THE AVIATION MAGAZINE

www.TheAviationMagazine.com

№ 97 July – August 2025
Volume 16, Issue 4

- Exercise: HAWGSMOKE 2024
- Exercise: RAMSTEIN FLAG 2025
- Exercise: COBRA WARRIOR 2025-2
- Flashback: WILLIAM TELL 1994
- And much more ...

THE AVIATION MAGAZINE

www.TheAviationMagazine.com

№ 97 July – August 2025
Volume 16, Issue 4

Content

Cover: **Royal Netherlands Air Force F-35A *Lightning II* during exercise RAMSTEIN FLAG 2025 at Leeuwarden AB** *Alex van Noije*
This page: **Finnish Air Force F/A-18C *Hornet* during exercise RAMSTEIN FLAG 2025 at Leeuwarden AB** *Royal Netherlands Air Force*

THE AVIATION MAGAZINE

by www.TheAviationMagazine.com e-mail: editor@TheAviationMagazine.com

THE AVIATION MAGAZINE is published six times a year by a team of volunteers interested in aviation. We are devoted to cover a wide range of aviation events ranging from air shows, air base visits, military exercises, civilian spotting, and pilot and veteran interviews – accentuated with exceptional photography. THE AVIATION MAGAZINE is a leader in the e-magazine format since 2009, bringing exclusive and fascinating reports to our global aviation enthusiasts digitally.

Do you feel addressed and want to be part of our team? We would love to publish your work too, so feel free to shoot us an e-mail to editor@TheAviationMagazine.com. Please note that we do not accept any unsolicited articles or images for publication.

The people behind THE AVIATION MAGAZINE

Publisher & Editor

Ralf Peter Walter
editor@TheAviationMagazine.com

Core Team
Ralf Peter Walter
Wolfgang Jarisch

Occasional Contributors
Juan Miguel Anatol
Simone Ba
Igor Bozinovski
Matteo Buono
Kris Christiaens
Joe Cilberti
Philippe Colin
Rui Ferraira
Björn van der Flier
Simone Gazzola
Ben Gorski
Roelof-Jan Gort
Manolito Jaarsma
Ralf Jahnke
Paco Jover
István Kelecsényi
Mathias Leischner
Udo Leischner
Mike Lintott-Danks
David Mazón Gómez
Wiebe Karsten
Marco Muntz
Matthias Neurohr
Marco Papa
Patrick Roegies
Salvatore Rocella
Danny Reijnen
Jorge Ruivo
João Santos
Anthony F. Seychell
Alessandro Stoico
Gert Trachez
Joris van Boven
Dennis van der Wiel
Alex van Noye
Martijn Venix
Peter de Vos / Lowpass Aviation
Alistair Zammit / Military Aviation Reachout
Paolo Zerlotto

FROM THE EDITOR

Dear Readers,

Welcome to the latest issue of **THE AVIATION MAGAZINE**.

The focus of this issue can be summarized with a clear motto: «exercise». The changed geopolitical situation shows more clearly than ever that alliances and partnerships must not only exist on paper - they must prove themselves in real life.

One thing is certain: 1 + 1 must not just add up to 2 - it must be more than the sum of its parts. This "more" can only be achieved through consistent joint practice, mutual trust and the determined will to become stronger together - STRONGER TOGETHER, then and now.

And of course, in this issue, you will also find other exciting articles on the subject of aviation that are just as worth reading.

With this in mind, we wish you an exiting read.

Peter WALTER and the team of **THE AVIATION MAGAZINE**

THE AVIATION MAGAZINE is 100% pure aviation, no advertisements, and absolutely free of charge! It is the BEST and FREE e-based, photo-centric magazine on military aviation since 2009. Imitated by so many, but never surpassed!

Photo By Ralf Peter Walter

FLASHBACK

HUNGARIAN AIR FORCE MIG-29 *FULCRUM*

ARTICLE BY ISTVÁN KELECSÉNYI

MiG-29 flight line at Kecskemét AB in November 2005

In the 1990s, after the collapse of the Eastern Block, many of the neighboring countries operated fourth-generation fighter aircraft, such as the MiG-29, and Hungary decided to improve its air defense. In particular, the southern border with the former Yugoslavia was at risk, where Hungarian MiG-21MF/ BiS fighters would have to face Serbian MiG-29s and J-22 Oraos in a potential conflict.

The Hungarian government intended to join NATO and the European Union and purchase Western military equipment. However, the United States refused to sell Lockheed Martin F-16 fighter jets to Hungary. Of the Western European-made fighter jets, only the Dassault Mirage 2000 and the SAAB JAS-39 Gripen could have been acquired. Russia offered military technology and equipment as compensation for the huge financial debt it owed to Hungary. Hungary would have purchased S-300 air defense missiles, but Russia offered MiG-29 and Su-27 fighter jets instead. The latter was considered too expensive and too complex, so the MiG-29 was accepted, which erased $800 million of Russia's debt.

In 1993, twenty-two 9.12 MiG-29B single-seat and six 9.51 MiG-29UB twin-seat Fulcrums were ordered, to re-equip one wing (two squadrons). The Hungarian Air Force also purchased weapons, including R-73E (AA-11 Archer) close and R-27R (AA-10 Alamo medium-range (BVR) missiles, as well as a simulator and spare parts.

The two squadrons were based at Kecskemét Air Base. Kecskemét was geographically convenient, but it lacked modern infrastructure, with no hangars or storage buildings.

The two squadrons were assigned to the 59th Tactical Regiment. The 59th was named after "Vitéz Szentgyörgyi Dezső" – a famous Hungarian ace from World War II. The 2nd Tactical Squadron "Dongó/Wasp" received its first aircraft in July 1993. The technicians and pilots completed their training at the Krasnodar AB and Kusovskaya AB in Russia. The first eight aircraft were delivered to Kecskemét in October on 15 October 1993, and the remaining aircraft arrived on 24 November.

The 59/2nd Dongó Squadron was declared operational on 1 September 1994, and two years later, on 1 September 1995, the 59/1st Tactical Squadron (Puma) was formed. The Russian-made identification friend or foe (FF) system was not compatible with NATO operations, so it was decided to install a limited-function U.S. system since Hungary was not a member of NATO at the time.

The pilots of the 2nd squadron averaged 60 flying hours with the MiG-29 – very low by NATO standards. On 23 June 1995, the MiG-29UB (number 29) crashed into a tree while landing – the aircraft

Pair take-off of two MiG-29B at Kecskemét AB, November 2005

Type | product number:	MiG-29B | 9.12
Side number:	02
Serial number:	2960535117
Date of production:	8 Sep 1993
Last flight:	11 Mai 2005
Total number of sorties:	1,253
Total flight time:	781hr 14min

Type | product number:	MiG-29B | 9.12
Side number:	03
Serial number:	2960535124
Date of production:	3 Sep 1993
Last flight:	23 Mrz 2006
Total number of sorties:	1,362
Total flight time:	870hr 38min

was damaged but was repaired and brought back to flying condition. The MiG-29 was operated by Russian pilots and technical staff in Kecskemét until 1995, and this was extended until the summer of 1999.

The first foreign guest Kecskemét AB was the Royal Netherlands Air Force (Koninklijke Luchtmacht) with the 313th Squadron between 14/15 August 1995, equipped with F-16A/B, MLU fighters. In 1996, the Hungarian Air Force flew two MIG-29Bs and two MiG-29UBs at Twenthe AB to participate in the annual Royal Netherlands Air Force air show. However, the Hungarian Ministry of Defense was struggling with severe budget constraints at the time, and as a result, flying hours were further reduced. The simulator purchased as part of the original package was never made operational (later sold to Peru), and spare parts were difficult to obtain from Russia. Due to the lack of hangars at Kecskemét, the aircraft were not stored indoors. This increased the frequency of electronic problems, especially in the KOLS Laser rangefinder/infrared search and track system, which suffered from increasing serviceability problems. The combat effectiveness of the 59th TFW was halved during this period.

A minor modernization of the MiG-29 fleet was carried out in 1997 when the aircraft were fitted with a NATO-standard APX-100 IFF transponder unit and preparations were made for the installation of Mode-IV IFF, which was finally installed in 2004. Modernized C-100 on-board computers were also integrated. In 2006, GPS, a digital camera, and a Head-Up Display (HUD) were installed.

The cannibalization of aircraft started as early as 1996. The MIG-29B "number 12" had accumulated only 189 flight hours before it was used as a spare aircraft. By mistake, the ground crew de-iced the aircraft. To improve maintenance capabilities, a 14,552 ft (1,352 m2) maintenance hangar was completed in Kecskemét in 1996, where four aircraft could be stored and maintained.

The first and only fatal accident involving a MiG-29 occurred in 1998. On July 23, Lieutenant Colonel Zsolt Rácz lost control of his MiG-29B Fulcrum with side number '17' during an aerial display at a media event at Kecskemét AB and crashed near the air base. The experienced pilot did not fly regular demonstrations but was tasked to perform aerobatics, as the demonstration pilot Gyula Vári was flying at the Royal British International Air Tattoo (RIAT) at RAF Fairford.

At Rácz's funeral, one politician said that no one could be blamed for the incident. Since Hungarian pilots (Gyula Vári, Péter Kovács, Gábor Molnár, and Zoltán Szabó) regularly won trophies for their displays at RIAT, the military leadership believed that everything was fine at the base. However, the prizes came at a cost: flying demonstration maneuvers caused severe structural damage

Type	product number:	MiG-29B	9.12
Side number:	04
Serial number:	2960535127
Date of production:	9 Sep 1993
Last flight:	12 Dez 2003
Total number of sorties:	1,016
Total flight time:	623hr 18min

This MiG-29B is loaded with four R-73E air-to-air missiles (NATO designation is AA-11 *Archer*) attached to the outer and middle under-wing station and two R-27R air-to-air missiles (NATO designation AA-10 *Alamo*) attached to the inner under-wing station

The weapons of the MiG-29B shown here are:

- four rocket pods for 20 S-8 (80 mm) air-to-ground rockets
- four R-73E air-to-air IR-guided short range (300 m to 12 mi) missiles
- two R-27R air-to-air, medim range missiles with semi-active radar homing. Most effective range is 1.2 mi - 26.4 mi, head-on, and 0.43 mi - 4.66 mi, tail-on, maximum 45 mi
- built-in 30 mm Gryazev-Shipunov GSh-30 canon with 150 rounds

Type | product number:	MiG-29B | 9.12
Side number:	05
Serial number:	2960535148
Date of production:	10 Sep 1993
Last flight:	3 Dez 1996
Total number of sorties:	357
Total flight time:	215hr 35min

to several aircraft. Two aircraft, the MIG-29UB ("number 25") and the MiG-29B ("number 22"), suffered damage attributable to the high stress exhibited during the demonstration flight, and had to be withdrawn from service early because repairs were too expensive.

The Hungarian MiG flew the Fulcrums very aggressively, and structural fatigue was almost double compared to that experienced by other MIG-29 nations, with +9G pulls during training, especially during close combat exercises. Although Hungary had the R-27R (AA-10 Alamo) BVR (beyond visual range) long-range missile, training for its use was neglected, and live fire with the R-27 missile was not conducted. Between 2004 and 2008, BVR training, which was mostly based on theory rather than practice, was taught by a German Air Force (Luftwaffe) replacement officer, Lieutenant Colonel Ronald Tiegel.

The Hungarian Air Force's MiGs participated in major military exercises every year. The 59/1 Squadron Puma and 59/2 Dongó participated in several AMPLE TRAIN exercises and also exercise TRAIN and NATO AIRMEET. In 2004, Kecskemét hosted Exercise AMPLE TRAIN, and foreign air forces were regular visitors in the following years.

In practice, however, the seemingly high pace of operations and air show visits masked increasing operational problems and training difficulties. More and more decommissioned aircraft were stored outdoors, and more and more cannibalized airframes appeared in a graveyard on the outskirts of the base, which became known as "Jurassic Park". Officially, the operating costs of the MiG-29 were relatively high, mainly because the RD-33 engine had to be overhauled every 350 hours.

Cannibalization of aircraft helped to keep costs down. During the 17 years of operation of the MiG-29, only €93.9 million was spent on spare parts, which is about the same as the Gripen program cost in two years. The MiG-29 needed a major overhaul after 750 flight hours or eight years of operation. The overhaul would have cost €5.3 million per aircraft, but the Hungarian government did not want to invest that much in the aging fighter, and none of them underwent a full overhaul.

The combat capabilities of the 59th TFW had already declined to such an extent by the late 1990s that the political and military leadership decided it was time to acquire a new, Western-made fighter. Nevertheless, the previously described modernization programs were implemented to update the navigation and communications equipment on the MiGs to Western standards.

The Russian MIG RSzK company proposed a larger program called Turul (the mythical bird of Hungarian legend), which would have modernized the MiG-29Bs to an MRCA variant. The MRCA is the basis for the current MiG-29M/MiG-35. After the modernization, the fighter would have become

Type | product number:	MiG-29B | 9.12
Side number:	06
Serial number:	2960535149
Date of production:	3 Aug 1993
Last flight:	2 Dez 2003
Total number of sorties:	1,042
Total flight time:	651hr 47min

a multi-role fighter-bomber with integrated air-to-ground precision weapons, a Zhuk-ME modernized radar and R-77 "Adder" active radar-guided BVR missiles, and new Klimov RD-33-III modernized engines. The program was rejected due to cost considerations and the Hungarian intention to replace Russian technology with Western types.

On 10 September 2001, the government announced that it would lease 14 Saab JAS-39A/B Gripen fighter-bombers from Saab, with an option to purchase. The decision involved the consolidation of the MiG-29s into the 59/2 Dongó Squadron before the Gripens entered service with the Hungarian Air Force, and the service life of 14 airworthy MiG-29s was extended by three years and 300 hours. 59/1 Puma Squadron was selected to be re-equipped with the new Gripen aircraft. The MiG-29 Fulcrums were painted in the same air superiority blue-grey

Type | product number:	MiG-29B | 9.12
Side number:	07
Serial number:	2960535150
Date of production:	10 Sep 1993
Last flight:	17 Dez 2001
Total number of sorties:	859
Total flight time:	537hr 43min

scheme as the Gripens.

The new air-conditioned hangars built for the Gripens were occupied by MiGs before the arrival of the JAS-39s, which then showed much fewer electrical faults. However, due to the lack of spare parts, combat capability remained low. The serviceability of the aircraft of the 59/2nd Squadron continued to decline, with fewer and fewer pilots capable of flying the MiG-29s. In 2002, 24 were fit for service, in 2006 and 2009 only 14 were, and in 2010, only seven MiG-29 pilots were fit for service.

Flights were severely restricted, no afterburner was allowed except in emergencies and maneuvers were limited to +6G. Due to the above, Fulrum flights were so severely restricted that demo pilot Zoltán Szabó found it impossible to gain enough practice for the 2005 Kecskemét International Flying Day. On 11 May, an aerobatic training aircraft, "number 02", caught fire over Kecskemét due to an engine failure, forcing the pilot to eject. Zoltán Szabó survived the accident. On 17 April 2008, Major Peszeki Zotán ejected from the Fulcrum "number 15" before crashing near Kecskemét AB. The accident was caused by human error. In the six months before the flight, he had flown the MiG-29 only for a total of seven hours.

However, after the two accidents, only 12 aircraft were declared operational, and usually, only four or five were able to fly at a time. With the arrival of the Swedish Gripen in March 2006, the MiG-29 was once again stored outdoors. Night flying was banned and only one MiG-29 was allowed to take off at a time due to the risk of collision. The average 40-60 hours per pilot per year was not enough to maintain pilot efficiency (the NATO minimum is 180). The QRA standby aircraft were reduced to one aircraft and one reserve in several cases.

After the 59/1 Puma Squadron was re-equipped with the Gripen, the Ministry of Defence, unable to secure funding for two fighter squadrons, wanted to maintain the 59/2 Dongó Squadron as a unit without aircraft. However, this was not possible until the Gripen was fully integrated into the air defense system. Thus, the Dongó Squadron survived for another year and finally, on 7 December 2010, with the last training flight of four aircraft, and on 28 December, with a small ceremony to which the press was not invited, the Fulcrum was bid farewell.

The MiG-29 Fulcrums served the Hungarian Air Force for 17 years, and considering the circumstances, it is a miracle that they only suffered three losses.

Overall, the history of the MiG-29 in the Hungarian Air Force, even though it contributed to its development, was a big waste and a financial loss. The Fulcrum was hardly flown because the Hungarian governments of the time and the Ministry of War did not provide sufficient financial and technical resources for its operation.

