

FREE
SUPPLEMENT

F-4 PHANTOM II SURVIVORS
LAST OPERATORS • EXCLUSIVE PHOTOS



COMBAT AIRCRAFT

AMERICA'S BEST-SELLING MILITARY AVIATION MAGAZINE

JOURNAL

SU-57 'FELON'

**RUSSIA'S STEALTHY
SUPERFIGHTER**



E-11 DOWN – WE EXPLAIN ITS MISSION
LAST DAYS OF THE F-105 THUNDERCHIEF
US NAVY CUTS SUPER HORNET PRODUCTION





The 2020 edition of the US Air Force air power yearbook is Key Publishing's annual insight into the world's largest and most powerful air arm.

2020 features include:

- USAF F-35A combat debut
- New engines for the B-52H Stratofortress
- Boeing's T-7A Red Hawk to transform pilot training
- Idaho's A-10 'Warthogs',
- Mountain Home nose art

PLUS a full order of battle and rundown of all USAF aircraft and units.



ORDER DIRECT

JUST £7.99 PLUS FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

Free P&P* when you order online at www.keypublishing.com/shop

OR

Call UK: 01780 480404
Overseas: +44 1780 480404

Monday to Friday
9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £2.00 DISCOUNT! SUBSCRIBERS CALL FOR YOUR £2.00 DISCOUNT!



April 2020 • Vol 21 • No 4

INSIDE

IN THE NEWS

06 **Headline News**

More B-21 Raider details emerge, F-15EX on contract, new carrier delivery Osprey for flight-testing, and light attack on the cards for AFSOC

08 **News**

Our new integrated news and analysis section includes Growler and Super Hornet advances, a detailed US budget report, plus the latest Military Losses

16 **OPS DESK**

Scott Wolff's fascinating column details a mass F-35 launch at Hill AFB

18 **READY ROOM**

Combat Aircraft Journal's regular column, looking at the stories behind the US Navy and Marine Corps headlines, by Rick Burgess

22 **BIG SHOT: 'HERITAGE' EAGLE**

Showcasing military aviation's latest and greatest images — this month it's an Oregon Air National Guard F-15C

24 **WAR GAMES AT KHOTILOVO**

Combat Aircraft Journal gained exclusive access to recent exercises at Khotilovo. Alexander Mladenov evaluates the action with exclusive photographs by Andrey Zinchuk

30 **THE AIRBORNE CONNECTOR**

A US Air Force aircraft type that had quietly gone about its trade for nearly 15 years came into sharp focus after a crash in Afghanistan. Tom Kaminski examines the role of the E-11A BACN

36 **QATAR — AN AIR FORCE REBORN**

The Qatar Emiri Air Force is undergoing one of the most impressive expansion efforts of recent times to cement its position as a leading air arm in the Middle East. Stephan de Bruijn updates the story of this unprecedented modernization effort

42 **HIGH-END IN HAWAII**

Rob van Disseldorp heads to Hawaii to witness Exercise 'Sentry Aloha' as the resident Raptors go up against visiting fighters for valuable dissimilar training

72 **PACIFIC PROJECTION**

Gordon Arthur joins the US Marine Corps' 31st Marine Expeditionary Unit (MEU), a force that projects a big presence in Asia-Pacific

78 **'RIVER RATTLERS'**

The US Navy Reserves fly some of the oldest Hornets in the US, yet they are able to provide meaningful fleet support and a valuable back-up force if the need to boost the front line arises, as Dick Wels and Hans Drost discover

84 **GRIPEN MAKES BID FOR FINLAND**

Combat Aircraft Journal editor Jamie Hunter reports from Tampere as Saab outlines its offering for Finland's HX fighter competition, and assesses the Swedish bid that many back as a potential winner

88 **ISRAELI'S WORKHORSE AT 50**

Yissachar Ruas reports on the CH-53 Yas'ur, which marked a half-century of service with the Israeli Air Force last October

92 **'WARTHOGS' OF CROW MOUNTAIN**

As the US Department of Defense looks to prune the A-10C Thunderbolt II fleet, Chen Chuanren highlights the work of the 25th Fighter Squadron 'Assam Draggins', the only forward-deployed A-10 unit

96 **'FELON' — IMPOSTER OR THE REAL DEAL?**

The Sukhoi Su-57 'Felon' was originally conceived in an effort to compete against Lockheed Martin's F-22 and F-35. Known as the PAK-FA, its development has progressed at a relatively slow pace. Alexander Mladenov evaluates if it has matured into a force to be reckoned with

NEW LAUNCH

KEY.AERO

SUBSCRIBER EXCLUSIVE!

As part of your subscription, you can now enjoy even more *Combat Aircraft Journal*, more often, with the launch of Key.Aero — Your Aviation Destination. Visit www.key.aero and use your customer ID and email address to register today for your exclusive access.

104 **'BLACK KNIGHTS' BACK IN THE GAME**

Combat Aircraft Journal reports from MCAS Miramar as VMFA-314 becomes the first F-35 unit at the San Diego base

106 **'THUD' OUT**

Lindsay Peacock looks back at the final days of the US Air Force's F-105 Thunderchief, and one very special farewell event at Hill AFB

110 **CUTTING EDGE**

David Axe's column looking at the latest technological developments in military aerospace

112 **FLASHBACK**

Combat Aircraft Journal's trip down memory lane; this month it's the unique two-seat YA-10B



FREE
SUPPLEMENT

F-4 PHANTOM
SURVIVORS

ON THE COVER | PAGE 96

Up close with the Su-57 'Felon'. In this issue we evaluate the capabilities of Russia's latest fighter aircraft as it edges towards service entry.

Vadim Savitskiy



KEY.AERO

Your Aviation Destination

Visit www.key.aero
for latest military
news

SUPER HORNET IS HERE TO STAY

DESPITE BANNER-GRABBING HEADLINES suggesting that the Boeing F/A-18E/F Super Hornet is down and out, the opposite is very much the case.

It's currently planned that Fiscal Year 2021 will see the last Super Hornet procurement for the US Navy — ending three years earlier than previously planned — but the 'Rhino' is still very much on the up, with Block III standard jets now arriving for flight-test, service-life modifications being completed for some older jets and still potential for more aircraft to be added in the Future Years Defense Plan. The 716-aircraft Program of Record will be reduced — probably by 36 aircraft — with funds being redirected into the accelerated development of Next Generation Air Dominance (NGAD). The navy must show commitment to the future — it has been criticized for dragging its heels over a Super Hornet

replacement — but at the same time it needs to equip its F/A-18E/Fs to stay credible out to 2040. The only option was to trim orders.

Boeing will undoubtedly look to keep the Super Hornet production line 'hot' to ensure potential export customers can still be secured and will probably look to string out the existing order book. What's more, chances are NGAD will slip and the navy will be able to fall back on an option that has proved to be so versatile and affordable in the past to bridge 'strike fighter gaps' — buying more Super Hornets.

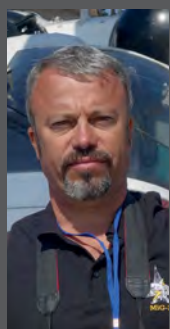
Keep on top of all the latest breaking military news and access all of our digital content at www.Key.Aero



Jamie
Jamie Hunter,
Editor

E-mail: jamie.hunter@keypublishing.com

CONTRIBUTOR OF THE MONTH ALEXANDER MLADENOV



Alexander Mladenov was born near Sofia in Bulgaria in 1972 and has been working as an aerospace journalist and photographer since 1991. His articles and photos have appeared in aerospace and defense publications around the world and his first contribution to *Combat Aircraft Journal*

dates back to 2010. He specializes in East European and Russian military aviation topics with a particular interest in the latest fixed-wing and rotorcraft combat technology, air-launched weapons, and combat employment. He is also a co-founder and managing partner of an aerospace and defense consulting company based in Sofia.

The Super Hornet forms the backbone of the US Navy strike fighter fleet, and although the navy is looking to redirect some funds away from production and into new programs, its huge force of these fighters is being upgraded to remain credible and capable into the future.
Jamie Hunter



NEW B-21A DETAILS EMERGE

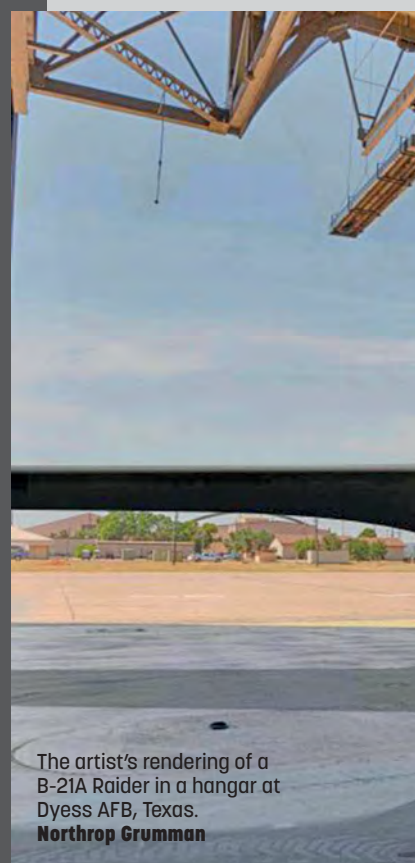
USAF'S NEW STEALTH BOMBER IS SMALLER THAN THE B-2

THE US AIR Force released several artist renderings of its new Northrop Grumman B-21A Raider on January 31. They depicted the bomber at the air bases of Dyess, Texas, in Ellsworth, South Dakota, and Whiteman, Missouri. The images offer perspective on the next-generation stealth bomber's size and features.

Although it resembles the B-2A Spirit, which was also developed by Northrop Grumman, the aircraft exhibits a number of important

differences. Earlier speculation about the design indicated the USAF was seeking a new bomber that was around one-third smaller than the B-2 — the new images suggest that may indeed be the case. Differences from the B-2A include a two-wheel main landing gear, which indicates it is also lighter than its predecessor. The nose landing gear also looks to be located further aft. The aircraft's deeply recessed engine inlets appear to be situated further towards the nose on either side of

the cockpit, and are of a different design. The cockpit has just two windscreen panels versus the B-2A, which has four, and it also appears to be located further aft. It is likely that these features are all intended to further reduce the aircraft's radar cross-section and are the result of lessons learned since the B-2A was designed more than 35 years ago. Northrop Grumman is well into assembly of the first B-21A test airframe at its facility at Air Force Plant 42 in Palmdale, California.



The artist's rendering of a B-21A Raider in a hangar at Dyess AFB, Texas.
Northrop Grumman

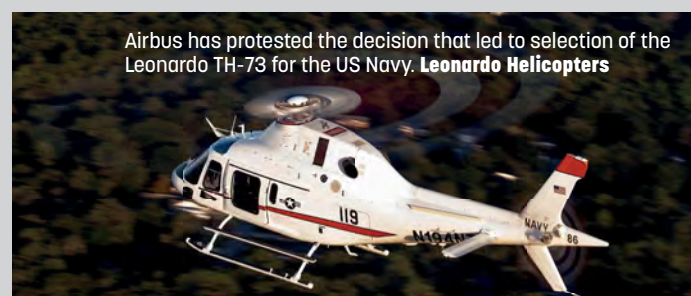


The USAF has received funding for an initial eight F-15EX fighters. **Boeing**

F-15EX PROGRESS

THE USAF HAS taken the first steps required to begin the acquisition of eight new F-15EX fighters from Boeing. The service expects to issue sole-source contracts to Boeing and GE Aviation that will provide for the purchase of the aircraft and the associated F110-GE-129 engines. Last December, US lawmakers approved the service's request to acquire an initial batch of eight fighters at a cost of \$985.5 million. The USAF had actually requested an additional \$64.5 million for the project and it plans to acquire as many as 144 F-15EXs that will replace its remaining F-15Cs.

The F-15EX is based on the configuration of the F-15QA (Qatari Advanced) that Boeing is producing for the Qatar Emiri Air Force. In addition to an upgraded Raytheon AN/APG-82(V)1 advanced electronically scanned array (AESA) radar, the aircraft will feature large-area displays in both cockpits, fly-by-wire flight controls and activated weapons stations 1 and 9. The fighters will also be equipped with the new BAE Systems Enhanced Passive Active Warning Survivability System (EPAWSS), which is currently in flight-test for the current F-15E Strike Eagle fleet.



Airbus has protested the decision that led to selection of the Leonardo TH-73 for the US Navy. **Leonardo Helicopters**

AIRBUS PROTESTS US NAVY HELICOPTER DECISION

AIRBUS HAS FORMALLY protested the US Naval Air Systems Command's selection of the Leonardo TH-119 helicopter as its new rotary-wing trainer. The protest was filed with the US Government Accountability Office (GAO) on February 3. The navy awarded the contract for the TH-73 Advanced Helicopter Training System to Leonardo's AgustaWestland Philadelphia Corporation in January. The initial \$176.5-million phase of the

contract included 32 helicopters. The single-engine TH-119 was selected over competing offers from Airbus and Bell, which respectively offered their twin-engine H135 and single-engine Model 407GX light helicopters.

In its protest, Airbus claimed certain technical aspects of its proposal were not assessed accurately. The GAO is expected to make its decision on the protest by mid-May, but until then all work on the program will be halted.

POLAND SIGNS FOR F-35

POLAND FORMALLY SIGNED a letter of offer and acceptance on January 31 for the purchase of F-35As. Poland will initially acquire 32 Lightning IIs at a cost of \$4.6 billion. The aircraft are

planned as replacements for Poland's MiG-29s and Su-22s. It makes Poland the 10th NATO member to purchase the F-35, with aircraft coming from Lots 16-23 and equipped with the same braking parachute developed for Norwegian F-35As. Delivery of the first F-35A is planned for 2024 with the fighters arriving in Poland by 2025.



COD OSPREY ARRIVES

THE FIRST BELL-BOEING CMV-22B carrier onboard delivery (COD) variant of the Osprey tiltrotor aircraft arrived at NAS Patuxent River, Maryland, on February 2 at the conclusion of a ferry flight from Bell's Amarillo Assembly Center in Texas. First flown in December 2019, the first COD Osprey is one of two examples that will be assigned to air test and evaluation squadron HX-21. The squadron is responsible for the developmental test (DT) program that will validate the tiltrotor's capabilities and ensure it meets the navy's unique COD mission.

The maiden flight of the first CMV-22B took place at Bell's facility in Amarillo, Texas, in December 2019. **Bell**

The CVM-22B integrated test team, which includes pilots, aircrew, engineers and maintainers from HX-21, the Naval Air Warfare Center Aircraft Division, Boeing and Bell, will conduct the DT over the next year.

The first operational CMV-22B will be delivered to fleet logistics multi-mission squadron VRM-30 'Providers', stationed at NAS North Island, in San Diego, California, this summer and operational testing is scheduled to start in early 2021. The CMV-22B is also scheduled to achieve initial operational capability in 2021.

The CMV-22B will replace the fixed-wing C-2A Greyhound in the COD mission that includes transporting personnel, mail, supplies and high-priority cargo from shore bases to aircraft carriers at sea. It will provide the capability to transport up to 6,000lb (2,722kg) of cargo and/or personnel over a 1,150nm (2,199km) range. The aircraft's expanded range is made possible by the addition of two fuel tanks installed in the wing, and the forward sponson tanks were redesigned for additional capacity. A beyond line-of-sight high frequency radio, a public address system for passengers, and an improved lighting system for cargo loading have also been integrated.



ALSO THIS MONTH...

US defense budget

A full breakdown of all the plans and potential retirements.

SOCOM SEEKING ARMED OVERWATCH AIRCRAFT

THE US SPECIAL Operations Command (USSOCOM) is moving forward with plans to acquire 75 fixed-wing aircraft under a new program, announced on February 3. A statement related to the news said: 'Armed overwatch will provide Special Operations Forces (SOF) with deployable and sustainable manned aircraft systems fulfilling close air support (CAS), precision strike, and intelligence, surveillance, and Reconnaissance (ISR) in austere and permissive environments.'

USSOCOM plans to conduct an armed overwatch prototype demonstration using Other Transaction Authority (OTA) funding. The aircraft that results from this program will support several Air Force Special Operations Command (AFSOC) missions including CAS and Forward Air Control — Airborne (FAC-A). A follow-on contract could include around 75 aircraft and associated support that will be procured over a five to seven-year period.

In October 2019, the USAF formally announced plans to purchase small numbers of Beechcraft AT-6 Wolverine and Sierra Nevada Corp A-29 Super Tucano aircraft as part of its light attack experiment, but USSOCOM has become increasingly frustrated with Air Combat Command's (ACC) approach to the program. Under that effort, the AT-6s are planned for delivery to Nellis AFB, Nevada, for continued testing and development of operational tactics and standards. AFSOC will receive the A-29s, which will be used to create an instructor pilot program at Hurlburt Field, Florida, for the Combat Aviation Advisory mission.

Begun in 2017, the light attack experiment was originally intended to develop a less-expensive alternative to using fourth and fifth-generation fighters for CAS missions. The armed overwatch program appears to be geared towards this goal.

The USAF is proposing to retire 17 B-1B Lancers that need prohibitively expensive structural upgrades.
USAF/MSgt Joshua L. DeMotts



According to the AFSOC commander, the 'off-the-shelf' armed overwatch aircraft will be tasked with both strike support and intelligence, surveillance, and reconnaissance (ISR) missions and will eventually replace the command's Pilatus U-28A aircraft.

The budget also funds numerous modernization programs for F-15, F-16 and F-22 aircraft. Those modifications include integration of Northrop Grumman AN/APG-83 active electronically scanned array (AESA) radar systems on 330 additional F-16s by 2026. The service had previously authorized the radar installation on 72 'Vipers'. In FY21, the fighter inventory will include 316 F-15s, 549 F-16s, 166 F-22s and 306 F-35As.

The USAF's Total Aircraft Inventory (TAI) in FY21 will comprise 5,485 aircraft, with Air National Guard (ANG) and Air Force Reserve Command units being responsible for 1,003 and 329 aircraft, respectively. The totals represent a net loss of 15 aircraft over FY20, with the ANG fleet being reduced by 47 aircraft.

US Navy

The navy's \$207.1-billion request represents a \$1.9-billion decrease over FY20. It provides \$17.2 billion for the procurement of 121 manned and unmanned aircraft with an additional 537 following in the Future Years Defense Plan (FYDP). Naval aviation's Total Aircraft Inventory (TAI) will see an increase

US DEFENSE BUDGET

FISCAL YEAR 2021 PLANS IN DETAIL

PRESIDENT TRUMP'S \$705-BILLION Department of Defense (DoD) Fiscal Year (FY) 2021 budget was released on February 10. The base budget includes \$636.4 billion, while \$53.0 billion is provided to sustain Overseas Contingency Operations (OCO). The combined budget represents an \$800-million increase over the enacted FY 2020 National Defense Authorization Act (NDAA) that provided \$704.6 billion.

Compared with the 2020 NDAA, which provided funding for 470 aircraft, the FY21 request includes just 346 aircraft. The US Army will receive \$178 billion, the US Navy \$207.1 billion and the US Air Force \$153.6 billion.

Aircraft and related systems are budgeted to receive \$56.9 billion

including \$15.1 billion earmarked for 24 F/A-18E/F Super Hornets and 12 F-15EX Eagles plus 79 F-35 Lightning IIs.

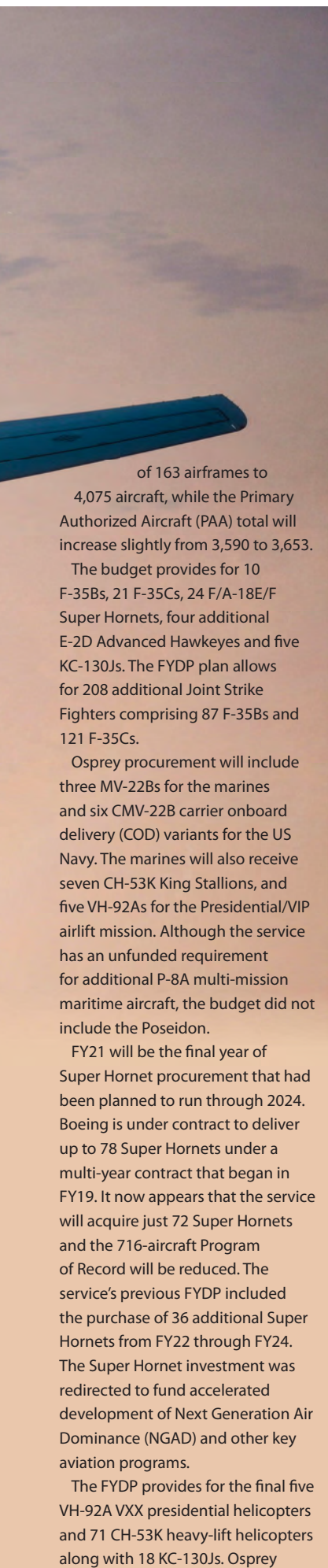
US Air Force

The USAF's \$153.6-billion budget includes \$22.9 billion for procurement and \$26.9 billion for Research, Development, Test and Evaluation (RDT&E). Aircraft procurement is broken down to include \$6.58 billion for combat aircraft, \$3.29 billion for airlift and \$1.49 billion for other aircraft. RDT&E funding provides \$2.8 billion for the B-21A Raider bomber, \$801 million for the Presidential Aircraft Recapitalization (PAR), \$793 million for the F-35A Continuous Capability Development & Delivery (C2D2) and \$249 million for the

T-7A Red Hawk advanced trainer program. The research and development request for the Next Generation Air Dominance (NGAD) program totals just \$1.04 billion.

The budget provides for 48 F-35As, 12 F-15EXs, 15 KC-46As, four AC/MC-130Js, 16 HH-60W and eight MH-139A helicopters. Three additional HH-60Ws are funded under the OCO request.

Special Operations Command will acquire five light-attack aircraft to support its Armed Overwatch program, which was launched last December. The command's request provides \$106 million for the aircraft for Air Force Special Operations Command (AFSOC). This effort is separate from the USAF's plan to acquire two A-29B Super Tucanos and two AT-6 aircraft for AFSOC and Air Combat Command (ACC).



of 163 airframes to 4,075 aircraft, while the Primary Authorized Aircraft (PAA) total will increase slightly from 3,590 to 3,653.

The budget provides for 10 F-35Bs, 21 F-35Cs, 24 F/A-18E/F Super Hornets, four additional E-2D Advanced Hawkeyes and five KC-130Js. The FYDP plan allows for 208 additional Joint Strike Fighters comprising 87 F-35Bs and 121 F-35Cs.

Osprey procurement will include three MV-22Bs for the marines and six CMV-22B carrier onboard delivery (COD) variants for the US Navy. The marines will also receive seven CH-53K King Stallions, and five VH-92As for the Presidential/VIP airlift mission. Although the service has an unfunded requirement for additional P-8A multi-mission maritime aircraft, the budget did not include the Poseidon.

FY21 will be the final year of Super Hornet procurement that had been planned to run through 2024. Boeing is under contract to deliver up to 78 Super Hornets under a multi-year contract that began in FY19. It now appears that the service will acquire just 72 Super Hornets and the 716-aircraft Program of Record will be reduced. The service's previous FYDP included the purchase of 36 additional Super Hornets from FY22 through FY24. The Super Hornet investment was redirected to fund accelerated development of Next Generation Air Dominance (NGAD) and other key aviation programs.

The FYDP provides for the final five VH-92A VXX presidential helicopters and 71 CH-53K heavy-lift helicopters along with 18 KC-130Js. Osprey

procurement will continue with 24 MV-22Bs and CMV-22B CODs from 2021-2025. Under the FYDP, the navy will also receive 14 E-2Ds. Beginning in FY23, the service will procure a new multi-engine trainer to replace the T-44, the unmanned MQ-25A Stingray, and it will also resume Triton acquisition. The service procured three System Demonstration Test Article (SDTA) MQ-25As in Fiscal Year 2020 and RDT&E spending in FY21 will total \$267 million.

The US Navy plans to save \$283.3 million over the FYDP by standing down the RQ-4A Broad

Area Maritime Surveillance — Demonstrator (BAMS-D). Savings will be reinvested in the Triton program.

Sundown of the TH-57 training helicopter will also begin in FY20, which marks the beginning of the transition from the legacy helicopter to the Advanced Helicopter Training System (AHTS). Although the TH-73A is scheduled to achieve IOC in 2021, that plan could be affected by the recent protest of the contract award by Airbus to the Government Accountability Office.

More details of the latest US Navy plans appear in 'Ready Room' on pages 18-21.

PROPOSED USAF CUTS

The USAF is proposing cuts over the five-year Future Years Defense Plan (FYDP). The moves would free up around \$4.1 billion that will be redistributed.

The retirements would eliminate 17 of the least capable B-1B bombers, three Block 20 EQ-4B and 21 Block 30 RQ-4B Global Hawks, 24 C-130Hs, 16 KC-10As and 13 KC-135Rs, and 44 A-10Cs. The bulk of the A-10C losses, totaling 39 aircraft, would be felt by Air National Guard (ANG) units. Air Force Reserve Command (AFRC) would lose seven aircraft, but the active USAF would gain two jets. Ultimately, the fleet would be reduced to 237 airframes including 218 combat-capable jets assigned to seven squadrons. Boeing's A-10 Thunderbolt II Advanced-Wing Continuation Kit (ATTACK) would be reduced from 109 aircraft to just 65. The service reached the decision to retire the hardest-used B-1Bs, which have fatigue cracks in their wing structure, after determining that the time and cost to repair the aircraft exceeds their life expectancy, making the work cost-prohibitive.

The service considers the risk in the loss of tanker capacity to be acceptable so long as the fleet size doesn't drop below 479 total aircraft available. Under the FY21 budget, the service would operate a combined fleet of 493 tankers.

Although it plans to operate more than 300 MQ-9A RPAs, the

USAF will reduce the number of combat air patrols (CAP) from 70 to 60 in FY21, by cutting 10 that were contractor-operated.

The service is also considering retirement of the T-1 trainer fleet as it proceeds with the 'Pilot Training Next' program. The B-2A's troubled Defensive Management System Modernization (DMS-M) project would be canceled, freeing up funds to invest in the B-21 and several small upgrades for the Spirit fleet. The Hercules and tanker retirements would be offset by the delivery of 19 C-130Js and 16 KC-46As in FY21. In the short term, the service will lose some operational tanker capacity until the Pegasus is fully cleared.

The KC-135 and KC-46 fleets will receive an upgrade that will equip them with a beyond-line-of-sight (BLOS) communications capability. The underwing pod-mounted system would also provide the aircraft with a command and control (C2) node capability. The loss of the capabilities resulting from the EQ-4B retirement would be mitigated by the purchase of one additional E-11A Battlefield Airborne Communications Node (BACN) aircraft annually, beginning in FY21.

Previous attempts by the USAF to retire A-10Cs, Global Hawks and B-1Bs have been blocked by lawmakers during the budget approval process and it remains a possibility that this will reoccur.

US Army

The army's \$178-billion budget request continues to sustain Apache, Black Hawk and Chinook production and remanufacture programs. The service's \$34.1-billion research, development and acquisition budget provides \$21.7 for procurement and \$12.6 billion for RDT&E. The base budget accounts for \$3.1 billion and provides for 39 new and 80 remanufactured aircraft.

The number of AH-64Ds to be remanufactured to AH-64E configuration saw a slight increase to 50 airframes and the OCO budget provides funding for two new War Replacement Aircraft (WRA). The Apache program is now in the final stage of a five-year multiyear procurement that began in FY17. New Black Hawk purchases will include 21 UH-60Ms and 15 HH-60Ms, while 24 UH-60Ls will be updated to UH-60V configuration. Through FY20, the army had ordered more than 1,100 UH/HH-60Ms against its objective of 1,375 aircraft. Chinook funding in the base budget covers six remanufactured MH-47Gs and a single WRA new-build CH-47F under the OCO budget.

The remanufactured AH-64Es comprise 26 that will be assigned to active-duty army units and 24 that will be delivered to the Army National Guard. Likewise, 23 UH/HH-60Ms will go to the national guard with the remainder being assigned to the active component.

The RDT&E request for the Future Vertical Lift (FVL) program provides around \$648 million in research and development funds to continue. Competitive demonstration risk reduction and competitive prototyping efforts will continue in support of the Future Long Range Assault Aircraft (FLRAA) and the Future Attack Reconnaissance Aircraft (FARA) programs. The army was expected to select two bidders to build competing prototypes for the FARA program in March. The aircraft will be evaluated in a head-to-head competitive fly-off in late FY23. The FLRAA program is developing a replacement for the UH-60. The army is allocating \$134.4 million for FLRAA in FY21 and \$2.44 billion over the FYDP. FLRAA will likely become a formal program of record in FY22.

US NAVY PROGRESSES NEW CAPABILITIES FOR GROWLER

THE US NAVY is moving forward with plans to develop a new version of the EA-18G Growler — dubbed the Block II. The service released a sources-sought notice on January 28 seeking contractors to support system development and integration. However, the program will very likely be carried out by Boeing as the prime contractor for the Growler. The integration program will provide the Growler with a new electronic attack unit, upgraded AN/ALQ-218(V)4 radio-frequency receiver system and improved AN/ALQ-227(V)2 communication countermeasures set. The upgrades will be in addition to the new features that are already funded for the Block III version of the F/A-18E/F. These include conformal fuel tanks and a large-format display. Under a separate program, the Growler will receive the AN/ALQ-249 Next Generation Jammer — Mid-

Band (NGJ-MB), which is under development by Raytheon. It will achieve early operational capability (EOC) on the EA-18G by Fiscal Year 2022. A low-band version will follow two years later.

The navy is taking an extremely proactive stance when it comes to the Growler. Naval Air Warfare Center Aircraft Division and Boeing recently demonstrated a capability for the EA-18G to act as a controller for autonomous unmanned air vehicles. Test unit VX-23 flew a pair of EA-18Gs that simulated unmanned air systems (UAS), controlled from a third Growler. In a series of four flights that began in September 2019, the Naval Air Warfare Center Aircraft Division demonstrated 21 missions. The flights were intended to demonstrate the use of the EA-18G as a mission-controlling platform for autonomous unmanned aircraft.

In preparation for the evaluations, three Growlers were modified to

support an open-architecture processor and advanced networking. Incorporation of the Distributed Targeting Processor-Networked and the Tactical Targeting-Network Technology radio transformed two of the jets into UAS surrogate aircraft. Take-off and landings were conducted by pilots aboard the aircraft, but the Growlers subsequently flew in multiple planned formations and transmitted air-to-air sensor data back to the 'manned' aircraft. Conducted from NAS Patuxent River, Maryland, under the annual Fleet Experimentation (FLEX) program, the manned/unmanned teaming demonstration validated the effectiveness of operating F/A-18E/F and EA-18G aircraft to perform combat missions in conjunction with unmanned systems. Both of the prototype systems are planned for inclusion on the Block III Super Hornet.

