 2023-2024 and the FAP will upgrade the aircraft configuration from the current M5.2R standard to M6.6. The first two aircraft will receive the update in Portugal next year, but the other 15 will be upgraded in Romania in 2024.

Discussions regarding the replacement of the F-16 have yet to be launched. For now, the priority is to keep them up-to-date, hence the recent acquisition of 30 multifunctional information distribution system-joint tactical radios (MIDS-JTRS) to replace the MIDS Block Upgrade I system. Upgrading the platform's GPS system is another priority.

At the air-to-air combat level, the APG-66(V)2 pulse-doppler radar needs to be replaced by Northrop Grumman's advanced APG-83 active electronically scanned array (AESA) radar, which equips the new F-16V Block 70/72 variant. It is also necessary to improve the jet's self-defence capabilities with a missile warning system and radar warning receiver, a similar package to Block 70/72 standard in the 'Viper' configuration.

From a structural perspective, the Portuguese F-16s have the potential to operate until the mid-2040s. However, they will have to be constantly upgraded to gain relevant capabilities and participate in future operations alongside fifth-generation fighters. **José Matos** *AFM*

Romania

The 17-strong Romanian Air Force F-16AM/ BM fleet is set to be bolstered by 32 ex-Royal Norwegian Air Force examples
Joe Campion



More F-16s coming

After 25 years of service, the Romanian Air Force (RoAF) MiG-21 LanceR fleet was grounded on April 15. The Romanian Chief of Defence Staff, General Daniel Petrescu ordered the grounding because of the significant number of incidents and accidents related to the LanceR, which have resulted in multiple casualties and damaged and destroyed aircraft.

There were believed to be 15 air defence LanceR Cs configured with the Elta EL/M2032 radar and eight LanceR Bs still in the RoAF's inventory when the grounding order came, although it's unclear how many were actually airworthy.

There were 112 RoAF MiG-21s upgraded to the LanceR by Elbit Systems in the late 1990s – including 73 air-to-ground LanceR As, which were grounded in 2011; 14 dual-seat LanceR Bs,

and 25 LanceR Cs that served at Baza 95/Bacau, Baza 71/Campia Turzii and Baza 86 at Borcea-Fetesti. Campia Turzii's Escadrila 711 'Aviatie Lupta' flew them right up until the end.

Now, this means the RoAF is reliant on its small fleet of 14 Lockheed Martin F-16AMs and three F-16BMs serving Escadrila 53 'Vanatoare' at Baza 86 Aeriana/Borcea-Fetesti. Initial operating capability (IOC) was declared in March 2019. The F-16AMs fulfil the quick reaction alert (QRA) at Fetesti while the dual-seat F-16BMs are used for familiarisation and training flights.

All the F-16s were purchased from the Portuguese Air Force, with deliveries of the first 12 (nine F-16AMs and three F-16BMs) under the Peace Carpathian I programme between August 2020 and March 2021. This was the first time F-16s had been sold for a

third time (Portugal having acquired them second hand from the US Air Force). A deal for an additional five F-16AMs under Peace Carpathian II was agreed in January 2020, with all the aircraft arriving at Fetesti on March 17, 2021.

In December last year, it was announced the RoAF was set to buy 32 ex-Royal Norwegian Air Force F-16AM/BMs under Peace Carpathian III. These aircraft are due to be delivered in 2023/24 (see p50-51). They are all currently stored at Kjeller Air Base. The fleet is scheduled for further upgrades, including mission software updates from M5.2R to M6.6 in the coming two years – this should include eight LN-260 GPS systems and 19 Multifunctional Information Distribution System Joint Tactical Radio Systems. The first two aircraft will be upgraded in Portugal and work on the

remaining 15 will be completed at Fetesti (see p54-55). The Romanian MoD believes the F-16s are viable for the next ten years or so, with the F-35As earmarked to replace them in the early 2030s.

The RoAF F-16s are working alongside NATO fighters deployed to Mihail Kogalniceanu as well as Fetesti, supporting the enhanced air-policing mission that has taken on more significance since the Ukraine war broke out. At Fetesti, there are currently six F-16Cs from the 510th Expeditionary Fighter Squadron/31st Fighter Wing based at Aviano, which replaced the 480th Expeditionary Fighter Squadron on April 29. Four RAF Typhoons flown by the 140th Expeditionary Air Wing have been on QRA at Mihail Kogalniceanu, overlooking the Black Sea, since March 30, on what the RAF calls Operation Biloxi. **Alan Warnes** *IAFM*

Order of battle

Baza 86 Aeriana 'Locotenent Aviator Gheorghe Mociornita'	Borcea- Fetesti
Escadrila 53 Vanatoare	F-16AM/BM

Source: AirForces Intelligence

Inventory

Aircraft	Delivered	Current
F-16AM	14	14
F-16BM	3	3

Source: AirForces Intelligence



Above: The Romanian Air Force retired its last Lancer Cs based at Campia Turzii on April 15 Alan Warnes

Serbia



The SAF&AD's MiG-29 fleet currently comprises 11 single-seat 'Fulcrum-A/Cs' and three two-seat MiG-29UB 'Fulcrum-Bs'. All images: Dimitrije Ostojic

Eyeing Western fighters

The Serbian Air Force and Air Defence (SAF&AD) currently operates 14 Mikoyan-Gurevich MiG-29 *Fulcrum* fighter-interceptors along with 12 SOKO J-22/NJ-22 Orao ground attack aircraft – with a further six undergoing overhaul work. However, the SAF&AD plans to procure a squadron of

modern multi-role fighters in the not-too-distant future.

In the last couple of years, there have been indications that Belgrade officially intends to open direct negotiations between the Serbian Ministry of Defence (MoD) and Dassault Aviation for the purchase of Rafale fighters. The nation was initially interested

in acquiring six second-hand Rafale F3s from the Armée de l'Air et de l'Espace (AAE, French Air and Space Force). Last December, Serbian President Aleksandar Vucic said in a statement that he still hoped to procure new combat aircraft for the SAF&AD.

In terms of the regional situation in the West Balkans, competitive relations between the Serbians and Croats are exceptional – there is an 'arms race' between them, according to local media. Croatia's decision to acquire 12 second-hand Rafales from the AAE will see Serbia look to gain 12 new aircraft for the SAF&AD.

Recent statements by politicians have leaked that procurement of new multi-role combat aircraft is being prepared and that it will be a job for the French. Immediately after Serbia's presidential elections – held in early April – France's *La Tribune* newspaper (referring to Dassault) said the purchase of 12 new Rafales was planned and that the offer was delivered to Belgrade in March.

In early 2022, the world's leading combat aircraft manufacturers became interested in news of potential business from Serbia. They have sent offers to Belgrade and it has been announced that a contract offer for 12 second-hand Eurofighter Typhoons from the Royal Air Force (RAF) is among

them. These aircraft will likely be sourced from the outgoing Tranche 1 examples, which are set to leave RAF service before the end of 2025.

For now, the Rafale is the firm favourite. In the late 2020s, one multi-role squadron will be established to replace the two SAF&AD combat units that are currently operational.

Serbia's Batajnica Air Base (AB) is home to the 101st Lovacka Avijacijska Eskadrila (Fighter Aviation Squadron), which operates 14 MiG-29s. This fleet comprises 11 single-seat examples of three sub-versions: seven Izdeliye 9.13s (*Fulcrum-Cs*); one Izdeliye 9.12A (*Fulcrum-A*) and three Izdeliye 9.12Bs (*Fulcrum-As*). The unit also has three two-seat MiG-29UB *Fulcrum-B* (Izdeliye 9.51) combat-trainers.

Just four of these aircraft are a legacy of the 16 MiG-29s initially acquired by the Yugoslav AF&AD in 1987-88. In December 2016, a long-term maintenance support contract was inked with the Russian state-owned defence export company, Rosoboronexport. The deal included delivery of six MiG-29s that had been donated to Serbia by the Russian MoD, but companies in Russia also benefitted from the technical work conducted on them.

Inventory

Type	Delivered	Current
MiG-29 <i>Fulcrum-A/C</i> (L-18)	26	11
MiG-29 <i>Fulcrum-B</i> (NL-18)	4	3
J-22 Orao	57	7
NJ-22 Orao	21	5

Notes: In total, Serbia has received 26 *Fulcrum-A/Cs*, comprising 16 delivered in the initial order in 1987-88 and donations from Russia (six) and Belarus (four) in recent years. The J-22/NJ-22 Orao has been in operational SAF&AD service since the early 1980s. Both types will be replaced by a Western-made multi-role fighter in the coming years.

Source: *AirForces Intelligence*

Order of battle

204th Aviation Brigade	Batajnica AB
101st Fighter Aviation Squadron	MiG-29 <i>Fulcrum-A/C</i> (L-18) MiG-29UB <i>Fulcrum-B</i> (NL-18)
Flight Test Centre	J-22/NJ-22 Orao
98th Aviation Brigade	Kraljevo-Ladjevci AB
241st Fighter-Bomber Aviation Squadron	J-22 Orao NJ-22 Orao

Notes: The SAF&AD's single-seat MiG-29 fleet is locally designated the L-18, while the two-seat MiG-29UBs are known in Serbian service as the NL-18. As per current plans, the units operating *Fulcrums* and Oraos will be disbanded and replaced by a single multi-role combat squadron once a new, Western-made multi-role fighter is selected and has entered Serbian service.

Source: *AirForces Intelligence*

European Fighter Survey



During Exercise Munjeviti Udar in June 2021, Serbian Oraos fired US-made AGM-65B Maverick TV-homing air-to-ground missiles on targets for the first time in more than 25 years

All ten aircraft were brought into flight condition in 2018. Following this, work began to modernise Serbia's single-seat *Fulcrum* fleet to MiG-29SM standard under a contract that also included the purchase of R-77 (AA-12 *Adder*) and R-27ER (AA-10 *Alamo-C*) air-to-air missiles, Kh-31P (AS-17 *Krypton*) anti-radiation missiles and homing air-to-ground missiles.