Type | product number:	MiG-29B | 9.12
Side number:	08
Serial number:	2960535151
Date of production:	26 Aug 1993
Last flight:	28 Jul 2006
Total number of sorties:	961
Total flight time:	613hr 51min

Type | product number:	MiG-29B | 9.12
Side number:	09
Serial number:	2960535157
Date of production:	9 Sep 1993
Last flight:	2 Okt 2008
Total number of sorties:	1,309
Total flight time:	880hr 55min


HuAF
59 TFW
09


HuAF
59 TFW
09


09

Type | product number:	MiG-29B | 9.12
Side number:	10
Serial number:	2960535158
Date of production:	24 Aug 1993
Last flight:	7 Dez 2010
Total number of sorties:	1,631
Total flight time:	1,083hr 13min


59TH
10


HuAF
59TFW
10


HuAF
59TFW


HuAF
59TFW
10

Type | product number:	MiG-29B | 9.12
Side number:	11
Serial number:	2960535161
Date of production:	27 Sep 1993
Last flight:	7 Dez 2010
Total number of sorties:	1,566
Total flight time:	1,025hr 12min

To celebrate the 70th anniversary of the Hungarian Air Force, the MiG-29B 'number 11' receives this special livery, showing a Caproni Reggiane Re.2000 *Héja*. The Hungarian Air Force acquired 70 *Héja*s which were their main fighter aircraft in the first half of World War II. The first appearance of this specially painted MiG-29 was at the Kecskemét Airshow in 2008


70
1938-2008
11


1938-2008
11
70


1938-2008
70
11

Type | product number:	MiG-29B | 9.12
Side number:	15
Serial number:	2960535182
Date of production:	28 Sep 1993
Last flight:	17 Apr 2008
Total number of sorties:	1,335
Total flight time:	876hr 18min

Type | product number:	MiG-29B | 9.12
Side number:	16
Serial number:	2960535184
Date of production:	5 Okt 1993
Last flight:	25 Mai 2006
Total number of sorties:	1,048
Total flight time:	658hr 56min

Type | product number:	MiG-29B | 9.12
Side number:	18
Serial number:	2960535189
Date of production:	5 Okt 1993
Last flight:	20 Jan 2009
Total number of sorties:	1,324
Total flight time:	890hr 25min


HuAF
59TH TFW
18


HuAF
59TH TFW
18


HuAF
59TH TFW
18


HuAF
59th TFW
18


HuAF
59th TFW
18

Type | product number:	MiG-29B | 9.12
Side number:	19
Serial number:	2960535190
Date of production:	5 Okt 1993
Last flight:	6 Mai 1998
Total number of sorties:	413
Total flight time:	254hr 1min

Type | product number:	MiG-29B | 9.12
Side number:	20
Serial number:	2960535191
Date of production:	12 Okt 1993
Last flight:	6 Nov 1996
Total number of sorties:	350
Total flight time:	204hr 26min

Type | product number:	MiG-29B | 9.12
Side number:	21
Serial number:	2960535192
Date of production:	20 Okt 1993
Last flight:	7 Dez 2010
Total number of sorties:	1,134
Total flight time:	759hr 15min

Type | product number:	MiG-29B | 9.12
Side number:	23
Serial number:	2960535198
Date of production:	20 Okt 1993
Last flight:	27 Jun 2002
Total number of sorties:	871
Total flight time:	547hr 51min

Type | product number:	MiG-29UB | 9.51
Side number:	24
Serial number:	50903027135
Date of production:	5 Nov 1992
Last flight:	12 Okt 2001
Total number of sorties:	1,102
Total flight time:	616hr 17min

Type | product number:	MiG-29UB | 9.51
Side number:	25
Serial number:	50903027146
Date of production:	10 Nov 1992
Last flight:	23 Nov 2001
Total number of sorties:	1,128
Total flight time:	668hr 05min

Type | product number:	MiG-29UB | 9.51
Side number:	26
Serial number:	50903027257
Date of production:	13 Nov 1992
Last flight:	22 Jun 2008
Total number of sorties:	1,867
Total flight time:	1,099hr 09min

26

26

26


HuAF
59TH TFW
26

Type | product number:	MiG-29UB | 9.51
Side number:	27
Serial number:	50903027268
Date of production:	27 Nov 1992
Last flight:	16 Dez 2010
Total number of sorties:	2,564
Total flight time:	1,500hr 15min


HuAF
59°TFW
27


27


27


HuAF
59°TFW
27


HuAF
59°TFW
27


HuAF
59TH TFW
27

Type | product number:	MiG-29UB | 9.51
Side number:	29
Serial number:	50903027380
Date of production:	9 Nov 1992
Last flight:	12 Mrz 1998
Total number of sorties:	572
Total flight time:	343hr 34min

Side-number	Type	Product number	Serial/ Production number	Date of Production	Last flight	Total number of sorties	Total flight time	Service life extension
1	B	9.12	2960535116	9 Sep 1993	21 Jan 1997	431	266hr 25min	no
2	B	9.12	2960535117	8 Sep 1993	11 Mai 2005	1,253	781hr 14min	yes
3	B	9.12	2960535124	3 Sep 1993	23 Mrz 2006	1,362	870hr 38min	yes
4	B	9.12	2960535127	9 Sep 1993	12 Dez 2003	1,016	623hr 18min	yes
5	B	9.12	2960535148	10 Sep 1993	3 Dez 1996	357	215hr 35min	no
6	B	9.12	2960535149	3 Aug 1993	2 Dez 2003	1,042	651hr 47min	yes
7	B	9.12	2960535150	10 Sep 1993	17 Dez 2001	859	537hr 43min	no
8	B	9.12	2960535151	26 Aug 1993	28 Jul 2006	961	613hr 51min	yes
9	B	9.12	2960535157	9 Sep 1993	2 Okt 2008	1,309	880hr 55min	yes
10	B	9.12	2960535158	24 Aug 1993	7 Dez 2010	1,631	1,083hr 13min	yes
11	B	9.12	2960535161	27 Sep 1993	7 Dez 2010	1,566	1,025hr 12min	yes
12	B	9.12	2960535181	23 Sep 1993	26 Apr 1996	314	189hr 37min	no
14	B	9.12	2960535162	5 Okt 1993	21 Jan 1997	380	219hr 20min	no
15	B	9.12	2960535182	28 Sep 1993	17 Apr 2008	1,335	876hr 18min	yes
16	B	9.12	2960535184	5 Okt 1993	25 Mai 2006	1,048	658hr 56min	yes
17	B	9.12	2960535188	5 Okt 1993	23 Jul 1998	484	291hr 36min	no
18	B	9.12	2960535189	5 Okt 1993	20 Jan 2009	1,324	890hr 25min	yes
19	B	9.12	2960535190	5 Okt 1993	6 Mai 1998	413	254hr 1min	no
20	B	9.12	2960535191	12 Okt 1993	6 Nov 1996	350	204hr 26min	no
21	B	9.12	2960535192	20 Okt 1993	7 Dez 2010	1,134	759hr 15min	yes
22	B	9.12	2960535193	12 Okt 1993	9 Dez 1999	574	357hr 22min	no
23	B	9.12	2960535198	20 Okt 1993	27 Jun 2002	871	547hr 51min	no
24	UB	9.51	50903027135	5 Nov 1992	12 Okt 2001	1,102	616hr 17min	no
25	UB	9.51	50903027146	10 Nov 1992	23 Nov 2001	1,128	668hr 05min	no
26	UB	9.51	50903027257	13 Nov 1992	22 Jun 2008	1,867	1,099hr 09min	yes
27	UB	9.51	50903027268	27 Nov 1992	16 Dez 2010	2,564	1,500hr 15min	yes
28	UB	9.51	50903027279	11 Dez 1992	21 Nov 2002	1,393	719hr 30min	no
29	UB	9.51	50903027380	9 Nov 1992	12 Mrz 1998	572	343hr 34min	no

HAWGSMOKE 2024

TEXT BY PATRICK ROEGIES, PAUL GROSS, AND BEN GORSKI | **PHOTOS** AS STATED

An A-10C Warthog assigned to the 190th Fighter Squadron, Idaho Air National Guard, performs a strafing run during the 'HAWGSMOKE 2024' competition. *Patrick Roegies*

GATHERING THE GUNNERS LAST CALL FOR 'SANDY 1'

"Brrrrrrrrrrt…brrrrrrrt…!" The silence over the Barry M. Goldwater Range is shattered by the unique sound of sixty-five shells per second leaving the Gatling GAU-8 cannon of a Republic A-10C Thunderbolt II. It is a sight, but mainly a sound, that anyone who has ever witnessed will remember forever. And many memories were made, during the 2024 edition of the bi-annual HAWGSMOKE gunnery competition.

For four decades the Fairchild A-10 Thunderbolt II has been a proven and reliable platform for the combat air support role. During the First Gulf War (1990-1991) the A-10 proved its value in an actual combat scenario. With air superiority as an umbrella the A-10 ensured the ground troops to advance and take out any potential threat opposing the coalition forces. Today, some 25 years later, the aircraft still fulfills an important role in Combat Air Support and its legacy has not been met yet.

The A-10 community gathers every two years in the biennial exercise HAWGSMOKE with the intention of sharing experiences, aligning tactics, and successfully completing the HAWGSMOKE competition. Patrick Roegies, Paul Gross & Ben Gorski interviewed Major Sky "COMET" Lesh assigned to the 47th Fighter Squadron *Dogpatchers* to assess the purpose, necessity, and objectives of the exercise.

WHERE THERE'S SMOKE….

In early 2000, it was very likely that HAWGSMOKE might be abandoned and that the Air Force gunnery competition, should not be revived. HAWGSMOKE adapted however and started to include the participation of every A-10 unit in the Air National Guard, Operational Air Force, and Air Force Reserves. After the revival, the HAWGSMOKE exercise continued to evolve throughout its existence. Consequently, the first HAWGSMOKE didn't include many of the events that are currently part of the competition. Initial formation flights were flown as two-ships which changed to four-ships currently as the exercise kept evolving.

VISION, MISSION, PURPOSE, AND NECESSITY

Major Lesh comments on the vision and mission of the HAWGSMOKE exercise as well as the purpose and necessity of the biennial interval. .

"HAWGSMOKE traces its heritage back to the GUNSMOKE exercise. The GUNSMOKE exercise, officially known as the Air Force Worldwide Gunnery

Davis Monthan Air Force Base is the home base of the 355th Fighter Wing with the 357th Fighter Squadron assigned, here seen on the Davis Monthan Flightline *Patrick Roegies*

Competition, was a biennial air-to-surface gunnery meet for conventional weapons, hosted by the United States Air Force. The exercise originated beginning in 1949 and was eventually succeeded by the HAWGSMOKE exercise".

"HAWGSMOKE is the current biennial United States Air Force bombing, missile, and tactical gunnery competition for A-10 *Thunderbolt II* units. The exercise is hosted by the winners of the previous competition and provides both skills competitions and an opportunity to share in the camaraderie and fellowship within the A-10 community. The inaugural HAWGSMOKE was organized in 2000 at the Alpena Combat Readiness Training Center in Michigan. It was hosted by the 172nd Fighter Squadron from Battle Creek, Michigan. Colonel Clifford "Cliff" Latta of the 172nd Fighter Squadron is credited with initiating the first ever HAWGSMOKE event".

"The purpose and necessity to continue the exercise was three-fold. The primary purpose remains to increase the tactical skills of the Hawg driver community. The competition would emphasize flying parameters and tactics that may have been relegated to the background prior to Low-Altitude Safety Targeting Enhancement (LASTE). For example, teams and individuals would lose points for releasing their bombs below a realistic abort altitude. Before Low-Altitude Safety Targeting Enhancement, Hawg pilots released lower to increase their chance of getting a better bomb score. From HAWGSMOKE 2000 onwards, Hawg pilots were also penalized for exceeding the five seconds on the final limit and for not performing the proper safe escape maneuver. These Hawg-friendly tactical events would have never made it into the Gunsmoke doctrine. Long Range Strafe and low altitude Maverick attacks were

Left: **The years are starting to show on the fleet, as seen here on this well-worn and weathered A-10. A 25th Fighter Squadron pilot steps into his "office", as he has some serious business to perform** *Paul Gross*

Middle and right: **During the first Gulf War in 1991 many A-10s were adorned with art on the inside of the door to the stairs. Nowadays some of these still survive and two of these were captured on a 25th Fighter Squadron A-10C *Thunderbolt II*.** *Paul Gross*

Main: **The forward retracting gear is one of the exterior characteristics of the A-10** *Paul Gross*
Left: **Prior to each mission the pilots performs a walk around the aircraft for an inspection and accepts the aircraft from the crew chief** *Paul Gross*
Middle: **As the serial on the ejection seat shows, this A-10 was on the 1981 fiscal year budget, long before its pilot was even born** *Paul Gross*
Right: **With their pilots already strapped in, these two 25th FS A-10s will be on their way for a training mission within minutes** *Paul Gross*

also included".

"The second purpose to be integrated from the HAWGSMOKE 2000 edition onwards, was to establish a biennial event where former A-10 pilots could meet to exchange experiences with the new generation keeping the "Fighter Pilot" traditions alive and to honor their fallen comrades in the now famous "Reading of the List" Ceremony".

"The third purpose of HAWGSMOKE is to allow current A-10 pilots an opportunity to show their capabilities and ability to master their aircraft. The goal behind gathering all A-10 units is to have a low-key fighter pilot weekend with the fellow Hawg drivers which, just happens to have a competition attached".

HAWGSMOKE 2000 comprised fifteen participating units, which also included the participation of the overseas units based at Osan Air Force Base, Korea, and Spangdahlem Air Force Base, Germany. The overall team winner of this first edition was the 118th Fighter Squadron based at Bradley Air National Guard Base, Connecticut. The

HAWGSMOKE EDITIONS

Year	Organizing Unit	Location
1998	172nd Fighter Squadron	Battle Creek Air National Guard Base, Michigan
2000	118th Fighter Squadron	Bradley Air National Guard Base, Connecticut
2002	47th Fighter Squadron	Davis Monthan Air Force Base, Arizona
2004	No event	
2006	303rd Fighter Squadron	Whiteman AFB, Missouri
2008	190th Fighter Squadron	Gowen Field Air National Guard Base, Idaho
2010	190th Fighter Squadron	Gowen Field Air National Guard Base, Idaho
2012	357th Fighter Squadron	Davis Monthan Air Force Base, Arizona
2014	47th Fighter Squadron	Davis Monthan Air Force Base, Arizona
2016	47th Fighter Squadron	Davis Monthan Air Force Base, Arizona
2018	74th Fighter Squadron	Moody Air Force Base Georgia
2021/22	190th Fighter Squadron	Gowen Field Air National Guard Base, Idaho
2022	190th Fighter Squadron	Gowen Field Air National Guard Base, Idaho
2024	47th Fighter Squadron	Davis Monthan Air Force Base, Arizona

The 25th Fighter Squadron is assigned to the 51st Fighter Wing based at Osan Air Force Base in South Korea. Two aircraft made the ferry flight to be present at Davis Monthan Air Force Base *Paul Gross*

winner of the previous edition was to be the organizing unit for the following edition.

HAWGSMOKE 2024 PARTICIPANTS

It is most likely the HAWGSMOKE 2024 edition was the final edition of HAWGSMOKE, due to the approaching withdrawal from the use of the A-10C. For this edition, 14 operational units participated (right table).

HAWGSMOKE 2024 PARTICIPANTS

Unit	Tailcode	Home base
25th Fighter Squadron	OS	Osan Air Force Base
47th Fighter Squadron	DP	Davis Monthan Air Force Base
66th Weapons Squadron	WA	Nellis Air Force Base
74th Fighter Squadron	FT	Moody Air Force Base
75th Fighter Squadron	FT	Moody Air Force Base
76th Fighter Squadron	FT	Moody Air Force Base
104th Fighter Squadron	MD	Warfield Air National Guard Base
107th Fighter Squadron	MI	Selfridge Air National Guard Base
190th Fighter Squadron	ID	Gowen Field Air National Guard Base
303rd Fighter Squadron	KC	Whiteman Air Force Base
354th Fighter Squadron	DM	Davis Monthan Air Force Base
357th Fighter Squadron	DM	Davis Monthan Air Force Base
358th Fighter Squadron	KC	Whiteman Air Force Base
422nd Test & Evaluation Squadron	ET	Nellis Air Force Base

Above: **25th Fighter Squadron participated with two aircraft. After the exercise the aircraft were transferred to 309th AMARG for long term storage** *Paul Gross*

Right: **In the early years the A-10s were painted in the Southeast Asia (SEA) color scheme consisting of green, dark green and tan. From 1990, the A-10s were painted in a two-tone gray scheme. Seconds later the advantages of the current gray-gray color scheme become evident** *Paul Gross*

OPERATIONAL CHALLENGES AND RESILIENCE

The HAWGSMOKE exercise showcases the versatility of the A-10C *Thunderbolt II* across a range of missions. Major Lesh comments on the greatest operational challenges an A-10 pilot experiences when operating the A-10 in a modern combat environment, and how participation in the HAWGSMOKE competition contributes to building resilience and adaptability to overcome those challenges.

