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ARMADA INTERNATIONAL

DECEMBER 2020-JANUARY 2021. Issue 06.

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CONTENTS

ON THE COVER:
The Swedish Air Force have ordered 60 Gripen E aircraft. The E-series has a new and more powerful engine, improved range and can carry greater payloads. It also has a new AESA-radar, InfraRed Search and Track System (IRST), as well as highly advanced electronic warfare and communication systems.

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INDEX TO ADVERTISERS

THIS MONTH ON ARMADAINTERNATIONAL.COM

RUSSIA FIRES FOR THE FIRST TIME AT SEA THE NAVAL PANTSIR

The Russian Navy has tested for the first time from a ship the Pantsir-M surface-to-air missile and anti-aircraft artillery system, which is a naval version of the land mobile Pantsir-S1 system.

JAMMING BACKPACKS

The US Army could receive backpack-based electronic warfare/cyber attack systems in the coming years.

DECOY AND DESTROY

A new addition to Saab's Arexis electronic warfare product line provides added protection for Gripen.

RASISR SHARP

L3Harris expects to have its new RASISR Signals Intelligence collection pod ready for delivery in 2021, the firm has told Armada.

Editorial

DEFENCE MEDIA YOU CAN TRUST IN 2021

As we come to the end of a landmark year in history, when our global community collectively faced the unforgiving COVID-19 pandemic, we will enter 2021 on a more positive note with several vaccines passing their clinical trials and becoming available to a growing number of people. As I write this, the first person in the world has just been vaccinated in the UK.

While it will take much of the year, perhaps longer, to return to something that resembles our old lifestyle, we are all eager to get our businesses back on track. While much good information can be gleaned by attending virtual events, there is nothing more immediate that being able to attend an event in person and searching for the information that you really need.

In 2020, we were already adapting our magazines, *Armada International and Asian Military Review,* and their associated websites, newsletters and podcasts, to the rapidly changing defence industry. We understand that our readers comprise defence professionals from the military user community, through to governments responsible for establishing their national strategic defence goals and creating the budgets to match those ambitions, and the manufacturers who are eager to understand what they must do to deliver current and next generation technology.

Technology development is more than ever at a premium. Spending on space defence is set to grow rapidly in the next decade both in terms of sovereign capability and through allied/partner projects. Cyber defence / offensive has joined space as a priority area for investment. Artificial Intelligence will not only provide management of 'big data', it will also be designed into digital networks to manage war fighting beyond the capability of the human command chain.

Our network of correspondents are some of the most experienced defence journalists in the business, and are in regular contact with those senior military, government and industry professionals who shape the defence industry. They also attend and report on defence events across the world, from airshows to defence exhibitions and specialist conferences. In 2021, their reports and specialist features will be published in both the *Armada International* and *Asian Military Review* magazines, supplements and associated website, as well as newsletters dedicated to Land, Sea, Air, Space, Electronic Warfare and Future Technology (Cyber, AI, Unmanned, Robotics etc). There will also be coverage on social media as well as online podcasts.

Our reporting is factual - we do not tolerate 'fake news.'

We look forward to your company along the way and, as always, will be delighted to receive your comments, thoughts, requests and feedback.

ANDREW DRWIEGA,
Editor-in-Chief

SWEDEN'S AERIAL SHIELD

Major General Carl-Johan Edström discusses current and future deployments for the Swedish Air Force, as well as modernisation plans.

David Oliver

Two new Gripen E test aircraft in formation: the Swedish Air Force has ordered 60 Gripen E fighters.

The Swedish Air Force has plans to create a 60 strong fleet of all Gripen Es which will replace the current inventory of over 70 JAS39Cs. The first Swedish AF aircraft was flown in December 2019 and two others were added this year into the Swedish verification and validation programme. The first JAS39 Gripen Es should reach their initial operating capability (IOC) by 2023.

The man now tasked with overseeing this transformation, in addition to many other challenges, is Major General Carl-Johan Edström, the Commander of the Royal Swedish Air Force. Appointed on 1 October 2019, he has flown more than 2,500 hours in the Saab 105, JA37 Viggen and JAS 39 A/B/C/D Gripens.

MG Edström's list of command achievements includes chief instructor at the Norrbotten Wing (F 21), commander of 212 Fighter Squadron, chief of operations, Swedish Air Detachment to NATO's Operation Unified Protector in Libya in 2011, and in 2018 senior air advisor and director CJ5 for the Train, Advise, Assist Command – Air (TAAC-Air) mission in Afghanistan during Operation Resolute Support. He was also earned the accolade of Distinguished Graduate and Master of Strategy from the USAF Air War College at Maxwell AFB, Alabama.

On 23 October this year, MG Edström attended the official presentation of the latest Saab JAS39 Gripen E to the Brazilian Air Force (Força Aérea Brasileira - FAB) at Wing 1, in Brasília. The FAB have named their Gripen E the F-39E and are contracted to purchase 36 Gripen E/Fs (the F version is a two-seater).

At the end of October, MG Edström talked to *Armada International* about his ongoing plans for the development of the Swedish Air Force:

Armada International: Major General Edström, could we begin with your appraisal of current Swedish Air Force operations?

Saab

Major General Edström: We are currently in a situation of mainly conducting the Standing Defence Plan (SDP). The main operational focus is on maintaining the Quick Reaction Alert (QRA) and readiness of our units.

AI: Have there been any changes in the Air Force's organisation this year or any planned for the future?

MG Edström: Air force organisation will be strengthened in areas including force protection, logistics and training during the upcoming years. Alongside the Air Warfare Centre in Uppsala, the F 16 (Uppland Wing) will be reactivated in 2022. Furthermore, the Air Force will gain additional resources such as aeromedicine and management, which will be transferred from other parts of the Armed forces. All in all, the Swedish Air Force is in transformation for the future with the aim to increase our operational capability over time.

AI: Has there been any changes in the numbers of air incursions by the Russians this year?

MG Edström: We have had no Russian incursion in airspace this year. Beyond that I wish not to comment on the Russian activities in the vicinity of our country.

AI: What is the Air Force's relationship with Finnish Air Force, or those of other Scandinavian nations?

MG Edström: Our relationship with the Finnish Air Force is unique. We are frequently conducting events through our Finnish-Swedish cooperation and participate in our national Air Forces exercises. This relationship is maintained at the highest political level on a regular basis, and interactions between public authorities and civil society are very strong. Both our countries are also united by the fact that neither Finland nor Sweden have joined NATO. In 2014, our two countries' defence ministers announced a special defence partnership, which constitutes the closest security partnership Sweden has with another country. We both participate in our two


Swedish Air Force

Major General Carl-Johan Edström was appointed commander of the Swedish Air Force on 1 October 2019.

countries' national exercises with, for example, fighter aircraft and personnel in command and control (C2) facilities, such as the national Air Operation Centre (AOC). The Swedish Air Force has a close cooperation with our Nordic neighbours under the umbrella of the framework of the Nordic Defence Cooperation (NORDEFCO).

AI: Are there any plans for the Air Force to participate in future NATO or PFP exercises?

MG Edström: Swedish Air Force has, over the years, developed cooperation with other countries to the point where our units train within the frameworks of Nordic Cross Boarder Training (CBT) or Finland Sweden Training Event (FSTE) with NATO and other countries. We recently participating with our 72 Squadron at Exercise *Ramstein Alloy,* above the Baltic Sea. In the year ahead, we are looking forward to planing and participating in the regular Arctic Challenge Exercise (ACE).

AI: Would the Air Force consider joining UN or Coalition operations in the near future if requested?

MG Edström: The Swedish Armed Forces are currently planning for participation in 2021 in the Takuba Task Force, a European military task force that will advise, assist and accompany Malian Armed Forces, together with G5-Sahel partners and other international actors on the ground, with helicopters and C-130 aircraft.

