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# MORE US PROCUREMENT FOR POLAND

**T**he new Russian threat is seeing many countries in Central Europe, such as Poland and the Czech Republic, stepping up their defence spending. Most of it is with the US government.

Unlike Germany, Poland has never really trusted Vladimir Putin, and has been on a huge spending spree for several years. The Warsaw government saw the evil dictator snatch Crimea from Ukraine and has always been mindful of his next step.

Fortunately, the brave and well organised Ukrainian military are now embarrassing Putin and his cohorts, even to the extent of clawing back around 3,000 square miles of territory it lost in the north-east during early September.

On September 9, Poland announced a plan to acquire 96 AH-64E Apache Guardians (see page 22), showing that it still takes the Russian threat seriously. Just look at the purchase of 32 F-35As in December 2020 and, in July this year, the decision to buy 42 Korean Aerospace Industries/Lockheed Martin FA-50s to replace their ageing Russian-built Sukhoi Su-22 *Fitters* and Mikoyan MiG-29s.

Buying from the US isn't just about the capabilities of the platform. It also brings a step-up in security co-operation with Washington. For those competing against the US for military contracts, it just isn't a level playing field, as Saab with its Gripen has found out.

The Polish Air Force is now set to be one of the strongest in NATO and that will bring more influence. Of course, Poland has always had large numbers of aircraft, albeit Soviet, to cover one of the biggest countries in Europe – we saw that when the Iron Curtain fell in 1990. Now the Soviet types are all being swept away and replaced by a new, up-to-date US-influenced military inventory.

The Apaches will replace Poland's fleet of Mi-24 *Hinds* and will undoubtedly come as a disappointment to the likes of Leonardo, which was hoping its new AW249 attack helicopter – which only made its first flight on August 12 (see page 26) – would fit the bill in Poland's Kruk program. The Air Force already operates the Leonardo M346 in the training role, but there have been some suggestions that the Poles have not been

happy with its performance. Leonardo would also have undoubtedly offered its new M346FA light combat aircraft as a Su-22/MiG-29 replacement.

This isn't the first time that Warsaw has snubbed European procurement, having pulled out of the NATO's new Multinational Multi-Role Tanker Transport Unit (MMU) in July 2016, having been one of the founding proponents of the new system to provide all air forces with a cheaper tanker/transport option. If Poland goes for an airborne refueller, it will undoubtedly be the Boeing KC-46 when it has matured, not necessarily because it's the best solution but because it's American. It's a strategy that European governments used to criticise the UK for, but is now creeping into the thoughts of most European nations. For more about European procurement, read CAJ's sister publication, *AirForces Monthly*.

**Alan Warnes, Group Editor at Large**



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**Below:** Poland is poised to acquire 96 Boeing AH-64E Apache Guardian attack helicopters to replace its ageing fleet of Soviet-era Mil Mi-24D/W *Hind*-D/E gunships **US Army/ Capt Brian Harris**



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David Axe considers the development of the F-15EX and the capabilities it is looking to bring to the USAF

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### Cover image:

A pair of F-15Cs from the 104th Fighter Wing's 131st Fighter Squadron, conduct a training mission over New England on November 13, 2014  
Jim Haseltine



# RAF GLOBEMASTER USED FOR QUEEN'S FINAL FLIGHT

A ROYAL Air Force (RAF) C-17A Globemaster III had the honor of transporting the coffin of Queen Elizabeth II from Edinburgh Airport, Scotland, to RAF Northolt in west London on September 13, following Her Majesty's death in Balmoral five days earlier.

The aircraft, serial number ZZ177, used the callsign 'Kittyhawk 01R.' Based at RAF Brize Norton, Oxfordshire, it was flown by a crew from No 99 Squadron.

On arrival at Edinburgh Airport in the Royal Hearse, the coffin was carried onto the C-17A by pallbearers from the Queen's Colour Squadron of the RAF. The aircraft then took off at around 1745hrs

local time. After just over an hour in the air, it landed at RAF Northolt at around 1900hrs. Following arrival at Northolt, pallbearers from the RAF Regiment carried the coffin off the C-17A to a waiting hearse. It was greeted there by UK Defence Secretary Ben Wallace and new Prime Minister Liz Truss, among other dignitaries.

*Flightradar24*, one of the major flight tracking devices currently available, reported that it had a record 4.79 million people following the flight's progress, while it would also have been followed on other similar trackers. This made it by far the most tracked flight of any kind ever.

On the day of the Queen's funeral, September 19, the RAF was also involved in providing airborne security, ensuring that there were no intrusions, either accidental or intentional, in the restricted airspace over the proceedings. For this purpose, two RAF Eurofighter Typhoon FGR4s, using callsigns 'Stone 11' and 'Stone 12,' were launched in the morning from RAF Coningsby, Lincolnshire, to provide continuous combat air patrols (CAPs) over the area. These CAPs continued throughout the day, until around 1700hrs, when the official proceedings came to an end.

To keep the Typhoons airborne, an RAF Voyager KC3 tanker, serial

number ZZ334, callsign 'Tartan 15,' took off from RAF Brize Norton at 0852hrs and headed over to East Anglia, where it began flying a racetrack pattern at an altitude of 20,000ft. This was maintained for the rest of the day to enable the Typhoons to top up with fuel as and when required. Finally, at around 1700hrs, once the Typhoons' job was done, the Voyager began its descent back home to Brize Norton, where it landed again at 1735hrs.

In the days preceding the state funeral, London's main airports saw an influx of VIP aircraft bringing in heads of state and other dignitaries from around the world, as shown in the accompanying images.







**Top:** RAF Regiment pallbearers carry Her Majesty Queen Elizabeth II's coffin off the RAF C-17A at RAF Northolt on September 13 **MOD Crown Copyright/Cpl Tim Hammond**

**Above:** RAF C-17A ZZ177 lifts off from Edinburgh Airport on September 13 to carry the Queen's coffin back to London **MOD Crown Copyright/Cpl Ciaran McFalls**

**Right:** Kuwait Government/State of Kuwait Airbus A340-541 9K-GBB on approach to land at Stansted was one of the arrivals on September 11 for the funeral **Neil Damsell**

**Left:** The hearse carrying the Queen's coffin drives away from RAF C-17A Globemaster III ZZ177 at RAF Northolt on September 13 after the aircraft had transported the coffin down to London from Edinburgh Airport **MOD Crown Copyright/Victoria Goodall**

**Right:** One of the many VIP aircraft arrivals in the UK for Queen Elizabeth II's State funeral was Republic of Korea Air Force 747-8i 22001, which flew into London-Stansted Airport, Essex, on September 11. It is operated by the 257th Special Flight Squadron at Seoul-Seongnam Air Base **Neil Damsell**





# 'NUKE SNIFFER' WC-135W RETIRED



**Above:** USAF WC-135W 61-2667 taxis in at RAF Mildenhall, Suffolk, on April 20, 2022, following a local training sortie as 'Jake21'. The aircraft was present at Mildenhall from January 30 until the May 6, when it departed to Kadena Air Base, Japan. This was the aircraft's last deployment to Europe, and one of the type's longest in recent history. It was officially retired on September 7. **Luca Chadwick**

FOLLOWING 60 years of service, the US Air Force retired Offutt AFB, Nebraska-based 55th Wing WC-135W 61-2667 on September 7. It was flown from Lincoln Municipal Airport, Nebraska (where the 55th Wing has been operating since April 2021 due to runway works at its home base) to Greenville-Majors Airport, Texas, on September 12 using callsign 'Shiner 51'. Greenville is home to L3Harris and the Big Safari office, which are responsible

for the Constant Phoenix program.

The role of Constant Phoenix is to monitor atomic explosions across the globe, hence the nickname 'nuke-sniffers'. At Greenville, the specialist equipment was removed from 61-2667 and will be recycled for use on the replacement WC-135Rs. On September 19, 61-2667 then flew to Davis-Monthan AFB, Arizona, where it will be placed into storage with the 309th Aerospace Maintenance and Regeneration

Group. During its service, #2667 accumulated a total of 36,577.2 flight hours and 8,767 landings.

Following the retirement of 62-3582 in November 2020, 61-2667 became the sole remaining WC-135. As it had become difficult to maintain and operate, it was announced in fiscal year 2019 that the ageing aircraft would be replaced by a fleet of three converted KC-135Rs (designated WC-135Rs). The first of these, 64-

14836, was delivered to the 45th Reconnaissance Squadron on July 11 this year (see 'Nuke Sniffer' to Constant Phoenix: New WC-135R lands, September, p11) and formally accepted into the fleet in a shared ceremony with its predecessor's retirement. The second is due for delivery in winter 2022/23, with the third next summer. All three are expected to remain in service until approximately 2045.

**Luca Chadwick**

## NEW NP2000 PROPS FOR CHILEAN KC-130R



ON SEPTEMBER 13, the Chilean Air Force announced that it had completed fitting its first Hercules with new Collins Aerospace eight-blade NP2000 composite propellers, which will reduce maintenance times and costs by around 50%. The aircraft, KC-130R Hercules, serial number 992, had returned to service four days earlier, after it had completed test flying. **Chilean Air Force**



## BOEING CONTRACTED FOR US, ISRAELI KC-46A PRODUCTION

BOEING HAS been awarded two contracts with a combined worth that exceeds \$3bn to produce another 15 KC-46A Pegasus tankers for the US Air Force and to build and deliver the four examples ordered by Israel through the Foreign Military Sales (FMS) process. Both contracts were placed by the US Air Force Life Cycle Management Center on August 31. The first – worth around \$2.2bn – exercises

the USAF's option to acquire 15 additional KC-46As under Production Lot 8. Work under this contract is expected to be completed by November 30, 2025.

The second deal – worth approximately \$927.4m – involves the production and delivery of four KC-46As to the Israeli Air Force (IAF). This contract also covers the non-recurring engineering design and test for platform-specific

mission equipment, including the Remote Vision System 2.0 and the Air Refueling Operator Station 2.0. Work is expected to be completed by December 31, 2026. US State Department approval of this FMS deal, which covers up to eight KC-46As for Israel, had been announced by the US Defense Security Cooperation Agency on March 3, 2020. The Israeli Ministry of Defense announced it

had signed a Letter of Offer and Acceptance for the first two KC-46As on February 22, 2021.

At present, the IAF operates an ageing fleet of Boeing KC-707 Re'em tankers, which entered operational service in the 1980s and are currently operated by No 120 'Desert Giants' Squadron from Nevatim Air Base. The KC-46A is expected to replace them in the air-to-air refueling role.

## WILL IRAN BUY SU-35SES FROM RUSSIA?

HAVING BEEN heavily restricted by international sanctions, Iran has been struggling to source replacements for its ageing fighters, however, recent indications are that it may buy Sukhoi Su-35SE *Flanker-E* fighters from Russia. On September 4, when Brig Gen Hamid Vahedi – commander-in-chief of the Islamic Republic of Iran Air Force (IRIAF) – told Iran's *Borna News Agency* that his force is pursuing plans for the procurement of Su-35s from Russia, he added that Iran had no plans to acquire the Su-30 variant. Vahedi noted that the General Staff of the Armed Forces will make the final purchase decision.

For three decades, Iran's attempts at procuring new Chinese- and Russian-made fighters to replace its ageing fleets of US-built Grumman F-14A Tomcats, McDonnell Douglas F-4D/E and RF-4E Phantom IIs, and Northrop F-5E/F Tiger IIs have been unsuccessful. The growing deterioration of Russia's relations with the West means it requires

Iranian economic and military support to help in its war effort, providing an opportunity for Iran to procure weapons from Russia under relatively easier terms.

Negotiations for the acquisition of new fighters began in October 2021, during the four-day visit to Moscow by Maj Gen Mohammad Bagheri, Chief of Staff for the Armed Forces of the Islamic Republic of Iran. Officials from the General Staff of the Iranian Armed Forces and the Ministry of Defense Armed Forces Logistics (MODAFL) discussed the procurement of Iran's Khayyam remote sensing satellite, the 24 Su-35SE fighters that were initially destined for Egypt, two S-400 surface-to-air missile battalions and upgrade packages for 27 Sukhoi Su-24MK *Fencer-D* ground attack/strike aircraft, as well as 23 Mikoyan-Gurevich MiG-29B/UB *Fulcrum* A-B fighter-interceptors.

In January 2022 – during Iranian President Ebrahim Raisi's visit to Moscow – a 20-year defense pact

between Iran and Russia was signed, yet the Su-35s were not ordered. Sources close to the IRIAF commander-in-chief told the author that no contract was signed because the Iranian delegation were still insisting on paying for the 24 Su-35SEs with petrochemicals.

The IRIAF currently operates 303 fixed-wing combat aircraft – of which, 180 are US-made fighters, including 60 F-4D/E Phantom IIs. In 2006, Iran attempted to obtain a fleet of Su-30MK *Flanker* multi-role fighters from Russia as a replacement for its ageing Phantom IIs. However, the arms embargoes placed on Iran by the UN Security Council in 2007 prevented the completion of any such deal. The Iranian MODAFL also failed to finalize another contract with Russia to upgrade 25 MiG-29s and 29 Su-24MKs to MiG-29SMT and Su-24MK2 standard.

Recent satellite images have revealed the completion of a new aircraft maintenance, repair and

overhaul centre for the Iranian Aircraft Industries Company, located north of Mehrabad International Airport in Tehran, where it is believed Russian companies – such as RSK MiG – will modernize the IRIAF's current MiG-29 and Su-24 fleets, along with the Su-35SEs in the future. This has therefore raised suspicions about the possible finalization of a deal with Russia for the modernization of these aircraft in Iran.

In addition to the Su-35SEs, the IRIAF plans to obtain other aircraft from Russia, such as the Yakovlev Yak-130 *Mitten* advanced jet trainer, although it is unclear if the recently restricted budget allocated to the force by the Iranian government will allow the MODAFL to purchase the aircraft. The recent decline in the IRIAF budget has resulted in a decrease in the number of the air arm's operational combat aircraft and a significant decrease in IRIAF pilots' flying hours.

**Babak Taghvaei**

## GREECE TAKES DELIVERY OF FIRST TWO F-16Vs



DURING A ceremony at Tanagra Air Base on September 12, the Hellenic Air Force (HAF) took delivery of its first two fully upgraded F-16V Block 72 Vipers. They are the first of a total of 84 HAF F-16s that will be upgraded to F-16V standard under a contract signed in 2018 **Hellenic Air Force**



US Air Force/7th Special Operations Squadron MV-22B Osprey serial number 10-0053 still stranded on a nature reserve on Senja island, Norway, on September 13, a month after its emergency landing following a hard clutch engagement incident on August 12. The problem led to a fleet-wide grounding of AFSOC CV-22Bs for two weeks **Forsvaret**



## AFSOC CV-22Bs GROUNDED FOR OVER TWO WEEKS

DUE TO an increased number of safety incidents involving US Air Force Special Operations Command (AFSOC) CV-22B Ospreys, on August 16, the Commander of Air Force Special Operations Command (AFSOC), Lt Gen Jim Slife, directed a safety stand-down of all 52 aircraft in the fleet. On September 2, the grounding order was lifted, even though investigations are still ongoing.

Following the grounding, Col Rebecca Heyse, AFSOC Public Affairs Director, told *Combat Aircraft Journal*: "Since 2017, there have been four incidents involving hard clutch engagement during

flight with two occurring in the past six weeks. In the coming days, the AFSOC staff will work with the Joint Program Office and industry partners to fully understand this issue and develop risk control measures to mitigate the likelihood of catastrophic outcomes. Ultimately, the goal is to determine a viable long-term materiel solution."

The clutch within the Osprey's gearbox connecting the powerplant to the propeller is randomly slipping, causing a large power shift to the other engine, due to a design feature that means the Osprey's can remain airborne during a single

engine failure. The problem with gearboxes and engines requires them to be replaced at an estimated cost of \$2.5m. This fault has been known about for a number of years, but after two such incidents within a short space of time, the AFSOC Commander decided action should be taken.

Despite lifting of the grounding order, the root cause remains unknown. However, operating techniques have been modified to reduce the risk of further incidents. The US Marine Corps and Navy decided against grounding their variants of the Osprey, saying that appropriate

measures were in place to handle such situations.

One of the recent hard clutch engagement incidents was on August 12, involving CV-22B serial number 10-0053 operated by the UK-based 7th Special Operations Squadron 'Aircommandos' at RAF Mildenhall, Suffolk. While on exercise in Norway it was forced to make an emergency landing in a nature reserve on Senja island in the northern most part of Norway. As it cannot be repaired on site, plans were being made to recover the tiltrotor without damaging the delicate habitat of the nature reserve, although a month later, it still remained in situ.

## INSITU BLACKJACK AND SCANEAGLE CONTRACT

INSITU INC was awarded a US Naval Air Systems Command contract on September 14 for RQ-21A Blackjack and ScanEagle unmanned air vehicles, along with associated equipment. The

\$191,835,973 firm-fixed-price modification to a previously awarded indefinite-delivery/indefinite-quantity contract covers procurement for the US Marine Corps, US Navy and Foreign

Military Sales customers.

This modification adds scope to procure 13 RQ-21A Blackjack air vehicles, 25 ScanEagle air vehicles, 48 RQ-21A and ScanEagle payloads and turrets,

support equipment, spares and sustainment spares, and tools in support of these RQ-21A Blackjack and ScanEagle unmanned aircraft platforms. Work is expected to be completed in June 2026.



## US ARMY COMPLETES UH-60V IOT&E TESTING

THE US Army's Utility Helicopters Project Office announced on August 19 that it had recently completed Initial Operational Test and Evaluation (IOT&E) of the Sikorsky UH-60V Black Hawk that successfully demonstrated and assessed the aircraft's ability to meet its design requirements. Supported by the Wisconsin Army National Guard's 1st Battalion, 106th Aviation Regiment (1-106th AVN), the evaluations were conducted at Fort McCoy, Wisconsin, over a one-month period that began on July 5 and concluded on August 5. During the IOT&E process, five UH-60V helicopters flew over 200 flight hours under simulated battlefield conditions, demonstrating the new variant's capabilities.

The successful completion of IOT&E is a required milestone for the UH-60V program to enter full-rate production. The UH-60V Black Hawk is an upgraded and recapitalized variant of the legacy UH-60L and features a newly-developed digital glass cockpit and integrated avionics suite. With units in Illinois and Georgia, the 1-106th AVN was the first unit to be equipped with the UH-60V and the assault helicopter battalion will have 30 examples in total when deliveries are completed.

**Tom Kaminski**



## FLORIDA AIR GUARD 75TH ANNIVERSARY JET

US AIR Force/Florida Air National Guard F-15C Eagle 86-0171 assigned to the 125th Fighter Wing's 159th Fighter Squadron 'Boxin' Gators' in a hangar at Jacksonville Air National Guard Base, Florida, on September 7 after being repainted in a special 75th anniversary scheme. It features every aircraft assigned to the unit on one fin, plus the Wing's emblem, State flag and a Mjölhnir (the hammer of Thor, the Norse God of Thunder) in reference to the unit's motto 'Home of the Thunder' **USAF/Master Sgt Mike Monlezun**

## FIRST HH-60W FOR 66TH RQS

US AIR Force HH-60W Jolly Green II 20-14500 shortly after arrival on delivery to the 66th Rescue Squadron (RQS)/Rescue Generation Squadron at Nellis Air Force Base, Nevada. This was the first of the new variant to join the 66th RQS as it began replacement of its HH-60G Pave Hawks that currently serve the unit, primarily in the combat search and rescue (CSAR) role but also being used for civil SAR requests and other support missions worldwide **USAF/Airman 1st Class Jordan McCoy**



## LOCKHEED MARTIN TO BUILD 129 F-35S UNDER MEGA \$7.6BN CONTRACT

US NAVAL Air Systems Command (NAVAIR) has awarded a contract to Lockheed Martin for the procurement of 129 Lot 15 F-35 Lightning IIs. The \$7,630,940,571 deal was signed on August 12 and is a modification to a previous advanced acquisition contract. It covers 49 F-35A aircraft for the US Air Force (USAF), three F-35Bs and ten F-35Cs for the US Marine Corps (USMC) and 15 F-35Cs for the US Navy (USN), along with 32 F-35As and four F-35Bs for unspecified non-US Department of Defense (DOD) participants and 16 F-35As for Foreign Military Sales (FMS) customers, as well as 69 shipsets of technical hardware. Contract completion is anticipated in October 2024.

A separate NAVAIR award, valued at \$53,415,771 and awarded to Lockheed Martin on the same day, covers continued engineering and other related activities in support of the development of an F-35 variant tailored for an unspecified FMS customer. Work is expected to be completed in July 2026.



## NEW COLOMBIAN BLACK HAWK DELIVERIES

ONE OF three UH-60A+ Black Hawks being unloaded from a US Air Force C-17A Globemaster III after delivery to the Colombian National Police on September 16. They are the first of a batch of 12 donated by the US Government to assist with counter-drug trafficking missions. All are former Afghan Air Force examples that fled due to the Taliban takeover **Policia Nacional Colombia**



# RAPTOR'S SHIELD

Support for NATO's Air Shielding strategy has come in the form of 12 US Air Force F-22A Raptors that have recently forward deployed to Poland.

**Bartosz Głowacki** reports on their vital role in defending the skies of Europe

**T**he NATO Air Shielding strategy aims to deter and protect against any possible Russian aggression and goes beyond what NATO already has employed on its eastern flank since the country's full-scale invasion of Ukraine on February 24.

To support this objective of regional security and stability in NATO airspace, 12

US Air Force (USAF) F-22A Raptors from the 3rd Wing's 90th Expeditionary Fighter Squadron (EFS) were forward deployed to the 32nd Tactical Air Base (TAB) in Łask, Poland, on August 4. The F-22s provide NATO with a more permanent deterrence option through Air Shielding and the deployment is a clear expression of NATO's commitment to readiness, boosting its posture for defence in Europe.

**Left:** USAF maintainers assigned to the 90th EFS perform maintenance inspections on the F-22A Raptors after arrival at the 32nd TAB in Łask, Poland on August 4, 2022  
**USAF/Staff Sgt Danielle Sukhlall**

**Below:** Polish Vipers from Łask perform joint flights with the Americans and are involved in the exercises as well as CAPs with full armament load and sometimes DB-110 reconnaissance pods  
**All images author, unless stated**



The Raptor has made vital contributions to US peacekeeping efforts around the world by deterring potential adversaries and enhancing lethality against all advanced air threats. In this case, additional assets will be deployed for four-to-six months at a time, shoring up an area from Turkey to the Baltic states.

The NATO Air Shielding incorporates allied air- and surface-based air and missile defence units into the NATO Integrated Air and Missile Defence (IAMD) system under NATO's command and control. In support of the NATO IAMD system, Air Shielding offers an agile solution. Although currently focused on NATO's eastern flank, it retains the flexibility to orientate towards any emerging threat. It will provide a near-seamless shield from the Baltic to Black Seas, ensuring NATO allies are better able to safeguard and protect alliance territory, populations and forces from air and missile threats.

USAF Gen James Hecker, US Air Forces in Europe and Air Forces Africa (USAFE-AFAFRICA) commander, explained: "This F-22 deployment will add significant capabilities to our support of NATO's collective defence. The Raptor's ability to perform both air-to-air and air-to-ground missions will exponentially increase the war-fighting capability along the eastern flank as this rotation supports NATO's Air Shielding."

USAFE-AFAFRICA plans to constantly cycle in fifth-generation aircraft (like the F-22A) throughout Europe, in addition to what will eventually be two permanent F-35A squadrons at RAF Lakenheath in the UK. On top of the permanently based F-35A units, 6-12 USAF fifth-generation aircraft will forward deploy to Europe for four- to five-month rotations.





## Reinforcement of the NATO eastern flank

Earlier, in July, F-35As from the Vermont Air National Guard's 158th Fighter Wing (FW) forward deployed to Amari Air Base, Estonia, to support the Air Shielding mission. Prior to that, the USAF deployed F-15s, F-16s, other F-35s, and still more aircraft to Eastern Europe, participating in NATO's Baltic Air Policing (BAP) and enhanced Air Policing (eAP) missions.

As part of NATO's plan to bolster its collective defence posture, the 90th EFS took over the mission from the 158th FW, which has been executing the coalition's Air Policing mission since their arrival in theatre on May 2, 2022. As the 90th EFS has officially taken over the mission at Łask, the six F-15E Strike Eagles from the 48th FW at RAF Lakenheath have returned home.

Lt Col Piotr Ostroch, commander of the 32nd TAB – where the F-22As are operating from – said: "The arrival of Raptors to the Polish Air Force base means only one thing – our ally, the US, treats the strengthening of the NATO eastern flank in a very serious way, in accordance with the declarations of the NATO summit in Madrid. The mission performed by the F-22s is the reinforcement of the eastern flank of the Alliance – from Romania, through the Baltic countries – Lithuania, Latvia, and Estonia.

"We perform joint flights with the Americans in Polish airspace and all our F-16 aircraft are involved in the exercises as well as combat air patrols [CAPs] with full armament load and training missions as well as exchanging some secret information. Sending Raptors to Poland for the first time allows us to learn about new techniques and perform



**Above:** More or less all 90th EFS aircraft based at Łask are flying each day and are armed with long-range AIM-120 AMRAAM and AIM-9X air-to-air missiles

tasks jointly, as well as allowing us faster adaptation to the near future, when the F-35 enters service, and of with the current [geopolitical] situation we must be ready for every scenario," Ostroch explained.

An example of the missions being performed by the Raptors is Defensive Counter-Air (DCA) – defending a pre-designated area that has crucial importance for the security of the country. Polish MiG-29s from the 23rd TAB at Mińsk Mazowiecki and F-16s from Łask played the role of Russian aircraft (flying high) and cruise missiles (flying low). The Raptors' CAP task was to scan the airspace and identify enemy forces crossing the Polish border. The F-22As would then pass information to the Polish F-16s and RAF Typhoon FGR4s as well as IAMD units, including Patriot systems. F-22s and Polish F-16s also conducted some basic fighter maneuver training scenarios (dogfights).

### Integration with allies

Lt Col Michael 'Popeye' Kendall, 90th EFS commander, told *Combat Aircraft Journal*: "The Air Force has relied on F-22 deployments to improve combined tactical air operations, enhance interoperability of forces, and deter

potential threats for the past 15 years.

"Raptor capabilities allow us to provide air superiority and dominance, rapidly and at great distances. We came here to enhance NATO's posture and increase warfighting capabilities along the eastern flank in support of our allies and partners.

"The F-22 ensures a lethality that no other aircraft can provide. We are unwavering in our commitment to extended deterrence and ready to go whenever they need us. This is our first time in Europe, facing real threat. More or less all [90th EFS] aircraft based at Łask are flying each day. During missions, we carry AIM-120 AMRAAM (all variants) and AIM-9X missiles."

The F-22s have been performing flights in Polish, German and Slovak airspace and have visited Estonia since forward deploying to Poland.

When asked about the frequency of missions, Kendall said: "The number of missions we fly daily totally depends on the type of integration with our partners. It changes daily. The main difference is in the Pacific; there is a lot of water [there] and here we are flying mainly over the land. It is cool to do some dogfights and look down on cities." 🇺🇸

**Below:** A 90th EFS F-22A touches back down at Łask after performing a Defensive Counter-Air training mission, defending a pre-designated area from Polish F-16s and MiG-29s acting as adversary aircraft



# USAF'S IN-DEVELOPMENT EC-37B VISITS FUTURE HOME

HIGHLY MODIFIED Gulfstream EC-37B Compass Call N591GA (c/n 5591) made a brief visit on August 17 to Davis-Monthan Air Force Base (AFB), Arizona. The type, based on the Gulfstream GV-SP (G550) business jet, is scheduled replace the current US Air Force (USAF) Compass Call airframe, the EC-130H operated by the 55th Electronic Combat Group (ECG) at Davis-Monthan and was visiting the unit so that it could get an update on progress with its future mount. The next-generation version will perform tactical command, control and communications countermeasures to support air, surface and special operations forces. The technology uses noise jamming to prevent communication or degrade transmission of information between enemy command and

control networks.

The USAF plans to acquire a total of ten EC-37Bs, the first was contracted for in Fiscal Year (FY) 2017, the second in FY2018 and the third and fourth in FY2019. A fifth was financed in the FY2020 budget and a sixth requested in FY2021. The remainder were planned for acquisition at a rate of one per year through to FY2025, although on June 22 this year the House Armed Services Committee sought \$883.7m in yet-to-be finalised FY2023 budget to accelerate acquisition and purchase of all of the last four aircraft. The example which appeared at Davis-Monthan is the second of these airframes. The first EC-37B, N967GA (c/n 5567), has been test flying since last autumn. The third, N591GA (c/n 5591), was handed over by Gulfstream Aerospace on August 29.

L3Harris Technologies, along with BAE Systems, is the system integrator for the EC-37B programme. L3Harris had announced its first flight on October 6 last year. On September 7, 2017, the company had been awarded an initial contract to transplant the existing EC-130H Compass Call systems into the new EC-37B airframe, along with new technologies. The first five EC-37Bs will be fitted with the EC-130Hs upgraded Baseline 3 package, which includes the Advanced Radar Countermeasure System (ARCS) and a number of other significant enhancements. From aircraft six, the aircraft will be delivered with the forthcoming Baseline 4 upgrade, which is expected to be ready for service entry in 2026.

The G550 airframe provides increased speed, endurance

and extended stand-off range compared to the legacy EC-130H, providing significantly improved survivability. The system features modular open system architecture, which enables rapid integration of new technology and reduces overall cost of future upgrades. Its size, weight and power enable customers to add new capabilities for evolving mission needs. At the time of the first flight, it was anticipated that the first five aircraft would be fielded by 2023.

The 55th ECG had operated 14 EC-130Hs – five of these are in storage with the 309th Aerospace and Maintenance Group at Davis-Monthan, while another is being used as a ground instructional airframe. Two more are due for retirement in 2022.

The second Gulfstream EC-37B Compass Call development aircraft, N591GA (c/n 5591), taxis in during its brief visit to Davis-Monthan AFB, Arizona, on August 17  
USAF/Airman 1st Class Vaughn Weber



# COLORADO NATIONAL GUARD FIRST TO RECEIVE NEW UH-72B LAKOTAS

Colorado Army National Guard UH-72B Lakota 20-72465 was one of the first two that were delivered on August 1 Colorado Army National Guard



THE COLORADO Army National Guard announced on August 15 that it has received the first two UH-72B Lakotas purchased by the US Department of Defense (DoD) exclusively for the US Army National Guard. They were delivered to the Army Aviation Support Facility at Buckley Space Force Base, Colorado, on August 4. In total, nine states will receive two UH-72B models based on their previous UH-72A utilization and domestic

operations support mission sets, and environmental factors.

State Army Aviation Officer US Army Col William Gentle, Colorado Army National Guard, said: "The Colorado National Guard will utilize the new platform primarily for counter-drug, and search and rescue in Colorado. The increased aircraft capabilities over the UH-72A in support of domestic operations will help lessen the load on our UH-60 fleet."



# USAF RECEIVES FINAL BOEING QF-16 'ZOMBIE VIPER' CONVERSION

PERSONNEL FROM the US Defense Contract Management Agency's (DCMA's) Aircraft Integrated Maintenance Operations (AIMO) St Augustine have celebrated a major milestone following the delivery of the final QF-16 'Zombie Viper' Full Scale Aerial Target (FSAT) to be converted in Boeing's facility at

Cecil Airport in Jacksonville, Florida. Delivery of the last of more than 75 QF-16s to come from Boeing's QF-16 modification line at Cecil Airport was announced by the US Air Force (USAF) on August 16, although the actual handover occurred on July 29. This recent delivery marks the conclusion of Boeing's QF-16

modification line, ending a decade's worth of work on the FSAT program in Jacksonville. A second QF-16 modification line – located with the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan Air Force Base (AFB) in Arizona – will continue to produce the remaining

QF-16s under the ongoing procurement contract.

Following its delivery to AIMO St Augustine, the QF-16 was subsequently handed over to the 82nd Aerial Targets Squadron (ATRS), a component of the 53rd Wing's 53rd Weapons Evaluation Group at Tyndall AFB, Florida.

Personnel from the US DCMA's AIMO St Augustine pose in front of the last QF-16 'Zombie Viper' to be delivered from Boeing's modification line at Cecil Airport in Jacksonville, Florida, on July 29 Boeing



## FIRST OF SIX BRAND-NEW F-35AS FOR 461ST FLTS

THE US Air Force's (USAF's) 412th Test Wing announced on August 15 that the first of six brand-new F-35A Lightning IIs has been delivered to Edwards Air Force Base (AFB), California. The new production Block 4 aircraft, 20-5578 'ED' (c/n AF-338), was delivered to Edwards straight from the factory in Fort Worth, Texas, on August 1. The aircraft is the first of six F-35s that the

461st Flight Test Squadron (FLTS) 'Deadly Jesters' and F-35 Lightning II Integrated Test Force will receive in the next few years. The upgraded fleet will be used to test the Technical Refresh 3 and Block 4 configurations of the USAF's newest fighter that will create tactical and operational advantages over peer competitors. Lt Col Jonathan Bearce, an Air Force Reservist with the

370th FLTS currently flying for the 461st FLTS, said: "The F-35 is modernizing from a Tech Refresh 2 configuration to a Tech Refresh 3 configuration. But we are still developing capabilities for both configurations for the next few years. Developmental testers need to evaluate those capabilities using four-ship formations of instrumented test jets in each configuration

to fully evaluate the F-35's warfighting systems."

These future upgrades will benefit the 826 fielded F-35 aircraft in the USAF, USMC and US Navy, as well as the eight partner nations in the F-35 program and the 15 total nations participating in the F-35 program. Brand-new Tech Refresh 3 aircraft will be rolling off the assembly line starting in the summer of 2023.