Modernisation work began in October 2020 and, last summer, images from Batajnica AB showed that some of the upgraded MiGs had received antennas for the L-150 Pastel radar warning receiver (RWR),

which is a unique feature of the customised Serbian version of the MiG-29SM. Meanwhile, the Belarusian MoD donated four single-seat MiG-29 *Fulcrum*-Cs to the SAF&AD. These aircraft underwent a general overhaul at the 558th Aircraft Repair Plant in Baranovichi before being handed over to the 101st Fighter Aviation Squadron in June 2021.

In the wake of Russia's invasion of Ukraine on February 24, it became evident the former Belarusian MiGs did not have RWRs, meaning it is probable that only seven single-seat *Fulcrums* have been upgraded to

MiG-29SM standard. One of the consequences of this conflict for Serbia will be the resulting crisis in its MiG-29 maintenance and modernisation programmes. This is why the decision to switch to Western-made technology is now the solution to a crisis in which the SAF&AD could find itself without aircraft.

In the *Fulcrum*'s shadow is the twin-engined J-22/NJ-22 Orao ground attack aircraft, which is operated by the 241st Lovacko-Bombarderska Avijacijska Eskadrila (Fighter-Bomber Aviation Squadron) from Kraljevo-Ladevci AB. Counting those that

are being flown at the flight test centre at Batajnica, the SAF&AD now has 12 Oraos – comprising seven single-seat J-22s and five two-seat NJ-22s – in operational service.

In 2016, it was announced the modernised J-22M and NJ-22M Orao aircraft will continue to serve the SAF&AD until the 2030s. During this modernisation process, some examples of the domestic-made VRVZ-200 air-to-ground missile have been tested on the platform. The nose of one Orao has also been modified for the installation of a thermal imaging camera and a laser rangefinder. Analogue instruments have also been replaced by head-down displays.

There are presently two NJ-22s involved in this test programme, which is not scheduled for completion any time soon. However, it seems that Belgrade's prospective Rafale purchase will make the J-22M/NJ-22M modernisation work rather meaningless, especially since Serbia's budget resources and the staff of the SAF&AD will be more concentrated on adopting a modern multi-role aircraft in the near-term – the arrival of which will see the *Fulcrum* and Orao withdrawn from Serbian service.

Aleksandar Radic *AFM*

In 2016, it was announced the Serbian J-22/NJ-22 Orao fleet would remain operational into the 2030s, but the planned procurement of a modern multi-role fighter means the Cold War-era ground attack aircraft will likely be retired this decade



Nine different types from 3rd to 5th generation

Our fourth and final part of the European Fighter Survey reviews countries operating a multitude of different fighters, ranging from Cold War-era MiG-29 *Fulcrums* in Slovakia; F/A-18+/EF-18M/BM Hornets, Eurofighters and T/EAV-8B/EAV-8B+ Matadors in Spain; Gripen C/Ds in Sweden; F-5E/F Tigers and F/A-18C/D Hornets in Switzerland; F-4E Terminators and F-16C/D Fighting Falcons in Turkey; plus Eurofighter Typhoons and F-35B Lightnings in the UK. Nine different types, with three already earmarked for replacement.

Slovakia's MiG-29s should go in 2024 – if they have not been sent to Ukraine before then – and will be replaced by 12 F-16C/D Block 70s, which will boost the Slovak Air Force's air defences considerably, and hopefully lead to it playing a bigger part in

Correction

During the editing stage of the Croatian Air Force survey (April, p52), the wrong local name for the Croatian Air Force was inserted. We would like to apologise to the author for any embarrassment this may have caused him.

NATO than it has in the past with the *Fulcrums*.

Spain, just like Italy (see Part 2, *AFM* May 2022), operates three different variants of jets (which is fairly unusual these days), including a derivative of the Harrier jump-jet. Undoubtedly, there are massive logistical issues while supporting the needs of three different fighters, particularly as the Spanish Hornets and Matadors are more than 30 and 25 years old, respectively. Once, it looked like the F-35 could be an option to replace both types, but that's not likely now. As a result, we don't know what the future holds for the Spanish Navy.

Spain and the US have had an uneasy relationship – some say it's a throwback to the days of General Franco, who overthrew the government during the 1936-39 Spanish Civil War. Just like the other three partner nations (Germany, Italy and the UK), Spain is likely to stick with more Typhoons but, unlike the other three nations, it has not ordered the F-35 Lightning II. The F-35B would have been a great match for the Spanish Navy, but as the Spanish Defence Ministry

said last year: "We rule out entering the F-35 project. Our commitment is to the [European] Future Combat Air System."

With a carrier derivative on the drawing board, who is to say if Spanish Navy aviation could one day operate an FCAS, but, by then, the Matador will be long gone and so will the *Juan Carlos I* amphibious assault-ship aircraft carrier, which the Matadors operate from when at sea.

Sweden is quite content with the Gripen E, which will become operational in 2025, working alongside the Gripen C/Ds until 2035. It is unclear if the Swedish will, longer term, go for the Future Combat Air System it is investing in with Italy, the UK and Japan, or whether it wants to participate in developing technologies.

Switzerland is set to replace its F/A-18C/Ds with F-35As by 2030. Some of its F-5E/Fs may remain.

Having been booted out of the F-35 programme, the Turkish Air Force will have to soldier on with its F-4Es for the foreseeable future, just like the Greeks, but in larger numbers. The Turkish government has enquired with the US government – rather cheekily, given the issues over

the acquisition of the Russian S-400 surface-to-air missiles – as to the possibility of buying 40 F-16 Block 70/72s and upgrading 80 F-16C/Ds to F-16Vs, which will see 120 F-16s operating with the new AN/APG-83 airborne electronically scanned array (AESA) radar.

Meanwhile, the UK continues to beef up its fighter capabilities with more F-35Bs, while at the same time perfecting the 4th/5th-generation integration with the Typhoons. On the horizon, there is the Tempest/Future Combat Air System – for more on that, see *Future Focus*, p92-93.

We hope you have enjoyed our survey – next month, we will complete the review with a free poster, covering all the European fighter air bases.

Alan Warnes

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The US government's decision to halt deliveries of 100 F-35As, means the F-4E-2020 Terminators will continue in service for a few more years. This example, from 111 Filo is seen departing the runway at Konya, where it is based Alan Warnes

Slovakia



The era of the Slovakian MiG-29 is heading to a close. Here, two single-seat MiG-29AS Fulcrum depart Sliac during a Quick Reaction Alert scramble in September 2018. Note that the aircraft are each equipped with live R-60 (NATO: AA-8 Aphid) short-range air-to-air missiles. All images: Alan Warnes

MiG-29s going, F-16s delayed

While the Slovak Air Force (SAF) has 11 MiG-29 Fulcrums on paper, only three were operational in late 2021. This situation has probably deteriorated, with Russia's Rosoboronexport support personnel pulled from Slovakia's Sliac Air Base, in light of the war in Ukraine. It may sound odd that a NATO country was employing Russian personnel, but that's what the SAF was doing to keep its weary Soviet-era fighters airworthy. In 2018, the Slovak MOD signed a multi-million dollar contract with the Russian state-owned company to support the upgraded Fulcrums until 2023, when 12 new Lockheed Martin F-16C/D Block 70s were due to arrive (this has now been pushed back to 2024).

Fortunately, when it comes to defending Slovakian airspace, there is an agreement (signed in 2017) with the Czech government, that means Czech Air Force Gripens on Quick Reaction Alert

(QRA) at Caslav can assist. Poland is also believed to have offered to defend Slovakian skies with its F-16s, after there were suggestions Slovakia might donate its MiG-29 fleet to the Ukrainian Air Force.

In 2018, after four years of deliberations, the Slovakian government signed a \$1.6bn contract for 12 F-16Cs and two dual-seat F-16D (all Block 70 standard), as well as the training of pilots, weapons and logistics services for two years.

The aircraft were due to be delivered next year, to Sliac Air Base, which is undergoing modernisation for the jets' arrival. However, the pandemic caused issues with some of the major companies supplying components, which, according to a Lockheed Martin official, could see delays of around six months.

The US Defense Security Cooperation Agency notified the US Congress in 2017 that the weapons package would

include 30 AIM-120C-7 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs), and 100 AIM-9X Sidewinder air-to-air missiles. For the air-to-ground role, the SAF was set to acquire 224 500lb GBU-12 Paveway IIs, 20 500lb GBU-49 Enhanced Paveway IIs and 150 500lb Joint Direct Attack Munitions (JDAMs).

In 2018, Brig Lubomír Svoboda, the Slovak Air Force Commander at the time, told the author: "The F-16 deal is the biggest in Slovak Air Force history and will include the training of 22 Slovak Air Force pilots in the US. The range of training goes from learning the English language to F-16 flying at Tucson ANGB. Two of the four pilots currently learning to fly the F-16 Block 42 at Tucson ANGB are set to become F-16 instructor pilots when they return to Slovakia. The pilots have been drawn largely from the small fleet of Aero L-39CM/L-39ZAMs used by the 2nd Squadron at Sliac Air Base as lead-in fighter trainers."

As Commander, Svoboda said at the time: "It doesn't make sense to send the MiG-29 pilots, because they are already around 40 now, and will be another three years older when they return. We intend to make use of their experience, as instructor pilots at the L-39 training squadron."

Moving from a 1970s-era L-39 to an F-16 Block 70 is a big step, so the SAF has a trainer competition underway, which includes the Leonardo M345 and Aero Vodochody L-39NG. The L-39s are expected to last until 2024.

A Lockheed Martin spokesman suggested if the SAF did not have a new jet trainer in time for the F-16 deliveries, the force could continue to send pilots to the US, but he believed the SAF wanted a European solution. "While any jet trainer has to be checked out by the US, to ensure [it's] good enough to train pilots for the F-16, I believe the Italian and Czech solutions would be up to it."