AI: What is the operational status of the anti-submarine (ASW) variant of the NH90?

MG Edström: Sweden is currently operating five (5) ASW NH90 from our F17 air base. An additional four (4) ASW platforms are in a retrofit program with industry, and are expected to be delivered in 2021-2022. The current status for our NH90 fleet is at Initial Operational Capability (IOC). A plan for future development towards Full Operational Capability (FOC), including enhanced operational capability through tactical data link, torpedoes and EWS, is ongoing coordinated with other NH90 operators within the NATO Helicopter Management Agency (NAHEMA) framework. Sweden is concerned regarding the unacceptably long timings for future development steps towards FOC and in conjunction the anticipated cost.

AI: Are there any plans to upgrade or replace the C-130H fleet?

MG Edström: The C-130 fleet will undergo a planned lifetime extension programme during the upcoming years. A strategy is underway concerning long time needs for transportation aircraft within the Swedish armed forces.

AI: Are there any plans to upgrade or replace the Saab S-100B Argus fleet (Saab 340 airborne early warning and control aircraft)?

MG Edström: The S-100 or ASC 890 (Erieye) will be modified in order to


Swedish Air Force

MG Edström served as Chief of Operations, Swedish Air Detachment to NATO's Operation Unified Protector in Libya in 2011.

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Andrew Drwiega

MG Edström flew the Gripen C when commanding F 21.

maintain its operational status until a planned replacement of both the carrier aircraft and the sensor suite in the late 2020s. Additionally, the Swedish Armed Forces will also aim to be more cost-effective, through reducing different types of VIP/transport/air refuelling aircraft in the future.

AI: When will a decision be made on a replacement for the SK-60 (Saab 105) and would the Boeing/Saab T-7 Red Hawk be considered?

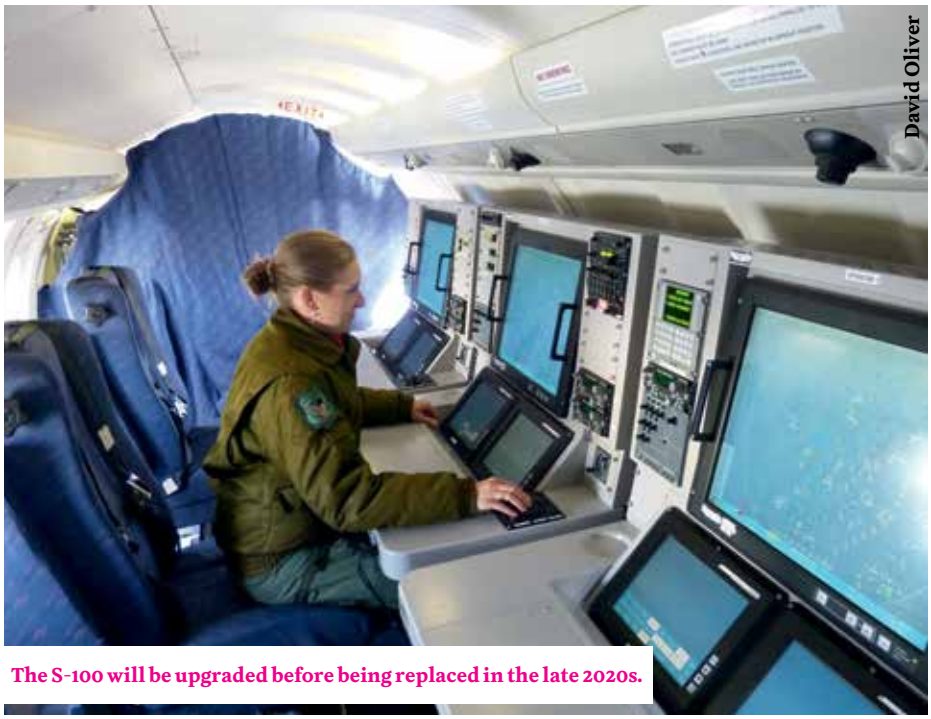
MG Edström: The Saab 105/Sk60 will be in service and used for flight training of our pilots until 2025. An acquisition of a Basic Trainer Aircraft (BTA) for basic flight training is in progress and our plan is that the BTA will be operational in a couple of years. Additionally, our plan is to use the Gripen C/D as an Advanced Trainer Aircraft (ATA) during the latter half of the 2020s.
In parallel, we have initiated studies to explore how we will conduct pilot training in the long-term. In these studies, a number of solutions and different aircraft systems are being considered.

AI: What is your input into the Swedish Parliament as it formally plans for its next-generation combat aircraft to replace the Gripen E at the next budgetary cycle of the Ministry of Defence.

MG Edström: We are currently not planning for a replacement of Gripen E. The Gripen E is not yet in operational service in the Swedish Air Force and it will be in our inventory for a long time ahead.

However, the Swedish Armed Forces are outlining a long-term strategy for air operations. The strategy is focused on future capabilities required and possible aircraft system solutions. Outlining a future strategy includes engagement and expertise through a wide array of cooperation within our government agencies as well as with industry and with possible coalition partners. One example of this cooperation is the Future Combat Aircraft System Capability (FCASC) study between Sweden and the UK, which is currently ongoing. The work will focus on possible areas of mutual interest for the future within this context.

AI: Thank you. A


David Oliver

The S-100 will be upgraded before being replaced in the late 2020s.

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Heckler & Koch

Heckler & Koch's HK416 has seen international success with its fielding by the US Marines (designed the M27), the French Army and Norwegian Army. Here soldiers of the French Commando employ the HK416.

COMPETING FIREPOWER

Small arms manufacturers within Europe and the Americas are vying in design and adaptability.

Stephen W. Miller

Small arms development trends have for centuries been primarily led by Europe joined much later by the United States. The use of European weapons in an army was once considered the mark of a modern force.

As more international small arms developers emerged, and as a result of private industry or government arsenal initiatives, armies began to adopt a wider range of weapons, not just those developed in Europe or by their home country.

The move to mass production, especially in response to major conflicts, resulted in large numbers of weapons being available at highly economical prices or offered as military assistance by major powers. Yet prestige remains among numerous national arms manufacturers, which is often linked to a particular type of weapon.

Despite this 'small arms nationalism', in examining the weapons that are being developed and fielded clear trends become evident that cut across various designs. Examining these influences offers insights not only into the evolving capabilities of individual weapons but on the tactics of units equipped with them.

GERMANY

A small arms manufacturer, over time, can become closely identified with one or more armies. Such companies demonstrate a sound understanding of that army's requirements, repeatedly winning contracts to supply their various small arms. One such company is Germany's Heckler & Koch (H&K) which has become the supplier of choice for not only the German Bundeswehr but for a number of other militaries with many of its weapons manufactured under license. H&K has supplied the Army since 1959 with the 7.62mm Gewehr 3 through the 5.56mm G36 which has been in service since 1996. The G36 is offered in over six configurations from a 615mm (24.2 inch) compact G36K carbine to the MG-36, a squad machine gun with a 100 round Beta C-magazine.

Reports of overheating issues with the

G36, which by some later accounts appeared unfounded, caused the German Ministry of Defence to issue a tender for a new weapon. However, by 2017 this competition experienced several setbacks when industry candidates failed to meet mandatory requirements. This was considered surprising in that entrants included weapons like the HK416, HK433 and Sig Sauer MCX, arms that had been adopted by other militaries. The HK416 had already been selected by the US Marine Corps (USMC) and French Army among others. A subsequent competition saw a number of manufacturers dropping out and expressing concern over the published requirements. Finally, on 14 September, 2020 the selection of Haenel's MK556 was announced as the future assault rifle. The weapon is a fully automatic version of the company's CR223 already used by police forces in Germany and other national law-enforcement agencies. It is 5.56mm patterned in the AR-15 style and includes features such as the accessory rail and adjustable sock that have become expected as standard on modern combat rifles.