"The A-10 has continued to prove itself as a lethal ATTACK asset over the many years of service and the varying combat environments. However, the adversary air forces are continuously developing, and changing their tactics. With that development, our armament and tactics must evolve equally to maintain our lethality. Our weapons officers and test squadrons have relentlessly kept this mission at the forefront while maintaining the foundation of what it means to be a Hawg pilot and Combat Air Support (CAS) expert. Therefore, we consider HAWGSMOKE to be just a small example of the versatility and criticality of our critical mission".

HAWGSMOKE showcases tactical innovation and doctrinal evolution within the A-10 community. Major Lesh comments on those key lessons in A-10 tactics and doctrine. Both from this year's competition and how these lessons learned are applicable and can be adaptive in current or future combat operations, particularly in joint or contested environments.

"This year's HAWGSMOKE event showcased the first GBU-39 small-diameter bomb tactical competition. As mentioned before, the A-10 weapons officers and test pilots have relentlessly strived to keep the A-10 with the latest and greatest munitions that will bring the fight to the enemy. Practicing these capabilities, even in the parameters of a bi-annual HAWGSMOKE competition, still provides the opportunities to refine our skills."

"Furthermore, maintaining the 47th Fighter Squadron "Legacy of Excellence" is our continuous challenge. The 47th FS has a proven history of

Left: **A 358th Fighter Squadron 'Hawg driver' pulls away from the target after one of four strafing runs** *Patrick Vercauteren*
Top right: **The 104th FS *Fightin'O's* arrived at Davis Monthan AFB Base after their flight from Maryland** *Aaron Paxton*
Right: **Firing the legendary GAU-8 cannon and carrying the AGM-65 *Maverick*; it does not get more A-10 than this. This is the nightmare of any opponent of the legendary *Thunderbolt II*** *Wim van Damme*

success in the HAWGSMOKE exercises. In our view, what distinguishes the 47th FS in terms of how we approach training, mentorship, and operational execution, and the contribution to this legacy to the ongoing refinement of A-10 tactics and combat readiness?"

"The squadron was credited with shooting down eight Japanese aircraft on 7 December 1941 and fought in the Pacific Theater during World War II. The 47th Fighter Squadron flew missions out of several locations, including Thailand, and was credited with shooting down hundreds of enemy aircraft by the end of the war".

"In 1980, the squadron commenced operating the A-10. From 1993 to 1995 the 47th Fighter Squadron completed 501 missions over Bosnia and Herzegovina. In 1996, the "Termites" became a Formal Training Unit. Needless to say, the 47th Fighter Squadron looks highly upon our heritage as a unit. We strive to attract only the best instructors to continue on this historic legacy to produce the world's greatest combat-ready Attack Pilots. So it is kind of a legacy we are trying to live up to".

SCORE!!!!

During the exercise, the results of each participant are scored and rated. Major Lesh explains how the scoring is performed and how the exercise process is shaped.

"The host unit's weapons officer is normally in charge of creating the event. The 2024 edition of the HAWGSMOKE exercise was no different. Our 47th Fighter Squadron weapons officer put together the entire plan. He forwarded the overall plan to each participant, including our formation, at the same time. As the information is forwarded a few days before the exercise, no advantage is given to the hosting unit or any unit for that matter. You could argue the *Bulldogs*, *Dragons*, and *Dogpatchers* may have an advantage because this year's event is on their "home turf". However, this is less true than most HAWGSMOKEs due to the fact that every A-10 pilot passes through Davis Monthan Air Force Base at some point for training. The projected scenarios also make it so that the actual layout of the range and location does not matter, and the advantage is minimal. The scoring process is accomplished by multiple weapons officers from across the Hawg communities to guarantee no favoritism in the scoring".

The evasive action is also part of the strafing rune score equal to a real combat situation *Patrick Roegies*

"Each squadron participates with four aircraft. The score for each four-ship is determined. The final score per four-ship depends on the results achieved in three different ways of deploying weapons. The first concerns dropping the unguided GBU-39 small diameter bombs, the second the firing of the AGM-65 *Maverick*, and the third the firing of the drill cannon. For all three deployments, special targets have been placed on the range course. For dropping the bombs, there are two passes where a minimum height has been set below which the bombs may no longer be dropped. For firing the on-board cannon, there are four passes where a burst is given at two different targets. Here too, a minimum height applies, and lines have been drawn in the course with white car tires beyond which no more shooting is allowed. Several factors such as the flight height and the evasive action afterwards are boundary conditions that affect the final score. Several weapons instructors assess the results to reach a final conclusion that is as transparent as possible".

Tactical debriefing and lessons learned are a critical part of every operation. Major Lesh shares his insights into how the individual teams debrief each event during HAWGSMOKE and what were the most important takeaways or improvements identified after key events, such as the low-altitude tactical navigation (LATN) or Combat Search and Rescue (CSAR) exercises.

"A debrief is often more critical than a brief in gathering the lessons learned and making the necessary changes to guarantee following missions' success. However, in the HAWGSMOKE competition, the competitors receive the mission details at a set time prior to execution, so the brief and mission preparation is vital to having a chance at winning. The debrief is less critical since everything has already been recorded, so it's more about the bragging rights following the award ceremony".

"The low-altitude tactical navigation challenge requires dead-reckoning precision without digital assistance. The planning and execution process is critical while mitigating the risks of navigating at such low altitudes in challenging terrain". Major Lesh continues.

"From the very beginning as Hawg wingmen, we train extensively in a low altitude environment. First earning our 500 feet qualification. This qualification is followed by a 2-ship flight leads training where we earn our 300 feet qualification, and finally our

100ft qualification as experienced flight leads. Needless to say, no matter how often you train for it, finding specific targets at 100 feet altitude, while traveling 350 mph over the ground is no easy task. Mission planning at "1G" is critical to identifying the funneling features that we will utilize to get our eyes on the target area when it matters most. No matter the planning, however, the risks of operating low altitude are always higher, and our contracts and standards that every Hawg Pilot utilizes across the CAF help to minimize this risk".

THE LONGEST STICK

The AGM-65 *Maverick* "Longest Stick" challenge highlights the A-10's standoff capabilities and defines the tactical considerations for extended standoff engagement. Major Lesh explains what tactical considerations come into play when deciding to employ munitions from such extended ranges, and how the benefits of standoff distance are weighed against potential limitations in sensor fidelity or target confirmation.

"Achieving to hit the long-range precision targets operating the AGM-65 *Maverick* at distances of over nine nautical miles however is also no small feature. Several factors, both situational and technical need to be considered when determining the optimal shot parameters". Major Lesh explains.

"The AGM-65 *Maverick* has proven itself repeatedly in combat ever since Desert Storm. The *Maverick* still proves to be the go-to weapon when combatting armor vehicles, especially when it comes to the necessity for a standoff. This is why brand new Hawg pilots are trained early on the *Maverick* and it remains in our daily tactical mission set. It is often a favorite in the HAWGSMOKE competition in trying to get the longest shot. A lot goes into a successful *Maverick* launch/firing: atmospherics, run-in direction, dive angle, shadowing, and the overall health of the training *Maverick* sensor, all determine whether or not you will successfully lock up the target at the longest range".

MANUAL DELIVERY

"However, decreasing manual bomb delivery accuracy is still practiced as well. Without the use of constantly computed bomb sights, manual bomb delivery requires a deeper understanding of aircraft ballistics and wind factors. Manual deliveries during the HAWGSMOKE competition are still included and scored. Major Lesh comments on the techniques that are critical maintaining accuracy with 60, 45, 30- and 20-degree profiles".

"Manual Bombing is a skill that is practiced less and less as the munitions have developed and been upgraded on the A-10. However, many A-10 pilots still practice this proficiency in the off chance the aircraft has an issue where only manual bombing will allow for the employment of the weapon. Without getting too deep into the details, a decent amount of math, skill, and a bit of luck goes into a shack of a manual bomb".

Besides hitting the target during a strafing-run additional factors are scored as well. One important factor is the altitude during the strafing-run *Patrick Roegies*

1 **Each flight of four performs four passes in which two bursts are fired at two separate targets** *Wim van Damme*
2, 3 **With each burst sixty-five shells per second leave the Gatling GAU-8 cannon of a Republic A-10C *Thunderbolt II*** *Wim van Damme (2) and Aaron Paxton (3)*
4 **During each strafing-run the scoring is kept by assessing if the 'Hawg driver' hit the target** *Wim van Damme*
5 **One of the strafing-runs is conducted in a steep decent** *Christian Beye*

Aiming during each strafing-run is a strenuous process as the aircraft is low and vulnerable and the time for aiming is limited, prior to releasing the Gatling GAU-8 cannon *Christian Beye*

The employment of the GBU-39 small-diameter bomb represents a significant evolution in the A-10's capabilities. Major Lesh explains how the introduction of this munition changed the approach to tactical employment in both the competition and in real-world scenarios.

"The A-10 weapons officers and test pilots have relentlessly strived to keep the A-10 equipped with the latest and greatest munitions that will bring the fight to the adversaries. Practicing these capabilities, even in the parameters of a biennial HAWGSMOKE competition, still provides opportunities to refine our skills. This year's HAWGSMOKE event showcased the first GBU-39 small-diameter bomb tactical competition. The standoff capability that the GBU-39 offers is

Left: **Three A-10Cs assigned to the 190th FS *Skull Bangers* are lining up behind a tanker aircraft** *Jason Wong*

Right: **A relative clean A-10C assigned to 76th FS *Vanguards* is banking away from the tanker after refueling. The aircraft needed to be refueled multiple times during their transition flight to Davis Monthan AFB** *Jason Wong*

unmatched by any other weapon the A-10 carries. Bringing this weapon into our daily training habits will only improve our lethality and versatility in combat".

The CSAR mission demands rapid situational assessment, especially under the stress of potential communications interference. Major Lesh explains how a Hawg driver manages the task of identifying legitimate survivor signals while navigating spoofed communications, and what tactical procedures are prioritized to ensure the mission's success.

"It's no small and easy task as 'Sandy 1' to lead in the recovery of an objective which in most cases is a downed pilot. This is why the 'Sandy 1' upgrade is one of the more challenging upgrades you can have as an A-10 pilot. Not all instructors hold the patch. One of the many challenges you receive in the upgrade is deciphering multiple spoofer communications while in flight and working through identifying the friendly objective from the foe. The United States Air Force has certain techniques to achieve this, but it still does not make it easy in a hostile environment with lives on the line".

"The CSAR role remains one of the A-10's most crucial but challenging missions". Major Lesh comments on the context of the HAWGSMOKE CSAR exercise, and how to prioritize the elements of finding, fixing, and authenticating survivors while maintaining situational awareness in a potentially hostile environment. "The CSAR mission is complex and dynamic in nature. No CSAR is equal to the other and HAWGSMOKE is no different. Fortunately, the roles are broken up between the

The low-flying qualifications are divided into three levels and are required to carry out air combat support missions in hostile environments. Intensive training is required to pass the qualifications *Jason Wong*

formations with 'Sandy 1-4' specific roles. Each pilot has a specific task to accomplish in the mission of locating and or recovering the objective. The HAWGSMOKE competition replicates this mission on a much smaller scale, but still brings the challenge of time constraints and new environments to the competitors".

TACTICAL FLEXIBILITY IN DYNAMIC SCENARIOS

The HAWGSMOKE exercise tests pilots across a wide range of tactical scenarios. Major Lesh explains how the organizing team prepares to maintain tactical flexibility and decision-making acuity when transitioning between events such as dive-bombing, strafe runs, and CSAR operations.

"HAWGSMOKE is designed to capture all the mission sets that A-10 pilots train to on a day-to-day basis. The challenge lies in the fact that you are executing all of these missions in one set event, where everything is scored and timed. Each team must work together and use their expertise to not only finish the competition but win it all! The 47th Fighter Squadron put forward our A-Squad of Attack pilots and I am proud to announce our squadron came out on top overall in the 2024 event."

PRECISION TIMING AND FORMATION COORDINATION

Ensuring time-on-target precision while coordinating with a formation in a situational dynamic airspace requires detailed communication and planning. Major Lesh explains how an A-10 crew manages to synchronize these variables, and what adjustments are made in-flight to stay within the narrow timing constraints of the competition.

"Time on target precision is practiced in multiple different mission sets; from simultaneous weapon impacts to off-target de-confliction in the low altitude environment, to shacking a flyover at the World Series at the end of the National Anthem. Hawg pilots learn early on how to utilize and integrate the A-10's basic timing logic and put it to tactical use when it matters most. It is for this reason that the HAWGSMOKE competition uses timing as a big part of the overall score and deduction if not met".

With multiple events back-to-back, HAWGSMOKE presents a high-tempo environment. Major Lesh explains how the Hawg drivers adapt to these fast-paced scenarios and mentally demanding competition to improve the Hawg drivers' ability to adapt and react in actual combat situations where time, precision, and decision-making are critical. "If you don't put yourself in high-stress situations in training, then when you find yourself in those situations when actual lives are on the line, you might not be able to execute. Hawg pilots thrive on intensive training, with complicated and stressful scenarios. The more "tools in our toolkit" that we can learn in training, the more we may utilize when the mission demands itself in combat".

Effective crew coordination is paramount in multi-ship missions. Leadership qualities and coordination techniques are vital to maintain cohesion and performance under the pressure of competition. "The A-10 community prides itself on adhering to techniques and standards that are accepted across all Hawg squadrons. As a result, any mission-ready wingman should be able to fly on the wing of any flight lead and successfully employ in combat. Roles

The A-10 was essentially built around the huge GAU-8 30mm cannon. To accomodate the cannon, the nose wheel had to be moved to the right side of the airframe *Jason Wong*

Main: The *Maverick* air-to-ground missile has proven itself during the Gulf War. Performing long distance shots requires both experience and assessing the situation from the pilot *Christian Beye*

Left: Close-up with a view of the "workplace" of 'Hawg driver' *Christian Beye*

Right: Each flight of four performs four passes in which two bursts are fired at two separate targets *Wim van Damme*

and responsibilities are held to a high standard to guarantee the success of a formation. The 47th FS HAWGSMOKE team was made up of four very experienced instructor pilots, however, there still was only one flight lead. Each member had to execute his position in order for the entire formation to attain the success that they achieved".

CROSS-PLATFORM TACTICAL INSIGHTS

During the HAWGSMOKE exercise, there was a notable comparison made between the A-10 and newer platforms like the F-35. As someone who has trained extensively in the A-10, what insights or lessons can be applied from your experiences to modern multi-role fighters, and what specific advantages does the A-10 bring to dynamic, close air support (CAS) missions that newer platforms might lack?

"The A-10 has proven itself in the CSAR task for over 4 decades. The Hawg history books have shown us how Hawg pilots have risked their lives to accomplish the mission of bringing home the good guys. Although we do operate off a Minimum Equipment List (MEL) in order to launch, we have seen many instances where pilots have risked it all and taken a damaged aircraft into the fight in order to save lives".

When the A-10 is withdrawn from use, the gap in Combat Air Support (CAS) and Combat Search and Rescue (CSAR) need to be filed and adopt the role of the A-10. These are big shoes to fill. The Air Force is still studying this answer. The A-10 has a legendary CAS and CSAR history and is not easily replaced. Davis-Monthan Air Force Base, Arizona, is expected to host a new Air Force Special Operations Command Wing and will continue to host multiple modernized flying missions to include the EA-37B and HH-60W. Given the importance of CAS to joint operations, future CAS requirements are being carefully reexamined at the DoD level.

BIG SHOES TO FILL

As the A-10 continues to play a significant role in joint and coalition operations, all aspects of HAWGSMOKE training best prepare a pilot for integrating with other aircraft and services in joint force missions, particularly in contested or denied environments. The A-10 has continued to prove itself as a lethal ATTACK asset over the many years of service and the varying combat environments. "Our weapons officers and test squadrons have relentlessly kept this mission at the forefront while maintaining the foundation of what it means to be a Hawg pilot and CAS expert. HAWGSMOKE is just a small example of the versatility and criticality of our mission. Integration in the bigger fight is a necessity that our leaders do not take lightly, which is why the A-10 continues to participate in joint exercises across the globe. Air Superiority, the freedom from attack and freedom to attack, is one of the greatest contributions the Air Force provides to the Joint Force."