Alan Warnes



Above: Painted in the tiger markings of the 1st Tactical Squadron, the only dual-seat MiG-29UBS flying taxis along the Sliac runway. Several of the MiG-29s still wear 'SL' for Sliac tail codes

Inventory

Type	Delivered	Current
MiG-29AS Fulcrum	10	9
MiG-29UBS Fulcrum	2	2

Notes: 12 F-16Cs and two F-16Ds on order, should be delivered by mid-2024

Source: AirForces Intelligence

Order of battle

Tactical Wing 'Major General Otta Smika'

1st Tactical Squadron	MiG-29AS/UBS Fulcrum
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Source: AirForces Intelligence

Three fighter fleets

Spain

Before Russian forces invaded Ukraine, the Spanish defence budget for 2021 was just barely above 1% of its GDP. However, with the ongoing conflict in Eastern Europe, this situation has changed (at least for now) as the Spanish government has stated it will double defence spending until it achieves the amount requested by NATO.

The Spanish Navy's Flotilla de Aeronaves (FLOAN, Aircraft Flotilla) boasts a long history of vertical/short take-off and landing (V/STOL) operations with the AV-8B Harrier (known as the Matador in Spain). Since 1976, the service has operated three variants of the type, including the initial T/AV-8S, the more modern T/EAV-8B and the EAV-8B+.

Now, 9 Escuadrilla (Squadron)

maintains a dozen single-seat EAV-8B+ Matador IIs and a secondhand two-seat TAV-8B Harrier II. The unit's primary mission is surface attack, close air support and fleet air defence, for which it employs a varied arsenal of air-to-air/ground weapons, including AIM-9 Sidewinder and AIM-120 AMRAAM air-to-air missiles (AAMs) and the AGM-65 Maverick air-to-ground missile (AGM), along with unguided and laser-guided bombs (LGBs) – directed by Litening II targeting pods – rockets and the externally fitted 25mm GAU-12 cannon.

It is clear that, for the Spanish Navy to maintain an embarked aviation force, acquisition of the short take-off and vertical landing-configured F-35B is the only option. The service's leadership has declared it would ideally like to acquire at least a dozen examples to replace the Matadors.

There was much commentary

in 2021 over rumours of Spain acquiring 25 F-35As for the Ejército del Aire (EdA, Spanish Air Force) as a possible replacement for its F/A-18A+ fleet, along with a similar number of F-35Bs for the navy. There was even word of a realistic timeline, with the aircraft to be ordered in around 2025 and first deliveries to take place in 2027, which went along with the planned retirement date for the Matadors (currently set for 2030).

However, this rumour was quickly quashed by the defence ministry, with a spokesperson saying "the Spanish government does not have the budget to enter into another aircraft project beyond those already under way" and adding: "We rule out entering the F-35 project. Our commitment is to invest in the FCAS [Future Combat Air System]." From this, it appears the future of embarked fighter aviation in Spain is at risk of extinction – not only because of the absence of other possible substitutes, but more importantly

due to the lack of budget needed to undertake a major programme during times of economic crisis.

Putting aside the bleak future of Spanish Naval Aviation, the EdA's current multi-role fighter force is comprised of two fleets: the EF-18M/BM and F/A-18A+ Hornet, and the Eurofighter EF-2000A/B. The 60 single-seat EF-18As and 12 two-seat EF-18Bs – now designated EF-18M/BM following their modernisation – form the backbone of Spanish air defence and attack operations, being the EdA's principal combat aircraft until the arrival of the more advanced and capable EF-2000A/B.

Unlike other operators, Spain – instead opted to develop its own operational software through the Centro Logístico de Armamento y Experimentación (CLAEX, Logistics Center of Armament and Experimentation at Torrejón Air Base (AB), which has allowed the integration of new capabilities and munitions that



An EF-18M Hornet assigned to Ala 12 breaks from the formation after completing a simulated interception. Note the multi-role fighter is equipped with both a Litening II targeting pod and an IRIS-T training AAM All images Roberto Yáñez, unless otherwise stated

European Fighter Survey



Eurofighters from the EdA's Ala 14 at Albacete-Los Llanos AB were the first to be integrated with MBDA's Meteor BVRAAM. This EF-2000A is equipped with two such missiles on its belly fuselage

helped to maintain the fleet at high operational levels.

The latest software version for the EF-18M/BM (developed by CLAEX) has been designated Operational Flight Program (OFP)-08E.

Among other improvements, this software enables the integration of the new Thales Scorpion helmet-mounted sight and display (HMSD) on the EF-18M/BM fleet, which will help to ease pilot workload in combat situations.

This is complemented by the addition of Combined Interrogator Transponder Mode 5 (CITM-5) systems. Recently, work to integrate the Remote Operational Video Enhanced Receiver (ROVER) 5i datalink inside the Litening targeting pod and Indra's new Capacidad Operacional de Reconocimiento Electrónico (CORE, Electronic

Reconnaissance Operational Capability) pod has taken place to modernise the Hornet fleet.

The CORE system is unique to the EF-18M/BM as it adds an electronic support measures/electronic intelligence (ESM/ELINT) mission to the type, replacing a capability that was lost with the retirement of the Mirage F1M and its Syrel pod in 2013.

The new OFP has also increased the offensive capabilities of Spain's EF-18M fleet with a certification to carry the GBU-12 Paveway II LGB on the Canted Vertical Ejector Rack (C-VER), doubling the number of bombs each aircraft can carry. The EGBU-16 LGB is now used in the same configuration as the Eurofighter and work is under way to integrate the AIM-120-C7 version of the AMRAAM

missile family on to the EF-18M, presenting the Hornet fleet with new capabilities for both air-to-air/ground missions.

The EF-18M/BM equips two squadrons with Ala 12 (Wing 12) at Torrejón and another three with Ala 15 at Zaragoza – one of which is the operational conversion unit (OCU). The constant updating of the fleet has allowed it to participate in joint exercises and international missions. The latest has been the deployment of eight EF-18Ms to Šiauliai AB, Lithuania, from April-July this year, in support of NATO's Baltic Air Policing effort.

Spain acquired 24 secondhand F/A-18A+ Hornets from the US during 2001-2003 as a replacement for the Mirage F1s employed by Ala 46's 462 Escuadrón (Squadron) at Las Palmas-Gando Air Base on

the Canary Islands. Due to the differences between these and the EF-18M/BM, the CLAEX had to create specific new versions of the OFP for the F/A-18A+ by using the know-how acquired from the EF-18M/BM.

The principal mission for these secondhand Hornets is to provide air defence for the Canary Islands, equipped with AIM-7 Sparrow and AIM-9 Sidewinder AAMs, as well as an internal 20mm M61A1 cannon. Unlike the EF-18M/BM, the F/A-18A+ is also capable of using the IRIS-T AAM, AGM-84 Harpoon anti-ship missile, AGM-88 HARM anti-radiation missile, AGM-65 Maverick AGM and Taurus KEPD 350 air-launched cruise missile.

The initial panoply of air-to-ground munitions for the F/A-18A+ comprised conventional bombs, but thanks to the OFP updates, these capabilities have improved little by little. With this, it has been possible to equip the F/A-18A+ with the Lince laser designator pod (an improved version of the Nite Hawk), enabling the use of GBU-10 and GBU-15 smart bombs and IR-guided Maverick AGMs.

Due to the harsh climate conditions under which they operate, the aircraft assigned to 462 Escuadrón have suffered from maintenance issues in recent years. From 2018, temporary detachments of EF-18M/BMs have deployed to the Canary Islands to cover F/A-18A+ Hornets being unserviceable at either Ala 46 (first and second level) or at the Maestranza Aérea de Albacete (MAESAL,



The Canary Island-based legacy F/A-18A+ Hornet fleet is now at the end of its viable service life after being purchased secondhand from the US between 2001 and 2003. This example is seen landing at Albacete for third-level maintenance work with the MAESAL, with the aircraft's vertical stabilisers being x-rayed to search for signs of corrosion

Albacete Maintenance Depot), which is charged with third-level maintenance and other work.

To meet the need to maintain an operational capability with aircraft stationed at Las Palmas-Gando, the MAESAL is conducting a service life extension programme on the F/A-18A+ fleet – aiming to add 1,000 flight hours to the service life of each aircraft, which will maintain the operational capability of the Hornet until it is replaced by new EF-2000s.

After a long period of uncertainty, in December 2021 the Spanish government gave its approval to acquisition of 20 EF-2000s to re-equip 462 Escuadrón under Project Halcón.

These new aircraft should be equipped with new E-Scan active electronically scanned array (AESA) radars and delivered between 2025 and 2030.

Since it entered EdA service in early 2004 until the final examples of the initial contract were delivered in 2019, the Eurofighter EF-2000A/B fleet – known as ‘Tifón’ in Spain – has become the backbone of the air arm’s multi-role fighter fleet, displacing the veteran but still capable EF-18M/BM. In total, 71 EF-2000A/Bs were delivered, comprising 17 Tranche 1, 34 Tranche 2 and 20 Tranche 3.

The Eurofighter EF-2000A/B fleet is divided between two wings: Ala 11 at Morón de la Frontera AB and Ala 14 at Albacete-Los Llanos AB. Morón was the first base to receive and operate the Eurofighter. It hosts 113 Escuadrón, which serves as the operational conversion unit for the type in Spanish service.

The second unit to stand up was 111 Escuadrón, tasked with air

defence and attack commitments. Ala 14 received its first EF-2000A/Bs in April 2012, with its aircraft divided between 141 and 142 Escuadrones (tasked with the same missions as Ala 11).

Spain recently contracted Airbus to retrofit the Tranche 1 aircraft to improve operational availability and facilitate the use of Tranche 2/3 avionics, such as the computer system generator, digital video and voice recorder and the maintenance data panel.

The first upgraded aircraft was returned to the EdA in February 2019 for the testing and validation of the OFP-02 software and its functionalities by the CLAEX.

The most recent and important update to the EF-2000A/B fleet occurred this year with the service entry of MBDA’s Meteor BVRAAM under Ala 14. While this capability is standard for Tranche 3 examples, the EdA is working to integrate the missile onto the other tranches.