SUPER HORNET SKI JUMP TESTS PLANNED

WITH HOPES OF selling the Block III version of the Super Hornet to the Indian Navy, Boeing plans to conduct ski-jump testing with the aircraft at NAS Patuxent River, Maryland. The site for the work was originally constructed to support F-35B ski-jump testing for the Royal Navy. The evaluations are planned as part of a project to confirm the Super Hornet's compatibility with the Indian Navy aircraft carrier *INS Vikramaditya* (R 33) and the future *INS Vikrant*, which is expected to enter service in 2022. The Indian Navy carriers are configured for short take-off but arrested recovery (STOBAR). Although they have arresting gear for landing, the ships feature a ski-jump rather than catapults for launching the aircraft. The Indian Navy has a requirement for 57 new carrier-based fighter aircraft. Likely candidates for the requirement include the Dassault Rafale M, the MiG-29K (which is already in service with the Indian Navy), a variant of Hindustan Aeronautics Ltd's indigenous Light Combat Aircraft (LCA), and the Super Hornet.



The US Navy is to develop a Block II variant of the EA-18G Growler. **Jamie Hunter**

UPGRADED SUPER HORNET RETURNED TO SERVICE

THE FIRST SUPER Hornet to receive Service Life Modifications (SLM) was turned over to strike fighter squadron VFA-106 at NAS Oceana, Virginia, on January 21. After completing US Department of Defense operational readiness review inspections and a functional flight check, the F/A-18F was returned to service. Carried out at Boeing's St Louis, Missouri, facility, the SLM program extends the Super Hornet's service life from

6,000 to 7,500 flight hours. The Block II Super Hornet service life will be further extended to 10,000 hours beginning in December 2022, and the aircraft will also be upgraded to Block III configuration. The Block III modifications will provide enhanced network capability, enhanced cockpit and communication systems, conformal fuel tanks, and reduced radar signature. Production Block III deliveries will begin in 2022.

Currently, 15 aircraft have been inducted into SLM modification lines in St Louis and the contractor's facility in San Antonio, Texas, which received its first Super Hornets in June 2019. Two additional inductions were scheduled for February.

Boeing is currently under contract to carry out the SLMs on 22 Super Hornets, but the program is expected to run through 2033 or beyond.

The SLM program began in April 2018 and scheduled inductions will increase over the next few years until a steady rate of 40 aircraft annually is reached. Although the current turnaround time, from induction to return, is around 18 months, that is expected to be reduced to 12 months by Fiscal Year 2023. The second SLM jet was to have been delivered by the end February with the third following in April. Five additional Super Hornets will be returned to service this year.

NEW WEAPONS FOR POSEIDON

THE US NAVY is to integrate several new types of missiles, bombs, mines and advanced decoys with the P-8A multi-mission maritime aircraft. The service initially plans to integrate the Lockheed Martin AGM-158C Long-Range Anti-Ship Missile (LRASM), but is also

considering the Raytheon GBU-53/B StormBreaker Small Diameter Bomb (SDB II), Mk62/63/65 QuickStrike naval mines, 500lb (227kg) GBU-38, 1,000lb (454kg) GBU-32 and 2,000lb (907kg) GBU-31 variants of the Joint Direct Attack Munition (JDAM) and the Raytheon ADM-160 Miniature

Air-Launched Decoy (MALD), as well as the BRU-55 Smart Bomb Rack and Universal Armament Interface (UAI) for incorporation.

The P-8A is currently capable of deploying several weapons, including the Raytheon Mk54 lightweight torpedo, AGM-84 anti-

ship missiles and the AGM-84H/K Standoff Land Attack Missile — Extended Range (SLAM-ER) from its internal weapons bay and six external hardpoints. LRASM is derived from the AGM-158B Joint Air-to-Surface Standoff Missile — Extended Range (JASSM-ER) land-attack cruise missile. It is currently operational with US Navy F/A-18E/Fs and the USAF's B-1B.

POLAND PLANS SEASPRITE REPLACEMENT

THE POLISH NAVY has started a program that will replace the four Kaman SH-2G helicopters based at Gdynia/Babie Doły. The decision to replace the helicopters with a multi-role embarked naval helicopter follows a period of low availability that is partially due to a lack of maintenance support from manufacturer Kaman. The navy plans to acquire four to eight new helicopters under its 'Kondor' embarked helicopter program. They will be tasked with anti-submarine warfare (ASW) and radar weapons control (RWC), which includes providing target detection and designation for the navy's Kongsberg Naval Strike Missile

and Saab RBS 15 anti-ship missiles. The former mission is currently conducted by Mi-14 helicopters. The Mi-14s will be replaced by four AW101 helicopters that were ordered in April 2019. The navy is considering nine potential suppliers for the helicopters, including Kaman, which could potentially work with General Dynamics Mission Systems — Canada Inc. to update the Polish Seasprites and extend their service lives. The latter contractor is already supporting similar efforts for New Zealand and Peru. The Polish Defence Ministry's Armament Inspectorate expects to begin discussions with potential bidders in May.

SECOND FRENCH KC-130J

LOCKHEED MARTIN DELIVERED the second of two KC-130Js to the French Air Force at its aeronautics facility in Marietta, Georgia, on February 4. The delivery completes France's Super Hercules order, which was conducted under the US Foreign Military Sale program. The acquisition included a pair of standard C-130J-30 airlifters that were delivered in 2017 and 2018. France's initial KC-130J arrived at BA123 Orléans-Brice air base in late September 2019. The KC-130Js

will enable the air force to refuel its Airbus Helicopters H225M in-flight. The four aircraft are operated by Transport Squadron 2/61. The Hercules fleet will be jointly operated with the German Luftwaffe, which is acquiring three C-130J-30s and three KC-130Js. The Franco-German squadron will be stationed at Evreux-Fauville air base in France. Delivery of the first German transport is scheduled for mid-2021.



The second of two KC-130Js for the French Air Force. **Lockheed Martin**

PORTUGAL SELLS MORE F-16s TO ROMANIA

THE SALE OF a second batch of F-16s from Portugal to Romania was completed on January 27. The contract was signed at at Monte Real air base, Portugal, by the Portuguese Minister of Defense João Gomes Cravinho and his Romanian counterpart Gen Nicolae-Ionel Ciucă.

The agreement includes five F-16AM airframes (FAP 15122, FAP 15132, FAP 15134, FAP 15135, and FAP 15141) that will be handed over in M5.2 Operational Flight Program (OFP) standard.

All airframes of the batch belonged to the Peace Atlantis II

program, received in Portugal in 1999. Deliveries to the Romanian Air Force are scheduled for June 2020 (two airframes), October (two airframes) and the last one in early 2021.

These five airframes will join the dozen operated by the Romanian Air Force since 2017, for a total of 17. The Portuguese Air Force will receive four further airframes after receiving a Mid-Life Upgrade (MLU) by OGMA in Alverca, to provide a fleet of 28 operational F-16 MLUs (24 AM and four BM) to be used by its two squadrons at Monte Real.



An F-16AM from the first batch sold to Romania prior to delivery in 2016. **Paulo Mata**

LITENING POD EVALUATED ON C-130J

THE ROYAL AUSTRALIAN Air Force (RAAF) has begun flight trials of a C-130J equipped with a Northrop Grumman AN/AAQ-28(V) Litening pod that is mounted on a pylon beneath the wing. The pod's electro-optical/infrared (EO/IR) sensors provide the capability to record video in daylight and night-time conditions. Trials will examine the Litening pod's ability to improve crew situational awareness and reduce mission risks. During the trials, the Litening pod is paired with a satellite communications system aboard the Hercules that will permit high-definition video to be shared with ground-based or headquarters units. The pod could also be invaluable during

humanitarian assistance and disaster relief missions, allowing the aircraft to deliver relief cargo, then collect and stream live video. Originally acquired for the F/A-18A/B Hornet, the pod's targeting function is disabled while fitted to the Hercules. Flight trials, which began on January 29, are being conducted from RAAF Base Richmond by No 37 Squadron and the Aircraft Research and Development Unit, with support from the Air Warfare Engineering Squadron. The trial is being conducted using Hercules serial A97-448, which has been fitted with a number of systems under the air force's Plan Jericho, and is the first of six C-130Js to receive a high-speed satellite communications antenna.

TRITON INITIAL DEPLOYMENT UNDER WAY

THE MAIDEN DEPLOYMENT for the US Navy's MQ-4C Broad Area Maritime System (BAMS) unmanned air system (UAS) began recently at Andersen AFB, Guam. The US Navy acknowledged the arrival of two Tritons at the base on January

26. The aircraft are operated by unmanned patrol squadron VPU-19 under the operational control of the Commander, Task Force CTF-72, which serves as the lead for patrol, reconnaissance and surveillance forces in the 7th Fleet. VPU-19 is operating the high-altitude long-endurance (HALE) UAS as part of an

early operational capability (EOC) to further develop the concept of operations for the UAS in the maritime domain. The forward-deployed MQ-4Cs will provide a persistent maritime intelligence, surveillance and reconnaissance (ISR) capability in support of a full range of military operations.

In related news, Northrop Grumman has received a \$172.4-million contract modification that exercised an option for the production and delivery of two additional MQ-4C Tritons. Work associated with the contract is expected to be completed in January 2024.

The Triton unmanned aircraft system (UAS) is assigned to unmanned patrol squadron VPU-19. The squadron will operate and maintain two aircraft in Guam under Commander, Task Force CTF-72, which is the lead for patrol, reconnaissance and surveillance forces in the 7th Fleet. **USAF/SRA Ryan Brooks**



FIRST UPGRADED Tu-160M FLIES

The first modernized Tu-160M, '4-05', returned to the air at the Kazan Aircraft Plant airfield, Russia, on February 2. It was previously operated by the Russian Aerospace Forces as '14 Red'/RF-94103, named 'Igor Sikorsky'. **UAC**



BOEING INCREASES BLOCK II CHINOOK TESTING

BOEING PLANS TO accelerate flight-testing of the Block II variant of the CH-47F. The move comes after elected officials restored \$25 million in advanced procurement for the Chinook upgrade program. The US Army had intended to 'reprogram' funds earmarked for Block II to next-generation efforts.

Boeing has delivered three Block II test aircraft under the engineering and manufacturing development (EMD) phase. One of the helicopters is currently supporting trials at Boeing's Mesa, Arizona, facility. A second is supporting testing of Boeing's advanced composite rotor blades. The Block II features a lighter, more structurally rigid airframe,

improved powertrain and the new rotors that are designed to provide a 1,500lb (680kg) increase in lift.

Testing associated with the EMD program is expected to last until the fall. Once it concludes, the US Army will take possession of the helicopters and limited user testing of Block II will begin.

The data collected will support a Milestone C decision on whether to upgrade the CH-47F fleet. Boeing is already under contract to build 15 MH-47Gs for US Army Special Operations Command (USASOC). Two examples are already on the production line in Philadelphia, Pennsylvania, and scheduled for delivery in 2020.

VALKYRIE FLIES AGAIN

THE UNMANNED XQ-58A Valkyrie completed its fourth flight test at the US Army's Yuma Proving Ground in Arizona on January 23. The low-cost unmanned aircraft had not flown since experiencing a mishap in October 2019. During the hour-long envelope expansion flight, the demonstrator successfully completed 49 test objectives. Kratos Defense developed the Valkyrie in conjunction with a US Air Force Research Laboratory program under the Low-Cost Attributable Strike Demonstrator (LCASD) effort. It is being developed as a possible munitions-carrying

'wingman' for manned fighters and would be used in situations where the service might not want to risk losing more advanced systems. The aircraft's fifth and final flight under the current program is scheduled to take place in April. The USAF plans to install a communications gateway in the aircraft that will allow it to communicate with the F-22A and F-35A on a low probability of detection and interception data link. The Valkyrie may participate in the USAF's upcoming joint all-domain command-and-control demonstration.

SAMPLING POD ON F-4 PHANTOM

Japan Air Self-Defense Force F-4EJ Kai serial 17-8301 from the Hiko Kaihatsu Jikken Dan test unit at Gifu carrying an atmospheric sampling pod, and photographed at Tsuiki in December. **Ali Hunt**



CC-295 TRAINER ARRIVES

THE ROYAL CANADIAN Air Force (RCAF) has received its first Airbus Military C295 from the factory at San Pablo Airport in Seville, Spain. The aircraft, which carries the serial number 295517 (c/n 187), is destined to serve as a trainer for maintenance personnel. After

an overnight stop at Lajes in the Azores, it arrived in St Johns, Newfoundland, on January 29. The C295 arrived at its home at 19 Wing/CFB Comox, Vancouver, British Columbia, on February 4.

Known to the RCAF as the CC-295, the type forms the basis of a new

Fixed Wing Search and Rescue (FWSAR) system, which will replace the RCAF's fleet of six CC-115 Buffalos and 12 CC-130Hs used in the search and rescue (SAR) role.

Although physically identical to the CC-295, this first aircraft is not fitted with the full suite of mission equipment. Referred to as an Aircraft Maintenance Trainer (AMT), it is not part of the 16-aircraft

FWSAR order and is considered an additional asset that is part of the training solution.

At Comox, the AMT joins the new SAR training centre, where it will support CC-295 technical and maintenance training. The first operational CC-295 is expected to arrive in Canada this spring. Delivery of the final aircraft to Canada is slated for the fall of 2022. The Canadian government ordered 16 C295Ws from Airbus Defence and Space in December 2016 and the initial CC-295 took to the air when serial 295501 (c/n 183) flew for the first time in Seville on July 4, 2019. Although it was accepted by the RCAF on December 18, 2019, it is currently supporting Initial Operational Test and Evaluation (IOT&E) in Spain.



The first Airbus CC-295 for the Royal Canadian Air Force arrives at 8 Wing/CFB Trenton, Ontario. **Andrew H. Cline**

IN BRIEF

F-22As from the 1st Fighter Wing's 27th Fighter Squadron returned to Joint Base Langley-Eustis, Virginia, at the conclusion of a deployment to Qatar in support of US Central Command. The deployment, which began in June 2019, marked the first time the Raptors had been based at Al Udeid Air Base. Conducted amid increased tension with Iran, the deployment was supported by airmen from both the 1st Fighter Wing and the Virginia Air National Guard's 192nd Fighter Wing. Also stationed at Langley, the wing operates as an associate unit, sharing the responsibility for operating and maintaining the Raptors with the active-duty wing. The Raptors' departure from the theater began on February 1 and, after passing through Moron Air Base, Spain, they all returned Stateside. While deployed as the 27th Expeditionary Fighter Squadron, the unit was attached to the 379th Air Expeditionary Wing.

Red Hawk construction under way

Saab began construction of the aft fuselage section for the first seven Boeing T-7A trainers at its facility in Linköping, Sweden, on January 10. The T-7A will undergo final assembly

at Boeing's St Louis, Missouri, facility. Saab will carry out future production work at a new facility in West Lafayette, Indiana. Boeing was awarded the \$9.2-billion contract for the new advanced trainer in September 2018.

Gulfstreams ordered

The US Air Force Life Cycle Management Center awarded Gulfstream Aerospace a \$127.4-million contract to produce and deliver two C-37B aircraft. Funded under the Fiscal Year 2020 National Defense Authorization Agreement (NDAA), the Gulfstream 550s will be delivered by September 2021. The USAF recently disclosed plans to acquire as many as six additional G550s over a 10-year period. The service's objective includes up to 22 C-37A/Bs, with a minimum requirement of 17 to support VIP/Special Air Mission (SAM) requirements. It currently operates nine C-37As and three C-37Bs.

JSTARS returns to CENTCOM

The USAF recently deployed E-8C Joint Surveillance Target Attack Radar System (JSTARS) intelligence, surveillance and reconnaissance (ISR) aircraft to Al Udeid Air Base, Qatar. The aircraft had made a celebrated departure from the theater in

October 2019, after operating there for 18 straight years. The E-8C reportedly arrived back in the US Central Command (CENTCOM) area of operations on January 16, one week after Iran launched ballistic missiles at US personnel stationed in Iraq.

Last Stratotanker departs Seymour Johnson

The 916th Air Refueling Wing said farewell to its final KC-135R during a ceremony at Seymour Johnson AFB, North Carolina, on February 8. Serial 60-0349, which was the final Stratotanker assigned to the Air Force Reserve Command wing, was also the first to arrive at the Goldsboro base when it touched down on October 1, 1995. Prior to its transition to the KC-135R, the wing's 911th Air Refueling Squadron flew the KC-10A.

Chinooks for Afghanistan

The US plans to supply an undisclosed number of heavy-lift CH-47 helicopters to Afghanistan's Special Missions Wing (SMW) for use in counter-terrorism operations. The CH-47s would replace the SMW's Mi-17s by the end of 2023. The potential transfer was noted in the US Department of Defense's semi-annual Enhancing Security and Stability in Afghanistan report,

which was released in December 2019. The US Army has transferred more than 40 UH-60A+ medium-lift helicopters to Afghanistan as replacements for its Mi-8/17 fleet. Plans to transfer up to 159 Black Hawks to Afghanistan have been reduced to a maximum of 53 aircraft.

Loyal Wingman progress

Boeing Australia recently completed major fuselage structural assembly for the first unmanned 'Loyal Wingman' aircraft. The aircraft is one of three prototypes that will be produced as a part of the Loyal Wingman — Advanced Development Program, in partnership with the Royal Australian Air Force (RAAF). It will be the first military aircraft developed in Australia in more than 50 years, according to the Boeing Airpower Teaming System (ATS) program manager. The 38ft (11.7m) aircraft is designed to use artificial intelligence in teaming with other manned and unmanned platforms. Boeing is developing the aircraft for the global defense market and international customers that will be able to tailor its sensors and systems based on their own defense and industrial objectives. The first prototype is expected to complete its initial flight this year.

RECENT LOSSES

• A Royal Saudi Air Force Tornado

IDS was reportedly shot down by a Houthi militia missile while conducting a mission in support of the Yemeni Army on February 14. The strike aircraft went down in the Maslub district of Yemen's Al-Jawf province and both crew were reportedly captured by Houthis.

• Three crew aboard a **US Army C-12** suffered minor injuries when the King Air aircraft suffered a hard landing at Hunter Army Airfield in Savannah, Georgia, on February 12. The intelligence aircraft and crew are assigned to 224th Military Intelligence Battalion.

• The pilot of a **Pakistan Air Force T-37C** was seriously injured after ejecting from the trainer before it crashed near the Takht Bhai area of Mardan district in Khyber-Pakhtunkhwa province on February 12.

• A **UH-1J** from the **Japan Ground Self-Defense Force's** 2 Squadron suffered a hard landing while training in snowy conditions on February 7. Both pilots were injured as a result of the mishap, which occurred at Asahikawa Garrison in Asahikawa City, Hokkaido.

• A **Mirage III** operated by the **Pakistan Air Force** crashed shortly after take-off from Rafiqui air base on February 7. The pilot ejected safely before the fighter came down near Shorkot, Jhang district, in Punjab province.

• **TB10GT** serial T-2405 (c/n 2229) operated by the **Indonesian**

Navy's Air Squadron 200 made an emergency landing in a pond after suffering engine problems on February 3. The instructor and the student pilot were not injured when the Tobago trainer came down in Sidoarjo, East Java.

• A **Cheetah** helicopter (HAL-produced SA315B Llama) operated by the **Indian Army** crashed near Reasi, Jammu and Kashmir, on February 1. Both pilots escaped without serious injury.

• **UH-1H** serial BF1606 (c/n 18061) operated by the **Burkina Faso Air Force** Helicopter Squadron crashed in the village of Nambé near Koubri on January 31. Neither pilot was seriously injured.

• **Bell 206B** serial AF-302 (c/n 3678) operated by the **Uganda Peoples' Defense Air Force** crashed during a night-time training exercise near Bulo, in Uganda's central Gomba district on January 28. Both pilots were killed.

• A **French Air Force Duo Discus** glider crashed in a field near the Salon-de-Provence air base, Bouches-du-Rhône, after experiencing a problem with its speed brakes on January 27. Both pilots were injured.

• Both crew were killed when an **Algerian Air Force Su-30MKa** crashed during a training exercise on January 27. The fighter went down near the village of Ain Zitoun in Oum El Bouaghi district, around 250 miles (402km) from Algiers.

• **OH-58D** serial 327 operated by

the **Croatian Air Force** crashed in the Adriatic Sea near Šibenik on January 27. Both pilots were killed.

• **E-11A** serial 11-9358, operated by the **USAF's** 430th Expeditionary Electronic Combat Squadron, crashed in eastern Afghanistan's Ghazni province on January 27. The Battlefield Airborne Communications Node (BACN) aircraft went down in a Taliban-controlled area near Sadozai, in the Deh Yak district, southwest of Kabul. Both pilots were killed when the Global 6000 went down.

• Five sailors were injured when an **MH-60S** helicopter assigned to the **US Navy's** helicopter sea combat squadron HSC-12 crashed in the Philippine Sea, on January 25. The Seahawk was operating from 7th Fleet command ship USS *Blue Ridge* (LCC 19) when it went down 106 miles (170km) east of Okinawa. Three crew members were recovered by a Japan Air Self-Defense Force UH-60 search and rescue helicopter, and another MH-60S from the *Blue Ridge* recovered the others.

• **T-35B-3** serial FAS74 (c/n 201) operated by the **Salvadoran Air Force** Center of Aeronautical Education and Military Training's Military Aviation School crashed in a residential area on January 21, killing both pilots. The Pillán was on approach to land at Ilopango International Airport when the mishap occurred.

• **MD 530MG** serial 1143 (c/n 0702FF) operated by the **Mexican Air Force** crashed during a landing attempt at El Zorrillo Airport, Guadalupe y Calvo, Chihuahua, on January 19. Several of the five crew and passengers were hospitalized following the mishap.

KENYA RECEIVES NEW AIRCRAFT

THE US DELIVERED six MD 530F scout-attack helicopters to Kenya's Joint Helicopter Command during a handover ceremony at the Embakasi Garrison in southeast Nairobi, on January 23. The helicopters feature the DillonAero Mission Configurable Armament System (MCAS), FN Herstal Weapons Management System, DillonAero Fixed-Forward Sighting System, FN Herstal .50-cal HMP 400 machine gun pods and M260 seven-shot 2.75in (70mm) rocket pods. Kenyan Defense Forces are expected to receive six additional Cayuse Warriors at a later date. The potential \$253-million Foreign Military Sale was approved in 2017. The helicopters will be operated by the army's 50th Air Cavalry Battalion.

The air force received its first two C-27J transports on January 30 when Leonardo delivered the Spartans to Jomo Kenyatta International Airport. Kenya ordered three Spartans at a cost of \$198 million in late 2017 and is the fourth African nation to order the C-27J, following Morocco, Chad and Zambia. The air force is also expected to take delivery of three C-145A light transports later this year. The Skytrucks were previously operated by the USAF and are excess to its requirements. Kenyan pilots and technicians are currently training in the US.

NEW SCHEME FOR AUSTRALIAN TANKERS

THE ROYAL AUSTRALIAN Air Force's fleet of KC-30A Multi-Role Tanker Transports is receiving a new paint scheme and markings. The new gloss gray paint replaces the aircraft's original 'low-visibility' gray scheme that was carried over from the predecessor Boeing 707 tanker-transports. KC-30A serial A39-004 was the first to receive the new markings and it returned to Australia from its repaint on January 15, 2020.



Commonwealth of Australia, Department of Defence

HOLLOMAN HERITAGE T-38

T-38C serial 63-8187 is assigned to the 586th Flight Test Squadron, part of the 96th Test and Evaluation Group (TEG), at Holloman AFB, New Mexico. It's one of a succession of the USAF aircraft wearing new heritage schemes, and was photographed at Fort Worth Alliance, Texas, in February. **Michael Keaveney**



THE MOST COMPREHENSIVE AIR ARMS INFORMATION AVAILABLE

AIRFORCES

Intelligence

Whether your background is in military analysis, the defence industry, maintenance, repair and overhaul or research, this is what you need.

- Research and analysis
- Threat assessment
- Competitive comparison
- Developing new market opportunities

Constantly
updated and
monitored with
more than
1,000 changes
every 3 months

**Comprehensive and
accurate data**

**Profiles for over 380 air
arms in 199 countries**

Multi-service operations

Secure online access

**Downloadable
Excel™ reports**

THE ESSENTIAL ONLINE AIR ARMS DATABASE



EMAIL: info@AirForcesIntel.com

CALL: +44 (0)1780 755131

www.AirForcesIntel.com

THE OPS DESK

BY SCOTT WOLFF



BRINGING YOU THE LATEST TALK
FROM AROUND THE SQUADRONS

LAYTON IN UTAH is a pretty breathtaking setting, especially on a clear winter day. It nestles at the base of the Wasatch mountains, approximately 30 miles to the north of Salt Lake City, Utah. It is also home to Hill AFB, named after Maj Ployer Peter Hill of the US Army Air Corps, who died test-flying the original prototype of the B-17 Flying Fortress bomber. The base is home to Air Combat Command's 388th Fighter Wing (FW), Air Force Reserve Command's 419th FW and the Ogden Air Logistics Complex, a critical component of the Air Force Sustainment Center.

In September of 2015, the base made history when the first two combat-coded F-35A Lightning IIs landed here. It was a momentous occasion for both fighter wings, which were selected to be the first units to employ the US Air Force's newest fighter. 'Ops One' — as it became known at the time — was a massive, ambitious undertaking, with the goal to bed down nearly 80 of the new aircraft, spread across

three active-duty squadrons and a reserve associate unit.

In December 2019, that vision became a reality, when the last of the aircraft arrived and the wing achieved full combat capability. It had taken four years, but resulted in 78 aircraft on the ground, fully trained with combat-capable pilots, the requisite number of experienced, capable maintainers, and the mission support equipment needed for sustained operations. The unit had supported two deployments to the Pacific theater, one to Europe, and several large-force employment exercises. Not only that, but also two combat deployments — one of them short-notice — had been successfully completed in the US Central Command theater of operations.

No small feat, but given the quality of leadership at the wing, group, and squadron levels during those critical and formative years, most would say the outcome was as expected.

In the fall of 2019, the plan was drawn up for another ambitious undertaking for 'Team Hill'. The commanders decided they wanted another way to demonstrate the capability of the unit, most notably the maintainers, and in the most epic fashion possible. A combat power exercise would be an ideal way to illustrate this.

Air power in focus

The term the USAF uses is 'maximum sortie generation' and when executed, it's a sight to see. I had the pleasure of witnessing such an event at Seymour Johnson AFB, North Carolina, nearly a decade ago, when 70 Strike Eagles took to the active runway for such an exercise. It was awe-inspiring, seeing the cocked hammer of American air power laid out in front of us. One by one the F-15Es blasted into the North Carolina sky and all over the state; more than 1,000 surface targets were engaged and destroyed!

Surge operations such as this have their roots back in World War Two, when mission packages over Europe would

sometimes include more than 1,000 aircraft. Because of the sheer number of 'tails' involved, the strings of taxiing airplanes would test the limits of aircrews, ground crews, supply chains, and even the aerodromes themselves. What's even more mind-boggling is that launching large numbers of aircraft like this was almost a daily occurrence.

I can't speak for everyone, but there's something truly comforting in knowing we possess the capacity to generate such an awesome amount of lethality, where the sword of freedom and justice is carried on the wings of men and women willing to die to defend us and our way of life. Some may call these exercises a waste of time and money, citing a potential enemy's ability to take out nearly an entire fighter wing because of how close together they are. Nonsense!

US Combat Air Forces are manned and led by incredibly smart, experienced men and women who excel at anticipating such eventualities. They are warriors who are also rather adept at providing annihilation with the precision of a neurosurgeon, and yet they operate with incredible restraint and discipline.

Not only do exercises such as these provide real-world value and demonstrate capability that could be brought to bear on short notice, but they also act as homage to a bygone era, when their predecessors paid for the freedoms enjoyed by Western society with large amounts of blood, twisted metal, and scorched earth.

Combat power projection – F-35 style

For the combat power demonstration at Hill, the overall objective was to demonstrate the maintainers' abilities to generate a large number of aircraft, taxi the jets, and launch them with at least an 80 per cent success rate. Not only that, a second objective — one arguably just as important — was to ensure safe, deconflicted ground movements and

F-35 'OPS ONE'

THE STORY BEHIND THE HILL AFB COMBAT POWER DEMONSTRATION

flight operations. More than a dozen aircraft were deployed, and would be off station for the near future, so they would make do with what was available at the time the exercise kicked off.

The big picture was to put a wing of fully combat-capable F-35s on display for the community, and really the world, to see, showing the billions of dollars invested in the aircraft, equipment, personnel, and training had more than paid off. It also sent a very strong, unapologetic message to potential threat nations: 'If the call comes, we're ready... even tonight.'

As the time approached, exercise coordinators and wing personnel worked through myriad challenges. One of the biggest question-marks would be the weather, as well as the number of aircraft available. The concept allowed for 60 aircraft, so it presented some significant challenges, even before the first airplane taxied.

The accepted level of risk for the exercise was categorized as 'medium' overall, with the biggest threat being weather before and during execution, the congestion on the ramp during ground operations, mid-air collision avoidance, and congestion during recovery operations.

Game time

On the ground side, there would be between four and five dozen aircraft running — at the same time. Maintenance vehicles scurrying about, and more than 100 maintainers working around all those aircraft. The hope would be for all to maintain their situational awareness at all

times, and remember two key points — they had been there before, and all they needed to do was stay in their respective lanes and do their jobs.

The plan would be to launch the aircraft in four-ships, with minimum-interval spacing allowed for instrument flight rules departures. Once airborne, they would fly out into the Utah Test and Training Range (UTTR), where KC-135s from the Utah Air National Guard would be available. The F-35s would fly both basic surface attack and basic fighter maneuvers profiles, and then come home.

The plan was for the first pilots to 'step' roughly an hour and 45 minutes prior to the first take-off. The second wave would step approximately 15 minutes behind them. The pilots knew the goal was to taxi each four-ship in sequence, utilizing minimum chat time to handle any significant maintenance issues affecting go/no-go. Ultimately, they would take what they were given at taxi time and be happy with the outcome, regardless.

There would be several aircraft serving as 'running spares', so if any of the lines fell out, there would be a jet cranked and ready to take its place. Any jet that fell out would transition to running spare status to work the maintenance issues. The plan was for no more than 20 minutes from step to start, and no more than 20 minutes from start to taxi — with emphasis on each line making its timeline.

The results are in

The goal was 60 aircraft airborne, and the final tally was 52. The time taken to launch

the aircraft? From when the first released its brakes to when number 51 got airborne was just over 14 minutes. The last aircraft followed a short time later after dealing with a maintenance issue.

Many speculated the massive display of combat readiness was in response to the recent flare-up of tension with the Islamic Republic of Iran, though as previously stated, this was simply not true. Exercises like these take a lot of planning and co-ordination and, in this case, took place over a period of months before go-time on January 6.

Even with one squadron of aircraft deployed in the Middle East, the remaining units at Hill were quite successful in re-asserting the ability to handle a real-world contingency in spectacular fashion. The level of professionalism there is at an all-time high and should instill great confidence in the ability of the USAF to handle the business of providing 'positive influence' from the air quite appropriately.