One of the most aircraft arriving at Davis Monthan AFB for HAWGSMOKE 2024 were the aircraft assigned to the 422nd Test & Evaluation Squadron based at Nellis AFB in Nevada. This aircraft is clearly used for operational testing of new innovations to the aircraft *Aaron Paxton*

Main: **The 47th Fighter Squadron *Dogpatchers* also referred to as the *Termites*' was the organizing squadron hosting the exercise. Coincidentally, they also won this year's competition** *Patrick Roegies*

Left: **All three units based at Moody AFB participated at the 2024 edition of HAWGSMOKE. The 76th FS *Vanguards* assigned to the Air Force Reserve Command can be recognized by their red tail band** *Christian Beye*

Right: **HAWGSMOKE 2024 was the fourth time the 47th FS won the competition** *Christian Beye*

The strafing-runs are close to the control tower positioned at the Barry M. Goldwater range close to Gila Bend *Patrick Roegies*

RAMSTEIN FLAG 2025

PART ONE

TEXT BY JORS VAN BOVEN AND ALEX VAN NOIJE
PHOTOS AS STATED

German Air Force Eurofighter EF2000s taxiing towards the runway at Leewarden AB for a night mission *Royal Netherlands Air Force*

FINNISH AIR FORCE – F/A-18C *HORNET*

SHOWCASING THE EUROPEAN DETERRENCE

On Monday 31 March 2025, the international exercise RAMSTEIN FLAG 2025 started at Leeuwarden AB. Next to Leeuwarden AB, more airbases were involved during this exercise. In Denmark, operations took place from Skrydstrup AB and in the United Kingdom airbases like RAF Marham and RAF Fairford were used for the exercise. Also, support from a lot of tankers and surveillance aircraft were involved operating from different airbases in Europe. More than ninety fighters from all over Europe participated in this major NATO exercise. The exercise lasted for two weeks where NATO units were prepared to conduct a major war scenario over Europe to defend the European territory. The exercise went further than only aircraft as it also fully focused on air defense with the help of land-based or sea-based missiles. Next to air assets also air battle management played a vital role in the RAMSTEIN FLAG scenarios.

Leeuwarden as the Center of the Exercise

Lieutenant General and commander of the Royal Netherlands Air Force Andre Steur (callsign Jabba) gave a short introduction to why RAMSTEIN FLAG is important for both the Netherlands and its international partners. Steur has been a fighter pilot for more than 20 years and saw as commander of the Air Force how the world has changed in the recent decade. Andre explained: "Current geopolitical developments require us as a NATO alliance to be able to act together, quickly and strongly. During the RAMSTEIN FLAG, we train the NATO response if one of the friendly countries is attacked (a so-called Article 5 scenario). We currently have around 45 aircraft at Leeuwarden AB for this exercise. Of these fighters, around thirty will fly per 'wave' of which two are launched per day." Participating countries at Leeuwarden air base were: the United States (Europe) with F-35A, Germany with Eurofighter EF2000, Finland using the F/A-18, France with the Rafale B/C, Greece with the F-16C, The Netherlands

Three Finnish Air Force F/A-18C *Hornets* are waiting for the clearance to enter the runway for take-off for an evening mission *Joris van Boven*

Hornets from the Arctic Frontline

Next to Sweden also the other newest NATO member Finland was present during Ramstein Flag. The detachment from Finland was from Rissala Air Base and led by Lt Col Rami Lindström (callsign Steiner). Rami is next to the DetCo of the Finnish detachment and also the squadron commander of Fighter Squadron 31 (Hävittäjälentolaivue 31, HävLLv 31) from Rissala Air Base. He has an overall experience of 3,500 flight hours of which he flew 1,600 on the McDonnell Douglas F/A-18C Hornet. The detachment from Finland consisted of 70 persons including 20 fighter pilots for the exercise. For an air force like the one from Finland, it is also quite a large operation to move the detachment to the exercise location. The Air Force is quite small and has limited assets to move over longer distances, according to Rami: "I think one very big deal is how to get here during the logistical operation before the exercise. Logistics is always a big thing for Finnish detachments because we don't have that many transport capabilities with the smaller CASA C-295M transport plane. That's one big thing for us which always need decent planning up front". Since Finland became a member of NATO the Air Force has moved abroad to participate in many exercises in Europe. The Air Force of Finland is not yet equipped to do this on a large scale, but the government is looking for better transport assets to be able to fit in NATO and the needs to Finland to do this. The country is considering buying Embraer C-390 Millenium aircraft and joining the MMU program which uses the Airbus A330 MRTT. There are no decisions taken about this yet as the country is still in the study phase for this. About the exercise and the Finnish objectives Rami was clear: "We are already combining things with the NATO and USA, with the manuals. The biggest lesson to learn here is the complete planning process. How to get all these components together and do the planning together to fulfill the missions. That's one thing we cannot train in Finland at all. Finally, of course, we don't have this many aircraft to use for an exercise, training on this scale is really a lesson to learn for us". One of the participating pilots in the Finnish detachment is Captain Petteri Kairinen. The Captain has a total flight experience of 1,500 hours on which he flew 1,150 hours on the F/A-18C Hornet. Kairinen is the first flight commander (leading the Finnish four-ship of Hornets) in the Finnish Fighter Squadron 31: "In this exercise, I'm one of the F/A-18 pilots in our detachment. We are flying with four F/A-18s in each wave. In total we brought five aircraft here of which one airframe is the spare aircraft". On the question what the captain and his flight want to learn here, he is also very clear: "If you are thinking about our own goals, the biggest thing might be fighter integration of course. We want to learn from our allies and to integrate into the NATO air forces. To see the 4th generation and 5th generation fighters in the same area and do something together is very special for us and we learn every day new lessons. That's for sure the biggest thing in this exercise". Also in the Finnish detachment are pilots involved with different skill levels and experience levels. That is not new in an average air force and also the Finns are here to train their aircrews to a NATO standard level of operability. This starts with bringing pilots who can do jobs on their own current level of experience. This means that pilots can be just wingman or a four-ship flight leader. Petteri explained why the Finnish Air Force made this choice to bring different experience levels together: "We have junior and senior pilots with us during RAMSTEIN FLAG, but we don't have levels present below the level of 'combat-ready wingman'. That's the minimum level that we need here. But, of course, it's a very good training opportunity for everybody. It doesn't matter if you are young or old, it's a very good and intense training, therefore that's why we would like to have all types of pilots here to learn on all levels". One of the big learnings was to see how other countries operate the Lockheed Martin F-35A Lightning II already. Finland will also transfer to this type in the upcoming years and the units are eager to see this plane in action during Ramstein Flag; "We are sending this year already our guys to the United States for training. The goal is to get our first jets by the end of next year (2026) at Rovaniemi AB. The transition time is about five years, and the last F/A-18 Hornet should retire in 2030". With exercise RAMSTEIN FLAG Finland was already training with and against fifth-generation fighters to prepare themselves for the F-35A Lightning II in Finland.

Lt Col Rami Lindström
Photo NATO

Royal Netherlands Air Force

Alex van Noije

F/A-18 *Hornet*s taxiing onto the runway for take-off

with F-35A and MQ-9, and finally Sweden with JAS-39 Gripen. The mission here at Leeuwarden was supported by Draken Europe with a Falcon FA-20. A lot of activity is ongoing at Leeuwarden, Steur said: "By training together, we as participating NATO countries develop on the focus points of RAMSTEIN FLAG, which are, Integration, cooperation, leadership, and night flying. The airbase can count on some 700 to 900 military personnel who come along with the various detachments and who stay in the region during the exercise." Next to Leeuwarden AB, the whole exercise covers many more airbases which are all located around the North Sea from Denmark to the United Kingdom. During RAMSTEIN FLAG, pilots trained in the following types of missions, among others: air defense missions with the aim to deny enemy fighter aircraft access to a certain area, air defense missions to keep the airspace free of missiles, exchanging tactical information and being able to quickly move combat units to respond to developments.

Adapting to a Changing World

In the last decade, the world around everybody changed a lot with respect to the safety of countries. Commodore and commander of the RNLAF Air Combat Command Marcel van Egmond (callsign Bo) gave a brief overview of what has changed with respect to the past. Van Egmond is like Steur also a fighter pilot with a huge experience in the business and flew for many years the F-16 *Fighting Falcon* and flies nowadays also the F-35A *Lightning II*. Van Egmond said it is very honoring for a country like the Netherlands to host this exercise at this location: "We've been conducting FRISIAN FLAG exercises for a lot of years already, and they were very successful. For us, it is a great moment that we have been recognized as being able to support and organize a high-quality exercise, like RAMSTEIN FLAG. We are proud that we have all the qualifications that are required to give our pilots the best training there is in the world, at least in their ability in this fragment of theatre, and do

Night take-off of a Finnish Air Force F/A-18C *Hornet* *NATO/Allied Air Command*

F/A-18C *Hornet*s on the taxiway back to the ramp after landing *Royal Netherlands Air Force*

Top: **F/A-18C *Hornet* just took-off** *Joris van Boven*

Left: **Flight line with five Finnish Air Force F/A-18C *Hornet*s and a Falcon 20C form Draken International** *NATO/AlliedAirCommand/Arnaud Chamberlin*

Right: **The pilot of this F/A-18C *Hornet* is waiting for the taxi clearance** *NATO/AlliedAirCommand/Arnaud Chamberlin*

that in a very organized and very effective way." Reiterating that van Egmond explained about the changing world and everything around it why NATO is organizing an exercise like RAMSTEIN FLAG. "In my career, I've been flying the F-16 until last year, and I was involved in a lot of exercises. I was looking forward to the current exercise last week together with Air Marshal Stringer (deputy commander of NATO Allied Air Command). We were looking to the briefing of the mission that was going to be flown, and we were both very excited about this. The only thing we wanted to do was jump in on a fighter and go and fly as well during the scenarios. We both saw up front the importance of this exercise." Van Egmond said why it is important: "This is one way of showing how the world looks right now, and I think you can all understand that the world isn't the same as it was ten or twelve years ago actually. 2014 was the first turning point in what we thought was going to be a nice, quiet, and very comfortable Western world with a great transatlantic alliance where we were working towards peace and keeping the peace as we have right now in this part of the world for more than 80 years. At the same time, there was a lot going on in the rest of the world. As nations within NATO, countries all focused on being able to support the world order at different locations than their own home base and their own theatre, because it was more important to go somewhere else in the world where the politicians would send the military to encounter insurgencies and to build new nations or restore peace at places where things have gotten

Rafale start-up prior to a night mission. The French Air Force deployed five Rafales from Escadron de Chasse et d'Experimentation 01.030 'Cote d'Argent' from BA 118 Mont-de-Marsan to Leeuwarden AB *Armee de l'Air et de l'Espace/Morgane Valle*

Armee de l'Air et de l'Espace/Morgane Valle

Joris van Boven

out of hand." Van Egmond continued: "But that reality has changed. We all know how Europe is looking right now, and the conflict on the eastern border with Ukraine, it is so close to our home countries, it's only an hour and a half flying time from here."

Forming the Winning Team

In 2022, Ukraine was invaded which was a major turning point in European history with respect to the common feeling of safety, said van Egmond; "We were flying within four hours missions from our home base, coming back home daily, sleeping in our own beds at home, and the next day you would fly again to Poland to support the NATO deterrence. We were there to reiterate the fact that we have a strong alliance and that we will not tolerate any incursions on our soil." Nonetheless, a lot has happened over time, and now the alliance landed here in Leeuwarden during the RAMSTEIN FLAG to show that NATO is determined, that nations train together, and that units train as realistically as possible together. NATO units also trained here on a nightly note which normally is not part of the FRISIAN FLAG exercise. This is changed during this RAMSTEIN FLAG because units then were able to operate in the dark as a team in a bigger alliance than normally is done. The airspace is not as big as the organization would like to see, but the alliance could utilize more airbases than normal. "During this exercise, we have to coordinate through multiple locations. We plan the missions at a distance. We make a plan together, we brief it together, we execute it together, and then we debrief together, and that is how we learn. Learn how to be good at what we do, which we normally already were, but also good at understanding what the other can and cannot do as a team. It is like all football players on a field, they are individually very good, but only with a good coach, and strong training, you can make the greatest team in the world, that can be world champion. On an individual level, there can be players who may not be there yet or do not have the same assets as you, we all have different aircraft, therefore we learn the strengths and the weaknesses of those aircraft, and we learn how we can utilize each other in the best way,

Alex van Noije

Rafales are rolling out for a night flight

and make the sum of all the parts bigger than the normal sum. Deterrence is based on the fact that units are able to do something as a team. People are trained to do it and are therefore able to show it. This is more than just a note on paper that people will do something, also the determination to actual execution is needed. It is not by showing only by being here together and putting all those assets together, it is about training together to reiterate our deterrence to whatever comes to the alliance members."

Defending by Deterrence

According to van Egmond, the missions had a specific objective during RAMSTEIN FLAG. The missions were mainly focused on integrated air missile defense which means defending the own territory. This is mainly done by counter A2/AD type of missions. With these forces, make sure that any opposing forces, that would try to enforce a no-fly zone against the alliance, are not able to do this by encountering their efforts. During counter A2/AD also the support to ground forces is part of the training. Van Egmond goes into the definition of airpower during the exercise; "Air power is especially great at projecting power over distance in a short matter of time and concentrating it at one point into a certain region. You are then able to put pressure on another point, within hours or minutes. Therefore, that speed is relevant, and the height is relevant to have a good visibility of what is going on, over a longer distance. It gives us a lot of information, and information sharing gives us the ability to detect, locate, and precisely attack those vulnerable assets of the opposing forces. With this approach, we can strike on opposing forces which are required for their plans against us. That is what air power brings." During RAMSTEIN FLAG the objectives were to make sure that the alliance demonstrates the capacity of air power,

Rafale start-up for the second round of the day, which takes place at night *All photos Armee de l'Air et de l'Espace/Morgane Valle*

make sure that forces are able to operate in a multi-disciplinary environment where forces can operate with the help of assets in space like satellites, at sea with a ship or on land with something simple as binoculars or any other tool which is needed. "This is to show how good we are, to make sure that they understand that it is not worth challenging us. Dedication of NATO is an alliance, therefore it's from all sides of the alliance that we have come together, all the way from Greece to all the way up in Finland, and everything in between, as well as across the ocean from the United States. It's all together here, to make sure that we train and fight as an interoperable military machine where we deliver air power. This is our mission that we show our force up that nobody will harm the alliance."

FRISIAN FLAG vs. RAMSTEIN FLAG

During FRISIAN FLAG the whole exercise was done from one location. During RAMSTEIN FLAG, units had the same airspace as units used in the past during FRISIAN FLAG. There was planning, execution, mission, and debriefing like always which was done at one location. Andre Steur explained the big difference between the exercise FRISIAN FLAG and RAMSTEIN FLAG: "The 323 Squadron was asked to organize the RAMSTEIN FLAG by NATO because of its years of experience with FRISIAN FLAG. It is a 'blueprint' for NATO to base future exercises on. 'Ramstein' refers to the airbase in Germany where NATO leads allied air missions. This year RAMSTEIN FLAG replaces the international exercise FRISIAN FLAG in the Netherlands. 'Frisian' refers to Friesland as the home province of Leeuwarden AB. It is therefore larger because we fly from multiple locations, but Leeuwarden does not have more participants than other editions, than what the region is used to from FRISIAN FLAG. The NATO allies also fly from other airbases in Europe for this exercise and that is a major difference. In the Netherlands, AOCS Nieuw Millingen and Eindhoven AB are also part of the exercise. In addition, our allies fly from various bases in Denmark, Germany, France, and the United Kingdom. In total, fifteen locations within NATO are participating." Now with the RAMSTEIN FLAG, the number of jets has grown, in the past there were about 60 aircraft at Leeuwarden AB, flying locally. Now the exercise consists of more than 90 aircraft

All photos Royal Netherlands Air Force

Left: The crew of a Rafale prepares for the next flight
Right: The Rafale's engines are running and the crew are waiting for the clearance to leave the ramp towards the runway for take-off

Alex van Noije

Joris van Boven

Armee de l'Air et de l'Espace/Morgane Valle

NATO/Allied Air Command

NATO/Allied Air Command

Joris van Boven

Armee de l'Air et de l'Espace/Morgane Valle

Armee de l'Air et de l'Espace/Morgane Valle

Main & below left: A Rafale fighter from the French Air and Space Force lands at Leeuwarden AB
Top left: Rafale fighters from the French Air and Space Force prepare to land at Leeuwarden AB
Below middle: A flight line supervisor shows the Rafales where to park after they returned from their flight
Below right: A ground crew member instructs the returning pilot to shut down the Rafale's engines

French Experimental Rafale Unit

During the Ramstein Flag 2025 exercise, a French detachment of Dassault Rafale aircraft was deployed at Leeuwarden AB. Lieutenant-Colonel Guillaume gave an interview. Lt Col Guillaume has some 2,500 flight hours and he is 22 years in service within the French Air Force (Armée de l'Air et de l'Espace). Five Dassault Rafale aircraft from Base Aérienne 118 Mont-de-Marsan flew to Leeuwarden AB for two weeks for the exercise. Lieutenant-Colonel Guillaume is part of the Escadron de Chasse et d'Expérimentation 01/030 'Côte d'Argent' (ECE, Fighter and Experimentation Squadron) which plays a crucial role in experimenting with new aeronautical technologies for the French Air Force. The detachment consisted of 115 persons of which some 20 were flying the Rafale aircraft. The role of Lieutenant-Colonel Guillaume was that of Detachment Commander and Rafale Pilot, where he was responsible for coordinating and managing the team while actively participating in flight operations. He mentioned that this exercise was of major importance for the Squadron as well as for the Air and Space Force because it strengthens the partnership within NATO and optimizes the ability to operate effectively with the allies. During this international exercise, he learned the importance of cooperation within NATO, particularly in air defense missions. Working with pilots and airmen from different countries strengthens the coordination, responsiveness, and effectiveness of units engaged in complex situations. This allowed him to perfect the mastery of common procedures and to better adapt the tactics and communication to ensure fluid and secure cooperation between the different allied forces.