Alongside various unguided bombs, LGBs and the IRIS-T/ AIM-120 AMRAAM missiles, work continues to integrate the KEPD 350 cruise missile onto the platform.

Looking to the future and at the replacement of the EdA’s EF-18M/BM fleet, the logical plan – given the budgetary problems that constantly plague Spain – would be to expand the Eurofighter order to leverage existing supply chains and take advantage of the experience that already exists with the ‘Tifón’.

Notably, the EdA’s traditional philosophy is to not depend on a single manufacturer, so a split ‘Euro-North American’ purchase cannot be ruled out.

Roberto Yáñez & Alex Rodriguez

Inventory

Type	Delivered	Current
EF-18M	54	52
EF-18BM	12	12
F/A-18A+	24	20
EF-2000A	58	56
EF-2000B	14	13
EAV-8B+	13	12
TAV-8B	2	1

Notes: The EdA’s EF-18M fleet suffered two attrition losses on April 2, 2009 and October 17, 2017, respectively, while the F/A-18A+ fleet has suffered four. Spain’s full EF-2000A/B fleet is split across three standards (Tranche 1/2/3) and a further 20 examples have been ordered to replace the ageing F/A-18A+ fleet. While the Spanish Navy’s EAV-8B+/TAV-8B fleet is scheduled to leave service in 2030, there are currently no plans to replace the type, despite calls from the service’s leadership to do so

Source: *AirForces Intelligence*

Order of battle

Spanish Air Force

Ala 11	Morón de la Frontera AB
111 Escuadrón	EF-2000A/B
113 Escuadrón (OCU)	EF-2000A/B
Ala 12	Torrejón AB
121 Escuadrón	EF-18M/BM
122 Escuadrón	EF-18M/BM
Ala 14	Albacete-Los Llanos AB
141 Escuadrón	EF-2000A/B
142 Escuadrón	EF-2000A/B
Ala 15	Zaragoza AB
151 Escuadrón	EF-18M/BM
152 Escuadrón	EF-18M/BM
153 Escuadrón (OCU)	EF-18M/BM
Ala 46	Las Palmas-Gando AB
462 Escuadrón	F/A-18A+

Spanish Navy

FLOAN	Naval Air Station (NAS) Rota
9 Escuadrilla	EAV-8B+ TAV-8B

Notes: The legacy F/A-18A+ Hornets assigned to Ala 46’s 462 Escuadrón will be replaced later this decade by 20 new-build Eurofighter EF-2000A/Bs, which have been sourced by the Spanish government under Project Halcón

Source: *AirForces Intelligence*

Below: The Spanish Navy operates 12 single-seat EAV-8B+ Matador IIs (pictured) and a single two-seat TAV-8B. Despite rumours of Spain acquiring a fleet of F-35Bs as a successor to the Matador in operational service, the Spanish MoD has denied such plans Khaleem Chapman





Gripenens are the future

There is only one fighter serving the Swedish Air Force (SwAF) – the multirole Saab Gripen. The SwAF, Saab and FMV (government agency) have worked well together to ensure the capabilities of the Gripen have evolved over the past 30 years, in line with the needs and tactical ambitions of the air force.

The first of 119 JAS 39A/B Gripen entered service with F 7 (air force wing) at Satenäs in 1993, but the peace dividend brought about by the end of the Cold War meant plans to replace the retired Saab Viggen and Draken wings were cancelled. F 4 at Östersund and F 16 at Uppsala never received Gripen, while F 10 at Ängelholm did receive several before plans to shut the

base meant operations there never really got off the ground.

As a result, only three wings were equipped with the A/B versions – F 7 ‘Skaraborg’ at Satenäs, where the Gripen training centre is also based; F 17 ‘Blekinge’ at Ronneby, and F 21 ‘Norrbotten’ at Lulea-Kallax. JAS 39A/B operations ended on December 13, 2012, with many of the jets being used to produce the 101 JAS 39C/Ds acquired by the SwAF, as well as aircraft for the Czech Republic (12), Hungary (12), South Africa (17) and Thailand (8).

The JAS 39C saw colour cockpit displays being introduced to the aircraft, along with an on-board oxygen generation system and the much needed capability of in-flight refuelling.

The same wings, with two squadrons known as Jaktflygdivisionen, operate the JAS 39C/D. Ronneby’s F 17 Wing covers the SwAF’s quick reaction alert (QRA), although personnel from the other two bases rotate.

On January 17, 2013, Sweden’s Ministry of Defence announced the government had given its approval for the Swedish Armed Forces to acquire 60 JAS-39E Gripen fighters, with all of them expected to be fully operational by 2027, although it is likely to be closer to 2030. A serial production contract was confirmed by Saab on December 18, 2013, while the Swedish aerospace giant had announced on July 3, 2013 that assembly of the first pre-production Gripen E (39-8) had

Above: A Gripen C equipped with two AIM-120C AMRAAMs, two RBS-15 anti-ship missiles and two IRIS-T short-range air-to-air missiles on the outer wing tips. Just some of the weapons the Gripen can carry Saab

MBDA Meteor

Having been upgraded with MS 20 software, the SwAF Gripen C/Ds have brought in several hardware and software updates. They feature an improved datalink and radar enhancements to cope with the longer range of the Meteor. The aircraft can now carry up to four MBDA Meteors, with a Diehl IRIS-T air-to-air missile on each wing tip rail, as well as the GBU-39 small-diameter bomb for the air-to-ground mission.

The Gripen was the first fighter to become operational with the Meteor BVRAAM (designated the RB 101 in Sweden), which has armed the Gripen manning the southern QRA at F 17 Wing/Ronneby since July 2016. However, the jets are usually only equipped with the 23mm gun for this role, according to one SwAF pilot, but it is likely Gripen do sit on alert manned with both the RB 99 AMRAAM and RB 101 Meteor, just in case. According to Lt Col Tobias Wikström, Head of Ops at F 21, Lulea: “While the Meteor is better in long range, the AMRAAM is handy for helicopters or transports.”

begun – that led to its first flight (f/f) on June 15, 2017.

In mid 2019, there were four Gripens with the Operational Test and Evaluation (OT&E) squadron, developing the Gripen E for its operational entry into service. Gripen D, 39-07 has been upgraded with the Gripen E's tactical functionality and a Gripen E cockpit, which hosts a wide area display, in the rear. It will enable potential customers to fly the aircraft from the rear and get the feel of its qualities. The three prototype Gripen Es flying as part of the test programme are 39-8 (f/f June 15, 2017), 39-9 (f/f November 26, 2018) and 39-10 (f/f June 10, 2019). In November last year, the OT&E took delivery of two Swedish Air Force Gripen Es.

Meanwhile, on October 6, 2021, SwAF Commander Major General Carl-Johan Edström announced F 7 at Satenäs would be the first wing to receive the Gripen E (scheduled for delivery in 2025). The Commander told *AFM*: “The plan is to train the first pilots and maintenance technicians for the squadron at the OT&E, and start operating with the [as yet unknown] squadron reaching initial operational clearance around 2026.”

The Gripen is the focus of the SwAF's future modernisation, with 120 Gripen C/Es likely to be serving by 2030. The 2019 Defence White Paper stipulated the future Gripen force should not drop below 90, 60 of them being the new single-seat Gripen E, while the remainder of the fleet would be made up of Gripen C/Ds. That's the bare minimum needed to face increasing threats, such as Russia and terrorism. Up to 60 Gripen C/Ds are likely to remain, with 15 of them used for advanced jet training from around 2025.

As a result, the current six Gripen squadrons will likely increase to eight – six Gripen E and two Gripen C/D – plus the advanced training unit of C/Ds by 2030. Two years ago, the SwAF announced plans to reactivate F 16 'Norrlands' Wing at Uppsala Air Base to accommodate the advanced flying training and two additional C/D squadrons, but that decision doesn't need to come until closer to 2025.

As the SwAF Commander told *AFM* in mid May: “There are still plans to set up an advanced training unit at Uppsala, and we are still looking at that concept. However, we are now looking at

Inventory

Type	Delivered	Current
JAS 39C	75	73
JAS 39D	26	24
JAS 39E	2	2

Note: 60 JAS 39Es on order to be in service by 2030. The two JAS 39Es that have been delivered are operational with the OT&E
Source: *AirForces Intelligence*

Order of battle

F 7	Satenäs
71 Jaktflygdivisionen	JAS 39C/D
72 Jaktflygdivisionen	JAS 39C/D
F 17	Ronneby
171 Jaktflygdivisionen	JAS 39C/D
172 Jaktflygdivisionen	JAS 39C/D
F 21	Lulea-Kallax
211 Jaktflygdivisionen	JAS 39C/D
212 Jaktflygdivisionen	JAS 39C/D

Source: *AirForces Intelligence*

two options.

“Pilots could fly the new Grob 120TP (SK40) side-by-side seater training aircraft, then transition to Gripen D for advanced training, LIFT [lead-in fighter training] and fighter training, that will also see the introduction of a new unit of C/Ds. If you are to go in that direction, there will be a burden on the other units to actually develop operational capabilities, because they will need to be part of that training.

“The other option is to carry out the LIFT and advanced training abroad and then you can focus to grow the operational capabilities of the fighter capabilities, instead of being focused on the basic training. So, it will give us the opportunity to grow the pilots each year, if [we] want to increase the fighter squadrons from six to eight. We will have to make a decision no later than October this

year. We are currently training 14 Gripen pilots per year.”

Unsurprisingly, the SwAF Commander is excited about the Gripen E: “[It] will provide the SwAF with a much stronger air force heading into 2040. This will include some very strong electronic warfare capabilities, that I describe as ‘Growler-like’ and the sensor suites integrated into Gripen E are true fifth generation.

“We are looking to integrate the latest air-to-air missile [and] long-range air-to-ground missiles, and continue to develop the anti-surface capability. The design of the computer and software/hardware is separated, so you have one flight critical infrastructure and then a tactical infrastructure.