Every training opportunity, exercise and deployment is a milestone, validating the ambitious measures taken to prepare both wings for sustained combat operations, as both are leading the charge for the F-35A meeting and exceeding the expectations set for it. Under the watchful and experienced eyes of Col Steven 'Cajun' Behmer, 388th FW commander, and Col Gina 'Torch' Sabric, 419th FW commander, Hill's F-35s are ready to answer the call, whenever it may come. 🇺🇸

The incredible sight of 52 F-35As on the runway at Hill AFB in January. USAF/
R. Nial Bradshaw



READY ROOM

THE STORY BEHIND THE US NAVY HEADLINES

RICK
BURGESS

THE FISCAL YEAR 2021 US defense budget request released on February 10 proposes the procurement of fewer aircraft than the 2020 request as the US Navy nears completion of production on some of its new types, slows the procurement of others, and turns its focus towards future air dominance. The Future Years Defense Plan (FYDP) — which budgets five years in the future — also forecasts accelerated retirements or reductions in other fleets.

The navy's 2021 budget is focused on all-domain dominance — sea, air, land, cyber, space, assured command and control, battlespace awareness and an integrated force. The service is making a priority of 'capable capacity over less-capable legacy platforms to pace a rapidly changing threat,' budget briefing slides explained.

It plans to fund 121 aircraft with \$17.2 billion in 2021, compared with \$19.7 billion enacted in 2020 for 163 aircraft. The numbers are projected to reduce even further in the years 2022-25, at 107, 113, 96, and 100, respectively.

Aircraft proposed for procurement in 2021 for the navy include 24 Boeing F/A-18E/F Super Hornet strike fighters, 11 Lockheed Martin F-35C Lightning II strike fighters, four Northrop Grumman E-2D Advanced Hawkeye early warning aircraft, six Bell-Boeing CMV-22B Osprey tiltrotor carrier on-board delivery

This image: The FY 2021 budget request removes a multi-year purchase of Super Hornets between 2022 and 2024.

Jamie Hunter

Below: Naval Air Systems Command received the first Block III Super Hornet from Boeing in early 2020. **NAVAIR**





“ The navy had planned to buy F/A-18E/Fs from Boeing at least through 2023, but the decision has been made to terminate Super Hornet procurement early

NAVY ENDS SUPER HORNET FOR NEXT- GEN FIGHTER

SUPER HORNET PRODUCTION ANALYSIS

The decision to end Super Hornet procurement earlier than previously envisaged comes as a direct move to divert funds towards the US Navy's Next-Generation Air Dominance (NGAD) project, whatever form that may take. Super Hornet production has already gone way beyond what the navy originally envisaged and Boeing's 2019 \$4-billion multi-year contract for 78 aircraft through Fiscal Year (FY) 2021 looks set to be the last. A further multi-year plan for 36 Super Hornets from FY 2022-2024 will be canceled and the funds diverted into the Future Years Defense Plan (FYDP) for NGAD.

The US Navy's program of record included 584 Super Hornets; however, that increased to 716. The FYDP had planned the purchase of 110 Block III aircraft from FY 2020-2024, but this will be reduced by 36 aircraft if they are cut in the period 2022-24 as requested.

The final six Super Hornets ordered in FY 2018 will be the first new-build examples in Block III configuration. The navy also plans to upgrade existing Block II F/A-18E/Fs to Block III configuration beginning in FY 2022. The

reduction in new Block IIIs will clearly come as a blow to Boeing and its current export aspirations as the production life of this latest Super Hornet variant is truncated.

Block III will feature five major upgrades, including conformal fuel tanks (CFTs). These will replace the aircraft's existing external tanks, extending its range by 100-120nm (185-224km) and enabling it to carry a greater payload. It will receive signature improvements designed to reduce its radar cross-section. Cockpit upgrades feature an advanced network architecture that includes a large 10 x 19in high-definition display with touch screen and picture-in-picture, a more powerful computer called the distributed targeting processor-networked (DTP-N), and the tactical targeting network technology (TTNT) internet protocol-based, high-speed data link that will increase its ability to transmit and receive data to other platforms. The equipment will make the Super Hornet 'a smart node' in the US Navy Integrated Fire Control Counter-Air (NIFC-CA) network. In addition to upgrading the AN/APG-79 radar, Block III will add the AN/ALQ-214 integrated defensive electronic countermeasures (IDECM) Block IV suite.

The aircraft will also receive an updated satellite communications (SATCOM) system and the integrated long-range infrared sensor (IRST). The airframes will be delivered with a 9,000-hour service life. The Block III version is expected to achieve initial operational capability in 2021. One strike fighter squadron in each carrier air wing will be equipped with Block III fighters by 2024. **Jamie Hunter**

Right: The MH-53E Sea Dragon could be retired completely by 2022.

**US Navy/MCS2C
Brandon Parker**

Below: Special operations support will fall to fleet MH-60S units under current plans.

**US Navy/MCS2C
Lyle Wilkie**

(COD) aircraft; and 36 Leonardo TH-73A training helicopters.

Procurement for the US Marine Corps includes 10 F-35Bs and 10 F-35Cs; three MV-22B Ospreys, five Lockheed Martin KC-130J Super Hercules tanker/transport, seven Sikorsky CH-53K King Stallion transport helicopters, and five Sikorsky VH-92A presidential transport helicopters.

The final US Navy Super Hornets?

Fiscal Year 2021 will fund the last batch of Super Hornets for the navy, under current planning. The navy had planned to buy F/A-18E/Fs from Boeing at least through 2023, but the decision has been made to terminate Super Hornet procurement early — although it already has lasted longer than originally envisioned — and shift funds to the development of the Next-Generation Air Dominance (NGAD) concept, which may result in a new strike fighter in the 2030s.

In more bad news for Boeing, the 2021 budget does not fund any more P-8A Poseidon maritime patrol aircraft for the navy, although with the production line open for foreign procurement it could order more if Congress funds them in the next few years.





Procurement of the MQ-4C Triton unmanned aerial vehicle (UAV) is being 'gapped' for 2021-22 to allow time to mature the type's signals intelligence suite. The navy's remaining RQ-4A Global Hawk Broad-Area Maritime Surveillance — Demonstration (BAMS-D) examples will be retired beginning in 2023, freeing up funds for MQ-4C sustainment. The MQ-4C will replace the EP-3E electronic reconnaissance aircraft in 2022 as the Triton reaches full operational capability.

The budget also funds research and development of the new Boeing MQ-25A Stingray unmanned aerial refueling aircraft for initial production in 2023 and initial operational capability in 2024.

Rotary plans

The navy plans to start retiring the MQ-8B version of the Fire Scout in 2024. Of the 23 airframes, 14 will be phased out first, pending the MQ-8C version reaching initial operational capability in the mine-countermeasures role — projected to happen in 2028 — when the last MQ-8Bs will be retired. Plans are also detailed regarding the aspiration to accelerate retirement of the Sikorsky MH-53E Sea Dragon minesweeping helicopter to begin in 2022, three years before the original date of 2025.

The large quantity of new Leonardo TH-73A basic training helicopters is included in the numbers for 2021.

Below: The MQ-8B Fire Scout will start being retired from 2024, and it will go completely when the preferred MQ-8C version reaches initial operational capability in the mine-countermeasures role.

US Navy/MCS2C Christopher A. Veloicaza

This will allow the navy to accelerate retirement of its TH-57B/C training helicopter fleet and enable it to cancel further depot-level overhauls of the TH-57 as part of a cost-saving drive.

The US Navy Reserve is eyeing 2022 as the date to deactivate Helicopter Sea Combat Squadron 85, a unit based at NAS North Island, California, tasked with supporting special operations forces with its MH-60S helicopters. The US Air Force and US Army will retain a robust special forces support capability and the navy's general-purpose MH-60S squadrons are able to provide a broadly similar capability, the budget report explained.

It also detailed how the retirement of the AH-1W Super Cobra helicopter gunship is likely to be complete in 2021 as the reserve Marine Light Attack Helicopter Squadron 775 makes its transition to the AH-1Z Viper.

Completing the overall picture, in the February 10 budget briefing at the Pentagon, RADM Randy B. Crites, deputy assistant secretary of the navy for budget, said that the refueling and complex overhaul of the aircraft carrier USS *Harry S. Truman* (CVN 75) will be funded over the next few years and that a 10th carrier air wing will be restored as the navy returns to an 11-carrier force.

All of this planning is, of course, subject to the upcoming (usually rancorous) congressional deliberations, and often the navy and marine corps happily end up with more equipment than was officially requested. 🚁



'HERITA



During a ceremony at the 173rd Fighter Wing on January 10, 2020, F-15C serial 78-0543 was unveiled in striking new markings. This wing is part of the Oregon Air National Guard, and based at Kingsley Field, in Klamath Falls, which is named in honor of Lt David R. Kingsley. During a combat mission in June 1944, Kingsley's B-17 was hit by anti-aircraft fire and attacked by German fighters. When the call to bail out was issued, it was found that there were not sufficient parachutes for each crew member. Kingsley gave his parachute to a wounded comrade, and he remained on board and went down with his aircraft. He was posthumously awarded the Medal of Honor. To mark the 75th anniversary of Lt Kingsley's heroism, the 173rd FW decided to honor him with a new flagship F-15. Details on the jet include 'Sandman' nose art recalling the B-17 that Kingsley was assigned to in 1944. The jet will wear this striking scheme throughout 2020, and will be on display for the public at local airshows, including Kingsley Field's own 'Sentry Eagle' exercise and open house in July. **Jake Melampy**

GE² EAGLE



A Su-35S launches from Khotilovo carrying a standard air-to-air weapons load, including pairs of R-77-1 (RVV-SD), R-27T and K-74M2 (RVV-MD) missiles under the wings.



WAR GAMES AT KHOTILOVO

Combat Aircraft Journal gained exclusive access to recent exercises hosted by the 790th IAP, a fighter regiment of the Russian Aerospace Forces' 6th Air and Air Defense Army, stationed at Khotilovo, northeast of Moscow, which saw the first public appearance of the new R-77-1 active radar-guided missile.

REPORT **Alexander Mladenov**
PHOTOS **Andrey Zinchuk**

THE RUSSIAN AEROSPACE Forces (VKS) are increasingly making use of large training events to showcase readiness and emerging capabilities.

The so-called 'flying-tactical exercise' in the Western Military District (WMD) — as official Russian documents referred to the Khotilovo-based event — saw involvement of the resident 790th Fighter Aviation Regiment (IAP) and the visiting 47th Bomber Aviation Regiment (BAP). This latter is a Su-34 *Fullback* regiment, also controlled by the 6th Air and Air Defense Army, home-based in Voronezh, but operating out of Buturlinovka during the protracted refurbishment of its home airfield.

The training event, which took place between February 5-9, was also supported

by a single Mi-8MTPR-1 electronic warfare (EW) helicopter, provided by one of the army aviation units in the WMD to create radar jamming in an effort to enhance the realism of the event.

The exercise, held under the command of the 105th Composite Aviation Division (a subordinate unit of the 6th Air and Air Defense Army incorporating all tactical air assets), featured several elements conceived to simulate real-world combat conditions. This commenced with the regiment being placed onto its highest combat readiness state in anticipation of a period of intense action. The regimental commanding officer subsequently received an air tasking order to begin a rapid launch of all aircraft involved in order to counter a fictional enemy strike against the airfield, which is situated some 166nm (308km) northwest of the Russian





capital, Moscow. The scenario included a surprise mass strike with cruise missiles, targeting the runway, aircraft parking, the air traffic control tower and the ordnance storage depots.

With the defending assets airborne — thus evading the strike — the 790th IAP's logistic services simulated repairing damage to the airfield while preparing for a massive influx of reinforcements.

New missile sighted

Following the initial launch, aircraft from the three component squadrons within the 790th IAP — two of which are equipped with MiG-31BM 'Foxhounds' and a third that flies brand-new Su-35S multi-role 'Flankers' — were directed to recover to diversion airfields in the Kursk and Voronezh regions (most likely Kursk-Khalino and Buturlinovka, respectively).

Above: 790th IAP armorers busy suspending an R-77-1 air-to-air missile on a Su-35S in inclement weather conditions.

Below: Armed and ready to go — a Su-35S rests in its revetment at Khotilovo.

The Su-35Ss were armed with the so-called 'combat load No 1', which is stored next to the aircraft parking spot, ready for immediate loading in alert situations. It includes two R-27T and two K-74M2 (or RVV-SD) heat-seeking missiles in addition to a pair of the newest R-77-1 (RVV-SD) active radar-guided missiles.

The latter missile is for beyond-visual-range (BVR) engagements and is a relatively new addition to the VKS arsenal, with the first sighting on frontline aircraft being a pair of Su-35Ss on quick reaction alert (QRA) with the 23rd IAP at Dzemgi/Komsomolsk-on-Amur in Russia's Far East, reported in April 2016.

The two MiG-31 units within the 790th IAP received 24 upgraded long-range fighter-interceptors between 2014 and 2016 — notably lacking in-flight refueling capability (and therefore sometimes dubbed MiG-31BSM). The upgraded and life-extended 'Foxhound' is still the principal VKS long-range fighter-interceptor, used exclusively for territorial air defense. By early 2020, the VKS fielded a fleet of no fewer than 90 life-extended and upgraded 'Foxhounds' serving with as many as six frontline and one instructor/research squadrons for operational conversion and combat training.



The 790th IAP fields two squadrons with MiG-31BM long-range interceptors, each equipped with a dozen aircraft.



Above: The R-77-1 outfitted with an active radar seeker (nearest camera) and the R-27T featuring heat-seeking guidance, optimised to counter high-performance air targets, loaded on a Su-35S.

The main mission of the Khotilovo-based MiG-31BM force is to provide air defense of Moscow and the Central Industrial Region, both of which are also endowed with exceptional anti-access/area denial capability, thanks to saturation with the S-400 (SA-21 'Growler') and S-300PMU-2 (SA-20 'Gargoyle') long-range surface-to-air (SAM) systems.

The war games develop

The scenario of the second stage of the exercise, played out the following day, included sorties flown against ground targets. The 790th IAP 'Flankers', reinforced by Su-34 'Fullbacks' from the 47th BAP, had to penetrate the 'enemy' air defense system and strike missile defense sites while facing dense jamming. During these

missions the Su-35S faced Almaz-Antey S-300PMU-2 long-range ground-based SAM systems and the aircrews honed their avoidance tactics, maneuvering and ultra-low altitude flying to avoid detection, before running in to mount attacks against ground targets. The planned employment of guided air-to-surface munitions by the Su-34 'Fullbacks' was canceled due to inclement weather conditions with heavy snow — instead the aircraft switched to P-50T 110lb (50kg) freefall practice bombs.

Targets included vehicles and simulated hardened command-and-control centers at three weapons ranges situated in the Voronezh and Kursk regions and in the republic of Karelia, close to the border with Finland. The squadron's dozen or so Su-35Ss amassed around 50 sorties during the short but intense flying part of the exercise.



A Su-35S taxis in snowy weather, passing in front of Khotilovo's control tower.

The February 2020 exercise was the first significant training event for the Khotilovo Su-35 crews following their conversion to the type.



The Khotilovo 'Foxhounds' are overhauled and upgraded for use until the mid-2020s. A further service life extension will require the fighters to be cycled through another general overhaul and additional upgrades for their mission suites.



“The Su-35s were armed with the so-called ‘combat load No 1’, which is stored next to the aircraft parking spot, ready for immediate loading in alert situations

Su-35S force growth

The Khotilovo-based Su-35S ‘Flanker’ squadron is the latest VKS unit to convert to the most recent variant, trading its worn-out Su-27P/UB/SM fleet for 12 new-build Su-35S jets. The Khotilovo squadron received an initial batch of three aircraft in January 2019, followed by three more in July. These were complemented between October and December by a batch of six ‘Flankers’ originally delivered in 2018 to the 159th Guards IAP at Besovets, apparently for temporary use until the completion of the infrastructure at the 790th IAP and conversion-to-type training of its aircrews.

It’s understood that six squadrons are now equipped with the Su-35S. In addition, six more examples are operated by a squadron within the 968th IISAP, an instructor-research aviation regiment, assigned to the combat training centre at Lipetsk. It is estimated that some 88 Su-35S ‘Flankers’ are now in service. 🇷🇺

MI-8MTPR-1 IN ACTION

Electronic jamming was undertaken by a new Mi-8MTPR-1 electronic warfare helicopter equipped with the Rychag-AV high-powered digital jamming suite.

According to public sources, the Rychag-AV system provides radar jamming and protection to formations of friendly aircraft from ground and air-based radar-guided threats at distances stretching out to 81nm (150km), covering the frequency range between five and 11 GHz.

The first batch of 18 of these advanced helicopters, based on the Mi-8MTV-5-1 tactical transport helicopter, was taken on strength by the VKS between 2015 and 2017.

A Su-34 ‘Fullback’ from the 47th BAP seen launching from Khotilovo, carrying a warload of six P-50T practice bombs.



THE AIRBORNE CONNECTOR

A US Air Force aircraft type that had quietly gone about its trade for nearly 15 years came into sharp focus after a crash in Afghanistan. We examine the role of the E-11A BACN.

REPORT **Tom Kaminski**

THE CRASH OF a US Air Force-operated E-11A Battlefield Airborne Communications Node (BACN) — serial 11-9358 — in the Taliban-controlled Dih Yak district in the Ghazni province of Afghanistan on January 27, 2020, placed the spotlight firmly on a type that has so far provided sterling support to forces from the shadows. The E-11 was operated by the 430th Expeditionary Electronic Combat Squadron (EECS) from Kandahar. Two US personnel were killed in the crash, but details of how it happened have so far remained sketchy, except that the US

military has said the incident was not the result of enemy fire.

The crash of an aircraft such as this is extremely unusual, which led to speculation regarding the cause. However, it seems it was the result of a technical failure, the aircraft coming down relatively intact and then burning out, possibly due to some sort of self-destruct measures.

Begun as an Advanced Concept Technology Demonstration (ACTD) managed by the Defense Microelectronics Activity (DMEA) in Sacramento, California, the BACN system (pronounced 'bacon') has proven to be a

vital asset in the skies over Afghanistan, where it operates on a '24/7' basis. Hosted on manned Bombardier E-11A and unmanned Northrop Grumman EQ-4B aircraft, the BACN is basically a communications relay platform and network-centric information server that permits real-time exchanges between dissimilar or incompatible radios and data links. Serving as a bridge, it enables voice communications and data, video, and imagery transfer between airborne assets, troops on the ground and command centers, when line-of-sight (LOS) communications are affected by terrain. Referred to as a



'communications gateway' or 'wi-fi in the sky'; the system was developed in direct response to limitations experienced during operations in Afghanistan's Kunar province in 2005.

The 430th EECS is a geographically separated unit of the 455th Air Expeditionary Wing at Bagram Air Base near Kabul. Although the Global Hawks are assigned to 319th Reconnaissance Wing's 348th Reconnaissance Squadron, they are forward-deployed to Al Dhafra Air Base in the United Arab Emirates and assigned to the 380th Air Expeditionary Wing's 99th Expeditionary Reconnaissance Squadron (ERS).

BACN origins

Created as a quick reaction capability, BACN was created to satisfy a US Central Command (CENTCOM) joint urgent operational need (JUON). Development began in April 2005, when the 653rd Electronic Systems Group (ESG) at Hanscom AFB, Massachusetts, awarded Northrop Grumman a \$25.7-million contract to create an aerospace networking payload of radios and advanced information architecture (AIA).

The BACN Spiral 1 proof of concept and demonstration system initially flew aboard NASA WB-57F N926NA in December 2005. A significant amount of flight-testing was carried out from MCAS Miramar, California, but the BACN-equipped Canberra later took



part in Joint Expeditionary Force Experiment 'JFEX 06' in April 2006 at Nellis AFB, Nevada.

The system was subsequently assessed aboard BD-700 Global Express N901GX (c/n 9001), along with the WB-57F, during 'JFEX 08' in April 2008 at Nellis. The WB-57F was later deployed to CENTCOM in 2008 to conduct a 'real-

world' evaluation of the BACN, and it flew 50 missions over Afghanistan.

Bombardier's original Global Express prototype served as Northrop Grumman's BACN test aircraft. It had first flown wearing the civil registration C-FBGX on October 13, 1996, and later served as the aerodynamic testbed for the Royal Air Force's Sentinel R1

Above right:

The burned wreckage of E-11A serial 11-9358 photographed on January 27, 2020, after it crashed in the mountainous territory of Dih Yak district in Ghazni province. **STR/AFP via Getty Images**

Below:

An E-11 Battlefield Airborne Communications Node (BACN) awaits its next mission at Kandahar Airfield, Afghanistan, in the summer of 2017. **USAF/Capt Keenan Kunst**

E-11 FACTS

The E-11As are based on the Bombardier Global Express, Global Express XRS and Global 6000 versions of the ultra-long-range business jets, and are crewed by two pilots. All three variants are powered by 14,750lb-st Rolls Royce BR710-A2-20 turbofans. Capable of operating at an altitude of 40,000ft (12,192m), the BD-700s can remain airborne for more than eight hours.



configuration. The jet made its first flight in the BACN configuration in August 2007.

On October 24, 2008, the Electronic Systems Center (ESC) at Hanscom AFB awarded Northrop Grumman a \$180.2-million contract to support the deployment of the BACN test aircraft to Afghanistan.

The success of that initial BACN deployment resulted in a JUON directive being issued by the Deputy Secretary of Defense in May 2009. On June 24, 2009, the 653rd ESG awarded Northrop Grumman a \$276.3-million contract to integrate the BACN with two Global Express XRS aircraft and two Block 20 RQ-4B Global Hawks.

Initially registered to Straight Flight Nevada Commercial Leasing LLC in Sparks, Nevada, which is a wholly owned subsidiary of Sierra Nevada Corporation (SNC), the Bombardiers departed Pearson International Airport in Toronto, Canada, in July 2009 and were flown to Hagerstown Regional Airport, Maryland, where system integration was carried out. The manned platform was intended as a short-term solution. Plans called for the aircraft to remain in the theater until the BACN-equipped RQ-4Bs were fielded in 2011.

On June 10, 2011, the ESC awarded Northrop Grumman an \$18.1-million contract covering the purchase of the original BACN/Global Express test aircraft, which had received the mission design series designation E-11A just days earlier on June 6. The USAF subsequently moved forward with plans to purchase the second two E-11As at a cost of \$50 million and, on September 30, 2011, the Airborne Networks Division of Air Force Materiel Command's Electronic Systems Center issued a contract to Orion Air Group LLC, which then held the leases on the aircraft. Although the jets received air force serial numbers, their civil registrations were transferred to the service on October 27, 2011.

On arrival in Afghanistan, the aircraft were operated by the 451st Tactical Airborne Gateway as a component of the 451st Expeditionary Operations Group (EOG). On July 14, 2012, the 451st flew its 3,000th mission. The unit was later redesignated as the 430th EECs on March 13, 2013.

Northrop Grumman subsequently integrated the BACN system with a Global 6000 to create a fourth E-11A that was delivered in September 2013. In May

2018, BACN transitioned from a JUON to an enduring program of record.

How a BACN works

Operated remotely by payload operators from ground stations, the BACN system provides the capability to conduct voice bridging/translation, tactical data link (TDL) gateway, and TDL relay functions for beyond-line-of-sight (BLOS) voice and data communications over long distances. The airborne data relay and gateway enables real-time information to be passed between varied tactical data link systems and by bridging frequencies, and it enables communications between dissimilar systems. BACN automatically

provides translation services between incompatible radios, making it possible for a ground commander to communicate directly with the pilot of a close support aircraft, for example, while both are operating on completely different frequencies. Additionally, it extends the range of data links and provides translation to enable information sharing across the theater of operations.

The BACN payload includes numerous radios and waveforms that include HAVE QUICK I/II frequency-hopping radios, Link 16, and tactical common data link (TCDL) terminals. A central computer, known as the gateway manager, links the various systems.

Top to bottom: Two pilots climb into an E-11A from the 430th Expeditionary Electronic Combat Squadron at Kandahar. **USAF/Capt Anna-Marie Wyant**

An 430th EECs E-11A pilot conducts familiarization training at Kandahar. As the only unit that flies the E-11, live flying is concentrated there. **USAF/Capt Anna-Marie Wyant**



Continued upgrades have provided the aircraft with new systems and operational improvements. An example saw the integration of the multi-role tactical common data link (MRTDL), which added beyond-line-of-sight command and control (BLOS C2) capabilities to the system. The equipment was initially integrated with the first E-11A when Northrop Grumman received a \$20-million contract in September 2012.

Since fielding the first E-11A in 2008, Northrop Grumman has provided contractor logistic support (CLS) for the deployed E-11As. The contractor also operates and maintains the airborne BACN equipment as well as the ground stations. The most recent \$217.2-million contract for the latter was awarded on January 22, 2020.

Recognizing the system's importance, the USAF moved forward with plans to acquire a fifth E-11A via a 'green' (unfinished) Global 6000 for the program in October 2018. In addition, the fiscal 2021 budget request adds a total of five new E-11As, which will replace the outgoing EQ-4Bs. 📧

Below right: Block 20 Global Hawks have been converted to an EQ-4 communication relay configuration carrying the BACN payload. **USAF/TSgt Marie Brown**

Below: Bombardier's original Global Express prototype, which later served as the aerodynamic testbed for the Royal Air Force's Sentinel R1 configuration. **USAF/Capt Keenan Kunst**

EQ-4B GLOBAL HAWK

The Northrop Grumman Global Hawk started with seven development aircraft and seven Block 10 production RQ-4As, followed by the more capable Block 20 RQ-4B, which first flew in March 2007. In addition to an enhanced integrated sensor suite (EISS), it featured improvements to the structure, powerplant and systems, and its payload doubled that of the RQ-4A. Six Block 20s entered service beginning in June 2008. Production later transitioned to the Block 30 and 40 models, which were respectively equipped with EISS and signals intelligence payloads and the AN/ZPY-2 multi-platform — radar technology insertion program (MP-RTIP) radar. The USAF standardized operations on the two later models and the small fleet of Block 20s was made available for training or to be tasked for other missions.

Northrop Grumman conducted the first flight of the BACN-equipped Global Hawk

from its facility in Palmdale, California, on July 14, 2010. Delivery followed just 13 months after contract award and USAF airworthiness certifications were issued on September 17, 2010. Unfortunately, one of the EQ-4Bs was written off on August 20, 2011, when it crashed in the Naranj Bagh district of Jalalabad, Afghanistan. In December 2011, the contractor received a \$47-million contract to integrate the BACN into two additional Block 20 Global Hawks that were delivered in June and September 2012.

Although they carry the same systems and equipment as the E-11As, the unmanned EQ-4Bs can operate at higher altitudes than the manned aircraft and remain airborne for up to 32 hours.

Northrop Grumman was awarded a \$39.9-million contract to integrate the BACN into the last surviving Block 20 RQ-4B on May 3, 2017. The EQ-4B was delivered on April 3, 2018, returning the fleet size to four aircraft. The USAF's fiscal 2021 budget request calls for the retirement of the Block 20 and 30 Global Hawks, meaning the BACN aircraft will be retired in favor of five new E-11As.

USAF BACN AIRCRAFT

Model	Serial No.	c/n	Notes
E-11A	10-9001	9001	N901GX, ex-C-FBGX
E-11A	11-9355	9355	N770AG, ex-C-FXAQ
E-11A	11-9358	9358	N760AG, ex-C-FXII, written off January 27, 2020
E-11A	12-9506	9506	N9506G, ex-C-GOUR
EQ-4B	04-2015	AF-6	
EQ-4B	04-2017	AF-10	written off August 20, 2011
EQ-4B	04-2018	AF-11	
EQ-4B	04-2019	AF-12	
EQ-4B	04-2020	AF-13	



Start your new year with a subscription
to the new-look **COMBAT
AIRCRAFT**

At *Combat Aircraft Journal* we live and breathe military air power. It's a genuine honour for us to bring this magazine to you every month, especially at such an exciting time for combat aviation as it enjoys a significant period of resurgence. Taking you inside the squadrons, into the production lines and into the cockpits of the world's most incredible military aircraft, hearing from the men and women that work tirelessly in support of our air forces is what we share with our readers every month to spread the word of modern military air power.

Jamie Hunter - Editor

I absolutely love *Combat Aircraft Journal* - it is THE 'go-to' for catching up on all of the latest news in the military aviation world. I also love the access that the writers can get to aircraft that are off-limits to most people!

James M, via Facebook.

SUBSCRIBER BENEFITS:

● Great Savings

Save £££s compared to buying each issue in shops

● Priority Home Delivery

Subscriber copies go first

● Specials Discounts

Save money on all of our one-off special magazines



Digital editions also available

Visit

 **pocketmags.com**

TWO EASY WAYS TO ORDER

Customer code: **CAJ020420**



ORDER ONLINE

www.imsnews.com/combat

* Savings based on 1-year subscription ordered direct vs 12x cover price in USA where stocked.

US SUBSCRIPTION OFFERS

SAVE UP TO \$38 A YEAR*

when you subscribe



Join us at



CHOOSE FROM

1 1 YEAR

Quarterly Credit card payment plus **FREE** F-35/F-22 DVD Bundle



\$17.49/quarter
YOU SAVE \$32

2 2 YEARS

Credit card payment plus **FREE** F-35/F-22 DVD Bundle



\$127.49 **YOU SAVE \$38**

3 1 YEAR

Credit card payment

\$69.90 **YOU SAVE \$32**

Overseas Customer? See page 71 for our latest subscription deals.



CALL US NOW

Toll free 757-428-8180

Qatar now has 36 Rafales on order from Dassault, these fighters forming the initial phase of its expansion in combat jets.
Dassault/Anthony Pecchi





QATAR

— AN AIR FORCE REBORN

The Qatar Emiri Air Force is undergoing one of the most impressive expansion efforts of recent times to cement its position as a leading air arm in the Middle East. *Combat Aircraft Journal* updates the story of this unprecedented modernization program.

REPORT **Stephan de Bruijn**

SMALL IN TERMS of territory, but extremely rich in oil and gas, Qatar is in the midst of an unprecedented expansion of its armed forces. The Qatar Emiri Air Force (QEAF), having long been a compact yet meaningful force built around a combat component of a dozen Dassault Mirage 2000-5s, is destined to become one of the most potent air arms in the region when it comes to new 'kit'. Its existing fleet of Mirages and six Dassault Alpha Jet Es, some 10 Westland Commando assault helicopters and a dozen SA342L Gazelles for battlefield support are being dwarfed by the sheer scale of its current effort, which could include as many as 132 new fighter aircraft.

An air force in expansion

The pace of the QEAF's expansion has been steady and measured. In July 2010, Qatar issued its first tenders for a

predicted 72-aircraft fighter requirement. From 2012, Boeing, Eurofighter and Dassault all rallied to fulfill Qatar's ambitious requirements and in-country evaluations of various aircraft began. That year, two Rafales were evaluated in Qatar in July, with two Boeing F/A-18E/F Super Hornets following at the end of August, and a further trial involving two USAF F-15E Strike Eagles at the end of September. These were followed in early 2013 by the Typhoon, with customer flights at RAF Coningsby in the UK and in Doha. It's worth highlighting that the Typhoon evaluation was initially scheduled for 2011, but was delayed due to the Operation 'Ellamy' campaign in Libya. During that period, Qatar was also committed to the operations over North Africa, but working alongside the French Air Force. After the cessation of hostilities, Qatar first turned to Dassault in order to evaluate the Rafale. Upon analysis, it became clear that there would be no



single winner (although the Super Hornet was eliminated), but that it would be a question of how many of each would be procured: Qatar wanted Rafales, Eagles and Typhoons.