Lieutenant-Colonel Guillaume
French AF/Morgane Valle

During this training, he had the opportunity to interact with other pilots and personnel from other nations, each bringing their own expertise. "We shared our respective experiences on the technical and tactical specificities of our respective aircraft, particularly addressing the Rafale's capabilities in terms of maneuverability and versatility in varied missions.

A ground crew member monitors the take-off preparations of a Rafale pilot
Armee de l'Air et de l'Espace/Morgane Valle

These discussions were valuable in comparing our working methods, whether for the management of on-board systems, in-flight communication, or coordination with other platforms. This has enriched our collective understanding and better integrated our different aircraft into a multinational framework." He was able to observe the approach taken to interoperability with fifth-generation aircraft, notably the F-35. The integration of this aircraft in joint operations has highlighted the challenges and opportunities linked to coordination between platforms of different generations, highlighting the importance of fluid communication and constant adaptation of procedures to guarantee maximum effectiveness in coalition.

About the air-to-air refueling, he said that the in-flight refueling procedure is a phase that requires great precision and high piloting skills. It requires perfect synchronization between the pilot and the tanker aircraft, with constant attention to flight parameters and the stability of the aircraft. At night, this procedure becomes even more complex due to the loss of three-dimensional visual cues. The absence of reference points on the ground makes spatial orientation much more difficult and increases the risk of disruptions when approaching for refueling. This difficulty is accentuated by the need for maximum concentration to maintain stability while integrating visual signals and instrumentation indications, which requires perfect technical mastery. Lt Col Guillaume said about the Ramstein Flag 25 exercise: "It was a huge opportunity for the Air and Space Force to practice and validate our procedures in a NATO framework while putting our material and human resources to the test in realistic and demanding conditions. The exercise results for our French Airmen and Women are as follows: 68 sorties flown, including more than 80 hours of daytime flight time, 64 hours of nighttime flight time, and nearly 20 hours of ferrying. An exercise that allowed everyone to hone their tactical expertise, confirming NATO's essential need to train in a high-intensity setting with leading nations equipped with the latest generation of combat aircraft. The idea, once again, was to place the participating nations in a high-intensity environment to prepare for tomorrow's conflicts. The threats that were replicated were completely modern and operational threats, so as to truly challenge the skills of friendly nations", concluded Lt Col Guillaume.

working together during various scenarios. The major difference and also difficulty is the fact that all these units fly from multiple locations making communication a key aspect to perform successful missions. This kind of coordination is new to many participants; therefore it's high-value training where it is important to coordinate quickly and accurately to make sure that people do the right stuff at the right time. The previous FRISIAN FLAG exercises took place during the day, at RAMSTEIN FLAG there was a shift to the evening/night flying. Andre Steur adds here; "It is important for us and our allies to train as realistically as possible. We see that performing in the dark is the most realistic currently. That is why we also say 'train as you fight'. We train in two waves from 16:30 to 23:30 at the latest. These are the only two evening flying weeks for Leeuwarden in the spring of 2025."

Objectives of RAMSTEIN FLAG

The planning of how the whole exercise was executed was the responsibility of Lieutenant Colonel Wim van Kampen of the RNLAF. He is working at HQ Aircom in the A7 division, which is responsible for planning and conducting the exercises within the Aircom community. His counterpart is Lieutenant Colonel Martin Friis of the Danish Air Force. Friis is working in the HQ Aircom A3 division, which is operations. His job is actually making the plans for how the alliance would go to war, and he needs to make sure the forces are able to do it already tomorrow. RAMSTEIN FLAG 2025 aimed to train allied air forces and test their responses to Article 5 scenarios in which NATO's defense commitments are invoked. A few focus exercises include Counter Anti-Access/Area Denial (C-A2AD), Integrated

Shortly after sunset, a German Air Force Eurofighter EF2000 assigned to Taktisches Luftwaffengeschwader 71 "Richthofen" taxis to the runway for take-off *Alex van Noije*

KEY-ROLE FOR EUROFIGHTERS

The German Luftwaffe's participation in RAMSTEIN FLAG consisted of the 71st Tactical Air Wing "Richthofen" (Taktisches Luft-waffengeschwader 71 "Richthofen", TaktLwG 71 "R"). The unit is based at Wittmund AB in the north of Germany and is operating the Eurofighter EF2000. This aircraft is very well equipped to strengthen tactical integration with Allied air forces and during the exercise the Germans were able to demonstrate the aircraft's flexibility across both offensive and defensive missions. As one of NATO's largest and most ambitious air exercises, Ramstein Flag 2025 set a new benchmark for operational integration, once again highlighting the Eurofighter's critical role in collective defense and rapid response operations. The German detachment at Leeuwarden AB was led by Lieutenant Colonel Fabian 'Forrest" S., leader of one of two Eurofighter squadrons the TaktLwG 71 "Richtfofen" has. This German unit is famous because of its name "Richthofen" referring to the famous Red Baron, Manfred von Richthofen. The aircraft of this unit are recognizable on the red "R" sign under the cockpit of the jet. Fabian flew in the past the Grob G120A, Beechcraft T-6, and the Northrop T-38 before he became a pilot on the Eurofighter. The German objectives during this exercise are briefly summarized by Lt Col Fabian: "Our main objective is the training of combined air warfare operations in the NATO alliance in both the air-to-air, as well as the air-to-ground roles. We will do this with eight Eurofighters, sustainably over two weeks, with two waves per day, and four aircraft per wave. We also give high attention to the training of younger crews and cross-sectional personnel in complex, highly realistic scenarios with up to 100 aircraft. For the more experienced pilots, we use the exercise also for tactical training and further education as a mission leader, operational group leader, or specialist group leader in military intelligence. Finally, we have technical challenges caused by short "turn-around" times, and harmonization of work processes on the ground. We want to learn to adapt quickly to these situations."

Lieutenant-Colonel Fabian S. Bundeswehr

The versatility of the Eurofighter was immediately visible when the exercise started. Both the aircraft as well as their pilots were easily adapted to changing situations in a matter of hours or even shorter. The EF2000 can easily be adapted to certain roles with respect to aircraft configurations and armament. The German unit undertook a wide range of high-intensity missions designed to simulate operations in contested and complex airspace. These operations tested the aircraft's capability to respond rapidly and flexibly to evolving threats. The Eurofighter was during Ramstein Flag a top-performing aircraft which was shown not only by the Germans but also by the British Royal Air Force with their Typhoons. Lt Col Fabian about the type of mission which are the key aspects of this exercise; "The missions during Ramstein Flag are Integrated Air and Missile Defense (IAMD), Counter Anti-Access/Area Denial (C-A2AD), Air Power Contribution to Land Operations (APCLO). One of our goals here is increasing interoperability, not only with air forces but also with land and naval forces within NATO." The Germans were very satisfied when looking back at the exercise. The

Joris van Boven

Joris van Boven

Luftwaffe achieved many of their learning objectives during this exercise according to Fabian: "Ramstein Flag 2025 impressively shows how professional and at what high level the NATO air forces work together! The attitude between participants is professional, open communication, and a friendly exchange between all nations involved. Intensive exchange of information about available weapon systems, tactics, procedures, and capabilities are just a few key features of this alliance. The exercise had an outstanding organization from both NATO and the Royal Netherlands Air Force". The German operations consisted of 150+ command participants from many areas of the Luftwaffe under the lead of the Tactical Air Force Squadron 71 'Richthofen'. The unit flew more than 70 sorties during the exercise in multiple roles which proved the Eurofighter to be a very suitable multi-role fighter for almost every type of mission. unit flew more than 70 sorties during the exercise in multiple roles which proved the Eurofighter to be a very suitable multi-role fighter for almost every type of mission.

A ground crew member signals the pilot of a German Air Force Eurofighter EF2000 into the parking position at the flight line *Bundeswehr/Marvin Hofmann*

Air and Missile Defense (AIMD), Agile Combat Employment (ACE), Air Command and Control, and information sharing across allied nations. Lt Col Van Kampen said the final area of focus is the integration of those five lines of effort in different scenarios. During RAFL25 Air, Land, Maritime, Cyber, and Space are fully integrated and seamlessly share information. From Space and Cyber Subject Matter Experts, Joint Terminal Attack Controllers, a Dutch Maritime Frigate operating from the North Sea, to over 90 Allied aircraft from 15 Allied Nations; operating from 12 airbases across the NATO theatre, integration has been the critical enabler. Over 2,000 personnel have supported RAFL25 demonstrating the scale of the exercise and, all benefitting from the most advanced highly sophisticated training opportunities in complex multi-domain operations.

Counter Anti-Access/Area Denial

One of the top priorities for RAFL25 was exercising Counter Anti-Access/Area Denial (C-A2AD) and Integrated Air and Missile Defense (IAMD). The threat on forward airbases from cruise and ballistic missiles can impose anti-access. With this capability, the enemy can deny access to Allied aircraft and create no-fly zones. C-A2AD measures are used to neutralize adversary military infrastructure, deter adversaries, and remove limitations on friendly forces to move freely in a given region to perform their missions safely. C-A2AD missions rely on all warfighting domains to execute successfully and are therefore the key objective of this massive exercise. Van Kampen explained in easy language what C-A2AD means: "If you have a fence outside of your house, it limits people from entering your house. So what you actually want, if you want to visit the house, is to be able to move into that area. Therefore, you would like to take that fence away, so it gives you freedom of movement. That is just an example, explained in a metaphoric way." All these defensive measures are set up in bubbles in general to protect certain areas of interest. An opponent will most likely have a concentrated area where its offensive capabilities are located, which they, of course, want to protect. Van Kampen explained that in these areas the enemy will have cruise missiles, ballistic missiles, and other offensive capabilities; "They most likely have missiles which are able to shoot at our ships, at our guys on the ground, and our aircraft in the air. This takes away, as I already mentioned, our freedom of movement. Therefore the first thing we would do is to make sure that these areas don't have a working defense anymore so that we are able to attend those areas, and that is what C-A2AD is." This is a discipline that is fairly new in NATO, said van Kampen: "The doctrine is developed in Aircom, and we are training this not for the first time, but we do train it the first time on this scale with the number of players we have in this exercise. And as we also stressed, this is what we call, again, multiple domain operations. It is not only about the air forces we have. For a mission like this, the plan goes over all components of the army, the navy, and even the space operations to support the air force. Also, in the cyber domain, there is a lot of support needed and even special operations can be involved. This is all in an effort to check out an opponent's ability to defend themselves."

Integrated Air and Missile Defense

The other main objective during the exercise was Integrated Air and Missile Defense (IAMD). IAMD is designed to unite multiple capabilities across the joint force to protect a given area against rapidly advancing air and missile threats. The IAMD setup requires sensors or assets across all the defense capabilities to be connected through multiple pathways to decide systems that evaluate and judge how best to deal with and defeat inbound threats. IAMD is built up of multiple layers of defense installations from short-range to medium-range to long-range capabilities. Friis highlighted that this

German Air Force Eurofighter on the taxiway *Armee de l'Air et de l'Espace/Morgane Valle*

Royal Netherlands Air Force

Joris van Boven

Royal Netherlands Air Force

Royal Netherlands Air Force

doctrine was practiced during the first phase of the exercise: "The first three days we did the integrated air and missile defense. Integrated means that we are defending our airspace on our territory with a mix of aircraft and ground-based or sea-based air defense capabilities using Surface-to-Air Missiles (SAM)." The exercise was conducted in a so-called semi-permissive environment. In total there are three types of environments in this area; There are non-permissive, semi-permissive, and permissive environments. Lt Col Friis explains the difference between the three types of environments: "If you remember places like Afghanistan where we had no airspace defense, we could do whatever we wanted during operations, this version is called permissive. If you then go to the other end of the spectrum, it is called non-permissive. This is an area where there are layered short-range, medium-range, and long-range surface-to-air Missile (SAM) installations placed which are able to shoot at us. That is a hard nut to crack, and that will take a lot more effort and bring risks. When we're talking about semi-permissive environments, that is where we assume that we will be there for

Joris van Boven

Royal Netherlands Air Force

just a few days to go into a war, and we need to set up these systems only for the period we are there."

Agile Combat Employment

Also, an important item in the recent period is Agile Combat Employment or 'ACE'. Despite the fact that this objective was set for RAMSTEIN FLAG it was not executed during this edition, according to Friis: "We're trying to teach the teams how to implement ACE as well, so they better understand what path they are taking in this exercise and in a real conflict. The exercise release concept was actually one of the aims of this exercise, but because of some relocation of aircraft, we were not able to conduct this concept for various reasons." ACE is an operational scheme of maneuver designed to improve resilience and survivability while generating air combat power from both home bases and geographically dispersed locations. ACE can be conducted from Main or Deployed Operating Bases and Contingency Locations; this requires a flexible, well-prepared, and coordinated approach by the deploying force and the receiving bases. Lt Col Friis was going deeper into ACE: "ACE actually means that you take a plane and you fly into another country, it has to be serviced over there, it has to be reloaded and re-armed, and then you go out to do your thing again. But unfortunately as said, we were not able to do that for now, so we are going to elude more

Take-off of an EF2000

HELLENIC AIR FORCE – F-16 *FIGHTING FALCON*

Take-off of a Hellenic Air Force F-16C *Fighting Falcon* with conformal fuel tanks (CFT), AIM-9 *Sidewinder*, and AIM-120 AMRAAM air-to-air missiles *NATO/Allied Air Command*

on that in future exercises. The reason why we do ACE is simple. If you are every day parking your aircraft at the same spot, an opponent will know where it is and likely try to target it. Therefore the purpose of ACE, which is Agile Combat Deployment, is actually to stay unpredictable for your enemies by moving your aircraft all the time to different locations." In practice, this means that personnel are able to move aircraft to different locations on the same base all the time when executed on a small scale. But also during missions on a large scale pilots are able to take off from their base and will fly a mission and land somewhere else to refuel or re-arm. This approach needs practice as the aircraft will be serviced by technicians from other countries who are not used to the aircraft type from others. Also logistically, this is a challenge as organizations need to have spare parts and weapons available in different locations to make sure that pilots have the right tools to continue fighting." Friis added that it goes further than just using the standard airbases "It is also possible to let planes operating from remote locations like short runways and highway strips. The Scandinavian countries are especially well-trained in this concept. Constantly moving aircraft around needs planning and a lot of training, but it is very valuable to survive during a conflict as the enemy doesn't know where you are."