“You have the ability to alter the tactical software, allowing you to fly the aircraft with changes, which could be a new weapon,

Gripen C/D roadmap

Saab has set out an operational roadmap for the Gripen C/D up to 2050, which will include two radar enhancements: the PS-05/A Mk 4 radar and later the Mk 5 radar. The MBDA Meteor air-to-air missile already brings a superb beyond-visual-range capability, and the GBU-39 small-diameter bomb has been integrated as part of the digital close air support philosophy. Other improvements include high-speed datalinks, Link 16 upgrade, long-range oblique photography pod, EWS 39 Mk II electronic attack pod, and enhanced self defence systems. Other improvements will come with the new PS-05/A Mk4 radar, such as an extended range for the AIM-120C7 AMRAAM, while the Mk5 radar will see the introduction of new air-to-ground weapons.

the next day. If you look at that in the perspective of a crisis or war time, that will be a game changer. As we have our own aerospace industry in Sweden, it means we can continue to develop our fighters at a high pace, in a way that no one else can.

“We will continue with Meteors and AMRAAMs, and a newer generation of the latter is coming up, so we will stay with a mix of missiles. It wouldn't be right to put all our eggs in one basket.”

The SwAF will continue to fly the Gripen C/D until 2035, so there are plans to update them to keep them relevant. Synchronising the C/D upgrades with the E is clearly the best way forward.

The Commander added that the new PS-05/A Mk4 (see Gripen C/D roadmap) is “an interesting radar, particularly when you have the Meteor, which is a game changer”.

Alan Warnes

Two pre-production Gripen Es of the Operational Test and Evaluation unit are being used to develop the new jet's systems
Saab



Switzerland

A pair of Swiss Air Force-operated F/A-18Cs pop flares during a demonstration at Switzerland's Axalp target range. While these exercises and displays are stunning to watch, they contribute a lot of stress to the fighter's airframe, adding to the fleet's fatigue issues. All images: Peter Gunti

Alpine rejuvenation

The Swiss Air Force currently operates 30 F/A-18C/D Hornets (see *Inventory* table). Having been operational since 1996, this fleet is nearing its foreseen fatigue life limit now. More than once, the entire fleet has been grounded because maintenance checks revealed cracks in unexpected places. The necessity for a prolonged service

life was foreseen from the outset. During production, reinforcements were introduced to give the airframes a prolonged life of 5,000 flight hours.

This number does not seem extravagant at all, but during routine training operations in this small country, these fighters hardly log any transit time. Training areas can be reached in minutes and the

bulk of the platform's flying hours are used for actual manoeuvring.

Since the three squadrons that operate the type (see *Order of battle* table) specialise exclusively in the air defence role, dogfights are standard practice. The Swiss Air Force estimates that the actual flight hours must be multiplied by a factor of 1.5 to compare the fatigue with NATO countries. With the increased use of the F/A-18C/D in recent years, these fatigue limits are steadily approaching. The loss of four Hornets since 1996 has also slightly increased the demand on the fleet's surviving airframes.

In 2017, the Swiss parliament approved a life extension programme – worth CHF450m (£374m) – that aimed to increase F/A-18C/D flight hours to 6,000.

This requires the fleet to be recertified, ensuring its safety for another five years of prolonged operations. Some 140 checks per aircraft will be necessary to

guarantee that fatigue is detected in time and parts can be replaced before failure.

Half of Switzerland's remaining F/A-18C/Ds have completed this programme, with the final airframe scheduled to complete the process by 2025. An allocated 200 flight hours per year will keep the Swiss Hornets active until they are withdrawn from service, which is set to occur by 2030.

As other operators phase out their legacy Hornet fleets, international logistic support chains will be wound down, so more spare parts will have to be stored or manufactured. All partner air arms will stop operating their F/A-18C/D fleets by 2026 and Switzerland is looking to Canada for data on how precisely these legacy Hornets age. Systematic surveillance has shown metal fatigue has not equally progressed on each aircraft.

Air show demonstration flights and gunnery exercises at the

Order of battle

Fliegergeschwader 11 (Air Wing 11)	Payerne AB
Fliegerstaffel 6	F-5E/F
Fliegerstaffel 17 'Falken'	F/A-18C/D
Fliegergeschwader 13	Meiringen AB
Fliegerstaffel 11 'Tigers'	F/A-18C/D
Fliegergeschwader 14	Emmen AB
Fliegerstaffel 19	F-5E/F
Patrouille Suisse	F-5E
Fliegergeschwader 14 (continued)	Payerne AB
Fliegerstaffel 18	F/A-18C/D

Notes: Fliegergeschwader 14 has units based at both Payerne AB and Emmen AB, as listed above. As Emmen, Payerne and Meiringen are each expected to host an F-35A unit, it is likely that one of the Payerne-based legacy Hornet squadrons will relocate to Emmen during the transition process

Source: *AirForces Intelligence*

famous Axalp range have fatigued these fighters more than other mission sets. To even out the wear-and-tear, each training flight is now assigned to a specific aircraft in accordance with the expected G-forces. This procedure should ensure an even fatigue record across the fleet.

After the US Marine Corps and US Navy retired their F/A-18C/Ds, the routine exchange of squadron pilots with the US was terminated. A similar arrangement with the French Air and Space Force was put on hold, pending Switzerland's selection of the Hornet's successor.

In the last three years, the Swiss Air Force has started reactivating some of its former alpine air bases for tactical decentralisation exercises. Fighters have deployed to St Stephan, Mollis and Alpnach for exercises. This practice will continue, with each squadron now planning logistics for several dispersal bases in case of war.

Some 25 F-5E/F Tiger IIs are still in Swiss service. However, these aircraft no longer possess offensive capabilities, as the AIM-9P Sidewinder air-to-air missile was decommissioned a decade ago and the type fired its last cannon round in 2018. The F-5E/Fs remain solely in the aggressor role, but the fleet's retirement is planned for 2025. Discussions are ongoing as to whether a small number of Tiger IIs could be retained for use by Switzerland's national aerobatic team, Patrouille Suisse.

Efforts to evaluate potential successors for the F/A-18C/D Hornet began in 2017. This process was based on multiple factors: the platform's tactical capabilities (55%); offered level of co-operation from the country of origin – ie, training and testing (10%); logistical support



One of the remaining roles of Switzerland's ageing F-5E/F Tiger II fleet is to perform target towing tasks in support of air-to-air gunnery training missions. This example (serial J-3089) is seen departing Meiringen AB, equipped with a target winch on its centreline pylon. Note that this particular aircraft is also wearing the colours of the Patrouille Suisse aerobatic team

(25%) and the participation of Swiss industry (10%). The selection of the F-35A Lightning II was anticipated by many. Its advantages over the competition left many speechless. For instance, it received the best score in every competition (including price), bar the Swiss industry participation category.

However, the F-35A's selection immediately triggered several political activists into protest. They launched an 'initiative' to ban the procurement and distribute the allotted funds among other, non-defence-related purposes. In order to achieve this, the group will have 18 months to collect the signatures of 100,000 registered voters. If they succeed, the electorate will have to decide the issue once more.

This collection of signatures occurred long before Russia invaded Ukraine on February 24. While public opinion shifted in favour of increased defence spending, those against the F-35 continue in their endeavour as if nothing has happened – hoping to stop the order or delay it. There are still those in Switzerland who want to dissolve the armed forces and they possess the political instruments to at least try.

A parliamentary majority is now

in favour of accelerating the foreign military sales contract with the US, instead of waiting for the initiative to unwind. If all goes according to plan, the first of 36 F-35As will enter Swiss service in 2028, with the last following in 2030. These will mostly come from the Leonardo-run Final Assembly and Check Out (FACO) facility in Cameri, Italy – except for four airframes, which will be assembled in Emmen, Switzerland, for technology transfer purposes.

The Lightning IIs will re-equip the three legacy Hornet squadrons: Fliegerstaffel 11 (Air Squadron 11); Fliegerstaffel 17 and Fliegerstaffel 18, with aircraft being based at Payerne, Meiringen and Emmen. Maintenance will no longer be centralised at Emmen and will be provided at each home base, while pilot training will take place in the US. Increased use of simulators and the shifting of training activities abroad will reduce the number of operations over Switzerland in the future, therefore mitigating noise emissions over the country.

The sudden eruption of war in Eastern Europe has led both Finland and Sweden to apply to join NATO. For Switzerland, such a move would be deemed politically unrealistic as neutrality

is too deeply rooted in this country – which was last invaded in 1798 by Napoleon Bonaparte.

The current situation in Ukraine highlighted a need for Switzerland to enhance interoperability with its allies. It became clear that a deliberate attack on the nation could not be successfully opposed alone.

The US Congress has approved this F-35A sale, along with a small stock of sophisticated air-to-ground weapons. Switzerland did not replace its ground attack capabilities when the final Hawker Hunters were phased out of service in 1994. The tactical science of battlefield support and interdiction/strike will have to be remastered and adapted to accommodate modern advances.

In a related programme, Switzerland wants to introduce five Patriot air defence systems to re-establish the long-range surface-to-air missile capabilities once offered by the British-built, Cold War-era Bloodhound system. Surprisingly, this procurement is yet unopposed by the country's pacifist movements.

Together with the F-35A, the air defence of this neutral alpine republic might retain its credibility long into the 21st century.

Peter Gunti



Inventory

Type	Delivered	Current
F-5E	98	22
F-5F	12	6
F/A-18C	26	25
F/A-18D	8	5

Notes: All the above types will be withdrawn from operational service by the end of this decade. The 30-strong legacy Hornet fleet will be replaced by 36 F-35A Lightning IIs, which are scheduled for delivery to the Swiss Air Force from 2028-2030. As per current plans, the F-5E/F Tiger II fleet will be retired in 2025

Source: AirForces Intelligence

Left: Switzerland will replace its legacy Hornet fleet with 36 F-35As, which will be delivered from 2028-2030. The shape of things to come was demonstrated to the Swiss press and public earlier this year, when two Italian F-35As visited Emmen AB

TuAF's Turbulent Transformation



Turkey

Above: *The Turkish F-4E-2020 Terminator fleet was set to be replaced by the F-35A in TuAF service during the mid 2020s, but this changed when Turkey was barred from the F-35 programme for purchasing Russian-made S-400 air defence systems* All images: Joe Campion

The Türk Hava Kuvvetleri (Turkish Air Force, TuAF) went through a large-scale reorganisation after the attempted coup on July 15, 2016. With many personnel involved in the coup, or linked to the outlawed religious organisation behind it, ousted, the TuAF experienced a shortage of pilots and maintenance crews.