In March 2016, 18 Rafale EQs and six Rafale DQs were ordered from Dassault under a \$7.6-billion deal, with options taken on a further 12 jets. In June 2017, a contract was signed for 36 F-15QA (Qatar Advanced) Strike Eagles from Boeing for \$12 billion, and a few months later, in late 2017, some 24 Typhoons and nine Hawk Advanced Jet Trainers (AJTs) were ordered from BAE Systems under a \$7-billion contract. The latter agreement coincided with Qatar taking up the option of the additional 12 Rafales. Remarkably, the QEAF had signed for 96 brand-new fighters, with an expectation that this could eventually be expanded to 72 F-15QAs, and a likely push for more Hawks and Typhoons to follow.

The net result is that Qatar will operate one of the most modern and advanced fighter aircraft fleets in the Gulf region,

Above: A trio of MFI-395 Super Mushshak basic trainers from the Al Zaem Mohamed Bin Abdullah Al Attiyah Air College at Al Udeid.
Stephan de Bruijn

Left: Royal Air Force Typhoons have deployed to Qatar on a number of occasions and the UK now has a joint training squadron with this new customer.
Crown Copyright

Below: Qatar has 48 Apaches on order from Boeing.
Stephan de Bruijn

second only to Saudi Arabia. It represents growth on an unprecedented scale in terms of doctrine, establishing separate logistics systems and creating infrastructure — not to mention training pilots and maintainers. For all of these vital supporting elements, Qatar must lean on support from its suppliers in France, the UK and the US. Indeed, with a relatively small indigenous population, the big business afforded by the trade and industry deals is countered by concerns within the military over a hungry QEAF that is offering impressive salaries for those seeking an expatriate lifestyle — it requires more than 150 new pilots alone to man its new fighter squadrons.

Mindful of its need to expand rapidly, Qatar front-loaded its combat aircraft plan with the establishment of a new training center from 2012, built around 24 new Pilatus PC-21s together with a complete training package. On October 1, 2014, the QEAF received its first batch



of PC-21 trainers, assigned to the Al Zaeem Mohamed Bin Abdullah Al Attiyah Air College at Al Udeid. For primary flight training, Qatar procured from Pakistan eight MFI-395 Super Mushshak basic trainers, the first batch being delivered in July 2017, also for the Al Zaeem air academy. Qatar is also relying on international training packages with the three governments supplying its new fighters. For example, new Typhoon pilots are progressing through advanced fast jet training and type conversion in the UK on the Hawk T2 at RAF Valley, Anglesey, and a joint Royal Air Force/QEAF Typhoon unit has been set up at RAF Coningsby, Lincolnshire. These international teaming agreements are designed to seed its initial cadre at the respective frontline fighter squadrons, building on its small core of aircrews with Mirage experience and coupling that with new blood flowing into the organization.

New infrastructure

Al Udeid air base is the current home of the QEAF. It also accommodates a large US military footprint and was deemed not to have sufficient capacity to house the upscaling of the QEAF. The Qatari government decided in late 2018 that an all-new air base would be required. The new base at Dukhan, also known as Tamim Air Base, named after the Amir of



Above: Boeing is set to roll out the first F-15QA built under the Ababeel project in the coming months.
Boeing

Right: The Qatari Rafale squadron is named 'Al Adiyat'.
Dassault

Below: QEAF Pilatus PC-21s fly over the impressive Doha skyline.
Stephan de Bruijn



A SECRETIVE AIR ARM

Qatar's National Day was celebrated on December 18, 2019. The festivities, related to the national commemoration of Qatar's unification in 1878, have since 2006 been coupled with a military parade on the ground, in the air and at sea. The whole event can be viewed from Al Corniche Street in the capital city of Doha. The latest parade was a rather low-key affair compared with previous years, but it served to give a taste of the air force's modernization efforts.





Qatar Sheikh Tamim bin Hamad al Thani, is now under construction northwest of the capital, Doha. This will be the home of the Rafales and Typhoons. Al Udeid is being extended in order to house the growing transport fleet of eight Boeing C-17A Globemaster IIIs and four Lockheed Martin C-130J-30 Super Hercules, together with the training academy PC-21s. The existing Doha Air Base is planned to welcome new aircraft and systems, too. This includes a still unknown number of DHC-6-400 Twin Otters purchased from Viking Air in Canada. The Twin Otters will be used for Qatari Joint Special Forces as well as supporting the national skydiving team. The first DHC-6 was delivered in mid-August 2019.

The QEAF is now in the unmanned arena, having ordered six Turkish-manufactured Baykar Makina Bayraktar TB2 unmanned combat aerial systems (UCAS) on March 14, 2018. This built upon

10 mini-UASs purchased from Baykar Makina in 2012.

Turkey is a key partner nation. It is reportedly planning to deploy air and naval forces to bases in Qatar, in addition to a 2017 move that brought ground troops to Qatar as Turkey established an army base in the country. The strengthening ties came about following deteriorating relations with Saudi Arabia, Bahrain, the United Arab Emirates and Egypt as they each cut links with Qatar, accusing it of backing extremism and fostering links with Iran.

Rotary expansion

In July 2014, the Qatari government signed an agreement for the acquisition of 24 Boeing AH-64E Apache Guardians and associated equipment. These are the first dedicated attack helicopters for the QEAF, heralding a whole new era of operations. Qatar was able to train 70 new aircrews

and 100 maintainers in the US to support the Apache force.

The first AH-64Es were handed over to Qatar in March 2019. In the meantime, an option was taken on a further 24 Guardians, which was cemented on May 9, 2019. All deliveries will be completed by July 31, 2024. Eight AH-64Es from the second order will be equipped with the Longbow fire-control radar atop the main rotor.

Not content with what most consider to be the world's most advanced attack helicopter in the Apache, and no doubt mindful of security of supply, in January 2019 Qatar signed a letter of intent for the purchase of the Turkish T129 ATAK assault helicopter, based on the Italian Mangusta. However, Turkey allegedly failed to obtain the necessary US export permit for the T129's Honeywell engines, blocking the Turkish deal. While this procurement is a likely victim of the somewhat chilly relations between Ankara and Washington, and is officially dead for the time being, it is understood that other options are being sought to pave the way to a potential deal.

Besides the Apaches, Qatar will receive NH90 helicopters from Leonardo. In March 2018, Qatar signed a deal worth \$3 billion for 16 NH90 Troop Transport Helicopters (TTH) and 12 Navy Frigate Helicopters (NFH). Helicopter pilots are being trained at the Al Zaeem academy in Doha, which is equipped with 16 Airbus H125 (AS350 Écureuil) light single-engine helicopters. The initial examples were delivered in late 2018. All had been received by mid-2019 and

Top left: One of the few remaining Westland Commando Mk3s, of which eight were purchased by Qatar in the early 1980s.

Stephan de Bruijn

Below:

A photograph from the third Exercise 'Epic Skies' in 2019, which included the Qatari Mirage 2000s. It's unclear what will happen to these aircraft, but they are expected to be sold.

Crown Copyright



thus heralded the retirement of the SA342L Gazelles.

With the Gazelle being phased out, soon to be followed by the 1970s-vintage Commandos, the oldest helicopters in the Qatari military will be its 21 AW139s, some 18 of which were ordered in August 2008. In March 2011, Qatar purchased a further three AW139s, for employment in emergency medical services (EMS) roles. The AW139Ms are used for utility, troop transport, search and rescue, border patrol, special forces operations, law enforcement and homeland security duties.

Fielding the fighters

Another dedicated joint training squadron forms the basis of the Rafale integration effort, which is supporting the work-up of ground and flight crews at Base Aérienne 118 at Mont-de-Marsan in France. On June 5, 2019, the first batch of fighters headed to Qatar, three Rafale EQs and two DQs being accompanied by a French Air Force A330MRTT Phénix and a C-135FR for logistical support. The Rafales are assigned to the Qatari Rafale fighter squadron, known as 'Al Adiyat'. They were flown for an acceptance and base opening ceremony at Dukhan, but later continued to Al Udeid for initial operations as the new airfield was not 100 per cent operational at that time. Second, third and fourth batches of five Rafales each followed on July 4, September 3 and December 3, 2019.

The arrangement with the UK regarding Typhoon training means the QEAF will remain in the joint No 12 Squadron at



Five Rafale DQ/EQs fly over Doha in December during rehearsals for the national day event. **Stephan de Bruijn**

This image: Qatar purchased four C-130J-30 Super Hercules. **Stephan de Bruijn**

Bottom: Qatar's AW139Ms are used for utility, troop transport, search and rescue, border patrol, special forces operations, law enforcement and homeland security tasks. **Stephan de Bruijn**

Coningsby and will deploy en masse to Qatar in time for the 2022 FIFA World Cup football championship. After this, the RAF element will return to the UK and the Qatari Typhoons will continue alone at Dukhan.

Boeing is in the final stages of assembling the first F-15QA, touted as the most advanced Eagle to date, under Project Ababeel. The QEAF expects six F-15QAs to be delivered by March 2021, with a further six to be dispatched three months later, and four more due every three months thereafter. The F-15 training plan sees eight pilots per year heading Stateside. As with the other new types, they will include a batch of experienced Qatari pilots seeding the Eagle force in order to establish 53 trained crews by 2023.

In August 2019, it was announced that the F-15QAs would be accommodated at Al Udeid, one of the largest US military facilities in the Middle East. Presumably, this facilitates a streamlined logistical support effort for the American equipment. During 2020, the base will be modified — this must be completed by 2021 in time to receive the first aircraft.

In the meantime, Qatar has looked at offloading its Mirage 2000-5s, negotiations with a number of possible buyers having included Argentina. Most of the Qatari experience has already been diverted to the new fighters, as this ambitious air arm looks to a very healthy future. 🇶🇦





A Hawaii ANG F-22 pilot strolls out to the 'Raptor line' at Hickam for a 'Sentry Aloha' mission.





Combat Aircraft Journal heads to Hawaii to witness Exercise 'Sentry Aloha' as the resident Raptors go up against visiting fighters for valuable dissimilar training.

REPORT AND PHOTOS **Rob van Disseldorp**

HIGH-END IN
down



WHEN THE HAWAII Air National Guard's (ANG's) 154th Wing received its first F-15 Eagles in 1987, the reality of its remote operations was a major consideration. While the location is strategically important, it limits the ability for the unit's aviators to keep their skills sharp. In-house training is notoriously limited when it comes to fighter aircraft.

With the need to generate dissimilar air combat training (DACT) in mind, the ANG came up with Exercise 'Sentry Aloha'. For three decades — and several times a year — this has brought together a collection of US military assets as well as

other visiting air forces on the beautiful island of Oahu.

This year's first such exercise, 'Sentry Aloha 20-1', took place between January 8-22 with a typically appealing spread of fighters. They included a dozen F-16Cs from the 18th Aggressor Squadron (AGRS) out of Eielson AFB, Alaska, eight F-15Cs of the 194th FS, California ANG from Fresno and 12 resident F-22As from the 19th and 199th Fighter Squadrons at Joint Base Pearl Harbor-Hickam. Alongside the traditional tanker support, a pair of E-3 AWACS from Tinker AFB, Oklahoma, and two C-17A Globemaster IIIs from the local 204th Airlift Squadron were on hand, the latter flying an air-drop profile that required fighter escort.

Twice-daily mass launches required careful co-ordination as the base shares real estate with Honolulu's Daniel K. Inouye International Airport. Exercise director Lt Col Matthew 'Bad' Ohman told *Combat Aircraft Journal*, 'The objective of 'Sentry Aloha' is to provide tailored, cost-effective and realistic combat training to provide the warfighter with the necessary skills in order to come back home safely.' This year's first edition emphasized large force employment against an advanced, near-peer threat. There was plenty of fourth-fifth generation fighter integration, mixing the Eagles with the Raptors. The 'Red Air' bad guys were mainly composed of 18th AGRS 'Vipers', but also incorporated the local Raptors.

Above: The Eielson aggressors are regularly on the road in the Pacific region, and they were in full flow at 'Sentry Aloha'.

Below: The impressive 'Raptor line' at Hickam — home to the 199th FS and its associate 19th FS.





“ In ‘Sentry Aloha’ we’re able to allow the weapons officers from the various units to work closely together to achieve whatever desired learning objective the unit wants to achieve

Lt Col Matthew Ohman



Right top to bottom:

‘Sentry Aloha’ is a valuable opportunity for the resident F-22 crews to get in some dissimilar type training as well as integrating with fourth-generation fighters.

The Fresno Eagles were mainly operating on the ‘Blue Air’ side working closely with the Hawaiian Raptors.

Exercise director Lt Col Matthew Ohman.

In fact, approximately 225 aggressor missions were flown by the F-22s during ‘Sentry Aloha’, amounting to about six per cent of their yearly requirement of 3,800 sorties.

Organizers of this particular event pride themselves on unit-specific custom scenarios. Ohman said, ‘In ‘Sentry Aloha’ we’re able to allow the weapons officers from the various units to work closely together to achieve whatever desired learning objective the unit wants to achieve. [This] is different in that we allow the participants to determine the training they want to achieve.’ Another advantage here is the weather. ‘The number of sorties lost every year due to weather here in Hawaii is negligible — actually, since the exercise kicked off last week, we’ve had some of the worst weather we’ve had during a ‘Sentry Aloha’ exercise and no sorties were lost.’

Increased tension in the Pacific region will only place a bigger spotlight on the exercise. If the presence of the Raptors in Hawaii isn’t enough of a deterrent, showcasing the Hawaii ANG’s capability to work in close co-ordination with other units such as the California ANG is an important messaging tool. This US military outpost is growing in importance, with ‘Sentry Aloha’ reflecting that level of significance. 🇺🇸

US NAVY & MARINE CORPS AIR POWER YEARBOOK 2019

**COMBAT
AIRCRAFT
SPECIAL**



Welcome to the 2019 edition of the US Navy and Marine Corps Air Power Yearbook. This annual bookazine aims to deliver a round-up of the most exciting action from the ranks of two of the world's premier air arms, including insightful interviews and reporting from the cutting edge of naval aviation.

- **TOPGUN AT 50 YEARS OLD**
- **LAST CALL FOR THE PROWLER**
- **WAITING FOR THE KING**
- **'SUNSEEKERS'**
- **TESTERS OF 'THE LAKE'**

And much more!



ORDER DIRECT

£6.99 PLUS FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

614/19

Free P&P* when you order online at www.keypublishing.com/shop



Call UK: 01780 480404
Overseas: +44 1780 480404

Monday to Friday 9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT!

24-PAGE SUPPLEMENT

COMBAT AIRCRAFT

www.Key.Aero

KEY

NORTH AMERICA'S BEST-SELLING MILITARY AVIATION MAG

PHANTOM SURVIVORS

THE LEGACY
CURRENT
OPERATORS
EXCLUSIVE
PHOTOGRAPHS
GONE BUT
NOT FORGOTTEN



THE LAST F-4 SMOKE TRA

The McDonnell Douglas F-4 Phantom II is one of the most famous fighter aircraft of all time. In this special supplement, *Combat Aircraft Journal* details the final operators of the mighty 'Rhino'.



An F-4E of the Hellenic Air Force is prepared for a night mission from Andravida. **Rich Cooper**

AILS



WITH ITS SLAB sides, upturned outer wings, anhedral tailplanes and twin canopies cranked open, there's simply nothing like an F-4 Phantom II as it rolls down the taxiway. This brute of a fighter — seemingly forged from a lump of steel — exudes charisma and power.

The first F4H-1 flew from McDonnell's St Louis facility back on May 27, 1958, with Bob Little at the controls. Developed as an all-weather fleet defense aircraft and quickly adapted into a capable all-rounder for both US and export operators, the F-4 Phantom II broke the mould when it came to jet fighters.

The F-4 began to join the US Navy back in 1960, initially with training squadron VF-101 'Grim Reapers' at NAS Oceana, Virginia. The first operational squadron, VF-74 'Be-devilers', received its initial Phantoms at Oceana from 1961. The USAF also fully endorsed the F-4, the 555th Tactical Fighter Squadron

'Triple Nickel' leading the type into combat action over South-East Asia from December 1964. This twin-engine, two-seat fighter was bristling with new technology and was armed with missiles rather than guns. It served with the armed forces of 11 nations outside the US: Australia, Egypt, Germany, Great Britain, Greece, Iran, Israel, Japan, South Korea, Spain and Turkey.

Production of the F-4 ran from 1958 to 1979, a total of 5,195 being built. Of those, 5,057 rolled off the McDonnell — later McDonnell Douglas — production line in St Louis, Missouri. The last 138 were built under license by Mitsubishi Aircraft in Japan. Of the 5,057 built in the US, the USAF took delivery of 2,874 aircraft; the US Navy and US Marine Corps 1,264; and international customers a combined total of 919 examples.

The Phantom soon became the mount of aces, being credited with well in excess of 300 aerial 'kills' worldwide. Now, 60 years on, *Combat Aircraft Journal* is paying tribute to the F-4, which still remains in service with five nations. **Jamie Hunter** 🐉





KOREA'S RARE RHINOS'

The Republic of Korea Air Force still operates a squadron of F-4Es, but the type is set to be replaced in the next few years.

REPORT **Jamie Hunter**

THE REPUBLIC OF Korea Air Force (RoKAF) has operated McDonnell Douglas F-4 Phantom IIs since 1969, when it began receiving a batch of 18 former US Air Force F-4Ds under the 'Peace Spectator' program. Ultimately, 92 of these early Phantoms were transferred to the RoKAF and some remained in use until June 2010 after 41 years of sterling service.

The RoKAF also took delivery of 37 new-build F-4Es that were handed over from 1977. This batch included serial 78-0744, the 5,068th and last Phantom to be built in the US. These were followed in turn by 57 ex-USAF examples, delivered from 1985-90.

Korea additionally flew 18 ex-USAF RF-4Cs, which it received in 1989.

The RoKAF lost two of the recce Phantoms in accidents, and the six remaining RF-4Cs were withdrawn in February 2014.

Most of the ex-USAF F-4Es had been phased out by 2016, the remainder continuing to serve with the 152nd and 153rd Fighter Squadrons, part of the 17th Fighter Wing at Cheongju. Preparations for the F-35A's arrival at Cheongju led to the 152nd FS' F-4Es being amalgamated into the 153rd FS, which in turn moved to Suwon, where it still operates as a large unit with around 25 jets. Korea plans to replace these remaining F-4Es over the next few years with F-35s and its indigenous KF-X project. However, for now, the Suwon unit remains a final bastion of Korean 'Rhino' operations. 🐘



Around 30 RoKAF F-4Es are equipped to employ the Rafael AGM-142 Popeye medium range stand-off missile, as seen here, along with its targeting pod. **T. Evans**

Photographed during 2017, this F-4E is one from the batch of 37 new-build jets the RoKAF received from 1977. The 153rd Fighter Squadron at Suwon is the final RoKAF F-4 unit. **T. Evans**



THERE'S NOTHING QUITE like a Phantom II. Strong, muscular lines, its sound, its charisma... While today's high-tech world may command the edge in warfare, the F-4 has brute force and a status that demands its name to be written in the book of legends. If the Hellenic Air Force's (HAF's) official stated intent to retain its F-4Es until 2027 can be taken as gospel, then Greece could end up as the world's final 'Rhino' operator.

Keeping the Phantom relevant in the era of fifth-generation fighter aircraft requires some pretty inventive tactics

and procedures to ensure credibility. The final Greek unit is 338 Mira, based at Andravida, located roughly 186 miles (300km) west of Athens. It's a sprawling base of hardened aircraft shelters, taxiways, and rotting F-4 hulks, surrounded by lush countryside and rolling hills. The sound of the J79 engines has been a constant feature here since 1974.

The single remaining HAF F-4 squadron is part of 117 Combat Wing (Pteriga Makhis — see boxed item). The squadron's callsign and badge pay homage to Ares, the Greek god of war, suitably wielding a 2,000lb bomb!

Furthermore, in a nod to the Greek past, the unit badge contains the inscription 'I TAN O ON YOU', a phrase the Spartans used to say to their sons when they handed them a shield for battle — 'Bring it victorious or bring it dead'.

As well as 338 Mira, Andravida houses the HAF's Fighter Weapons School, an organization of growing importance and stature, and the host for the annual 'Iniochos' exercise.

The present commander of 338 Mira is Lt Col Dimitrios Sakorafas, a proud Phantom II pilot who has a gentle spirit but a persona well deserving of the leadership he took on in July 2019. This

GODS OF WAR

The Hellenic Air Force is one of two European air arms that still operate the F-4. Now confined to a single squadron, it carries on providing a meaningful multi-role capability for the Greek military.

REPORT **Rich Cooper/COAP**

This image: A three-ship of F-4Es recovers to Andravida. Often, F-4s returning from a mission perform a tactical airfield attack. **Katsuhiko Tokunaga/DACT**

Inset: An F-4 'driver' takes a moment to reflect ahead of a mission. **Rich Cooper**

is an honor he holds as the highlight of his air force career to date, which features nearly 2,000 'Rhino' hours.

'I first flew the Phantom in June 1998 and I have seen our F-4s change a lot within the HAF,' he told *Combat Aircraft Journal*. 'When I was first here, the jets suffered radar issues and low avionics quality. But after modernization under the Avionics Upgrade Program [AUP], it was a totally new machine.'

Legendary status

The primary task of the Greek F-4Es today is air-to-ground, with a secondary air-to-air capability — a subtle role



reversal that reflects the advent of the HAF's most advanced F-16s. As such, training here is more geared towards laser-guided weapons, close air support (CAS) and working with joint terminal attack controllers (JTACs). The emphasis on ground attack means the F-4's quick reaction alert (QRA) stance at Andravida involves jets being on standby for air-to-ground missions. They can be launched in a readiness status of 30 minutes, one hour or four hours, depending on requirements at the time.

'The F-4 is a versatile weapons platform and we really make the most of that,' said Sakorafas. 'As well as our





AMRAAM [AIM-120 Advanced Medium-Range Air-to-Air Missile] capability, we can employ GBU-10, GBU-12, GBU-16 and GBU-24 [laser-guided bombs, LGBs]. We don't yet have a data link, but of course we would like that next time.'

The squadron undertakes annual live weapons exercises in order to maintain pilot currency with each of the munitions, these specific training periods being dictated by the air force headquarters. 'For instance, we had around 40 live weapon missions in 2019,' he continued. 'These were air-to-ground weapons, with general-purpose and LGBs employed.'

Outside of the live drops, the squadron has a robust training system in place.

'We will launch perhaps a flight of three or four Phantoms together, and in that flight perhaps just one jet would be carrying the laser designator pod, or maybe it will be carried by each jet. This is dictated by our tactics and how many targets we are training against. We push learning on how to co-operate together as a package, as well as working separately within the mission — so, one jet could target for the whole mission, or each jet would have their own individual targets to attack. The aircraft have the ability to simulate each of the weapons we carry — we can load the aircraft's central MMRC [modular multi-role computer] with the profile of the bomb

Above: HAF F-4 operations revolve around a two-pilot concept as opposed to having a weapons systems officer in the back seat. **All photos Rich Cooper unless credited otherwise**

Below: An F-4 emerges from its lair with J79s screaming.

we want to simulate.' This integrated computer calculates everything as if the jet was carrying and releasing the weapons for real, including the release parameters for a successful drop.

'The MMRC computer, coupled with the Litening pod, is a highly effective training system for laser designation and weapons release. Naturally, the MMRC also has the AIM-120 firing envelope built into it, so we can train with our complete arsenal of air-to-air and air-to-ground weapons.'

Local training

The F-4s typically work the local ranges. The air-to-air range is over the sea, as





is one of the two air-to-ground ranges, which employs a small island as a well-pounded target. A second air-to-ground range can be found inland. 'We have to be very careful around the local communities, especially around the inland range,' explained the squadron boss. 'The sea-based ranges are easy for us to use, but of course there is a lot of ship traffic — and that can often stray into the area, despite notices having been issued.'

'For air-to-air training we normally use a specific target that is dropped by another F-4, then falls on a parachute and is engaged by our infrared missiles. There are very tight procedures to follow to ensure the utmost safety, not least for the aircraft

Above left to right: Young HAF aviators are keen to join the F-4 community — it's an aircraft that attracts huge interest and pride.

Commander of 338 Mira is Lt Col Dimitrios Sakorafas.

Below: With twin J79s in full reheat, a HAF F-4E blasts out of Andravida.

that deploys the target. For AMRAAM engagement, we have munitions that can be released to simulate a small aircraft with a metal surface — we can achieve a good lock-on to fire. We are also still training to use the 20mm [M61A-1] gun, and for that we drag a target a long way behind another jet and fly a certain axis to maintain safety and which allows the other aircraft to attack. It is always safety first and training after.

'We also have an air-to-sea mission, and for this we use the AGM-65 Mavericks as well as LGBs, depending on the target. We have great co-operation with the navy [and the army] and conduct regular training together to simulate a strike,

often co-ordinated with F-16s and Mirage 2000s to attack a surface target. The army can also guide our weapons and we work with their joint terminal attack controllers [JTACs] to illuminate a target and we can provide close air support [CAS] for them too, all provided by the standard nine-line brief [target co-ordination] procedure. It's very common for us to lase [a target] for the F-16 guys and vice versa, and the procedures of the laser platform and the bombing platform are clear for everyone. This is particularly important when we work in combined air operations [COMAOs] — and especially if there is a technical issue during the mission, because we can swap roles if required.



HAF HISTORY

Andravida's 117 Combat Wing (CW) traces its roots back to March 4, 1961. It was chosen to receive the Hellenic Air Force's first F-4Es under the 'Peace Icarus' initiative. The first aircraft landed on April 5, 1974. Deliveries were complete by the end of that year for initial use by 338 Mira, before 339 Mira joined Andravida Phantom operations in June 1974. A third unit, 337 Mira, was established at Larissa during the second batch of F-4E deliveries. In 1978 it was joined by the RF-4Es of 348 Mira, also at Larissa, completing the HAF's original orders.

338 Mira itself was formed on December 24, 1952, as part of 112 CW at Elefsina with the F-84G Thunderjet. It converted to the F-4 from July 1974.

Operations remained unchanged until the early 1990s, when 28 surplus F-4Es were transferred from the Indiana Air National Guard. All of them joined 338 Mira, which transferred its original machines to the co-located 339 Mira, as well as 337 Mira at Larissa. The RF-4 recce fleet was bolstered with the arrival of 28 ex-Luftwaffe RF-4Es in 1993. This structure remained constant until 2005, when 337 Mira transitioned to the F-16, leaving 338 and 339 at Andravida. The status quo changed on October 31, 2017, with the disbandment of 339 Mira. This move saw all operations being condensed into 338 Mira.



Another example would see me lasing my target first, then breaking off to perform a CAP [combat air patrol] orbit over the top of the next bombing wave whilst I also lase [a target] for them. We can only point our laser at one target at a time, and we need around one minute per target, so it is quite a skill to set a timetable for an attack. We don't fly with NVGs [night vision goggles], but the pod can be used as [a] FLIR [forward-looking infrared] to see our targets at night when necessary.'

Sakorafas is aware of how resources are tight and how a number of aircraft have been retired without replacement. 'The HAF does not have a lot of aircraft or personnel,' he says, 'so in the spirit of



Above: An F-4E on final approach to Andravida, seen from the back seat of the wingman aircraft. **Katsuhiko Tokunaga/DACT**

Below: An F-4 drags its braking parachute clear of the active runway post-mission.

economy we make sure everyone can do everything. There's no in-house specialist in just one area.'





Inside the sanctuary of a dark hardened aircraft shelter, two F-4 pilots prepare to mount up for a mission.

“If you make a mistake in a modern aircraft it will take control and save you on its own. Here, on the Phantom, you are the one that has to take control and save yourself

Lt Col Dimitrios Sakorafas

‘Rhino’ survivors

With a highly capable F-16 force and an aging Phantom fleet, Sakorafas is keen to explain how this proud air arm can maintain the credibility of its final F-4 unit. ‘The F-4 is a legend,’ he smiled. ‘Perhaps we will be one of the last air forces in the world using the type like this, but through all these years this aircraft has proved just how reliable it is. That’s really important. It can also carry a lot of different weapons. So, when you add that into the economic crisis that we are in — internationally

and domestically — it’s not easy to order new aircraft.

‘Since our AUP upgrade, you could say that although our aircraft is not modern, it is operated in a modern way. Right now, there are some support issues, but we can manage those. As you can see, we are flying a lot. Thankfully, our technicians know the jets inside-out — some have been on the jet for over 40 years — so the experience level here at Andravida is huge. We don’t enjoy support from a ‘mother company’, but we are searching worldwide for spare



An F-4E rushes over the ‘keys’ as it returns to Andravida.





parts with some good success. But time is passing there too. There are fewer air forces and fewer parts available — I have been watching the retirement date of the Japanese aircraft with interest.

Back in 2000 the HAF was talking about complete F-4 retirement by 2015. The current talk is of 2027. Some airframes at Andravida are being used as spares sources to keep the fleet flying, and every day the unit is able to fly at least 10 aircraft, out of around 15 airworthy examples at any one time. 'We usually generate 15-20 sorties a day,' Sakorafas added.

New blood

'We are still training new pilots, which is incredible — it's great to see,' said Sakorafas. 'They come from the T-6 [Texan] and T-2 [Buckeye] at Kalamata. The rate is not as high as it used to be, but the spirit is to have a small, highly capable force and we are very good at that. When a pilot finishes their training they are

streamed based on their performance in the Buckeye. The headquarters will ask for their preferred fighter — F-16, Mirage 2000 or F-4 — and, if the figures match and the skills add up, they get the type they ask for. When a newly qualified pilot arrives here at 338 Mira as a lieutenant from Kalamata, they begin their specialist training on the F-4, concentrating on the weapons and the laser designator pod. They will fly in the back seat and learn the systems and start to get a feel of the aircraft. They are not weapons systems officers — we are all pilots that sit in the front or back seat. So, after a period of perhaps two years or 200 hours in the back, they will train again in the front seat where they will undergo a further period of pilot training for around 500 hours. Once that's over, they go back into the rear again for a final qualification. They will then continue their career here and have the opportunity to become an F-4 instructor pilot.'

Phantom strength

The current Andravida base commander is now the highest-hour pilot on the whole station, having accumulated a total of more than 3,000 hours in the F-4. He is one of around 40 pilots on strength with 338 Mira. The numbers rose significantly after the demise of 339 Mira, and the squadron swelled to what Sakorafas called challenging levels. 'We had two units here at Andravida, with 339 tasked with air-to-ground and 338 air-to-air. The HAF decided to pool everything into one squadron and merge the two roles. In that period, we had to undertake a huge training program to bring the 339 guys up to speed with the new weapons so we could all be ready for anything. This was around two years ago and the workload was huge. We nearly doubled from 40 to 80 pilots, trying to find the right path for training and co-operation as one unit all at the same time.'



A fabulous night study of a 338 Mira F-4E at Andravida.