New production F-35A Lightning II 20-5578 'ED' (c/n AF-338) arrives at Edwards AFB, California, from the factory in Fort Worth, Texas, on August 1 to join the 461st Flight Test Squadron **USAF/Chase Kohler**



This new image released on September 15 shows an AGM-88 HARM integrated onto a Ukrainian Air Force MiG-29 using a standard LAU-118/A launcher attached to a newly fabricated pylon-adapter **General Staff of Ukraine**

## UKRAINE SHOWS OFF AGM-88 HARMs

FOLLOWING REPORTS in early August that Russian air defense (AD) positions in Ukraine were being engaged by what appeared to be AGM-88 HARM anti-radiation missiles, the US officially confirmed that it had transferred an undisclosed number of the missiles to the Ukrainian Air Force (UkrAF), which had integrated them with its MiG-29 *Fulcrum* fighters.

On August 31, the UkrAF released a video showing the MiG-29 type 9-13, serial number '71 White' of the 114th Tactical Aviation Brigade

(114th brTA) from Ivano-Frankivsk Air Base, equipped with a pair of AGM-88 HARM missiles and – presumably the same aircraft – firing them. The footage also revealed that standard LAU-118/A launch rails for the AGM-88 had been integrated to the innermost pylon on each wing of the aircraft, otherwise reserved for carrying the R-27 (AA-10 *Alamo*) series of heavy beyond-visual-range (BVR) air-to-air missiles (AAMs). Given the fact that there are no other added displays visible inside the cockpit –

other than two commercial hand-held GPS/GLONASS receivers – it appears that the aircraft pilot has no devices that interact with the missiles, apart from the button to launch them.

Although this has not yet been confirmed, it appears that UkrAF went for the simplest solution, with the missiles being launched in a so-called 'prebriefed' (PB) mode. In this configuration, a missile is preprogrammed while still on the ground and instructed to fly to a specific area and turn

on its sensor after reaching its objective in an attempt to acquire a specific threat. This mode is effective against known AD positions and the missile launch visible on the video is consistent with the launching of an AGM-88 using this method.

Furthermore, UkrAF sources claim that all their combat aircraft types can be easily adapted to carry AGM-88 missiles, so it remains to be seen whether this will materialize in the future.

**Vladimir Trendafilovski**

## NORTHROP GRUMMAN UNVEILS FIRST AUSTRALIAN MQ-4C TRITON

NORTHROP GRUMMAN revealed Australia's maiden MQ-4C Triton autonomous aircraft, serial number A57-001, during a ceremony at its high-altitude, long-endurance (HALE) aircraft production site in Palmdale, California, on September 14. The event was attended by Australian, US government and defense officials and highlighted the continued progress of the

MQ-4C Triton program for both the Royal Australian Air Force (RAAF) and US Navy.

Australia is a co-operative partner in the Triton program and was critical in helping shape the requirements for the system. US and Australian defense forces will be able to share data collected by their respective Tritons. Air Marshal Robert Chipman, chief of

the RAAF, said: "Triton will provide the Royal Australian Air Force with an unprecedented capability to monitor and protect our maritime approaches. Triton will work alongside the P-8A Poseidon and this unmanned aircraft system will allow us to cover significant areas, at longer ranges and has the ability to stay airborne longer than a traditional aircraft."

Northrop Grumman initiated the build of the first RAAF Triton in October 2020 at its production facility in Moss Point, Mississippi. In December 2021, the fuselage and one-piece wing were mated in Palmdale. The aircraft is now scheduled for final system integration and flight tests, with production completion in 2023 and delivery to Australia in 2024.

The first RAAF MQ-4C Triton, A57-001 in Palmdale **Northrop Grumman**





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Tension between Taiwan and China reached a new high after a controversial visit by one of the United States' most senior politicians. David Axe examines the fallout.

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The crisis in Afghanistan and the war in the Ukraine have meant that United States forces in Europe's German centre have become the heart of vital operations. Ludo Mennes and Frank Visser visited the 52nd Fighter Wing at Spangdahlem Air Base for an update on their mission.

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# FINAL JOINT STARS FLIGHT FOR USAF'S 16TH ACCS

AS PART of the US Air Force's drawdown of its E-8C Joint Surveillance Target Attack Radar System (JSTARS) fleet, the Georgia Air National Guard's 16th Airborne Command and Control Squadron (ACCS) flew its final local sortie with the type on September 8 from Robins Air Force Base (AFB), Georgia. The aircraft undertaking the mission was serial number 94-0285 'GA' (callsign 'Phenom 16') which had the honor of ending 27 years of

operational JSTARS missions.

The unit is now preparing for its upcoming inactivation, which is officially scheduled to take place on February 16, 2023. This will make way for bedding down of four new missions at Robins AFB. This will include a new active-duty Bombardier E-11A Battlefield Airborne Communications Node (BACN) squadron. These E-11As will be operated as a detachment of the 319th Reconnaissance Wing

(RW) at Grand Forks AFB in North Dakota.

Retirement of the E-8Cs includes transfer of the first four aircraft to storage with the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan Air Force Base, Arizona, during Fiscal Year 2022. The first to be retired was 92-3289 'GA' which arrived at AMARG earlier this year, on February 11. It was followed, on March 10, by 01-2005 'GA' and

then 96-0043 'GA' on July 12.

The fourth is due to be delivered to AMARG before the end of September.

US Air Force E-8C JSTARS 94-0285 'GA' lands back at Robins Air Force Base, Georgia, on September 8 after the final local sortie by the 16th Airborne Command and Control Squadron **US ANG/Senior Master Sgt Roger Parsons**



# LATVIA MI-2s AND MI-17s TO AID WAR EFFORT



One of the Latvian Mi-2MSBs after repainting and delivery to Ukraine **Latvian MOD**

LATVIA'S MINISTRY of Defence announced on August 15 that it had donated four helicopters to Ukraine. They comprised two Mil Mi-2MSBs and two Mi-8MTV-1s (Mi-17s), which have already been delivered and were quickly integrated into Ukrainian Air Force service. Before delivery, all four were repainted in Ukrainian colours and markings, while one of the Mi-17s was also overhauled. They were transported in a partially disassembled condition. Latvia has been a staunch supporter of Ukraine ever

since the Russian invasion on February 24, having previously supplied an unmanned air vehicle (UAV), weapons and individual equipment, dry food rations, ammunition, anti-tank weapons and Stinger anti-aircraft missiles valued at more than €200m. The UAV, a Turkish-made Baykar Bayraktar TB2, was crowdfunding by the Lithuanian public, which raised €6m to buy it. However, Baykar generously donated it for free and it was delivered in July, allowing the money raised to be used instead for vital aid to the Ukrainian people.

# NORTH MACEDONIA DONATES SU-25s TO UKRAINE

NORTH MACEDONIA has donated its fleet of four Sukhoi Su-25 Frogfoot ground attack/strike jets to Ukraine, according to local media reports on August 4. The North Macedonian Ministry of Defence did not deny or confirm this information and also avoided comment on whether the aircraft were donated together with related weapons, spare engines, spare parts and relevant tools.

North Macedonia operated three single-seat Su-25 Frogfoot-As (serials 121-123) and a single two-seat Su-25UB Frogfoot-B (serial 120) – all originally acquired second-hand from Ukraine. These aircraft were operated by the Macedonian Air Force until their definitive grounding on March 1, 2004.

The Su-25's two R-195 turbojet engines were started and the ground systems were checked

on a weekly basis before the aircraft were abandoned and consequently withdrawn from the Army of the Republic of North Macedonia's inventory in October 2005. Repeated efforts to sell the Frogfoots yielded no results, with the most serious attempt being a bid to sell them to Georgia in 2005, a move that was diplomatically blocked by Russia.

The last serious effort to restore

the Macedonian Su-25s to operational condition occurred in late 2011, when the nation's then-conservative government in Skopje seriously considered the move. However, this effort was promptly abandoned due to financial restraints. Thus, the Macedonian Su-25 fleet remained grounded and in open storage at Petrovec, making it difficult for them to return to operational use and only potentially of use for spare parts.

**Igor Bozinovski**



## PORTUGAL ORDERS SIX BLACK HAWKS FOR FIREFIGHTING SUPPORT

SIX SIKORSKY UH-60 Black Hawks have been ordered by the Força Aérea Portuguesa (FAP – Portuguese Air Force) to provide additional support to the State's own resources in fighting rural fires. The FAP announced the deal on August

30, saying that delivery of the first two helicopters is scheduled for the first quarter of 2023. The contract was signed on August 12 through contracting company Arista Aviation Services LLC, following approval by the Council of Ministers.

The contract includes the supply of material and tools, plus technical maintenance support until 2026 and training for six pilots and 21 mechanics. Approximately 81% of this acquisition is financed by community funds, through the

Recovery and Resilience Plan. The Black Hawk will allow transport of a team of 12 firefighters and their equipment, and will be capable of a water release of about 150 minutes. It has the capacity to carry up to 2,950 litres of water per drop.

## ASCENSION'S EASTERN RUNWAY FULLY REOPENS

AFTER A year of construction, Ascension Island Auxiliary Airfield resumed full flight operations recently with the opening of the newly-paved eastern portion of the runway. The US Air Force Installation and Mission Support Center announced the achievement on

September 8, saying that the first aircraft landed on the freshly-paved surface on August 31. The aircraft involved was US Air Force C-17A Globemaster III 07-7279 from the 60th Air Mobility Wing's 21st Airlift Squadron 'BEEliners' at Travis Air Force Base, California. Construction now transitions to

phase three of the project – the western side of the runway – on the remote British-owned island that supports military missions and commercial flights. The outpost, located between South America and Africa, is a critical air transport hub for passengers and cargo, and the airbridge

to the Falkland Islands for Britain's Royal Air Force missions. The \$309 million project is a jointly funded investment by the US and British governments.



US Air Force C-17A Globemaster III 07-7279 from the 60th Air Mobility Wing's 21st Airlift Squadron 'BEEliners' at Travis Air Force Base, California, becomes the first aircraft to land on the newly re-opened runway on Ascension Island on August 31 following a year-long rebuild of its eastern side **USAF**



## USAF'S 123RD AW RECEIVES FINAL C-130J-30

US Air Force C-130J-30 Super Hercules serial number 19-5945, the eighth and final example for the Kentucky Air National Guard's 123rd Airlift Wing/165th Airlift Squadron, shortly after delivery to Louisville Air National Guard Base on August 25. The new variant replaces the unit's C-130Hs, the last of which left on September 24, 2021 **USAF/Staff Sgt Chloe Ochs**



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### **US NAVY & MARINE CORPS AIR POWER YEARBOOK 2021**

Lockheed Martin's F-35 Lightning II is at the centre of this year's big stories. The F-35C will embark on its first deployment as part of a carrier air wing and the F-35B continues to form part of Marine Expeditionary Units embarked on US Navy amphibious assault ships. Similarly, the US Navy's test community is now putting the Boeing Block III Super Hornet through its paces, the CMV-22B Osprey is proving itself ahead of first deployment, and the first TH-73 training helicopter entered service in June. The latest edition of this popular yearbook features all of these new types and is packed with reviews and analysis of the two services air power in 2021.



## From the Editor



Here at *Combat Aircraft Journal* we are at the cutting edge of modern military aviation and every month we bring you the latest news, analysis, and features that you won't find anywhere else. Each issue of the magazine is packed full of exclusive content and detailed briefings by our team of experts and our legion of correspondents from across the world.

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## POLAND OPTS FOR 96 APACHES TO REPLACE ITS HINDS

POLAND'S DEPUTY Prime Minister and Minister of National Defense (MND), Mariusz Blaszczak, announced on September 8 that the AH-64E Apache Guardian has been selected to replace the Polish Land Forces' now-obsolete Mi-24D/W Hind-D/E attack helicopters. Blaszczak said that, following an earlier meeting with US Secretary of Defense Lloyd J Austin III at Ramstein Air Base, Germany, Poland had submitted a Letter of Request for 96 AH-64Es.

These are being acquired under the Kruk program, which has been examining options for new attack helicopters for

some time. If Poland decides to purchase the full 96 helicopters, it will become the largest export user of the AH-64. This is a significant increase in acquisitions under the Kruk program, as previous plans called for only 32 to equip two squadrons. The move suggests that the Polish Land Forces will field a total of six Apache squadrons, with the first examples likely to be subordinated to Poland's 18th Mechanized Division.

Commenting on the Apache a day before the announcement, Adam Hodges, Capture Team Lead for Vertical Lift International

Sales at Boeing Defense, Space and Security, said that the company had offered Warsaw the "AH-64E (Version 6), with manned-unmanned teaming [MUM-T] capability, but the level of interoperability will be detailed on [the basis of] government-to-government talks and will depend on customer requirements and [the] US government". Hodges added that Boeing is now in talks about sustaining the Apache in Polish Land Forces service with a number of Polish-based firms. It is believed that all of the 96 Polish AH-64Es will be new-build aircraft.

In April 2022, Blaszczak revealed that the Polish MND had shortlisted two offers in its Kruk programme: Boeing with its AH-64E and Bell with the AH-1Z Viper. While European manufacturers – such as Airbus Helicopters and Leonardo Helicopters – had initially expressed an interest in submitting their platforms as solutions for Poland's Kruk requirements, it comes as no surprise that they were not shortlisted by the Polish MND, as the nation has distinctly shifted to procuring military equipment direct from the US in recent years. **Bartosz Glowacki**

## ITALIAN GULFSTREAM E-550A AT COBRA WARRIOR

Italian Air Force Gulfstream E550A Conformal Airborne Early Warning (CAEW) aircraft MM62303 '14-12' seen arriving in the UK at RAF Waddington in Lincolnshire, on September 4 for Exercise Cobra Warrior 2022. The aircraft was one of the more unusual participants at the event and is making its debut in a UK exercise **Mike Hiley**



## THIRD GERMAN C-130J DELIVERED

A THIRD German Air Force Lockheed Martin C-130J-30 Super Hercules has now been delivered. The aircraft, serial number 55+03 (c/n 5944), arrived at Base Aérienne 105 (BA 105) Évreux-Fauville, France, on August 24 to join the Franco-German Joint Tactical Airlift Squadron. The first Luftwaffe example had arrived at BA105 in February, followed by the second on June 25 – see *Luftwaffe Super Hercules arrives*, October, p14.

Germany has ordered six aircraft for the unit, of which the first three delivered are all C-130J-30s. The remaining three will be KC-130J tanker variants. In total, the

Franco-German Joint Tactical Airlift Squadron will operate ten Super Hercules aircraft, comprising four French Air and Space Force (FASF) examples (two C-130J-30s and two KC-130Js) plus the six Luftwaffe transport aircraft.

When fully operational, the Franco-German Joint Tactical Airlift Squadron's ten-strong Super Hercules fleet will be manned by a mix of both French and German crews, although command of the squadron will always fall under the responsibility of a FASF officer. As per current plans, the KC-130Js should start gaining the capability of refuelling fighters, which will be



The third Luftwaffe C-130J-30 Super Hercules, serial number 55+03, during a pre-delivery test flight from Marietta, Georgia, with nationality markings taped over. It was delivered to Base Aérienne 105 (BA 105) Évreux-Fauville, France, on August 24 **Luftwaffe**

developed for the Mirage 2000, Tornado, Rafale and Typhoon (not necessarily in that order) by 2024-25.

According to one source, a single C-130J will be tasked with conducting national French operations in Africa, with the remaining seven falling under the requirements of the European Air

Transport Command (EATC) used for delegated taskings and training. The FASF already operates a 14-strong fleet of legacy C-130H/H-30s to support Special Forces operations. These aircraft were acquired in the late 1980s and are operated by Escadron de Transport 3/61 (ET 3/61 – Transport Squadron 3/61) 'Poitou' at Orléans.



# FINNISH AIR FORCE RETIRES L-70 VINKA TRAINER FLEET

AFTER MORE than 40 years of service, the Ilmavoimat (Finnish Air Force) has retired its fleet of Valmet L-70 Vinka primary training aircraft. The type's final flight took place on August 31 at Tikkakoski, when L-70 Vinka (serial VN-21) completed its last sortie with Engineer Lt Col Jyrki Laukkanen and Capt Juho Sirola at the controls. Laukkanen had also made the maiden flight of the first production Vinka (serial VN-1) on December 29, 1979.

The piston-engined Vinka was designed and built in Finland in the 1970s as a replacement for the Swedish-made Saab Safir in the elementary flying training role. It entered Ilmavoimat service in 1980 at Kauhava.

After the Safirs retired from service in 1982, practically all aircraft and helicopter pilots of

the Finnish Defense Forces and the Border Guard took their first steps in flying at the controls of the Vinka.

In 2005, all Vinkas were moved from Kauhava to Tikkakoski. The Ilmavoimat took delivery of a total of 30 Vinkas. Latterly, they were operated by Hävittäjälentolaivue 41 (HävLLv 41 – 41 Fighter (Training) Squadron) at Tikkakoski. Many types of structural strengthening work and other modifications have been made to them during their long service history. In 2002, they received the Garmin GNS 430 avionics system.

The Finnish Defense Forces will sell the remaining Vinkas (approximately 15 aircraft previously operated by HävLLv

41) at an auction during autumn 2022. Those known to have been already retired and put into storage at Tikkakoski pending the auction include serials: VN-6, VN-7, VN-12, VN-15, VN-20, VN-26 and VN-28. Additionally, VN-3 has been an instructional airframe with the Lapland Vocational School at Rovaniemi Airport since at least February 2021 while VN-9 has been preserved in Kauhava town since November 2017 at the latest. During its long service, there have only been two attrition losses: VN-8 on April 12, 1988 and VN-13 on May 11, 1988.

The Vinka is being replaced by the Grob G115E as the Ilmavoimat's primary training aircraft. A total of 28 former

Royal Air Force-operated (RAF) G115E Tutor T1s were purchased from Babcock International in the UK in 2016. These were modified to Finnish requirements after delivery, including new cockpit displays, radios and navigation systems. However, the conversion work took longer than anticipated and training with the G115Es did not begin until January 2020. This resulted in the Vinka being retained in service longer than planned until sufficient G115Es were converted to take over training.

Finnish Air Force-operated L-70 Vinka (serial VN-21) receives a traditional water cannon salute as it taxis in at Tikkakoski after completing the type's final flight on August 31, 2022. Ilmavoimat



# NEW RUSSIAN SU-35Ss ARRIVE

Three further new production Sukhoi Su-35S fighters were handed over to the Russian Aerospace Forces on September 10 at the Komsomolsk-on-Amur factory. Bort numbers '01 Blue,' '02 Blue' and '03 Blue' were delivered the same day to an unspecified air base. Two are seen here being prepared to depart, although their identities have been blurred out by censors **United Aircraft Corporation**



## CZECH FLEET RECEIVES BOOST OF EIGHT FREE UH-1Y/AH-1ZS

EIGHT H-1 helicopters are to be donated free-of-charge to the Czech Republic by the US. The donation was confirmed on August 19 by Czech Defense Minister Jana Černochová during a visit to the 24th Air Transport Base at Praha-Kbely on August 19. They will comprise an additional six AH-1Z Vipers and two UH-1Y Venoms, adding to the four AH-1Zs and eight UH-1Ys that are already on order.

This will bring the total number to be delivered to the Czech Republic to ten of each type.

From 2023, they will replace the fleet of eight outdated Mi-24V/35

*Hinds* that have been in service since 2003.

The minister agreed delivery of the eight additional helicopters during her visit to Washington in April. These helicopters are already in use with the US Marine Corps and are fully operational. She said: We will only pay the price of repairs, reconstruction according to our requirements, transport to the Czech Republic and other related costs." She had stated repeatedly in the past few months that the originally agreed 12 helicopters were not enough. Her earlier statement explained that the war in Ukraine clearly showed

that air support is necessary in a conventional conflict and not just NATO compatibility.

Brig Gen Petr Čepelka, director of the Ministry of Defense's Forces Development Section, said: "The Mi-24 helicopters, which are being phased out, can, if necessary, be used as a source of spare parts for the Mi-171Š machines, or they can also be offered for sale."

The Czech Army will also receive Hellfire air-to-ground and Sidewinder air-to-air missiles. In the US, two groups of pilots and technicians from Náměšť nad Oslavou began retraining on the new types in July. Bell's mobile

training team will train local personnel in the Czech Republic for two years before they fully master the helicopter operation and maintenance system.

In a new move Czech defense industry will participate in the order with more than a third share. LOM Praha will provide life-cycle support while a simulation centre will be set up in Náměšť nad Oslavou for the training of personnel. The original inter-governmental agreement for the purchase of eight UH-1Ys and four AH-1Zs was signed on December 12, 2019.



US Navy P-8A Poseidon 169567 'Shiner 01' fitted with the under-fuselage-mounted AN/APS-154 Advanced Airborne Sensor (AAS) pod landing at RAF Mildenhall on September 2 **Luca Chadwick**

## SECRETIVE US NAVY POSEIDONS LAND AT RAF MILDENHALL

A PAIR of US Navy-operated Boeing P-8A Poseidon maritime patrol aircraft (MPA) assigned to the extremely secretive Bureau of Naval Personnel Sea Duty Component (BUPERS SDC) at Dallas Love Field Airport, Texas, arrived at RAF Mildenhall in Suffolk, UK, on September 2. The two aircraft comprised Bu Nos 169567 (callsign 'Shiner 01') and 167952 (callsign 'Shiner 02'). Interestingly, the former (169567) was carrying the new-generation and highly classified AN/APS-154 Advanced Airborne Sensor (AAS) pod, marking the

first time the system has been noted as visiting Europe. The same Poseidon also features two vertical fins – one on either side of the aircraft's rear fuselage – which is a unique feature to P-8As that have been configured to carry the AAS.

Manufactured by Raytheon as a follow-on system to the AN/APS-149 Littoral Surveillance Radar System (LSRS) used on the Lockheed P-3C Orion, the AN/APS-154 AAS is an externally mounted active electronically scanned array (AESA) radar that features next-generation line-of-

sight capabilities. The double-sided AESA radar also contains a moving target indicator (MTI) – which can simultaneously detect, classify and track targets on land and sea – along with a synthetic aperture radar (SAR) and inverse synthetic aperture radar (ISAR) for mapping both inland and ocean areas at the same time while generating picture-like radar imagery. When used in operations, the AAS-equipped P-8A can detect and classify a hostile vessel before transmitting targeting information to combat aircraft

and guide a networked weapon to the target via a datalink.

The AN/APS-154 was recently used during the 28th iteration of the biennially held Rim of the Pacific (RIMPAC) exercise, which took place from June 29 to August 4. In total, 26 different nations participated in this year's edition of RIMPAC – the world's largest international maritime warfare exercise (hosted by the US Navy) – with more than 25,000 personnel, 170 aircraft, 38 surface ships, 30 unmanned systems, nine national land forces and three submarines involved.



# TWO MORE KAZAKHSTAN L-39CS FLY ONCE AGAIN FROM AERO

TWO OF the ten Kazakhstan Air Defense Force (KADF) L-39C Albatrosses that have been going through overhaul and upgrade at Aero Vododchody since mid-2020 were seen flying from the facility on September 7. These are the seventh and eighth aircraft to be completed and were seen wearing the last four of their construction number, 4172 '08' and 4329 '09', which is always the

case when Aero carries out flight-tests in the Czech Republic.

Both aircraft first flew in mid-August and were airborne for around an hour on each occasion, just as they were on their latest sortie. Both are now likely to be air-freighted very shortly to Kazakhstan by Ilyushin Il-76 from Pardubice, just as the previous six had been. Four were delivered in 2021 and deliveries of the second

four planned for 2022 will be completed when these two arrive at Balkhash Air Base.

Two more examples are currently being overhauled, 4534 '11' and 4601 '12', believed to have arrived at Aero in late 2021. All the aircraft have been upgraded with the full Genesys avionics system that includes two Multi-Function Displays and a Speed Head Up Display. They have

full eastern symbology but English language instructions.

With the rejuvenation of these ten L-39Cs, the KADF now has a lead in fighter training aircraft that will allow pilots to progress to its Russian-origin fighter fleet, which includes the Sukhoi Su-27 and Su-30SM Flanker-H.

**Alan Warnes**



One of a pair of Kazakhstan Air and Defense Force L-39Cs that test-flew on September 7 holds at the end of the Aero Vododchody runway **Alan Warnes**

## LITHUANIAN BLACK HAWKS NEARING COMPLETION

LITHUANIA'S MINISTRY of Defence announced on August 16 that the first three UH-60M Black Hawks for the Lithuanian Air Force (serials 21-27463, 21-27464 and 21-27466) have been transferred from the Sikorsky factory to the modification facility in Huntsville, Alabama, for completion work. The fourth (21-27465) was due to follow by the end of that same month. Delivery of the first two, along with additional equipment, is scheduled for 2024, by which time

air and groundcrew will have been fully trained.

The type was selected in late 2019 to replace Lithuania's elderly Mi-8Ts, which have reached the end of their service life and are becoming increasingly difficult to operate. US State Department approval for the purchase of six UH-60Ms was granted on July 6, 2020, but ultimately only four were ordered through a contract signed on November 13, 2020. The deal included options on a further two.



Sikorsky UH-60M Black Hawk 21-27463, one of the first three for the Lithuanian Air Force, has been delivered to Huntsville, Alabama, for completion **Lithuanian MOD**



## TRIO OF F-35As ARE DELIVERED TO NORWAY

Royal Norwegian Air Force (RNoAF) F-35A Lightning II 5664 lands at Ørland air station on the evening of August 24 after its delivery flight from the Lockheed Martin factory in Fort Worth, Texas. It arrived along with 5665 and 5666, bringing RNoAF deliveries to 37 aircraft, with a further three to follow this year out of a planned total of 52 **Forsvaret**

# ITALY'S AW249 COMPLETES FIRST FLIGHT



Leonardo Helicopters' AW249 attack helicopter prototype, CSX82069, completes its maiden flight on August 19. Note the TM 197B light turreted gun system under the nose **Jeroen van Reijmersdal**

THE INITIAL prototype of Italy's next-generation attack helicopter – Leonardo Helicopters' AW249 – completed its maiden flight at Vergiate Airport near Milan in northern Italy on August 19. It wore the Italian test serial CSX82069 and was painted only in primer. The helicopter then performed a second flight early that afternoon.

Leonardo Helicopters has made no official announcement regarding the first flight, but has been quietly working on the AW249 since it was awarded a

€487m multi-year development contract by the Italian Ministry of Defence (MOD) under the nation's New Exploration Escort Helicopter (NEES) program in January 2017. The NEES deal covers the study, development, industrialization, production and testing of an all-new, next-generation attack helicopter, which has been designed to replace the ageing fleet of AgustaWestland AW129C/D (AH-129C/D) Mangusta gunships of the Comando Aviazione dell'Esercito (AVES; Italian Army Aviation Command).

As part of this contract, the company will produce one AW249 prototype, as well as three pre-serial production aircraft.

The Italian MOD has so far confirmed that the AW249 will be fitted with Leonardo subsidiary OTO Melara's TM 197B light turreted gun system, a chin-mounted 20mm rotary cannon that can already be seen fitted to the prototype (CSX82069) in the images of its first flight.

The helicopter will also inherit RAFAEL's Toplite targeting system and Spike anti-tank guided

missiles from the outgoing Mangusta fleet.

Despite officially still being in development, the AW249 has already garnered interest in the European export market. In July 2018, Leonardo signed a letter of intent (LOI) with Poland's state-owned Polish Armaments Group (PAG) to collaborate on the rotorcraft's development. Poland had been seeking to replace its fleet of Mil Mi-24D/V *Hind*-D/E helicopters, but on September 8 it was announced that the AH-64E Apache had been selected for this.

# FIRST QATAR TYPHOON DELIVERIES

BAE SYSTEMS has delivered the first Qatar Emiri Air Force (QEAF) Eurofighter Typhoons. A formal roll-out ceremony was held at the manufacturer's UK production facility in Warton, Lancashire, on August 15. The first four aircraft were due to depart from Warton on August 25 but, on the day, only three of the four were ready for delivery.

The aircraft that departed on that date were QA404/ZR505 (MS001, callsign 'RR9672'), QA405/ZR506 (MS002, 'RR9673') and QA407/ZR508 (MS004, 'RR9671'). However, shortly after taking off, QA407 encountered

a problem with the in-flight refuelling (IFR) probe and was forced to return to Warton, leaving just two aircraft to complete the flight to Qatar. They made an overnight stop in Greece, before continuing to Qatar on August 26.

A formal welcoming ceremony for them was held at Dukham-Tamim Air Base, Qatar, on August 28. Support was provided by Voyager KC2 ZZ338 ('RR9260') which came out of its base at RAF Brize Norton, Oxfordshire.

A few days later, on August 30, QA407 finally managed to fly out of Warton after its IFR probe

problem had been rectified. It left accompanied by a second aircraft, QA406/ZR507 (MS003), both flying initially to Tarbes in France and then on to Malta, where they arrived later that evening, before continuing

the next day to Qatar. The next aircraft, ZR509 (MS005), made its maiden flight at Warton on June 17. The total Qatari order is for 24 of the jets, comprising 20 single-seaters and four twin-seat aircraft.



Qatar Emiri Air Force Typhoon QA407/ZR508 at Luqa, Malta, on August 30. It had originally left Warton on August 15 but had to return due to an IFR probe problem. After rectification, it then was one of the second pair to be delivered **Ruben Zammit**



# CHILE INDUCTS EX-RAF E-3D SENTRIES INTO SERVICE

DURING A ceremony at II Brigada Aérea, Base Aérea Pudahuel, Comodoro Arturo Merino Benítez International Airport, Santiago, on August 19, the two former Royal Air Force E-3D Sentry AEW1s acquired by the Fuerza Aérea de Chile (FACH; Chilean Air Force) were formally inducted into service. This will finally enable replacement of Grupo de Aviación No 10's already retired EC-707 Condor, which has been in service for more than 25 years but has reached the end of its operational life. Introduction of the E-3Ds

finally restores the FACH's early warning, airborne command and control capabilities.

The two aircraft were formerly serialised ZH103 and ZH106, one of which has now become 905 in FACH service. The FACH serial for the second aircraft has yet to be confirmed. Of these, ZH103 left its previous base at RAF Waddington, Lincolnshire, on its delivery flight to Chile on July 25. It was followed the next day by ZH106.

Honorary guests at the induction ceremony included the Chilean Minister of National Defense,

Maya Fernández Allende, along with the commander in chief of the FACH and General of the Air Force Arturo Merino Núñez and the British Ambassador to Chile, Louise De Sousa. At the reception ceremony, the aircraft were officially transferred to Chile through an agreement between the UK and the Chilean government. The Minister of National Defense considered the incorporation of this capacity as excellent news, saying it is "very important for Chile, for the defense of our sovereignty and

also because it will provide vital support in other tasks in times of peace." Similarly, the Commander-in-Chief of the FACH indicated that "today is a very important day for the Chilean Air Force, because we have recovered a capacity that we had lost with the Condor plane, which was decommissioned due to obsolescence.

"The arrival of the Sentry aircraft allows us to maintain control of the airspace and also contributes to our versatile means in other types of operations in direct support of the community."

Newly acquired Chilean Air Force E-3D Sentry AEW1 905 at Base Aérea Pudahuel on August 19 for the formal handover ceremony of the two ex-RAF examples FACH



Portugal's first KC-390 Millennium, with national markings taped over and wearing test registration PT-ZDK on a test flight from Embraer's facility in São Paulo **Embraer**

# PORTUGUESE KC-390 FLIGHT TESTS BEGIN

BRAZILIAN MANUFACTURER Embraer announced on September 1 that the first KC-390 Millennium, serial number 26901 (c/n 39000011), wearing test registration PT-ZDK, has entered its flight test program for the Força Aérea Portuguesa

(FAP; Portuguese Air Force). The aircraft is the first of five on order for the FAP, while an option is held for a sixth.

The KC-390 is currently undergoing final testing at Embraer's facility in Gavião Peixoto, São Paulo, where test

and certification flights are being conducted to ensure it meets Portugal's specific requirements and to certify the aircraft with the Brazilian aviation authorities.

The first aircraft is due to arrive in Portugal in the near

future for NATO-standard equipment integration work and certification by the country's National Aeronautical Authority with support from the Portuguese aerospace company, OGMA. Delivery to the FAP is anticipated in early 2023.



# BLACK IS BACK

After a four-year hiatus due to the COVID-19 pandemic, Exercise Pitch Black made a triumphant return to Australia this summer, as **Khaleem Chapman** reports

**C**ombat aircraft and support aircraft from several major global air arms deployed to Australia for Exercise Pitch Black – a biennial large force employment (LFE) exercise hosted by the Royal Australian Air Force (RAAF). The event, from August 19 to September 8, took place for the first time in four years.

As the first edition since the outbreak of the global COVID-19 pandemic, all eyes were on northern Australia as approximately 100 aircraft and 2,500 personnel from 17 different countries – comprising Australia, Canada, France, Germany, India, Indonesia, Japan, Malaysia, the Netherlands, New Zealand, the Philippines, Singapore, South Korea, Thailand, the United Arab Emirates (UAE), the UK and the US – came together to conduct training and integration activities.

Significantly, this year's event was the largest in its history and it marked the first time that Germany, Japan and South Korea had participated. It was also the first time that RAAF-operated Lockheed Martin F-35A Lightning IIs – by No 3 and 75 Squadrons – had taken part in the Pitch Black exercise.

The objective of the three-week

multinational LFE exercise is to provide a platform for allied air arms and partner nations to train together and integrate with each other to test and improve force integration, while facing off against realistic, simulated threats that replicate what can be found in a modern battlespace environment in both day and night settings. As Australia's premier international engagement activity, Pitch Black also helps to strengthen relationships and foster closer ties with allies in the Indo-Pacific region in a bid to strengthen regional security.

Operations were mainly carried out from RAAF Bases Darwin and Tindal in Australia's Northern Territory, as well as from RAAF Base Amberley, Queensland. In addition, two of the world's largest airspace training areas – the Bradshaw Field Training Area and Delamere Air Weapons Range in northern Australia – were utilized.