Built-up of RAMSTEIN FLAG

Like many other exercises, RAMSTEIN FLAG also had a build-up of intensity during the two weeks of action. The airspace of the exercise was located north of the Netherlands above the North Sea from the west coast of Denmark almost until the United Kingdom. The exercise airspace is from the South to the North, roughly 360 kilometers long. The width is about 180 kilometers from East to West. Also, civilian aviation is using this airspace in general and therefore the airspace during the exercise is limited to this size as it is a very busy

Joris van Boven

Alex van Noije

Suppression of Enemy Air Defenses Role

During NATO's RAMSTEIN FLAG 2025 exercise, the Hellenic Air Force (HAF) played a pivotal role, particularly in the Suppression of Enemy Air Defenses (SEAD) operations. Greece deployed F-16C Fighting Falcon fighter jets from 343 Squadron, known as 'Asteri' (Star), based at Souda Bay in Crete, to participate in the exercise. The Greek detachment brought four F-16C Fighting Falcon "Viper" fighter jets to Leeuwarden AB. The F-16s are the newly modified version of the Fighting Falcon. "All aircraft here are the modified Block 72V version" confirmed the Greek Detachment Commander ('Geek DetCo'), whose name stays undisclosed due to operational security reasons. About 50 personnel supported the Greek operation at Leeuwarden during the exercise. The HAF's F-16s are particularly configured for SEAD missions, primarily using AGM-88 High-speed Anti-Radiation Missiles (HARM) to target and neutralize enemy radar and surface-to-air missile systems. According to the Greek DetCo "Our basic role is air-to-air defense, but we are also a SEAD capable squadron. Therefore, we are executing the SEAD missions also during the operations.". The DetCo confirmed that the jets were loaded with HARM ordnance for the exercise: "Today we're going to load them up again because our mission is SEAD in today's scenario." In early 2020, the Hellenic Air Force announced the start of a modernization program for its large F-16 fleet. Greece awarded Lockheed Martin a $280 million contract to upgrade its fleet of F-16C-52+ and F-16D-52+ aircraft to the Block 72 "Viper" configuration. This upgrade included the integration of the APG-83 Active Electronically Scanned Array (AESA) radar, significantly enhancing the aircraft's ability to identify and engage enemy aircraft. Starting in 2021, the 343 Squadron 'Asteri' was the first unit to receive the upgraded Vipers, and is now operationally involved in a key role during RAMSTEIN FLAG. RAMSTEIN FLAG 2025 emphasized complex, multinational air operations, including Counter Anti-Access/Area Denial (C-A2AD) and Integrated Air and Missile Defense (IAMD) scenarios. The HAF's SEAD missions were critical in suppressing simulated enemy air defenses to enable freedom of action for other allied aircraft. "As SEAD players, we're high-value players daring an average mission. We have to be protected by escorting fighter aircraft on scene, do our job and destroy the enemy radar and missile installations, and then move out and participate in the air-to-air role on our way out" explained the Greek DetCo. He also mentioned the dual nature of their missions showing the flexibility of the Viper standard F-16s: "We always carry air-to-air missiles next to our SEAD armament, we can do that in the same mission making us a special participant in the scenarios." The Greek unit had previously also participated in the inaugural RAMSTEIN FLAG exercise, hosted in Greece in 2024. Comparing the two editions, the Greek DetCo noted: "The big difference is that last year it was a one-base-concept where we all took off from one location moving out to do our things. This year we all fly from multiple locations making it more realistic as we need to plan with assets that are not present on this base. Otherwise, we fly the same missions and we're trying for the same purpose eventually". The involvement of the HAF in SEAD roles during RAMSTEIN FLAG 2025 underscored Greece's commitment to NATO's collective defense initiatives. Their participation not only showcased their advanced capabilities but also enhanced interoperability among NATO air forces, ensuring readiness for various operational scenarios. Participation in RAMSTEIN FLAG 2025 once again highlighted the Hellenic Air Force's advanced capabilities and its commitment to enhancing NATO interoperability and readiness across various operational scenarios.

Joris van Boven

Armee de l'Air et de l'Espace/Morgane Valle

Above: **This frontal photo clearly shows the CFTs, which fit perfectly into the transition between fuselage and wings and give the F-16 an impressive appearance**
Armee de l'Air et de l'Espace/Morgane Valle

Royal Netherlands Air Force F-35A *Lightning II* taxis for take-off for a night mission *Alex van Noije*

part of airspace in general. The built-up of the exercise follows the rules and development of most wars, as Friis explained: "The scenario is in general that the fighters of the 'Blue Force' start from their home country somewhere in the north and engage the 'Red Force' towards the south. The first three days of the exercise were all about IAMD defending ourselves and our own territory. The next four days were about the C-A2AD approach. Here we had to strike back against those enemies with a number of threats simulated and actually present in the south, including ships and aircraft on the Dutch side of the area. The last two days will be Air Zero. That means air power contribution to land operations, which means actually supporting the army while they are entering the enemy territory which was neutralized during the C-A2AD phase. If NATO is attacked, it's probably on the ground, and the army will be the party that is requesting help from us with some aircover." All participants of the exercise played roles in both 'Blue Force' and 'Red Force' during RAMSTEIN FLAG. With this built up all involved participants need to communicate and cope together as one big team in all domains of modern warfare. This made RAMSTEIN FLAG the most up-to-date exercise fitting the modern world of nowadays.

Great Results on the Scene

RNLAF Commodore van Egmond was looking back on the exercise RAMSTEIN FLAG: "We have the exercise behind us, and it's been a great success so far and I'm very happy. The fact that we have flown nearly all missions with all aircraft being able to take off is great. We had only a few aborted flights, but it's been very limited which is something great." Also about the lessons learned in the exercise van Egmond was clear: "There are always a lot of lessons learned during an exercise like this. Therefore, if you ask me what could be better, I think it will be in the tactics and in the training level of people that came here. We need to keep working on getting better over time, but you can see this group is growing rapidly. There are different missions that are being challenged. This means it was the first time that we integrated air missile defense. On the third day, things went much better than the first day already showing the learning curve of

Photos this page by Alex van Nolje

all involved. This is the same for our integrated air missile defense teams during countering Anti-Access/Area Denial (A2/AD). The things that we would like to improve are probably better threats for training purposes like air missile systems." There is a good simulation going on currently, but this aspect might be something to improve upon according to van Egmond. Also, he liked to see more tankers and other assets available during the training. But for now, the airspace reservation was an issue as it is a limited area to train in.

Dutch & American Innovation

Another success during RAMSTEIN FLAG was the first success with the live exchange of combat data without the help of the United States. An F-35A fighter and the Dutch command system Keystone exchanged live data for the first time outside the United States. This important step in the multi-domain operation was taken during the second week of the exercise. In this example, an F-35 found and identified a target on the ground, and the aircraft sent the information to the Keystone system. This automatically forwarded it to an army unit which in turn eliminated the target via the PULS rocket artillery system. This process took only a few minutes, from finding the target to firing the missiles. The test was conducted with the help of the United States Air Force and F-35 manufacturer Lockheed Martin and TNO (TNO is a Dutch investigation organization). It is the first time that this has been done in Europe with F-35 aircraft. The RNLAF has been using the Keystone program since last year. This program shows how quickly concrete results can be achieved from an operational concept. Collaboration with military and civilian partners has led to this successful test. All in all van Egmond was looking back as a satisfied man, but he also mentioned that this is only the beginning and it can only grow further from here on in the future.

Conclusion of the Exercise

Hosted by the Royal Netherlands Air Force (RNLAF), RAFL25 brought together around 2,000 personnel, over 90 aircraft from more than 15 NATO nations, operating from 12 Allied airbases across Europe.

Preparing an F-35A *Lightning II* for the next flight
All photos Royal Netherlands Air Force

During RAMSTEIN FLAG, for the first non-U.S. F-35A demonstrated its capability to securely share data in flight and in real time with 'Keystone', a Dutch Command and Control system *All photos Royal Netherlands Air Force*

Royal Netherlands Air Force

Joris van Boven

Joris van Boven

Building upon the inaugural RAMSTEIN FLAG 25, this year's exercise focused on enhancing capabilities in Counter Anti-Access/Area Denial (C-A2/AD), Integrated Air and Missile Defense (IAMD), Agile Combat Employment (ACE), and information sharing among participating Allies. The scenarios provided a high-intensity training environment, challenging participants to execute complex missions across all warfighting domains: air, land, maritime, cyber, and space. General James Hecker, Commander of NATO Allied Air Command, emphasized the importance of such exercises; "RAMSTEIN FLAG 2025 underscores the Alliance's determination to adapt, evolve, and deter potential threats across the Euro-Atlantic region." RAFL25 builds not only on the lessons identified during RAFL24 but also lessons from the ongoing war in Ukraine. To gain and maintain air superiority in a potential conflict is the level of ambition in every contested area of operations. "Air superiority is a premise, for the Air Force and for all domains", added General Hecker, "we are here today practicing to ensure that if we need to get air superiority, that we have the capability to achieve it." Lieutenant General André Steur, Commander of the Royal Netherlands Air Force, emphasized the importance of exercises such as RAFL25, "When push comes to shove, many will depend on us as a First Responder, tonight if need be. The ability and will to fight together among Allied Air Forces remains NATO's most significant deterrent. The successful execution of RAFL25 reinforces NATO's ability to respond rapidly and effectively to emerging threats. By integrating advanced tactics and fostering collaboration among member nations, the exercise contributes to the Alliance's deterrence and defense posture. As NATO continues to adapt to the evolving security landscape, exercises like RAMSTEIN FLAG remain vital in ensuring that Allied forces are prepared to defend the Alliance's territory and populations.

Take-off of a Dutch F-35A *Lightning II* ib the warm light on the late afternoon *Alex van Noij*

ROYAL NETHERLANDS AIR FORCE – MQ-9A *REAPER*

Currently the Royal Netherlands Air Force has four MQ-9 *Reapers* and another four on order. The *Reaoers* will receive upgrades, including capabilities such as maritime radars, a communications relay, extended range fuel tanks, electronic support measures (ESM), and weapons
Royal Netherlands Air Force

With the MQ-9A, the Royal Netherlands Air Force supports NATO's ISR and maritime surveillance missions throughout Europe
All photos Royal Netherlands Air Force

SWEDISH AIR FORCE – JAS 39C *GRIPEN*

Two Swedish Air Force JAS 39C *Gripens* are taxiing past the German Air Force Eurofighter EF2000 flight line *Armee de l'Air et de l'Espace/Morgane Valle*

Youngest Member with a Huge Experience

Currently the latest new member of NATO is Sweden. The Swedish Air Force was for the first time involved as full NATO member in an exercise of this scale. They came to Leeuwarden AB with six Saab JAS-39C Gripen fighters. The Swedish detachment during RAMSTEIN FLAG 2025 was led by Major "Expert" ("Expert" is his personal callsign) who is one of the Gripen pilots and squadron commander of the 71st squadron from Såtenäs AB in Sweden. The 71 Squadron is also known as F7 1.Division. F7 is in Sweden known as the Skaraborg Air Flotilla.

The Swedish detachment consisted of almost 70 people who were supporting the Gripen fleet in Leeuwarden. Sweden is NATOs youngest member but a very experienced member as the country always took care of its own security on a national level. "Expert" explained that the world changed enough to convince Swedish politics to join NATO in 2024: "The potential threat in Europe is very clear at the moment. The world has changed compared to one decade ago. The trainings have shifted from peacekeeping missions to preparation for war in various scenarios." The main goal of the Swedish Air Force was to continue NATO integration, especially in the planning, execution, and evaluation of large-scale air combat operations. Flying in new airspace, cooperating with non-Swedish-speaking pilots, and operating from a foreign base provides valuable lessons, especially for the younger Gripen pilots. At the same time, the unit will both learn from and contribute to NATO with new perspectives and tactics in air combat. "Expert" added weight to this as it is very important for Sweden to go through these steps; “We've been a partnership for peace nation for quite some time, therefore especially the Swedish Air Force has been quite well integrated already.

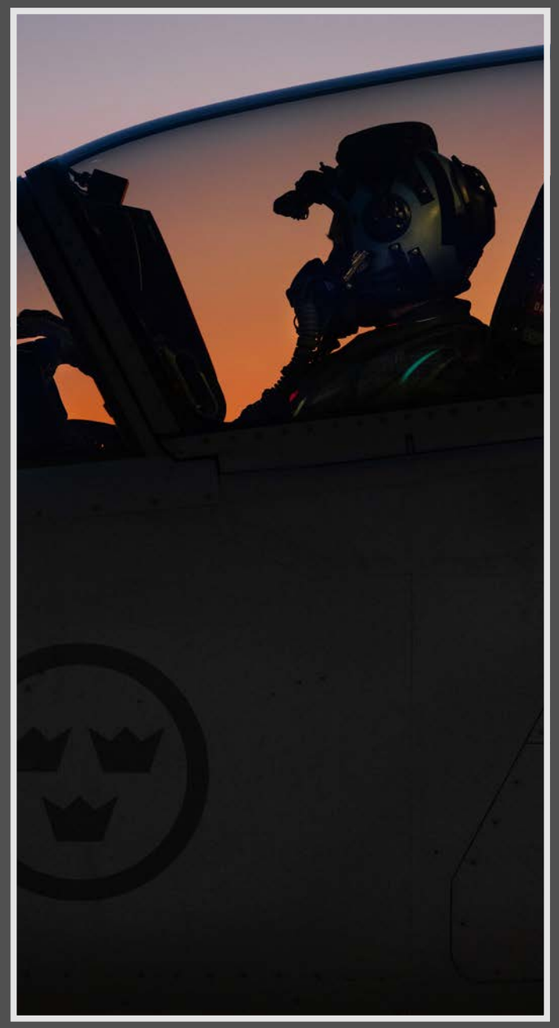
Joris van Boven

Armee de l'Air et de l'Espace/Morgane Valle

The big change currently as a full NATO member is that we're able to share information both during planning and in the air between aircraft. Now we can really say we are fully integrated as we can actively join all the processes and preparations." Despite the fact that the Swedish are new in NATO it is not the first time they come to Leeuwarden. The Swedish participated in Frisian Flag in the past and are therefore already familiar with working in an international team during the exercise.

"Expert" added that the Swedish Air Force is now able to make the next step in their development on the European stage due to this exercise: "We train here on a daily base in the highest combat intensity. This means that we train every possible scenario where multiple aircraft are involved which all play a different role. As a standard scenario, we fly offensive counter-air missions with various components such as air-to-ground strike missions, air-to-air sorties, and being part of a team for the suppression of enemy air defenses. Next to this we also practice refueling and we need to deal with changing incoming intel at all moments. We just have to be ready to perform this on a daily basis. We aim to participate with four aircraft in each wave. This means that we take off twice a day to join the missions. One time we will join the 'Blue Forces' while another time we join the 'Red Forces. By switching all the time we are forced to adapt and we grow as a team every day."

The Saab JAS 39 Gripen was a unique aircraft during the exercise as it was the only lightweight fighter during the scenarios of RAMSTEIN FLAG. The JAS-39 is a 4th generation fighter jet and was developed by the Swedish company SAAB. The Gripen is able to do specific tasks which are unique for the aircraft. With the Gripen Sweden is bringing specific knowledge to the alliance during the exercise. Expert explains what the typical Swedish techniques are which are brought to NATO by this newest member: "In the Swedish Air Force we have the Robotsystem 15 anti-ship missiles which is our own national product. This missile is versatile and can be fired from ships and the Gripen. We are able to carry two of these missiles on one aircraft. We also have the meteor air-to-air missile, but this missile is used by more countries. These weapons give a great standoff against both aircraft threats and on the surface like ships." One of the other advantages is that the Gripen is a rather small aircraft; "Back home in Sweden we have the possibility of landing on short airstrips and stuff like that but that's not part of this scenario right now. But this is a big part of our way to do it, defending just our nation. Now we are looking more at NATO because both Article 3 and Article 5 apply to us and we no longer just have to defend our country, but much more." All in all, "Expert" and the rest of his team are very pleased to be part of this bigger picture since his country joined NATO. The Swedish have proven already that they are a very valuable member of NATO.



Left: **Pilot of a *Gripen* with night vision googles (NVG) mounted to his helmet** *NATO/Allied Air Command*
Top right: **The *Gripen* is leaving the ramp for a night mission** *NATO/Allied Air Command*
Right: **Waiting on the runway waiting for take-off clearance** *Alex van Noije*

Alex van Noije

U.S. AIR FORCE EUROPE – F-35A *LIGHTNING II*

Alex van Noije

Royal Netherlands Air Force/Sgt. Maj. Jan Dijkstra

NATO/AlliedAirCommand/Arnaud Chamberlin

Royal Netherlands Air Force/Sgt. Maj. Jan Dijkstra

Alex van Nolje

Main: The pilot of this U.S. Air Force F-35A *Lightning II* is waiting for the clearance into the take-of position on runway 05 at Leeuwarden AB

Insets: During a cross-servicing event at RAMSTEIN FLAG 2025, U.S. and Dutch ground crews worked together to prepare to launch U.S. and Dutch F-35A *Lightnings IIs. S*uccessful cross-servicing at RAFL25 is an example of the importance of integrated logistics and maintenance training that enhances U.S. warfighting readiness by strengthening United States Air Forces in Europe – Air Forces Africa's ability to deploy, sustain, and project fifth-generation capabilities across the European theater

All photos Royal Netherlands Air Force

All photos Joris van Boven

Alex van Nolje

CIVIL – DRAKEN INTERNATIONAL – FALCON 20C

Falcon 20C from Draken Inernational, a civil company, provided electronic warfarce support for the exercise *Joris van Boven*

All photos Royal Netherlands Air Force

COBRA WARRIOR 25-1

ARTICLE BY RALF JAHNKE

Exercise COBRA WARRIOr 25-1, led by the Royal Air Force, took place from 24 February to 14 March 2025. RAF Coningsby was a primary operating base and home to many Typhoon squadrons. Following the exercise, six Typhoon FGR.4s were deployed on one of the many flight lines

ROYAL AIR FORCE – II (AC) SQUADRON – EUROFIGHTER TYPHOON FGR.4

The first COBRA WARRIOR exercise of the year was held from February 24 to March 14, led by the Royal Air Force from various RAF bases across the United Kingdom, including RAF Waddington, RAF Lossiemouth, RAF Coningsby, RAF Brize Norton, and RAF Leeming. RAF Waddington was responsible for planning all training scenarios and operations.