Sakorafas explained the intricacies of flying the F-4: 'As I tell my pilots here, if you make a mistake in a modern aircraft it will take control and save you on its own. Here, on the Phantom, you are the one that has to take control and save yourself.' The pride in being associated with the F-4 shines through in the commander's eyes as he recalled one of his stand-out missions: 'I was flying low-level over the Greek islands of the Aegean Sea. As I passed along the edge of one very small island, I knew it only had around a dozen people there. They could see me and I could see each one of them. They knew that we were there for them, there was a connection — I have never met them, nor do I know who they are, but there was a connection, and this will stay in my memory forever. They are there living their lives through all the craziness of politics and economy and we are here protecting them.' 🇬🇷

AUP EXPLAINED

In 1997, the 'Peace Icarus' modernization program began under a contract with German aerospace company DASA. Also known as the Avionics Upgrade Program (AUP), this saw the entire fleet undergo a service life extension program (SLEP), which centered on developing the beyond visual range (BVR) capability with the AIM-120 AMRAAM and AN/APG-65 multi-role radar, the CPU-143/A central air data computer, modular multi-role computer (MMRC), laser gyro inertial navigation system with embedded GPS, AN/APX-113 advanced identification friend or foe (AIFF), and multi-function color displays. The result was a transformation that shifted

the Hellenic F-4s up the generation ladder.

In the back seat of the upgraded jets, the weapons system officer (WSO) workload was paired with the multi-mode capabilities of the APG-65. The new Litening pod became the sole domain of the WSO and a kingpin in the Phantom's arsenal. An experienced WSO serves as the 'brains' of the tactical formation, providing regular situational awareness updates to other jets, increasing the probability of a kill in air-to-air missions or providing accurate attack parameters for air-to-ground tasks. With the LITENING pod, F-4s can now undertake non-traditional intelligence, surveillance and reconnaissance (NTISR) duties and launch laser-guided bombs, or designate these weapons for other types. Each F-4E AUP also received the 'Aegean Ghost' camouflage scheme. The first upgraded aircraft was handed over on December 18, 2002.



F-4Es serials 97730/3-6535, 00234/3-6665 and 00242/6-6673 from the 91st Tactical Fighter Squadron at Bandar Abbas in November 2018.
Dietmar Fenners



The Islamic Republic of Iran Air Force has operated F-4s since 1968, and today retains a significant number of these aircraft as the backbone of its aging fighter force.

REPORT **Jamie Hunter**

IRAN WAS ONE of the largest export customers for the F-4 Phantom II, and its fighter pilots have been involved in a huge number of air combat operations over several generations. More than 200 Phantoms, including some 32 F-4Ds, 177 F-4Es and 16 RF-4Es, were all handed over before the 1979 Islamic Revolution. Now in service with the Islamic Republic of Iran Air Force (IRIAF), the F-4 remains the backbone of its fighter squadrons.

Iran initially ordered 16 F-4Ds in 1967, followed by a second batch of 16, with the first aircraft arriving in September 1968. During 1969, Iran ordered 32 F-4Es under the Peace Roll II Foreign Military Sales (FMS) program. These started arriving from March 1971.

The post-revolution era led to the US government placing an embargo on further arms deliveries to Iran and the final batch of 31 F-4Es remained undelivered. The first RF-4E for Iran had

IRANIAN SURVIVORS





F-4 AT WAR

The Iran-Iraq war from September 1980 saw Iranian F-4s being used to strike targets deep inside Iraq as well as using their AIM-9P/J Sidewinder missiles for air-to-air combat. The Phantoms fared well initially, but as Iraqi pilots gained experience, they began claiming Phantoms in large numbers, with Iraq's Mirage F1s scoring highly. Poor radar performance forced the Iranian pilots to fall back on the tactics of close-in dogfights and ambushes.

been completed in St Louis, Missouri, in 1970 and it arrived the following year. Despite 27 having been ordered, the arms embargo meant that only 16 aircraft were actually delivered.

Ongoing embargoes from the US caused severe spares shortages. F-4 fleet availability dwindled to very low levels at times, particularly during the latter stages of the Iran-Iraq war. This wasn't the first combat outing for the Iranian F-4s, as in 1974-75 they flew combat missions against rebels in the Omani province of Dhofar. Shortly

after the Islamic revolution of 1979, the Iranians employed Phantoms during a violent uprising in Iranian Kurdistan and Azerbaijan, and in 2014 the F-4Es were heavily involved in operations against the forces of the so-called Islamic State.

Maintaining the Phantoms

Iran's aerospace industry has been forced to cleverly reverse-engineer parts and use ingenious local upgrade programs in order to keep its Phantoms in the air. In 2008, Iranian Aircraft Industries (IACI) launched Project 'Dowran', designed to upgrade both the F-4Ds and Es. It mainly involved keeping the radars serviceable in the E-models. A cocktail of upgrades for the F-4s has included new U/VHF radio systems, improved navigation and deep overhaul work.

Since June 16, 2010, when the last F-4Ds of the Republic of Korea Air Force (RoKAF) were retired, the IRIAF has been the sole operator of the F-4D, and a handful could remain in service with the 101st Tactical Fighter Squadron (TFS) at Chabahar until around 2030. A few RF-4Es are also still active with the 31st Tactical Reconnaissance Squadron at Hamadan and, with little present prospect of replacement, the three squadrons of F-4Es could stay in service as late as 2035. 🇮🇷



Iranian F-4 crews are among the most combat-experienced in the world. Pride in their association with the F-4 clearly permeates throughout squadrons.



RISING SUN 'RHINO'

The Japan Air Self-Defense Force operates an exotic mix of F-4s, with its reconnaissance variants now being retired and a single squadron of air defenders remaining.

REPORT AND PHOTOS **Rich Cooper/COAP**



Above: A stunning two-tone blue RF-4E at Hyakuri in December 2019.

Right top: The distinctive sight of the twin cranked canopies as an F-4EJ Kai of 301 Hikotai heads out.

Right: An RF-4EJ taxis out at Hyakuri. These and their fellow RF-4Es were to be retired in March.

Left: 301 Hikotai is still operating at full capacity, evidenced here by an early-morning departure.

OF ALL THE Phantoms still active, the exotic examples of the Japanese Air Self-Defense Force (JASDF) must surely be among the most striking of them all, sporting an array of incredibly vibrant colors, reflecting a variety of roles. On November 1, 1968, the Japanese Defense Agency selected the F-4E as the new fighter for the JASDF to replace the F-104 Starfighter under the FX program. The F-4EJ bears a close resemblance externally to a standard F-4E, but was optimized for air-defense. To limit its capabilities, air-to-ground roles were deleted, as was its ability to receive fuel in mid-air. The F-4EJ lacks the popular slatted-wing, and despite its prolific use of locally produced systems, it retained the standard Westinghouse AN/APQ-120 radar.

OS'



The first batch of 104 F-4EJs saw the first two examples (JASDF serials 17-8301 and 17-8302) being manufactured in St Louis, Missouri. The remainder were all built in Japan under a license agreement with Mitsubishi. Ultimately, it increased its overall order to 140 F-4EJs. In addition, the JASDF received 14 RF-4Es that were delivered directly from the US production line between November 1974 and June 1975. They took the Japanese Phantom fleet to 154 aircraft.

From 1984, a major service life extension program (SLEP) was launched, 96 aircraft being upgraded to the F-4EJ Kai standard (Kai meaning 'modified'). This extended airframe lives to 5,000 flying hours and added the APG-66J radar that gave a modest beyond visual range (BVR) capability in association with the AIM-7E/F Sparrow missile.

Alongside these fighters, the 14 unarmed reconnaissance RF-4Es included 17 F-4EJs that were equipped with long-range oblique photography (LOROP) pods and were converted to the reconnaissance role under the RF-4EJ designation. The RF-4EJ is visually distinguishable from the RF-4E by virtue of its nose, which lacks camera equipment and retains the F-4E's gun housing.



All JASDF operations are now concentrated at Hyakuri, with the reconnaissance squadron 501 Hikotai disbanding as the final RF-4s were being retired in March 2020. 301 Hikotai is the last F-4EJ Kai squadron, also based at Hyakuri. 301 is known as the 'Mother Squadron', so-called as it was the first to receive the F-4 in JASDF service; it also refers to 301's original operational conversion unit role. It will likely cease operations with the Phantom in March 2021. 🐣



TURKIS

ESKİŞEHİR AIR BASE has housed every fast jet type operated by the Türk Hava Kuvvetleri (Turkish Air Force — THK) and was heavily involved in the initial arrival of the F-4E Phantom II in Turkish service from 1974. It was a perfect match for Turkey's demands at the time — 40 F-4Es were ordered in the Peace Diamond I deal with the US. The era of the F-4 heralded a step-change in air-to-ground capability with the likes of AGM-65A/B Maverick missiles, Pave Spike laser targeting pods, GBU-10/12 Paveway laser-guided bombs, electronic warfare pods and AIM-7 Sparrow medium-range air-to-air missiles. It was a huge leap forward for the THK.

The first two aircraft (serials 73-1016 and 73-1017) were flown into Eskişehir by US Air Force pilots on August 30, 1974, and supplied to 113 Filo. Deliveries continued in 1975, and by that time 22 aircraft equipped 112 Filo 'Şeytanlar' (Devils). The remaining 18 aircraft, which were received after an arms embargo ended in 1977, subsequently entered service with 171 Filo 'Korsanlar' (Pirates) at Erhaç.

In 1978, the 'Peace Diamond II' deal saw the THK ordering a second batch of 40 aircraft, consisting of 32 F-4Es and eight RF-4Es. These jets joined 111 Filo 'Panterler' (Panthers) at Eskişehir and 172 Filo 'Şahin' (Hawk) at Erhaç. The charismatic RF-84Fs made way for the new RF-4Es, which joined 113 Filo 'Işık' (Light) in 1980.

Expansion of the fleet continued and a further 14 F-4Es were acquired in 'Peace Diamond III'. They joined 173 Filo 'Şafak' (Dawn), also at Erhaç. 'Peace Diamond IV' followed, encompassing 15 more jets, mainly as attrition replacements. 'Peace Diamond V' added 40 surplus USAF F-4Es from October 1987, finally seeing off the remaining F-100 Super Sabres at Konya. These Phantoms joined 131 Filo 'Dragon' and 132 Filo 'Hançer' (Dagger)

there. The final batch of deliveries came shortly after the Gulf War ended in 1991, another 40 F-4Es arriving from the US under 'Peace Diamond VI'.

The end of the Cold War and the military drawdown in northern Europe presented a new opportunity for Turkey. Surplus Luftwaffe RF-4Es were snapped up both by the THK and neighboring Greece, 46 of these jets (including 13 held in reserve as spares sources) being delivered between 1992 and 1994. Turkey's Project 'Kaan' upgraded these aircraft immediately, replacing the original AN/APQ-99 radar systems with the newer AN/APQ-172.

These jets boosted 113 Filo at Eskişehir and enabled standardization on a 20-aircraft fleet per squadron. The remaining examples joined 173 Filo at Erhaç, thus forming a new reconnaissance unit. This pushed out the F-4Es to establish 172 Filo at the same

base. These ex-Luftwaffe jets initially retained their three-tone 'Norm 83' black and green camouflage, but later received a standardized South-east Asia green and brown scheme.

2020 vision

Faced with a decision to replace or modernize the F-4s in the 1990s, it was determined that upgrading them was likely to involve a quarter of the cost of introducing a new type. Israeli Aerospace Industries (IAI) signed a \$632-million contract on August 24, 1995, for the upgrade of 54 F-4Es. Of those, 28 were updated by IAI at its Bedek facility; the others were modernized by the 1st Air Supply Maintenance Center at Eskişehir. Although the moniker 'Terminator' was used at the start of the project, this referred to the first squadron that

171 Filo 'Korsanlar' markings have remained on some jets despite the rationalization under 111 Filo 'Panterler'. **All photos Rich Cooper unless stated otherwise**



SH TERMINATORS

Having undergone a major reshuffle in recent years, the Turkish Air Force has dramatically rationalized its F-4 Phantom II fleet as these warriors ultimately face retirement.

REPORT **Onur Kurc and Tayfun Yasar**



Onur Kurc/Tayfun Yasar





received the aircraft. The upgrade was officially referred to simply as the F-4E-2020, in recognition of its aim of keeping the jets in front-line service until after 2020.

The first two F-4Es (serials 73-1025 and 73-1032) were sent to Tel Aviv on February 24, 1997. Modification of the initial example was completed on March 1, 1999, but the aircraft stayed in Israel for another year for testing and verification work. At the same time, 230 technicians slated to work on the 2020 program were trained in Israel. The first two completed F-4E-2020s (serials 73-1032 and 68-0498) were re-delivered to 111 Filo at Eskişehir in January 2000. As the project ramped up, 171 Filo started to receive upgraded jets and from June 2002 the program continued at Eskişehir under the auspices of the 1st Air Supply Maintenance Center until completion in July 2003. In fact, the work there was valuable to the THK and offered excellent experience, which proved advantageous in years to come. Talk of

a further batch of F-4E-2020s fell foul of cost and Israeli activities in Lebanon. Instead, Turkey opted to purchase 30 additional F-16s.

In addition to structural work, the 54 F-4E-2020 aircraft were equipped with the Elta EL/M-2032 multi-mode fire control radar with a 144km range, ELOP 976 wide-angle head-up display (HUD), hands-on throttle and stick (HOTAS) controls, new UHF/VHF radio antennas, improved INS/GPS navigation, new multi-function cockpit displays, flight data recorders, a new radar warning receiver (RWR) and electronic warfare upgrades. Airframe life was extended to 6,000 flight hours.

Another capability for the 2020 was the addition of the AGM-142 Popeye long-range air-to-ground missile. While they have the ability to carry a pair of the 3,000lb (1,361kg) weapons, operationally THK Phantoms tend to fly with a single weapon on the port inner station, plus the data link on the opposite side.

The 'Rhino' remains

Having pressed the upgraded RF-4E-TMs into service, poor availability plagued the two squadrons. This led directly to the decision to decommission 113 Filo on April 21, 2014, all remaining aircraft being transferred to 173 Filo.

On June 22, 2012, an RF-4E-TM (77-0314) was shot down by Syrian air defense systems as it flew over the eastern Mediterranean, both pilots being killed. Then, on February 24, 2015, a mid-air collision during a night mission saw the loss of four pilots.

Meanwhile, the Turkish Airborne Reconnaissance Program (TARP) had started integrating the Ultra Electronics DB-110 pod onto the F-16. Plans to retire the RF-4Es were accelerated due to the misfortune that had hit 173 Filo, and the decommissioning process of the eight remaining aircraft was brought forward. On March 12, 2015, the last RF-4E reconnaissance mission was carried out by serial 77-0315 at Erhaç, bringing an end to the recce Phantom's career in Turkey.

The situation with the RF-4s was actually being felt elsewhere. The effects of age were hitting the THK F-4 inventory fast, even for the upgraded F-4E-2020s. The F-4E-TMs were withdrawn and soon the F-4E-2020s were in high demand, despite their dwindling numbers.

During 2014, 132 Filo 'Hançer' stepped out of the Phantom world, donating its '2020s' to 111 Filo 'Panterler' at Eskişehir and 171 Filo 'Korsanlar' at Erhaç. 112 Filo 'Şeytanlar' stood down in June 2015, its F-4E-2020s also being sent to 'Panterler'.

The net result of all the reshuffling and retirements was that by early 2016, just two THK squadrons continued to

Above: F-4E-2020s on the flight line at Eskişehir. The aircraft nearest the camera carries the old Pave Spike targeting pod.

Below: F-4E-2020 serial 77-0285 in special 111 Filo markings and carrying an AGM-142 Popeye stand-off missile. **Onur Kurc/ Tayfun Yasar**



The F-4s initially worn the brown and green South-east Asia camouflage, but the THK standardized on 'European One' two-tone gray in later years.



THK Phantom pilots decked out with a typical array of F-4 patches.



fly the F-4: 'Panterler' at Eskişehir and 'Korsanlar' at Erhaç.

Things were about to get even worse for the Turkish Phantoms. After a coup d'état attempt against the Turkish government on July 15, 2016, 171 Filo was immediately shut down as change swept through the THK. 111 Filo 'Panterler' was spared and today stands as the only Turkish F-4 unit, flying the remaining F-4E-2020s and still based at Eskişehir.

From 236 Phantom IIs delivered to Turkey that served with nine squadrons at three main jet bases, just a handful remain. Turkey has become a major operator of the F-16, but was turning its attention to the F-35 Lightning II, as well as to the indigenous TF-X fighter. Turkey's ejection from the F-35 program in 2019 due to its acceptance of Russian S-400 surface-to-air missile systems means the F-4s have taken on renewed importance. TF-X is still in its infancy and, despite plans to retire the F-4s this year, there is hope they will continue in service with 'Panterler'. 🇹🇷

INDIGENOUS UPGRADES

A modest upgrade for 16 older F-4Es was completed by Turkish aerospace company Aselsan from 2006 under the 'Simsek' (Lightning) program. This involved jets from 112 Filo, which became known as the F-4E-TM (Turkish Modernization). They received some air-to-ground targeting upgrades and improved navigation and communications kit. After modernization at Eskişehir, the first updated aircraft was delivered to 112 Filo in March 2010.

Project 'Işık' (Light) preceded this F-4ETM work and was actually the first national aircraft modernization program in Turkey. It was aimed to extend the service life of the RF-4E fleet. Aselsan led the task, alongside the 1st Air Supply Maintenance Center, which made good use of its experience with the F-4E-2020. Seven RF-4Es from the original batch plus 11 ex-Luftwaffe jets received LN-100GT INS/GPS precision navigation, updated electronic warfare and CDU-900 control indicator systems, MFX-484 UHF/VHF radio, ARC-190 HF radio, and new radar warning receiver systems. In addition, five former Luftwaffe examples were equipped with the KS-146B LOROP (long-range oblique photography) pod, which increased the total number of aircraft with the ability to carry these pods to 12 and enhanced the THK's ability to acquire high-resolution imagery from high altitude.

The first RF-4E-TM carried out its maiden flight on December 19, 2008. The project was completed by 2010, equipping 113 and 173 Filo and earning the motto, 'Lonely, unarmed and fearless'.

An F-4E pilot acknowledges the camera as he returns from a mission during exercise 'Anatolian Eagle'.





Operational F-4s have dwindled over the past decade, with some notable retirements and events.

REPORT **Jamie Hunter**

GONE BUT NOT FORGOTTEN

THE ADVENT OF modern fighters such as the Eurofighter Typhoon and F-35 Lightning II has illustrated how the F-4 may be universally popular, but that it has become increasingly obsolete. There have been some notable retirements in the past few years as long-time operators of the F-4 made their final farewells.

The initial F-4F Phantoms arrived in Germany in 1973. The Luftwaffe went on to take delivery of 175 F-4Fs, joining some 88 RF-4E tactical reconnaissance versions that preceded them. The inaugural unit to receive the F-4F was

JG 71 'Richthofen', its very first aircraft, serial 37+01, being the last to bow out of service in June 2013 wearing special blue and gold colors.

It was decided to apply stunning 'retro' color schemes to two aircraft for the Luftwaffe farewell, in order to chart the career of the F-4 in German service. Serial 38+10 received the original 'Norm 73' green and grey camouflage, with 38+33 being given the toned-down 'Norm 81' scheme, and 37+22 being painted in a fresh 'Norm 90' finish, the standard camouflage for the last years of service. However, arguably of greatest significance was 37+01, the Luftwaffe's first F-4F and the commander's jet right up to the last

day. A stunning electric blue and gold scheme and the inscription 'First in — last out' signified the final Luftwaffe tribute to the mighty F-4. The very last official landing by an F-4F was made at the event in June 29, 2013 by pilot Oberstleutnant Alex Berk and JG 71 wing commander Oberst Gerhard Roubal in the rear seat.

The Hellenic Air Force had operated its magnificent, chisel-nosed, photo-reconnaissance RF-4Es since 1978. In May 2017 it was bidding a final farewell as 348 Mira Taktikis Anagnoriseos (MTA, Tactical Reconnaissance Squadron) 'Eyes' joined the history books. Based at Larissa in northern Greece, in the shadow of Mount Olympus, 348 MTA — part of 110 Pteriga Machis (PM, Combat Wing) — was down to just three RF-4Es when *Combat Aircraft Journal* visited in March 2017, during the squadron's last weeks of flying.

The Hellenic Air Force formally retired its RF-4Es on May 5, 2017. A May 5 event saw a formation flypast, the last of the original HAF RF-4Es, serial 77-1765, landing first followed by 69-7450, a former Luftwaffe aircraft. The final touchdown was saved for 69-7499, another ex-German airframe,

Above: The three specially painted Luftwaffe F-4Fs fly in formation with an example in a standard scheme during the final months of operation in 2013.

Jamie Hunter

Left: One of the last three Hellenic Air Force RF-4Es gets airborne from Larissa in March 2017.

Jamie Hunter





with Lt Col Stavros Antonopoulos at the controls. The aircraft had received special markings in its last few weeks of service, with 'End of the film' titles for the event. Two of the aircraft were ferried to Andravida and Tanagra on May 10, marking the final flights of the RF-4Es. This left just the last unit of HAF F-4Es still active at Andravida.

December 2016 will forever be remembered as the month that saw the end of US Air Force F-4 Phantom II operations. The F-4 was a stalwart of the USAF for five decades, before the QF-4 drone bowed out of service with Detachment 1 of the 82nd Aerial Targets Squadron (ATRS) at Holloman Air Force Base, New Mexico.

Back in April 1996, the USAF ended the operational service of the Phantom II when the Idaho Air National Guard at Boise retired its F-4G 'Wild Weasels'. Over the following two decades, the USAF continued to operate these venerable and charismatic fighters, albeit as manned/unmanned full-scale aerial targets (FSATs) to help facilitate testing and evaluation of air-to-air and surface-to-air missiles. It was a career that could ultimately lead to these old warriors being literally blown out of the sky.



The QF-4 served America well, but sustainability latterly became a real issue and the USAF had exhausted the supply of suitable airframes. With only 13 remaining QF-4s on the unit, the era of the QF-16 had arrived, promising greater airframe availability and more plentiful spare parts. All 13 QF-4s remained on charge until January 1, 2017 when the seats and engines were removed and the aircraft were turned over to the 49th Wing for use on the local weapons range as targets — this time on the ground. 🛩️

Above: A handful of USAF QF-4Es wore 'Heritage' schemes that harked back to previous eras of F-4 operations. This QF-4E sported a South-east Asia scheme.

Jim Haseltine

Left: Taken from the boomer's window during a 'Bright Star' exercise, an Egyptian Air Force F-4E takes on fuel. Egypt received 42 ex-USAF Phantoms.

US DoD

EGYPTIAN 'RHINOS'

It's not clear exactly when Egypt formally retired its F-4Es, but a few airworthy examples were attached to 76 and 78 Squadrons at Cairo West until fairly recently, according to some sources. Initially interested in buying F-5E Tiger IIs, the Egyptian Air Force (al-Quwwat al-Jawwiya II-Misriya) settled instead for a batch of 35 ex-USAF F-4Es in 1979, following the Camp David peace accord with Israel. Purchased under the 'Peace Pharaoh' deal, the agreement also included AIM-7F Sparrow, 350 AIM-9 Sidewinder and 500 AGM-65A TV-guided Maverick missiles, and freefall bombs.

The F-4Es were initially drawn from the 31st Tactical Fighter Wing at Homestead AFB, Florida, and were rapidly delivered to make the October 1979 National Military Day in Cairo. A lack of spares meant the Phantoms were initially in poor status. However, the US increased its support and from 1983 the Phantoms were steadily returned to service. In 1988, an additional seven ex-USAF aircraft were supplied.

The F-4s failed to achieve popularity and in recent years they fell into disrepair as Egypt purchased new Dassault Rafales and MiG-35s.





OVERSEAS SUBSCRIPTION OFFERS

HOW MUCH WILL YOU SAVE?

when you subscribe direct



SAVE ON SHOP PRICES

EU subscription

From £56.99

Save up to £39

UK subscription

From £40.99

Save up to £16

RoW subscription

From £59.99

Save up to £30

TWO EASY WAYS TO ORDER

Customer code: CAJ010420



ORDER ONLINE

www.combataircraft.net/suboffer



CALL US NOW

+44 (0)1780 480404

Monday to Friday 9.00am until 5.30pm GMT

USA customer? See pages 34-35 for our latest subscription offers



Pacific PROJECTION

Combat Aircraft Journal joins the US Marine Corps' 31st Marine Expeditionary Unit, a force that projects a big presence in Asia-Pacific.

REPORT **Gordon Arthur**



Above: The amphibious assault ship USS *Wasp* (LHD 1) transits the Coral Sea with the embarked 31st Marine Expeditionary Unit. **US Navy/MCS1C Daniel Barker**

Right: With Australia's Queensland coast visible in the distance, a CH-53E approaches the flight deck of USS *Bonhomme Richard* during Exercise 'Talisman Sabre 2017', a biennial event held mostly at the Shoalwater Bay Training Area in central Queensland. **All photos Gordon Arthur unless otherwise stated**

THE US MARINE Corps has a significant presence in the Asia-Pacific region, and one of its important forward-deployed units is the 31st Marine Expeditionary Unit, based in Okinawa, Japan.

A MEU (pronounced 'mew') — of which the USMC has seven — has a strong aviation contingent. Indeed, its aircraft complement is typically stronger than many complete air forces. There are four essential components in any MEU: the command element, ground combat element, aviation combat element (ACE) and the logistics combat element. The MEU is the smallest permanent building block of a scalable Marine Air-Ground Task Force (MAGTF), an expeditionary quick-reaction force that can be established for specific contingencies or in anticipation of a wide range of possible missions. The 31st MEU's area of responsibility covers the whole Asia-Pacific region. Because it is the only forward-deployed MEU, it is distinctive in the way in which it operates.

When the 31st MEU of about 2,200 personnel deploys on ships for its two annual patrols, its ACE is typically comprised of up to a squadron of Bell-Boeing MV-22B Osprey tiltrotors, detachments of Sikorsky CH-53E Super

Stallion, Bell UH-1Y Venom and Bell AH-1Z Viper helicopters, and a detail of Lockheed Martin F-35B Lightning II fighters. On call and available to the 31st MEU are land-based Lockheed Martin KC-130J Hercules and Boeing F/A-18D Hornets.

The ACE also includes its own air control detachment and marine wing support squadron detachment. The element is equally comfortable operating from the flat-top deck of an amphibious

assault ship or a barren tract of land in an expeditionary capacity, providing powerful air support to ground and naval elements.

The Asia-Pacific MEU

The 31st MEU has played instrumental roles in regional disaster relief operations, including typhoons and mudslides in the Philippines, in Indonesia after the 2004 Boxing Day tsunami, and after the Tohoku



There are normally four CH-53Es embarked aboard an LHD when the 31st MEU conducts a spring or fall patrol around the region. This helicopter carries the unit insignia of HMM-262, the photo taken just before the unit was redesignated as VMM-262 on 30 August 2013.



earthquake and tsunami in Japan in March 2011. Naturally, helicopters and tiltrotors are vital assets for such humanitarian assistance efforts, while the MEU is also trained to perform non-combatant evacuations. Of course, it can conduct conventional mechanised raids, small-boat raids, urban operations, tactical recoveries of aircraft and personnel, helicopter raids and jungle operations, too.

The 31st MEU was reactivated on September 9, 1992, relocating to Camp Hansen in Okinawa in 1994. Today, the helicopter and tiltrotor units of its ACE are located at MCAS Futenma on Okinawa. For this particular MEU, the lead element of the ACE alternates between Marine Medium Tiltrotor Squadron (VMM) 262 (Reinforced) 'Flying Tigers' and VMM-265 'Dragons', both of which are resident Osprey squadrons at Futenma. For its other aviation assets, units rotate to Japan for at least six months at a time as part of the corps' Unit Deployment Program (UDP).

When conducting spring and autumn patrols, the 31st MEU deploys on three US Navy ships, typically a landing helicopter dock (LHD), a landing platform dock (LPD) and a landing ship dock (LSD). For example, in 2019 the MEU embarked

TYPICAL EMBARKED EQUIPMENT OF THE AIR COMBAT ELEMENT OF THE 31ST MEU

Number	Type	Description
4	AH-1Z Viper	Attack helicopter
3-4	UH-1Y Venom	Utility helicopter
10-12	MV-22B Osprey	Tiltrotor
4	CH-53E Super Stallion	Heavy-lift helicopter
6	F-35B Lightning II	Fighter/attack aircraft

aboard USS *Wasp* (LHD 1), USS *Green Bay* (LPD 20) and USS *Ashland* (LSD 48).

Owing to the size and capacity of the LHD, this vessel embarks Ospreys and Super Stallions. The other two ship types normally carry a mixed complement of Vipers and Venoms. As with some of the aircraft units, ships rotate regularly to Sasebo in Japan for tours of duty to form these 'blue-green teams' known as amphibious ready groups. It is during these routine patrols that the 31st MEU participates in multilateral or bilateral exercises such as 'Cobra Gold' in Thailand,



This Osprey is from VMM-265 'Dragons'. Here, an M1163 prime mover towing a 120mm mortar (together referred to as the Expeditionary Fire Support System) disembarks.

'Balikatan' in the Philippines, 'Ssang Yong' in South Korea and 'Talisman Sabre' in Australia.

Maintaining the MEU

As the smallest service, the USMC has often been at the end of the queue when the Department of Defense (DoD) allocates funding. However, the marines are well along the path of a major recapitalization program as the US prioritizes the Asia-Pacific region due to the perceived threats from North Korea and China.

The 31st MEU received its first UH-1Y Venoms in 2012, replacing the incumbent UH-1Ns. The AH-1Z, supplanting the AH-1W SuperCobra, only became a permanent fixture in Okinawa several years after that, in November 2016. Providing perhaps the greatest impact has been the MV-22B Osprey, which replaced the elderly CH-46E, despite opposition to its presence from local residents in Okinawa. Even now, the Japan Ground Self-Defense Force has not been able to bring its Ospreys back to Japan because of stiff resistance from citizens living near the proposed Osprey base.

After they first arrived in Japan in 2012, the MV-22Bs' initial foray into wider Asia occurred during Exercise 'Cobra Gold 2013'. Six tiltrotors from VMM-265 flew to Thailand, via a stopover in the Philippines,

Below: VMM-262 and VMM-265, both of the 1st Marine Air Wing, are permanently based at MCAS Futenma, and take annual turns to support the 31st MEU.

as well as mid-air refuelling along the way. In 2013 alone, the unit's Ospreys visited Australia, Japan, Malaysia, the Philippines, Singapore, South Korea and Thailand. These deployments show how the Osprey is a game-changer for the USMC. The MV-22 brings a unique versatility to the US military, especially in the Pacific region where there are long distances to cover and a lot of ocean between countries. Flights from Okinawa to Singapore can be achieved in nine hours, and the Osprey can carry three fuel cells that each give

an extra hour's worth of endurance in addition to the type's base three hours of flight time. The limiting factor now relates to regulations concerning a pilot's endurance rather than the aircraft itself. Impressively, the V-22 flies twice as fast, carries nearly three times the payload, and has four times the range of the retired Sea Knight.