The aircraft participating in this year's edition Exercise Pitch Black were stationed at either Darwin, Tindal or Amberley for the duration of the event. RAAF Base Darwin hosted the majority of the visiting aircraft, with RAAF-operated EA-18G Growler electronic attack aircraft, F-35A Lightning II fifth-generation multi-role

This Luftwaffe-operated Eurofighter EF-2000 (serial 31+11) received a special scheme – dubbed 'Air Ambassador' – for Germany's Rapid Pacific 2022 deployment. This flagship aircraft represented the Luftwaffe while in the Indo-Pacific region and during the air arm's official debut at Exercise Pitch Black Bundeswehr

stealth fighters and KC-30A (A330-203MRTT) tanker-transports; along with British Typhoon FGR4s (supported by a single Voyager KC2/KC3 (A330-243MRTT)); French Rafales; German EF-2000s and A400Ms; Indian Su-30MKI *Flanker*-Hs; Indonesian F-16A-15 OCU Fighting Falcons; Japanese F-2A/Bs; Singaporean F-15SG Strike Eagles, A330-243MRTTs and F-16C/D Block 52s; and US F-15C Eagles.

In addition, RAAF Base Tindal hosted more Australian F-35As, along with RAAF E-7A Wedgetail airborne early warning and control (AEW&C) aircraft and Hawk Mk 127 lead-in fighter trainers. US Air Force (USAF) F-22A Raptors and US Marine Corps-operated (USMC) F-35B Lightning IIs also operated from Tindal, along with the French CN-235-200s. Amberley housed other RAAF KC-30As, as well as the visiting French A330-243MRTT *Phénix* and South Korean KC-330 *Cygnus* (A330-243MRTT) tanker-transports.

## Enhanced Cooperation

In line with tradition, aircraft from ten of the 17 different participating nations took part in an hour-long sunset display at Mindil Beach, Darwin, in front of thousands of people. The event – which is the RAAF's way of thanking the local community for hosting the exercise – saw tanker-transports conduct flypasts flanked by multinational combat jets, along with air displays from a USMC MV-22B Osprey and German EF-2000, among other platforms. The Mindil Beach flypast (as it is

known) was one of two major community engagement displays conducted during Exercise Pitch Black 2022.







During Pitch Black 2022, a number of air-to-air refuelling (AAR) exercises were conducted to train and integrate multinational crews with tanker-transport and combat aircraft operated by allied and partner nations. One such exercise involved a Japan Air Self-Defense Force-operated (JASDF) F-2A and an RAAF KC-30A, which demonstrated both nations' commitment to co-operation in the Pacific.

Capt Hiroki Tetsuo, a JASDF F-2A/B pilot at Pitch Black 2022, said: "I am very pleased to be here in Darwin, proving that Australian and Japanese technology, like Japanese and Australian people, can work very easily together. The mission went very well. Fuelling today from an Australian KC-30 means that my F-2 can go further. It means Japan can reach further into the Pacific with Australian co-operation. And together we can help the Pacific more."

AAR was a key feature of this year's edition, as RAAF exercise commander Air Cdre Tim Alsop explained: "This year, significant efforts have been made to advance the [AAR] capability between many of the participating nations. [AAR] is a force multiplier, providing essential reach to our combat aircraft. Working with many of the participating nations aims to increase our force projection and maximize our capability."

The exercise also provided a platform for Royal Air Force (RAF) aircrews, maintainers and technicians to be embedded within the RAAF's No 2 Squadron to gain experience on E-7A operations under the Seedcorn program, ahead of the first of

**Above:**  
Three Republic of Korea Air Force (ROKAF)-operated Lockheed Martin KF-16 Fighting Falcons fly over Australia's Northern Territory during Exercise Pitch Black 2022  
**Australian Dept of Defence**

three Wedgetail AEW1s being delivered to the British air arm in 2023. The RAF Seedcorn crews participated in Pitch Black, working with their Australian counterparts as the sole tactical command-and-control element and operating with ground units and up to 60 aircraft every day.

From an operational perspective, the four-year hiatus gave the directors of Exercise Pitch Black time to evaluate how to evolve and further diversify the event going forward. Commenting on this, Air Cdre Philip Gordon, RAAF Director General Air Defence and Space, outlined that future Pitch Blacks would need to adopt a multi-domain approach. He said: "As an Air Force, we have already made the shift from de-conflicted to co-ordinated operations and we are now working towards realising truly integrated operations. In the past, Pitch Black has focused heavily on air combat training. While this will always be a bedrock of our contribution to the joint force, I see Pitch Black increasingly moving to multi-domain operations with the increased inclusion of space and joint considerations."

When it was first conceived in 1981, Exercise Pitch Black was entirely focused on air defence operations, with RAAF-operated Mirage IIIO fighters being scrambled to intercept 'enemy' strike aircraft. In 2002, the scope and scale of the exercise grew significantly when it was relocated to the Northern Territory, but the core remit of the exercise remained centered on air defence operations, before it progressed to being an LFE event.

Reflecting on a successful Pitch Black

2022, which marked a triumphant return for Australia's largest multinational exercise, Air Cdre Alsop said he was impressed with how quickly all participants were able to integrate with each other to conduct the realistic training scenarios.

"By training with our international partners, we develop common standards, personal relationships, and most importantly, a level of trust that allows us to operate effectively together," he explained. "Exercise Pitch Black provides more than just flying operations training. It's about deepening relationships and understanding between personnel, and that's exactly what we achieved this year."

"It's been an honour to host all the participants this year, and we look forward to welcoming them back for the next iteration of Exercise Pitch Black in 2024," he concluded. 🇦🇺

**Right:**  
Sqn Ldr Andy Brown, a Mission Systems Operator with the RAF's Airbus A330-243MRTT Voyager KC2/KC3 force, pays close attention as the tanker-transport refuels a French Air and Space Force-operated Rafale B over northern Australia in Exercise Pitch Black 2022  
**Australian Dept of Defence/Cpl Kylie Gibson**



# US APPROVES SALE OF 40 UH-60Ms TO AUSTRALIA

US STATE Department approval has been granted for the possible \$1.95bn Foreign Military Sale to the Government of Australia of UH-60M Black Hawks. An announcement by the US Defense Security Cooperation Agency (DSCA) on August 25 confirmed the approval and said that US Congress had been notified the same day. The DSCA stated that the potential deal will also include eight spare engines

and a wide range of equipment. The proposed sale will enable replacement of Australia's troubled MRH90 Taipan multi-role helicopter fleet with "a more reliable and proven system that will allow Australia to maintain the appropriate level of readiness to conduct combined operations" says the DSCA. Australia had been dissatisfied with the performance of the MRH90 and Defence Minister

Peter Dutton had announced on December 10 last year that the country was looking at purchasing the UH-60M to replace the 47 MRH90s in Australian Army service. A press release from Dutton at that time said that the MRH90 helicopter fleet has not met contracted availability requirements nor the expected cost of ownership ahead of its planned withdrawal from

service in 2037. He stated that: "The performance of the MRH90 Taipan has been an ongoing and well-documented concern for Defence and there has been a significant effort at great expense to try to remediate those issues. It is critically important there is a safe, reliable and capable utility helicopter available for our service men and women into the future, with reasonable and predictable operating costs."

## FIRST RNZAF P-8A POSEIDON FLIES

ROYAL NEW Zealand Air Force (RNZAF) P-8A Poseidon serial number NZ4801 (c/n 67017, line no 9449), with temporary test registration N786DS, the first of four on order, made its maiden flight on August 16 from Renton, Washington. After being fitted out with its mission systems, it is scheduled to be delivered to New Zealand in December this year. The remaining three aircraft

will follow in 2023.

The Poseidons are to replace the RNZAF's six ageing P-3K2 Orions that have been in service since the 1960s. They are operated by 5 Squadron at RNZAF Base Auckland, Whenuapai. The second RNZAF Poseidon, NZ4802 (line no 9488), was rolled off the assembly line on September 7, already painted in full RNZAF colours.



## MOROCCAN NAVY KING AIR IN TOULOUSE

An unusual visitor to Toulouse, France, on September 5 was this Moroccan Navy King Air 350ER maritime patrol aircraft (MPA), serial number 212 (c/n FL-1007). It is one of two operated by 21 Flotille at Casablanca-Mohammed V Airport and is believed to be in France for attention by Raytheon. The aircraft were originally converted in France before delivery in February 2020 John Spencer

## AUSTRALIAN NAVY ORDERS 12 MH-60Rs

LOCKHEED MARTIN was awarded a \$503,718,672 US Naval Air Systems Command Foreign Military Sales contract on August 29 for the production and delivery of 12 MH-60Rs for the Royal Australian Navy (RAN). Work is expected to be completed in October 2026.

The Australian Government had announced on May 9 this year that it was going ahead with this acquisition to allow the RAN MRH90 fleet to be retired in 2027. Deliveries of the new MH-60Rs are due to begin in 2025. They will supplement the 23 MH-60Rs currently in service.

## INDIAN SU-30MKIs PARTICIPATE IN PITCH BLACK 2022

Indian Air Force Su-30MKI SB066 arrives at Royal Australian Air Force Base Darwin, Northern Territory, on August 18 for Exercise Pitch Black 2022. The exercise ran from August 19 to September 8, involving around 100 aircraft from 17 nations RAAF/Sgt Pete Gammie





# RECENT LOSSES



US Air Force CV-22B Osprey (serial 10-0053) from the 7th Special Operations Squadron at RAF Mildenhall, Suffolk, seen on September 12 still stranded on Senja Island, Norway, where it had made an emergency landing on August 12. This, and another recent incident, resulted in the grounding of the CV-22B fleet for two weeks – see p10 for more details **Forsvaret**

- **A Ukrainian Air Force MiG-29** was shot down on August 14 by a Russian Air Force Su-35 in the Kharkiv Oblast, Ukraine. The pilot was killed.
- **US Navy T-45C Goshawk** No 163656 'B-200' assigned to Training Air Wing 2 (TAW-2) at NAS Kingsville, Texas, crashed near its base on August 16 following a suspected bird strike. The instructor pilot ejected safely.
- Wreckage of a **Ukrainian Air Force Mi-8** was discovered on August 21 at an unspecified location in Ukraine. The pilots survived the crash and were evacuated safely.
- **Indonesian Air Force Hawk Mk 209** TT-0211 assigned to Skadron Udara 12 was substantially damaged on August 22 after the pilot ejected following a tire burst on take-off from Roesmin Nurjadin Air Base, Pekanbaru, which caused the aircraft to veer off the runway.
- **A US Air Force MQ-9A Reaper ER** was destroyed on August 22 when it was shot down near Al-Maqzha, Benghazi, Libya.
- **A Royal Jordanian Air Force F-16** crashed during a training

flight on August 31 at Bā'ir Ma'an. The pilot ejected safely.

- **A United Nations Mi-8** flown by Nizhnevartovsk-Avia was destroyed when it crashed on September 2 at Mugunga, Virunga National Park, near Goma in the Democratic Republic of Congo (DRC). All three crew members were injured.
- **A Syrian Air Force MiG-21 Fishbed** crashed on September 2 in Al-Suwayda governorate, southern Syria, during a training sortie from Khalkhala Air Base. The pilot ejected but was seriously injured.
- Ukrainian Armed Forces claimed to have shot down a **Russian Air Force Ka-52** on September 3 in Ukraine's Donetsk region.
- Ukrainian forces downed **Russian Air Force Mi-28N** serial number '81 Red' on September 4 outside Hulyaipole, Ukraine.
- **A Syrian Air Force Mi-8/17** crashed on September 4 in a residential area in Hama, west-central Syria. All three crew members were killed.
- **A Turkish Land Forces S-70A-28 Black Hawk** crashed in northern Iraq on September 4 following a technical malfunction. Seven crew members were rescued,

however an eighth was missing.

- **Indonesian Navy G36 Bonanza** serial number T-2503 was reported missing in the Madura Strait area of East Java after taking off from Surabaya Juanda Airport on September 7. The bodies of the pilot and co-pilot were found the following day.
- **Russian Air Force Su-25SM** serial number RF-95134 'Blue 04' was shot down on September 7 by Ukrainian Armed Forces with a MANPADS missile in Volokhiv Yar, Kharkiv Oblast, Ukraine. The pilot ejected.
- Ukraine General Staff announced that a Ukraine Air Force anti-aircraft missile unit shot down a **Russian Air Force Mi-24** on September 7 in the Kherson Oblast of Ukraine.
- **A Ukrainian Air Force Su-25** was shot down on September 7 at an unspecified location in Ukraine. The pilot was killed.
- **A Russian Air Force Su-25** crashed immediately after take-off from an airfield in Crimea on September 9. The pilot ejected but was killed.
- **Russian Air Force Su-34** serial number RF-94004 '20 Red' was shot down by Ukrainian forces near

Izium, Kharkiv Oblast, Ukraine, on September 9.

- **An Afghan Air Force UH-60A+ Black Hawk** crashed on September 10 following a technical malfunction just after take-off for a training flight from the National Defense University in Kabul. All eight on board were killed.
- **A Russian Air Force Sukhoi Su-34** crashed in Crimea on September 11. Both crew were able to eject safely.
- **Russian Air Force Su-30SM** serial number RF-81773 '62 Red' was found crashed on September 12 in Izium, Kharkiv Oblast, Ukraine, although it is thought to have been lost at an unknown much earlier date.
- **An Iranian Islamic Republican Guard Corps Air and Space Force Su-22** crashed near Bandar Abbas on September 17 due to a technical malfunction. The pilot was killed.
- **A Ukrainian Air Force Su-25M1** crashed on September 19 after being shot down by Russian forces at Yehorivka, near Vuhledar in Ukraine's Donetsk Oblast.

# BATTLIN' ON

Vladimir Trendafilovski reports on how the combat aircraft of Ukraine are still very much involved in stopping the Russians

**F**rom the very start of Russia's invasion of Ukraine on February 24, the combat aircraft of the Ukrainian Air Force (UkrAF) have been heavily involved in defending the country, conducting well over 1,000 reconnaissance, combat air patrol (CAP) and close air support (CAS) sorties.

## Before the invasion

At the start of 2022, the UkrAF had a total of 140-150 combat aircraft, split between seven tactical aviation brigades (brTAs). The main types in service are MiG-29 *Fulcrum*

and Su-27 *Flanker* fighters, Su-25 *Frogfoot* attack aircraft, as well as Su-24 *Fencer* bombers and reconnaissance aircraft.

These include some 20-25 Su-24s with the 7th brTA at Starokostyantyniv Air Base (AB); 30 Su-25s of the 299th brTA at Mykolayiv-Kulbakino; 35 Su-27s with the 39th brTA at Ozerne and 831st brTA at Myrhorod; and 55-60 MiG-29s with the 40th brTA at Vasylkiv, 114th brTA at Ivano-Frankivsk and 204th brTA at Lutsk.

With the exception of the 7th brTA, which has three squadrons – two with Su-24M bombers and one with Su-24MR reconnaissance aircraft – all the remaining



Su-27P1M '50 Blue' of the 831st brTA with Myrhorod AB visible behind, showing Su-27s and Su-24s from the 7th brTA – regularly detached here before the war in case their deployment over Donbas was required. At the beginning of the conflict on February 24, the base was subjected to a Russian airstrike but all aircraft were successfully dispersed to Kanatove AB **Chris Lofting**



regiments (brTAs) have two squadrons, each with 12 single-seat aircraft plus two twin-seat trainers (where available). However, only three of these (the 40th brTA, 299th brTA and 831st brTA) had enough operational aircraft to fill two full squadrons – the rest had 10-15 available jets, split between their two squadrons.

Finally, each brTA had several two-seat L-39 Albatros trainers used for pilot training, as well as for pilot proficiency flights. Although combat-capable, the 25-30 L-39s aren't included in the totals; in general, two are allocated per squadron.

## The multi-role MiG-29 force

The most numerous combat aircraft type in UkrAF service is the MiG-29 *Fulcrum* fighter. It comes in three main variants: the modernized Ukrainian single-seat MiG-29MU1, as well as standard Soviet-era single-seat MiG-29 type 9-13 *Fulcrum-C* and two-seat MiG-29UB *Fulcrum-B* variants – the last having no radar and thus not

being able to employ radar-guided air-to-air missiles (AAMs). The UkrAF had a total of 30 MiG-29 type 9-13, 16 MiG-29MU1 and 10 MiG-29UB aircraft in service at the beginning of 2022 – well over 40 of these were overhauled and/or modernized in the last ten years.

The MiG-29MU1 upgrade was designed by the Lviv State Aircraft Repair Plant (LDARZ), tasked with the overhaul and modernization of UkrAF MiG-29s. Improved, more reliable parts replace

some original components in the N019 radar, increasing target detection range by 30% and enabling the use of the long-range R-27ER and R-27ET AAMs. The original A-323 navigation unit has been bolstered with a SN-3307-01 satellite navigation (SATNAV) system, while a modified ICAO-compatible R-862M1 VHF/UHF radio and A-511 transponder enable operations from civilian or Western military facilities. Finally, the Tester-U3-L flight data recorder (FDR) and an Ekran-13M-4 pilot warning system have been fitted, both with solid-state memory.

The MiG-29MU1 entered service on December 23, 2009 and, so far, a total of 17 aircraft are known to have been delivered exclusively to the 40th brTA. One was damaged in an accident last year, so its operational status in 2022 is uncertain.

Finally, there is also the MiG-29MU2 prototype, '12 White' of the 40th brTA – a further development of the MiG-29MU1 with added navigational aids, plus an ability to employ TV-guided air-to-ground weaponry such as the Kh-29T (AS-14 *Kedge*) missile and KAB-500Kr bomb. This prototype underwent testing in 2021 and was expected to enter service in 2022, but the process was interrupted when the invasion began – it was pressed into UkrAF service and was last noted flying in August.

Due to their large numbers and small size, the MiG-29s are used both for combat air patrol (CAP) and close air support (CAS)

The non-modernized MiG-29 type 9-13 '43 Blue' of the 204th brTA demonstrates a low-level pass. The highly-maneuverable MiG-29 is being frequently used in the air-to-ground role during this conflict  
**Sergey Smolentsev**

MiG-29 type 9-13 '73 White' of the 114th brTA. This aircraft was last seen in August – flying in a pair with an identical aircraft from the same unit, '71 White', which was armed with two AGM-88 High-speed anti-radiation missiles (HARMs)  
**Sergey Smolentsev**





ORDER OF BATTLE OF THE UKRAINIAN AIR FORCE AT THE BEGINNING OF 2022

Unit	Equipment	Location
UkrAF Headquarters		Vinnytsia
Air Command 'East'		Dnipro
Air Command 'South'		Odesa
Air Command 'Center'		Vasylkiv
39th Tactical Aviation Brigade	Su-27, L-39	Ozerne
40th Tactical Aviation Brigade	MiG-29, L-39	Vasylkiv
831st Tactical Aviation Brigade	Su-27, L-39	Myrhorod
Air Command 'West'		Lviv
114th Tactical Aviation Brigade	MiG-29, L-39	Ivano-Frankivsk
204th Tactical Aviation Brigade	MiG-29, L-39	Lutsk
7th Tactical Aviation Brigade	Su-24, L-39	Starokostyantyniv
299th Tactical Aviation Brigade	Su-25, L-39	Mykolayiv-Kulbakino

**Note:** Air Commands 'East' and 'South' have no directly subordinated aviation units.

missions from the start of the 2022 invasion. When Hostomel Airport was taken over by the Russians in a daring heliborne assault on the first day of the invasion, MiG-29s from the 40th brTA flew air-to-ground missions together with UkrAF Su-24s and Su-25s, engaging ground targets in the area with unguided rockets. Simultaneously, other MiG-29s from the 40th brTA defended the airspace over Kyiv, engaging Russian Aerospace Forces (RuAF) aircraft with AAMs. In the first day of operations alone, the 40th brTA lost three MiG-29s and their pilots, while a total of nine aircraft and eight pilots from all three units were confirmed destroyed in the first month of the conflict. By August, at least two aircraft had been destroyed on the ground and two more pilots were killed.

With the stabilization of the situation on the battlefield, the *Fulcrums* are

A two-seat MiG-29UB, '99 White' of the 40th brTA, decelerates after landing with the help of a braking parachute. As it has no radar, its air-to-air weaponry is limited to only six close-range IR-guided AAMs  
**Sergey Smolentsev**

**Below:** This modernized MiG-29MU1 ('11 Blue') of the 40 brTA is seen here departing its home base on a regular training flight before the war. This was the second aircraft of the type delivered to 40th brTA, arriving in 2010  
**Sergey Smolentsev**





Su-27S '53 Blue' from the 39th brTA is seen taxiing at Starokostyantyniv AB after relocating there from its home base with full air-to-air loadout, consisting of four long-range R-27ER (AA-10 *Alamo-C*) radar-guided AAMs, two long-range R-27ET (AA-10 *Alamo-D*) and four short-range R-73 (AA-11 *Archer*) IR-guided AAMs below its wings **Chris Lofting**



predominantly used in their intended CAP role, but they have also recently acquired a new mission: the suppression of enemy air defenses (SEAD). Armed with US-supplied AGM-88 High-speed Anti-Radiation Missiles (HARMs), the MiG-29s are now being successfully used against Russian air defense (AD) systems (see news item on page 16).

## The Su-27 force – reserved for air superiority

The Su-27 air superiority fighter in UkrAF service comes in four variants. The former Soviet Air Force Su-27S and its two-seat Su-27UB variant, both with identical combat capabilities and able to employ unguided air-to-ground weapons, and the former Soviet AD Su-27P and two-seat Su-27UPs, configured as pure interceptors capable of employing only AAMs.

In addition to these basic variants, an upgrade developed by the Zaporizhzhya State Aircraft Repair Plant (ZDARZ) entered UkrAF service on August 5, 2014. Like the MiG-29 upgrade, it comes with improved

Su-27S1M '21 Blue' of 39th brTA at Starokostyantyniv AB during the joint US-Ukrainian Clear Sky 2018 exercise in October 2018. It has a full air-to-air loadout, consisting of four long-range R-27ER radar-guided AAMs, plus two long-range R-27ET and four short-range R-73 IR-guided AAMs **Sergey Smolentsev**



more-reliable parts, replacing some of the original components in the RLPK-27 (N001) radar, increasing its target detection range by 30% and improving anti-jamming capabilities. Navigation capabilities were vastly improved by fitting a SN-3307-02 SATNAV system, a Kurs-93M-V combined VOR/ILS navigation system and a MSD-2000V DME/TACAN receiver. A new Ekran-02M-3 (Ekran-UB-02M-3 on two-seat aircraft) pilot warning system was fitted, as well as the SAVR-27U audio and video recording system (replacing the old Soviet gun camera and voice recorder) – their data is recorded by the BUR-4-1-10-01

FDR with a solid-state memory. Finally, an ICAO-compatible A-511 transponder and the modified R-800L1M VHF/UHF radio were fitted. The '1M' suffix was added to the original designation of the modernized aircraft, becoming a Su-27S1M, Su-27P1M, Su-27UB1M or Su-27UP1M.

At the beginning of 2022, the UkrAF had some 35 Su-27s, of which 12 had been overhauled in the last decade, with a further 12 being modernized. Despite many of the aircraft being capable of employing air-to-ground weapons – a feature that was put to use during the 2014 conflict – the Su-27s now appear to be only

Close-up of the cockpit area of Su-27UB1M '71 Blue' from the 831st brTA while it prepares to take off on a training flight. This was the lead aircraft for the UkrAF Su-27 modernization project – it was completed in August 2012 and delivered to the unit in October 2015 – after the state trials were finished. Note a small white antenna of the SATNAV on its spine, immediately behind the cockpit – an indicator that the aircraft has been upgraded. This antenna is found on all modernized UkrAF combat aircraft, the position depending on the type – on Su-25s it is found on the nose, immediately in front of the windshield, while on MiG-29s and Su-27s it is found on the spine **Chris Lofting**







involved in CAP sorties against Russian aircraft and cruise missiles, and unlike other UkrAF aircraft they are frequently seen operating at higher altitudes. Three Su-27s and two pilots were confirmed lost in the first month of operations – practically in the first week of the invasion – with two more aircraft losses following in June and August, and regrettably one more pilot being killed.

### The Su-25 force – the omnipresent flying artillery

At the beginning of the year, the UkrAF's Su-25 force consisted almost entirely of modernized aircraft – 26 out of 30 aircraft in service had been overhauled and upgraded. This was thanks to the fact that the modernization program was developed by ZDARZ in the 2000s,

turning original Soviet-era single-seat Su-25 and two-seat Su-25UB aircraft – both with identical combat capabilities – into upgraded Su-25M1 and Su-25UBM1 variants, which officially entered service on March 4, 2010.

The M1 upgrade features the SN-3307 SATNAV system, integrated with a new pilot's ASP-17BTs8-M2 optical sight, which has a digital computer – providing increased accuracy for unguided air-to-ground weapons delivery as well as the capability to release these during night or in bad weather conditions, with poor or no target visibility. A modified ICAO-compatible R-862M1 VHF/UHF radio and an A-511 transponder are also fitted.

A further development is the M1K upgrade, adding the MSD-2000V DME/TACAN receiver, the Kurs-93M-V combined VOR/ILS navigation system, a solid-state BUR-4-1-10 FDR, SRVP-25 video recording system (replacing the Soviet-era gun camera) and finally KUV 26-50-01 chaff/flare launchers (replacing Soviet-era ASO-2VM launchers). The M1K upgrade was officially accepted into service on April 27, 2015 and the modernized aircraft are designated Su-25M1K and Su-25UBM1K.

At the beginning of 2022, the UkrAF had 12 Su-25M1, nine Su-25M1K, two Su-25UBM1 and three Su-25UBM1K

Su-25M1 '37 Blue' of the 299th brTA armed with a pair of 20-shot B-8M1 rocket pods for the 80mm S-8 series of unguided rockets. Note the characteristic KUV 26-50-01 chaff/flare launchers on top of its engine nacelles and on the tail  
Sergey Smolentsev



Su-27P1M '50 Blue' from the 2nd Squadron of the 831st brTA with a single UZR-73 training round below the port wing – this is an inert R-73 AAM for target lock-on training. On the port side below its cockpit it carries the name of a legendary UkrAF Su-27 pilot, the late Lt Gen Vasyl Nikiforov **Chris Lofting**





This unarmed Su-25UBM1 ('64 Blue') from the 299th brTA decelerates with the help of its braking parachutes, shortly after returning to its home base from a training flight. The two-seat Su-25s have the full combat capabilities of the single-seat variants **Sergey Smolentsev**



aircraft, as well as a few unmodified Su-25s and Su-25UBs. The KUV 26-50-01 chaff/flare launchers introduced with the M1K upgrade package were also retrofitted to all operational aircraft, including the unmodified ones.

The UkrAF Su-25 force is undoubtedly one of the most potent and by far the most iconic component of Ukraine's armed forces. Flying extremely low – sometimes even directly above columns of enemy vehicles – they have been present in every known hotspot in the country since the beginning of the invasion, practically on every side of Ukraine simultaneously, starting from Hostomel in the north, Donbas in the east and, finally, Kherson in the south. Their courageous pilots flew some very decisive actions in the initial days of the conflict without any regard for their life, and despite the considerable losses they helped to stop the Russians from steam-rolling through Ukraine. The Su-25 fleet suffered four confirmed losses in the first three days of the conflict alone, with three pilots killed and one captured. By the end of the first month of operations,

the numbers had risen to eight aircraft lost, four pilots killed and two crew captured. By the end of July this had risen to 11 aircraft, with seven pilots killed and the two that had been captured were exchanged. There were no known losses in August.

Initial head-on strikes against enemy vehicles or positions made UkrAF Su-25s highly vulnerable to all sorts of AD systems, including anti-aircraft (AA) artillery and man-portable AD systems (MANPADS). However as the conflict progressed, their attacks were modified to safer stand-off strikes that were well practiced before the conflict. The aircraft fly extremely low and, when they are a few kilometres in front of the target, they pull up in a steep climb, simultaneously firing a volley of unguided rockets in the target's direction and, within seconds, they dive back to the relative safety of extremely low altitude, releasing flares during the process. The number and size of the unguided rockets is adapted to the target and sometimes come in the form of four large S-25 rockets, equivalent to a heavy artillery bombardment, that can inflict serious damage.

## The Su-24 force – in dire straits

The UkrAF's Su-24 force consists of two original Soviet-era variants – the Su-24M *Fencer-D* bomber and the Su-24MR *Fencer-E* reconnaissance aircraft. While the former is capable of employing a very wide range of air-to-ground weapons, including guided bombs and missiles, the latter is a specialized reconnaissance platform, which may only carry two short-range IR-guided AAMs for self-defense. The 7th brTA had a total of 15 Su-24M and nine Su-24MR aircraft in service at the beginning of 2022.

The situation with the Su-24s is of real concern to the UkrAF. The lack of spare parts has forced the UkrAF to cannibalize stored aircraft in order to keep its current fleet operational. Most of the aircraft in service were overhauled more than a decade ago and new overhauled aircraft are delivered only occasionally as the overhaul process at the NARP repair plant in Mykolayiv has also been affected by the lack of spare parts. Since the start of the conflict with Russia in 2014, only four Su-24M and three Su-24MR aircraft have been

Su-25M1K '16 Blue' of the 299th brTA at the unit's home base of Mykolayiv-Kulbakino on September 29, 2021. It is outfitted with two OFAB-250-270 high explosive fragmentation bombs, two 20-shot B-8M1 rocket pods and two PTB-800 auxiliary fuel tanks under its wings. Note the VOR/ILS antenna on its tail just above the serial – found only on aircraft upgraded to the M1K standard. This aircraft was still operational at the end of July **Chris Lofting**



# THE L-39 TRAINERS

In addition to their combat aircraft, the seven UkrAF tactical aviation brigades also operate additional L-39 Albatros two-seat trainer aircraft in three variants: the original Soviet-era L-39C and two Ukrainian modernized variants, the L-39M1 and L-39M.

The L-39M1 variant officially entered service in 2009. Compared to the L-39C, these have a more powerful 4,079lb (18.14kN) thrust AI-25TLSh engine replacing the old AI-25TL and a solid-state BUR-4-1 FDR in place of the original SARPP-12 – both of domestic manufacture.

The L-39M officially entered service in 2015 as a further development of the L-39M1, equipped with the BTK-39 training complex. This simulates standard MiG-29 and Su-27 operating procedures up to weapons employment, reducing fighter pilot training costs and enabling pilots to accumulate more flight hours. Among

other features, the BTK-39 includes the ILS-39 head-up display fitted in the front cockpit, a SN-3700-03 SATNAV system, two multi-functional displays – MFI-1 in the front cockpit and MFI-2 in the rear cockpit – and a PUBR control box (used to switch between combat modes).

The two modernized variants were built exclusively at the OAZ plant in Odesa, while the basic L-39Cs were also overhauled there and at the Chuhuyiv Aircraft Repair Plant (ChARZ). At the start of 2022, the UkrAF tactical aviation brigades had 25-30 aircraft of all three variants – mostly L-39M1s. So far the OAZ delivered at least 21 L-39M1 aircraft (including three from the 204th brTA impounded in the Crimea in 2014 and one from 7th brTA that crashed in 2017) plus two L-39M aircraft, the latter operated solely by the 40th brTA. The L-39s were seen flying following the invasion, but their involvement in combat sorties has not been reported.

overhauled and delivered to UkrAF, which is disastrous when compared to the other aircraft types. A modernization program was developed for the Su-24MR by the Odesa Aircraft Plant (OAZ), featuring new sensors, but this only reached the static demonstrator stage and was ultimately shelved due to lack of funds.

Despite all this, the Su-24 force was in action from the very first day of the invasion, especially in the area around Kyiv, conducting low-level airstrikes against enemy forces converging on the capital. In the initial month of the invasion, at least five Su-24Ms were confirmed as lost, but of more concern is the fact that their crews also perished. Seasoned Su-24 pilots are in high demand as the *Fencer* is a fairly complicated aircraft both to fly and to maintain. Consequently, many of the crews that were lost were predominantly reservists and retirees returning to their parent unit when the invasion began.

At the same time, the Su-24MRs were not sitting idle – at least one was lost during a reconnaissance mission along the border with Belarus on March 30.

Finally, despite Russian claims that the UkrAF Su-24 force was wiped out in the initial month of operations, the Su-24s conducted a very effective low-level airstrike against the Russian forces on Snake Island. Since then, Su-24s have also appeared on a few occasions over the battlefield during the summer. Understandably, their involvement in the combat operations has been limited because of the need for quick stand-off



Four L-39M1s and L-39Ms of the 2nd Squadron of the 40th brTA on the main apron at Vasylykiv AB. The aircraft closest to the camera, being refueled after a training flight, is L-39M1 '101 Blue' **Sergey Smolentsev**

Displayed at Starokostyantyniv AB, Su-24M '44 White' from the local 7th brTA is outfitted with a total of 38 OFAB-100-120 free-fall dumb bombs, carried on seven MBD3-U6-68 multiple ejector racks. In front of it is a spectrum of air-to-ground weapons, including Kh-25ML (AS-10 *Karen*) and Kh-29L (AS-14 *Kedge*) laser-guided missiles, Kh-58U (AS-11 *Kilter*) anti-radiation missiles, KAB-500Kr TV-guided bombs and a KAB-1500L laser-guided bomb **Sergey Smolentsev**







With Su-24M '66 White' closest to the camera, a row of seven Su-24M, three Su-24MR and two L-39C aircraft of the 7th brTA are seen here detached at Lutsk AB for live-fire training at the nearby Povursk range before the war. Additional stored Su-24Ms are visible in the background – some of them were destroyed during the Russian airstrike on February 24 **Sergey Smolentsev**

attacks in the manner performed by the Su-25s. The Su-24Ms were also used in stand-off attacks, but apparently the UkrAF has now decided to employ them only where their combat potential can be put to full use.

## The force performance

In the early hours of February 24, the UkrAF – tipped off by its Western partners about the impending Russian invasion – began to disperse its fleet of combat aircraft. They were flown to secondary air bases, civilian airports or wartime airstrips, predominantly in the relatively safe western and central Ukraine.

As a result, the initial airstrikes against the UkrAF by RuAF aircraft and ballistic and cruise missiles yielded little success. The only verified loss of an operational UkrAF combat aircraft on the ground was an Su-27 destroyed at Ozerne AB. All the rest were stored aircraft, many of them withdrawn from service decades ago and still in their original Soviet livery!