The French selected the HK416 to replace their local GIAT designed FAMAS introduced in 1970s while the USMC, initially fielding it as a Squad Automatic Weapon (SAW), then chose to expand this by adopting it as the standard combat rifle for all infantrymen. The HK416 uses an HK-proprietary short-stroke gas piston system derived from the HK G36 (similar to that of the AR-18) rather than the AR-15's concentric to bore gas piston system. This approach reduces heat buildup and fouling of the bolt carrier which increases reliability. H&K reported that the HK416 fired 10,000 rounds in full-auto in factory tests without malfunctioning. The rail forearm is 'free-floating' and does not contact the barrel, improving accuracy. The HK416 uses an adjustable multi-position telescopic butt stock and has a MIL-STD-1913 accessory rail forearm with MIL-STD-1913 rails on four sides. This H&K design is proving to fulfil one of the major desires of the infantry small unit – having a common base rifle able to address the various combat tasks within the squad. The USMC are employing the HK416 for riflemen (as the M27), automatic rifleman, and designated marksman (M29) with adaptions for each role, allowing cross tasking and magazine exchange.

UNITED KINGDOM

British forces have been using the national Royal Small Arms Factory's SA80 bull-pup style rifle since 1987. Field use of the weapon revealed some issues which the Ministry of Defence (MoD) is again seeking to correct though a three year 2016 contracted effort by NSAF, a subsidiary of H&K. Conducted under the British Army's Equip to Fight programme, the weapon is being upgraded to the SA80A3 variant. The upgrade includes a new foregrip, an improved upper receiver, a full length Picatinny rail, additional safety features and enhancements to reduce the weight of the assault rifle. In addition, the weapon with be made compatible with H&K's AG36 under-barrel grenade launcher while the SUSAT sight has been replaced with a Trijicon ACOG 4x sight or Elcan Specter lightweight day sight. While the S80A3 is continuing to equip most of the British Army some units of the Royal Marines have chosen to acquire the Canadian C8 Colt Canada Carbine, a version of the C8 used by the Canadian Army which is derived from the M16A2.

UK MOD

British soldier using an SA-80 A3 whilst deployed on Operation *Toral*, the United Kingdom's contribution to the NATO mission to Afghanistan.

ITALY

Berretta has been the principle infantry weapons supplier for the Italian forces for decades with the company and military working closely. The most recent example is the ARX160. Initially launched in 2008 as a commercial venture, it became the focus of the Italian Armed Forces Soldato Futuro (Future Soldier) programme. The design is an evolution of the Beretta AR 70/90 and Beretta SC 70/90, introducing new materials, a length adjustable stock, and other features. The weapon is chambered for 5.56mm NATO round and entered initial production with an Italian Army order in 2008 for field trials in Afghanistan. By 2014, around 30,000 ARX160 A2s had been delivered to the Italian Forces. In 2013, Beretta had introduced the ARX160 A3 with a redesigned hand guard, improved heat ventilation and an extended Picatinny rail on its bottom, as well as a pistol grip.

In a 2014 the Italian Ministry of Defence contracted with Beretta to develop a battle rifle in 7.62mm NATO, the ARX200. After passing a wide range of military and environmental tests the weapon was adopted by the Italian Army where it complements the ARX160 including filling the designated marksman rifle role.

POLAND

The current main rifle used by the Polish military is the Beryl WZ 96, a local version of the Soviet AK rifle adapted to NATO standard ammunition that has been produced since the 1950s. It is being replaced by the MSBS (Modułowy System Broni Strzeleckiej) GROT C16, a 5.56mm modular design developed by Fabryka Broni.

The GROT is fully compliant with the NATO standards featuring Picatinny rails, compatibility with STANAG magazines, and utilising NATO 5.56 ammunition. A company spokesperson explained that "special attention has been given in the design to maintaining reliable operation even in the most adverse circumstances. Tests have verified its ability to reliability function

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Israeli Weapons Industries (IWI) developed TAVOR feature bullpup design, is compact and offers various barrel lengths with minimal impact on its overall length.

even with a dirty barrel, when unable to be maintained by the soldier and even firing low quality ammunition."

The weapon is offered in both a conventional and bull-pup configuration using a common upper receiver. It can be configured as an assault rifle, carbine, designated marksman rifle, or squad automatic weapon. The versatility of the design and responsiveness of the company was demonstrated by its adaption of the GROT to 7.62mm NATO calibre with features to fill the marksman role when the Polish Army chose to replace its Dragonov sniper rifle.

CZECH REPUBLIC

Česká zbrojovka, also known as CZ, builds on the historic Czech small arms manufacturing legacy. Since 2011 the Czech Army has been replacing its vz. 58 rifle which resembles the Soviet AK-47 but is an entirely different design. The replacement is the CZ805 BREN A1/A2, a modular design that allows changing the weapon calibre between 5.56×45mm NATO or 7.62×39mm by changing the barrel with gas tubes, breech block, magazine bay and magazine. In 2016, the Army chose to transition to the BREN 2 which incorporated user recommendations. These improved the ergonomics and function of the weapon including a .5kg (1.1lb) weight reduction, a redesigned ambidextrous cocking mechanism and three different length quick-detach barrels. The calibre adaptability has been viewed particularly favourably by some users as it allows the greater range and penetration of the heavier 7.62mm while gaining the benefits of the advanced BREN design. The weapon, in addition to the Czech and Hungarian Armies, was adopted in 2017 by the special intervention group of the French National Gendarmerie (GIGN).

RUSSIA

Kalashnikov, creator of the AK-47, continues to be the dominating influence in Russian small arms. The Russian Army's move to an intermediate 5.45x39mm calibre, matching the NATO transition to 5.56mm, was accommodated by adapting the AK-47 design to the new ammunition resulting in the AK-74. The weapon was modernised in 1991 as the AK-74M which continues in service with over 30 militaries. One of the critical features of the AK has been reliability in heavy use given its 120rpm sustained rate of fire. Kalashnikov has now introduced a new weapon, the AK-12, as part of the Ratnik soldier programme. The new assault rifle weighs 3.3kg (7.28lb) and integrates the accessory rail, adjustable and folding stock, and new magazine with a 'witness window' for gauging its remaining capacity. Firing selection includes burst, two-shot cutoff and single shot with an effective range of up to 500 meters. The Russian news agency TASS stated in April 2019 that Kalashnikov planned delivery of 112,500 AK-12 assault rifles to the Russian troops in 2019-2021.

FINLAND

The Finnish Army has been using the domestically designed and produced Valmet RK62 in 7.62x39mm form since 1965. In 2015 it introduced the upgraded RK62M which had a number of ergonomic improvements and greater modularity. These included a collapsing buttstock, a more ergonomic selector lever, and an accessory rail for mounting optics. These upgrades added weight with the RK62 M2 and M3 now weighing 4.1kg (9lbs) unloaded. The standard rifle has and has an overall length (with its stock extended) of 940mm (37.5in). The rifle is available in 7.62x39mm, 7.62x51mm NATO, and 5.56x45mm NATO as well as a range of commercial calibres. The modernised versions of the assault rifle are being fielded to the Finnish Defence Forces' brigade-level units and has also been adopted by Estonia.