Capt Christopher Demars, a USMC Osprey pilot, told *Combat Aircraft Journal*, 'We're a medium-lift assault support asset of the marine corps, so what that means



The Venom and Viper tend to operate in pairs, as here over the beach of Bowen in Queensland during 'Talisman Sabre 2019'. Pilots are able to fly both H-1 aircraft types, which gives the commander greater flexibility during high-tempo operations.





Left top to bottom:

An M1161 Light Strike Vehicle of the 31st MEU's battalion landing team being loaded into the rear of a Super Stallion on the flight deck of the LHD USS *Bonhomme Richard*. M1161 and M1163 vehicles are designed to fit inside both the Osprey and Super Stallion.

Technicians service the M197 20mm triple-barreled Gatling gun of a Viper at MCAS Futenma. This base will eventually be relocated because the Japanese city has encroached all around it, while there is strong local resistance to the American military presence in Okinawa.

is you can equate us with everything from an 18-wheeler to a school bus to a taxicab to a postal service. We don't carry as much as a CH-53 would, but we do just a little bit of everything — troops into and out of a zone, casualty evacuation, high-altitude command and control operations and humanitarian assistance.'

Each tiltrotor squadron possesses 12 Ospreys, and Demars praised the type's capabilities. 'I'm not limited to a runway like a C-130. I have the ability to land in the most remote locations and drop off supplies and aid. You compare that with a traditional helicopter — I'm doubling their speed, carrying twice their load and travelling twice as far.'

'Zulu' in the Pacific

Marine Light Attack Helicopter Squadron 169 (HMLA-169) 'Vipers', part of the 1st Marine Air Wing (MAW) at MCAS Futenma, operates the AH-1Z Viper and UH-1Y Venom combo, with eight of each type on strength. HMLA-169 deployed to Okinawa from MCB Camp Pendleton in California earlier in 2019 under the UDP.



Left: An AH-1Z Viper of HMLA-169 flies during 'KAMANDAG 3' in the Philippines in October 2019. **USMC/LCpl Ethan LeBlanc**

Below: An F-35B of VMFA-121, but assigned to the 31st MEU's VMM-265 (Reinforced), departs the new amphibious assault ship USS *America* (LHA 6). **US Navy/MCSS Jonathan Berlier**

AH-1Z pilots achieve around 20 flying hours each month, the 'Viper' being used as the 'destroyer' and the Venom in support. Capt Daniel Kelly, an AH-1Z pilot, described how the 'Zulu' is 'more capable' than the AH-1W 'Whiskey' that it replaced, being able to 'see farther' with Lockheed Martin's AN/AAQ-30A target sight system. A typical weapon load on a 'Viper' is 12 Hellfire missiles and 19 rockets on six hardpoints, plus 650 rounds for the M197 20mm cannon. Meanwhile, the Venom can carry a door gun as well as rockets such as the laser-guided Advanced Precision-Kill Weapons System (APKWS) for an anti-armor capability.

Kelly emphasized that the two types are purpose-made for shipboard operations, where they may spend most of their time on the flight deck, exposed to harsh oceanic environments that can play havoc with electrical systems and cause rapid corrosion.

Game-changer

The most significant step in US Marine Corps aviation in the Pacific in recent years has been the arrival of the 16 F-35B Lightning II fighters of VMFA-121 'Green Knights' at Iwakuni in Japan. This was the F-35B's first permanent overseas basing

assignment, and the type has transformed air power projection for the MEU.

The 31st MEU will experience further changes in 2020 as the USS *Wasp* — previously forward-deployed in Japan — is replaced by the new amphibious assault ship USS *America* (LHA 6 — landing helicopter assault). Specifically designed to accommodate the MV-22B and F-35B, this new class does not have a well deck, so will require some changes in the way the MEU and its ACE operate. The MEU will no longer be able to transport heavy vehicles ashore via landing craft or hovercraft from the LHA. Instead, USS *America* will have more deck space to support the carriage of a full squadron of 12 Ospreys, plus the Super Stallions and F-35Bs.

Another change for the USMC in the western Pacific is the redistribution of its forces, as it will divert many marines from Okinawa to Guam once new facilities there have been completed. Nonetheless, the 31st MEU will remain on Okinawa for the foreseeable future. Okinawa occupies a prime geostrategic location as it is close to hotspots like the Korean peninsula, Taiwan, China, the Philippines, and South China Sea. In addition, the MEU is tied to US Navy ship assets based at Sasebo on mainland Japan. 🇺🇸



IT'S WELL KNOWN that when you're working with the US military reserve forces, there's going to be a lot of experience around. That rings true for Strike Fighter Squadron 204 (VFA-204) 'River Rattlers', stationed at NAS Joint Reserve Base New Orleans in Louisiana. 'Classic' Hornets may be out of the frontline fleet squadrons now, but the navy's two reserve F/A-18 units continue to fly some of the oldest fighters in the inventory.

The US Navy Reserve includes just four fighter squadrons these days — two with Hornets and two with F-5s. Three of these — VFC-12, 13 and 111 — are tasked purely with adversary support, whereas VFA-204 is a true strategic reserve unit, ready to support the fleet as and when required, in addition to providing that same adversary support.

Squadron skipper CDR Ryan 'Slappy' McLaughlin told *Combat Aircraft Journal*: 'In the strategic reserve role we are a fighter/attack asset like any other F/A-18 [squadron]. To this day that is still what we train to, and it is our primary mission.

We can carry air-to-ground ordnance and air-to-air, so we have a self-protection capability, and we do the multi-role mission. However, most of our flying is in the adversary role.

'Every single one of our pilots has been a fleet naval aviator for at least 10 years. They are extremely experienced when they show up here, with a minimum of 800-1,000 F/A-18 hours.' The squadron doesn't receive pilots fresh from the training pipeline; these are seasoned hands and well used to whatever comes at them, whether that is flying from a carrier or deploying on the road to provide high-end adversary support. CDR McLaughlin said: 'We could deploy to an aircraft carrier if required, but we haven't done that in a number of years. We used to go to the aircraft carrier routinely for currency, but they found it is really not required. It's really more of a concern with the maintainers' experience than the aircrew. Once you get a couple of hundred landings on the boat, it's like riding a bike! If we ever needed to deploy to a carrier, we would do a ramp-up cycle, and then

we would get plenty of touch-and-goes on the aircraft carrier at that point. So we really don't need to do that recurrent training — it's expensive and it is tough on the airplanes.'

A demanding second job

The majority of the aviators at VFA-204 are part-time operators of the Hornet, with most being airline pilots as their regular occupation. It makes for a busy lifestyle as the minimum flying-hour requirement sits at around 100 hours per year in the Hornet cockpit, according to McLaughlin: 'That can be difficult to reach. Our average flight time is probably not much longer than an hour. When you look at our typical reservists, they are flying one time a day when they are here. To get one hour of flight time, it probably takes about four-to-six hours of time, depending on the depth of the debrief. The pilots have to show up here 80 to 100 days a year just to get that 100-hour minimum. It's a big commitment. Fortunately, the way a typical airline pilot works [with] a flexible schedule — it's not really a nine-to-five

A VFA-204 F/A-18A+ carries a brace of live AIM-7 Sparrows plus two ADM-141 TALDs (Tactical Air-Launched Decoys). The TALDs are dropped as targets for the missile shots.

José M. Ramos



RIVER RATTLES

The US Navy Reserve flies some of the oldest Hornets in the US, yet it is able to provide meaningful fleet support and a valuable back-up force if the need to boost the front line arises.

REPORT **Dick Wels and Hans Drost**





job — the airlines are really co-operative and by law they are required to give the reservists time off. So, typically, a reservist airline pilot does four trips a month for the airline, plus their days here.'

The current squadron includes 18 pilots, six full-timers and 12 part-time, with 16 aircraft on the books, four of which are in upgrade. Speaking to *Combat Aircraft Journal* in late 2019, CDR McLaughlin said: 'We currently have 12 aircraft on hand that are ours. Of those, one is in the

hangar awaiting a spare part for the wing.' He explained that spares can be tough to locate these days for 'classic' Hornets: 'They cannot be taken from [jets in storage in] the boneyard because they are required to keep those jets at a certain level of readiness.

'We have a two-seat D-model, three F/A-18A+ Hornets and the other eight are F/A-18Cs.' The plan was to migrate away from the older A+ jets by early 2020. The squadron has a broad requirement to be

able to get eight jets into the air at any given time.

'Since we are predominantly a full-time unit [across the board] we have — on any given drill weekend — about 20-30 selected reservists that show up. A lot of those part-time reservists have a lot of requirements that the full-timers don't — a lot of it is human resources type of stuff that they just don't have time to do, because they are only here during the drill weekend.'

Staying sharp

In addition to its adversary work, VFA-204 also has an important role in training Joint Terminal Attack Controllers (JTACs), which can equate to as much as 25 per cent of its flight time. 'Nowadays, when we are dropping ordnance in close proximity to our troops, they require constant training. Probably once

Above: A plane captain runs through a start sequence under the sun shelter at JRB New Orleans.

All photos Dick Wels/Hans Drost unless credited otherwise

Left: CDR McLaughlin in the cockpit on a mission from NAS Key West. **US Navy/CDR McLaughlin**



It's a big team effort at a reserve squadron, with a lot of full-time personnel, especially on the maintainer side.



The 'River Rattlers' skipper CDR McLaughlin uses the 'fighting sticks' to explain the nuances of the mission.

a month we go and deliver ordnance to these folks in Louisiana or Mississippi. On the ranges where we do the JTAC training, we can drop live or inert air-to-ground bombs.

'Almost all of our pilots have been through TOPGUN,' CDR McLaughlin continued. 'So much of that TOPGUN training is about assessing other aircraft and being able to tell what they are capable of, based on energy state when you look at an aircraft. The big question is, can they or can they not shoot you?' He described the intricacies and detail that goes into performance in a close visual fight: 'When you come into the fight you turn across the tail and you assess. If you decide to go nose low and the [opponent] turns, what do you want to do with your airplane at that point? Do you want to try to fly up front and take a shot? Or do you to try to get behind, and



VFA-204 had just three F/A-18A+ models in late 2019.



maybe extend the range to work with an air-to-air missile? When you look at basic fighter maneuvering [BFM] it's more of an art than a science. You've got to have the science down with the numbers as far as employing the aircraft. The art of looking back there and assessing the other plane is important. It is also important to train with dissimilar aircraft so you get used to them. When I go and train against one of my squadron mates, we know each other — there's a familiarity there. But when

you go and train with someone from a different squadron, even though they may not be real adversaries, it adds realism with those different units.'

Maintaining a 'classic'

The 'River Rattlers' operate some of the oldest fighters in the US Navy, and McLaughlin spoke highly of his engineers: 'Most of our maintainers are young, but they are very dedicated to their jobs. Although we fly the oldest fighters in the

Above: Three US Navy Reserve squadrons working together — VFC-13 and 111 F-5Ns plus a VFA-204 Hornet during a Strike Fighter readiness phase at NAS Key West.
José M. Ramos

Left: One of VFA-204's last F/A-18A+ Hornets looking every bit its age.

US Navy, I have never felt [for] a second unsafe in my aircraft.'

After joining and receiving initial qualifications, the maintainers are all about on-the-job training. 'They will be with somebody who is teaching. The first thing that they learn before they do any maintenance is to be out there on the flight line, to direct the start-up and the recovery of the aircraft. We do that to get them excited about aviation and get them to recognize the big picture of what we do. Then they go to C-school — more of a graduate level of education. It can last from four weeks to three months, after which they come back here for more on-the-job training.'

The squadron is often on the road, usually at NAS Fallon, Nevada, or to MCAS Miramar, California, another hub of 'classic' Hornet operations within the US Marine Corps. 'We deploy to Miramar so we can qualify folks not only dropping ordnance on the aviator side, but having all of our maintainers do that end-to-end training



Above: The pilots at VFA-204 are very experienced, with the part-timers switching seamlessly between airliner and Hornet cockpits.

Below: The large over-water Gulf of Mexico ranges are a quick 'hop' from New Orleans and make ideal training areas for the 'River Rattlers'.

of getting the bombs to the jet, loading them, making sure the jet communicates with the bombs correctly and then actually going out and being able to release that weapon. We have about 160-170 full-time folks in the squadron and about 120 of them are maintainers.'

New iron

When asked about future plans for VFA-204, CDR McLaughlin said: 'Well, we need new airplanes! What we have are still capable and we can execute any mission that the US Navy asks us to do right now, but they are getting to the limit of their service lives. The maintenance effort to keep them airborne is significant. I don't know what the answer really is or what our future will be like. I know they are looking at a lot of different options [for] a new lightweight fighter aircraft that could possibly do a dual role as an advanced training aircraft and also as an adversary-type simulation platform.

If we get something like that, we would obviously not be able to do the strategic reserve mission any longer. There's talk about getting us Super Hornets, and that makes a lot of sense. Getting the Joint Strike Fighter probably makes the most sense, as you have F-35 pilots in the regular navy who are transitioning outside. With the F-35 at VFA-204 there would be a capability to utilize them as a part-time reservist and maintain that strategic reserve posture. I think if you asked the leadership in the reserves, the F-35 is probably the way to go.' Of course, that isn't currently funded, as the fleet squadrons are only just starting to re-equip with the F-35C. This is reflected in CDR McLaughlin's conclusion: 'I think we are going to have these 'legacy' Hornets for three to five years to come.'

The authors would like to thank Andrew Thomas, Public Affairs Officer NAS JRB New Orleans, for his help in making this article possible.



GRIPEN MAKES BID FOR FINLAND

Combat Aircraft Journal reports from Tampere as Saab outlines its offering for Finland's HX fighter competition, and assesses the Swedish bid that many back as a potential winner.

REPORT **Jamie Hunter**

THE FINNISH AIR Force (Ilmavoimat) wrapped up a round of evaluations in February under its so-called HX Challenge, which is part of the overall process to select a new fighter aircraft to replace its aging F/A-18C/D Hornets from 2025. Saab held a media briefing on January 30, the day before it began a week of HX evaluations at Pirkkala air base, near Tampere, in Finland.

The HX Challenge saw the five candidates (Typhoon, Rafale, Gripen, F-35A and F/A-18E/F/EA-18G) deploying in sequence to Pirkkala to fly missions alongside Finnish aircraft in different combat scenarios. This was designed to allow each of the candidates to demonstrate the performance criteria outlined in the respective bid packages, and for the aircraft to handle a series of carefully planned exercises designed to evaluate specific attributes. These encompassed the full range of mission

sets from close air support (CAS) to offensive counter-air (OCA).

Saab's HX Challenge window coincided with the timeline for all of the contenders to submit their respective revised offers in response to the final Request for Quotation for HX. In a statement, Saab said its offer to Finland includes the Gripen E and two-seat F fighter aircraft and is 'designed for the most challenging operations and threat scenarios'; it also incorporates the GlobalEye airborne early warning and control (AEW&C) system as a 'force multiplier'.

As part of its proposal, Saab said it is offering a 'substantial weapon and sensor package' as well as the necessary equipment and associated services needed to operate the system. The offer also includes an impressive industrial co-operation program aimed at building extensive national capabilities to underpin security of supply. Saab stated that it has included maintenance, repair and overhaul (MRO) capabilities for local

industry, parts production and final assembly of some of the aircraft, as well as establishment of a sustainment and development center in Finland.

Finland has run an impressive open and honest campaign for its €10-billion (\$11.1-billion) HX competition. Now that the respective bids have been provided, a round of 'spring negotiations' will be followed with a best and final offer (BAFO) submission later this year. The Finnish government will then take the HX project findings and make a decision in 2021.

Finnish Air Force HX program director Col Juha-Pekka Keränen told *Combat Aircraft Journal*: '[We will run a] combined planning exercise with each tender to pass all steps in our decision-making model.' The HX Challenge was about proving and demonstrating the respective capabilities laid out in the bids. This will then be used in a series of war-gaming events, which will analyze each contender's ability to operate if logistics and communications lines are cut. Keränen asked: 'Do they give

ID



us a capability to disperse our aircraft — use civilian airfields and highway strips — and testing turnaround times?’

Saab in Finland

Saab participated in the HX Challenge by bringing a new Gripen E (serial 39-10) to Tampere on January 29, followed two days later by its two-seat Gripen Demo aircraft — which features many of the mission systems of the E-model including a wide-area display in the rear cockpit. A GlobalEye flew from Sweden with a Finnish evaluation team aboard. This marked the Gripen E’s first visit outside Sweden, with the aircraft arriving in truly horrendous winter conditions. Indeed, Saab faced the first such weather of any of the HX Challenge periods, with Finland experiencing one of its warmest winters in years — ironic for a series of events timed to test each candidate in ‘typical’ Scandinavian winter conditions.

Speaking to reporters on January 30, Magnus Skogberg, Saab’s HX campaign

director said: ‘With Gripen we have [the] possibility to bring a lot of operational capability for the set budget, and to maximize what the Finnish defense forces will get from their investment in the HX program.’

Jonas Hjelm, senior vice-president and head of Saab business area aeronautics, gave a brief update of the latest Gripen E flight-test progress, with five aircraft flying

in Sweden and engaged in trials work. He said: ‘We are now in a stage where we are moving into the tactical systems to test the radar, the EW [electronic warfare] system, the payloads, and the weapons themselves.’

The responses to HX are very much down to each company offering their blended solution to meet the requirements. Skogberg said: ‘In the [Saab] offering to Finland in the context of HX program, we have included both Gripen E and F aircraft in the mix. Not only aircraft are included, but also a full set of equipment and services needed to initiate operations. Each candidate is free to suggest a package that could optimize the air defense capabilities of Finland; we have decided to include the GlobalEye AEW&C system. It provides a strategic asset for 24/7 airspace, land, and sea surveillance. We think it will provide a situational awareness enhancement for Finland that will work for supporting the nation’s territorial integrity.’



Gripen E serial 39-10 taxis out at Pirkkala during the HX Challenge in February. All photos Saab unless otherwise stated



Skogberg also praised Saab's world-leading EW capabilities, adding that the Gripen E features '360-degree spherical radar warning receivers, missile approach warners, and advanced internal jamming'. He added that the Gripen E 'is built to be used at road bases', a clear reference to the type's suitability to the Finnish concept of operations (CONOPS), which includes the need for small conscript teams to be able to quickly service and regenerate fighters. 'With Gripen, you do a turnaround within 10 minutes if you're doing air-to-air [missions] — you do the refueling and re-armament — and that is building sortie generation so that we can perform a lot of missions in a defined period of time.'

A statement from Saab on completion of its week-long stint said: 'The HX Challenge was carried out in Finland with tests performed under Finnish winter conditions, with the purpose to verify the data previously reported by the fighter manufacturers. The solution offered by Saab features the latest technology available for operating in a continuously changing and highly challenging operational environment.'

Jonas Hjelm said: 'During the past week we have successfully completed the planned tests, and hence demonstrated the capabilities of Gripen and GlobalEye, a solid and highly capable solution responding to the needs of the Finnish Air Force.'

The right choice for Finland?

Of the five candidates, the Gripen would appear to closely meet Finland's

Above: This smart Gripen E is serial 6002, the first series-production aircraft for Sweden.

Right: Magnus Skogberg, Saab's HX campaign director.
Jamie Hunter



requirements, which primarily calls for a potent air defender. Gripen E was designed and built to tackle high and fast-flying targets, combining the active electronically scanned array ES-05 Raven radar from Leonardo and the ability to carry up to nine MBDA Meteor beyond-visual-range air-to-air missiles for long-range engagement.

Finland's close diplomatic ties with Sweden and a bilateral defense agreement mean that jointly operating Gripens could enhance the ability to operate from austere road bases in often poor weather. The Gripen undoubtedly holds the cards in this domain as this type of scenario is ingrained in its design — short turnaround times with a small conscript ground team at an austere base is what

Gripen is all about. Moreover, closer co-operation between Sweden and Finland in the shape of a common fighter would bring added benefits, such as Finland being able to fall back to Swedish bases in times of conflict and leverage the commonality through Gripen.

Saab says the inclusion of the GlobalEye adds '20 minutes extra pre-warning time' for incoming threats, with coverage out to 342 miles (550km) for targets above 9,000ft and low-level targets out to 280 miles (450km). However, it's unclear how the addition of GlobalEyes affects the number of fighters in the offer. Finland initially set the requirement at 64 fighters, but the number is no longer fixed, with the HX team preferring to receive an overall solution based on capability. Saab



will not disclose details of its response, but it's likely to involve a variable number of Gripens and GlobalEyes — which will be fine-tuned for the BAFO (best and final offer).

Saab is renowned for being hard to beat when it comes to cost and industrial participation. The Swedish offer includes layered support to Finnish industry with a new MRO facility, parts production as well as final assembly of some of the aircraft, and the F414 engines in Finland, plus the establishment and operation of a 'system center' — likely to be geared towards national mission data capabilities. Finland wants a fighter that offers programmatic longevity — it aims to operate these aircraft out past 2050 — and HX initial operational capability is set for 2027. Despite some questions over the type's current customer base and therefore the prospective production run of the Gripen E, this industrial co-operation is designed to give Finnish industry the skills required to support the Gripen well into the future.

Saab said the timing is perfect for the Gripen E, with Finland able to join a mature program that's currently evolving under the Gripen E, a type

set to achieve full operating capability in Sweden in 2023.

Saab's is the only offer that includes a dedicated surveillance platform, although it's not the only proposal with dual types. The US government has granted Boeing permission to include the EA-18G Growler electronic attack aircraft in its bid alongside the Super Hornet. Interestingly, when Gripen E 39-10 was made available for the media to photograph at Pirkkala, it was carrying Saab's new Electronic Attack Jammer Pod (EAJP) — underscoring the high-end nature of this Finnish requirement.

Its pedigree for dispersed operations, the inclusion of GlobalEye, low cost and industrial offset put the Gripen E in a strong position in Finland, plus it's a politically popular choice in times of increasing defense co-operation with Sweden. Little is known about its true warfighting capabilities, but in the air-to-air role it faces stiff competition from the blistering kinetic performance of the Eurofighter. The F-35 is the candidate that many say is 'the one to beat' — with a growing footprint in Europe. However, it's hard to see how the Lockheed Martin fighter will fit into the Finnish CONOPS and meet security needs while operating from road strips. Moreover, the F-35

will require significant infrastructure investment — which must come from within the €10-billion budget. Lockheed Martin says that the Finnish F-35 deal will include some local manufacturing of components, however a new F-35 Final Assembly and Check Out (FACO) facility in Finland is unlikely to be on the table. It's possible that Turkey's ejection from the Lightning II program has opened up some F135 engine support work, but arguably there are other customers ahead of Finland in the queue for large-scale F-35 industrial participation.

When it comes to capability, Finland primarily wants an air defender — it's the main requirement — and that wouldn't appear to favor a stealthy 'day one' strike aircraft like the F-35. It needs an aircraft that fits with its CONOPS and an industrial partner that offers secure supply chains in the most demanding of scenarios, with zero restrictions on the data that its new fighter generates. Each of the HX contenders offers much of what is required, but behind the scenes the Finnish team is building a picture of which is the best fit. There will be some compromises, and a keen eye on cost, but once the best solution is settled upon, it will be passed to the politicians who will make the ultimate decision. 🇫🇮

Above left to right: Saab's proposal includes the GlobalEye AEW&C aircraft.

The Finnish bid from Saab includes some assembly of aircraft.

Below: Aircraft 39-10 in the snow and low-cloud conditions at Pirkkala during Saab's HX Challenge period. **Jamie Hunter**





ISRAEL'S WORKHORSE

at 50

REPORT AND PHOTOS
Yissachar Ruas

Combat Aircraft Journal reports on the CH-53 Yas'ur, which marked a half-century of service with the Israeli Air Force last October.

Above: Yas'ur 985 had been placed into storage but was resurrected and upgraded to 2025 status due to an acute shortage of flying airframes.

THE FIRST TWO from an eventual total of 55 CH-53s for Israel arrived in the port of Ashdod by ship on October 26, 1969. The type's 50-year milestone comes at a time when this veteran heavy-lifter is in more demand than ever, with no foreseeable replacement. Within the Israeli Air Force (IAF), the Sea Stallion is known as the Yas'ur (Petrel). The current Yas'ur 2025 version has been modernized and upgraded several times.

The Yas'ur is usually crewed by three or four, depending on the mission, comprising two pilots and one or two crew chiefs. The crew is often complemented by operators from the IAF's 669 Rescue Unit. For most of its service the Yas'ur was tasked with more complex rescue missions, at least until the Black Hawk entered IAF service in 1994. This was largely due to its inherent adaptability and the fact that the alternative Bell 205/212 was often operating close to its



air defense radar from under the Egyptian military's noses. The Super Frelons ferried Israeli Defense Forces (IDF) special forces while the Yas'urs were tasked with lifting the radar, split into two parts, back into Israeli territory.

Rumor has it the P-12 was later shipped to the US where it played a part in simulations on the Nevada Test and Training Range.

Another unit, 118 Squadron, was formed in August 1970, following the ceasefire agreement that was supposed to end the War of Attrition. Known as the 'Nocturnal Birds of Prey' Squadron, this unit has operated the Yas'ur exclusively ever since.

By the time the Yom Kippur War broke out in October 1973, the IAF had received 17 Yas'urs in three batches. Once the US airlift began, additional examples were ferried to Israel in an effort to replace those lost either during battle or in accidents leading up to the war.

The Yas'ur played a key part in the 1973 conflict, not only ferrying troops and evacuating wounded soldiers from the front — including medevac sorties from the west side of the Suez Canal — but also taking part in highly secretive electronic intelligence efforts in an effort to both gather signals intelligence (SIGINT) and jam enemy radars. During one of

these missions, the Egyptian defenses succeeded in shooting down a Yas'ur operating south of Sinai. The Yas'ur also played a major role in recapturing Mount Hermon from Syrian commandos. This strategic position is known to the Israelis as the 'Eyes of the Country'.

Expanding the fleet

Up until the mid-1970s, the IAF operated a variety of Stallion versions, ranging from the CH-53D that carried external fuel tanks and was capable of aerial refueling, to the earlier CH-53A that lacked both features and was therefore limited in terms of range. Over the course of the next decade-and-a-half, the IAF procured more helicopters from various sources, including two from the Austrian Air Force. This was part of an ongoing effort to bolster both squadrons' operational strength and fill the gaps created by losses, due in most part to accidents.

While the Yas'ur squadrons' bread and butter is troop ferrying and heavy lift, the Yas'ur has been involved in other, different projects over the years.

During the late 1980s and early 1990s, Israel identified the potential threat from Saddam Hussein's regime in Iraq. After Iraq launched 'Scud' missiles into Israeli population centers during the 1991 Gulf

safety margins during missions in hot temperatures.

Israel purchased its first helicopters from Sikorsky as civilian versions. For that reason, they were designated S-65 despite them being equivalent to the US Marine Corps' CH-53D. The first two helicopters arrived at the height of the War of Attrition — the three-year Arab-Israeli conflict that ended in the summer of 1970. The pair served with 114 'Night Leaders' Squadron out of Tel Nof Air Base, alongside French-made Super Frelons. Within weeks of their arrival, they were demonstrating their invaluable capabilities.

Yas'ur into battle

Their first combat mission was a dramatic one — Operation 'Rooster 53'. On the night of December 26, 1969, the Yas'ur began its special operations career. Five helicopters from 114 Squadron — two Yas'urs and three Super Frelons — flew at low level and far behind enemy lines and proceeded to capture a Soviet-made P-12

Right: The final Yas'ur was upgraded to 2025 status in 2015, with no further improvements planned.





War, operational plans were drawn up for a mass conquest of western Iraq by Israeli forces. In an effort to bolster the Yas'ur's defensive capabilities on the battlefield, the IAF tested it as a platform for long-range Nimrod air-to-ground missiles. This effort saw the Yas'ur's external fuel tanks removed and a battery of four missiles attached to each side.

Israel was asked to restrain its firepower during the 1991 war — aiming to keep Arab coalition forces in the fold. As a result, plans for an armed Yas'ur never progressed beyond a prototype. On the other hand, Israeli restraint was rewarded with additional Stallions from US stocks at the end of the 1991 conflict.

Drone ops

One of the Yas'ur's other non-standard roles was 'trapping' Firebee unmanned aerial vehicles (UAVs). The IAF was a pioneer of drone operations in the 1970s and by the 1980s it was still using the US-made Firebee for target practice and other roles. For this task the Yas'urs had their drop tanks removed for greater maneuverability.

In 1992, all IAF Stallions were slated for a mid-life upgrade. This was carried out by IAI's Helicopter Division located in Jerusalem, in a project known as Yas'ur 2000. This upgrade had streamlined all Yas'urs to the same standard within a couple of years. All were made capable of aerial refueling, while the CH-53As were strengthened, adding support bars to allow external fuel tanks to be attached to the sponsons. Meanwhile, the cockpit underwent a limited digital upgrade.

On the night of February 4, 1997, a pair of Yas'urs ferrying troops into Lebanon collided over the village of Shear Yishuv, northern Israel. This accident was not only pivotal for the way the Yas'ur squadrons trained and operated, but is also considered a trigger that led to Israel eventually withdrawing its forces from Lebanon. The loss of Yas'urs 903 and 357 from 118 Squadron was costly, leaving 73 soldiers dead. The accident led to a total restructuring of the IAF and the creation of a dedicated Rotary Wing Division.

One of the significant changes was pilot qualifications — up until the 1997 accident the Yas'ur was flown by a qualified aviator on the right and the equivalent of a navigator (not a qualified pilot) on the left. The Ivri Committee in charge of investigating the tragedy recommended that both flight crewmembers be qualified pilots. Now, the list of qualifications required for a Yas'ur pilot to be current and operational is the longest of any airframe in IAF service. In essence, it meant the Yas'ur fleet needed to double the quantity of hours flown to qualify each squadron's roster.

The Yas'ur was not out of action for long. At night on September 4, 1997, a covert operation by Israeli Flotilla 13 operatives (the equivalent of the US Navy SEALs) went horribly wrong, near the city of Tyre, Lebanon. An ambush set up by the militant group Hezbollah killed 10 operators, including the flotilla's commander. Yas'urs from 114 Squadron were called in under heavy fire to rescue the team. The rotorcraft landed in a field near them with a rescue force, but

only two members of the original team escaped unharmed. The Yas'ur took off towards Israel carrying the wounded, while the rescuers attempted to locate two missing operatives — their efforts were painstakingly long, under enemy fire, and in the dark. Having unloaded the wounded at Nahariya Hospital, the Yas'ur returned to the battlefield under covering fire from IAF Apache and Cobra gunships. The Yas'ur landed in a 'hot' landing zone and remained on the ground during the recovery effort. Despite the IAF HQ requesting the Yas'ur leave the area, the crew decided to remain under fire in an effort to find the missing operatives, all the while taking small-arms fire and mortar damage.

After airlifting the rescue team back to Israel and returning to base, the Yas'ur was found to have significant damage from bullets to the fuel tank, as well as shrapnel. During the second flight into Lebanon the crew had moved fuel from the drop tanks into the Yas'ur's internal tanks, preventing a much greater disaster.