The base/squadron structure was changed significantly, with some units being disbanded. An emergency project was initiated for the air and ground crews. Many former pilots were recalled to duty, resulting in a steady recovery process starting from 2020.

Turkey's removal from the F-35 Lightning programme

can be considered as another major milestone in the TuAF's modernisation. After the nation acquired S-400 (SA-21 *Growler*) air defence systems from Russia in 2019, the US cancelled the delivery of six already manufactured F-35As, and ejected Turkey (a Level 3 partner) from the project.

The TuAF planned to induct 100 F-35As, while the Turkish Navy was contemplating a purchase of between 12-20 F-35Bs for use aboard the amphibious assault ship TCG *Anadolu* (L-400). The F-35As were to equip 111 and 112 Filo (Squadron) at the 1st Main Jet Base (MJB) in Eskisehir, along with 171 and 172 Filo at the 7th MJB in Malatya-Erhac.

Today, the TuAF's combat fleet comprises around 240 F-16C/D Fighting Falcons and around 25 F-4E-2020 Terminators. Of the 270 F-16s delivered from 1987 to 2012 under the Peace Onyx programme, roughly 240 aircraft remain operational with nine units, including 401 Test Filosu (the test and evaluation squadron) at Eskisehir. After the RF-4E Phantom II fleet was retired in 2015, F-16C/Ds fitted with DB-110

pods assumed the tactical reconnaissance role with 113 Filo from the 1st MJB.

In the wake of the 2016 coup attempt, the TuAF went under a major reorganisation that saw the 4th MJB at Ankara-Mürted disbanded. The base's three squadrons (141, 142 and 143 Filo) were all deactivated. F-16s from 141 Filo were handed over to 132 Filo (a weapons and tactics unit) of the 3rd MJB at Konya, while 142 Filo was renamed 113 Filo and relocated to Eskisehir. Finally, 143 Filo – the F-16 operational conversion unit – was first moved to the 5th MJB at Merzifon, before becoming 193 Filo at the 9th MJB in Balikesir.

Among the two F-16 units in Merzifon, 152 Filo was relocated to the 10th MJB at Incirlik, due to rising tensions in the Eastern Mediterranean and Syria. Once a Phantom 'super base' with three resident squadrons, the 7th MJB at Malatya-Erhac is now inactive. The base's two combat units were set to be the first to receive the F-35A, before Turkey was kicked out of the programme.

The removal of Turkey from the F-35A programme

Inventory

Type	Delivered	Current
F-4E-2020	54	23 (approx)
F-16C-30	32	27
F-16C-40	104	89
F-16C-50	60	52
F-16C-50M	14	14
F-16D-30	9	8
F-16D-40	15	14
F-16D-50	20	19
F-16D-50M	16	16

Notes: Previous plans would have seen the F-35A replace the ageing F-4E-2020 fleet in Turkish service, but Turkey's removal from the programme means that this will no longer be the case. It remains unclear what Turkey's future plans are for the Terminators. The TuAF's F-16C/D fleet will remain operational until the early 2030s, when the air arm will begin to gradually replace the type with the MMU fifth-generation combat aircraft. Turkey is currently seeking to purchase 40 new-build F-16V Block 70/72s (along with 80 upgrade kits for in-service F-16C/Ds) to fill the potential capability gap caused by the F-35 situation.

Source: *AirForces Intelligence*

dramatically changed the TuAF's modernisation plans. As per the original roadmap, the F-35A would have replaced the service's ageing F-4E-2020 Terminator fleet – which is operated by 111 Filo – by the mid 2020s.

Three additional units (112, 171 and 172 Filo) would have been reactivated to operate the fifth-generation multi-role stealth fighter. This force would have been supplemented by the F-16C/D fleet, which will itself be incrementally replaced by the Milli Muharip Uçak (MMU, National Combat Aircraft) in the 2030s.

The MMU programme was launched in December 2010 and aims to develop a fifth-generation combat aircraft that incorporates advanced avionics, stealth characteristics and high performance. Led by Turkish Aerospace Industries (TUSAS), the project's conceptual design phase was completed between 2011-13. The development phase – which started in 2016 – is set to reach a critical milestone in March 2023, with the roll-out of the first prototype.

The type's maiden flight is scheduled to take place in 2025-26 and the first production examples are set to enter Turkish service by the end of this decade. The MMU will begin replacing the F-16C/Ds – starting with the Block 30 examples – in the early 2030s.

As a direct result of the F-35 situation, and the time required for the MMU to achieve full operational capability, the TuAF has faced the risk of a capability gap. To address this issue,

Order of battle

1st MJB	Eskisehir Air Base
111 Filo 'Panther'	F-4E-2020
113 Filo 'Ceylan'	F-16C/D-30, F-16C/D-50
401 Test Filosu	F-4E-2020, F-16C/D-30, F-16C/D-40
3rd MJB	Konya Air Base
132 Filo 'Dagger'	F-16C/D-30, F-16C/D-40
5th MJB	Merzifon Air Base
151 Filo 'Savasan Kurt'	F-16C/D-40, F-16C/D-50
5th MJB	Incirlik Air Base
152 Filo 'Raider'	F-16C/D-40
6th MJB	Bandirma Air Base
161 Filo 'Eagle'	F-16C/D-40, F-16C/D-50
8th MJB	Diyarbakir Air Base
181 Filo 'Leopard'	F-16C/D-40, F-16C/D-50
182 Filo 'Hawk'	F-16C/D-40
9th MJB	Balikesir Air Base
192 Filo 'Tiger'	F-16C/D-40
193 Filo 'Oncel'	F-16C/D-30, F-16C/D-50

Notes: 152 Filo was relocated to Incirlik from Balikesir in 2018-19. The arrival of the F-35A would have seen 111 Filo transition from the F-4E-2020 to the fifth-generation multi-role stealth fighter. In addition, the TuAF would have reactivated 112, 171 and 172 Filo to operate the type from Eskisehir (111 and 112) and Malatya (171 and 172), respectively. The 4th MJB at Ankara-Mürted was disbanded following the failed coup attempt in 2016.

Source: *AirForces Intelligence*

Turkey has officially asked the US for the sale of 40 F-16V Block 70/72 Fighting Falcons and kits to upgrade 80 TuAF-operated F-16C/Ds to the same standard. A total fleet of 120 F-16Vs – fitted with active electronically scanned array (AESA) radars – would provide the TuAF with an adequate stopgap until the arrival of the MMU. However, this purchase may not be straightforward, given the current, turbulent political relationship between Turkey and the US.

TUSAS is currently developing the Hürjet – an advanced jet trainer/light combat aircraft – for

the TuAF. The platform is set to replace the T-38M Ari jet trainer fleet and the NF-5A-2000s of the Turkish Stars (Turkey's national aerobatic team).

Powered by a single GE Aviation F404 afterburning turbofan engine, the Hürjet will be capable of achieving speeds of Mach 1.4 at around 45,000ft. It will be equipped with advanced communications and avionics systems, suited for the training of fifth-generation combat aircraft pilots. The Hürjet is set to complete its first flight at some point next year.

Arda Mevlutoglu

Unmanned assets

One of the main pillars of the TuAF's modernisation is in the field of unmanned aerial vehicles (UAVs). Turkey first acquired IAI Heron Is from Israel in the mid 2000s, before introducing the TUSAS-developed Anka S in 2017.

The latter was the first armed UAV to enter Turkish service. It can carry L-UMTAS and Cirit air-to-ground missiles, along with MAM-L/C laser-guided bombs – all developed by Roketsan. The 14th Unmanned Aircraft Systems MJB at Batman, southeastern Turkey, is the TuAF's main drone base and also hosts UAVs from other services.

The TuAF started accepting deliveries of Baykar-developed Bayraktar Akinci twin-turboprop high-altitude, long-endurance (HALE) UAVs in 2021. The Akinci is designed to undertake electronic intelligence, communications intelligence, electronic warfare and strike mission sets. The UAVs are equipped with dual satellite communications systems, along with an electro-optical camera, collision avoidance radar and synthetic aperture radar.

With a service ceiling of up to 40,000ft, an endurance of more than 24 hours and a payload capacity of approximately 3,306lb, the Akinci is able to carry a large number of guided bombs and missiles, including the SOM air-launched cruise missile.

Another major project for the TuAF is the development of Baykar's Bayraktar Kizilelma – an armed UAV that is powered by a single turbofan engine. This platform employs a delta-wing and canard configuration, with its overall airframe geometry being consistent with contemporary stealth aircraft design characteristics.

As per the technical specifications shared by Baykar, the Kizilelma will boast a five-hour endurance, a combat radius of 500nm and a service ceiling of 35,000ft, with a maximum take-off weight of 13,228lb, with a payload capacity of 3,306lb.

The Kizilelma will have an internal weapons bay to carry precision-guided munitions – a feature that contributes to the UAV's stealth characteristics. It was first revealed to the public in July 2021 and the type's first flight is scheduled to occur in 2023.