TURKEY

The MPT 76 (Millî Piyade Tüfeği/National Infantry Rifle) is a modular rifle family designed by MKEK for the Turkish Armed Forces. It was first fielded in 2017 to replace its H&K G3 and HK33 . The weapon is gas operated with the firing rate selector using NATO 7.62×51mm ammunition which was preferred by the Turkish military. A 5.56x45mm version the MPT-55 was also developed but appears not to have been adopted. The basic design draws from the AR-15 but uses a gas piston system similar to the H&K417. It includes a Picatinny rail and can mount either an under-barrel shotgun or grenade launcher. The MPT-76 uses advanced polymer materials with a moulded pistol grip, a moveable angled foregrip and ambidextrous fire controls. The standard weapon uses a 406mm (16") barrel while there are also compact carbine version with 305mm (12") barrel and designated marksman KNT rifle with 508mm (20") barrel.

ISRAEL

Israeli Weapons Industry's (IWI) Tavor was developed to address the Israeli Defence Force's (IDF) requirements for a individual soldier weapon suitable for both close-quarters use and mechanised infantry. A bullpup design was selected which permits a long barrel giving a higher muzzle velocity while keeping the weapon compact. It uses a long-stroke piston system, similar to the AK-47, and is known for its reliability. The Tavor is offered with three barrel lengths 460mm (18.1") (TAR-21); 380mm (15.0") (CTAR-21); 410mm (16.1") (TC-21) offering total lengths of 720mm (28.3"), 640mm (25.2") and 670mm (26.4") respectively. The weapon uses 5.56×45mm NATO ammunition, although both 9×19mmParabellum and 5.45×39mm Russian versions are available. The 5.56mm TAR 21 has an effective range of 550 meters. The model selected by the IDF is named Tavor X95 (also known as the Micro Tavor or MTAR).

The Tavor is designed primarily as a Close Quarters Battle (CQB) weapon though use of a bipod and optical scope allow for longer range engagements. In addition to the IDF, a number of special force units of other counties have adapted it while

the Royal Thai Army has made purchases toward replacing its M16 rifles.

IWI has also introduced a conventional style rifle called the Carmel. A spokesperson explained: "it is a multi-purpose, modular, 5.56x45mm calibre assault rifle that can be customised for various operational needs. The Carmel is, in fact, a wholly new weapon, that is fully ambidextrous, has a high strength impact polymer body, is equipped with military standard 1913 Picatinny rails on all sides and is compatible with any available sights, devices or accessories. It uses a the free-floating quick detachable barrel for maximum modularity. Barrel lengths of 267mm (10.5"), 305mm (12"), 368mm (14.5") and 406mm (16") are offered. The stock is both adjustable in length and folds to the right. The short barrel Carmel is only 526mm (20.7") with the stock folded and weights 3.3 kg (7.2lb)without magazine or sight. IWI is watching the United States Army interest in more powerful alternates to the 5.56mm and is reportedly is considering chambering a Carmel for the 6.8mm Remington SPC.

BELGIUM

Fabrique National Hertal (FN) has long been designing and manufacturing small arms, supplying them to much of the world. The FAL rifle was in service with over 66 militaries into and beyond the 1970s. Its current Special Operations Forces Combat Assault Rifle (SCAR) is considered by some as setting a standard against which modern assault rifles are often compared. Dave Steinbach, director of Military Products at Maxim Defence Industries, a former special operator with experience of a broad range of infantry weapons suggested that "SCAR combines many of the features most often sought by fighters including reliability, well thought ergonomics, and adaptability to CQC or longer range engagements." The 5.56mm NATO (SCAR-L), 7.62mm NATO (SCAR-H) and other calibres including Russian 7.62X39mm can be accommodated by changing the barrel assembly. It also integrates multiple Picatinny rails to support various optics, tactical options, or under-mount grenade launchers. It also is provided with lengths of 254mm (10") in its

Russian MOD

Kalashnikov continues to dominate Russian small arms with its latest AK-12 still using the gas-operated long-stroke piston system of the AK-47 and AK-74. The new rifle adds the accessory rail, adjustable and folding stock, transparent magazines, as well as, a firing selector and optional noise suppressor (shown).

The US Army is in the process of a competition to select a new service rifle. The NGSW-R (Next Generation Squad Weapon – Rifle) is required to utilise 6.8mm caliber, however, the specifics of the ammunition and the weapon design proposed are largely up to each of the three developing companies. General Dynamics – Ordnance and Tactical Systems has select to propose a Bull-Pup configuration in its RM277, shown here with a silencer and optic sight features.

CQC, 100mm less than its STD (standard), and also a long barrel 457mm (18").

US ARMY

The US military has been using the M16 rifle since its introduction during the war in Vietnam. Its use of a smaller 5.56mm calibre initiated a similar move by other world militaries. Subsequently the weapon has evolved to the M4 version which remains the standard issue infantry rifle. Concerns over the combat effectiveness of the 5.56mm have often been widely expressed and have grown given the wider use of personal body armour despite the introduction of new ammunition. The US Army's Chief of Staff General Milley testified to the US Congress that a new calibre was essential to address this. Following consideration of various bullet sizes the Army selected 6.8mm and directed its use in its Next Generation Squad Weapon (NGSW) programme. The 6.8mm calibre was selected to achieve greater lethality and range.

NGSW requires not only a new 6.8mm calibre but seeks to field both an individual rifleman assault weapon and a squad automatic rifleman's weapon using the same ammunition. Currently, three industry teams have offered candidates that are being evaluated. Each offers unique features and challenges with not only differing weapon designs but also differing ammunition configurations. Army Lieutenant Colonel Jason Bohannon, product manager Next Generation Weapons explained: "the weapons being offered are capable; yet all are in their own way ingenious or novel." The SIG Sauer draws from its SIG MCX-SPEAR design chambered in 6.8x51mm using a 'hybrid' PPI round configuration. Textron Defence's weapon uses a telescoped case (CT) round developed from the Lightweight Small Arms Technologies (LSAT) project. The CT has the projectile nested inside a polymer case. Wayne Pender, senior vice president Applied Technology explained: "the CT allows using a unique weapon action where the spent cartridge is pushed forward and ejected by the next round entering the chamber thus eliminating the need to extract the spent cartridge. As a result both the ammunition and weapon itself are lighter with simpler and more reliable operation." General Dynamics – Ordnance and Tactical System (GD-OTS) RM277 is a bullpup style using a new composite case ammunition from True Velocity. Mark Anderton, vice president of sales at True Velocity stated that "this case accepts higher chamber pressures allowing greater muzzle velocities for tighter accuracy. In addition, our composite case ammunition weights 30 percent less than metal case allowing a rifleman to carry three additional magazines without adding to his load."

The US Army also intends that NGSW will utilise a smart sight/fire control coming through a separate programme, meaning the weapons must consider integrating power to support them. NGWS weapons are being delivered for field evaluation with a final selection planned for 2021.

BRAZIL

Brazil's state-owned IMBEL has taken its license produced FN FNC (essentially the FAL chambered for the 5.56mm NATO round) and is updating it. This includes changing to a side folding polymer stock, redesigning the receiver with the fire selector above the pistol grip; and adding extensive Picatinny rails for mounting optics, tactical gear, and a grenade launcher. The IA2 is the standard assault rifle of the Brazilian armed forces with variants including a battle rifle chambered for 7.62x51mm NATO and a CQB carbine.

CHILE

Chile's state-owned arms factory FAMAE has chosen to update its SIG540 licensed rifle by adopting a Picatinny quad rail along its barrel assembly, changing the front and back folding sights, adding a side folding polymer butt stock and a bipod.

The resulting FAMAE 2013 rifle uses stamped steel receivers, which reduce its weight. A shortened transparent magazine is also provided offering visual round count.