Second Lebanon War

In summer 2006, Israel was once again at war with Lebanon. Known as the Second Lebanon War, it was another opportunity for the Yas'ur to showcase its capabilities. In a covert operation deep inside Lebanon's Bekaa Valley, Yas'urs ferried Israel's premier strike unit, Sayeret Matkal, aiming to locate two of its soldiers who had been kidnapped by Hezbollah. Immediately before a UN-brokered ceasefire, and in an effort to strengthen

Above: Israel has examined a number of Yas'ur replacement options from the CH-53K King Stallion to a combination of Boeing H-47s and V-22 Osprey tiltrotors.



its negotiating position, Israel tasked its Yas'urs with ferrying an entire special operations regiment into Lebanon. A single Yas'ur was lost after offloading troops, presumably hit by a rocket-propelled grenade.

In 2007, the IAF Command debated replacing the Yas'ur. A decision had to be made between purchasing the only heavy-lift helicopter available at the time — Boeing's Chinook — or putting the Yas'ur 2000 fleet through another upgrade. The IAF opted for the latter in the hope that by the end of the decade there would be significant progress with Sikorsky's CH-53K King Stallion project. The upgrade, known as Yas'ur 2025, was intended to strengthen the Yas'ur airframe and add more than 20 new systems including SATCOM, an enhanced electronic warfare suite, an automated hover system, plus other digital elements to the cockpit.

The first prototype was slated to be Yas'ur 056, which flew as a 2025 for the first time in December 2007. Work on upgrading all airframes was completed in 2015. In recent years, the Yas'ur has been deployed to Cyprus, Greece and Romania on exercise. One example was lost along with its crew of eight during Exercise 'Blue Sky' in Romania's Carpathian Mountains in July 2010.

On the night of November 26, 2019, Yas'ur 042 was ferrying IDF soldiers from an elite unit, when it caught fire. The Yas'ur crew landed the helicopter safely in a field near the city of Beersheba. All occupants were evacuated without injury, but the



Above: The Yas'ur is able to turn its hand to a wide variety of roles, and being equipped with a hoist means it can support maritime operations.

Below: A Yas'ur down low during a rare spell of snow in Israel.

Yas'ur was damaged beyond repair. The incident led to a fleet-wide grounding of the type. The Yas'ur fleet was inspected at length while an investigation was launched. On January 13 this year, the Yas'ur fleet resumed regular operations, although the exact cause of the incident is still unknown.

The incident last November brought into focus the battle between the two industry giants, Boeing and Lockheed Martin, to provide a successor. Since the last Yas'ur was upgraded to 2025 status in 2015, the question of its ultimate replacement has become increasingly urgent. The IAF has been debating between the King Stallion or a combination of Boeing's H-47 and

V-22 tiltrotor. The main issue comes down to cost. The IAF has flown demonstrations with all three types, but its conclusions are not currently known. Israel was without a functioning government throughout 2019 and the process of finding a Yas'ur replacement has been stalled further. A successor is now not likely before 2024 at the earliest. Until then, the Yas'ur will continue to serve as the IAF's undoubted workhorse. 🚁

Acknowledgments: Thanks to Amir Segev for assistance with this feature. This article is dedicated to the memory of Nir Lakrif who introduced the author to the Yas'ur squadrons and was killed with his crew in Romania in 2010.





As the US Department of Defense looks to prune the A-10C Thunderbolt II fleet, *Combat Aircraft Journal* highlights the work of the 25th Fighter Squadron 'Assam Draggins', the only forward-deployed A-10 unit.

REPORT **Chen Chuanren**

WARTHOGS OF CROW MOUNTAIN



LIKE ALL US military units these days, squadron culture and heritage is a big deal at the 25th Fighter Squadron (FS). The 'Assam Draggins' has just cause to celebrate its history — first established in 1941 as the 25th Pursuit Squadron, it flew its first combat missions over Southeast Asia from 1942. Spending most of its history in the Pacific, the squadron took part in the Korean War, flying F-80s in 1950, and later the F-86 from November 1951. The squadron returned to South Korea in 1981, when it relocated from Japan to Suwon, but it wasn't until 1982 that it received its first Fairchild Republic A-10A Thunderbolt IIs, before disbanding in July 1990. However, it reformed in October 1993 as the 'Assam Draggins' under the 51st Fighter Wing at Osan Air Base, where it still resides today as a rare active-duty 'Warthog' squadron — assigned a strong force of 22 A-10Cs, and led by commanding

officer Lt Col Brian Elmerick. Osan was known as Crow Mountain in the past, in reference to the abundance of these birds in the area.

The A-10 came to Korea to address a close air support (CAS) requirement, as it was widely believed that large numbers of troops and armored activity would be expected should conflict break out in the peninsula again. Look no further than the A-10 — the USAF's CAS aficionado.

Talk to any A-10 pilot and they'll tell you in no uncertain terms that their role is to support the ground commander — it's a matter of pride in A-10 squadrons — in this case, the garrisoned US Army forces and the Republic of Korea (ROK) Army.

Lt Col Elmerick said: 'Specifically here on the Korean peninsula we work a lot with our Korean partners and their ground commanders.'

In this part of the world, the weather is a challenging issue in terms of reduced visibility, and it can have a severe impact on air-to-ground options. Similarly, most of Korea — especially the east — is mountainous, but Elmerick said that doesn't affect training and flying

operations too much: 'A-10 pilots are all trained operating in low altitude, so terrain is always in our cross-check. Most of us have been deployed to mountainous locations like Afghanistan, so they also have some experience in mountainous terrain. Korea is different in that it doesn't have 10-20,000ft mountains like Afghanistan, but it does have its difficult terrain.'

'FIENDLY' RIVALRY

The 25th FS shares Osan with the 36th FS 'Flying Fiends', an F-16C/D Block 40 unit. Lt Col Elmerick said: 'It's fun being here with a squadron like the 36th FS. It is a friendly rivalry and we like to compete.' He said both squadrons come up with combined scenarios where they work together, with the A-10 taking on CAS and taking out air defenses while the F-16s provide top cover.

An 'Assam Draggins' 'Warthog' in its lair at Osan as a crew from the 51st Aircraft Maintenance Squadron removes the GAU-8/A 30mm ammo drum. **All photos Chen Chuanren unless otherwise credited**

A pair of A-10Cs from the 'Assam Draggins' gets airborne from Osan.



A recent drill in Osan involved a 'hot-reloading' of the GAU-8/A 30mm rounds, while the engines were running, in an attempt to achieve a quick turnaround. **USAF/A1C Ilyana A Escalona**



'The US and ROK army all appreciate our mission to protect South Korea, and they all appreciate how focused the A-10 is on the ground mission. We also appreciate the [need for] ground forces to hold the ground and protect our bases — everybody has their part to play. The fact that all of us know their part creates this special relationship between the A-10 pilots and army forces from the two countries.

'Korea is a tight community, and we are the only overseas-based A-10 unit after [the squadron in] Europe closed. With that, it's also a uniting factor; most of the A-10 crew will come to Korea at one point or another in their career, hence there is a shared experience amongst all of us,' he added.

Buddy wing and local collaboration

The USAF and Republic of Korea Air Force (ROKAF) conduct 'Buddy Wing' conceptual operations on numerous occasions across various bases and units on the peninsula. The week-long program sees USAF crews and aircraft cross-deployed to a ROKAF base to exercise. The 25th FS has a particular tie with the ROKAF's 237th Tactical Control Squadron, a CAS unit from Wonju Air Base that flies the Korean Aerospace Industries (KAI) KA-1 Woong-Bee light turboprop attack aircraft.

Elmerick recalled: 'We worked closely with them in 2018 and in the following week we had to divert our A-10s to Wonju due to some issues, and the



A total of 22 A-10Cs are assigned to the 25th FS, most housed in shelters in an area called the 'Dragon's Lair'.



squadron was there to look out for us. It's this kind of relationship that you forge that has real effect.'

Elmerick stressed that it is important to understand how the Korean forces go about their training, and how they employ various tactics and weapons: 'We have different weapons and that drives different tactics — even the same munitions have differing employment and cueing methods when deploying from the A-10 and, for example, from a ROKAF F-16,' he said. 'For example, though slower, the A-10 can carry a wider variety of ordnance compared to other fast jets. The F-16 might have lower endurance, so we might use their bombs first, and we can stick around and attack what is left,' he explained.

Elmerick underscores the importance of forging and maintaining those relations — especially in this tense

Badge: A badge from a recent 'Red Flag' exercise where the 25th FS A-10s simulated 'Red Air' Su-25s.

Below: An impressive 'Elephant Walk' at Osan, led by the 25th FS and including deployed F-16s from the Minnesota Air National Guard. **USAF/TSgt Travis Edwards**

region. Exercise 'Vigilant Ace' is a large annual event that draws the various assets together. The 2017 edition saw some 230 aircraft both locally based and deploying into the region.

Elmerick says: 'The real trick here is to integrate air assets; it can take up a lot of space above the ground fight. So, combining artillery fire with air assets from Korea and the US takes a very skilled planner.'

Being assigned to the Pacific Air Forces, the 'Assam Draggins' are often found on the road in this region. The unit is a regular at 'Red Flag — Alaska' at Eielson AFB, Alaska, and it also took part in Exercise 'Balikatan' in the Philippines in April 2019.

According to Col William Betts, commander of the 51st Fighter Wing, the US forces in Korea clock more flying hours than their counterparts at home. Elmerick said while everyone has differing methods to measure flying hours, his squadron has an advantage as its combat zone is right on the doorstep: 'Here we are always training from Osan, and we have a more stable flying environment and we maximise as much as we can,' he said. 🇺🇸



KEEPING THE 'HOGS' FLYING

Being the only forward-deployed A-10 unit poses its own problems when it comes to maintenance. 'But being the most permanent forward-deployed A-10 unit, our mission's geographical location sets us apart from the rest of the world,' said MSgt Mark Bapp, 51st Aircraft Maintenance Squadron, Production Superintendent. 'Osan's location poses inevitable wait times for delivery of these vital components.'

He said the maintenance units in Osan have developed alternative practices and procedures to ensure the aircraft operates at its highest level of lethality, as various circumstances require unique components.

Bapp said time is always the biggest hurdle when it comes to getting parts to the aircraft. In certain situations, they require Stateside engineers' assistance, and could encounter delays of 12 hours or more just to initiate a request for a solution, due to time-zone differences. Additionally, engineering solutions may require multiple levels of co-ordination to reach a final conclusion.

'Furthermore, specialized testers and equipment may be requested by engineers via satellite to fully diagnose a solution; items we may not normally have on-hand,' Bapp added. 'This equipment is often shared by multiple locations around the world, so efforts to move these items may require direct co-ordination with a maintenance unit located anywhere on the globe.'



One of the notable improvements for A-10C pilots in recent years is the addition of the Scorpion Helmet Mounted Cueing System.



FELON

IMPOSTER OR THE REAL DEAL?

The Sukhoi Su-57 'Felon' was originally conceived in an effort to compete against Lockheed Martin's F-22 and F-35. Initially known as the PAK-FA, its development has progressed at a relatively slow pace – but has it matured as a force to be reckoned with?

REPORT **Alexander Mladenov**



The Su-57's overall configuration suggests that it has been designed to be stealthy in the forward hemisphere only, evidenced by well-exposed engines exhaust sections and nozzles. **Vadim Savitskiy**

THE RUSSIAN MILITARY is bouncing back from years of underinvestment and slow progress. The military supremacy enjoyed by America both numerically and technologically can no longer be taken for granted. Russia's 'Flanker' series may be old, but few doubt the capabilities of its latest variants. The Su-57 'Felon' — its official NATO reporting name announced in October 2019 — is Russia's first stealth fighter, and is an interesting comparison with products from the West, which has been in the 'fifth-generation' fighter game for more than two decades.

Known as the T-50-1, the first of this new generation of Russian fighter aircraft made its maiden flight on January 29, 2010, in Komsomolsk-on-Amur, in the capable hands of Sukhoi's chief test pilot Sergey Bogdan. It marked the beginning of the comprehensive flight-testing effort, which remains in progress. The intervening years have seen a series of technological and budgetary issues, but the project has steadily progressed. Significantly, the so-called first stage of joint state flight-testing was declared complete in July 2017, an important step towards low-rate serial production. The second stage of this complex effort, undertaken by the Russian military with support from Sukhoi, commenced in early 2018 and is ongoing.

However, initial tactical evaluations and instructor training with the Russian Aerospace Forces (VKS) start this year, on what is the largest and most complex development effort ever undertaken in the post-Soviet aerospace industry in Russia.

The Su-57 is also known as the PAK-FA (Perspektivnyi Aviatsionnyi Kompleks Frontovoi Aviatsii — Future Air Complex of Tactical Aviation). It incorporates a significant level of cutting-edge technology including stealthy characteristics, aerodynamics, powerplant design, system integration and weapons. Most of the aircraft's features are highly classified and there are more questions than answers when it comes to its true operational capabilities and performance. It is difficult to evaluate just how successful Sukhoi's world-class designers have been in solving serious challenges posed by an all-new high-performance stealth fighter design, combining extremely high agility and maneuverability with supersonic cruise (supercruise), advanced sensors, sensor fusion and robust multi-role mission capabilities. This fighter has been conceived to meet a complex VKS requirement that includes the ability to undertake deep penetration missions to knock out well-defended, high-value targets, and command the air in high-threat scenarios.



Evaluating the stealth

Sukhoi designers claim that the Su-57's radar cross-section (RCS) is about 30 times smaller than that of a 'Flanker'. Its fuselage is distinctively angular and flattened for RCS reduction, and there is extensive use of radar-absorbing coatings plus enclosed weapons bays.

Sukhoi designers aligned the leading edges of the wings, tailplanes and forward leading-edge extensions to make them parallel to each other. This all points to a reasonably stealthy forward hemisphere that offers tactical advantages in head-on air-to-air and air-to-surface engagements. However, there is little evidence of RCS reduction measures in the rear hemisphere, with well-exposed engine nozzles. In fact, this approach is likely attributed to the Russian concept for low observable design — there's little inclination to trade overall performance with RCS reduction. Instead, Sukhoi has tended to rely on the use of an advanced multi-spectral sensor suite. This approach was conceived to afford better detection capability to counter the potential advantage of other low-observable (LO) platforms such as the F-22.

It is also noteworthy that the Su-57's engines aren't obscured by S-shaped inlet ducts. The existing curvature appears insufficient to completely mask the engine compressors from incoming radar energy. However, the masking could be achieved by adding radar blockers in the inlets, but this aspect of the Su-57's design still remains highly classified.

Super maneuverability

The Su-57 can perform 'Flanker' type post-stall maneuvers, indicating a high level of agility for close-in fighting. Its blended-body aerodynamic configuration features a lift-generating body, fuselage extensions for improving aerodynamic performance at high angles of attack and wings liberally endowed with high-lift devices. There are no fewer than 12 flight-control surfaces, grouped in six symmetrical pairs, augmented by moving engine nozzles for thrust vectoring control. The six pairs of aerodynamic surfaces include all-moving horizontal stabilizers, all-moving vertical tails, ailerons, wing leading-edge flaps, flaperons and wing moving leading-edge extensions.

The nozzles of the widely separated engines can be deflected in two planes, thereby providing effective 3D thrust vectoring, with resultant control forces in pitch, roll and yaw axes — a design solution borrowed from the Su-30SM and Su-35 where the symmetric nozzle deflection is used for pitch control, while asymmetric deflection creates roll and yaw control forces. The 3D thrust-vectoring technology is considered to be a useful feature for retaining accurate control at slow speeds, when aerodynamic control surfaces are rendered ineffective.

According to Sergey Bogdan, flight performance is more or less similar to that of the Su-35. He reports a notable difference in supersonic acceleration — where he claims the Su-57 has no equal. Bogdan has said that the Su-57's acceleration is 'raw and wild'. In addition, he noted that the new fighter features good controlled spin characteristics, with rapid revolutions and a swift recovery.

Supercruising capability

The ability to cruise in dry power and supersonic speed (supercruise) is considered vital in modern fighter design and this is achieved in the Su-57 via two principal design features. For the 'Felon' it's a combination of low drag for a high lift-to-drag ratio in supersonic cruise, combined with a high thrust-to-weight ratio. The Su-57's wide engine installation accommodates rather large and deep weapons bays, affording a 'clean' configuration in all mission modes, with increased-thrust engines and a lightweight airframe using composite materials. The aircraft can optionally carry external stores if required.

The Su-57, in its initial configuration, is powered by a pair of AL-41F-1

Top: According to Sukhoi, the T-50-1 prototype completed its preliminary ground and flight trials campaign by early March 2011, with the lone prototype having amassed 36 sorties. **Sukhoi**

Above left: The Su-57's K-36D-5 ejection seat is the same as that used on the Su-35, featuring so-called 'smart control' of the ejection sequence to increase the chances of pilot survival in complex situations such as low-level inverted flight. **Alexander Mladenov**



afterburning turbofans — an evolution of the AL-31 series of engines powering the Su-27/30 family, developed by NPO Saturn-Lyul'ka and designated as the so-called 'Phase 1' powerplant. Its design is based on the izdeliye 117S engine of the Su-35, with a dry rating of 20,938lb (93kN) thrust while the full afterburner rating is 33,060lb (147kN) thrust.

The definitive Su-57 engine, dubbed izdeliye 30, began flight-testing in December 2017 on the T-50-2 prototype. This is the so-called 'Phase 2 engine', with full-authority digital control, expected to be rated at about 24,220lb (107kN) dry and 37,468lb (166.77kN) at full afterburner. The new engine — expected to be installed on production-standard Su-57s by 2022 at the earliest — is lighter, more powerful and includes a reduced number of components. In addition, the Su-57 uses variable-area intakes for optimum performance in both

Above: The T-50-3 prototype is being used for manned-unmanned teaming trials with the S-70 Okhotnik ('Hunter') jet-powered stealth-design unmanned aerial vehicle. **Alexander Mladenov**

Right: The T-50-1 prototype approaching the factory airfield in Komsomolsk-on-Amur on completion of its maiden flight on January 29, 2010, in the capable hands of Sukhoi's chief test pilot, Sergey Bogdan. **Sukhoi**

supersonic and subsonic regimes of flight, hitting Mach 2.0 and above.

Sensor fusion

The Su-57 features the brand new NIIP Tikhomirov N036 Byelka modular multi-band radar system, also known as Sh121. This integrates three principal modules — one being the nose-mounted X-band

active electronic scanning array (AESA) radar. This is augmented by a second module, also working in the X-band, which employs a pair of side-looking antennas just aft of the nose antenna, designed to expand the system's angular coverage in azimuth. The third element is a pair of L-band phased-array antennas built into the wing leading-edge extensions, intended to endow the Su-57 with enhanced detection performance against stealth aircraft, as well as for identification friend or foe (IFF) purposes.

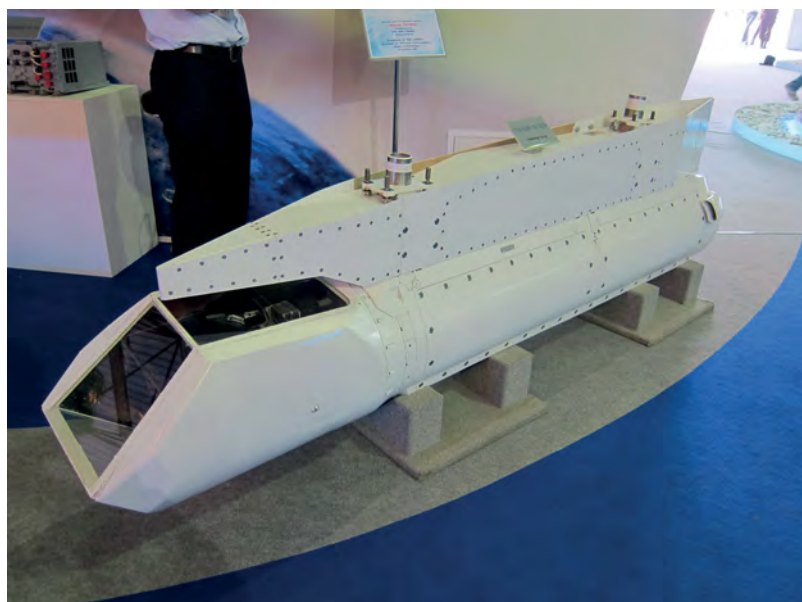
Stealth technologies fielded in Western fighters are mostly tailored to counter airborne and ground-based radars operating in the X-band; as a consequence, LO characteristics are deemed less effective when pitted against L-band airborne radars. This could be also regarded as an attempt to compensate for the Su-57's apparently higher RCS compared with that of the F-22 and F-35, which would facilitate extended-range detection of these fighters.

The infrared search-and-track (IRST) sensor suite is integrated with the Su-57's



Sukhoi's chief test pilot Sergey Bogdan completed a demonstration of a short landing roll with early opening of the twin brake parachutes at the MAKS 2019 airshow, in front of Vladimir Putin. **Alexander Mladenov**





weapons control system, and it includes the 101KS-V targeting system installed in the nose as well as 101KS-U ultraviolet missile approach warning sensors under the nose and built into the rear fuselage, along with an 101KS-O electro-optical jammer. A navigation/targeting pod, dubbed 101KS-N, can also be carried in uncontested strike missions when stealth performance is not required.

The Su-57 also features the L402 Gimalay integrated electronic warfare (EW) system, but no specific information has been released yet about its components and real operational capabilities.

Weapons for all occasions

The Su-57 features centerline weapons bays capable of housing up to four K-77M

medium-range active radar-guided missiles (also known as the RVV-SD) for beyond-visual-range engagements, while two short-range K-74M2s (RVV-SD) are accommodated in side bays in the underwing fairings. In 2018, it was further revealed that the 'Felon' can also use the K-37M (RVV-BD) long-range air-to-air missile, capable of engaging targets at up to 110nm (200km) distance in head-on attacks. The tandem internal bays between the engines can also house large-size air-to-surface and anti-ship missiles as well as large guided bombs.

When stealth is not required, the Su-57 can carry missiles and bombs on at least four underwing pylons plus two more under the engine trunks. In these missions the aircraft is advertised as being

Above clockwise: T-50-9 carrying a camera pod designed to record missile launches during testing. **Vadim Savitskiy**

The UOMZ 101KS-N navigation/targeting pod is designed to be carried on strike missions when stealth is not required. **Alexander Mladenov**

The antenna array of the NIIP Tikhomirov NO36 radar, also known as Sh121. **Alexander Mladenov**

capable of delivering heavy warloads of up to 11,000lb (5,000kg). In March and April 2016, the T-50-2 prototype was spotted involved in aerodynamic flight trials carrying six distinctly old-fashioned OFAB-250-270 freefall fragmentation/high-explosive 'dumb' bombs.

It also features the proven 30mm GSh-30-1 single-barrel cannon as used on the Su-27/35 and MiG-29, albeit in a vastly improved version dubbed the 9-A1-4071K. It is installed starboard, with the barrel protruding adjacent to the cockpit, and is provided with 150 rounds.

The air-to-surface precision-guided arsenal includes the newly developed Kh-38 modular missile that uses a variety of guidance packages, plus the Kh-58USHK long-range anti-radar missile optimized



for internal carriage (with maximum range of 132nm [245km]) and two new versions of the Mach-3 Kh-31 missile. The Kh-31AD, intended for use against ships, is outfitted with an active radar seeker and has a maximum range of 86nm (160km), while the Kh-31PD is designed for knocking out radars, with a passive radar seeker and maximum range quoted as 135nm (250km). The Kh-35U is another anti-ship missile touted for the Su-57, with range of up to 140nm (260km).

There is also a range of guided bombs with laser, TV and satellite guidance systems set to be incorporated into the Su-57, such as the 550lb (250kg) KAB-250 and the 3,306lb (1,500kg) KAB-1500. In 2019,

the Tactical Missiles Corporation showed to the public two brand new guided bomb types with satellite/INS guidance packages, which can be carried by the Su-57. The first of these is the K08BE, weighing 1,113lb (504kg) and the second one is the K029BE, weighing 3,361lb (1,525kg). Boris Obnosov, director general at the Tactical Missiles Corporation, hinted in August 2018 that his company could start developing new-generation guided bombs weighing 220lb (100kg) and possibly 110lb (50kg) for the 'Felon'.

The Su-57 is also set to use new-generation, special-purpose unguided bombs such as the 1,100lb (500kg) OFZAB-350 (outfitted with a high-

Above: The Su-57 uses a blended-body aerodynamic configuration, including a lift-generating body, complemented by fuselage extensions and high-lift leading-edge flaps on the wing. **Vadim Savitskiy**

Below: The fourth flying prototype, T-50-4, took to the air in December 2012. **Sukhoi**

A DOOMED INDIAN PARTNERSHIP

The PAK-FA was set to be used as a basis for the development of an international T-50 version, undertaken in partnership with India. An intergovernmental agreement on the international version was formalized in 2007. Then a tripartite contract, inked in December 2010 by Sukhoi, Hindustan Aeronautics Limited (HAL) and Russia's arms export monopolist Rosoboronexport, it covered a preliminary development effort for an advanced multi-role fifth-generation fighter, designated by India as the Fifth Generation Fighter Aircraft (FGFA).

The program was valued at \$295 million and set at 18 months. It was initially expected that the eventual number of FGFA's ordered for India would reach between 250 and 300 aircraft — with a potential purse of \$25 billion. The FGFA development effort was originally planned for completion by 2016 or 2017, while induction into Indian Air Force (IAF) service was to take place by 2020. In fact, the ambitious program began stagnating during 2012, with little progress and never-ending negotiations between the partners for more than five years. The Indian side expressed a requirement to participate in aircraft testing as well as in the development of certain systems, in a bid to raise the level of its technology competence not forthcoming in a straight purchase.

By 2014, high-ranking Indian military representatives were expressing dissatisfaction with the engine performance and low-observability characteristics of the T-50 as well as with the weapons and the project timeframe. In February 2016, it was revealed that Russia and India had at last reached a general agreement on a significant cost reduction for the FGFA program. However, in April 2018, the Indian government was considering its withdrawal from the FGFA program, while sources in Moscow still preferred to remain silent. In August that year, Dmitry Shugaev, the head of Russia's federal service of military-technical co-operation — the country's arms export control body — publicly acknowledged that the FGFA project had been shelved. No further news has been forthcoming and the plan appears to have been completely abandoned.

“ Sukhoi designers claim that the Su-57's radar cross-section is about 30 times smaller than that of a 'Flanker'





explosive/fragmentation/incendiary warhead) and the ODAB-500PMV with a thermobaric warhead.

Flight-test progress

According to Sukhoi, preliminary ground and flight trials were completed in early March 2011 using the T-50-1 prototype, which amassed 36 sorties. This included evaluation of stability and controllability performance as well as some other important characteristics while expanding the speed, altitude and g-load limits.

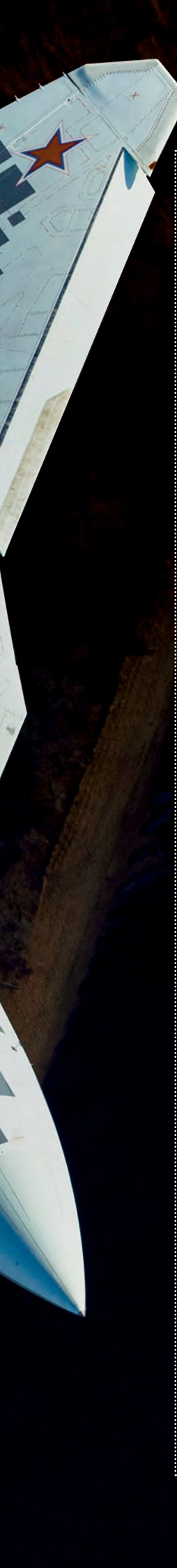
The second flying prototype, T-50-2, took to the air for the first time in March 2011, while the third one, T-50-3, followed in November and, after a series of initial

test flights in Komsomolsk-on-Amur, it was transported by air to Sukhoi's main test base in Zhukovsky, near Moscow, on December 28, 2011, to continue system testing and evaluation. T-50-3 was the first example to be equipped with N036 AESA radar in addition to a pair of 101KS-U IRST sensors under the nose and on the tail boom; it also sported three UV-50 chaff/flare dispensers built into the rear fuselage.

The fourth flying prototype, T-50-4, took to the air in December 2012, while the fifth, T-50-5, followed in October 2013. These aircraft were used for avionics and sensor testing, outfitted with many components of the integrated avionics suite otherwise lacking in T-50-1/2.

Above: The infrared search-and-track (IRST) is integrated with the Su-57's weapons control system, as are ultraviolet missile approach warning sensors under the nose and rear fuselage, along with an electro-optical jammer.
Vadim Savitskiy

Right: This is the ill-fated T-50S-1, the first production-standard 'Felon' for the VKS, lost in its first post-assembly test flight on December 24, 2019. The fighter, seen here in final assembly at the KnAAZ plant, was included in the order for two production-standard Su-57s, placed in August 2018.
Via Russian internet



Sukhoi's former chief, Mikhail Pogosyan, said the initial effort was designed to achieve preliminary approval from the Russian military authorities to confirm the fighter performed as expected, allowing for the test effort to proceed into the next stage — joint state-testing, undertaken jointly with the air force at its 929th State Flight-Test Center in Akhtubinsk.

It is here that serious technical issues were encountered. The most serious was with T-50-5, which sustained extensive damage in a fire immediately after landing at Zhukovsky on June 10, 2014. This aircraft was subsequently rebuilt using the fuselage originally constructed for the T-10-6. Receiving the new designation T-10-5R, the fifth prototype returned to the air in its new guise in October 2015.

T-10-6 was then completed with new components. As a result it was significantly delayed and didn't fly for the first time until the end of April 2016, while T-50-8 followed in November the same year.

Overall, 2017 was a productive year for the program, with T-50-9 flown in April 2017, followed by T-50-11, which flew in August that year. The last prototype for state testing — T-50-10 — flew at Komsomolsk-on-Amur in December 2017. It is noteworthy that the T-50-10 was delivered in a configuration said to be production-standard.

In 2018, the Su-57's development and testing effort continued at pace. According to Russian industry and trade minister, Denis Manturov, who spoke to reporters in January that year, flight-testing of the definitive Su-57 version — powered by the new izdeliye 30 engines (flown for the first time on T-50-2 on December 5, 2017) — was set for completion in three years. By December 2019, the new engine was reported to have completed 16 flights on the T-50-2.

VKS begins Su-57 purchases

As a result of the various testing delays, the number of production-standard aircraft ordered under Russia's State Armaments Program 2020 was to be reduced from 52 to just 12 aircraft. This figure was deemed sufficient to equip one instructor/research squadron at Lipetsk. This initial order was further reduced to two aircraft, and eventually placed in August 2018, with deliveries slated for late 2019 and early 2020. In fact, the first of these aircraft, known as the T-50S-1 (c/n 51001), was lost during a factory test flight on December 24, 2019, due to a flight control system failure.

The aircraft hit the ground some 60nm (111km) north of Komsomolsk-on-Amur, with factory test pilot Alexey Gorshkov ejecting safely.