At the same time, the international participants were stationed at this base. The Armée de l'Air sent three Rafale B fighter aircraft from the 4e Escadre de chasse from St. Dizier, but they only took part in the first week of the exercise. Türk Hava Kuvvetleri sent three F-16C/D of the 152nd Filo from Incirlik.

A special highlight was certainly the participation of six F-15SAs from the Royal Saudi Air Force's 6th Squadron, which is stationed at King Khalid Air Base on the Red Sea in the southern part of Saudi Arabia. The Royal Saudi Air Force (RSAF) is one of the most modern and powerful air forces in the Middle East. From 2015 on, 84 Boeing F-15SAs were built for the RSAF, in addition to the 72 F-15S Peace Sun IXs already in service. However, the country could not purchase the modernized fighters directly from the manufacturer. Instead, it had to place the order with the U.S. government as part of a bilateral government-to-government deal, known as Foreign Military Sales (FMS).

II (AC) Squadron from RAF Lossiemouth sent a Typhoon FGR.4 'ZK300' to the main operating base at RAF Coningsby for support

With a volume of 29.4 billion US dollars, it was one of the largest defense contracts of its time. The last four F-15SAs were only delivered to Saudi Arabia in December 2020. The F-15SA is comparable in type to the F-15E Strike Eagle of the US Air Force. The participation of the Saudi F-15 in a COBRA WARRIOR exercise was also a first. The exercise is known for non-NATO partners occasionally participating in and flying joint missions. In the past, the Indian Air Force has also taken part with the Mirage 2000 and Su-27.

The exercise usually takes place in the spring and fall of each year. In this year's edition, the exercise area was mainly over the North Sea in reserved airspace. Other combat aircraft involved were Typhoons FRG.4, flying from their home bases RAF Coningsby and RAF Lossiemouth, and F-35B Lightning IIs from RAF Marham. One mission per exercise day was flown either in the morning or afternoon with up to 40-50 aircraft, classically Blue Air versus Red Air. French A330 MRTT, RAF C17A, RAF A400M, and an RAF Voyager were used for aerial refueling of the fighter aircraft over the exercise area. Helicopters from RAF Leeming were also embedded in COBRA WARRIOR. This time, the U.S. Air Force Europe did not take part with their F-35A from RAF Lakenheath and tanker aircraft from RAF Mildenhall.

The main objectives of COBRA WARRIOR 25-1 were to integrate the nations and their capabilities, to practice tactics, and to ensure the compatibility of the different combat aircraft. This multinational element forms the core of COBRA WARRIOR. During the exercise, the participants carried out a wide range of missions, from defensive air defense to offensive operations. All content of the exercise was carefully choreographed by the senior staff at RAF Waddington. The large-scale scenarios included threats from the air and ground. Therefore, the crews had to coordinate tactics, share best practices, and operate effectively as a combined force. Current knowledge from the war of aggression against Ukraine was incorporated into the exercise, which included GPS failure, cyber threats, and sophisticated air defenses. The exercise included maritime operations in the North

Above: After its mission over the North Sea, Typhoon FGR.4 'ZK300' returns to base
Right: The Typhoon FGR.4 is ready for takeoff for its next mission

Sea and land force operations. Altogether, these elements simulated a challenging, multidisciplinary environment designed to replicate the complexity of modern conflict.

The personal connection between the international crews also played a crucial role in the success of the learning process. Especially as COBRA WARRIOR will evolve along with new technologies, new aircraft capabilities, and changing strategic environments. The exercise ensured that all participants were better prepared for possible real-world scenarios by offering realistic, large-scale missions, promoting interoperability, and emphasizing camaraderie between partner nations. This multinational exercise gave participating units the chance to enhance their cooperation and tactical abilities in complex situations.

3 (F) Squadron participated with its FGR.4 Typhoons. Three aircraft without squadron markings await take-off clearance at the holding point on runway 20 at RAF Coningsby

3 (F) Squadron operates one of two Quick Reaction Alert (QRA) stations in the United Kingdom. The squadron crest bears the unit's motto, "The third shall be the first!"

Top: Touch down of the Typhoon FGR.4 'ZK343' with good rubber abrasion on the tires
Above left & right: Two Typhoons, 'ZK373' and 'ZK334' of 3 (F) Squadron, hover over the runway. The Typhoons carry an ASRAAM missile on their outboard under-wing station. This is a short-range air-to-air missile with an infrared seeker and a fragmentation warhead

ROYAL AIR FORCE – XI(F) SQUADRON – EUROFIGHTER TYPHOON FGR.4

The XI (F) Squadron is the world's oldest, dedicated fighter unit. Aircraft flown by the Squadron include Bristol Scout, Hurricane II, Lightning F6 and Tornado F3. XI (F) Squadron policed the no-fly zone over Libya during Operation ELLAMY. Most fighter aircraft carry colorful squadron insignia

Main: Shortly before sunset, Typhoon FGR.4 'ZK333' returns from the Cobra Warrior mission
Left: Typhoon FGR.4 rolls from the runway onto the taxiway and back to the XI (F) Squadron area
Right: Typhoon FGR.4 is waiting at the holding position for taxi clearance onto the runway.

Turning off for the final landing at RAF Coningsby. The low sun illuminates the aircraft perfectly

ROYAL AIR FORCE – 12 SQUADRON – EUROFIGHTER TYPHOON FGR.4 & T.3

Approaching RAF Coningsby in a three-ship formation. Since July 2020, they have formed the joint British-Qatari Typhoon squadron and are a cornerstone of the cooperation between the two air forces. The Qatar Emiri Air Force (QEAF) ordered a total of 24 Typhoon fighter aircraft, and every pilot in this 12 Squadron has completed the training on this type

Main: 3-ship formation of 12 Squadron. Two aircraft carry a LITENING V targeting pod for reconnaissance and close air support (CAS) missions

Left: Takeoff of a Typhoon FGR.4 'ZK376'. The newly designed 12 Squadron patch includes both national flags

Right: For training, 12 Squadron uses several two-seater Typhoon T.3s, shown here is 'ZK383'

Left: The Typhoon FGR.4 'ZK345' rolls onto the runway
Right: Rolling out of Typhoon FGR.4 'ZK314' after landing
Above: Takeoff without afterburner of Typhoon FGR.4 'ZK345'. The Qatari Squadron also uses aircraft without markings

After a touch-and-go, this aircraft enters another circuit with the landing gear down. The two external fuel tanks, the LITENING V targeting pod, and the ASRAAM missile on the left external boom are clearly visible

ROYAL AIR FORCE – 29 SQUADRON – EUROFIGHTER TYPHOON FGR.4 & T.3

29 Squadron, the Typhoon Operational Conversion Unit (OCU), trains RAF fighter pilots on the Typhoon and prepares them for frontline combat. Here, two are taxiing fairly close together along the runway after returing from a COBRA WARRIOR mission

RAF Coningsby is a former bomber base. Three Vulcan Bomber Squadrons were once stationed here, among others. Therefore, the airfield has a very wide runway, allowing multiple Typhoons to take off simultaneously

Main: A close formation of 29 Squadron Typhoons arriving over RAF Coningsby

Left: The Typhoon FGR.4 'ZK344' takes off for its next mission.

Right: As a training squadron, the unit has several training aircraft, the 'ZK382' is a Typhoon T.3 from the last production batch

The RAF currently operates only 137 Typhoons in 10 squadrons. Forty-nine Typhoons from the first batch have already been decommissioned. The Typhoon's primary bases are RAF Lossiemouth and RAF Coningsby. QRA is also provided from these bases


382

Main: Fly-over of a Typhoon FGR.4 assigned to 29 Squadron
Left: Takeoff of Typhoon 'ZK325', equipped only with a center-line external tank
Right: Takeoff with afterburner of Typhoon FGR.4 'ZK431'

The squadron's insignia shows a flying eagle chasing a buzzard, symbolizing aerial combat. A flag and the name of the commander of 29 Squadron are depicted below the cockpit

ROYAL AIR FORCE – XLI (TES) SQUADRON – EUROFIGHTER TYPHOON FGR.4

As the RAF's Test and Evaluation Squadron for fast jet aircraft, XLI Squadron focuses primarily on developing capabilities and tactics for the Typhoon. The squadron's motto is: Seek and destroy! In the post-war period, the squadron operated Hawker *Hunter*, Gloster *Javelin*, McDonnell Douglas *Phantom* FGR2, SEPECAT *Jaguar,* and Panavia Tornado F3

Head-on shot of the Typhoon! The RAF base allows for great photos from outside the fence!
On the left side above the radome is the Pirate System (Passive Infrared Airborne Tracking Equipment). The system's passive sensors enable simultaneous detection and tracking of multiple and movinig targets

ROYAL SAUDI AIR FORCE – 6 SQUADRON – F-15SA *STRIKE EAGLE*

The Royal Saudi Air Force (RSAF) F-15SA *Strike Eagle* multi-role fighter aircraft made its UK debut as part of the RAF's largest exercise. The six *Strike Eagles* deployed from 6 Squadron/5 Wing at King Khalid Air Base to RAF Waddington. F-15SA '636' and '638' in the traffic pattern at RAF Waddington

The RSAF is deploying up to six *Strike Eagles* per mission during Exercise COBRA WARRIOR. The F-15SA *Strike Eagle* is the most modern version of the modernized two-seat F-15S *Strike Eagle* and, in addition to improved combat management systems, features redesigned wings and an additional underwing station. The photo shows the aircraft taxiing for takeoff at RAF Waddington. The *Strike Eagle's* bulky CFTs (conformal fuel tanks) attached to the fuselage tanks are particularly striking

While *Strike Eagle* '635' awaits taxi clearance, the Red Arrows continue to rehearse specific maneuvers from their flight program at their home base

Main: Another F-15SA taxis onto Runway 20 at RAF Waddington
Left: The F-15SA '636' assigned to 6 Sqaudron takes off for a morning mission
Right: Takeoff of F-15SA '633' with its afterburners engaged

F-15SA '633' breaks for a circuit and subsequent landing. Flight times were up to 2.5 hours, and the main training areas were mostly over the North Sea

Touches down of *Strike Eagle* '636' in front of ATC tower in RAF Waddington. Shortly before touchdown, the crew deploys the large airspeed brake

Return of four RSAF F-15SAs at RAF Waddington base. The oversized runway allows the aircraft to land in quick sequence as it provides sufficient space for taxiing

For air combat, the F-15SA carries an AIM-9X *Sidewinder* short-range air-to-air missile, an AN/AAQ-33 SNIPER targeting pod on the left fuselage station, and an AN/AAQ-13 LANTIRN navigation pod on the right. The navigation pod contains a terrain-following radar and an infrared detector. This enables the aircraft to maintain a predetermined altitude above ground and to avoid obstacles

F-15SA '638' taxiing off the runway. The RSAF received a total of 84 F-15SAs from the United States, and additional F-15Ss were modernized to the new SA standard. They operate from No. 3 Wing at King Abdulaziz Air Base and No. 5 Wing at King Khalid Air Base.

The F-15SA '636' taxis to its parking position after a mission. The squadron motto is written in Saudi and English under the cockpit: "Good bless you"

Main: The 152nd Filo of the Türk Hava Kuvvetleri participated in Exercise COBRA WARRIOR with a total of three F-16C/D Fighting Falcons. Two Turkish F-16C/Ds, '90-0020' and '92-0022' flew over RAF Waddington

Inset: A Turkish Air Force F-16C prepares to land

Main: F-16D assigned to 152 Filo '92-0022' taxis onto Runway 20 after takeoff clearance. The Turkish Air Force used two Falcons per mission. The 152 Filo from Incirlik sports a stunning Akinci-style tail paint scheme.

Inset: The F-16C '93-0007' taxis out to its next mission

Main: Low flyover of a 2-ship formation over RAF Waddington.
Left: F-16C '90-0020'' shortly before touchdown after successful COBRA WARRIOR mission.
Right: Low approach of F-16D '92-0022' to Runway 20

The return of a pair of *Fighting Falcons* of the 152 Filo on the extra-wide runway, followed by taxiing onto the taxiway to the Squadron's flight liine

F-16C '93-0007' assigned to the 152nd Filo rolls off the runway after its morning mission. With 230 aircraft, the F-16 forms the backbone of Turkey's air defense. The NATO state originally planned to upgrade to the F-35 *Lightning II*, but the acquisition of the Russian S-400 air defense system put the U.S. F-35 procurement on hold. Meanwhile, the Turkish aviation industry will push ahead with the modernization of its fleet

ROYAL AIR FORCE – 14 SQUADRON – SHADOW R1

14 and 54 Squadrons operate a total of eight reconnaissance aircraft at RAF Waddington. A Beechcraft Shadow R1 from 14 Squadron rolls out and completed several reconnaissance flights during the COBRA WARRIOR mission

Landing approach of a Shadow R1 'ZZ507' to runway 20. Based on the Beechcraft King Air 350CER, the Shadow R1 was transformed into a reconnaissance and surveillance platform with an electro-optical sensor turret under the fuselage, a multitude of integrated sensors, and comprehensive communications functions.

The Shadow R1 'ZZ507' is ready for takeoff on the runway. The aircraft is equipped with satellite communications, allowing it to transmit or receive information during a mission.

ROYAL AIR FORCE – RED ARROWS – HAWK T1

In October 2022, the Red Arrows relocated from RAF Scampton to RAF Waddington. Since then, the aerobatic team's training flights have primarily taken place here, and the base is once again home to fighter jets.

A pair of Red Arrows, 'XX310' and 'XX232' take off to practice the "reciprocal maneuvers" program over the base. The aerobatic team's rehearsals were conducted prior to the start of the COBRA WARRIOR missions

Hawk T1 'XX232' in a slight climb to approach the oncoming Hawk.

Pilots with aircraft '6' and '7' are required to meet special demands. These pilots comprise the so-called "solo pair," formerly known as the "synchro pair," of the team. They remain separate from the rest of the formation except for a few figures in the second part of the dsiplay program of the show. They are primarily responsible for spectacular encounter maneuvers.

In 1980, the previous Gnat aircraft were replaced with the more modern BAE Hawk, which the Red Arrows are still flying today. The Red Arrows have flown over 5,000 demonstrations in 57 countries. The team represents the speed, agility, and precision of the Royal Air Force and is the flagship of the armed forces

MARINA MILITARE AT SARZANA

ARTICLE BY SIMONE BA & PAOLO ZERLOTTO - AVIATION-SHOTS

Close formtion of an MH-101 assigned to 1st Helicopter Group (forground) and an MH-90A assigned to 5th Helicopter Group (background) over the sea near the "CinqueTerre" area

MARISTAELI LUNI-SARZANA

The Helicopter Station of the Italian Navy ("Marina Militare") of Luni-Sarzana is located about 10 km from the city of La Spezia, in the last offshoots of the Lunigiana area, and together with those of Catania and Grottaglie constitutes one of the 3 Aircraft Bases of the Navy. Built in the 70s, it was named after Admiral Giovanni Fiorini, a central figure in the development of the helicopter component of the Armed Force. Maristaeli Luni hosts two Flight Groups: the 1st Helicopter Group, operational since the early 2000s with the EH-101 heavy helicopters, flanked by the 5th Group, equipped for a decade now with one of the most modern helicopters in the world: the NH-90. The two Flight Groups have a crucial role in keeping the crews and vehicles in operational readiness, meeting the operational and training needs of the Armed Force. Their main areas of expertise include anti-ship and anti-submarine warfare, support to the S. Marco Marine Brigade, and special operations. The Flight Groups are supported by the various branches belonging to the Helicopter Station, which guarantee the coordination of activities, logistical support, training and standardization of crews; in addition, the Base also ensures technical-operational support to the aircraft embarked on board the units of the Naval Squadron or deployed in the operational theaters. Luni also stands out for hosting two centers of excellence: the Sea Flight Training and Standardization Center (CASVM) and the Aeromaritime Experimental Center. The CASVM is responsible for ensuring and managing the advanced training of the flight crews of the entire Aircraft Component, using flight simulators for the EH-101 and SH-90 and synthetic training tools, as well as the operational tank for forced ditching training and survival at sea. The Aeromaritime Experimental Center, on the other hand, is in charge of conducting all the study and operational evaluation activities of helicopters and their onboard systems. During the visit to the base we had the opportunity to immerse ourselves in the various daily activities. The most significant moments, in addition to the flight mission, were attending a training session for forced ditching and seeing the flight simulators in action, today's essential tools for the education and training of crews.