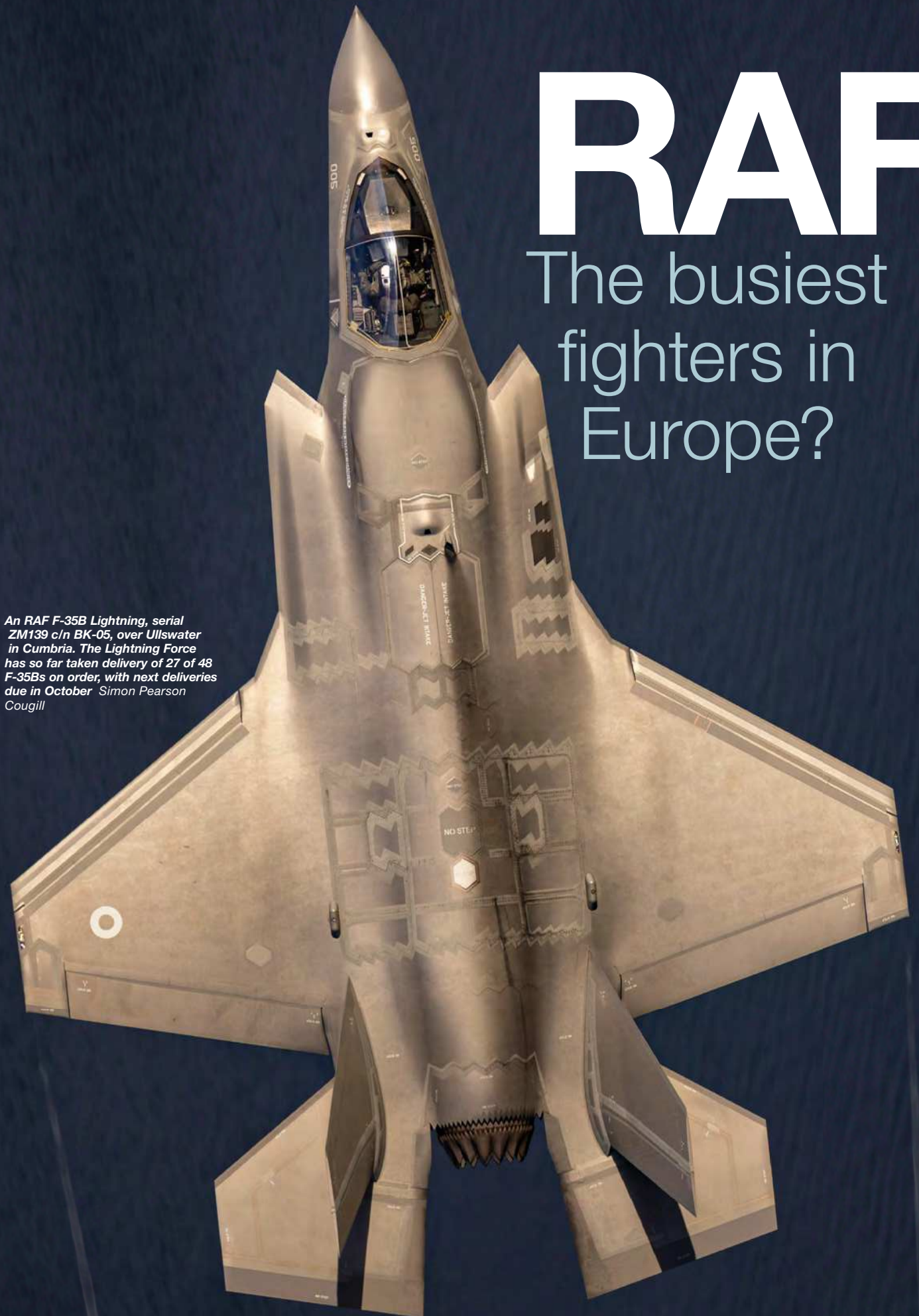


Above: This TuAF-operated F-16D Block 50 (serial 07-1029) rolls out after landing at Konya Air Base in 2019. Turkey acquired the F-16C/D Block 50s under the Peace Onyx II programme, which started in the early 1990s

RAF

The busiest
fighters in
Europe?

An RAF F-35B Lightning, serial ZM139 c/n BK-05, over Ullswater in Cumbria. The Lightning Force has so far taken delivery of 27 of 48 F-35Bs on order, with next deliveries due in October. Simon Pearson Cougill




 United Kingdom

Typhoons

No air arm in Europe has a more capable fighter force than the RAF. There are around 135 multi-role Eurofighter Typhoons and 26 Lockheed Martin F-35B Lightnings, which are continuously being modified for more capability. Integrating the strengths of both types – effectively fighting as one – is now a top RAF requirement, with progress regularly reviewed under Exercise Babel Fish.

The RAF is still working the hurdles, but fourth/fifth-generation fighter integration is extremely important to fly as part of a coalition force with the US and other NATO countries (see *Transatlantic Tricks*, August 2021, p42-49). The Typhoon Force has flown with other (mainly USAF) F-35As, as well as No 617 Sqn 'The Dambusters' F-35Bs over Syria in Operation Shader.

Undoubtedly the lessons learnt from Exercise Babel Fish and the trilateral French/US/UK Atlantic Trident series of drills have enabled this.

Typhoons

Together, the F-35Bs and Typhoons make up ten flying units and two test and evaluation squadrons. The Typhoons were initially introduced into service in March 2005, although the focus then was on the dual-seat T1s, with the single-seat F2s arriving in March 2006 purely in an air defence role. The F2s were eventually upgraded to FGR4, when this became the required standard for multi-role operations in August 2007. Today, all the dual-seaters have been retired, with the RAF opting to use more simulation instead. Of the 135 Typhoon FGR4s that serve today, 24 are the older Tranche 1 variant with the flight control system that was not upgraded with multi-role avionics. Published on March 22, 2021, the UK government's Defence Command Paper announced the Tranche 1s would be withdrawn from use by 2025. As AVM Ian Duguid, Air Officer Commanding 1

Intercepting Russian military aircraft such as this Tupolev Tu-142 has become a way of life for the Typhoon Force, while conducting NATO-led Baltic air policing duties and domestic QRA operations MOD Crown Copyright



Group, who runs the RAF Combat Force, told *AFM*: "While a Tranche 1 might look identical to a Tranche 2/3, inside its not. It's a generation behind where the Tranche 2/3s are – and when we role out the AESA radar it will be two or three generations behind. From an avionics perspective, it has reached its out-of-sale date. In the early programme plans, Tranche 1 would be in service for just 15 years anyway."

While initially there were going to be two Tranche 1 Typhoon squadrons, those plans were shelved when the joint British-Qatari unit, No 12 Sqn, was stood up at RAF Coningsby, leaving just No IX(B) Sqn at RAF Lossiemouth to be more dedicated to Red Air and Quick Reaction Alert (QRA) operations. Making the Typhoons more capable in the air-to-ground role was a primary mission for the RAF between 2016-2019. Working with BAE Systems, the Typhoon was modified to take over the Tornado's role when it was retired in December 2019. This meant the Storm Shadow cruise missile, Meteor beyond-visual-range air-

to-air missile (BVRAAM) and Dual-Mode Brimstone had to be integrated on the Typhoon. At that time, the Tornado was being used by the RAF to attack Islamic State (IS) targets in Syria and Iraq as part of Operation Shader, so it was vital the fourth-generation fighter was fit to fill those shoes.

Replacing the Reconnaissance Airborne Pod Tornado (RAPTOR) didn't prove quite so easy. When the new Litening V targeting pod enters service in June, the issue will finally be resolved. This latest pod from Israel's Rafael has a datalink system that allows imagery to be downloaded at near-real-time.

There are currently six frontline operational Typhoon squadrons: No 1 (Fighter) Sqn is based at RAF Lossiemouth alongside No 11 (Army Cooperation) Sqn, No 6 Sqn and No IX (Bomber) Sqn; while No 3 (Fighter) Sqn and No XI (Fighter) Sqn at RAF Coningsby make up the remainder of jets that cover the RAF Typhoon Force's operational requirements. No 12 Sqn is a joint British-Qatari unit based at Coningsby, where the

RAF is training Qatar Emiri Air Force (QEAF) aircrews and ground personnel. There is also the No 41 Test and Evaluation Sqn (TES) at Coningsby, which acts as the interface for industry upgrades and tactical enhancements.

No 29 Sqn – the Typhoon Operational Conversion Unit (OCU) – at Coningsby is responsible for training pilots for the frontline units. Synthetics are now playing a big part in their syllabus, not just to cut costs but because it can also speed-up training. According to AVM Ian Duguid, the split between flying and simulation is around 60/40: "Four years ago, the Typhoon OCU at RAF Coningsby was on 65% simulation and 35% flying. In terms of frontline flying, it was around 65-70% live flying and 30% in sim. However that will change, with less live flying when we introduce the Typhoon Future Synthetic Training [(TFST)] capability in three-to-four years."

Last December, Canada's CAE announced it had installed the first two Medallion MR e-Series visual display systems for the TFST with

European Fighter Survey



Above: This Typhoon FGR4 gets airborne from RAF Akrotiri, Cyprus, to conduct evening operations in support of Operation Shader. This particular mission involved two RAF Eurofighters, along with an Airbus A330-243MRTT Voyager KC2/KC3 multi-role tanker transport, which provided the fighters with fuel throughout the sortie MOD Crown Copyright

ready-for-training certification expected later this year. Of the ten systems to be integrated, six will go to RAF Coningsby and four to RAF Lossiemouth.

While the Typhoons stand on QRA duty at RAF Lossiemouth and RAF Coningsby, there are also two permanent overseas detachments at RAF Mount Pleasant, Falkland Islands and RAF Akrotiri, Cyprus, although the latter is dedicated to ground ops rather than air defence. The standard QRA fit comprises Advanced Short-Range Air-to-Air Missiles (ASRAAMs) and gun, although a suite of weapons – including Meteor BVRAAMs and Advanced Medium-Range Air-to-Air Missiles (AMRAAMs) – is also included, and it is down to the ops commander to review the threat and dictate what aircraft fly with.

The protection of sovereign airspace (including the Falkland Islands) is the top priority. There are eight Typhoons deployed to RAF Akrotiri to support the UK's anti-IS campaign under Operation Shader, which sees frontline units deploy on a rotational basis. The Typhoon Force – under the auspices of the 140th Expeditionary Air Wing, but manned by No 3 (F) Sqn – is also providing jets for Operation Biloxi, the NATO-led enhanced

air policing detachment at Mihail Kogalniceanu in Romania. Four arrived on March 30, with two more following a couple of weeks later to increase NATO's presence on its eastern flank due to Russia's invasion of Ukraine. Typhoons have been involved in combat air patrols over Polish airspace and the Black Sea region, as well as multiple air, land and fighter integration exercises with Baltic partners.