Following the initial shock from the Russian onslaught, the UkrAF began consolidating its AD network and communication lines and this was over by mid-March. By that point, the surviving UkrAF combat aircraft were operating from primary and secondary air bases, well-defended by long-range surface-to-air missile (SAM) systems, forcing RuAF aircraft to operate only near the frontline or in the border area. Clearly, the UkrAF was not only still in the fight, but the air superiority over Ukraine was heavily contested, with neither of the sides having the upper hand.

At the conclusion of the first month of the war on March 25, the Russian Ministry of Defense claimed that 73% of the UkrAF combat aircraft (i.e. 112 aircraft out of a total of 152) had been destroyed. However, these numbers appear to have been highly

inflated, because by this point only 30 UkrAF combat aircraft were confirmed as lost. Furthermore, this figure was 75% of all the confirmed UkrAF combat aircraft losses by August (40 in total). This would indicate that the UkrAF has successfully adapted its tactics to reduce combat losses.

Of interest are also the official figures released by the UkrAF regarding the activities of their offensive aircraft. By August 16, the UkrAF combat aircraft and the Mi-8 *Hip* and Mi-24 *Hind* combat helicopters of the Ukrainian Army Aviation had conducted almost 2,200 combat sorties against the enemy. For comparison purposes, by July 13, this figure stood at 1,700 sorties, while by June 4 it was only 1,000 sorties.

Obviously, the number of combat sorties has more than doubled since June 4 and the UkrAF combat aircraft fleet has kept up with the increased activity.

## The main problems identified

The main problem with UkrAF combat jets is that all of them are Soviet-era aircraft – the newest are 31 years old by now and many of the upgrade features have no specific use in combat, with all modernized variants inheriting serious limitations from

their original Soviet versions.

This is well illustrated on the modernized Ukrainian Su-27. By retaining its original weapons suite, it remains a basic fourth-generation fighter, unlike the Russian Su-27SM (also a modernized Soviet-era Su-27) that introduced new weapons, the most important of which is the R-77 (AA-12 *Adder*) AAM with an active radar seeker. The R-77 AAM is basically a fire-and-forget weapon, while the R-27R and R-27ER (AA-10 *Alamo*) – the main long-range AAMs used by Ukrainian fighters – have a semi-active radar seeker head, requiring the launch aircraft to continuously track its target until the missile scores a hit. This makes the UkrAF fighters seriously inferior in combat to the RuAF Su-27SM and Su-35S fighters pitted against them.

The age of the aircraft leaves no doubt that – if they manage to survive it – this will be their last war. The supply of spare parts is extremely limited and they cannot remain in service without proper maintenance. It's hardly surprising that Ukraine is constantly asking the West to supply it with modern combat jets that will enable it to be on par with the RuAF as far as aircraft capabilities are concerned. 🇺🇦

Su-24MR '11 Yellow' of the 7th brTA taxis at Starokostyantyniv, while the fully-armed Su-27P '37 Blue' of the 39th brTA lands in the background. Only the Su-24MRs have a shark's mouth painted on the nose **Chris Lofting**



# MERCURY

Its name may have changed early in its career, but the Boeing E-6 has since undergone further, more significant transformations. **Bob Archer** reports

United States Navy Boeing E-6B Mercury of Strategic Communications Wing ONE, Task Group 114.2, based at Tinker Air Force Base, Oklahoma, high over Colorado on August 23, 2019. The E-6B was refueled by a Boeing KC-135R Stratotanker of the 507th Air Refueling Wing, Air Force Reserve Command, also from Tinker AFB  
USAF /Greg L Davis

**O**n the evening of May 1, 2011, E-6B 164409 departed RAF Mildenhall and flew an orbit over the UK for several hours. There is speculation that the aircraft was the relay for a pair of Northrop B-2 Spirits that had overflown the Mediterranean and continued towards Pakistan. At 0100hrs on May 2, a US Navy SEAL team was flown covertly by helicopters into a compound at Abbottabad, Pakistan, where terrorist leader Osama bin Laden was living. The team killed bin Laden and neutralized the area.

The presence of the B-2s was as a backup in case the SEAL team plan failed. With operation Neptune Spear a success,

the B-2s were not required, and after an eight-hour sortie the E-6B landed back at Mildenhall, before returning to the United States two days later.

The aircraft had arrived at Mildenhall on April 28 and flew a similar sortie on both April 29 and 30. The latter was the intended evening of the operation but was delayed 24-hours due to unfavorable weather around Abbottabad.

## Origins of Mercury

The Airborne National Command Post (ABNCP) mission has been ongoing since 1961, flown by a plethora of Air Force Boeing EC-135s to replicate Strategic Air Command (SAC) headquarters, as well as transmitting important communications

between Offutt AFB, Nebraska, and other bases within the command. Two years later, the Navy began flying Lockheed EC-130 Hercules as an airborne relay, connecting the office of the Chief of Naval Operations (CNO) and the worldwide-dispersed nuclear submarines. The Air Force program was known as Looking Glass, while the Navy used the title TACAMO, which was a World War Two US Marine Corps abbreviation for Take Charge and Move Out.

However, by the 1980s both types needed replacing, with the Navy realizing that the EC-130s were limited to the quantity of equipment and the number of operators that could be carried. The TACAMO role was originally



# ON THE RISE



performed with communications apparatus and operators housed in vans, which were driven aboard the EC-130s. However, this was soon replaced by equipment installed inside each aircraft themselves. Furthermore, the lack of an aerial refueling capability limited the time on station.

## Selecting the Boeing 707

The Air Force had earlier acquired the Boeing 707 as the E-3 Sentry for their airborne early warning (AWACS) requirement, with the Navy carrying out

a study to determine if the same aircraft would be ideal for the TACAMO mission. The decision was made in 1984 to acquire 16 707-320 models, which were among the final airframes to be constructed before production of the type finished. These were designated as the E-6A, with the name Hermes being assigned. Unfortunately, this choice proved unpopular with personnel as it sounded similar to a social disease and the name was changed to Mercury in 1992.

The E-6 offered a huge improvement in capability, as the fuselage was double the size of the EC-130, enabling additional equipment to be installed, as well as more workstations and operatives. Whereas ten was the normal EC-130 mission crew,

the E-6 would often number 22 or more, depending upon the requirements of the task.

The heart of the E-6 mission was the range of frequencies that the communications systems used, both to receive and to transmit. Ultra High Frequency (UHF) and Super High Frequency (SHF) were the primary communications ranges, which linked the CNO and other National Command Authorities with the aircraft. However, Ultra Low Frequency was the secure network, which was directly linked to deployed submarines, relayed through a trailing wire. One wire, located behind a cover positioned beneath the rear fuselage, was five miles in length, while a



second positioned at the extreme rear of the aircraft was considerably shorter. Once reeled out, the wire would hang vertically, thereby ensuring the connection was effectively acting like a tall mast. To ensure the wire remained vertical the E-6 was flown in an orbit.

The communications equipment installed in the EC-130s had been routinely upgraded to maintain efficacy, with much of this being removed and installed in the first E-6As. Apart from being a cost-saving measure, personnel were familiar with the communications kit, being transferred from the EC-130.

## Initial deliveries

Following company evaluation and a period of systems development testing with the Naval Air Test Center at NAS Patuxent River, Maryland, the first two

aircraft were delivered to the Navy on August 2, 1989. These joined Fleet Reconnaissance Squadron-3 (VQ-3) at NAS Barbers Point, Hawaii. While VQ-3 personnel were beginning their work up, Air Test and Evaluation Squadron 1 (VX-1) also at Patuxent River was carrying out operational appraisal to ensure all systems worked as required. The completion of aircraft deliveries to VQ-3 enabled sister squadron VQ-4 at Patuxent River to transition, beginning on January 25, 1991.

## Looking Glass merged with TACAMO

The peace dividend after the end of the Cold War enabled a wholesale reduction of NATO forces. This included the ABNCP, which was largely redundant, although not abandoned entirely. A study was

**Bottom:** The small new antenna covering and the pair of downlinks beneath the fuselage are apparent on 163918 as the aircraft completes its sortie on June 28, 2022  
**All images Bob Archer unless stated**

**Below:** Making the European debut of an E-6B with the Block I upgrade, 163918, arriving at Mildenhall in the UK on June 26, 2022. A single evaluation sortie was flown two days later before the Mercury returned home

conducted into transferring the airborne launch control system (ALCS) into the TACAMO E-6s. The objective was to operate a joint relay capability, adding the Pacer Link satellite communications antenna and its large oval fairing above the forward fuselage, as well as the appropriate consoles and workstations. Four EC-135Cs had Pacer Link fitted by this time, with the intention of transferring this equipment to the E-6 and to add the same system to the remaining 12 Mercurys.

The amalgamation of command and control of the Air Force land based intercontinental ballistic missiles and strategic bombers, together with the nuclear weapons carrying submarines, would effectively place all three elements of the nuclear triad under a single airborne manager. Earlier SAC had been inactivated, with US Strategic Command at Offutt AFB becoming the unified command responsible for the triad and



## CREW

Whereas the cockpit crew of four and up to ten operators were the normal complement for the EC-130, the E-6 featured a similar cockpit crew, but double the number of operators, depending upon the mission. For lengthy missions involving aerial refueling to extend duration, a second cockpit crew could be assigned. With bunk beds and a galley installed, it was feasible for the E-6 to be airborne for up to 72 hours, although it is unlikely such an extensive sortie has ever been undertaken.





the Mercury aircraft directly under US Strategic Command (USSTRATCOM) control in time of crisis.

The transition of the former Looking Glass mission to the Navy aircraft was beset with integration problems, delaying retirement of the EC-135Cs, which had to maintain the ABNCP mission far longer than planned. However, eventually these issues were rectified, enabling the Navy to assume the mission on October 1, 1998, with the final pair of EC-135Cs relinquishing the mission when retired in February 1999. Upon completion of the Pacer Link and Air Force ALCS mission into the Mercury aircraft, the designation was changed to E-6B.

## Centralized operations

Whereas the EC-130 operation was located at two Naval air stations, the decision was made to centralize both squadrons at Tinker AFB, Oklahoma.

**Bottom:** E-6A 164409 at Cottesmore, UK, in July 2001. Ten years later, the aircraft was involved in the command-and-control relay with B-2s on the night that Osan bin Laden was killed in Pakistan

**Below inset, left:** Forward fuselage showing the location of the Pacer Link communications fairing on 164404

**Below inset, right:** Close-up of the high frequency aerial on the wing tip of 164404 in May 2001

Strategic Communications Wing 1 (SCW-1) was activated on May 29, 1992, as the controlling element, with responsibility for VQ-3 and VQ-4, which both relocated to Tinker around the same time. The concentration of both E-3 and E-6 operations at Tinker AFB enabled centralization of maintenance and the spare parts holding to be integrated with large financial savings. The Navy decided to form a dedicated training unit, designated as VQ-7, which was activated at Tinker on February 11, 2000, equipped with various Boeing C-18 models, which have all since been retired.

While operations were consolidated at Tinker, there was a requirement to forward deploy small numbers of aircraft to coastal locations. VQ-3 established a forward detachment to Travis AFB, California, while VQ-4 formed a similar

arrangement at NAS Patuxent River. Additionally, to support USSTRATCOM, three aircraft are now normally located to Offutt AFB, Nebraska. Apart from dispersing assets to several locations, thereby affording an additional measure of survivability in the event of a surprise attack upon the American mainland, the presence of the two coastal sites reduced transit time to the oceans for operational sorties.

## European operations

US European Command (USEUCOM) was responsible for the Silk Purse airborne command and control mission flying the EC-135H at RAF Mildenhall from 1965, tailored specifically to replace the headquarters at Stuttgart, Germany, if this became inoperative. Furthermore, Supreme Headquarters Allied Powers

# MISSION PROFILE

The internal layout of the E-6 comprises the crew rest area aft of the cockpit, which is ahead of the battle staff section. Adjacent is the main communications central area housing consoles and workstations. Next is the high-power transmitter set, alongside the VLF transmitter. Towards the rear is the long wire winch assembly; while at the extreme rear is the second winch which operates the short wire.

As stated, the E-6 provides the relay between the Chief of Naval Operations (CNO) in Washington and the various nuclear submarines at sea around the world. The extension of the appropriate trailing wire aerial is stabilized by a shuttle cock assembly affixed to the end of the cable. The long wire can extend up to five miles, with bursts of data broadcast to vessels as required. A satellite communications link enables the E-6 to be beyond line of sight from Washington or other senior officers in command authority, permitting effective global communications.

Since the inclusion of the Air Force airborne launch control system (ALCS) mission, the strictly naval complement of personnel has been changed to include Air Force staff. Whereas the TACAMO mission was a relay, the addition of the command-and-control mission required the inclusion of senior officers of flag or general rank along with Air Force operatives. These personnel are included particularly when performing an ALCS sortie where a two- or three-star general is required to be aboard to authorize the launch of retaliatory measures.



## NEW NAOC

The Department of Defense has not revealed information about the continuance of the command, control and communications (C3) program for the ICBMs and bombers, which will presumably remain with the E-6 for the time being. Current plans indicate the Mercury will remain in service until 2038. However, at the end of the present year (fiscal year 2023), the Air Force will begin to seek a replacement for the Boeing E-4B National Airborne Operations Center (NAOC), which can perform the C3 for the strategic bombers and ICBMs in the same manner as the E-6B.

The plan is for eight aircraft to be ordered, with personnel from the 1st Airborne Command and Control Squadron at Offutt AFB, Nebraska, suggesting that they will be a similar sized aircraft to the present type. The replacement aircraft will be known as the Survivable Airborne Operations Center (SAOC). If a Boeing 747-8 version is to be acquired, it is feasible these could possibly include low-hour examples, which are currently 'parked', as stored examples are known. The production line is due to close in October 2022, so it is unlikely Boeing would produce eight more, even for a customer as important as the USAF.

The current thinking would appear to indicate that the new jets will resume the C3 mission for the ICBMs and manned strategic bombers exclusively later in the decade.

The mission has gained importance in the last few months following the rhetoric by the Putin regime with threats to unleash nuclear weapons upon western nations if Russia feels intimidated.



Europe at Mons, Belgium, could also be linked into the Silk Purse command and control network if required. Silk Purse was withdrawn in 1990 as part of the post-Cold War peace dividend. However, the ever-present threat by rogue nations required a limited presence, as some potential adversaries remained. Therefore, the E-6 has regularly deployed to Europe for short-term visits, usually to Mildenhall to perform two or three familiarization sorties, before relocating to Stuttgart Echterdingen Airport for a similar task.

US Pacific Command (USPACOM), renamed US Indo-Pacific Command from May 30, 2018, with headquarters at Camp H M Smith, Hawaii, had a similar responsibility as USEUCOM, with E-6s deploying to bases across the region for training and operations.

Three E-6Bs are usually deployed to Offutt AFB at any one time to support USSTRATCOM – 163919 is seen parked on the small ramp there

E-6Bs 164406 and 164387 parked at Stuttgart-Echterdingen Airport in March 2007. It is unusual for two E-6s to be at Stuttgart at the same time

## Upgrade to Block I and II

Following the conversion to E-6B standard, the aircraft have been periodically 'tweaked' to improve their effectiveness, although this was usually while each was processed through 'inspect and repair as necessary' major overhaul.

The E-6s are being upgraded to Block I standard by Raytheon Technologies Corp of Cedar Rapids, Iowa, to roughly double the power of the mission computers from a 32-bit to a 64-bit Linux based operating system under a \$16.9m order. This will vastly increase capability and reduce threat vulnerabilities.

Prior to this upgrade, Rockwell Collins and L3 Harris completed the first four E-6Bs to be modified with advanced satellite communications (SATCOM) capabilities following the installation







of the Multi-Role Tactical Common Data Link (MR-TCDL) by Northrop Grumman Mission Systems. The MR-TCDL provides secure Ku line-of-sight and Ka SATCOM systems. The data link comprises two Ku line-of-sight channels and one Ka satellite communications channel. The new link is housed in a second, smaller oval fairing located above the rear fuselage. In addition, positioned beneath the forward and rear fuselage is an oval antenna covering, both with a small circular aerial pointing downwards. These are also a recent addition and comprise downlink antennas to connect with ground stations. Other internal equipment includes power conditioning, cooling, electrical and network distribution. The system also has equipment that interfaces Block II B kits into the existing E-6B avionics. The work by Collins Aerospace is being carried out in Richardson, Texas, and should be finished by March 2023. The first two to be completed are 163918 and 163920.

After Russia invaded Ukraine in February 2022, the Putin regime began issuing intimidating threats to NATO nations who were supplying the latter with weapons and support. Russia also intimated that their forces had increased the readiness of their nuclear weapons stockpile and threatened their use to prevent non-NATO nations, such as Finland and Sweden, from joining the organization.

Believed to be the first Block I aircraft, 163920 is seen on an air test from Tinker AFB, Oklahoma, in September 2019  
**US Navy**

The slightest mention of Russia changing their nuclear weapons readiness status caused a ripple of anxiety within many governments, including the USA. Therefore, it was no coincidence that E-6B 163918, fitted with the latest Block I modifications, was deployed to Europe for the first time, arriving at Mildenhall on June 26, 2022. The aircraft flew a seven-hour evaluation sortie above the eastern Atlantic Ocean two days later, before returning to NAS Patuxent River on June 30. Clearly the CNO or USSTRATCOM wished to test the enhanced system within European waters.

### Medium-term upgrade

In the short-term, the first E-6B to be upgraded to Block II standard was flown to the Northrop Grumman Corporation's Aircraft Maintenance and Fabrication Center in Lake Charles, Louisiana, on May 9, 2022. No details of the next upgrade have been released other than it will involve the integration of improved high-speed, secure communications systems which will be capable of processing and transmitting data at a much higher rate.

Interestingly the first aircraft to arrive at Lake Charles lacked the second SATCOM system as well as the two lower oval antennas. These will no doubt be installed while at Lake Charles. Whereas previous upgrades took some 19 months to

complete, as the aircraft was required to receive work at two plants, the new facility at Lake Charles anticipates achieving this in just six months with no requirement for upgrade work elsewhere.

Completion of the initial Block II is scheduled for December 2022, with the entire fleet finished by 2025.

### Longer-term future

The Navy has announced plans to acquire three EC-130J-30 aircraft to test the TACAMO mission within a different airframe. The three Hercules will be purely for evaluation but will include most exterior features of the E-6, including the large SATCOM antenna, although this is likely to be positioned above the rear of the fuselage. This would indicate that the forward fuselage will contain much of the heavier communications equipment. The trailing wire aerals will also be fitted.

However, the new TACAMO Hercules will be providing command and control communications exclusively for the Navy's submarines. The first EC-130J-30 is planned to be delivered to NAS Patuxent River during Fiscal Year 2026. It is worth noting that, should the service adopt the C-130J for the task, it will have come full circle, as the original TACAMO mission was flown by four C-130Gs, which began deliveries to the Navy in December 1963! 🚀

# MISSILES MA'



**New aircraft may steal the headlines and pilots may be played by movie stars but it's the weapons that are going to make the difference, says Charlie Clark**

**W**ithout the not-so-humble missile life would be back to the 1950s for all air forces. It is the marriage of pilot with aircraft that produces the lethal machines that we know as fighter jets. The air-to-air missile lacks the presence of the first two – but what are the effects of the third leg of the tripod and the introduction of more capable, but also more expensive ordnance?

The perennial questions about any new weapon are: does it provide better performance than the one it replaces; and does the price allow enough to interpret

that advance into a real advantage for the pilots who must use it and allow the necessary stocks to be established?

It's hard to predict how effective air-to-air weapons are. In terms of time, the longest conflict, excluding Vietnam, that any material conclusions can be drawn from is the Iran-Iraq War of 1980-88, although even that is limited to the initial and interim periods before Iranian missile stocks began to decline. This conflict offers only a vague snapshot of what happened approaching 35 years ago.

There are now far more capable weapons in service and in development. Missiles such as the AIM-260 Joint Advanced Tactical Missile will inevitably

be more expensive. Commonality for the United States armed forces air-to-air weapons procurement is spread between the US Air Force (USAF), the US Navy (USN) and the Marine Corps, helping with cost. The USAF and USN buy around 500-600 AIM-120s a year at around \$1m apiece and they also buy Sidewinder X at about \$400,000 each.

## **An unknown quantity**

How good an air-to-air missile is mirrors that of the shipborne surface-to-surface anti-shipping missile, far fewer of which have been used in combat. Russia's *Moskva* was the first major warship loss





# ARTILLERY



US Navy Lt. Daniel 'Crib' Armenteros, piloting an F-35C Lightning II assigned to Naval Air Station China Lake's Air Test and Evaluation Squadron Nine (VX-9), conducts the first live-fire test of an AIM-120 missile released from an operational Joint Strike Fighter  
**USAF/Christopher Okula**

to this type of system since the sinking of HMS *Sheffield* in the Falklands conflict 40 years ago.

The only missile systems we know that work and have been used with success are the various types of wire- and laser-guided anti-tank missiles, which are deployed in totally different environments. Except for the Iran-Iraq conflict there has been no lengthy, high-intensity peer-to-peer fight beyond a few brief incidents in the Middle East. There are no real indicators of not only how effective these missiles are and what their rate of consumption might be.

New types of missiles are under consideration in research and

development projects and studies. As noted, the one family of missiles that have had some success are the guided anti-tank ones but even these are now being countered by protective systems.

We might ask therefore how much longer will it be before combat warplanes are protected by more than chaff, flares and electronic measures? Will the day come when missiles need to be fired in salvos to stand any chance of a hit? Technology advances and where there is a need and a lucrative contract will surely mean someone will find an answer.

We are now in the fourth generation of air-to-air missiles. In the years after the introduction of the first US Sidewinder in the late 1950s missiles have matured through several types of guidance systems, warheads, and methods of propulsion. What they can do has expanded exponentially, with guidance

## DRONES AND UAVS

The invasion of Ukraine has seen the use of UAVs in large numbers for the first time in modern military history, but in terms of losses the numbers seem about even. Deployed both in attack and surveillance, the latter role has probably had the greatest impact especially with artillery and rocket forces now able to engage targets in real time with observation of fall of shot and adjustment ramping up effectiveness greatly.

There seems to be a complete absence, though, of any armed drones carrying AAMs, which could probably have been expected had these been in Russian service. It would make far more sense to send 'fighter' drones into Ukrainian airspace, given that there seems to be a reluctance on the part of the Russian Air Force to conduct either deep strike or air superiority missions with their conventional airpower. These are AAMs carried on drones into contested airspace, controlled and released by air or ground units under the user's control and shouldn't be confused with 'loyal wingmen' vehicles spotting targets well beyond the missile's sensor range. The drone in this case merely provides the transport for the missiles and the launch controls could push air-to-air missiles in theory to any place deemed of interest rather than the air-to-ground ordnance carried at the moment that effectively puts the ball into your opponent's half. This depends of course on the degree of surveillance of your enemy's airspace and your ability to make use of that and other forms of information.



stimulating the means of advancement, initially with heat-seeking and then into radar illumination by aircraft and then follow-on targeting by the missile's radar through to Infra-Red Search and Track (IRST). The radar models may be semi-active, which means they illuminate their target in bursts rather than continuously. All these types have pluses and minuses in their abilities to find and not be shaken off or decoyed by their prey.

The area of acoustics, although abandoned in theory in the 1930s, remains an option for possible future investigation. Modern combat jets radiate heat and sensor signals. They are also very noisy and with advancements in this area it might be possible to use this as a base for a secondary guidance system that seeks out a jet's engine. Israel now fields the Python-5 that uses silhouette recognition among its sensors to spot



targets, an ability now being deployed and investigated for maritime missiles, allowing priority targets such as aircraft carriers to be attacked within task groups. Weapons such as lasers and microwave systems might in the future also work with AAMs against specific targets.

Alongside accuracy, engine power has also increased and that has brought longer ranges and higher speed; a missile could get there more quickly and the warning time would be lessened because of this. These are the three factors that still govern missile parameters. Although engine power has increased as a result

so have size and weight. Solid fuelled rockets, although in competition with ramjet propulsion systems such as that carried on the Meteor, showed that such power plants did have drawbacks in other performance areas.

Another field of advancement has been the ability of AAMs to maneuver often at high G, making it harder for a target to evade through countermeasures. That leaves us roughly where we are today. There are missiles under development and without doubt there are updates and modifications under investigation or on the drawing board. What else can also be

done to make better use of existing types by incorporating the physical changes to missiles and to tactical changes to get more 'bang for the buck'? At the moment an air-to-air missile that doesn't hit its target ends up as a crater in a farmer's field, which is a poor return for the cost involved – not just the unit price but the cost of fuel to get the carrying aircraft up there as well as the risk to the pilot.

Upgrades for missiles to cope better with adverse weather is another area that needs attention. Perhaps the parameters of use and success could be altered – dogfights do not always take place in blue skies.

## More value with every shot

If we look at this through a logical series of events in combat we have, firstly, a round fired at an enemy aircraft. It fails to lock either from that aircraft's maneuvers or from countermeasures and given the speed of modern military jets it's outside the area where it will achieve a lock again pretty quickly, so our \$1m dollar piece of ordnance goes flying off till it runs out of fuel and makes that hole in the farmer's field. Throughout its flight, though, it has been over enemy territory, usually a place that is target-rich with all sorts of enemy equipment, vehicles, store dumps and headquarters, but it doesn't hit these because it's just a missile that missed and ploughing time is urgent this year. Take this a step forward: it has already been muted so that AAMs could carry anti-radar capabilities, which would be a very good idea, even the round that missed would be supporting the air effort. Link this capability with an overall network of battlefield information coming in from all types of sensors and it goes further. Perhaps there's no radar near enough for

**Left:** The 40th Flight Test Squadron's Majors Benjamin Naumann and Mark Smith fly the F-15EX Eagle II preparing to fire an AIM-120D missile during a Weapons System Evaluation Program mission near Tyndall AFB, Florida on January 25, 2022. This was the first live fire performed from the Air Force's newest aircraft  
**TUSAF/Sgt John Raven**

**Top:** The F-15EX Eagle II fires an AIM-120D missile during a test mission near Eglin AFB, Florida on January 25, 2022. The F-15EX can hold up to 12 AIM-120D missiles  
**USAF/Tech Sgt John Raven**







**Above:** An F-15E Strike Eagle weapons load crew team lifts an AIM-9X Sidewinder missile to attach to a pylon on July 15, 2019 at Al Dhafra Air Base, United Arab Emirates. The AIM-9X is an advanced infrared missile and the newest of the Sidewinder family of short-range air-to-air missiles carried on a wide range of fighter jets  
**USAF/ Staff Sgt Chris Thornbury**

**Left:** Members of a Stinger Man-Portable Air Defense System (MANPAD) team with 1st Battalion, 16th Infantry Regiment, 1st Armored Brigade Combat Team, 1st Infantry Division, fire and hit an outlaw drone target, as part of a training exercise in Bulgaria  
**US Army**

**Right:** The Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) completes its first live fire event off the coast of Point Mugu Sea Test Range in California in 2021  
**US Navy**

the missile to hit before its rocket burns out, though there is an ammunition dump located by another asset that is close enough to strike if carrying a GPS device. An accurate attack is on the cards. Missiles also founder in other ways. They fail to launch, fly and, frustratingly for the launch pilot, they don't either lock or detonate. These pitfalls require further research. The average air-to-air missile isn't a cruise missile though, and this is obviously not the primary role it's built or purposed for. However, it does contain perhaps a 50lb-plus blast/fragmentation warhead, probably even heavier. Add some unused rocket fuel and it's travelling at high velocity. Whatever target it hits is going to notice it even more than that farmer's field. The sensors carried on even the most advanced weapons are primarily designed to seek their target and destroy it; they're put into the envelope where a lock can be successful, and the pilot then taps the screen or pushes the button. This missile may be flying past high-value targets just outside its sensor range after it has a negative lock. As such it has no value either to the pilot who launched it or the taxpayer who financed it – but not if it is linked to data showing the big picture.

## Ukraine: too early to tell

The Russian invasion of Ukraine will supply more data about the success of air-to-air missiles. It will take time to gather, but as things stand it seems unless there is a radical change to the air combat taking place it won't contribute much overall due to its paucity. Tim Ripley's article Ukraine

Air War in August's *AirForces Monthly* magazine comprehensively examines this issue. Much can be said of the role of the surface-to-air missile in this conflict.

Again, it's hard to judge what effect the various GBAD systems are having with several films streamed on the media of successful shoot-downs including many helicopters, but judging their effectiveness is going to be difficult without reliable data. Both sides use similar vintage missiles, with Russia able to field more modern systems, but there was no indication from the beginning of the fighting that she had deployed any unknown new types; there was an absence of the kind of Ukrainian losses that resembled those of Israel in the 1973 Yom Kippur War. In this conflict, first use of the SAM-6 *Gainful* and to a very lesser extent SAM-7 *Strela* MANPAD inflicted losses that have really never been rivalled on a tactical level. The capture of the Pantsir gun/missile system, of which at least one



# MISSILE TRUCKS AND FIRST STRIKES

Boeing is now producing the F-15EX Eagle fighter with the ability to carry 12 AIM-120D BVRAAMs. It remains to be seen whether the new AIM-260 can be carried in similar numbers, but if it can and the descriptions of that missile's range are anywhere near to what has been hinted, this AAM is getting firmly into the area of a first strike weapon, certainly in a supporting or complementary role.

Any first strike on an adversary's airfields by either ballistic missile or cruise missile weapons would result in the scrambling of everything that can be got into the air, not only aircraft on QRA but those on routine training or testing or even just those that are fuelled with a pilot available to fly them. Scrambling aircraft would fly into swarms of missiles launched against these bases to time with the missile alerts from aircraft flying below radar levels. They could create havoc; those that didn't could go over to ground attack and wreak another type of damage on runways and facilities.

If the humble AAM can be made smarter it can achieve much more. It could become a more versatile weapon and increase its value. Research and studies will no doubt be carried out to test the viability of getting more from missiles aside from greater speed, range and improving its no-escape parameters. It's a case of fight smarter to fight better because in a plane-to-plane engagement missiles matter.

was intact, will fill a hole in the West's knowledge, but it doesn't seem to have had much of an impact. It should be borne in mind that Ukraine had a small air force to begin with, so losses must be viewed through this prism. 🇺🇦





# *ESCALATION* IN THE EAST





## The unprecedented PLA drills around Taiwan have raised tensions across the Straits to levels not seen in nearly 30 years, as Roy Choo reports

**S**ince the Strait Crises of the 1950s, tensions between China and Taiwan (officially the Republic of China or ROC) were at their highest between July 1995 and March 1996. The Third Taiwan Strait Crisis – as the events came to be known – was sparked by the late Taiwanese President Lee Teng-hui's visit to the US in June 1995. Taiwan's first Presidential election in March 1996, which China tried to influence, prolonged the animosity.

During the events, Beijing had its People's Liberation Army (PLA) conduct a series of military exercises near Taiwan, simulating an invasion. Volleys of short-range ballistic missiles (SRBMs) were rained close to the ports of Keelung and Kaohsiung, disrupting air and shipping links. PLA Air Force (PLAAF) fighters also probed the median line – a demarcation drawn down the center of the Taiwan Strait by the US in the 1950s that China had previously respected but never agreed on.

A pair of F-CK-1Cs from the 1st Tactical Fighter Wing (TFW) taxi to depart Hsinchu AB with a loadout of four AIM-9P Sidewinder and two indigenously developed Tien Chien 2 (Sky Sword 2) air-to-air missiles

All images: Peter Ho

There was fear that the exercises could develop into actual military action and Taiwan's military and the ROC Air Force (ROCAF) was put on high alert. The ROCAF was recognized to be significantly threatened at this time; it had aging Northrop F-5E/F Tiger IIs, an increasingly unreliable fleet of Lockheed F-104 Starfighters and less than one wing of new indigenous AIDC F-CK-1 Ching-Kuos yet to be fully operationalized. On the other hand, the PLAAF had been operating about two dozen Sukhoi Su-27s, alongside large numbers of J-6s, J-7s and J-8s.

Fortunately, the US intervened by directing two carrier battle groups to the





area, leading to China's de-escalation. Further aggression was averted as parties expressed willingness for reconciliation; the eight-month crisis came to an end.

Nearly 30 years on, China has emerged as a global power, its meteoric economic growth powering its military strength.

The events of August 2022 were stirred by a congressional delegation to Taiwan, led by US House of Representatives Speaker, Nancy Pelosi, between August 2-3. The visit led to her being the highest-ranking US official to step foot in Taiwan in 25 years. It was also noteworthy that the US Air Force (USAF) Boeing C-40 supporting the visit – callsign 'SPAR19' – took a deliberate route to skirt around the South China Sea while en route from Malaysia to Taiwan, likely to avoid possible harassment by the PLA or to signal political escalation.

Pelosi's visit hit a raw nerve, as China's President Xi Jinping is expected to be reappointed to a third term in office in November. As such, Beijing had its PLA conduct an unprecedented display of military might after Pelosi's visit was concluded, most probably designed to appease a domestic audience, some of whom had expressed dissatisfaction at the perceived insufficiently confrontational posture to her visit.

The military drills were to be held around Taiwan from August 4-7, in six

designated closure zones. On the first day, the PLA Rocket Force launched a reported 11 – possibly more – DF-15B and DF-16B SRBMs into the zones in the northeast, east and southwest of Taiwan island. According to the Japanese defense ministry, four of these had flown over the northern portion of Taiwan.

Flying high in the atmosphere at above 100km, the SRBMs would have been outside the engagement altitudes of the ROCAF ballistic missile defense systems, such as Raytheon Patriot Advanced Capability 2 (PAC-2) and PAC-3 as well as the indigenous NCSIST Tien Kung (Sky Bow) 3 systems. While seen as highly escalatory, CAJ understands that SRBMs had also flown over the northern tip of Taiwan in 1996.

The PLAAF also projected its airpower across the Taiwan Strait. During the period of high tensions from August 4-7, the ROC Ministry of National Defense (MND) reported 90 PLAAF-operated Shenyang J-11 and Sukhoi Su-30MKK *Flanker-G* sorties crossing the median line. Over a dozen PLA Navy (PLAN) ships also sailed close to Taiwan and an unspecified number entered its contiguous zone.