FUTURE TRENDS

The latest generations of individual soldier weapons have remarkable similarities in features driven by their simple practicality. Many of these reflect the application of new materials like polymers in the stock or technologies such as optics rugged enough to withstand day to day use and abuse by the soldier. Others look to provide increased performance. As an example, magnified optical sighting may permit target identification at longer range, which then requires ammunition that is also effective at these ranges. Similarly, there is the push to determine if and how some new electronics and computing technologies can be integrated to expand the effectiveness of the weapons themselves. This larger direction potentially sees the encompassing of ammunition, weapon, target detection/sighting, shooter, and even the interconnection of the soldier's fellow teammates in an integrated process. A

Northrop Grumman's Litening pod has seen over 20 years of service and has been integrated with a wide variety of aircraft. (Inset) Looking at the target via the Litening pod.

NOWHERE TO HIDE

Targeting pods have matured and are turning the laser-guided bomb from bludgeon to rapier!

By Jon Lake

Though guided munitions date back to the Second World War, it was in the Vietnam war that they really came to prominence. Initially, radio-guided and wire-guided missiles were employed, and later TV-guided weapons. But in 1968, the United States Air Force (USAF) undertook combat testing of the world's first laser-guided bomb (LGB), the Texas Instruments BOLT-117. The BOLT-117 combined a 750lb (340kg) M117 bomb with a KMU-342 laser guidance and control kit. This in turn consisted of a gimballed laser seeker on the front of the bomb to home onto reflected laser energy from the target, with tail-mounted control fins to guide the weapon. Initially the Weapon Systems Officer (WSO) in the back seat of an McDonnell Douglas F-4 Phantom II fighter bomber would use an improvised hand-held Airborne Laser Designator (ALD) to illuminate the target, and the bomb (dropped by a second F-4) would then home onto the laser energy reflected by that target. Even with this rudimentary form of guidance, the LGB proved to be more accurate than other guided weapons, and more precise, with a bigger warhead and a lower cost. This was because an LGB was no more than a traditional bomb body mated to a relatively inexpensive add-on guidance kit.

The ALD soon gave way to the Philco-Ford Aeronutronics Division AN/AVQ-10 Pave Knife targeting pod. The pod contained a steerable laser and a closed-circuit television camera. The weapon systems officer steered the laser onto the target with a hand controller, monitoring where the laser was pointing in a small Sony TV in the rear cockpit. It could be used to designate targets for its own bombs (self designation) or carried by a wingman (buddy lasing). The Pave Knife pod was deployed operationally in Vietnam, and was the fore-runner of to-

day's targeting pods. The Westinghouse AN/AVQ-23 Pave Spike pod was more compact, while other early, daylight only targeting pods included the French Thomson-CSF ATLIS (Automatic Tracking and Laser Integration System) and ATLIS II pods, and the Chinese K/PZS-01 laser targeting pod.

Because ATLIS was designed to be used by single-seat attack aircraft like the Mirage III/5/50 and Jaguar, it had an automatic target lock capability, allowing the pilot to lock on to a target, launch a weapon and then concentrate on flying the aircraft. The pod kept the laser locked on to the target using INS, pattern-matching and edge-detection techniques.

The massive FLIR-equipped Ford Aerospace AN/AVQ-26 Pave Tack offered a night/all-weather capability and superb picture quality, but in a heavy and high drag pod, though its operational capabilities made it the new benchmark for a second generation of targeting pods, the leading example of which was the AN/AAQ-14 LANTIRN (Low Altitude Navigation and Targeting, Infrared, for Night) targeting pod. This formed one element of the LANTIRN system, usually being carried together with an AN/AAQ-13 navigation pod, which has a FLIR and a radar for terrain following and mapping.

The US Navy used a similar dual pod arrangement on McDonnell Douglas (now Boeing) F/A-18C/D Hornet, with one carrying a FLIR for navigation, and one a laser spot tracker. In latter years Hornets carried the Lockheed Martin AN/AAS-38 Nite Hawk pod (Navigation IR Targeting Equipment), which included a targeting FLIR and a laser designator.

Thomson-CSF's second generation targeting pod was the PDLCT (Pod de Designation Laser a Camera Thermique/Laser Designation Pod With Infrared Camera), used on the Dassault Mirage 2000, while the UK's GEC-Marconi developed the TIALD (Thermal Imaging Airborne Laser Designator) pod for the Panavia Tornado, Hawker Siddeley Harrier and SEPECAT Jaguar – proving most successful on the latter type. TIALD had useful auto-tracking capabilities, and could incorporate an airframe mask to recognize when the laser might be blocked by some part of the carrier aircraft.

3RD GEN PODS

A third generation of pods took advantage of advances in technology, including new more sensitive and higher magnification IR sensors, solid state CCD (charge-coupled device) visible-light cameras, IN/GPS, new recorders, and improved datalinks.

First and second generation targeting pods were also optimised for use at low level, while the third generation tended to be capable of use at higher altitudes, suiting the growing tendency towards medium level tactics and operations.

The new pods are also lighter and smaller in size, with the option of providing wider field of view, allowing them to be used on light attack aircraft and unmanned aerial vehicles (UAVs). Because UAVs can operate for extended durations, using pods to provide persistent wide-area surveillance, collecting massive amounts of data, one challenge has been to provide compact, low power, network attached storage solutions with very high capacity and a high data throughput rate.

The first of the current generation of pods was Rafael's Litening. The Israeli company began work on the Litening pod in the mid-1980s and introduced the first model in 1993. The Litening III, which used a third generation day/night 640x480 resolution FLIR, proved particularly popular, giving pilots the ability to search an area using the wide-field imager, before zooming in on a target with the narrow-field imager. Litening pods were exported to Chile, Germany, Greece, India, Romania, Spain, Sweden, the UK, and Venezuela, for use on platforms as diverse as the Northrop F-5E and MiG-21 Lancer to the Eurofighter Typhoon. For the UK's Typhoons, the the UK MoD awarded a £56 million contract to Ultra Electronics for the supply of locally assembled Litening EF pods. The availability of a UK-built Ultra Litening allowed the pod to be offered to the Royal Saudi Air Force, though in the end, the Saudis opted for a French-supplied solution.

Subsequently, Rafael developed the Litening 5 pod, incorporating an upgraded 1.2Kx1.2K large aperture mid-wave and short wave FLIR, with day HD colour imagery.

While Rafael continues to offer the Litening III, IV, 5 and Reccelite pods, the Litening pod is also being sold by Northrop Grumman in the US and for export, with customers including Australia, Denmark, Finland, Italy, Netherlands, Portugal, and Spain.

The initial Northrop Grumman variant was the Litening II, which incorporated a 256x256 resolution third generation FLIR, and was ordered by the United States Navy, Spain and Italy for use on the AV-8B Harrier II, and by the USAF for the Lockheed Martin F-16 and Boeing F-15E.

The Litening ER (Extended Range) used a 640x512 third generation FLIR, while the Litening AT (Advanced Targeting) made use of new circuitry and software algorithms to extend range and improve accuracy, and to provide better support for GPS-guided weapons. Litening II and ER pods were upgraded to the AT configuration for use on the Fairchild Republic A-10, Boeing B-52H, F-15E, and F-16, and USN and RAAF Hornets.

More recently, Northrop Grumman has offered the Litening Gen 4 ("largely

Northrop Grumman

The modular design and architecture of the AN/AAQ-28(V) Litening pod.


USAF

A B-1B Lancer bomber offensive systems officer loads software into a Sniper advanced targeting pod prior to a mission. The long-range targeting system provides aircrews with positive target identification, autonomous tracking coordinate generation and precise weapons guidance from extended standoff ranges.

synonymous with Litening 3"), and Litening Digital and Litening Digital Colour pods. The Litening Gen 4 uses a 1024x1024 pixel FLIR and other new technologies to provide enhanced targeting and situational awareness.

Northrop Grumman has received contract awards for 200 upgrades In the last 12 months, with the new pods giving compatability with new digital displays. Colour is regarded as being especially useful for air-to-ground operations, allowing different coloured trucks, and buildings to be picked out. There is less need for colour in the air-to-air role.