When it comes to exercises, the main feature of the Typhoon's programme has been No 1(F) Sqn's deployment alongside No 41 TES for Exercise Red Flag at Nellis AFB, Nevada, in January/February. During these drills, the Typhoons worked alongside USAF and Royal Australian Air Force aircraft, flying against simulated ground-based air defence systems, aggressor aircraft simulating a near-peer adversary, and cyber and space-based threats. This year, the US Department of Defence prioritised the People's Republic of China (Taiwan) as what it calls its number one pacing challenge, and Exercise Red Flag helped US and allied aviators to develop the right operational concepts, capabilities and plans to bolster deterrence and maintain a competitive advantage. The training also included activity intended as an

effective deterrent to nation-state threats emanating from Russia, Iran and North Korea, together with transnational and non-state threats from violent extremist organisations.

Looking ahead to the rest of the year, support will continue to Operations Shader and Biloxi, with the latter continuing well into the middle of the year. This summer's UK air exercise schedule is dominated by Storm Warrior and Cobra Warrior, which are proving grounds for the RAF's newly qualified weapons instructors (QWIs). Moving into autumn and winter, No 12 Sqn will deploy to Qatar again to support the stand-up of the QEAF's own Typhoon Wing and contribute to air defence operations during the 2022 FIFA World Cup. Next year, the Typhoon Force will return to Nellis to participate in Exercises Red Flag and Green Flag to deliver high-end air-to-air and close air support training, respectively. It will be followed soon after by Exercise Magic Carpet in Oman – a trilateral Omani, Qatari and British air exercise – and finally by Cobra Warrior 23-1, a multinational large force employment exercise hosted by the UK.

Looking to the future, RAF Typhoons will be upgraded with the Eurofighter Common Radar System

(ECRS) Mk 2 radar, which will not only enhance their air-to-air and air-to-surface capabilities, but allow for new electronic warfare (EW) roles, including suppression of enemy air defence (SEAD) through electronic attack. The RAF's version of this radar has been driven by the requirement for cutting-edge EW and electronic jamming.

In effect, this will complement the UK's F-35B capability in providing the ideal force mix. The next phase of this project will be to develop the new radar and integrate it onto RAF Typhoons through the four-nation Eurofighter Phase 4 Enhancement (P4E) programme, which will also deliver a range of time-critical upgrades. The IOC forecast of 2030 also includes risk and uncertainty for delivering ECRS Mk 2 and P4E.

In May, it was revealed by the UK MOD that, by the end of 2022, a prototype ECRS Mk 2 radar will be delivered and the full system critical design review for the production-standard radars will be completed. Both provide critical outputs to take forward into the next phase of the programme, starting with flight trials in 2023. The ECRS Mk 2 will be delivered and integrated onto the Typhoon platform by end of this decade. While the P4E range of upgrades will be delivered across the RAF's Typhoon fleet, the current planning assumption for ECRS Mk 2 is that it will be installed on UK Tranche 3 Typhoon aircraft (40), although that option remains under review.

F-35B Lightning

Joint Force Lightning is a Royal Navy/RAF operation under the supervision of the RAF's Combat Air Force Commander, who is usually an Air Commodore.

There are currently two F-35B units based at RAF Marham: No 617 Sqn 'Dambusters' and No 207 Sqn, which is the F-35 OCU. They will be joined by 809 Naval Air Squadron (NAS) in April 2023, which will not be ship-facing and do as much on land as ship, as No 617 Sqn does now. A Navy Commanding Officer or RAF Commanding Officer will rotate on each squadron.

Cdr Tim Flatman (Royal Navy) heads No 207 Sqn and Wg Cdr David Tait (RAF) has recently taken over No 617 Sqn from Cdr Mark Sparrow. Cdr Sparrow took the F-35Bs to sea on the HMS *Queen Elizabeth* (R08) during its first operational cruise last year.

Unfortunately, the squadron lost an F-35B (ZM152) in the eastern Mediterranean on November 17, 2021, as the vessel was heading back to the UK. The fifth-gen fighter dropped off the carrier's take-off ramp as it was departing and fell into the water. Fortunately, the pilot ejected and the aircraft was subsequently salvaged.

According to an RAF spokesperson, "The F-35B's first embarkation on HMS *Queen Elizabeth* provided an opportunity to test the breadth of capabilities offered by F-35B within a Carrier Strike Group context. No 617 Sqn conducted several exercises with international partners and conducted live operations, while developing the interface between the ship and the aircraft. This also provided an opportunity to work closely with the USMC continuing a relationship which has existed since the UK commenced operating with F-35B."

Lightnings from the 'Dambusters' also deployed to RAF Akrotiri in June 2021 for a sustained period of Operation Shader during the Carrier Strike Group (CSG) deployment. Capt James 'Blackers' Blackmore, HMS *Queen Elizabeth's* Carrier Air Wing Commander, told *AFM* at the time: "That really showed the return of carrier strike for the Royal Navy and our ability to deliver and demonstrate a credible carrier strike capability."

While no weapons were dropped when deployed in Cyprus, the unit provided support using the F-35's sensors, whether it was the electro-optical targeting system (EOTS), radar or other onboard sensors. Capt Blackmore said: "While it would have been great to drop weapons, and the aircraft definitely flew with weapons during every sortie, we contributed in other non-kinetic ways."

Since returning from sea, No 617 Sqn has been working up the qualifications of pilots for the next operational tour, as well as 'resetting readiness' to respond at short-notice to global crises overseas or support to the defence of NATO.

There are currently 26 F-35Bs serving in the UK military of the 48 contracted so far under Tranche 1. The next batch of these fifth-generation fighters should be delivered in October. Air Marshal Richard Knighton, Deputy Chief of the Defence Staff, told a Defence Select Committee hearing on April 26 that negotiations have begun for another 26 F-35Bs under a Tranche 2 purchase. Meanwhile, Block IV upgrades are expected to commence in 2027, with the first delivered in 2028 and the rest completed by 2034. These aircraft will fly with the MBDA-developed Meteor BVRAAMs and Select Precision Effects At Range Capability (SPEAR) 3 air-to-ground missiles that are set to be enter service in 2028. BAE Systems will use one of its Typhoons to support the integration of the weapon on to the UK's F-35B fleet, as it did with the original SPEAR in July 2016. Flight trials are expected to commence later this year.

As the F-35B OCU, No 207 Sqn is tasked with training pilots for the F-35B, as well as familiarising pilots who may have been serving in a ground posting. However, first they need to go through ground school, which includes fulfilling tasks in a full mission simulator.

To date, the OCU has completed three initial qualification (IQ) courses that resulted in six pilots graduating, and there is another ongoing with two students. Regarding the TX (transition, which refers to a pilot already qualified on another type, which incidentally doesn't include 'Creamies' as they

Order of battle

Squadron	Station	Aircraft
No 1 (F) Sqn	RAF Lossiemouth, Moray	Typhoon FGR4
No II (AC) Sqn	RAF Lossiemouth, Moray	Typhoon FGR4
No 3 (F) Sqn	RAF Coningsby, Lincolnshire	Typhoon FGR4
No 6 Sqn	RAF Lossiemouth, Moray	Typhoon FGR4
No IX (B) Sqn	RAF Lossiemouth, Moray	Typhoon FGR4
No XI (F) Sqn	RAF Coningsby, Lincolnshire	Typhoon FGR4
No 12 Sqn	RAF Coningsby, Lincolnshire	Typhoon FGR4
No 17 TES	Edwards AFB, California	F-35B Lightning
No 29 Sqn	RAF Coningsby, Lincolnshire	Typhoon FGR4
No 41 TES	RAF Coningsby, Lincolnshire	Typhoon FGR4
No 207 Sqn	RAF Marham, Norfolk	F-35B Lightning
No 617 Sqn	RAF Marham, Norfolk	F-35B Lightning

Source: *AirForces Intelligence*

Inventory

Aircraft	Delivered	Current
Eurofighter Typhoon FGR4*	135	116
Eurofighter Typhoon T3**	22	0
Lockheed Martin F-35B***	27	26

Notes: * All Tranche 1s retired by 2025. ** All dual-seaters now retired. *** The UK government has so far committed to 48 F-35Bs, with discussions for a further 26 underway – there is a requirement for 144

Source: *AirForces Intelligence*

are classified as IQs), five courses with seven graduates have been completed so far, and another two are in progress with three students.

When it comes to refreshers, there have been two graduates from two courses, while three graduates have converted from other aircraft during three courses. The first Qualified Weapons Instructor (QWI) course is taking place later this year.

Just like the Typhoon Force, synthetics are assisting with training aircrews on the F-35B Lightning, usually comprising a 50/50 split between live flying and synthetics. The synthetic environment allows pilots to train against a high-end threat in a degraded environment that can not often be replicated through live flying due to various constraints.

This might include instrument rating tests, suppression of enemy air defences and high-end warfighting that utilises all of the F-35's unique capabilities, without risking compromising sensitive information to an adversary.

During HMS *Queen Elizabeth's* first operational deployment, F-35B crews from No 617 Sqn 'Dambusters' and the USMC's Marine Fighter Attack Squadron 211 (VMFA-211) carried out high-end training on the ship with four Deployable Mission Rehearsal Trainers (DMRTs), allowing crews to carry out four-ship high-end missions to brush up and refine their skills, which they were unable to perform while out at sea.

So it has been a busy time for the RAF's Combat Air Force, and that isn't likely to be coming to an end anytime soon. *AFM*



A pair of F-35Bs from No 617 Squadron 'The Dambusters' head up a massive line of fighters at Nellis AFB in February 2020, when the unit deployed to the US for Exercise Red Flag, which is undoubtedly the biggest and most complex series of exercises in the world MOD Crown Copyright