On August 10, the PLA's Eastern Theatre Command (ETC) announced an end to the exercises, claiming to have achieved its goals, although it said regular patrols would be carried out "in the direction

**Above:** An upgraded ROCAF F-16AM Block 20 – the local designation for an upgraded F-16V – returns with an impressive CAP loadout of four AIM-120C AMRAAM and two AIM-9M Sidewinder air-to-air missiles

of the Taiwan Strait". Five days later, it reaffirmed the patrols, in light of a US visit led by Senator Ed Markey. On August 26, the PLAAF stepped up its air coercion again due to another US visit, by Senator Marsha Blackburn. Of the 35 PLA aircraft reported by the ROC MND around Taiwan, eight Su-30MKKs, three J-11s, four J-16s, and three J-10s crossed the median line.

Unspecified drones – mostly commercial models – also overflew military facilities on Taiwan's outlying islands of Matsu and Kinmen, just off the coast of China. Taiwan's initial military response, firing flares to warn off the drones, was widely criticized as insufficient.

Apart from infringing airspace, commercial drones can unleash munitions on unsuspecting targets. Unfortunately, the Taiwanese military's counter-drone measures, such as jamming systems and using drone-deployed netting systems are only operated on a small scale.

Nearly a month after regular drone activity began, Taiwan's defense ministry announced on September 1 that an intruding commercial drone was shot down over the Kinmen islands after failing to heed warnings.

## Taiwan's response

Confronted with the latest round of Beijing's sabre-rattling, Taiwan has heightened the alert posture of its armed forces. Having just come off the annual Han Guang exercises, Taiwan's military was also on a slightly higher readiness. While exercising restraint to avoid escalation, Taiwan stood its ground as the PLA tested its red lines. The ROCAF conducted increased combat air patrols (CAPs) and had fighters on standby, ready to be scrambled against PLA incursions. Forward deployed at Magong Air Base (AB) on Penghu island – not too far from the median line – roughly a

**Below:** ROCAF F-16s were launched with AGM-84L Harpoon anti-ship missiles to counter PLAN ships, if necessary





dozen F-CK-1C/D Ching-Kuos of the 'Tian Ju' ('Sky Horse') detachment were also involved in the air operations.

The forward deployment allows scrambling fighters a quicker transit time to intercept encroaching PLA aircraft and is usually conducted in spring and summer's favorable weather conditions. Since late 2020, it has been extended to provide coverage over much of the year due to increased PLA air activity within Taiwan's Air Defense Identification Zone (ADIZ). To counter PLAN ships, F-16A/Bs from Hualien AB also flew regular patrols with AGM-84L Harpoon anti-ship missiles.

## Analyzing the drills

The conduct of the drills right on Taiwan's doorstep seems to affirm this as an extension of Beijing's gray-zone assault – referring to operations below the threshold of a military conflict but that could still erode a will to resist through sheer exhaustion.

Historically, the PLAAF has mostly kept its flights close to mainland shores due not only to the ROCAF's then-superior capabilities, but also to avoid possible defections across the Taiwan Strait. Beijing's military coercions against Taiwan have been stepped up since November 2016, when independence-leaning ROC President Tsai Ing-wen took office.

These began as 'island encirclement' drills with Xian H-6 bombers and escort aircraft. Such sorties, conducted intermittently, circumnavigated the island, but did not enter or fly close to the border of Taiwan's ADIZ. Since September 2020, these have escalated to near-daily incursions by various aircraft types into Taiwan's southwestern corner of the ADIZ.

The daily skirting across the median line by PLA fighters for much of August 2022 – even after the drills were said to have concluded – suggests China is attempting to push the boundaries, using Pelosi's visit as an opportunity.

ROC MND records also show Su-30MKKs as the primary aircraft used by the PLA to cross the median line during the exercise period and for much of August. This could point to certain Su-30MKK-equipped units forward deployed to bases along the Chinese coast to conduct these coercion operations. The J-16 was the most utilized aircraft during the last record-breaking number of intrusions in October 2021, possibly for the same reason.

The firing of SRBMs into closure zones around Taiwan seeks to reinforce that the island is highly vulnerable to ballistic



and cruise missiles. China's investments in its missile programs are largely driven by two key motivations: the rapid and decisive defeat of Taiwan through the destruction of its air bases and airpower generating capability, while at the same time, the establishment of an anti-access/area denial envelope to complicate any US intervention in the defense of Taiwan.

In particular, PLA SRBMs launched into the eastern-most closure zone seemed to demonstrate that the ROCAF's two hardened facilities on its east coast, designed to shelter its fighter aircraft from attacks, are no longer safe. These are the Chiashan (Optimal Mountain) base in Hualien and the smaller Shizishan (Stone Mountain) facility at Chihhang AB in Taitung. Both 'sanctuaries' were conceptualized in the early 1980s to allow the ROCAF to force-preserve, but are thought to be less survivable of modern bunker-busting munitions.

Of concern to Taiwan is how Beijing's gray-zone activities have been increasingly intensified and normalized. China's progressive step-up of its coercion of Taiwan is on point with its 'salami slicing' tactics to slowly chip away the island's territorial and sovereign integrity.

Apart from the objective to send a political message, the multi-pronged maneuvers also allowed the PLA to internally evaluate its joint operations and command-and-control (C2) functions, particularly in the cross-strait theater.

## Defending Taiwan

Recently, Taiwan's defense strategy has been to pursue a balance between symmetric and asymmetric capabilities. Symmetric force-on-force capabilities allow Taiwan to counter China's large-scale gray-zone assaults like those of August 2022, but asymmetric strategy is also needed. China outspends Taiwan on defense by a factor of 15, and the



ROC military's limited budget will never allow it to compete force-on-force in a conventional symmetric defense strategy.

Some analysts have criticized Taiwan's procurement of 66 F-16C/Ds, due for delivery from 2023. They cited their high cost, requirement of a large, vulnerable air base and limited effectiveness in an air war when deployed against the PLAAF's advanced fifth-generation fighters. They suggested that Taiwan should downsize its fighter force to focus on merely countering PLA coercive scenarios while a well-equipped surface-to-air missile (SAM) force should be established as a deterrent.

But recent events indicate that a sizable fighter fleet is still needed to defend against gray-zone assault. In fact, symmetric capabilities such as aerial refueling aircraft would have been helpful to provide a force-multiplier effect for the ROCAF's fighter force. An air refueling capability could allow its fighters to remain on CAPs for longer durations to maintain a deterrent presence. This is particularly required at the corners of its ADIZ that are far from the main island where the PLA has regularly projected its presence over the last two years.

Taiwan was offered ex-USAF KC-135 tankers through the Pentagon's Excess Defense Articles (EDA) program in the late 1990s, but the then leadership did not see a requirement. With Taiwan fighting a gray-zone assault from the air, the decision would seem to be a misstep.

The country's struggle against China's coercive actions is a work-in-progress and it remains to be seen how it will refine its defense strategy. 🇹🇼

**Left:** Having completed a CAP, a Mirage 2000-5Ei (assigned to the ROCAF's 2nd TFW) with Magic 2 infrared-guided and MICA radio frequency-guided air-to-air missiles returns to Hsinchu AB. Of the 60 aircraft delivered, 55 remain in the fleet, with a number of these placed in long-term storage due to the high costs associated with their operation

**Top:** A 3rd TFW-operated F-CK-1C Ching-Kuo fitted with AIM-9P and Tien Chien 2 air-to-air missiles returns after a CAP. About a dozen F-CK-1s are forward deployed at Magong AB on the Penghu islands as part of the 'Tian Ju' ('Sky Horse') detachment to allow quicker interception of encroaching PLA aircraft



## As the Slovakian Air Force withdraws the MiG-29 *Fulcrum* from service, Jorge Ruivo reports on the future for the fleet and Slovakia's fighter operations

**A**s a natural development for the process of military modernization, operations with the MiG-29 *Fulcrum* fighter in Slovak Air Force service have come to an end. It may have been accelerated by the conflict between Ukraine and Russia.

As '6425' pulls away from the formation it is easy to see the *Fulcrum* has three hardpoints under each wing, where it is possible to hang guided missiles, for example: two R-27 or six R-73 and R-60MK, blocks with unguided S-8 rockets, or unguided bombs up to 500kg  
**All images Jorge Ruivo, unless stated**

A member of the NATO alliance and Ukraine's neighbor, Slovakia operated a fleet of 11 *Fulcrums* under the 1st Tactical Squadron (1 Bojová Letka) at Sliač Air Base (AB). This was a fleet segmented between nine single-seat MiG-29AS and two dual-seat MiG-29UBs.

### 1st Tactical Squadron

The history of the Slovak Air Force's 1st Tactical Squadron dates back to October 1992, when Slovak pilots underwent a MiG-29 *Fulcrum* conversion course held at Zatec AB in the former Czechoslovakia.

The *Fulcrums* flew to Sliač AB in December 1992. Just a few days later, on January 1, Czechoslovakia peacefully split into the Czech Republic and

Slovakia, resulting in the division of the Czechoslovak Armed Forces. Over the next two years, its designation changed from 1st Tactical Squadron to being renamed as 311 Stíhacia Letka (1st Squadron of the 31st Fighter Wing) in early 1995 and finally to the 1st Bojová Letka of Stíhacie Letecké Krídlo (Fighter Wing) in October 2001.

Now, after more than 30 years of service, the MiG-29s will no longer be flown by Slovakia. Speaking in mid-August, Slovakia's Defense Minister Jaroslav Naď said: "The fighters are still in Sliač. They will protect our airspace until the end of August. On the 27th and 28th of August you will see them at the Slovak International Air Festival (SIAF), where they will officially say goodbye."





## AFTERLIFE

As of August 30, 2022, Slovak Air Force had nine modernized single-seat MiG-29As (0619, 0921, 2123, 3709, 3911, 6124, 6425, 6627 and 6728) and two modernized twin-seat MiG-29UB (1303 and 5304) fighter jets with the 1st Tactical Squadron of the 81st Wing (1.Bojová letka/81.Kridlo) at Sliač/Tri Duby AB in central Slovakia. These aircraft have a projected end-of-service life between 2029 and 2035. There are also three non-modernized MiG-29s (single-seat MiG-29As 0820 and 5113; and twin-seat MiG-29UB 4401) that are kept stored at Sliač.

The privilege of being the last Slovak *Fulcrums* to be seen in public, at SIAF in August, fell to four MiG-29AS jets (0921, 2123, 6124, 6627) in the flying display and one (6425) in the static display. The ceremonial water salute marking the end of *Fulcrum* operations in Slovakia was given to MiG-29AS 0921.

**Igor Bozinovski**

## Speculations

Many have speculated in recent months about whether or not Slovakia was due to hand over its MiG-29 fleet to Ukraine, for use in defending itself against the invading forces of Russia.

In April, Slovak Prime Minister Eduard Heger had mentioned that his country could possibly send MiG-29 fighter jets to Ukraine, but he did not elaborate. Three months later, Heger said his country could send its Soviet-made MiG-29 fighters and tanks to Ukraine, but declined to discuss the details.

And finally, during SIAF, the defense minister told reporters that the capital, Bratislava, remained ready to send the MiGs to neighboring Ukraine, but no deal had yet been concluded.

At the close of their flying display at SIAF, which marked the end of *Fulcrum* ops in Slovakia, the four single-seat MiG-29AS jets (0921, 2123, 6124, 6627) were given the traditional water-cannon salute by the base's fire brigade. The digital schemed 0921 is seen here being given its dowsing  
**Igor Bozinovski**



The upgraded MiG-29AS received the BAE Systems APX-113 IFF interrogator/transponder, which is fully integrated into the MiG-29's N019 radar and allowed Russian and Western electronics systems to work together and enabled reliable detection and identification of targets



## The next generation

In the process of modernization, the Slovak Air Force ordered 14 F-16 Block 70/72 aircraft as a replacement for its MiG-29 fleet in 2018. From a capability standpoint, the new F-16s for Slovakia will include advanced systems and equipment, such as the APG-83 active electronically scanned array (AESA) radar; modernized cockpit with new

and enhanced safety features; advanced weapons; conformal fuel tanks; an improved performance engine; and an industry-leading extended structural service life of 12,000 hours.

The first six Slovak Air Force pilots began training in the US last year and, according to the Ministry of Defense, another four were joining them this year. They begin with the T-38C Talon jet

trainer and then move on to the F-16. The training of technical and support personnel is also part of the contract. The last pilots selected to fly F-16 aircraft should complete training in the US in 2028. Before they go over to the US, they need to complete training at Sliač AB, where they undergo advanced training in the Aero L-39 Albatros trainer aircraft.

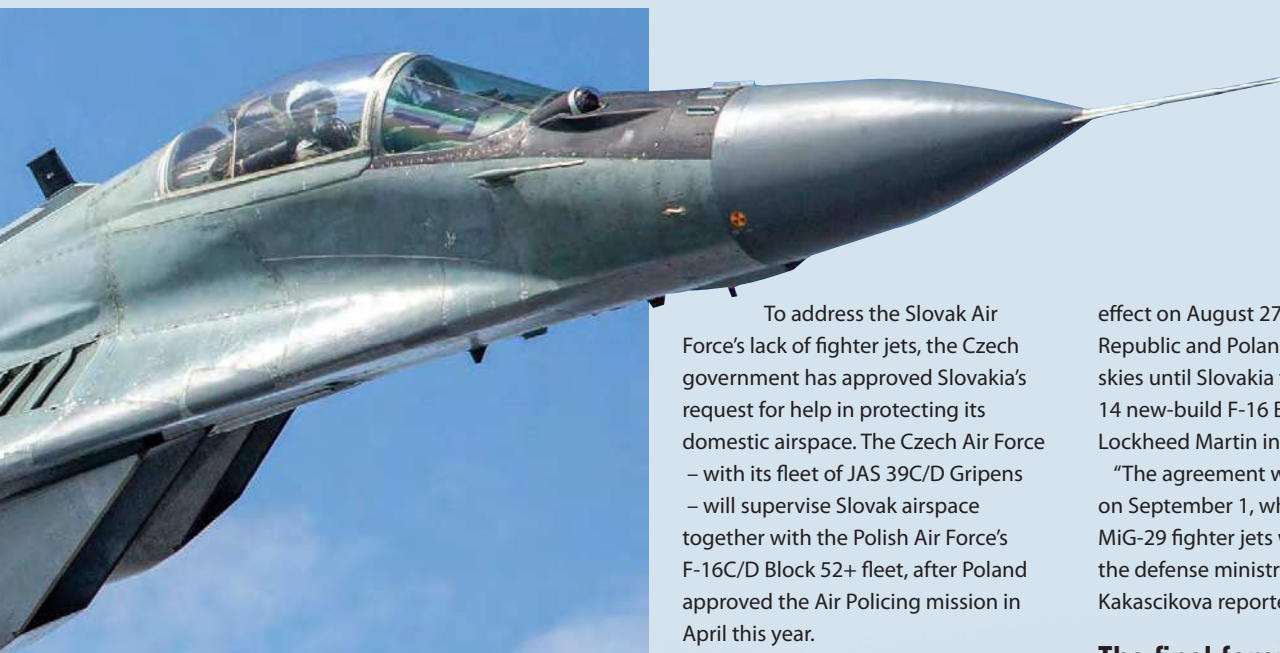
With the acquisition of the new F-16s, Slovakia is equipped with a military platform with greater interoperability between the allied and NATO countries, to the detriment of its predecessor, the MiG-29, a veteran of the Cold War that was built in the Soviet era.

## COVID then war

The Russian invasion of Ukraine in February caused logistical problems with the maintenance of the Slovak *Fulcrum* fleet (which had been provided at Sliač by Russian technicians). But the COVID-19 pandemic also caused problems in the production of Slovak F-16 Block 70/72s. In fact, the first aircraft that were supposed to arrive in the country in 2022/23 are now scheduled to be delivered in the first half of 2024. The expectation is that the Slovak F-16s will serve the nation's Quick Reaction Alert (QRA) mission from 2025.

**Above:** Despite the Slovak Ministry of Defense announcing that all of its MiG-29 fighter jets would be converted to digital camouflage, only two were painted – one of which (serial 0619) is seen here in-flight over Slovakia





To address the Slovak Air Force's lack of fighter jets, the Czech government has approved Slovakia's request for help in protecting its domestic airspace. The Czech Air Force – with its fleet of JAS 39C/D Gripens – will supervise Slovak airspace together with the Polish Air Force's F-16C/D Block 52+ fleet, after Poland approved the Air Policing mission in April this year.

effect on August 27. It means the Czech Republic and Poland will police Slovak skies until Slovakia takes delivery of the 14 new-build F-16 Block 70/72s from Lockheed Martin in the US.

"The agreement will come into effect on September 1, when Slovakia's MiG-29 fighter jets will be grounded," the defense ministry's Martina Koval Kakascikova reported in August.

### The final farewell

Thus the era of Soviet *Fulcrum* aircraft comes to an end – a total of 52 pilots have been trained, approximately 20,246 hours have been flown and, for those who attended SIAF 2022, it was the last opportunity to see the iconic MiG-29 flying in the colors of the Slovak Air Force. 🇸🇰

**Below:** The opening of the parachute to reduce the landing speed of the MiG-29AS *Fulcrum*, here very visible when arriving at Malacky AB near Bratislava for the official farewell ceremony in August



MiG-29AS 0619 with its engines in full afterburner takes off from Malacky AB after the Slovak Air Force's official MiG-29 farewell ceremony





# USS *KEARSARGE* VISITS FINLAND

As Finland settles into joining NATO, **Perttu Karivalo** reports on the USS *Kearsarge* amphibious group visit to the Northern European country, and other exercises that took place this summer. Finland and neighboring Sweden handed in their applications to join NATO on May 17 this year



# KLAARA OPERATIONS


The training area utilized by participants in Exercise Klaara was the Hanko coastal area and archipelago, South Finland, some 50 to 100km west of Finland's capital, Helsinki.

Two Finnish Navy garrisons are located in that area with good exercise areas, both having navy marine troop units. During Exercise Klaara, several different scenarios were trained, lasting from one day to several days. In most exercise scenarios, US Marine Corps and Finnish troops did landings using Finnish Navy Jehu-class landing boats, MV-22B Ospreys and USS *Arlington* CH-53Es escorted by

the UH-1Y and AH-1Z helicopters. AV-8B+ Harriers provided top cover and close air support for landing operations.

In one scenario, combined USMC and Finnish reserve units performed landings and got into heavy fighting against defending forces of Finnish conscripts. Conscripts performed maneuvers that forced USMC/Finnish Reserve troops to fight in two directions.

Exercise Klaara was a great experience for Finnish reserve and conscript soldiers, and it showed them they can operate both against and with US Marine Corps professional forces.



**S**everal bi-lateral military exercises between Finland and NATO countries were held during the summer this year – in the air, at sea, and on the ground. The largest of them was the visit of the 22nd Marine Expeditionary Unit (MEU) on board the US Navy's USS *Kearsarge* (LHD3), USS *Arlington* (LPD24) and USS *Gunston Hall* (LSD44) to Finland.

The 22nd MEU is a Marine Air-Ground Task Force that provides strategic speed and agility, ensuring that marines are forward deployed and prepared to protect US national security interests around the globe. The 22nd MEU can respond faster from longer ranges with greater capabilities across the spectrum of military operations.

An MEU consists of four elements: Command Element (CE), Ground Combat Element (GCE), Aviation Combat Element (ACE) and Logistic Combat Element (LCE). The ACE consists of a composite medium tiltrotor squadron operating Bell-Boeing MV-22B Ospreys, UH-1Y and AH-1Z helicopters and AV-8B+ Harriers, air defense teams, and all necessary ground support assets.

Activated on December 1, 1982, as the 22nd Marine Amphibious Unit (MAU), the 22nd MEU has had an impressive operational history and continues to serve as an expeditionary force in readiness.

The *Kearsarge* Amphibious Ready Group departed home port in March 2022 and sailed across the Atlantic Ocean. It operated firstly in the Baltic Sea between May and June and then participated in the multinational BALTOPS Exercise. From the Baltic Sea it sailed towards the Mediterranean, reaching it mid-July, when the group was ordered to sail back to the Baltic Sea, specifically the Gulf of Finland. This was for an exercise with the Finnish Defense Forces, starting just three weeks later, on August 8.

The order came as a surprise, and the group had not planned or prepared for it. Normally the planning of two week-long large exercises starts six to nine months prior. This time, the MEU had around 20 days to prepare.

Col Paul Merida, commander of the 22nd MEU, told *Combat Aircraft Journal* (CAJ) that three weeks before the exercise they knew nobody from Finland, and when the US Department of Defense contacted that nation about a possible exercise in

less than a month's time, Finnish Defense Forces already had their own exercise and operations ongoing. Therefore, he said, it was notable "how quickly the Finnish Navy and Defense Force planned the exercise" with the MEU. "It was incredibly impressive," Merida added.

The aim of the exercises was to develop the co-operation and compatibility between the navies and marines of the US and Finland. Finland is also aiming to bolster its ability to provide host country support during exercises and deployments.

Commander of the Finnish Navy Coastal Brigade, Cdre Marko Laaksonen supported what Col Merida said, commenting: "The planning of the exercise in little over three weeks was an enormous task and required hard work and long days from personnel of participating units.

"The navy also called in troops from its reserve to participate in the exercise. Everyone who got the call was ready to take part in the exercise."

As Finland has a mandatory military service, US Marine Corps (USMC) troops trained with Finnish conscripts and reserve troops – all of them well trained – and the USMC found it very easy to work with the professional Finnish units.

A single Finnish Air Force F/A-18C Hornet flies with two USMC AV-8B+ Harriers over the USS *Kearsarge*. Due to eutrophication in hot summers, blue-green algae grows in the Gulf of Finland, seen clearly here as the USS *Kearsarge* makes a track through it during Exercise Klaara  
**Finnish Air Force**



# FLYING UNITS

On board the *USS Kearsarge*, VMM-263 'Thunder Chickens' was operating 11 MV-22B Ospreys, VMA-542 operating six Harrier AV-8B+ V/STOL fighters and HMLA-167 'Warriors' three UH-1Y Venoms and four AH-1Z Vipers.

During deployments, the Harriers and helicopters are assigned to a medium tiltrotor squadron, this time being VMM-263, which then became VMM-263 (Rein). 'Rein' stands for reinforcement. As Harriers and helicopters are assigned to VMM-263, their own unit markings are overpainted and replaced with VMM-263 (Rein) markings. The same applies to the USMC CH-53E fleet operating from the *USS Arlington* during the deployment.

VMM-263 (Rein) is therefore one USMC flying unit, but operating

different types of air assets as one solid unit. On board the *Kearsarge* were three US Navy MH-60S Search and Rescue (SAR) and Anti-Submarine Warfare (ASW) helicopters from HSC-28 'Dragon Whales'. These three helicopters are not part of 22nd MEU and are operated by the US Navy providing SAR/ASW support.

USMC AV-8B+ Harrier pilot Cpt Leonhardt said: "This is our last deployment as VMA-542 before the squadron is disbanded."

VMA-542 is one of the three original USMC Harrier squadrons. It was founded as a AV-8A Harrier squadron on January 12, 1972, a few years after the disbandment as a F-4 Phantom squadron. VMA-542 will be re-born as a F-35B Squadron soon. Leonhardt hopes he can continue flying the

Harrier for as long as possible in other Harrier Squadrons, as he prefers the AV-8B+ Harrier over the F-35B like many other Harrier pilots.

The only jet that did not get overpainted with VMM-263 Rein markings was VAM-542's CAG bird, serial 165425 coded 'EG-53'.

Capt Brennan, a AH-1Y helicopter pilot, said: "USMC UH-1Y and AH-1Z helicopters always operate together, especially in exercises like Klaara."

The AH-1Z is flown by two equally trained pilots. Both cockpits have the same equipment and instruments, which makes it possible to fly and perform all missions from either the front or back seat.

The UH-1Y and AH-1Z also have 80% technical commonality, making maintenance easier.



**Left:** US Army UH-60M, 10-20276, Blackhawk at Port of Pori working together with Finnish Army Aviation during Exercise Klaara  
**Juha-Matti Lievonen**

## AIRCRAFT VISIBLE ON BOARD *USS KEARSARGE* AT HELSINKI PORT, AUGUST 7, 2022

Unit	Aircraft	Serials
VMM-263/ 'EG' 'Thunder Chickens' (Rein)	MV-22B Osprey	168347/00, 168231/01, 168239/02 (in hangar), 168733/03, 168605/04, 168293/05, 168346/06, 168626/07, 168611/08, 168326/09, 168021/10, 168666/13
VMA-542/ 'EG' 'Flying Tigers', assigned to VMM-263	AV-8B+/+(R)	164567/50, 165306/51, 165387/52, 165425/53 (CAG), 165428/54 (in hangar), 165430/55
HMLA-167/ 'EG' 'Warriors', assigned to VMM-263	AH-1Z	169278/40, 169277/41, 169508/42, 169510/43
HMLA-167/ 'EG' 'Warriors', assigned to VMM-263	UH-1Y	168504/30, 168317/31, 168417/32
HSC-28/ 'BR' 'Dragon Whales'	MH-60S	167844/36, 167860/42, 166324/44

## AIRCRAFT OPERATING FROM THE *USS ARLINGTON*

Unit	Aircraft	Serials
HMH-461 'EG' 'Iron Horse' assigned to VMM-263	CH-53E	162489/20, 161541/21, (162521)/ 23, 7/24

**Above:** Finnish Air Force F/A-18C Hornet flies with two USMC AV-8B+ Harriers. This summer, as well as flying with the USMC Harriers, legacy Hornets of Finland that are soon to be replaced by F-35As flew with RAF Typhoon FGR4s, F-35Bs, Belgian and Danish F-16As, and French Mirage 2000s  
**Finnish Air Force**

**Above right:** The badge of 22nd MEU

**Right:** *USS Kearsarge* can be seen in formation with Finnish Navy Missile boat PGG *Tornio*, and minelaying ship MLC *Hämeenmaa* **US Navy**







# OPERATION BIG LIFT

One of the exercises during Klaara was Operation Big Lift. During this, Finnish Navy Readiness Marine unit and USMC units were airlifted from land side to Russarö Island in Finnish Archipelago. The target was to overtake and capture the island using helicopter transport.

The Finnish Army provided ten NH90 Tactical Transport Helicopters (TTH), and the US Army sent two UH-60M Blackhawks and two CH-47M Chinooks. The USMC AH-1Z and UH-1Y provided cover for the transport helicopters. In total, 18 helicopters flew in one big formation to Russarö island – the largest-ever helicopter formation flown in the skies of Finland. It was also the biggest Finnish Army Aviation NH90 formation flown operationally. The Finnish Army has 20 NH90 TTH in operational service and 50% of the fleet took part in Big Lift.

Royal Air Force Chinooks and US Army CH-47 Chinooks and Blackhawks had their own exercise with the Finnish Army between June 19 and August 12. This exercise was combined during Klaara for operation Big Lift. Royal Air Force and US Army helicopters were based at Tampere-Pirkkala AB during their stay in Finland.

Col Paul Merida and Cdre Marko Laaksonen underlined that both parties had learned a lot from each other. Laaksonen also concluded: "Exercise Klaara was the best military exercise in my 33 years-long military career."





# A SUMMER FULL OF EXERCISE

After Russia invaded Ukraine in February and Finland decided to apply to join NATO, several exercises were held in Finland during the summer of 2022.

The Finnish Air Force, Army, and Navy all had their own bi-lateral training exercises with NATO countries; the US and British Armies trained with Finnish troops.

Exercises took place in the Rovaniemi region, north of the Arctic Circle. Several air forces visited Finland for short exercises – the most visible the *Kearsarge* Amphibious Group's participation.

These exercises were sending an important message to Russia that Finland is intending to join NATO and is already working together with NATO allies. Finland has been a NATO Partner nation for some years, and the Finnish Defense is fully NATO-compatible.

The Finnish Army held the first exercise June 27 to July 31, with US Army Special Forces taking part and their two MH-47G Chinooks. US and Finnish Special Forces trained together using US Army and Finnish helicopters.

A larger exercise, partly overlapping, took place June 19 to August 12, when Royal Air Force Chinooks and US Army CH-47 Chinooks and Blackhawks trained with Finnish NH90 TTHs.

The Finnish Air Force had multiple short exercises. The first took place as early as February 16 to 17; Finnish F/A-18C Hornets trained with Belgian Air Force F-16AM (MLU) Fighting Falcons based at Ämari Air Base (AB) in Estonia on NATO Air Policing duties.

The Finnish AF has trained regularly with NATO air units at Ämari – during July 6-7, the Finnish AF flew again with NATO units from the Estonian air base, this time with French Air and Space Force Mirage 2000-5Fs. Under the UK-led Joint Expeditionary Force (JEF), four RAF Typhoon FGR4s arrived at Rovaniemi AB between June 6-17, and two RAF F-35Bs visited Kuopio-Rissala AB, June 28-30. Both the Typhoons and F-35Bs performed joint training missions with the Finnish Air Force F/A-18C Hornets.

Two RAF Lakenheath, Suffolk-based USAF F-35A Lighting IIs from the 495th Fighter Squadron flew to Tampere-Pirkkala AB and trained with Finnish Air Force Hornets and Hawks for two days. The 495th F-35As also took part in Finland's annual airshow in Pori, June 18-19, a couple of days prior to training with the Finnish Air Force.

Other nations such as Denmark visited Finland over the summer – two Royal Danish Air Force F-16A (MLU) fighting Falcons visited Kuopio - Rissala AB, August 3-4, to fly dissimilar air combat maneuvers (DACT) and increase interoperability between the two nations.

It is clear that it was an extremely busy and challenging summer for the Finnish Defense Forces arranging all the different exercises, and on very short notice.

As its relationship with NATO strengthens, other exercises will be held and more nations that are part of NATO will visit, creating a stronger co-operation between Finland and allies.



**Left:** USMC AV-8B+ Harrier pilot Capt Leonhardt poses in front of one of the AV-8Bs aboard the USS *Kearsarge* during Exercise Klaara



**Left:** Capt Brennan flies the AH-1Z Viper attack helicopter from either the front or the back seat, depending on what he has agreed with his co-pilot. The two equally trained pilots decide before a mission their duties and who will sit where  
**All images**  
**Perttu Karivalo**  
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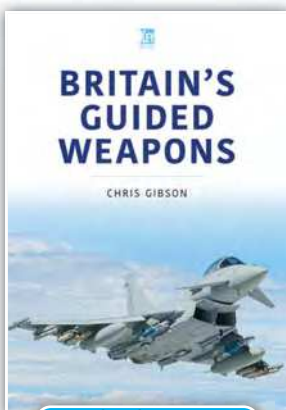
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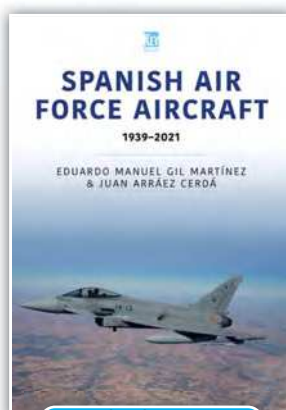
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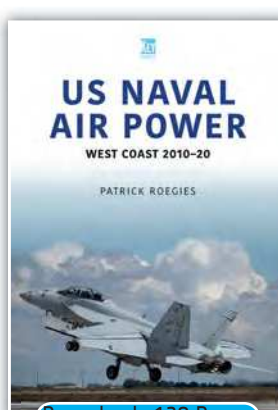
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OUR SHOP

**E**xercise Typhoon Flag, initially planned to take place at Decimomannu Air Base in Sardinia, was hosted jointly by 4° Stormo (Wing) at Grosseto in Tuscany and 36° Stormo at Gioia del Colle in southern Italy from June 20 to July 15. Each unit initially took part in the exercise from its own home base – 4° Stormo at Grosseto, 36° Stormo at Gioia del Colle, 37° Stormo at Trapani in Sicily, and 51° Stormo at Istrana in Veneto – after which they all deployed for two weeks at Gioia del Colle in Apulia.

The exercise involved both aircraft and personnel recreating a genuine out-of-area redeployment with all the units of the Aeronautica Militare (AM)

operating with Eurofighter Typhoons. It encompassed four different types of mission: training future fighter pilots through the advanced phase of the Operational Conversion Course (OCC), gaining experience in flying large force employment (LFE) missions in a complex scenario; performing advanced tasks as part of the Weapons Instructor Course (WIC); making preparations for a Eurofighter deployment to the UK for Exercise Cobra Warrior in September; and focusing on the integration process between fourth- and fifth-generation combat aircraft.

Maj P (name withheld for security reasons), commander of the 20° Gruppo (Squadron) Operational Conversion Unit (OCU) at Grosseto, explained: "The first

two weeks we concentrated on training related to OCC. In this first phase, each unit operated from its home base and we met in certain areas with the aim of pursuing the objectives related to the training of the pilots who are doing the final phase of OCC at Grosseto."

For the pilots in training, missions with increasing difficulty have been created following the profiles presented in the training syllabus. This is the advanced phase in the pilots' training, explained Maj P. "We introduce them to the world of air-to-air (A2A) and air-to-ground (A2G), to the use of the Laser Designator Pod, and also with the aid of night vision sensors, so that once they are ready, they can be sent to the operational units with Swing Role capability and with the

# TYPHOON

**Typhoon Flag, Italy's largest Eurofighter exercise of the year, took place at Gioia del Colle and Grosseto air bases in June and July. Giovanni Colla and Remo Guidi were there**







# TOWN



**Above:** Eurofighter F-2000A MM7351 '4-9' assigned to 9° Gruppo at Grosseto, taking off in full reheat for a morning mission

capability as Limited Combat Ready."

With the first phase approaching its conclusion, the units began to prepare for the second and most important part of the exercise - redeployment at Gioia del Colle. In addition to the local Eurofighter units, 10° and 12° Gruppo, a total of 12 F-2000s from 4° Stormo's 9° Gruppo at Grosseto, 37° Stormo's 18° Gruppo at Trapani, and 51° Stormo's 132° Gruppo at Istrana were deployed. This phase was mainly focused on the WIC, with the theory element handled by the Air Warfare Center (AWC) in Poggio Renatico, northern Italy, and the flight aspects managed by 20° Gruppo OCU at Grosseto. Two flight areas were mainly used for these missions: one located between Calabria, part of the Basilicata region, mainly in the Gulf of Taranto on the Ionian Sea (named 'Donald'), and the other in the Tyrrhenian Sea, east of Sardinia ('Star').