Northrop Grumman has recently celebrated the delivery of its 900th Litening pod, in more than 20 years of deliveries. Northrop Grumman claim to have been the first to deploy an all 1K sensor suite in a pod, the first to provide a short wave infra red laser, and the first to offer digital capabilities and colour HD daytime video in the US market. All of this has been made possible by Litening's modular design and architecture. The Northrop Grumman Litening pod has also been demonstrated on a US Air National Guard MQ-9 Reaper UAV.

Lockheed Martin developed the AN/AAQ-33 Sniper Advanced Targeting Pod in the mid-1990s, producing a system with better high altitude capability than LANTIRN (which was limited to 25,000 feet), and with better reliability, resolution, and sensitivity, and weighing 180lb (81kg) less than an AN/AAQ-14. Sniper had a much-improved stabilisation system, allowing the crosshairs to be kept on target even at altitudes of up to 40,000ft (12,100m).


Northrop Grumman

Northrop Grumman's Litening pod includes a suite of advanced high-resolution sensors and a data link for intelligence, surveillance, reconnaissance (ISR) and target acquisition.

Externally, Sniper was distinguished by its distinctive wedge-shaped nose, which contrasted with the rounded sensor balls used by most other targeting pods, and which was said to be more aerodynamic and more 'stealthy'. This chisel nose incorporated synthetic sapphire windows, which were highly transparent in the visible and infrared wavebands.

The Sniper pod featured a highly modular design, and was claimed to have half the parts count of the AN/AAQ-14, making it more maintainable and more reliable.

Lockheed Martin have subsequently produced the improved Sniper XR (Extended Range) and the Pantera export model.

The Sniper and Sniper XR have been used on the US Air Force B-52H Stratofortress, B-1B Lancer, F-15E Strike Eagle, F-16 Fighting Falcon, and A-10 Thunderbolt II, and was also exported to the UK, Belgium, Canada, Kuwait, Norway, Oman, Pakistan, Poland, Saudi Arabia, Singapore, Thailand and Turkey.

Sniper subsystems were incorporated in the Lockheed Martin F-35's EOTS system, and in the AN/AAQ-30 Hawkeye Target Sight System (TSS) of the US Marines' Bell AH-1Z Cobra Zulu.

Technology developed for the new-generation Sniper pod has also been fed back into modernised versions for the LANTIRN system, under the Enhanced LANTIRN and LANTIRN 2000 designations, and in upgrades, for example to the LANTIRN pods fielded on Royal Danish Air Force and Royal Netherlands Air Force F-16s.

The third of the new generation US

The Russian UOMZ Sapsan-E features several sensors including a low-light TV camera, an IRST / FLIR dual-band (IIR) sensor, a laser rangefinder and a laser designator.

targeting pods is Raytheon's AN/ASQ-228 Advanced Technology FLIR (ATFLIR), which was designed to replace the Nite Hawk pod on the Hornet and Super Hornet fighters. ATFLIR featured a more capable FLIR, providing greater stability, resolution, and magnification and demonstrated three to five times more range than the Nite Hawk. Testing was completed in 2003 and ATFLIR was delivered to the US Navy, Marine Corps, Australia, Malaysia and Switzerland.

The USAF launched the Advanced Technology Pod (ATP) competition to find a replacement for LANTIRN on the F-16 and F-15E. This attracted bids from Northrop Grumman with a variant of the Litening II, Lockheed Martin with Sniper and Raytheon. The Sniper pod won the competition in August 2001, but in September 2010 the USAF started to split its purchase of targeting pods, placing orders for the Northrop Grumman Litening pod.

Thales (as Thomson-CSF was renamed) produced the Damocles third-generation targeting pod, which achieved Initial Operational Capability (IOC) in 2009, and which has been used on the Mirage 2000, Super Etendard, and Rafale – and on Saudi Eurofighter Typhoons. It is widely felt to be inferior to the rival Litening pod, with an IR sensor of just 320x240 resolution, and is now being replaced by the Thales TALIOS, which combined targeting and tactical reconnaissance capabilities in a single pod. TALIOS incorporates Automatic Target Detection and Recognition, and reportedly delivers unmatched image quality, including colour and with real-time imagery integrated into a 3D mapping display. Successfully qualified in 2018, the pod is now combat ready on the Armée de l'Air Rafale.

Turkey has developed an indigenous targeting pod in the shape of the ASELPOD, a high performance electro-optical reconnaissance, surveillance and targeting system designed specifically for use on fast jet platforms, including a high resolution, third generation IR Camera, Day TV, Laser Range Finder, Laser Pointer and Laser Target Designator. 17 were delivered initially out of a total of 69 contracted quantity, to fulfill the domestic and international requirements. Though many Soviet attack aircraft featured internal, built in laser designators, Russia has developed some podded systems, most notably the UOMZ Sapsan-E, and the combat-proven NPK-SPP T220 pod, used on the Su-30, Su-35 and MiG-35.

China's 613 Institute has developed a family of targeting pods, starting with the FILAT (Forward-looking Infrared and Laser Attack Targeting) pod, unveiled in 1998. This was based on technology from the AN/AAQ-14 LANTIRN targeting pod, the TIALD pod, and Litening. It has spawned the simplified K/JDC-01 pod, the more advanced WMD-7, and the Loong Eye I and II pods – dedicated variants for UAV applications. China has also deployed the YINGS-III pod on the J-16 (Chinese Su-30) – a pod said to be broadly comparable to the Lockheed Sniper. China has also developed the A-Star AUEODS system, which uses paired TX-S55 and TX-S56 pods.

Though next generation LO aircraft will require internal targeting systems, targeting pods will continue to play a role on fourth generation tactical platforms, UAVs, and special operations and transport aircraft. A

Airbus

The UK Ministry of Defence Skynet 6A satellite from Airbus, Defence and Space will launch in 2025.

SPACE DEFENCE SET FOR METEORIC RISE

As space operations are increasingly under threat, the United Kingdom is joining the United Space in establishing its own Space Command.

Andrew Drwiega

"Space is a global and integrating domain, accommodating the systems that we use for communication, intelligence, surveillance and reconnaissance and enabling defence to integrate and cooperate into the future," stated General Sir Patrick Sanders, Commander of the United Kingdom's Strategic Command, speaking on 17 November during the virtual Defence Space 2020 conference.

"Unless we take a long term strategic approach and invest accordingly, we shall find ourself at a fundamental and unrecoverable disadvantage," he added. The Defence Space 2020 conference, organised on behalf of the United Kingdom's Ministry of Defence (MoD) by the Air and Space Power Association was held virtually from 17-18 November from London.

Gen. Sanders said that space had become the cornerstone to economic and strategic security and that the development in defence of a "digital backbone is vital to delivering multi-domain integration but it is also fundamental to our broader modernisation agenda. And space plays an integral part in enabling the digital backbone," he said.

This growing international dependence on space for economic and sovereign security is steadily but inevitably fuelling the next arms race. The United States, concerned about how the Russian and Chinese governments were investing in, and testing, military space systems recently reconstituted a modernised Space Command.

US Space Command

The latest US DoD Space Command (SPACECOM) was established on 29 August, 2019, having been originally formed in September 1985, then inactivated in 2002. It is responsible for military operations in space; basically anything over 62 miles (100km) above sea level.

Its declared mission is to conduct "operations in, from, and through space to deter conflict, and if necessary, defeat aggression, deliver space combat power for the Joint/Combined force, and defend US vital interests with allies and partners."