The sharp cut in initial procurement was most likely caused by the unsatisfactory flight performance exhibited by the early aircraft. Instead, the Russian military decided to wait for the introduction of the more powerful 'second-stage' engines.

Unexpectedly, a large Su-57 order came in June 2019, mainly due to Russian President Vladimir Putin's personal intervention. He said the large 'Felon' order had become possible thanks to a significantly reduced unit price, promised by United Aircraft Corporation (UAC), the parent company of Sukhoi. According to the Russian daily newspaper *Kommersant*, the order for 76 Su-57s was valued at about \$2.8 billion, with all aircraft to be delivered by 2028.

These Su-57s, to be powered with a mixture of AL-41F-1 and izdeliye 30 engines, are deemed to be sufficient for equipping three fighter regiments, each fielding 24 aircraft in two squadrons. Four more examples are to be taken on strength by the combat training center in Lipetsk, to be used for conversion training and tactics development work.

This large indigenous order is a major shot-in-the-arm for the Su-57. Despite a decade of test and development work, the aircraft still has a long way to go to achieve its full potential, but Putin realized the procrastination of the Russian ministry of defense couldn't continue. To make meaningful progress, the VKS needed to get behind its new stealth fighter in order to develop greater operational understanding and experience. This will likely combine with

COMBAT TESTING IN SYRIA

On May 25, 2018, the Russian minister of defense Sergey Shoigu disclosed the nature of the testing undertaken by the Su-57 in operations in Syria. He said that during a three-day spell at Khmeimim air base in Syria, two Su-57s were valued in a combat environment. The sketchy briefing was accompanied by a brief video showing a T-50 prototype launching a cruise missile, but there was no confirmation that this specific footage originated from the Syrian campaign.

The Su-57's much-touted deployment to Syria between February 21-23, 2018, involved prototypes T-50-9 and T-50-11, operated by the 929th State Flight-Test Center at Akhtubinsk. The two prototypes were accompanied by flying laboratories, which monitored weapons events. Footage released by the Russian ministry of defense showed a Su-57 launching a test round appearing to be a new Raduga Kh-59MK2 long-range air-to-surface missile.

In December 2019, the Russian chief of the general staff of the armed forces, Gen Valeriy Gerasimov divulged that Su-57 prototypes underwent a second combat testing campaign in Syria in 2019.

a stream of upgrades and refinements as the VKS builds corporate knowledge of the 'Felon', so that it can start down the path of building operational credibility. 🛩️





Combat Aircraft Journal reports from MCAS Miramar as VMFA-314 becomes the first F-35 unit at the San Diego base.

REPORT **Jamie Hunter**

ONCE KNOWN AS 'Fightertown' in its US Navy heyday, MCAS Miramar, California, is today home to the 3rd Marine Air Wing (MAW). The F/A-18 Hornet has dominated here since the navy moved out, but now the first Lightning IIs have arrived as VMFA-314 'Black Knights' returned home following transition to the F-35C at NAS Lemoore, California. The squadron is the first US Marine Corps unit to fly the carrier variant of the F-35, its initial

aircraft arriving at Miramar on January 21, 2020. 'It should be no surprise that VMFA-314 is once again leading the way into the next generation of fighter attack aircraft,' commented Lt Col Cedar Hinton, commanding officer of VMFA-314.

The unit was commissioned in 1943 at MCAS Cherry Point, North Carolina, and in 1952 it became the first squadron in the 3rd MAW to transition to jets as it received F9F Panthers. In 1957, the squadron was named 'Black Knights' as it switched to the F4D Skyray. It went on to fly F-4 Phantom



Left: From left to right, Col Scott M. Koltick, commanding officer of Marine Aircraft Group 11, Lt Col Cedar Hinton, and Maj Gen Kevin M. Iiams, commanding general of 3rd MAW. **USMC/Sgt Dominic Romero**

Below: VMFA-314 is the US Marine Corps' first unit to be equipped with the F-35C carrier variant.

US Navy/LCDR Darin Russell

Left: Lt Col Cedar Hinton, the commanding officer of VMFA-314, arrives at MCAS Miramar on January 21. **USMC/Sgt Dominic Romero**

IIIs and Hornets, before relinquishing its last F/A-18s in 2019 to transition to the F-35C.

Hinton said the F-35C 'will give the 'Black Knights' a technological advantage across the entire spectrum of tactical aviation.' He added, 'This includes everything from advanced sensor and weapon integration to increased range and endurance. We will be more survivable and more lethal than we have ever been.'

While the USMC has operated the F-35B for several years, this is its first F-35C unit, and one of three F-35 squadrons in the

3rd MAW, which also takes in MCAS Yuma, Arizona. VMFA-314 spent the latter part of 2019 at Lemoore completing squadron-wide F-35C qualifications. This ensured the squadron was equipped with the required personnel to implement the maintenance and safety programs necessary for an operational F-35 squadron. The squadron has not yet received its 'safe for flight' rubber stamp, but it is expected to complete carrier qualifications soon. It will later join a US Navy carrier air wing as a core component and is one of four marine squadrons set to fly the F-35C. The four

units will each receive a complement of 10 jets to be stationed at Yuma, Beaufort in South Carolina, Cherry Point and Miramar. The next 3rd MAW squadron set to transition from the F/A-18 is VMFA-225 'Vikings', which made its final F/A-18D flight in January and is now transitioning to the F-35B, to become Miramar's second Lightning II unit.

Hinton concluded, 'We are all extremely excited to ensure the 'Black Knights' continue our legacy of leading from the front as we deliver this new capability to [the] 3rd MAW.' 🇺🇸

'BLACK KNIGHTS' BACK IN THE GAME



'THUD' OUT



Combat Aircraft Journal looks back at the final days of the US Air Force's F-105 Thunderchief, and one very special farewell event at Hill AFB.

REPORT AND PHOTOS **Lindsay Peacock**

ON A BITTERLY cold Utah day in February 1984, just three Republic F-105Fs were all that remained of the US Air Force's once huge Thunderchief fleet, one that at its peak numbered in excess of 800 aircraft. Hill AFB near Salt Lake City was the 'Thud's' final operating location with the 419th Tactical Fighter Wing (TFW) of the Air Force Reserve (AFRes).

Entering service in August 1958, the F-105's operational career has been

well documented in *Combat Aircraft Journal* and enshrined in tomes such as *Thud Ridge* and *100 Missions North*. Suffice to say that the Thunderchief was often likened to the ugly duckling that eventually became a swan. It was certainly among the finest of the celebrated 'Century Series' of US fighters in terms of combat exploits during the Vietnam War. That conflict exacted a heavy toll on both man and machine and was largely responsible for a dramatic change in pilot attitudes

towards the Thunderchief. These underwent a remarkable transformation, the once derogatory appellation of 'Thud' eventually becoming a term of great affection and pride.

Up close with the 'Thud'

My first encounter with the Thunderchief occurred during a school trip to Germany's Rhine Valley in the early 1960s. Aircraft tearing overhead at low level on missions from Bitburg and Spangdahlem were a daily sight and greatly enlivened an otherwise rather tedious visit. My initial awe was later reinforced at open house events at USAF bases in the UK, which usually featured examples of most of the 'Century Series' — the F-100 Super Sabre, F-101 Voodoo, F-102 Delta Dagger and F-104

Flying alongside the KC-135 tanker during the final official mission is F-105F serial 63-8309 piloted by Maj Barry Wytttenbach.



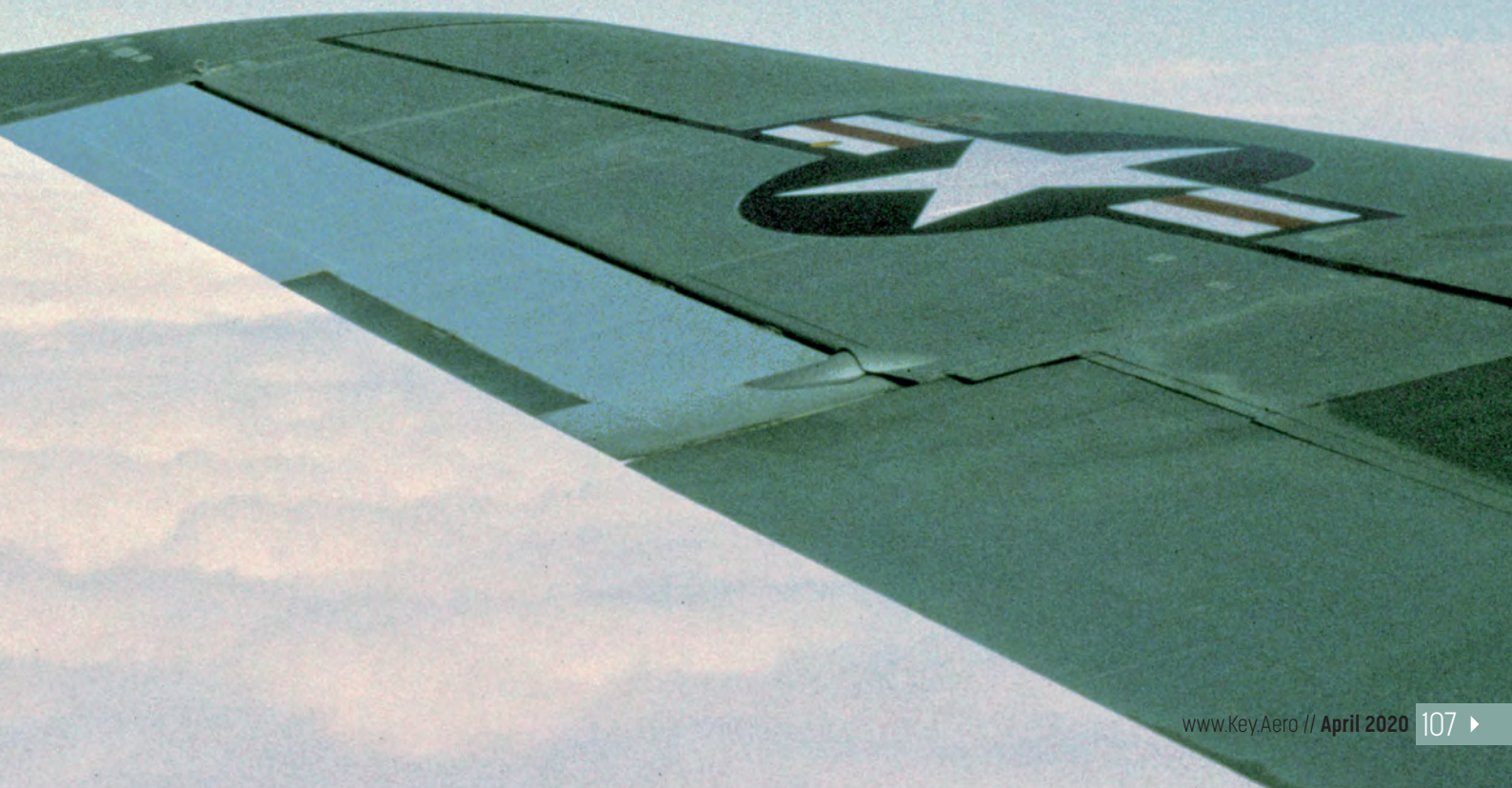
Starfighter were regulars and could all be seen in Europe. Standing head and shoulders above all of them, the F-105 was a most impressive aeroplane and I never imagined that I would one day find myself climbing the access ladder to take a seat in the cockpit. It was a handsome beast as well, especially in a pre-camouflage era when USAF combat aircraft still wore colourful unit insignia and had yet to don drab battledress.

Two decades and several visits to the US later, my passion for the Thunderchief remained undimmed. Indeed, it had been greatly reinforced as a consequence of media flights in F-105F two-seaters assigned to the Georgia ANG at Dobbins AFB and the Air Force Reserve outfit at Hill. Those sorties gave me a much greater appreciation of just how special the 'Thud' really was.

When I heard the 419th TFW was planning a formal retirement event, I knew I just had to be there. It was a 'no-brainer', to use the modern idiom.

Final Hill encounter

So it was that I found myself going for a snowy weekend in Utah. Flying via San Francisco to Salt Lake City, I collected a hire car and headed north to Ogden and a very chilly Hill AFB. On my previous visit, in October 1983, the 419th had still possessed a reasonable complement of jets, predominantly consisting of single-seat F-105Ds plus a quartet of two-seat F-105Fs. It was in one of the latter (serial 63-8287) that I experienced a truly exhilarating flight over the training areas to the west of Hill in company with a pair





of F-105Ds. Now, in February 1984, all the F-105Ds had departed, save for one that was earmarked for static display. All that remained were three F-105Fs and it was these that would have the honour of performing the last rites for America's 'Thuds'.

The personnel of the 419th TFW were evidently determined to see their

precious 'Thuds' go out in style, with a full program set for the retirement day including a formal banquet in the evening attended by distinguished guests and many combat veterans. For the final mission, they had arranged for three notable former pilots to occupy the rear cockpits of the three aircraft. Lt Col James Webster

would lead the formation in 'Thud 01' (63-8287), with Col Tom Coady as his passenger. Coady's claim to fame was the greatest number of combat hours in the Thunderchief, having surpassed the 1,000-hour mark. The other two aircraft both carried Medal of Honor recipients, namely Merlyn Dethlefsen in 'Thud 02' (63-8261) piloted by Maj Frank Bernard, and Leo Thorsness in 'Thud 03' (63-8309) in the hands of Maj Barry Wyttenbach. During the mission, one last rendezvous would take place with a KC-135 Stratotanker, each recipient taking on about 2,000lb of fuel. I was fortunate enough to be one of the passengers allowed aboard that KC-135 for the final refuelling encounter.

While we were airborne, those on the ground at Hill attended the dedication of a permanent memorial to all USAF personnel who lost their lives while flying the F-105 between January 1961 and August 1981. This ceremony involved F-105D serial 62-4347 — which had accumulated no fewer than

Left: F-105D serial 62-4347 was displayed at Hill AFB — it had accumulated no fewer than 6,730.5 flight hours, making it the high-time Thunderchief.

Below: The final F-105s of the 466th Tactical Fighter Squadron on a snowy flight line at Hill AFB in February 1984.





6,730.5 flight hours, making it the high-time Thunderchief by a considerable margin. Accepted by the USAF on July 22, 1963 and making its final flight just over two decades later on October 3, 1983, 62-4347 was one of just seven particularly hard-worked F-105s that had racked up in excess of 6,000 flight hours. The airframe was still to be seen at Hill for several years, but it appears to have been removed and disposed of around 2010.

Fortunately, we were back on the ground in time to witness the recovery of the final three-ship of

these magnificent 'fighters.' This, not surprisingly, involved several high-speed passes by all three Thunderchiefs before 63-8287 became the last to land and return to its parking slot on the flight line. A few days later, on March 10, 1984, this same aircraft made the last Thunderchief flight of all when it was ferried to Chanute AFB, Illinois, where it remained until the recent threat of being scrapped. Luckily, despite some deterioration, it was reprieved at the 11th hour and is now being looked after by the Aviation Museum of Kentucky at Lexington. 🙏

Above: The last flight for the retirement ceremony was completed by three two-seat F-105Fs.

Right: Lt Col James Webster at the controls of 63-8287 as he drops back from the boom after receiving fuel.



CUTTING EDGE

DISPATCHES FROM THE FRONT LINE
OF AEROSPACE TECHNOLOGY

BY DAVID AXE

US NAVY'S P-8 POSEIDON IS LOOKING MORE AND MORE LIKE A BOMBER

THE US NAVY wants to arm its Boeing P-8 Poseidon maritime patrol aircraft with new anti-ship missiles, plus precision-guided bombs, mines and aerial decoys.

If the fleet follows through on the plan, the navy will acquire its first new bomber aircraft in generations. Arguably the service's last true bomber was the Grumman A-6 Intruder, withdrawn in the late 1990s.

But just because the sailing branch *equips* the P-8 as a bomber doesn't necessarily mean it will use it as a bomber.

The jet-propelled P-8, which rapidly is replacing older, propeller-driven P-3s in navy squadrons, already carries anti-submarine torpedoes, Harpoon anti-ship missiles and Standoff Land-Attack Missiles — Expanded Response, or SLAM-ERs.

But now the navy wants to add Long Range Anti-Ship Missiles (LRASM), Joint Direct Attack Munitions (JDAM), Small Diameter Bombs (SDB), Mk62/63/65 mines and Miniature Air-Launched Decoys (MALD). The fleet announced the addition in a February 2020 solicitation to industry.

The new weapons would greatly expand the kinds of targets the P-8 can attack. The Poseidon is based on the 737NG airframe with a new wing, military sensors and communications as well as an internal weapons bay and wing pylons for munitions.

With its current loadout, the P-8 can strike ships and land targets more than 150 miles away plus submarines at shorter distances. Adding LRASM would extend the Poseidon's striking range to greater than 200 miles for sea targets.

JDAM and SDB, while more limited in range than SLAM-ER, would give P-8 crews the option of striking coastal installations and supporting ground troops in lightly defended airspace. The addition of an air-launched decoy could improve the P-8's survivability against enemy air defenses.

The navy typically uses its planned fleet of at least 177 Poseidons for maritime patrol, anti-submarine warfare, anti-ship strikes and overland surveillance using a secretive, underslung radar.

Perhaps most notably, US Navy P-8s were part of NATO's response after Russia in October 2019 sortied eight submarines at one time into the cold waters of the Barents and Norwegian Seas — a major surge in Russian undersea deployments that drew comparisons to the Cold War.

Between October 25 and November 7, 2019, the NATO aircraft flew more than 40 missions monitoring the eight Russian boats. Six Royal Norwegian Air Force P-3s, four US Navy P-8s and a Royal Canadian Air Force CP-140 flew from Andøya in Norway. At least one additional P-8 flew from Keflavík in Iceland. A French Navy Atlantique 2 patroller staged from Prestwick Airport in Scotland.

Amateur flight-trackers followed the patrol aircraft as they flew hundreds of miles into the North Atlantic to fly racetrack patterns over the apparent locations of Russian submarines. The patrollers use their radars, sonobuoys and magnetic detectors to find subs on and below the waves.

Anti-submarine warfare will likely continue to be the P-8's main role even if the type gains new munitions. It would take major doctrinal changes for the navy routinely to deploy P-8s in the overland direct-attack role that most people usually associate with bombers.

The US fleet hasn't developed tactics for employing the P-8 as a true bomber. Nor is the relatively lightly built P-8 necessarily suited for hard flying in dangerous environments.

But in adding new munitions, the navy could make the P-8 better at what it already does. And

it's worth noting that the Poseidon does handle at least one important overland mission. The AN/APS-154 Littoral Surveillance Radar System (LSRS) transforms the P-8 into a surface-surveillance platform similar to the US Air Force's E-8 airborne battle management and command and control platform.

It's not hard to imagine a section of P-8s — one with the APS-154 and another with JDAMs or SDBs — working together to detect, track and destroy lightly armed enemy ground forces on a coastal battlefield.

In adding weapons to the Poseidon, the navy in some ways merely is maintaining existing capabilities.

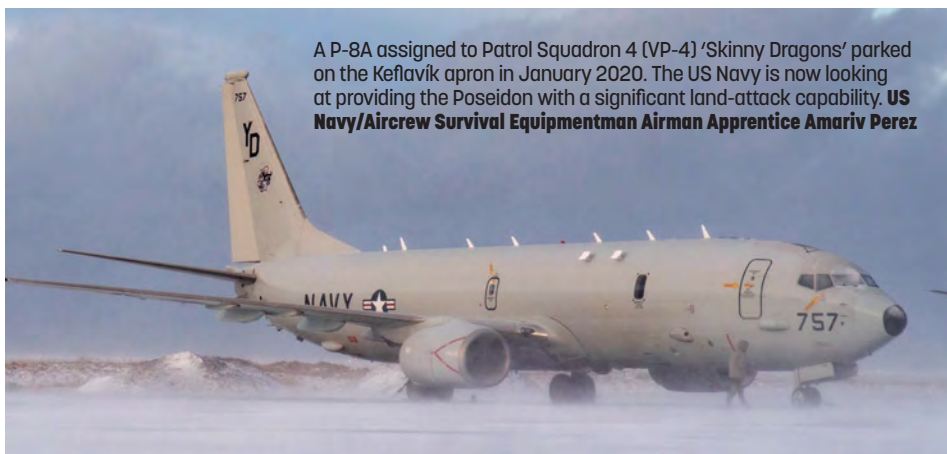
The patrol version of the P-3, which has served since the 1960s, is on schedule to leave the fleet in 2023. The navy over the decades has added a wide range of weapons to the P-3 including torpedoes, anti-ship and land-attack missiles, unguided rockets, cluster bombs and even Maverick anti-armor missiles.

Other countries have planned or completed similar modifications to their maritime patrol aircraft. The Royal Air Force in the early 2000s weighed adding land-attack cruise missiles to its planned fleet of Nimrod MRA4 patrol aircraft.

But London canceled the Nimrod in 2010, leaving the RAF without a maritime patroller until the first of a batch of nine new P-8s arrived in the United Kingdom in early 2020. It's unclear whether the RAF plans to add to its Poseidons the same weapons the US Navy wants to add to its own aircraft.

The French Navy meanwhile has modified some of its twin-prop Atlantic 2s to carry laser-guided bombs. ☛

“Anti-submarine warfare will likely continue to be the P-8's main role even if the type gains new munitions. It would take major doctrinal changes for the navy routinely to deploy P-8s in the overland direct-attack role



BACK ISSUES

Complete your collection with our range of back issues.



099/20

TO ORDER

VISIT

www.keypublishing.com/shop

CALL

UK: 01780 480404

Overseas: +44 1780 480404



*P&P free on all UK + BFPO orders. Overseas charges apply.

WIN! 1 OF 5 PAIRS OF TICKETS TO

ROYAL AIR FORCE
COSFORD AIR SHOW
SUNDAY 14TH JUNE 2020

On Sunday 14th June, the RAF Cosford Air Show will once again be bringing thousands of families, veterans and aviation enthusiasts together to commemorate the 80th anniversary of the Battle of Britain, the 75th anniversary of VE Day and the exciting theme of Fighter Meet 2020 will demonstrate the evolution of air defence aircraft over the last century. With six hours of flying displays as well as exhibitions and static displays on the ground, it offers a full day of entertainment for all ages.

To enter this fantastic competition, simply visit

www.combataircraft.keypublishing.com/competitions and fill in the online competition entry form

082/20

Alternatively, send your name, address and e-mail (if you have one) to:
RAF Cosford Air Show Ticket Competition, Combat Aircraft Journal April Issue, Key Publishing, PO Box 100, Stamford, Lincolnshire, PE9 1XQ, UK.

Didn't win or want to know more? Visit www.cosfordairshow.co.uk

Closing Date 1st May 2020. Winners notified by 8th May 2020. Travel and accommodation costs are not included in the prize. The winner will be drawn at random from all correct entries received by the competition closing date. There is no cash prize alternative and the Editor's decision is final. No purchase necessary



THE TWO-SEAT 'HOG'



Photographed at Edwards AFB in November 1983, the YA-10B is seen returning from a mission after the night/adverse weather study had been canceled. **Michael Grove**

ORIGINAL FAIRCHILD REPUBLIC A-10A Thunderbolt IIs had no night or bad-weather capability, so in April 1978 the US Air Force and Fairchild worked together to modify serial 73-1664 to A-10 N/AW (Night/Adverse Weather) configuration. The work consisted of rebuilding the forward airframe to accommodate a second cockpit that was equipped with dual controls. The canopy was changed from the clamshell to a side-opening type, and a large fairing was added to house additional avionics. A forward-looking infrared (FLIR) was added, as well as a low-light-level television (LLTV), plus a laser ranging device, terrain following radar, radar altimeter, and an electronic moving map display. The FLIR and laser ranger were housed in an external pod mounted on station six (the center fuselage station). The terrain following radar

was also housed in an external pod on station four (center wing closest to the left main landing gear). The vertical stabilizers were also rebuilt with a 20in (50cm) extension and the aircraft retained the GAU-8/A Gatling gun but with a reduced capacity of 750 rounds.

On May 4, 1979, the A-10 N/AW was delivered to the air force for testing, which began on October 23 at Edwards AFB, California, with a total of 48.6 hours completed during 28 missions, a third of which were flown at night. This was completed on December 4, 1979.

Although the program was successful, it was canceled because of other advances in night attack and the A-10 N/AW was subsequently redesignated as the YA-10B in the early 1980s.

The USAF investigated conversion of a number of A-10As into two-seat training aircraft, but this was also abandoned. 🚫

NEXT MONTH

MAY ISSUE: ON SALE GLOBALLY FROM APRIL 2

(ON SALE DATE MAY VARY BY REGION)

SHEPPARD'S STUNNING TRAINERS

PLUS

- Mi-24 'Hind' in detail
- European industry breaking through in the US
- Leonardo's fighter-attack M346FA



Katsuhiko Takunaga/DAC

EDITORIAL AND DESIGN

Editor: Jamie Hunter

Editorial Team: Thomas Newdick, Ben Dunnell, Tom Kaminski, Khaleem Chapman

Design: Dominique Maynard

Special Correspondents: David Axe, Rick Burgess, Ted Carlson, Giovanni Colla, Richard Cooper, Joe Copalman, Frank Crébas, James Deboer, Brad Elward, Jim Haseltine, Jon Lake, Ioannis Lekkas, Andreas Rupprecht, Warren E. Thompson, Scott Wolff

Editorial Address:

Combat Aircraft, Key Publishing Ltd,
PO Box 100, Stamford, Lincs, PE9 1XP

Tel: +44 (0)1780 755131

E-mail: jamie.hunter@keypublishing.com

Web site: www.key.aero

Editorial Contributions: The Editor is pleased to receive contributions to Combat Aircraft in the form of articles, news stories, letters and photographs. Items accepted will be retained and paid for at standard rates on publication. Material sent to the Editor, whether commissioned or freely submitted, is provided at the contributor's own risk; Key Publishing Ltd cannot be held responsible for loss or damage howsoever caused. The opinions and views expressed by authors and contributors within Combat Aircraft are not necessarily those of the Editor or Key Publishing Ltd.

ADVERTISING

Sales Executive: Ian Maxwell

Production: Debi McGowan, Kay Townsin
For all aspects of advertising in *Combat Aircraft* Magazine se contact Ian Maxwell:

Tel: +44 (0)1780 755131

E-mail: ian.maxwell@keypublishing.com

SUBSCRIPTIONS, BINDERS AND BACK ISSUES

US/Canada Combat Aircraft

International Media Service, PO BOX 866, Virginia Beach 23451

Tel: +1 757 428 8180 (Toll Free for US and Canada)

E-mail: CS@imsnews.com

Website: www.imsnews.com

UK/Europe/RoW Combat Aircraft

Subscriptions Department
Key Publishing Ltd, PO Box 300, Stamford, Lincolnshire, PE9 1NA, UK.

Tel 01780 480 404, (from UK), +44 1780 480 404 (from outside UK).

Email: subs@keypublishing.com

Website: www.keypublishing.com/shop

Magazine Binders & Back Issues:

Available from our UK Subscriptions office

PUBLISHING

Production Manager: Janet Watkins

Head Of Design: Steve Donovan

Head Of Advertising Sales: Brodie Baxter

Head Of Distance Selling: Martin Steele

Head Of Circulation: Ann Saundry

Head Of Finance: Wilma Digby

Chief Digital Officer: Vicky Macey

Chief Customer Officer: Gaynor Hemingway-Gibbs

Chief Content & Commercial Officer: Mark Elliott

Group CEO: Adrian Cox

Combat Aircraft is published 12 times a year by:

Key Publishing Ltd, PO Box 100, Stamford, Lincs, PE9 1XP

Tel: +44 (0)1780 755 131 **Fax:** +44 (0)1780 757261

Registered Office:

Unit 1-4, Gwash Way Ind Est, Ryall Road, PE9 1XP

UK: **ISSN 2041-7489** US: **ISSN 2041-7470**

Printed at: Acorn Web Offset Ltd., Normanton, UK.

Distributed: US/Canada:

Enquiries Line 001 973 939 7213

UK/Europe/RoW: Seymour Distribution Ltd, 2 Poultry Avenue, London. Enquiries Line +44 (0)20 3148 3333

Combat Aircraft, ISSN 2041-7489 (USPS 25428), is published monthly by Key Publishing Ltd, PO Box 300, Stamford, Lincolnshire, PE9 1NA, UK.

The US annual subscription price is \$69.90. Airfreight and mailing in the USA by agent named WN Shipping USA, 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA.

Periodicals postage paid at Jamaica NY 11431.

US Postmaster: Send address changes to Combat Aircraft, WN Shipping USA, 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA

Subscription records are maintained at Key Publishing Ltd, PO Box 300, Stamford, Lincolnshire, PE9 1NA, UK.

Air Business Ltd is acting as our mailing agent.



SUBSCRIBER
EXCLUSIVE

COMBAT
AIRCRAFT

© Key Publishing Ltd 2020

All rights reserved. No part of this magazine may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without prior permission in writing from the copyright owner. Multiple copying of the contents of the magazine without prior written approval is not permitted.

We are unable to guarantee the bona fides of any of our advertisers. Readers are strongly recommended to take their own precautions before parting with any information or item of value, including, but not limited to, money, manuscripts, photographs or personal information in response to any advertisements within this publication.

Royal Air Force Annual Review 2020

NEW



 **ROYAL
AIR FORCE**



008/20

The Official RAF Annual Review 2020 has been produced by Key Publishing with exclusive access to the Royal Air Force, and featuring articles written with and by RAF personnel. This 132-page special magazine provides behind the scenes insight into the aircraft, equipment, people and operations of one of the world's premier air forces.

FEATURING

Normandy Dakota

Flight Lieutenant Paul 'Ernie' Wise describes piloting the Battle of Britain Memorial Flight's Dakota for D-Day 75 events in Normandy on June 5 and 6, including the aircraft's first paratroop in five years.

Malian Chinooks

Flight Lieutenant Andy Donovan, a Chinook pilot with 27 Squadron, provides an operational perspective on the vital contribution aircraft is making to French efforts against Islamic extremism in Mali.

Lightning at Large

In the past 18 months, Lightning Force has deployed jets to Cyprus, Italy and onto HMS Queen Elizabeth, plus added an OCU at its Marham home. Those involved describe a challenging but exciting period.

and much more!

AVAILABLE FROM THURSDAY 23RD JANUARY FROM **WHSmith** AND ALL LEADING NEWSAGENTS

ALTERNATIVELY, ORDER DIRECT

JUST £7.99 PLUS FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

Free P&P* when you order online at www.keypublishing.com/shop



Call UK: 01780 480404
Overseas: +44 1780 480404

Monday to Friday 9am-5:30pm GMT

SUBSCRIBERS CALL FOR YOUR £2.00 DISCOUNT! SUBSCRIBERS CALL FOR YOUR £2.00 DISCOUNT!



ILA BERLIN

INNOVATION AND
LEADERSHIP IN
AEROSPACE

May 13 – 17, 2020

Berlin ExpoCenter Airport
www.ila-berlin.com

BDLI  German Aerospace Industries
Association

 **Messe Berlin**


Hosted by **LAND
BRANDENBURG**