Maj V (name withheld for security reasons), head of tactics and operational standardization at 20° Gruppo OCU, said: "We structured the last two weeks of Typhoon Flag with the components A2A and A2G both featuring within the same mission. During these weeks we wanted to include the F-35 aircraft in the missions because one of the objectives was the integration between the fourth- and fifth-generation.

"The objective was to create a complex but controlled scenario, because we knew what effects we wanted to produce and repeat several times, to explore the capabilities of the Eurofighter aircraft, which may then be useful to the F-35 community, and to highlight the peculiarities of the F-35

**Left:** A true swing role fighter, this immaculate 36° Stormo's 12° Gruppo F-2000A has a special livery created for NATO Tiger Meet 2022. It is shown fully loaded with four AIM-120 AMRAAMs, two IRIS-T and four GBU-16 Paveway IIs. No 36° Stormo is scheduled to host the 2023 NATO Tiger Meet **All images by authors**



A unique opportunity to see Eurofighters from all the Aeronautica Militare fighter squadrons together. Here, all are ranged outside their shelters during Typhoon Flag flight operations. The line-up is headed by MM7317 '4-43' from 4° Stormo's 9° Gruppo at Grosseto



F-2000A MM7301 '37-11' from 37° Stormo's 18° Gruppo at Trapani taxis out for a Typhoon Flag mission



aircraft that would be useful for the Eurofighter pilots."

There were various exercise scenarios, all focused on using tactics with a very high level of difficulty to consolidate and test maneuvers in an environment with a large number of aircraft. Lt Col S (name withheld for security reasons) of 36° Stormo said: "Gioia del Colle is probably one of the [most] ideal places because it has space, both on the ground and in the air, and is close to the F-35's main base – Amendola – where we operate daily in integrated missions. It is a bit of a test case for what we do during the year at home; we bring it together and develop it all together."

Experienced pilots took part in this phase, along with many moderately experienced pilots who were training to perform a formation lead. The remainder were relatively young pilots who had recently completed the OCU course.

A further purpose of this phase is to prepare pilots who are already instructors to become weapon instructors (WI). This is the ultimate qualification, the highest that can be taken within the Eurofighter fleet and takes a pilot from being a specialty instructor to becoming a WI.

Maj P, 20° Gruppo commander, said: "Those are the pilots that the squadron

Below: A pilot assigned to 18° Gruppo shows he is ready for a Typhoon Flag mission



commanders report as having the required characteristics, abilities, and skills to become a weapon instructor. These pilots are the link between the tactics and operational standardization section and the technical systems and armament section of the 20° Gruppo at the units in which they belong."

This aspect is crucial because when there is a change in technology, the techniques for using a military instrument are likely to alter, so a structure must be in place to teach the revisions. Maj P continued: "Integration does not mean perfection, so finding the ideal balance between the capabilities of your machine and the capabilities offered by the new technology is essential. It entails integrating two systems that arise from different constructive logics, philosophies, and concepts of use, putting them together and adapting the tactics accordingly."

Crew chiefs performing pre-flight checks before the engine start for this F-2000







As mentioned earlier, the missions included within the WIC were vital for the upskilling of pilots ready to participate in September's Cobra Warrior exercise in the UK (formerly known as the Combined Qualified Weapons Instructor Course), so they were prepared for the modus operandi, methodology, and planning used by the Royal Air Force.

Pilots who upgraded at 20° Gruppo's WIC will have completed their training and received the WI qualification. Maj V of 20° Gruppo said: "We have trained to be ready to confront ourselves internationally when we fly alongside the pilots of the allied nations."

Typhoon Flag provided a vital training scenario where all personnel were able to compare and standardize the

## AM F-2000S AT GIOIA DEL COLLE DURING CAJ VISIT

### 4° Stormo/9° Gruppo Grosseto

MM7288 '4-40'

MM7317 '4-43'

MM7351 '4-09'

### 51° Stormo/132° Gruppo Istrana

MM7296 '51-11'

MM7339 '51-12'

### 37° Stormo/18° Gruppo Trapani

MM7301 '37-11'

MM7307 '37-01'

### 36° Stormo/10° and 12° Gruppo Gioia del Colle

MM7272 '36-11'

MM7308 '36-31'

MM7314 '36-33'

MM7315 '36-46'

MM7331 '36-47'

MM7352 '36-55'

**Above:** Two 36° Stormo F-2000As in front of the most famous wall at Gioia del Colle where they are preparing for a morning sortie as part of a Large Force Employment mission

techniques and procedures required for flying the Eurofighter. They were also able to develop of new tactics and techniques related to the use of the aircraft's Phase 2 Enhancement (P2E) capability software and the new related armament.

Given the highly positive feedback, the AM and the units involved are now aiming to stage the Typhoon Flag exercise annually and in various locations to be able to test the redeployment and reception capacity of all Eurofighter air bases. However, for the moment, Command of the Combat Forces has decided that the two main bases at Gioia del Colle and Grosseto should avoid moving around too many staff members and not have too many spare parts in place. 🛩️

**Below:** A pleasing angle on a F-2000A MM7301 '37-11,' assigned to 18° Gruppo at Trapani, while taxiing out for an afternoon sortie





# STATE REPORT

## ALABAMA TO HAWAII

*Combat Aircraft Journal* began running its series of US State Reports in July 2021. Since then, a number of changes have taken place and Tom Kaminski provides a state-by-state review of unit activations, deactivations and platform changes



## ALABAMA

### Maxwell-Gunter AFB (July 2021, Page 50)

In preparation for its conversion to a new mission as the formal training unit (FTU) for the MH-139A helicopter, the 908th Airlift Wing's (AW) 357th

Airlift Squadron flew its final C-130H tactical mission with its remaining four aircraft on April 2, 2022. Six days later, the unit's final aircraft departed for its new home with the Arkansas Air National Guard's

189th AW. The Air Force Reserve Command wing's new mission will involve training flight crews from the Air Force Global Strike Command, the Air Force District of Washington and the Pacific Air Forces.



USAF 908th Airlift Wing C-130H2 Hercules 91-9142 taxis out at Maxwell AFB, Alabama, on April 2, to participate in a final four-ship formation to mark the end of Hercules operations by the unit USAF/908th AW USAF/908th AW

### Joint Base Elmendorf-Richardson (August 2021, p40)

In support of its updated Arctic Strategy, the US Army reactivated the 11th Airborne Division on June 6, 2022. Replacing the US Army Alaska and assigned to I Corps, the 'Arctic Angels' will be manned, trained and equipped for the environment. During World War Two, the division fought in the Philippines from Leyte to Luzon and took part in the liberation of Manila from Japanese forces. It was

stationed at Okinawa, Japan, from August 1945 to May 1949, when it moved to Fort Campbell, Kentucky. The 11th Airborne Division deployed to Germany early in 1956, but was deactivated in August 1958. Reactivated as the 11th Air Assault Division (Test) at Fort Campbell on February 1, 1963, the organization developed and refined the air assault and air mobile tactics and equipment fielded by 1st Air Cavalry Division in Vietnam. The 11th Air Assault Division was deactivated

on June 29, 1965. The reactivated division assumed the responsibility for the US Army Alaska Aviation Task Force at Fort Wainwright's Ladd Army Airfield in Fairbanks.

### Eielson AFB (p46)

The 354th Fighter Wing (FW) at Eielson AFB received the last of its allotment of 54 F-35As on April 14, 2022, when serial 19-5494 and 19-5496 arrived from Lockheed Martin's Fort Worth, Texas facility. Both Lightning IIs were delivered to the 355th Fighter Squadron (FS).



## ARKANSAS

### Little Rock AFB (October 2021, p55)

After completing the required site surveys, the USAF confirmed on June 24, 2022, that the Arkansas ANG's 189th AW at Little Rock AFB in Jacksonville, would be tasked as a FTU for the C-130J. The 154th Training Squadron's (TRS) will initially receive four C-130Js. Considered to be the nation's tactical airlift center of excellence, the base already hosts the 314th AW, which is the USAF's C-130J FTU. Under the plan, the unit will divest four of its C-130Hs and receive a like number of C-130Js reassigned from other Super Hercules units. A timeline for the moves has not been announced. The wing began training crews to fly the C-130E in 1986 and later became the C-130H FTU.



## ALASKA



The final pair of F-35As delivered to the 354th Fighter Wing at Eielson AFB, Alaska, fly over the Joint Pacific Alaska Range Complex, on April 14, 2022 USAF/SrA Jose Miguel T Tamondong





## ARIZONA

### Davis-Monthan AFB (September 2021, p39)

Reporting to the 53rd Test and Evaluation Group at Nellis AFB, Nevada, as a geographically separated unit (GSU), the 418th Test and Evaluation Squadron (TES) was activated at Davis-Monthan on October 1, 2021. It is tasked with conducting operational test and evaluation for the Lockheed Martin HC-130J Combat King II and EC-130H Compass Call aircraft. The unit had previously been known as 88th TES, Detachment 1.

### Tucson International Airport (p41)

Training of Royal Netherlands Air Force F-16 pilots at Morris Air National Guard Base (ANGB) at Tucson International formally ended when the final mission concluded on July 29, 2022. The Dutch were the first of numerous allied and international partner air forces to train at the Arizona Air National Guard base. Assigned to the 162nd Wing's 148th Fighter Squadron (FS),

the Dutch detachment flew an average of 2,000 hours each year and four student pilots graduated from the training program every nine months. Training for Dutch pilots first took place at the Tucson base in 1989 but, in 2007, the program relocated to Springfield, Ohio. It returned to Tucson in 2010.

### Luke AFB (p47)

Reporting to the 56th FW, the 21st FS has supported training for the Republic of China Air Force with Block 20 F-16A/B fighters since 1997. Beginning in May 2021, the aircraft started returning to Taiwan, where they are being upgraded to the latest F-16V configuration. A final group of four jets returned to Taiwan in June 2022. An initial group of six F-16Vs, comprising five upgraded single-seat F-16s and one two-seat aircraft, arrived at Luke AFB on June 19, 2022, following the final leg of flight that began in Taiwan. As part of the upgrade to the latest F-16V configuration, the fighters received the Northrop Grumman AN/APG-83



ROCAF F-16V 6713 prepares to depart from Taiwan on June 15 on its delivery flight to the US Formosa military Image Press

active electronically scanned array (AESA) radar. The unit will relocate to the Arizona Air National Guard's Morris ANGB, Tucson International Airport, later this year.

The AFRC's 944th FW gained another squadron when Detachment 2, 944th OG was designated as 52nd FS at Luke on August 7, 2021. Known as the 'Ninjas', the squadron's 35 full and part-time instructor pilots support F-35A training for foreign military sales (FMS) operators.

### MCAS Yuma (p48)

Marine attack squadron VMA-214 became Marine fighter attack squadron VMFA-214 during a re-designation ceremony at MCAS Yuma on March 25. Its transition marked the end of 3rd Marine Aircraft Wing and Marine aircraft group MAG-13 Harrier

operations.

The 'Black Sheep' squadron's final detachment returned to MCAS Yuma at the conclusion of a deployment aboard the USS *Essex* (LHD 1) as part of the 11th Marine Expeditionary Unit on February 27, 2022.

Marine unmanned aerial vehicle squadron VMU-1 welcomed the first Marine Corps-owned General Atomics MQ-9A to MCAS Yuma on August 30, 2021. Also, part of the 13th MAG, the unit transitioned to the Reaper after sending its RQ-21A Blackjacks to storage with the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan AFB in Tucson.

The assets of the Reapers, which had previously been contractor-owned, contractor-operated (CO/CO), transitioned to government-owned, government-operated (GO/GO) status.



## NORTH CALIFORNIA

### Humboldt County Airport, McKinleyville (Nov 2021, p50)

Coast Guard Sector/Air Station Humboldt Bay became the seventh unit to complete the transition from the MH-65D to the MH-65E variant of the short range recovery (SRR) helicopter on May 19, 2022, when it took delivery of its third Dolphin. The unit's first MH-65E arrived on April 19, 2022

### Beale Air Force Base, Marysville (p51)

The last Block 30 RQ-4B Global Hawk remotely piloted aircraft assigned to the 12th Reconnaissance Squadron (RS) departed Beale for Grand Forks AFB, North Dakota, on July 22, 2022. Although based at Beale, the 12th RS is a geographically separate unit of the 319th Reconnaissance Wing at

Grand Forks. The USAF will complete its divestment of the entire fleet of 20 Block 30 Global Hawks by the end of Fiscal Year 2022.

### San Francisco International Airport (p56)

The transition of Coast Guard Air Station San Francisco from the MH-65D to the MH-65E began on June 23, 2022, when tail number 6578 arrived following a ferry flight from the Coast Guard Aviation Logistics Center in Elizabeth City, North Carolina. The air station is responsible for seven Dolphins.

### Naval Air Station Lemoore (p62)

The US Navy's second operational F-35A squadron moved closer to full operational capability on February

18, 2022, when strike fighter squadron VFA-97 achieved safe-for-flight (SFF) status at NAS Lemoore. The Warhawks flew the F/A-18E Super Hornet prior to their reassignment from Commander Strike Fighter Wing Pacific to

Commander Joint Strike Fighter Wing following its final Super Hornet flight on February 26, 2021.

The F-35C completed its first aircraft carrier deployment on February 12, 2022, when VFA-147 returned to NAS Lemoore.

The squadron's six-month placement aboard the USS *Carl Vinson* (CVN 70) had begun in August 2021.

The last RQ-4B Global Hawk Block 40 left Beale AFB for Grand Forks AFB on July 22, 2022. They were formerly operated by the 12th Reconnaissance Squadron and supported by the 319th Aircraft Maintenance Squadron Detachment 1 USAF/Staff Sgt. Ramon A. Adelan





# SOUTH CALIFORNIA

## Naval Base Ventura County, Point Mugu (Dec 2021, p44)

Although the US Navy initially planned to station its MQ-25A Stingray unmanned aerial refueling aircraft at Point Mugu, that decision was revised. As a result, the home

station of unmanned carrier-launched multi-role squadron VUQ-10 was changed to NAS Patuxent River, Maryland, on March 3, 2022. The fleet replacement squadron, which was established on October 1, 2021, will still operate under the administrative control of

Commander, Airborne Command & Control Logistics Wing at Point Mugu.

## MCAS Camp Pendleton (p52)

VMU-4, which had been assigned to the 4th MAW's MAG-41, was deactivated on May 15, 2022. Known as the 'Evil Eyes', the squadron had operated the unmanned RQ-21A Blackjack and was the only squadron of its type within the Marine Corps Reserve. It had been stationed at Camp Pendleton since relocating there from the MCAS Yuma in Arizona in 2013.

## MCAS Miramar (p55)

An F-35B training capability arrived at Miramar in December 2021,

when Marine fighter attack training squadron VMFAT-502 relocated from MCAS Beaufort, South Carolina. Reactivated as part of 2nd MAW's MAG-31 in June 2020, the 'Nightmares' were realigned under the 3rd MAW's MAG-11 on January 10, 2022. MCAS Miramar said farewell to Marine medium tiltrotor squadron VMM-166 when it was deactivated on October 1, 2021. The unit known as the 'Sea Elk' flew its final MV-22B flight on June 30, 2021.

The deactivation of the Osprey squadron is part of the Marine Corps' Force Design 2030, to ensure the Marine Corps is prepared to stand as the nation's naval expeditionary force-in-readiness. The unit had been assigned to the 3rd MAW's MAG-16.



An MV-22 Osprey attached to Marine Medium Tiltrotor Squadron 166 (VMM-166) (Reinforced), launches from the flight deck of Wasp-class amphibious assault ship USS Essex (LHD 2) while on a deployment of the Essex Amphibious Ready Group (ARG) and 13th Marine Expeditionary Unit (MEU) in the Arabian Sea on December 17, 2018. The unit disbanded at MCAS Miramar on October 1, 2021 **US Navy/Mass Communication Specialist 3rd Class Jenna Dobson**



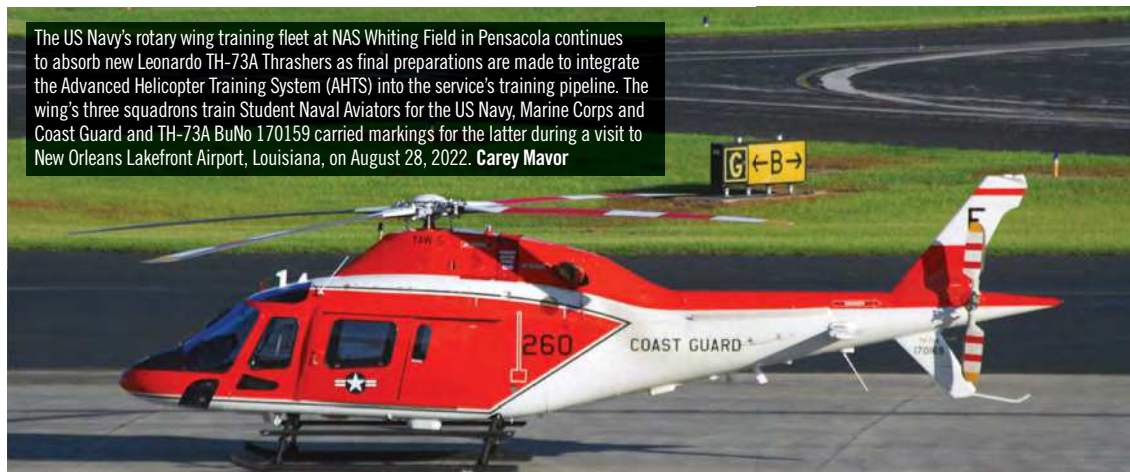
# COLORADO

## Buckley Space Force Base, Aurora (January 2022, p67)

In addition to the 140th Wing's 121st FS, Buckley is home to an Active Associate squadron that shares responsibility for operating and maintaining the Colorado Air National Guard wing's F-16C/Ds. The 383rd FS was activated on February 1, 2016, and it is one of ten similar units that report to the 595th Fighter Group (FG) at Shaw AFB, South Carolina.

The Colorado Army National Guard received the first of two UH-72B light utility helicopters on August 4, 2022, when Lakota serial 20-72465 arrived at the Buckley's Army Aviation Support Facility in Aurora. The helicopters were assigned to Company D(-), 3rd Battalion, 140th Aviation Regiment, replacing two of the unit's four UH-72A models.

The US Navy's rotary wing training fleet at NAS Whiting Field in Pensacola continues to absorb new Leonardo TH-73A Thrashers as final preparations are made to integrate the Advanced Helicopter Training System (AHTS) into the service's training pipeline. The wing's three squadrons train Student Naval Aviators for the US Navy, Marine Corps and Coast Guard and TH-73A BuNo 170159 carried markings for the latter during a visit to New Orleans Lakefront Airport, Louisiana, on August 28, 2022. **Carey Mavor**



# FLORIDA

## Eglin AFB, Valparaiso (Feb 2022, p50)

The last Sikorsky HH-60W assigned to the 96th Test Wing's 413th Flight Test Squadron departed from Eglin in Okaloosa County on March 22, 2022 and was transferred to the 53rd TEG's 88th Test & Evaluation Squadron (TES) at Nellis AFB, Nevada. Operating as part of the Combat Search and Rescue (CSAR) Task Force, the 88th TES is

conducting follow-on operation test and evaluation of the Jolly Green II helicopter.

## Duke Field, Crestview (p52)

The Air Force Special Operations Command (AFSOC) took delivery of three Embraer Defense A-29C Super Tucano light attack aircraft from Sierra Nevada Corporation (SNC) in March and April 2022. The

two-seat turboprops are being operated by the 492nd Special Operations Wing's (SOW) 6th Special Operations Squadron (SOS). Based at Eglin AFB's Duke Field, which is also known as Eglin AFB Auxiliary Field #3, the squadron reports to the wing via the 492nd Special Operations Group (SOG). The Super Tucanos will support AFSOC's Combat Aviation Advisor (CAA) program.



## Robins AFB, Warner Robins (April 2022, p62)

The Georgia ANG said farewell to the first of its Northrop Grumman E-8C joint surveillance target attack radar system (JSTARS) aircraft when serial 92-3289 departed from storage with the 309th Aerospace Maintenance & Regeneration Group (AMARG)

at Davis-Monthan AFB, Arizona, on February 11, 2022. The USAF was given permission to retire four of its 16 E-8Cs in Fiscal Year 2022. Assigned to the ANG's 116th Air Control Wing (ACW), responsibility for the aircraft is shared with the active duty 461st ACW at Robins. Prior to its departure, serial 92-3289 flew its final operational training sortie

from Robins on January 27. Since the initial delivery, the 128th Airborne Air Control Squadron (AACS) has flown two additional E-8Cs to the 309th AMARG.

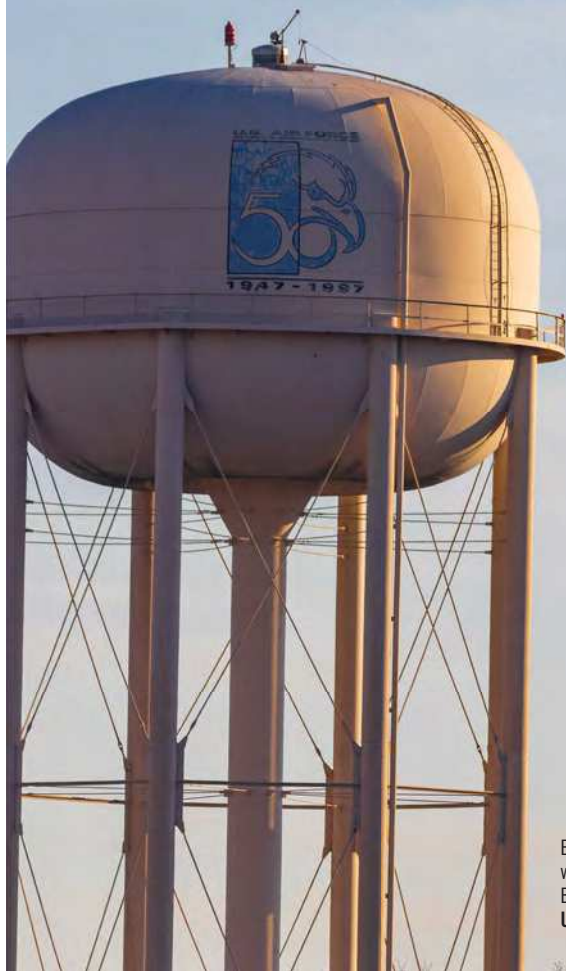
## Barrow County Airport, Winder (p62)

The Georgia Army National Guard's Company C, 1st Battalion, 106th Aviation Regiment has

transitioned from the UH-60A/L to the upgraded UH-60V variant. Based at the Barrow County Airport, the air assault company's battalion headquarters is in Illinois. Company C is expected to have a full complement of UH-60Vs by September 2022.



# GEORGIA



E-8C 92-3289 does one last fly-by, waving its wings over Robins Air Force Base, Georgia, on February 11, 2022  
US ANG /Tech. Sgt Jeff Rice



# HAWAII

## MCAS Kaneohe Bay (May 2022, p35)

Recent changes at MCAS Kaneohe Bay saw the deactivation of two of the helicopter squadrons assigned to Marine aircraft group MAG-24.

Marine heavy helicopter squadron HMH-463 was deactivated on April 21, 2022. Known as the 'Pegasus', the squadron had operated the Sikorsky CH-53E. Just one day later, Marine light attack helicopter squadron

HMLA-367 was deactivated. The 'Scarface' will be reactivated at MCAS Camp Pendleton, California, in 2023. It will replace HMLA-469, which is scheduled for deactivation. The moves are associated with the implementation of the Marine Corps' Force Design 2030 efforts.

In addition, Marine unmanned aerial vehicle squadron VMU-3 flew

its final RQ-21A mission on May 24, 2022. The Blackjack was launched and recovered from Landing Zone Westfield at the Marine Corps Air Station at Kaneohe Bay. The 'Phantoms' will subsequently be transitioning to the extended range variant of the General Atomics MQ-9A Reaper, with deliveries beginning in summer 2023.

# BAY STATE AIRPOWER

Tom Kaminski continues our state report series, exploring Massachusetts, nicknamed the Bay State



**Above:** A pair of F-15Cs from the 104th Fighter Wing's 131st Fighter Squadron, conduct a training mission over New England on November 13, 2014. Both Eagles are equipped with external fuel tanks, six CATM-120 and two CATM-9X captive air training missiles. The 131st FS operated the A-10A prior to transition to the F-15C in late 2007  
**Jim Haseltine**

**T**he most populous state in the northeastern US is officially known as the Commonwealth of Massachusetts, nicknamed the 'Bay State' or 'Old Bay State'. The seventh smallest state in terms of total area, it borders the Atlantic and Gulf of Maine on the east, Connecticut and Rhode Island to the south, New Hampshire and Vermont north, and New York state to the west. As recently as 1997, Massachusetts was home to an army airfield and a naval air station. Today, with one exception, it's military aircraft are operated from joint civil military airports or bases maintained by reserve components.

## Westover

Central Massachusetts has two facilities that support reserve components of the

USAF. Covering 2,511 acres near Chicopee, the Westover Air Reserve Base (ARB) is the largest by land area and serves as a staging base for the Federal Emergency Management Agency (FEMA). It opened as Westover Field on April 6, 1940, named to honor General Oscar Westover, commanding officer of the US Army Air Corps from 1935 to 1938. During World War Two, the base became the largest military air facility in the northeast.

Renamed Westover AFB in June 1948, during the Cold War it supported Strategic Air Command (SAC) bombers and tankers but on May 19, 1974, was turned over to the Air Force Reserve. It is currently a joint-use facility, shared by Westover Metropolitan Airport. The 11,600ft runway is the longest in New England.

Today the base's 439th Airlift Wing and its Operations Group (OG) are responsible

for eight Lockheed Martin C-5M Super Galaxies. Although it is an Air Force Reserve Command organization and assigned to the 4th Air Force at March ARB, the Wing is gained by Air Mobility Command (AMC). Transition of the 337th Airlift Squadron from the C-5A to the C-5B began in June 2006. It had first received the C-5A in 1987. The squadron welcomed its first C-5M on June 2, 2017, and the final upgraded Super Galaxy touched down at Westover on September 20, 2018. The squadron has been stationed at Westover since April 1966 and was responsible for the USAF's last C-5A; serial 70-0461 departed Westover for storage at Davis-Monthan AFB, Arizona, on September 7, 2017. It had received several C-5As that were intended to fill gaps as the squadron's C-5Bs were sent to Lockheed Martin for conversion to C-5M.





**Above:** HH-60M Serial 07-20039 from Detachment 1, Company C, 3rd Battalion, 126th Aviation Regiment, prepares to land at Westfield-Barnes Regional Airport on July 24, 2014 **Ken Middleton**

## Westfield

Westfield Barnes Airport is northwest of Springfield in the central part of the state and the 1,200-acre facility's tenants include the Barnes Air National Guard Base and the Massachusetts Army National Guard's Army Aviation Support Facility (AASF) #2.

The Westfield Aviation Field was dedicated on October 12, 1923, and in 1936 was named to honor the family that made its construction and expansion possible. Today, the airport is owned and operated by the City of Westfield and Barnes ANGB is home to the 104th Fighter Wing (FW) 'Barnestormers'.

Assigned to the Wing's 104th OG, the 131st Fighter Squadron (FS) has been stationed at Barnes since activation in 1947. Prior to its conversion to the F-15C/D, the squadron operated the A-10A and had first received the Thunderbolt II in 1979. After decisions associated with the Base Realignments and Closures Commission (BRAC) 2005

recommendations, the squadron – the 'Death Vipers' – took over the mission and aircraft previously assigned to Massachusetts ANG's 102nd FW on Cape Cod. The A-10A departures began in March 2007 and the first F-15Cs arrived on September 8, 2007. The 131st is one of five operational ANG squadrons that continue to fly the Eagle in the air defense role.

On February 15, 2010, the 104th FW first stood up the Air Sovereignty Alert (ASA) mission, when it assumed the responsibility from the Vermont ANG's 158th FW. In August 2012, the Barnestormers completed their first 90-day theater security package deployment to the Central Command Area of Responsibility with the Eagle. As a component of Air Combat Command (ACC), the unit continues to perform the 24/7 Aerospace Control Alert (ACA) mission with armed F-15Cs in support of the North American Aerospace Defense Command (NORAD) mission. It expects to receive a decision regarding its transition to the Boeing F-15EX or the Lockheed Martin F-35A in near future.

Constructed in 2001, the Massachusetts ARNG's AASF #2 replaced a facility located at Westover ARB and supports three units. Detachment 1, Company C, 3rd Battalion, 126th Aviation Regiment operates six Sikorsky HH-60M in the air ambulance role. Although the 3rd Battalion is headquartered at Joint Base Cape Cod, the main body of Company C is in located in Burlington, Vermont. Detachment 1, Company C, 1st Battalion, 224th Aviation Regiment, is tasked with the security and support role and has a pair of Airbus Helicopters UH-72As. The company headquarters is at Joint Base McGuire-Dix-Lakehurst, New Jersey, and the 1st Battalion is headquartered in Maryland. Detachment 3, Company B, 638th Aviation Support Battalion (ASB) is a maintenance unit and its company headquarters is in

## MASSACHUSETTS



Canton, Ohio. The Battalion headquarters is in Indiana and the 638th ASB is a component of the 38th Expeditionary Combat Aviation Brigade (ECAB). The AASF is in the northwest corner of the airport and occupies 31 acres of land leased from the City of Westfield.

## Hanscom Field

Located 20 miles northwest of Boston, Laurence G Hanscom Field in Bedford, Massachusetts, is the region's largest general aviation airport. It supports a variety of private and corporate aircraft and is also home to a Flight Test Facility.

The Commonwealth of Massachusetts acquired 500 acres of land in 1941 to create an auxiliary airport for Boston. The Bedford Airport was leased by the Army Air Corps in mid-1942 and named Laurence G Hanscom Field, honoring a founding member and commander of the Massachusetts Wing of the Civilian Air Reserve in February 1943. The airfield became a joint military and civilian facility in the 1950s and, in 1959, the Massachusetts Port Authority assumed control of the state land. Regular military operations ended September 1973 and general operations and maintenance of the airfield became the responsibility of Massport in 1974.

Hanscom AFB is adjacent to the airfield and is the Air Force's center for development and acquisition of electronic systems. In July 2012, the Electronic Systems Center was realigned as part of the newly created Air Force Life Cycle Management Center at Wright-Patterson AFB in Ohio. Today, Hanscom is home to the AFLCMC's Program Executive Offices (PEO) for

the Digital and Command, Control, Communication, Intelligence (C3I) & Networks (C3I&N) Directorates. Known as PEO Battle Management until September 2018, the Digital Directorate retained responsibility for the USAF's battle management portfolio that includes the E-3B/C/G, E-4B, E-8C and E-11A aircraft but was expanded to include software products, cybersecurity processes, cloud infrastructure and testing activities. PEO-C3I&N is responsible for developing, acquiring, deploying and sustaining cyberspace, communication, cryptologic and space/nuclear network capabilities.

The Massachusetts Institute of Technology (MIT) Lincoln Laboratory, in Lexington, Massachusetts, is a federally sponsored research and development institution of the US Department of Defense. It applies sophisticated technology to national security issues and conducts long-term technological research and development (R&D), as well as rapid prototyping and demonstration.

**Above:** The crew of an MH-60T from Coast Guard Air Station Cape Cod conducts a hoist operation with the personnel aboard the US Coast Guard cutter *Seneca* (WMEC 906) during the Operation Orange Flag exercise in Rhode Island Sound on April 1, 2015. **USCG/P03 Jimmy Clay**

**Below:** A modified Saab 340B airliner became the newest aircraft in the MIT Lincoln Lab's airborne testbed fleet when it arrived at Lawrence G Hanscom Field, Bedford, on April 30, 2021. Now civil registered as N331CL (c/n 340B-331), the Saab had been delivered to Japan Air Commuter in 1993. **Lincoln Labs /G Cooper**

Sensors, integrated sensing, signal processing for information extraction, decision-making assistance and communications are among the lab's main competencies, and it occupies 75 acres at the east of Hanscom AFB, including 20 acres that are owned by MIT.

Located on Hanscom Field, the Flight Test Facility supports R&D programs with unique airborne test platforms, state-of-the-art test facilities and integration and flight-test risk management solutions.

Created to support early air-to-air collision avoidance research programs sponsored by the Federal Aviation Administration (FAA), the Flight Test Facility expanded to cover a variety of Department of Defense and FAA programs. It currently operates several experimentally certificated commercial derivative and former military airborne testbeds, ranging from a small single-engine Cessna to larger jets. The fleet includes a pair of Gulfstream IVs and a





## MASSACHUSETTS STATE REPORT

Location Command	Unit	Aircraft	Tail Code	Notes
<b>Westover Air Reserve Base, Chicopee</b>				
439th Airlift Wing / Operations Group	337th Airlift Squadron	C-5M		
<b>Westfield-Barnes Regional Airport/Barnes ANGB</b>				
104th Fighter Wing / Operations Group	131st Fighter Squadron	F-15C/D	MA	
AASF #2 (Massachusetts Army National Guard)	Det. 1 C/3-126th AVN (AA)	HH-60M		
	Det. 1 C/1-224th AVN (S&S)	UH-72A		
<b>Hanscom Air Force Base, Bedford</b>				
AFLCMC	MIT Lincoln Lab Flight Test Facility	G1159, Gulfstream IV, C-20H, HU-25B, Saab 340B, Cessna TU206G		{1}
<b>Joint Base Cape Cod/Camp Edwards, Falmouth</b>				
AASF #1 (Massachusetts Army National Guard)	A/3-126th AVN (CMD)	UH-60A/L		
	OSACOM Det. 12	C-26E		
1st Coast Guard District	Air Station Cape Cod	MH-60T, HC-144A		
Notes: {1} Aircraft are operated by the Massachusetts Institute of Technology Lincoln Laboratory Flight Test Facility on behalf of the USAF's AFLCMC				

former USAF C-20H variant of the same corporate jet, a former US Coast Guard HU-25D, a highly modified Saab 340B and other experimental general aviation aircraft that support R&D. A single Gulfstream II is expected to be retired soon. The small fleet includes aircraft owned by MIT, bailed/loaned by the USAF, and leased from commercial sources and operated as airborne radar, sensor, and optical systems testbeds.