'Allies and partners' is a key phrase that will be oft repeated by all sovereign nations looking to play a role in space. These allies are partners are not only other nation states, but will rely over the next decade on an increasing number of civilian commercial enterprises such as United Launch Alliance and Elon Musk's Space Exploration Technologies (SpaceX), providing launch vehicles for satellites and personnel travelling into space.

In June the DoD issued its Defence Space Strategy which highlighted four specific areas of focus: building a comprehensive military advantage in space; integrating military space power into national, joint and combined operations; shaping the strategic environment; and cooperating with allies, partners, industry and other US government departments and agencies.

One of the key triggers for this spotlight on space is the general recognition of a number of significant and growing counter-space threats, principally arising from the activities of Russia and China. These are viewed in escalating severity from denial and deception, to electronic warfare and cyberspace attacks, then directed energy and kinetic energy weapons, to orbital satellite threats and even nuclear weapons.

WEAPONISING SPACE

During a US Department of State briefing on 24 July, 2020, Dr. Christopher Ashley Ford, assistant secretary, Bureau of International Security and Nonproliferation stated that "the problem here is also very fundamentally the full-bore, full-throttle development of very dangerous capabilities that both Russia and China have been doing. I mean, the militarisation of the space domain, the weaponisation of space, is unfortunately well-advanced, and we find ourselves in the position of trying to figure out what to do in response to that weaponisation."

Dr. Ford evidenced back to 2017, where he stated that Russian officials were open admitting that they were developing satellite killing missiles. "Back in late 2017, there was an example in which Cosmos 2521 fired a projectile through space in ways that were very clearly a weapons test." That had continued to the present day: "on 15 July, Cosmos 2543 also fired a projectile through space. So these are clearly on-orbit weapons tests of precisely the sort that Russia and China claim that it is the objective of their diplomacy to prevent, and yet – clearly the Russians are doing this already in orbit."

The Air Force launch of a Boeing-built Wideband Global SATCOM satellite at Cape Canaveral on 18 March 18, 2017. Such satellites assist in the strategic and tactical coordination of military operations.

United Launch Alliance

"We also heard them earlier this year say publicly that their new S-500 air defence system can also be used as an anti-satellite weapon." Further to this he stated that "President Putin has said that anti-satellite weapons ...(are) acceptable in the political and military respect. And they are clearly developing anti-satellite systems ...at a very fast pace."

The S-500 Prometheus, developed by Almaz-Antey, has been described as a potential anti-satellite kinetic weapon. In a 25 June 2019 report published on the Russian Pravda website, Sergey Druzin, deputy chief designer of the Almaz-Antey stated that the S-500 system "would be able to shoot down targets even outside the atmosphere." In 2020 Pravda further claimed that it would be supported by the newly developed Yenisei radar.

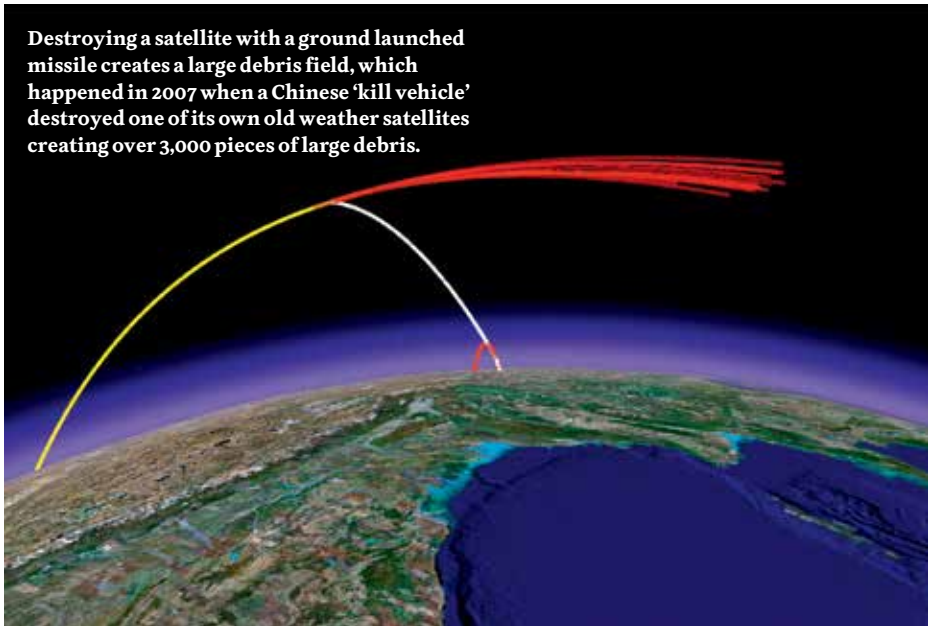
The Chinese too have tested their satellite killing capability. In January 2007, a Chinese FY-1C weather satellite at an altitude of 537 miles (865km) was destroyed in a head-on engagement by what is described as a kinetic kill vehicle. This created over 3,000 items of space debris greater than four inches (>10cms) in low earth orbit which is still a danger to all using that sector of space.

Air Chief Marshal Sir Mike Wigston, Chief of Air Staff, during his opening speech at the Defence Space 2020 conference, also drew attention to the weaponisation of space: "We've seen directed energy weapons that have the ability to deny sensors; causing temporary or permanent damage to satellites that may be supporting a wide range of tasks from earth observation to weather to disaster relief operations."

He added that there were also "several examples of direct ascent anti-satellite testing; firing a rocket from earth to orbit, with the aim of destroying satellites as previously mentioned.

The UK's response has been to increase its own space domain awareness, both in terms of sovereign capability and with partner nations. The Royal Air Force, in collaboration with the UK Space Agency working with key industry partners, has led to the development of the Aurora information system, a cloud-based mission control software suite designed to control a single satellite or a complete constellation through a user-friendly customisable interface.

The UK government's Integrated Review has not fully developed a multi-year spend-



Destroying a satellite with a ground launched missile creates a large debris field, which happened in 2007 when a Chinese 'kill vehicle' destroyed one of its own old weather satellites creating over 3,000 pieces of large debris.

ing plan. However, according to Gen. Sanders the Integrated Operating Concept is the most important document to have emerged from the Defence's concepts and doctrine centre and total force structure is being moulded around it. Gen. Sanders stated that key areas within this are the following:

- Adversaries have broadened the concept of warfare, particularly into the domains of space and cyber despite our efforts to establish norms of behaviour.
- Constant competition is the new reality. In space this means that key national capabilities are at risk.
- Information and data are the oil of the digital age and we are critically dependent on space to remain competitive.
- The key imperative to pursue integration - a national enterprise of government, commercial and defence combined. This includes integration with allies and partners and across all domains: air, land, sea, space and cyberspace.

The establishment of the UK's Strategic Command (UKStratCom) in 2019 will assist defence to compete in confrontational sub-threshold defence: including intelligence gathering, surveillance and reconnaissance, offensive cyber and special operations support.

"StratCom will become the enabling, integrating command," said Captain David Moody, deputy head for Space Capability, UKStratCom. "It will lead in the information advantage era moving us from platforms to enabling systems and transitioning from the joint force to the integrated force to allow us to operate and fight in the information age."

During his address to the House of Commons on 19 November, 2020, Prime Minister Boris Johnson announced the formation of a new UK Space Command, in addition to a centre for Artificial Intelligence and the creation of a National Cyber Force. This formed part of an extra £16 billion of funding that would be allocated to defence over the next four years.

UK Defence Secretary Ben Wallace said the intention in awarding Airbus, Defence and Space a $661 million (£500 million) contract for Skynet 6A satellites was to bring the skills and ownership within the defence community. "It will give our personnel the tools to operate a world-leading satellite constellation and ensure they stay at the cutting-edge of space expertise."

Russia's new S-500 air defence missile could be used against low earth orbit satellites.

SKYNET 6A

Skynet 6A is based on Airbus' Eurostar Neo telecommunications satellite platform but will provide greater capacity and versatility than Skynet 5 which has supported UK military operations since 2003. Managed by Airbus, Skynet 5 comprises four satellites launched between 2007 and 2012,

Skynet 6 Alpha is the first of a new generation of satellites to replace Skynet 5, with the expected delivery around 2025 and an operational lifetime of around 15 years. According to Airbus, it will "utilise more of the radio frequency spectrum available for satellite communications and the latest digital processing to provide both more capacity and greater versatility than Skynet 5 satellites."

Capt. Moody commented that to take advantage of the satellite's new architecture and what it can offer, "the Space Capability Planning Group will analyse the demand from the integrated operating concept, the multi-domain integration change programme, the demands from the force elements from single service commands, and from the operational commanders. This will guide how the mix of capabili-

ties available can be made to be adaptive, responsive, resilient, confidential and can meet the mission requirements of the future force."

PARTNERS AND ALLIES

The Australian 2020 Force Structure Plan instructs the Australian Defence Force to work with the Australian Space Agency and associated industry to improve its resilience and self reliance, particularly with the aim of improving and enhancing "a large number of space-dependent capabilities, including communications satellites and ground control stations that will be under sovereign Australian control."

Investment in space from the defence budget over the next decade will focus on improving satellite communications (US$3.5-5.2 billion) and space situational awareness ($1-1.5 billion), which will be followed by strengthening satellite assurance ($1.3-2.9 billion) and providing the capability for terrestrial operations under contested space ($1-1.5 billion) from 2030 to 2040.

The French Space Command (Commandement de l'Espace) was formed on 3 September 2019 and is part of the French Air Force. It is tasked with defining and implement French space policy with its missions tasked as: " "the management of a congested space situation, the monitoring of the proliferation of space resources, the analysis of the capacities made possible by new technologies and the setting up appropriate means to compensate for the lack of international regulation of space traffic ".

LOOKING AHEAD

Capt. Moody noted that one of the keys for maintaining enduring capability would be the ability to 'onboard' the latest technology as fast as possible. He observed that "defence is facing a steep increase in satcom demand" and that in future, considering budget constraints, "a balance (would need) to be struck between ownership and access of satellites. With whom and at what price?"

The Skynet 6A programme remains aligned with the latest defence policies and strategies for the information age. Illustrating the challenge, Capt. Moody revealed that "in a little over the past year, the number of active satcom satellites has increased over 30 percent." A

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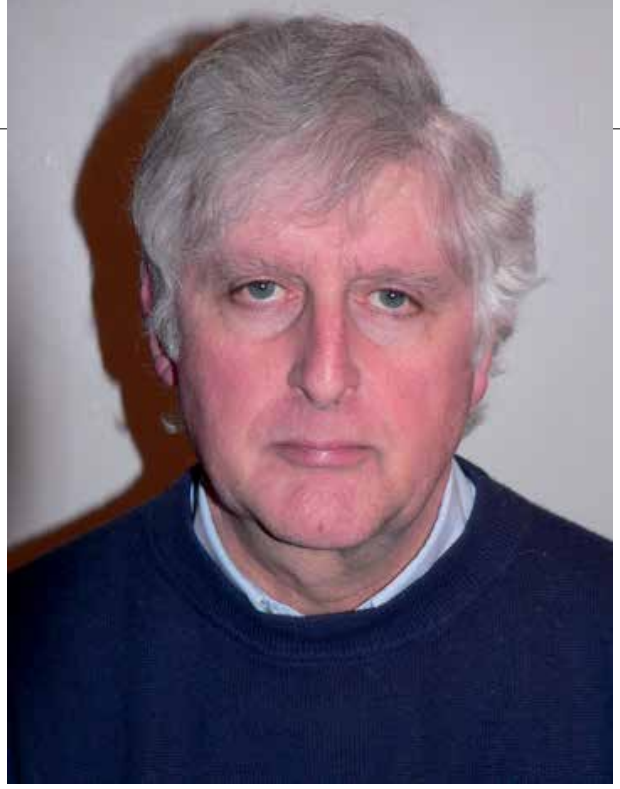

LIFTING POWER SUSTAINS MALI MISSION

David Oliver

On 1 August, 2014, France launched Operation *Barkhane* at the request of the Republic of Mali government as extremist groups pushed south and threatened to overrun the capital, Bamako. The mission was simple, to stabilise the country. Not long after the creation of Barkhane, a terror group known as the Islamic State in the Greater Sahara (ISGS) formed and operated mainly in eastern Mali and neighbouring regions of Niger and Burkina Faso.

Barkhane's military aircraft are mostly based at airfields in Niamey and N'Djamena. These include French Air Force transport and combat aircraft and French Army (ALAT) Airbus Tiger and Gazelle combat helicopters and Puma and NH90 Caiman transport helicopters. The mission is also supported by three Royal Air Force (RAF) Boeing Chinook HC.5 heavy lift transport helicopters and in 2019, Denmark announced its plan to deploy two Royal Danish Air Force Leonardo EH101 Merlin transport helicopters with up to 70 personnel to the mission. Since reaching full operational capability on 24 December 2019, the unit had completed 120 missions and logged 250 flight hours by the end of March, transporting nearly 1,800 people and 45 tonnes of cargo.

The operational environment in northern Mali is daunting. Temperatures reach well above 40 degrees centigrade, sandstorms reduce visibility to almost nothing and, during the rainy season, many roads become impassable. On 25 November 2019 an ALAT Tiger collided with an AS532 Cougar at low-altitude at night while on a sortie near Ménaka in Northern Mali, killing all soldiers and crew. The loss of 13 was the heaviest loss of life for the French military since 1983.

The RAF detachment in Mali is designated as No 1310 Flight and is deployed in a non-combat role on the UK's Operation *Newcombe* and flying from Gao Airfield in Mali. The Flight is fully integrated into the French Groupement Tactique Désert-Aérocombat (GTD-A).

The deployment of RAF Chinooks began in 2018 and it has been Joint Helicopter Command (JHC) that has sustained this operation by providing the personnel, together with the planning needed to ensure the operations continue. The RAF Chinook detachment supporting French and other European troops in Mali has so far logged over 2,000 flight hours, including nearly 340 hours so far this year (2020). Between January and May 2020, the Chinooks lifted 247 tonnes of freight and transported 1,150 passengers.

JHC personnel are also deployed in Mali at Gao Air base, to support No 1310 Flight which is currently from C Flight, No 18 (B) Squadron RAF and their supporting ground crew. One of the JHC units supporting the operation is the Tactical Supply Wing (TSW) which has introduced specialist refuelling activities for all aircraft and helicopters currently based at Gao, including the Danish Merlins and the French Tiger helicopters as well at the RAF Chinooks.

In June 2020 the UK Ministry of defence announced that it would extend military support to Mali by continuing Operation *Newcombe* with three Chinooks. In November the British Army deployed a 300-strong Long-Range Reconnaissance Task Group to Mali in support of Operation Newcombe in order to provide specialist assistance to the The United Nations Multidimensional Integrated Stabilisation Mission in Mali (MINUSMA).

Troops from 22 European Union member states and five non-EU states work with both the Armed Forces of Mali (FAMa), and the five countries of the G5 Sahel Joint Force: Burkina Faso, Chad, Mali, Mauritania and Niger. European armed forces personnel from Germany, Belgium, Czech Republic, Estonia, Germany, Ireland, Lithuania, Romania and Switzerland are located at Camp Castor in Gao to support MINUSMA.

France has stressed that *Barkhane* is not an indefinite mission. As soon as possible, it intends to give way to local forces. As often as possible, France wants to partner with national militaries, regional efforts like the G5 Sahel Joint Force and the United Nations. A

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