## Cape Cod

Joint Base Cape Cod in Falmouth is a joint-services base that covers around 22,000 acres, on the upper western portion of Cape Cod. It supports units of the Massachusetts ARNG and ANG, the US Coast Guard and the USAF. In 1938, the landing field area at Camp Edwards was named Otis Field for pilot and flight surgeon, Lt Frank 'Jesse' Otis. He was a member of the 101st Observation Squadron and was killed on January 11, 1937, when his Douglas O-46A crashed near Hennepin, Illinois, during a cross-country training mission. Renamed Otis AFB in 1947, throughout the Cold War the facility supported units of the Aerospace Defense Command (ADCOM) and SAC. Until 1973, the base was the nation's largest Aerospace Defense Command

**Below:** One of eight Super Galaxies operated by the 439th Airlift Wing's 337th Airlift Squadron makes its final approach to land at Portsmouth International Airport at Pease in Portsmouth, New Hampshire, on December 7, 2021. Originally delivered as a C-5B, serial 87-0031 was among the last Galaxies upgraded to the C-5M configuration  
**Ken Middleton**

facility. Renamed Otis ANGB that same year; in 1977 the base was divided by new boundary lines that formed the Massachusetts Military Reservation (MMR). The new complex comprised the Otis ANGB, Camp Edwards and Coast Guard Air Station Cape Cod.

The airfield was known as Otis Air National Guard Base but became known as Cape Cod Coast Guard Air Station because of the 2005 BRAC decisions. The US Coast Guard assumed responsibility for the operation and management of the airfield on October 1, 2008. In July 2013, MMR was renamed Joint Base Cape Cod.

Comprising about 15,000 acres in the northern section of the base, the Camp Edwards Army National Guard Training Site is the primary military training facility for the Massachusetts National Guard, but is also used by other military branches, law enforcement and first responders.

Prior to its conversion to an intelligence, surveillance and reconnaissance (ISR) organization, the Massachusetts ANG's 102nd Intelligence Wing was responsible for F-15C/Ds flown by the 101st FS. On September 11, 2001, the 102nd FW's F-15Cs were the nation's first military response to the terror attacks in New York, where they established a combat air patrol

intended to prevent other incidents there.

The Wing's mission changed because of the 2005 BRAC decision and its final F-15 mission was carried out on January 24, 2008, when two Eagles conducted a simulated scramble. The 102nd is the Air Guard's fifth oldest unit, tracing its history to the spring of 1921 when the 101st Observation Squadron stood up. The Wing remains at the Otis Air National Guard Base at the southeast of the airfield.

Commissioned on August 29, 1970, Air Station Cape Cod is the only air station assigned to the 1st Coast Guard District and is the service's third largest physical facility. It operates three HC-144As and three MH-60Ts from northern New Jersey to the Canadian border. Plans call for the transition to the HC-144B to begin in 2023.

Air Station Cape Cod claims to be the service's oldest continuously operating air station, tracing its roots to 1925 when the first formal unit was established on Ten Pound Island in Gloucester. In 2014, Coast Guard Base Cape Cod was established as a mission-support facility for operations within the 1st Coast Guard District.

On the western side of the airfield, the Massachusetts ARNG's AASF #1 supports the operation of two flying units – Company A, 3rd Battalion, 126th Aviation Regiment, operating eight UH-60A/L variants of the Black Hawk in the Command Aviation role. The unit reports to the 3rd Battalion headquarters, also located at JB Cape Cod. Also based at the AASF, Detachment 12 Operational Support Airlift Command (OSACOM) is responsible for a single Fairchild C-26E that reports to the Operational Support Airlift Activity (OSA-A) at Davison Army Airfield, Fort Belvoir, Virginia.

The 100-acre Cape Cod Space Force Station is on the northwestern edge of the joint base near the Cape Cod Canal in Sagamore. It is home to the 6th Space Warning Squadron, a unit of Space Delta 4, at Buckley Space Force Base, Colorado. The squadron is responsible for operating the AN/FPS-132 Pave PAWS (phased array warning system), which is the only land-based radar site providing missile warning covering the eastern US and southern Canada against sea-launched and intercontinental ballistic missiles.

Originally designated the Cape Cod Missile Early Warning Station, it opened on April 4, 1980. It was known as Cape Cod Air Force Station from January 5, 1982, until June 11, 2021, when the mission was transferred to the US Space Force. 🗨



# WOLVERINES SHOW SOME STEEL

**Tom Kaminski takes a look at the only inland state that operates US Coastguard units to cover the Great Lakes**

**M**ichigan is known as the Wolverine State, but is also often referred to as the Great Lake State – it is bordered on four sides by Lake Superior to the north, Lake Michigan west, Lake Huron on the northeast and a small part of Lake Erie southeast.

Lakes Michigan and Superior and the Mackinac Strait separate the Upper Peninsula from the rest of the state, the Lower Peninsula.

Michigan shares an international border with Canada that passes through Lakes Superior and Huron to the north and east.

On its south side it borders the states of Ohio and Indiana and its western border

with Wisconsin and Illinois passes through Lake Michigan. Second only to Alaska, the state's shoreline covers 3,288 miles and is the only inland state to support US Coast Guard aviation assets.

Michigan was admitted to the Union as the 26th state on January 26, 1837. It is the tenth most populous state in the nation and the 11th largest in land area.

Michigan's Upper and Lower Peninsulas are divided into eight geographic regions.

The state had been home to several active military facilities and air bases that included the Strategic Air Command's (SAC) K I Sawyer, Kincheloe and Wurtsmith Air Force Bases (AFB), which are all now civil airports. Today, only reserve facilities remain and, with one exception, the



A pair of A-10Cs from the 127th Wing's 107th Fighter Squadron flies a training mission over Michigan on May 13, 2022. Based at Selfridge Air National Guard base near Detroit, the unit has operated the Thunderbolt II since the aircraft were transferred from the Michigan Air National Guard 172nd Fighter Squadron in 2008 **US ANG/Drew Schumann**





state's military aircraft now operate from joint civil military airports.

## Southeast

Selfridge Air National Guard Base (ANGB) in Mount Clemens is the largest facility in the state and was originally opened by the Packard Motor Car Company as the Joy Aviation Field. Selfridge Field was one of 32 Air Service training camps established after the United States entry into World War One. It was named to honor 1st Lieutenant Thomas E Selfridge, who was killed on September 17, 1908, while flying as a passenger with Orville Wright at Fort Myer, Virginia. Later operated by the US Army Air Corps it became Selfridge AFB in 1947 and hosted numerous tactical and strategic aircraft and units. On July 1, 1971, Selfridge AFB was transferred to the Michigan Air National Guard and today the 3,075-acre facility is one of the oldest continuously operating military airfields in the nation.

The Michigan Air National Guard's 127th Wing has been stationed at Selfridge since it relocated from Detroit Metropolitan Airport near Romulus in December 1970. Operating from

**Below:** A UH-60 prepares to land at Camp Grayling while transporting soldiers from the Michigan National Guard's 126th Infantry Regiment on August 10, 2018. The unit was participating in the Northern Strike 18 exercise at the Camp Grayling Joint Maneuver Training Center and the Alpena Combat Readiness Training Center  
**Michigan National Guard/Private 1st Class**  
**Chris Estrada**



the southeastern side of the airfield, the 127th Wing is responsible for units gained by both Air Combat Command (ACC) and Air Mobility Command (AMC). Reporting to the wing's 127th Operations Group (OG), the 107th Fighter Squadron operates 21 Fairchild Republic A-10C attack aircraft. Known as the 'Red Devils', the squadron transitioned

from the Block 30 F-16C/D to the A-10C in 2008. It had operated the Fighting Falcon since receiving the first F-16As in 1990. Historically, it is one of the oldest squadrons in the USAF and was first organized as the 107th Aero Squadron at Kelly Field, Texas, on August 27, 1917.

The squadron conducted a notable event on August 5, 2021, when two of its



A-10Cs landed and took off from a closed section of Michigan State Highway M-32 in Alpena, as part of exercise Northern Strike 21. The historic event marked the first time that the USAF had intentionally landed

modern aircraft on a civilian roadway within the United States.

The milestone proved the air force's ability to deploy to austere conditions and continue to operate, and underscored the

flexibility and versatility highlighted in the service's latest Agile Combat Employment Air Power Doctrine.

Reporting to the 127th Air Refueling Group (ARG), the 171st Air Refueling Squadron flies and maintains nine Boeing KC-135T Stratotankers. Known as the 'Six-Pack', it completed the transition from an airlift mission flying the Lockheed C-130E to the aerial refueling role on April 1, 2008. The 127th ARG was activated at Selfridge on September 30, 2007 and assumed control of the tankers from the 127th OG. The squadron had converted to the C-130E in 1995 after operating tactical aircraft for more than 50 years.

The Michigan Army National Guard operates six Boeing CH-47F helicopters from Aviation Support Facility (AASF) #2 on the northeastern quadrant of the base. The Chinooks are operated by Detachment 1, Company B, 3rd Battalion, 238th Aviation Regiment. The main body of Company B is in Canton, Ohio, but the battalion headquarters is in Grand Ledge, Michigan.

The unit is tasked in the heavy helicopter role. As the US Army's only heavy-lift helicopter, the Chinook has a payload of more than 21,000lb. Chinooks were first fielded in Michigan when the CH-47D variant arrived in 2003.

The Department of Homeland Security is a major tenant aboard Selfridge and its assets include those of the US Coast Guard and US Customs and Border Protection (USCBP). The US Coast Guard's Air Station Detroit has been located there since it was commissioned on July 1, 1966. Situated on the northeast portion of the base, Air

**Above:** A pair of UH-72A Lakota helicopters operated by Company B(-) 1st Battalion, 112th Aviation Regiment depart from the Alpena Combat Readiness Training Center for Camp Grayling Maneuver Training Center in Michigan on April 13, 2021. The helicopters were transporting the Michigan National Guard Adjutant General and the chief of the National Guard Bureau. The Michigan Army National Guard has operated the Airbus Helicopters UH-72A since the first examples were delivered to Company B(-), 1st Battalion, 112th Aviation Regiment in 2013. Assigned to the security and surveillance role, the organization is one of four flying units operated from Army Aviation Support Facility #1 **US ANG/ Master Sgt David Kujawa**



**Above:** Three UH-60Ms from Michigan Army National Guard's 1st Battalion, 147th Aviation Regiment, arrive at the Fort Custer Training Center, in Augusta, Michigan. The state's newest Black Hawks are normally based at Abrams Municipal Airport in Grand Ledge **Michigan ARNG**



**Above:** Airmen from Arizona Air National Guard's 214th Aircraft Maintenance Squadron launch recovery element, push an MQ-9A into a hangar at the Alpena Combat Readiness Training Center in Michigan on July 22, 2019. Deployed from Fort Huachuca, Arizona, the unit was supporting the Northern Strike 19 exercise **US ANG/Senior Airman Ryan Zeski**



Station (AIRSTA) Detroit is responsible for operating and maintaining five Airbus Helicopters MH-65D short-range recovery (SRR) helicopters. It was the final unit to complete the conversion to the 'Delta' variant in May 2015.

Reporting to the 9th Coast Guard District in Cleveland, Ohio, the 'Motor City SAR' (search and rescue) unit's area of responsibility includes the eastern Great Lakes and spans more than 1,000 miles (1,609km) of shoreline along Lakes Ontario, Erie, and Huron and St Clair up to the 44th parallel and ranges from Saginaw Bay, Michigan, to the St Lawrence Seaway. Since September 30, 2001, the air station has also been responsible for a seasonal Air Facility (AIRFAC) at Muskegon County Airport, Michigan.

In 2017, AIRSTA Detroit also assumed the responsibility for AIRFAC Waukegan, Illinois, from AIRSTA Traverse City, following the latter's transition to the MH-60T. The seasonal air facility is located at Waukegan National Airport, Illinois.

Opened on August 11, 2008, as part of a move that expanded security operations along the northern border with Canada, the Great Lakes Air & Marine Branch is responsible for eight fixed and rotary wing aircraft. The former comprises two Beechcraft King Air 350 Multi-Role Enforcement Aircraft (MEA) and a single Cessna 206 Stationair Light Enforcement Aircraft (LEA). Rotary wing platforms include a pair of Sikorsky UH-60M Black Hawk medium-lift tactical helicopters and three Airbus Helicopters AS350 Light Enforcement Helicopters (LEH). The branch reports to the CBP Air and Marine Operations' Northern Region, which is also headquartered at the ANGB.

Air operations in this region were established in March 2002 by the US Border Patrol. The Great Lakes Air and Marine Branch is the primary provider of aviation and marine response capabilities to support the US Border Patrol's Detroit Sector. It is responsible for securing more than 860 miles of international border between the US and Canada.

Battle Creek Executive Airport at Kellogg Field is a city-owned, public-use, joint civil-military airport, situated 3nm west of Battle Creek in southern Michigan. The 1,500-acre facility is home to the Michigan ANG's 110th Wing and the Battle Creek ANGB. The Battle Creek Airport was opened in August 1925 and renamed for the famous cereal company founder William K Kellogg in June 1928; Kellogg had donated the money to buy additional



**Left:** A Colorado Army National Guard CH-47F from Company B, 2nd Battalion, 135th Aviation Regiment, lifts an M777 105mm howitzer from Camp Grayling, Michigan, on August 10, 2018. The Chinook crew was participating in the Northern Strike 18 exercise at the Camp Grayling Joint Maneuver Training Center and the Alpena Combat Readiness Training Center  
**US ARNG/Staff Sgt Warren W Wright Jr**

land for the airport's expansion. It became known as W K Kellogg Regional Airport in 1947 and assumed its current name in December 2019.

Reporting to the wing's 110th OG, the 172nd Attack Squadron (ATKS) had flown the A-10C until 2009 when it lost that mission because of the 2005 Base Realignments and Closures (BRAC) Commission decision that sent the Warthogs to Selfridge ANGB. Known as the 'Mad Ducks', the unit operated the Learjet C-21A from 2008 until 2013 as an airlift squadron. The C-21A was intended as a 'bridge' aircraft that would be operated until the unit received four new Alenia C-27Js. However, when the USAF decided to divest the Spartan and cancel further acquisition, the unit's mission was realigned. Today the unit operates the General Atomics MQ-9A from ground control stations (GCS) at the Battle Creek ANGB, as a remote split operations (RSO) squadron. Under that concept, a forward-deployed launch and recovery element (LRE) is responsible for the Reaper, during take-off and landing. Once airborne, control is handed off to the

ground control station (GCS) crew, which executes command and control of the remainder of the mission via beyond-line-of-sight links. The basic GCS crew consists of a rated pilot to control the aircraft and command the mission, and an enlisted airman to operate sensors and weapons. During 2021, the 172nd ATKS flew 320 sorties totaling 5,887 hours while supporting combat operations in four countries spread over three separate areas of responsibility (AOR).

## Southwest

Abrams Municipal Airport in Grand Ledge is located around 12.7 miles west of downtown Lansing in south-central Michigan. Owned and operated by the City of Grand Ledge, the airport opened in September 1946 and is governed by the Abrams Municipal Airport Advisory Commission. The Michigan Army National Guard's AASF #1 is the largest tenant on the 160-acre facility, and it supports four flying units.

Detachment 1, Company C, 3rd Battalion, 238th Aviation Regiment is an air ambulance unit and operates the



**Left:** MH-60T tail number 6022 departs from a snow-covered ramp at Air Station Traverse City on a typical Michigan winter day. The air station operates three Jayhawk medium-range recovery (MRR) helicopters from the facility at Cherry Capital airport  
**US Coast Guard**



Sikorsky HH-60M variant of the Black Hawk. The main body of the company is in Concord, New Hampshire, but the battalion headquarters are at the Abrams facility. Company B and Company C(-), 1st Battalion, 147th Aviation Regiment operate the UH-60M from the AASF in the assault helicopter role. A detachment of Company C and the battalion headquarters are in Madison, Wisconsin.

Due in part to the long-standing partnership between the Michigan and the Latvian military through the National Guard Bureau's State Partnership Program (SPP), the 1st Battalion's Company B was chosen to train Latvian Air Force personnel on the Black Hawk over four months from November 2021, to prepare the Latvian personnel for the arrival of four new UH-60Ms in 2022.

Company B, 1st Battalion, 112th Aviation Regiment is responsible for six Airbus Helicopters UH-72A Lakotas. The light utility helicopters are assigned to the security and surveillance role and feature mission equipment packages that permit them to carry out the varied S&S missions. A detachment of two additional Lakotas is stationed in Rapid City, South Dakota. The battalion headquarters is in Bismarck, North Dakota.



The Michigan ARNG's only fixed wing aircraft is a Beechcraft C-12U. Rather than operating from the AASF at Abrams, it is based nearby at the Capital Region International Airport in Lansing. The King Air is assigned to Detachment 4, Company B, 2nd Battalion, 245th Aviation Regiment, but is also known as Operational Support Airlift Command (OSACOM) Detachment 15. Tasked in the operational support airlift role, the C-12U provides non-executive airlift support moving passengers, cargo, and/or information within the continental US (CONUS) as well as in international locations. While operating on its peacetime mission, the unit reports directly to the Operational Support Airlift

Activity (OSAA), at Fort Belvoir, Virginia. For its wartime mission, the detachment is aligned to the Oklahoma ARNG's 2nd Battalion, 245th Aviation Regiment in Oklahoma City. It began its most recent deployment in support of Operation Freedom's Sentinel, in March 2021.

The US Coast Guard's AIRSTA Detroit supports operations at a seasonal air facility at Muskegon County Airport in west central Michigan. Operational each year from Memorial Day in May to Labor Day in September, the AIRFAC provides coverage for the southern portion of Lake Michigan, with a deployed MH-65D. The county-owned, public-use airport is located five miles south of Muskegon in Norton Heights.

**Above:** Michigan Air National Guard A-10C serial 80-0221 departs Nellis AFB, Nevada, for a Green Flag-West 21-06 mission in April 2021. The 127th Wing's 107th Fighter Squadron's participation in the exercise was designed to ensure the unit maintains a high degree of combat readiness **USAF/ Randy Lewis**



KC-135T serial 58-0062 from the 127th Wing's 171st Air Refueling Squadron flies over Selfridge Air National Guard Base in Mount Clemens, Michigan, accompanied by a pair of F-16Cs from the wing's 107th Fighter Squadron on August 11, 2008. The 107th converted to the A-10C later the same year after flying the Fighting Falcon since 1990 **Jim Haseltine**



## Northwest

Coast Guard Air Station Traverse City is located at Cherry Capital Airport, on the southern end of Grand Traverse Bay in the northwestern portion of lower Michigan. This station operates three MH-60Ts and completed its transition from the MH-65D on August 14, 2017, when the final Dolphin departed. Nicknamed the 'Guardians of the Great Lakes', the air station was originally established as an air detachment in 1938 with a single aircraft. It has been in full-time operation since it was commissioned on November 15, 1945. As a component of the 9th Coast Guard District, its area of operations includes all of Lake Michigan and portions of Lake Superior and Lake Huron.

Around two miles southeast of Traverse City is Cherry Capital Airport, jointly owned by Grand Traverse and Leelanau counties and operated by the Northwestern Regional Airport Authority. Called Traverse City Airport when opened in 1936, the facility was later known as Naval Air Facility Traverse City. From mid-1991 to 1995, when it transitioned to the HH-65A, the air station had operated the HH-60J version of the Jayhawk and was the first operator of the helicopter.

## Northeast

Operated by the Michigan ANG, the Alpena Combat Readiness Training Center (CRTC) is seven miles west-northwest of Alpena, in the northeastern part of the Lower Peninsula. The CRTC supports year-round training for the Department of Defense, Department of Homeland Security, first and emergency responders. It is one of four National Guard Combat Readiness Training Centers in the US.

The Alpena CRTC offers the largest airspace east of the Mississippi River and supports the training of more than 20,000 personnel annually. When deployed to Alpena, aviation units often operate from the Alpena County Regional Airport, which is a shared use facility between the CRTC and the Alpena County. As such, it supports both civil and military operations. The 3,084-acre facility was Michigan's first state-owned airport and opened in 1931. Activated as the Alpena Army Airfield on April 19, 1943, the facility was turned over to Alpena County in 1947. It was known as Phelps Collins Field until it assumed its current name in March 1989.

Also located in the central northeastern part of Michigan's Lower Peninsula, Grayling Army Airfield is a joint use public/military airport. Owned by Michigan

MICHIGAN STATE REPORT				
Location Command	Unit	Aircraft	Tail Code	Notes
<b>Selfridge Air National Guard Base, Mount Clemens</b>				
127th Wing / 127th Operations Group (OG)	107th Fighter Squadron	A-10C	MI	
127th Air Refueling Group	171st Air Refueling Squadron	KC-135T		
AASF #2 (Michigan Army National Guard)	Det. 1 B/3-238th AVN (HH)	CH-47F		
CBP Air & Marine Operations Northern Region	Great Lakes Air and Marine Branch	UH-60M, King Air B350, AS350B, Cessna 206		
9th Coast Guard District	Air Station Detroit	MH-65D		
<b>Abrams Municipal Airport, Grand Ledge</b>				
AASF #1 (Michigan Army National Guard)	B/1-147th AVN ASLT	UH-60M		
	C-/1-147th AVN (ASLT)	UH-60M		
	Det. 1 C/3-238th AVN (AA)	HH-60M		
	B-/1-112th AVN (S&S)	UH-72A		
<b>Capital Region International Airport, Lansing</b>				
	Det. 4, B/2-245th AVN/OSACOM Det. 15	C-12U		
<b>Battle Creek Executive Airport at Kellogg Field / Battle Creek Air National Guard Base, Battle Creek</b>				
110th Wing / Operations Group (OG)	172d Attack Squadron	MQ-9A RSO		
<b>Cherry Capital Airport, Traverse City</b>				
9th Coast Guard District	Air Station Traverse City	MH-60T		
<b>Muskegon County Airport, Muskegon</b>				
9th Coast Guard District	Air Facility Muskegon	MH-65D		{1}
Notes: {1} Seasonal Air Facility				



**Above:** A CH-47F operated by Detachment 1, Company B, 3rd Battalion, 238th Aviation Regiment, delivers a section of improved ribbon bridge bays in support of the Michigan National Guard's 1437th Multi-Role Bridge Company (MRBC) during a training evolution on August 12, 2018 **Michigan National Guard**

Army National Guard, it is seven miles northeast of the main cantonment area of the 147,000-acre Camp Grayling Joint Maneuver Training Center (JMTC) and just over one mile northwest of the city of Grayling. No military aircraft are permanently stationed at the 923-acre airfield, which is capable of handling aircraft as large as the C-130 and C-17 and has ramp space and tie-downs for up to 70 aircraft. Established in 1913, Camp Grayling is the largest National Guard training facility in the US.

Although physically separated, the Alpena CRTC and Camp Grayling JMTC are operationally connected as part of the National All-Domain Warfighting Center (NADWC). Camp Grayling serves as the local garrison component of the range complex while Alpena CRTC oversees and controls training operations and management of the entire complex. The area stretches from the eastern border with Canada to the western edge of Camp

Grayling and includes the special use airspace (SUA) complex.

As one of the largest airspace complexes in North America, it includes approximately 18,000sq nm of low and high-altitude SUA that extend as high as 45,000ft and as low as 300ft over Lake Huron. The SUA provides approximately 935sq nm of protected airspace for operational activities including tactical flight maneuvering, air interdiction, aerial denial, chaff and flare release, aerial gunnery, and bombing missions.

The airspace above Lake Huron includes supersonic permissions at altitudes above 30,000ft. Live weapons training is conducted on the Grayling Air-to-Ground Range, which supports the live-fire of rockets, aircraft cannons, live guided/unguided bombs up to 500lb and 2000lb inert bombs.

Michigan's unique geography features rolling hills, the Great Lakes, shorelines and large forests and a climate offering similarities to central Europe. The state's facilities support training for aviation, ground maneuvering and even littoral operations. Each year, the CMTC and JMTC jointly host the fourth-largest National Guard Bureau (NGB) training operation, known as Northern Strike. The Joint Multinational combined arms live fire exercise was first held in 2011 and a winter session, called Winter Strike, was added in January 2020. The CRTC is also responsible for training around 25% of the USAF's joint terminal attack controllers (JTAC). 📡



# REVOLUTIONARY WATER BOMBERS

Iran's Revolutionary Guard has been tasked with tackling wildfires.

**Babak Taghvaei** examines how their role has grown as incidents increase

**T**he Aerospace Force of the Islamic Revolutionary Guard of Corps (IRGCASF) started to conduct aerial firefighting operations back in 2011 at the request of the Iranian Forests, Range and Watershed Management Organization (FRWMO).

For this purpose, a firefighting package was designed and installed in the cargo hold of an Aerospace Force Ilyushin Il-76TD heavy transport aircraft.

IRGCASF has used its Mi-171 helicopters, equipped with Bambi Buckets, and Il-76TDs equipped with the firefighting kits, for tackling blazes

at home, as well as in countries such as Georgia, Pakistan, Syria and Turkey.

## Birth of aerial firefighters

Most of the wildfires in Iran are caused by people and are mostly sparked by farmers, hunters and speculators. In some cases, IRGC Ground Force has

**Above:** On February 7, 2011, the firefighting module designed and manufactured by the IRGCASF's Self Sufficiency and Industrial Research branch was successfully tested by an Il-76TD, serialised 15-2283, in Golestan airport **Ali Naderi**



**Left:** Mi-171, serial number 15-1223, in its old color scheme on the Amir Kabir drilling platform in the Caspian Sea. It is now painted in the new colors of IRGCASF helicopters. **Morteza Naseri**



# INTERNATIONAL MISSIONS

On July 31, 2021, an IRGCASF IL-76TD landed at Dalaman airport in the southwest of Turkey. The aircraft, along with two Mi-171 helicopters, participated in firefighting missions against the wildfire in Izmir, Mugla and Antalya districts.

Since this deployment, the IRGCASF has twice taken part in firefighting operations abroad. Between September 2 and 11, 2017, IRGCASF deployed two Mi-171s to Georgia, where they logged 103 flights and airdropped 562 tonnes of water. On September 10, 2020, 15-2283 was deployed to Syria where it participated in several missions against a forest fire in Hama region.

The IRGCASF conducted another international firefighting operation, again using 15-2283. The aircraft was deployed to Islamabad International Airport on May 23, 2022, from where

it carried out water airdrop missions over the Shirani forests of Balochistan's Koh-i-Suleman area in five sorties until May 26, 2022. The Shirani forests had been alight from May 18 and with the help of an IL-76TD, Pakistani Armed Forces finally managed to control and suppress it.

IRGCASF is currently the operator of eight IL-76TD heavy transport aircraft, two of which have been cannibalized to keep the remaining six in service. Among the six, four are operational simultaneously, one is in use by Pouya Air for transport of civil and military cargo, such as commercial goods exported to Asian countries or weapons for the IRGC Quds Force proxies. Three others are in use for military purposes, such as transportation of the IRGC Personnel, their families and military equipment, across Iran.

In just two months, the Self-Sufficiency Branch of IRGCASF designed and manufactured a specialist firefighting module for installation on the IL-76TD as a temporary solution for using the heavy airlifter for emergency missions, giving the IAMI time to develop and convert at least one of the six Tu-154M passenger aircraft into water bombers. The new module, consisting of two 20,000 liter tanks capable of releasing 2,000 liters of water per second, was successfully tested by IL-76TD serial number 15-2283, at Golestan airport on February 7, 2011.

Before using the IL-76TD for firefighting, IRGCASF used its Mi-171s. Delivered in 2000 and 2001, the Ulan-Ude factory also supplied Bambi Buckets for use by the helicopters. However, IRGCASF did not test these until December 2007 and, despite having some of its Mi-171 pilots trained for firefighting missions, they did not take part in any firefighting operations until 2015. On June 9, 2015, for the first time, an Mi-171, serial number 15-1222, carried out ten fire sorties.

accidentally set the oak forests ablaze on the Iraq border during firing exercises. To combat the wildfires, local municipalities and county governors engage local foresters, firefighters and volunteers to help put out the flames.

However, once the fires have started to spread and grown out of control, the local Crisis Management Headquarters, as well as the Iranian Forests, Range and Watershed Management Organization (FRWMO), request the Ministry of Interior assist the operations by providing aircraft and helicopters. Unfortunately, FRWMO's annual budget has always been limited and sometimes payments have been delayed, resulting in a decline in the effectiveness of the aerial operation.

In 2011, the Iranian Ministry of Defense was contracted by the FRWMO to develop firefighter aircraft for use in the wildfires, especially in Golestan province. As a result, two projects were launched, first for the conversion of six former Iran Air Tours Tupolev Tu-154Ms by Iranian Aircraft Manufacturing Industries (IAM) at Shahin-Shahr and secondly a project by the IRGCASF for the design and manufacture of a firefighting module for installation inside IL-76TDs of IRGCASF, converting them into water bombers.

The water bombing module installed inside the cargo cabin of an IL-76TD of IRGCASF, with serial number 15-2284  
**Derek Begrovich**





**Top left:** Mi-171, serial number 15-1228, is one of the last four helicopters still left in service with the IRGCASF. Their primary role is Combat Search and Rescue and transportation of IRGC Generals while their secondary role is participation in civilian missions tasked by Yas Air Kish.  
**Keyvan Tavakkoli**



**Left:** The nozzles of the firefighting module installed on the Il-76TD, serialised 15-2284 **Keyvan Tavakkoli**



**Below:** Il-76TD, serial number 15-2284, and equipped with a water-bombing module prior to dropping its water during training in December 2012  
**Derek Begrovich**



# DANGEROUS GOODS

IRGCASF formed Pars Air on July 4, 2002, using a pair of former Fars Air Qeshm's Il-76TD cargo aircraft to transport freight in Iran and abroad. Pars Air served as a source of income for IRGCASF and to transfer weapons and proxy forces of IRGC Quds Force in the Middle East. In 2008, the airline was rebranded as Yas Air Cargo Airlines and its two Il-76TDs, EP-PCA and EP-PCB, received EP-GOL and EP-GOM registrations under the new air operator's certificate.

On March 16, 2011, EP-GOL was intercepted by a pair of Turkish Air Force F-16Cs and was forced to divert to Diyarbakir for inspection.

The interception was carried out at the request of the US government in a bid to prevent Iran from transferring weapons to Syria. EP-GOL was flying from Tehran's Mehrabad International Airport to Aleppo without using Iraq's airspace, which was under control of the Americans. No weapons were found and the aircraft was released after 15 hours.

Five days later the Turkish Air Force asked to stop another Iranian flight bound for Aleppo. EP-GOL was again diverted to Diyarbakir where a large cache of weapons was found, including 60 Kalashnikov AK-47 assault rifles, 14 BKC/Bixi machine guns, nearly 8,000 rounds of BKC/AK-47 ammunition, 560 60mm mortar shells and 1,288 120mm mortar shells. This violation of the UN imposed arms embargo on Iran resulted in termination of Yas Air Cargo Airlines flights over Turkey.

EP-GOM and GOL, as well as three Antonov An-74T-200 and TK-200s of the IRGCASF were later sanctioned by the US government in September 2012. To circumvent the sanctions, IRGCASF rebranded Yas Air Cargo Airlines to Pouya Air in December 2012, resulting in the change in registrations of its aircraft for the second time.

In order to get around the sanctions in the An-74 fleet, IRGCASF changed the EP-GOL registration to EP-PUO and EP-GOM to EP-PUS. The Antonov An-74T-200s and An-74TK-200s also had their registrations changed under the new air operator's certificate. Since that time, at least, Il-76TD EP-PUS has been significantly used for commercial purposes, including transporting military equipment and operatives of Russia's Wagner Group between Syria and Russia from February 2022.



**Above:** Mi-171, serial number 15-1223, together with another example, serial number 15-1226, were deployed to Dalaman airport in Turkey to combat the wildfires in August 2021 **Armen Tabayan**



## Profitable operations

Since 2015, the IRGCASF has provided its Il-76TD aircraft for firefighting services through commercial operator Pouya Air in order to be able to charge governmental organizations, such as FRWMO, for the cost of this type of operation. The first firefighting mission performed by an Il-76TD was carried out by serial number 15-2284 (carrying civil registration EP-PUL) on March 29, 2015.

The second known case took place in June 2016, when 15-2282 was used for similar work. An Iranian forest had been burning for 10 days by the time the aircraft took just one pass over, airdropping 30 tonnes of water from an altitude of 5,000ft. Unfortunately, most of the water vaporized on its way to the ground and the IRGCASF was criticized for its poor performance.

In another mission, the IRGCASF was called in to extinguish the wildfires in 2018 in the Hawizeh Marshes, situated on the Iran-Iraq border. First, on July 18, two of its Mi-171s were deployed to Ahvaz in Khuzestan Province, from where they carried out numerous missions.

However, their operations were not effective enough to deal with the fire and the Crisis Management Organization called on the Iranian Ministry of Defense to order IRGCASF to send an Il-76TD.

After IRGCASF received the cost of services, it finally provided an Il-76TD equipped with the firefighting module on July 25, 2018. On that day, the aircraft logged five sorties. 🚒

# MOOSE





# ON THE LOOSE

In June 2022, the 137th Airlift Squadron (AS) of the USAF 105th Airlift Wing at Stewart Air National Guard Base, Newburgh, New York, moved the 3rd Battalion 27th Field Artillery Regiment, 18th Field Artillery Brigade, high range field artillery from Fort Bragg, North Carolina to Nellis Air Force Base in Nevada. The crew of C-17A Globemaster III serial 00-177 shifted 80,000lb of freight, 15 passengers, supporting the 57th Weapons Squadron at Nellis AFB.

This took place during the US Air Force Weapons School (WIC) class 22-A integration exercise. The C-17, known as the Moose, conducted semi-prepared runway operations (SPRO) landing zone assaults, also known commonly as 'dirt' landings, to infiltrate the 3rd Battalion 27th Field Artillery Regiment, 18th Field Artillery Brigade. The infiltration included two High Mobility Artillery Rocket System (HMARS) launchers, two support vehicles and 18 soldiers.

**Kedar Kamarkar**





The official patch for  
Mountain Bull 2022

# BULLS OVER THE ROCKIES



In July, the Netherlands flew three of its four legacy C-130Hs to Peterson Space Force Base in Colorado to take part in Exercise Mountain Bull. **Frank Visser** spoke with the commander of No 336 Squadron RNLAf and his US counterpart

**T**he Royal Netherlands Air Force's (RNLAf's) 336 Squadron has operated the C-130H-30 since 1994 and bought two more in 2007 to conduct air transport all over the world. It is primarily tasked by the European Air Transport Command, which is based at Eindhoven Air Base. However, since 2012, the squadron has been working on building up its tactical airlift capabilities.

For the members of 336 Squadron, the tactical mindset means being able to operate rapidly and successfully in or near a theater of operation, where the keyword is integration between them as a supporting unit to both national and international forces.

Since 2014, 336 Squadron has a strategic partnership with the 11th Air Maneuver Brigade (AMB). This consists of the helicopters of the Defence Helicopter

Command and the 11th Air Assault Brigade of the Royal Netherlands Army (RNLA). A leap forward took place in 2017, when the unit participated in that's year Fighter Weapons Instructor Training, held at Leeuwarden Air Base, with its own Transport Weapons Instructor Course (TWIC). This resulted in the first weapon instructors in the Dutch C-130 community.

Over the following years, the squadron has grown to become a high-standard

Three C-130Hs of 336 Squadron at the military ramp of Peterson SFB, Colorado. All photos by Northern Skies Aviation unless stated





tactical airlift specialist that can operate anywhere in the world. For this, tactical training is essential – learning to operate in warm and cold environments, landing at dirt strips and dropping cargo, and flying in mountainous terrain.

## Preparations

When Lt Col Maurice 'Skunk' Schonk took office as commander of 336 Squadron on September 2, 2020, he already had the idea to set up an integrated exercise to train operations in mountainous terrain. Peterson Space Force Base (SFB) near Colorado Springs was familiar territory to him. While he was still flying the F-16, he once made a stopover there and gained an impression of the location. He asked his American C-130 exchange pilot at 336 Squadron to investigate whether this area near the Rocky Mountains would be suitable for Exercise Mountain Bull 2022. Contact was also made with the 120th Fighter Squadron (FS) of the Colorado Air National Guard, operating the F-16C/D from nearby Buckley SFB.

Permission was granted by the US for the mission to take place and, at the end of June, three legacy C-130Hs left Eindhoven for Peterson. Two of the Hercules' were extended C-130H-30s, while the third was a C-130H. Flying via Keflavik Airport in Iceland, the aircraft transited to Gander International Airport on the east coast of Canada, before continuing their flight to Duluth International Airport in Minnesota and from there making their final leg to



An RNLA F C-130H-30 drops two container delivery systems at a remote location

Peterson SFB. The return flight on July 24 was via Chicago O'Hare International Airport in Illinois, Pease AFB in New Hampshire and Keflavik Airport, before returning to Eindhoven on July 26.

## Exercise and goals

The exercise started on July 5 and the detachment consisted of about 110 personnel from the RNLA Air Mobility Command (AMC). The largest part of the detachment were members of 336 Squadron and consisted of aircrew, maintenance, logistics and intelligence staff. The other part consisted of members of the Dutch Defense Para School, part of the RNLA. This school provides all of the parachute training within the Dutch armed forces. In addition, RNLA members

of the 11th AMB, Pathfinders and Special Forces and Belgian Army paratroopers flew to Colorado for the exercise.

American units also took part in Mountain Bull. These were the 302nd Airlift Wing (AW) stationed at Peterson SFB, part of the US Air Force Reserve that also operates the C-130H, and the 120th FS of Buckley SFB, a Colorado Air National Guard squadron operating the F-16C.

The US Army participated in Mountain Bull with the 10th Special Forces Group from nearby Fort Carson. The tactical challenge for 336 Squadron and also the purpose of their exercise was to operate tactically at height, day and night, with warm weather conditions in mountainous terrain and with enemy threats.

The tactical missions consisted of



## ADDED VALUE

"The biggest lesson, which I also learned from the time I was flying the F-16, is that you go to a location where you can be supported by a unit that flies the same type of aircraft," was how Lt Col Schon described Mountain Bull. "For example, spare parts can be used, which can be borrowed temporarily, so that the missions can continue."

He had nothing but praise for his hosts: "We were very well received by Peterson SFB and were able to make optimal use of the facilities and their equipment at this air base. Unfortunately, 336 Squadron was confronted with COVID and this mainly affected the loadmasters. This resulted in six canceled flights. One lesson learned was the effect different dirt strips have on the tires. We will bring more tires in the future."

Another important lesson learnt was how to operate at high altitudes in the mountains and the effect this had on the performance of the aircraft. In these conditions, planning your route is essential, so that you always have an exit route. As a learning point, Lt Col Schonk also mentioned the use of night-vision goggles as part of the mission.

For the future, Col Franks said: "A day after we stopped flying operations, we conducted an initial evaluation with all involved. A major evaluation will take place in September. Then it will be determined how the next Mountain Bull will take place better and differently."

"The more we integrate with our international partners and allies, the better prepared we will be for a joint fight in the future. The next Mountain

Bull planned in 2024 will give enough time for new personnel to participate and gain a lot of experience with multinational integration. Overall, we at the 302nd AW look forward to continuing our partnership with the RNLAf and we're excited that planning is already moving forward for the possible future engagements. We truly value the relationships and friendships we've made this summer and we know it is very important for our training and experience as well to continue working together."

Schonk is also investigating the possibility of returning to Peterson SFB in the winter months to offer a different sort of challenge to his staff. Similarly, a Nordic Bull exercise that will be taking place in northern Scandinavia in 2023 could be held at Peterson SFB in the future.

low-level flights and practicing landings and take-offs from dirt strips to move personnel and cargo. Two makeshift runways were used for this, named Red Devil and Pinon. Also, day and night paratroops were practiced with Special Forces at low altitude via static line, and high altitude via the ramp door of the C-130s. Another important task that was practiced was the dropping of a container deliver system (CDS). This was done both ballistically, where the CDS was dropped by parachute, and with the Joint Precision Airdrop System (JPADS).

The JPADS uses a GPS and steerable parachutes. A computer sends the parachutes to a predetermined location. The computer, which is connected to satellites, takes into account air pressure, wind velocity and temperature. The CDS and JPADS drops were done both day and night and at different altitudes. In order to train as realistically as possible, Dutch ground troops were deployed

to simulate air threats, such as the Russian man-portable air defense missile systems SA-14, -16 and -18. To be able to withstand this threat, two of the three C-130Hs of 336 Squadron were equipped with an ALQ-131 electronic countermeasures pod under each wing.

Another threat was the F-16s of the 120th FS in the role of enemy fighters (Red Air). The aim was to train 336 Squadron aircrews in fighter fundamentals, so that they could dodge shots from F-16s for as long as possible. In addition to this Red Air role, the F-16s also performed the Blue Air role so that the C-130s, protected by the friendly F-16s, could fly into enemy territory and, for example, carry out drops or dirt strip landings and deliver or pick up personnel and cargo.

In Mountain Bull's final week, seven F-16s from the 120th FS took part in the missions, four of which were Blue Air and three Red Air. The 302nd AW flew several operations with 336 Squadron, during

which formation flying was practiced, aligning the US standard with the Dutch standard. Because the RNLAf C-130 pilots are trained in America, these standards do not differ much from each other. In general, the Dutch led the mission with the American C-130Hs, because they have a better weather radar than the US troops.

### 302nd AW perspective

The 302nd AW at Peterson SFB has been intensively involved in the planning, participation and execution of this exercise since 2021.

Its current commander, Col DeAnna K Franks, explained: "Co-ordination between the RNLAf and 302nd AW started 18 months prior to execution. In that time, the Dutch came to Peterson SFB three different times for site surveys. I took on the position as the new Operations Group Commander in October 2021, one of my first engagements on the job was during the

One lesson learned was the effect of different dirt strips on tires. At Pinon, tires needed to be replaced sooner than normal due to the number of small stones







second site survey with the planning team in Colorado. Immediately, I was very impressed by the scale of the exercise and the interest to complete a large amount of mountain and formation training for the entire team."

Franks saw that the preparation and logistical work between her team of tacticians and maintenance personnel was operating very smoothly. From the very beginning, two tacticians worked directly with the Dutch team to co-ordinate the operations. This team of two grew very quickly to include numerous representatives from operations, maintenance, aerial port and the mission support group – a hugely complex task given the number of RNLAf traveling to Colorado to participate in Exercise Mountain Bull 2022.

Col Franks continued: "During the planning period, the face-to-face communication was very helpful considering the large footprint of the exercise. In between the site surveys, the Colorado representatives – including Air Force and Army representatives from Fort Carson – would have phone conversations or video chats weekly to make sure everyone was working towards the same operational goals."

During the Mountain Bull exercise, the RNLAf was eager to accomplish training with their dedicated aircraft. Col Franks said: "I provided a welcome brief to the entire RNLAf group on their in-processing day prior to starting their flight training and acknowledged their dedication to create such a challenging and demanding training schedule for this exercise. During Mountain Bull, our team from the 302nd AW flew with the Dutch

on six mission days in July. The 302nd AW held meetings and tactical planning daily with Dutch operations personnel to co-ordinate the daily execution schedule."

While the RNLAf was engaged fully in their exercise in Colorado, the 302nd AW maintained their local daily flying requirements and other previously scheduled training and obligated travel missions. "It was a very busy time around the airport, in the training ranges, on the drop zones, at the dirt strip and throughout the Colorado mountains for all C-130 aircraft," said Col Franks.

She is clear about the lessons learned from Mountain Bull: "Training staff in integrating tactics, techniques and procedures (TTPs) with our international partners was crucial in prepping for the next joint fight in the world. The US and Dutch C-130 TTPs are very similar, but it really takes the direct application and hands-on flying of the integrated training for our crews to both learn and teach how we can better fly together.



Even though we speak the same language, it was excellent for our crews to work through cultural and personality differences."

Another lesson learned was handling airspace issues during the exercise, with Denver Center for high altitude airdrops. Col Franks is confident that earlier co-ordination with Denver Center over the 2-3 months prior to Mountain Bull helped to alleviate this issue. For the sheer size of the personnel and equipment footprint for the exercise, the 302nd AW had to lean heavily on the active-duty personnel at Peterson SFB for their logistical help, such as providing lodging, feeding at the dining facility and moving equipment, especially on in-processing and out-processing days of the exercise.

"On the ground here in Colorado, it was a total team effort to host our international partners the best we could, to ensure their experience and training was successful," said Col Franks. 🇺🇸



One of the 302nd's C-130H over the plains of Colorado. One of the tasks of the 302nd AW is aerial firefighting

**Left:** Lt Col Maurice 'Skunk' Schonk is the commander of the RNLAf's 336 Squadron

**Far left:** The current commander of the 302nd Air Wing is Col DeAnna K Franks USAF

# TESTING THE FUTURE

**Søren Augustesen** looks at one pilot's career, from ejecting during a final check ride before qualifying with the F-16 to becoming the first Dane to fly an F-35

**A**s a young man, 'Mon' (full name withheld for security reasons) did not plan on a career in the Royal Danish Air Force (RDAF).

He had already started studying civil engineering at Aalborg University when he decided to look at pilot selection: "I applied to the air force, just to see how it worked and to give it a try," he explained. "And I succeeded!"

Starting at the RDAF Flight School in 1993, Mon just passed the basic flight training course at at Karup Air Force Base.

"I never became good friends with the T-17" – the Saab T-17 Supporter, the RDAF's basic trainer – Mon said. "But it was just good enough to pass the solo check and the final check ride."

In 1995, Mon was sent to Sheppard Air Force Base (AFB) in Texas, to train on the T-37 and T-38. He recalled: "This was when it all started to come together, and it dawned on me how flying worked, and it actually went really well."

Following his training in Texas, he was sent to Fighter Wing (FW) Skrydstrup in southern Jutland, to start his F-16 conversion training.

On his final conversion flight in an F-16B, taking off from RAF Marham near Norfolk,



Flying the flag: 'Mon' displays the Danish national flag, Dannebrog, which flew with him on his first flight in an RDAF F-35

UK [on December 11, 1996], the tower advised the pilots, Mon and the instructor, that they saw flames around the engine. Following take-off, the crew ejected at less than 1,000ft. Both landed safely, although Mon was stuck in a 30ft-high tree for an hour before being rescued. "But I did at least pass the ride," he added.

Having recovered from the ejection, he started his career flying the F-16 in the RDAF. The first major event was involvement in NATO's Allied Force campaign over the former Yugoslavia.

"It was the 'old' F-16s we flew back then; what we called the 'Classic' F-16.

"We flew along the border of Kosovo, over Macedonia, Albania, Bosnia, and

Hungary – all the countries that surround Serbia. Our task was to fight any Serbian aircraft in the area. If they started flying out of Serbia, we had to make sure they were unsuccessful.

"Our involvement in actual combat situations was very limited at the beginning," Mon explained. "I think it was only two to three offensive missions that were flown, dropping dumb bombs, using the Classic F-16."

## Becoming a test pilot

Returning back to FW Skrydstrup, Mon was appointed as a flight instructor on the F-16. He then went on to become a test pilot at the National Test Pilot School



The two first RDAF F-35s (L-001 and L-002) taxi in after arriving at Luke AFB in Arizona. All images, Forsvaret

(NTPS) in Mojave, California. When the RDAF retired its fleet of Saab F-35 Drakens, a number of them were handed to the NTPS in exchange for some slots at the school.

Working as a test pilot in the RDAF for many years, Mon gained a wealth of experience in flight testing new equipment. This was all a great help when he was granted the opportunity to fly the first RDAF F-35.

## Hands-on experience

In 2016, the Danish government selected the F-35 as the replacement for the F-16. It was decided to purchase 27 F-35s. Of these, 21 would be operating out of FW Skrydstrup, with the remaining six stationed at Luke AFB, and used to train RDAF pilots on the F-35. On April 7, 2021 the first RDAF F-35s were handed over to the air force, and flown to Luke AFB by American pilots. But while the first Danish jets were delivered in April, the first time a Danish pilot flew the F-35 had been on January 14, 2021, when Lieutenant Colonel Kin flew in a 308 FS 'Emerald Knights' F-35.

"Following the first delivery of a Danish F-35 to Luke AFB, it was decided that it would be helpful in the preparations for the arrival of the first batch of F-35s in Denmark in late 2023, if a Danish pilot, stationed in Denmark, had some actual hands-on experience with the operational aspects of flying the F-35," Mon said.

"Having a pilot in Denmark who had just a minimum of actual experience was deemed to be important, which is why I was granted three flights," he added. "It was a very compacted process, lasting only about a month and a half.



Fresh out of the paint shop, RDAF F-35 L-001 sporting the Dannebrog on the tail and the red RDAF roundel

"I had the theoretical background and flights in the simulator, finishing off with the three flights. It was a crazy fast training session. This is really only possible if you have flown something similar to the F-35 before – I mean, the F-16 is quite similar to the F-35 in that regard. At least, that is my experience," Mon said, continuing: "The flight control system is very similar to the F-16, so if you have flown the F-16, you are very well prepared to fly the F-35."

The first flight Mon had in an F-35 wasn't in a Danish F-35, but rather in a USAF one, flying with a Dutch instructor on the wing.

## The first RDAF F-35

Having successfully completed his first flight in an F-35, it was time for Mon to make the first flight in a Danish F-35 by a Danish pilot. And by the time the flight was scheduled to take place, two F-35s – serial numbers L-001 and L-002 – had been delivered to Luke AFB.

"The plan was to make the first flight in L-001 and have the privilege of having

the other aircraft next to me as a spare," Mon said. "There was a fair bit of attention surrounding the flight; a general, high-ranking officers, a TV camera crew and the mayor were present, so we had to succeed with this flight. It was only my second flight, so it was a bit stressful."

The flight was planned to involve all three nations making up the 308th FS: Netherlands, Denmark and the US.

This would mark the first time all three nations had their own aircraft in the air together.

## Conversion training

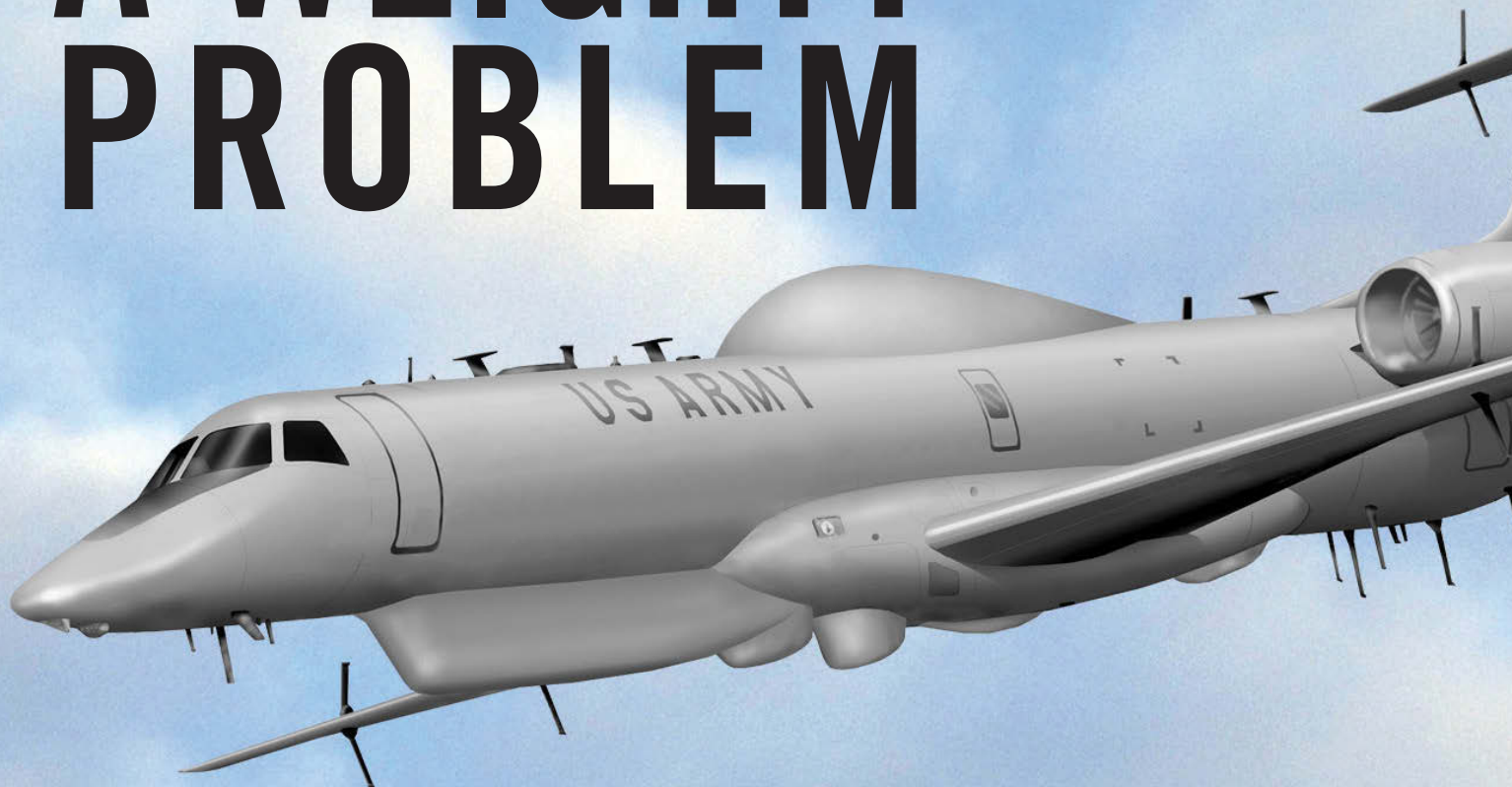
Having returned to Denmark, Mon took up his job as test pilot on the F-16. In the coming year he will return to Luke AFB, alongside the first group of RDAF pilots to be converted to the F-35, for the last part of the F-35 conversion training.

Mon concluded: "This means there will be a number of qualified F-35 pilots in Denmark when the first jets arrive in October of 2023." 🇩🇰

RDAF test pilot 'Mon' prepares for the first flight of an RDAF pilot in a Danish F-35



# A WEIGHTY PROBLEM



The US Army's Aerial Common Sensor was conceived to combine the RC-12 Guardrail Common Sensor and the RC-7 Airborne Reconnaissance Low into a single aircraft.

**David Willis** explains how the proposed system was scuppered by its own ambitions

**A**erial Common Sensor (ACS) consisted of five subsystems, comprising the sensor suite, the processing, exploitation and dissemination equipment, the airborne communications and data links, the ground-processing and an airborne platform. Performance criteria for the first of these included a speed greater than 345kts and a threshold altitude of 37,000ft, ruling out a turboprop. Another requirement was that the aircraft be able to carry a payload of 10,000lbs.

A broad area announcement was released in late January 2000, soliciting bids for an open architecture system to integrate proven components and sensors for "real time battlefield mapping and the exploitation of modern SIGINT [signals-intelligence] threats and modulations." A business unit of Raytheon (later sold to L-3 Communications), Lockheed Martin Space Systems and Northrop Grumman Electronic Systems was selected to participate in an

18-month concept demonstration phase, with Lockheed and Northrop going forward in April 2002 with \$35m contracts for component advanced development. Both teams explored several platforms before choosing the Embraer ERJ-145 regional airliner and Gulfstream G450 business jet, respectively.

In October 2002, the program was reviewed by the US Army, which concluded that it needed a more sophisticated system, with an aircraft with greater performance. It stipulated an operating altitude of 45,000ft, mission endurance of eight hours (six hours on station) with a 45-minute fuel reserve and a payload carrying capability of up to 13,000lbs. Additional capabilities included an airborne communications center able to link ground commanders to rear echelons. Originally the crew was to comprise a pilot and co-pilot, with the latter also tasked with monitoring the mission equipment. Four operator stations were added to permit data to be processed onboard, although

in most cases the role would still be undertaken by ground stations.

## Airframe selection

These additions created problems for Lockheed Martin, as the ERJ-145's operating altitude fell short of the requirement. At the time, Embraer was working on Federal Aviation Administration certification to increase its operating altitude to 41,000ft. Incorporating the additional operator stations also added weight.







Mission equipment for the ACS included signal and communication interception systems from Lockheed Martin and Argon Engineering, plus a variant of the Northrop Grumman AN/APG-68 synthetic aperture radar to gather imagery intelligence and a ground moving target indicator **Lockheed Martin**

Given these shortcomings, it was a surprise to many – not least Northrop Grumman – when the US Army's PEO Intelligence, Electronic Warfare & Sensors division at Fort Monmouth, New Jersey, awarded Lockheed Martin the \$879m contract for the 66-month system development and demonstration (SDD) phase on August 2, 2004. The contract covered delivery of five certified, mission-ready airborne ACS systems. Lockheed Martin's proposal had lower costs – the

The ERJ-145 was eventually rejected as the Aerial Common Sensor because it was too small and unable to carry all the systems that were required **Embraer**

price of the ERJ-145 airframe was less than two-thirds of the G450. Developmental risk was also thought to be lower, as Lockheed was already partnered with Raytheon on the Distributed Common Ground-Army 10.2 communications network, a key system within the overall ACS program.

The US Army sought 38 ACSs, including three for development and training. Although these aircraft would be built by Embraer in Brazil, most of the rest would be assembled at a new \$6.5m facility at the Cecil Commerce Center in Jacksonville, Florida. Meanwhile, L-3 Communications Integrated Systems and Communications Systems-West at Greenville, Texas, would be undertaking system integration in the 'green' airframes.

The initial development test evaluation was planned for 2006, with the awarding of a low-rate initial production contract for seven aircraft expected the following year and validation of multi-ship operations in 2008. Full production would commence in 2009 and three aircraft would initially be deployed to South Korea that year. The US Army planned to field 35 ACSs in five aerial exploitation battalions by 2017.

## Naval interest

US Navy interest in the ACS crystallised in June 2003, when it announced its intention to join the program. At the time, the service envisaged using it to replace the Lockheed EP-3E Aries II for overland missions, while the broad area maritime surveillance (BAMS) unmanned air vehicle would augment the multi-mission maritime aircraft (MMA) over the world's oceans. The service turned to the ACS as an EP-3E replacement after looking at a version of the MMA, which later entered service as the Boeing P-8 Poseidon.

While standard army practice would involve three ACSs operating together to accurately triangulate targets, the naval version would operate singularly. The smaller size of the ACS compared to the EP-3E limited the number of mission specialists that could be carried to six, necessitating

a higher level of automation to maintain the same level of capability. The US Army later decided its aircraft would also have six workstation to increase commonality.

Navy-specific changes included two underwing hardpoints, each stressed for 595lbs, to carry jamming pods, plus inflight refuelling to extend range. The US Navy wanted up to 19 aircraft, with service entry scheduled for 2011.

## Heavy load

During 2005, it was becoming increasingly clear that the ERJ-145 airframe could not meet the US Army's requirements, partly due to an underestimation of the weight of the sensors and fixtures that created a capacity shortfall of 7,000lb. The aircraft was also considered incapable of providing the electrical power and cooling needed for the mission systems.

In mid-September, the Army issued Lockheed Martin with a stop work order and requested it to explore new platforms. Prospective replacements included the Boeing 737, Bombardier Global Express, Embraer 190 and Gulfstream G550, while distributing the sensors across smaller types was also considered. According to Lockheed Martin, abandoning the ERJ-145 would cost \$600m and delay the project by two years. Northrop Grumman also stated that it would launch an official protest if the airframe was changed. The US Army initially wanted an airframe decision by December 14, 2005, but this was delayed for a further 30 days. On January 12, Lockheed Martin was informed that the contract had been cancelled.

In February 2006, the US Army revealed it would modernize and standardize its ARL fleet as ARL-Ms (multi-mission). The Guardrail Modernisation System Integration program to upgrade 33 RC-12K/N/P/Qs as RC-12N-1s was announced in September 2007, while the US Navy began to explore its options to replace the EP-3E under the EP-X project.

However, ACS was to continue, with the Army seeking a larger platform with an incremental payload development strategy, starting with SIGINT and adding other capabilities later. It planned to release a new request for proposals in the third quarter of 2008, but this was pushed back to the first quarter of 2009. By early 2009, the focus had turned to turboprop-based solutions and ACS was allowed to quietly fade away. In late 2010, Boeing secured a contract for the Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS), which became the MC-12S. ☛



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By Juan Arráez Cerdá & Eduardo Manuel Gil Martínez

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These aircraft continue to defend Spanish skies as well as take part in many international missions

for NATO.

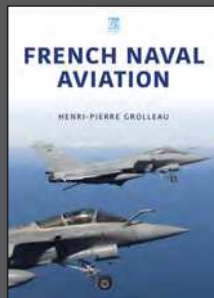
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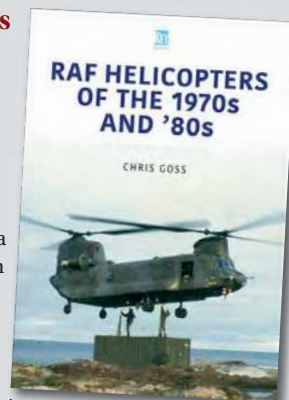
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# CUTTING EDGE

DISPATCHES FROM THE  
FRONT LINE OF AEROSPACE  
TECHNOLOGY BY DAVID AXE

**A**s a wartime machine, the newly acquired F-15EX is yet to play its part. It has been developed as a whole weapon system, providing the capabilities sought by the US Air Force. Eight months after the USAF's new Boeing F-15EX Eagle II fighter fired AIM-120 Advanced Medium-Range Air-to-Air Missiles for the first time, at a test range in Florida, operational testers finally got around to analyzing the shots.

The conclusion: the latest version of the classic, twin-engine F-15 is a formidable long-range shooter—one that could fight in and around contested airspace with a combination of very-long-range missile launches and powerful radar-jamming. If there is a hitch, it is that the F-15EX fleet might never be big enough to bring to bear, in a sustainable way, its significant capabilities. "The new capabilities that the F-15EX offers push it squarely into the future of combat," said 1st Lt Hagan Strader, lead analyst with the Air Force Operational Test and Evaluation Center's Detachment 6 at Nellis Air Force Base in Nevada.

Strader added: "This is a platform that can work with penetrating assets in a network-enabled battlespace with the potential to cause significant problems for our adversaries."

In a surprise move in 2019, the USAF announced it would order 144 new F-15EXs from Boeing for as much as \$15bn to replace the 230 or so 1980s-vintage F-15C air-superiority fighters serving with two Pacific Air Forces squadrons, a single European Air Forces squadron (493rd FS has now retired the F-15C) and six Air National Guard squadrons. The Air Force also operates around 220 1990s-vintage F-15E Strike Eagles in nine squadrons. The F-15Cs rapidly are aging out—their readiness has slipped to below 50%—while the more toughly-built F-15Es continue to post decent readiness rates of around 65%.

The USAF's main rationale for the F-15EX buy is that Boeing can produce the fighters quickly, faster than Lockheed Martin could ramp up F-35 production. That should help the Air Force to recapitalize the F-15C squadrons before their

current airframes likely become unsafe and uneconomical sometime in the next few years.

But the F-15EX also offers certain capabilities that the single-engine F-35 cannot deliver. While lacking the F-35's radar stealth, the F-15 is bigger, more capacious, flies farther—1,000 miles and back with a combat load, compared to 500 miles for the F-35—and packs a powerful new radar-jammer that is incompatible with the stealth fighter's low-observable flight profile.

The Nellis analysts who traveled to Eglin Air Force Base in Florida to assess the F-15EX's January AMRAAM shoots also scrutinized the performance of the Eagle Passive Active Warning Survivability System (EPAWSS) jammer on the F-15EX. The upshot is that the F-15EX by virtue of its speed and altitude performance can fire an AMRAAM farther than any other USAF fighter can do. The exact distance is classified but could approach 100 miles.

"The jet can clearly function as a long-range, stand-off weapons system," said Capt Max Denbin, the Nellis team's lead test engineer.

The F-15EX also carries more AMRAAMs than any other type—up to a dozen; the F-35 carries two internally in its standard loadout, and the twin-engine Lockheed Martin F-22 stealth fighter has six in its belly bay. That high capacity means the F-15EX is an obvious platform for new, larger USAF munitions in development, including the mysterious AIM-260 long-range air-to-air missile as well as the AGM-183, likely the Air Force's first in-service hypersonic land-attack missile.

Longer-range weapons could mitigate the bulky F-15EX's lack of stealth. While F-35 and F-22 pilots use their planes' low-observability to close on the enemy, Eagle II crews in their easy-to-detect mounts could linger on the edges of an air battle, lobbing their AIM-120s, AIM-260s and AGM-183s at targets in the air and on the ground a hundred miles away or farther.

In the event an F-15EX squadron faces an adversary with very long-range air-defenses and can't just fight from beyond its reach, the adaptive EPAWSS jammer could protect the Eagle IIs—as well any friendly fighters in the Eagle IIs' vicinity.

"Whether in a more passive jamming role or as

Maj Benjamin 'Torch' Naumann and Maj Mark 'Smack' Smith from the 40th Flight Test Squadron flying the F-15EX Eagle II prepare to fire an AIM-120D missile during a test mission near Eglin Air Force Base, Florida, January 25, 2022. The F-15EX can hold up to 12 AIM-120D missiles USAF



## F-15EX QUANDARY

a follow-on strike package, an F-15E or EX with EPAWSS causes detrimental impacts to opposing forces' decision space," Strader said. "This system gives aircrews many more options when fighting through contested airspace and enables other stealth assets in a force package—like an F-22, F-35 or other futuristic penetrating assets—to more efficiently neutralize threats."

It is becoming clearer how the USAF plans to use the F-15EX in combat. While the flying branch seems optimistic about the Eagle II's potential, it also is signaling a steep reduction in the planned F-15EX fleet. This spring the Air Force announced it would buy just 80 Eagle IIs instead of 144, wrapping up production in 2024. Lt Gen David Nahom, USAF's deputy chief of staff for plans and programs, in April said: "We are going to have a certain-size F-15 fleet. In a resource-unconstrained world, those would all be EXs—newer aircraft, better sustainability, more life time on them..."

To fill in for the 64 F-15EXs it will not buy, the Air Force would retain some older F-15Es for longer. "Right now, as we look at the budgets moving forward, we are likely to keep more of the F-15Es to be part of that F-15 fleet," Nahom said. The service over the next five years or so gradually would winnow its F-15 fleet down to slightly more than 300 airframes—and maintain them for a decade or more before beginning to retire the oldest F-15Es.

The plan, subject to congressional approval and quickly could change, seems to count F-15Es and F-15EXs as essentially interchangeable—true to an extent. The older Eagles are getting radar upgrades as well as the EPAWSS jammer.

But the F-15E is firstly a ground-attack platform and what its crews train for. The F-15EX primarily is an air-superiority platform. Moreover, no one has mentioned specifically integrating hypersonic weapons or the AIM-260 with the F-15E.

So, the F-15EX with its unique capabilities and potentially limited numbers could end up being a high-demand, low-density asset, like the 20 Northrop Grumman B-2 stealth bombers. Even the 180-strong F-22 fleet, which USAF leaders admit is far too small for wartime demands, would be much bigger than the token Eagle II force. 🐦

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## NATO ON THE FRONT LINE

Canadian Hornets, Hungarian Gripens, French Mirage 2000-5Fs, A330 MRTT air-to-air tankers all working to maintain NATO's presence on the Eastern European border

A RCAF CF-18A prepares to take fuel while airborne en-route from Canada to Romania for NATO Air Policing duties  
Yissachar Ruas

### F-35 LATEST

The latest updates surrounding the F-35 program

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