Italian Navy MH-101 and MH-90A landing on the main runway at Luni-Sarzana

1st HELICOPTER GROUP

The 1st Helicopter Group of the Italian Navy was formed on 1 August 1956 on the Augusta Terrevecchie heliport, in the area now occupied by the current naval base. Initially equipped with three AB-47G helicopters, the department saw a first strengthening with the arrival of four more specimens in December 1957, and with the birth of this flight group, the modern history of Italian Naval Aviation began. In the following two years, the Group consolidated its structure by growing numerically, logistically, and above all operationally, outlining the typical organization of an operational air department. A historic moment was marked on 24 October 1961, when an AB-47J of the 1st Group made its first landing on a ship of the Italian Navy, the helicopter frigate Luigi Rizzo; subsequently, on 20 December 1967 a detachment of the Group was temporarily redeployed to Luni-Sarzana, where work was underway for the construction of the new Helicopter Station. The final transition to the new headquarters took place on 25 January 1971, when the 1st Group transferred its last three SH-34s

Main: 1st Helicopter Group MH-101 '2-21' taxiing to the main runway for a mission
Left: Pre-flight checks before engine start-up
Right: MH-101 engines starting

MH-101 'Shark 21' on the taxiway – note the shark markings under the nose

there; subsequently, starting from May of the same year, it began to receive the modern SH-3D Sea King becoming operational on these new vehicles by the end of 1971. The last SH-34s were decommissioned in 1979, marking the end of an era. In 1985, some of the SH-3Ds of the 1st Group were assigned as the first organic flight component of the aircraft carrier cruiser Garibaldi, the new flagship of the Italian Navy, this event represented a further milestone in the history of the Component. Since 2002, the 1st Helicopter Group has been assigned the EH-101 in different versions: Anti-Submarine/Anti-Ship (ASW/ASuW), Radar Discovery (HEW) and Helicopter Assault (UTI/ASH). These modern helicopters have progressively replaced the Sea Kings, expanding the operational capabilities of the unit.

Currently, the 1st Helicopter Group operates mainly in the context of helicopter assault, supporting the Special Forces of COMSUBIN and the San Marco Regiment with the EH-101 in ASH (Amphibious Support Helicopter), and Utility versions. The EH-101 is a medium-heavy multirole helicopter of almost 15 tons, equipped with three General Electric T700-GE-T6A engines,

Main: MH-101 '2-21' flying in glorious winter light over the Ligurian coast
Left: MH-101 Take-off for the photo mission
Right: Both MH-101s take off in close formation from Maristaeli Luni

each capable of delivering 1,725 kW (2,300 shp), connected to a main transmission that drives a five-blade rotor. The peculiarity of the propulsion system is the possibility of disengaging, through an electromechanical actuator, engine number 3 during the cruise flight, allowing a reduction in consumption and a consequent increase in the operating range. The adoption of three motors offers decisive advantages in terms of safety and performance; The higher overall power translates into a higher load capacity, while the ability to fly even with only two engines in specific weight ranges guarantees greater safety in long-range operations or away from support bases, such as ships or coasts. The main rotor consists of five composite blades with a spoon-shaped end part, called the British Experimental Rotor Programme (BERP). This design, developed in the 1990s, reduces turbulence generated at the ends of the blades due to high rotational speeds relative to the root, improving overall stability and performance. The EH-101 was the first helicopter in the world to be built with a fuselage made entirely of composite material, while the flight controls follow a classic configuration, with

Preparing for the first photo shot over the sea with the Appennines in the background

Frontal shot of MH-101 'Shark 21'

mechanical components assisted by a hydraulic one at 200bar. With a maximum take-off weight of 14,600 kg, an MH-101A can carry up to 35 people (in addition to the two pilots), although the standard operational configuration of the 1st Group includes 19 seats; the autonomy reaches 5 hours of flight, with an operational range of 540 nautical miles (about 1,000 km); the maximum speed is 150 knots (277 km/h), while the cruising speed is 120 knots (222 km/h); The helicopter can reach a maximum operating altitude of 15,000 feet. In the MH-101A version, the helicopter is equipped with various onboard systems, including the FLIR Sapphire II for infrared vision, the SIAP self-protection system, and four chaff and flare dispensers. The

MH-101 'Shark 21' approaching from the back with a fast turn for this action shot

'Shark 21' prepares for operations over the sea with the beautiful Ligura Coast in the background

armament includes three machine guns, positioned respectively on the right and left sides of the fuselage and on the rear ramp, while the "combat ready" configuration also includes Kevlar armor, which ensures additional protection for crew and passengers. Currently, the Italian Navy has 22 EH-101s in different versions, confirming the versatility and efficiency of this aerial platform in meeting the operational needs of the Armed Force.

MH-101 hovering with light rainbow effect. Note the water in the air that is whirled up by the 5-blade rotor.

'Shark 21' performs a 360° slow turn above the 'photo ship' hovering at sunset

Flying in a very close formation – you cannot go any closer

5th HELICOPTER GROUP

The 5th Helicopter Group, established on 1 November 1969, was the first operational unit of the Luni base. Initially equipped with two AB-47Js, the group later received two AB-47Gs, seven AB-47J3s, and six SH-34J *Seabats*, transferred from the 1st Helicopter Group. With the arrival of the Seabats, now obsolete for the anti-submarine role, a strategic collaboration with COMSUBIN and the San Marco Battalion began. The anti-submarine equipment was removed, and the *Seabats* were converted into transport helicopters for raiders and amphibious forces; for this purpose, the stern of the auxiliary troop transport ship Andrea Bafile was modified in 1971 to permanently accommodate at least two *Seabats*, which remained in service until 30 June 1979, the date of decommissioning of the last three aircraft. From 1971 the 5th Group was equipped with AB-204 AS helicopters, to which were added, from 1976, the more modern AB-212 which gradually replaced all previous vehicles. Since its founding, the unit has played crucial roles, from anti-submarine and anti-ship warfare to surveillance of Soviet units during the Cold War. In the 90s the 5th Group participated in missions in international scenarios such as the Persian Gulf, Somalia, the former Yugoslavia, Albania, Lebanon, and Afghanistan, as well as responding to the numerous requests of the Civil Protection for emergency interventions. In 2000, the group created a nucleus of pilots and operators specialized in supporting Special Forces, with helicopters specially configured for the use of light-intensified visors (NVGs). On 15 June 2011, the 5th Group received the first SH-90A (Shipborne Helicopter), while on 23 January 2017, the first MH-90A (Multi-Mission Helicopter) arrived. Both versions derive from the NH-90 platform, with the difference that the SH-90A is designed for maritime patrol, anti-ship (ASuW – Anti Surface Warfare) and anti-submarine (ASW – Anti Submarine Warfare) operations, while the MH-90A is optimized for tactical transport missions in maritime and amphibious environments, collaborating mainly with the San Marco Regiment and the Special Forces of COMSUBIN (Underwater Grouping and Raiders). The NH-90 fleet of the Italian Navy consists of 56 helicopters, divided into 46 units of the SH-90A version and 10 of the MH-90A version. Both configurations are designed to operate from aboard the units of the Naval Squadron, ensuring operational capabilities both day and night, even in

Main: **Flight line with MH-90As assigned to the 5th Helicopter Group**
Insets: **Mission startup operations: Crew swap – same helicopter, different crew, different mission**

The MH-90A 'MM81631' is returning to its home base Lunni-Sarzana

extremely adverse weather and sea conditions. The NH-90 is equipped with an all-digital glass cockpit and is the first helicopter in the world to use the fly-by-wire flight control system. This advanced electronic control system offers absolute precision in piloting, allowing considerable weight and space savings, as it eliminates the use of steel cables and traditional pulleys; In addition, the total integration with the avionics suite significantly reduces the pilot's workload, allowing him to focus more efficiently on the mission. A distinctive aspect of the NH-90 is its modularity, which allows for quick configurations of the helicopter to adapt to the specific operational needs of the moment, making it a versatile and highly responsive platform in the most complex missions. The SH-90A version stands out for its high-level technological equipment, designed to tackle complex missions in maritime environments. Among the main equipment that stands out is the surface discovery radar with integrated ISAR and IFF capability, capable of identifying targets at sea up to a hundred nautical miles; this system is flanked by the FLIR (Forward Looking InfraRed), which guarantees infrared vision. For anti-submarine warfare, the SH-90A can be configured with HELRAS sonar, characterized by a cable of about 450 meters that allows deep dives, adaptable to various parameters such as the type of seabed, temperature, and salinity of the water. The sonar can operate both in passive (listening) and active (emission of acoustic signals) modes and can also be associated with a sonobuoy launcher to extend the search area; The launcher can carry up to 10 units between active, passive or dedicated buoys for the detection of environmental parameters. For self-defense, the aircraft is equipped with an EWS (Electronic Warfare System) system and two "Chaff and Flares" dispensers, one on each side; for the attack, however, it can carry two MU-90 torpedoes and Marte MK2/S anti-ship missiles, while the proximity armament is complemented by two 7.62 mm DILLON M134D rotary barrel machine guns. Up to two mission consoles can be installed on board: one dedicated mainly to radar and the other to sonar and sonobuoy management; all systems, including radar, sonar, electronic warfare and the Data Link link are fully integrated and manageable by both operators. For air-naval operations, the

MH-90A '3-59' flying with both doors open in front of the "Cinque Terre"

SH-90A is equipped with an automatic anchoring system to the flight deck called "Deck-Lock"; This allows the helicopter to be secured to the deck without the use of traditional chains, but thanks to a hook installed on the belly of the fuselage which, on command of the pilots, engages in a dedicated grid on the flight deck. Finally, the helicopter can fold the tail and blades of the main rotor, in order to reduce overall dimensions and optimize parking in the hangar on board the naval units. The MH-90A (Multi-Mission Helicopter) version is designed specifically for assault operations, distinguishing itself as a configuration optimized for amphibious tactical missions. Unlike the SH-90A, the MH-90A is not equipped with a discovery radar, but integrates a weather radar, a FLIR (Forward Looking InfraRed), and an EWS (Electronic Warfare System) system consisting of a Laser Warning Receiver, Radar Warning Receiver, and Infrared Warning Receiver; it also has four launchers of "Chaff and Flares". The aircraft can be equipped with two DILLON M134D 7.62 mm machine guns. In addition to the OWS (Obstacle Warning System) for the identification of obstacles during flight at very low altitude, the equipment also includes HMSD (Helmet Mounted Sight Displays) helmets, fully integrated with the FLIR and NVGs (Night Vision Goggles). These helmets allow pilots to control the FLIR simply by moving their heads: looking down, pilots can even have a view "through" the floor of the helicopter, greatly improving situational awareness. The MH-90A can be configured with up to 14 seats and has four anchor points for the Fast Rope system, which is used for the rapid descent of troops. The main technical characteristics of both versions are as follows:

- maximum take-off weight of 11 tons;
- maximum speed of 175 knots (324 km/h) at sea level,
- cruising speed of 130 knots (240 km/h),
- maximum altitude of 20,000 feet (about 6,000 meters),
- maximum autonomy of 4 hours, variable according to the type of mission.

MH-90A flying low and fast

MH-101 is perparing for an SAR mission to "Tino Island"

THE MISSION

After admiring and photographically documenting the numerous helicopters that have made the operational history of the Base and that today are exhibited as prestigious Gate Guardians (an Agusta-Bell AB 47J, an Agusta-Bell AB-204, a Sikorsky SH-34 "Seahorse", a Sikorsky SH-3D "Sea King" and a prototype of the AgustaWestland EH-101), it is time to prepare for the mission planned in the afternoon, which will involve both flight groups. The first stop is the 5th Helicopter Group, where we begin the preparation in the equipment room. Here we are shown the technical and operational details of the devices used by the crews: from the pilots' helmets, which can be integrated with the light amplifiers that allow night vision (NVG Night Vision Goggles), to the bulletproof vests and tactical life jackets used during missions by flight crews. For photographers, there is a simplified life jacket without a cylinder, with equipment that includes a colored smoke bomb and a whistle to facilitate any localization by rescuers; Above the life jacket, we will wear a harness that will be fixed to the anchor point on the roof of the helicopter, allowing us maximum freedom of movement in complete safety even with the rear ramp and side doors open. To complete, we'll wear headsets that ensure constant communication with the crew during the flight. After familiarizing ourselves with the equipment, we move to the hangar for a safety briefing aboard an MH-90A; here we learn about emergency procedures, including how to open emergency exits; Everything related to safety is explained to us such as the use of 5-point belts and the peculiarities of the seat equipped with a shock absorption system, which provides for the cushioned lowering of the seats in the event of a landing or forced ditching, thus reducing the risk of spinal injuries due to the impact. After becoming familiar with MH-90A, we move to the 1st Helicopter Group to perform a similar safety briefing session on board MH-101A. These activities, which are essential for safety during the flight, are followed by a passage in the briefing room, where we meet the crews who will participate in the mission. The briefing begins with the analysis of the weather report, which promises ideal conditions: some isolated clouds on land, clear skies over the sea and calm winds, with a low probability of precipitation and turbulence; The mission is illustrated in detail by the training leader with the help of special slides projected on a large screen. We will operate three helicopters, each with a specific task, and we will use the SHARK 02 call-sign for coordination with Air Traffic Control (ATC) units. The first helicopter will be an MH-101A, identified as SHARK, in charge of the transport and landing of assault troops that for this mission will only be simulated; the second helicopter will be an MH-90A, called GUNNY, with

Formation flight of an MH-101 (foreground) and MH-90A (background) close to the coast

MH-90A and MH-101 formation swap for the photo mission

the task of providing escort and protection during assault operations and possible SAR (Search And Rescue); the third helicopter, an EH-101A with the call sign FOXTROT, will be dedicated to photographic documentation of the various phases of the mission. The planning includes a take-off at 14:30 with an initial route south to the sea, followed by navigation along the coast of the Cinque Terre for a series of maneuvers in formation; the mission will then get underway with a SAR simulation on the Island of Tino and a subsequent simulated assault and release of troops on Nave Piave, anchored inside the bay of Varignano. One photographer will be embarked on GUNNY and the other on FOXTROT to capture every detail. After take-off, as planned, we head towards the Cinque Terre in tight formation; GUNNY and SHARK proceed almost side by side, while FOXTROT, with the rear ramp open, occupies the forward position to immortalize the formation. Then, in an elegant game of movement, the helicopters perform a series of tactical maneuvers in formation, with position swaps and reunions, showing flight precision and coordination derived from constant training. From the coast we move towards the Island of Tino, equipped with a small pitch; here SHARK performs a simulation of SAR operation, hovering near the pad while using the winch for retrieval. Meanwhile, GUNNY is positioned at a higher altitude, providing protection from above to prevent any threats during the operation. Once the recovery is complete, the mission continues towards Nave Piave, and the objective changes: SHARK hovers on the bow of the unit to simulate a release of troops with Fast Rope, that is, with special "ropes" used for rapid descent operations of the Special Forces. GUNNY remains stationary at the top, in a cover position, ready to intervene and engage any hostile forces. Once the operation is over, the formation rejoins and proceeds towards Luni. During the landing phase, FOXTROT anticipates by moving over the head of runway 36 to immortalize SHARK and GUNNY touching the runway in a coordinated manner. The mission ends at 16:00, after highlighting the perfect operational synergy and the level of training of the crews.

The helicopters are flying towards the harbor of La Zpezia for a simulated attack on the ship 'Nave Piave'

Simulation of an attack on the "Nave Piave" by MH-101 'Shark' and MH-90A 'Gunny'. After a quick fly-by over the ship, both helicopters circled the ship several times and simulated deploying troops onto the ship.

Formation split at sunset

HELICOPTER WASHING

Every mission at sea, especially those conducted at low altitudes, exposes the Navy helicopters to high concentrations of salt. This factor, if not properly managed, can accelerate the deterioration of the external structure and promote the formation of scale on the high-temperature parts of the engines, compromising the operational efficiency of the aircraft. To prevent these risks, at the end of each mission carried out at low altitudes at sea, the helicopters are subjected to a thorough washing process. On the way back, before reaching the parking area, the aircraft goes to a dedicated spot of the taxiway, where there are water jets that, similar to a car wash, remove the salt residues accumulated on the external surface; This treatment guarantees immediate protection against corrosion. The internal washing of the engines, on the other hand, is a more complex operation and takes place by injecting distilled water into each engine through a dedicated valve located on the side of the helicopter. The turbines are rotated without starting the engine, allowing the water to circulate inside and subsequently be expelled, eliminating any salt deposits or impurities. At scheduled intervals, defined according to the number of hours of flight over the sea, the treatment is intensified by using a specific descaling foam instead of distilled water; the foam is left to act for about 20 minutes to break up any more resistant accumulations, before being carefully removed by further washing.

Main: An MH-90 is passing through the first washing station with water jets to remove salt. The procedure has to be done after each mission over the sea

Left: Formation hovering and landing on the main runway at Luni-Sarzana

Right: MH-90A landing after the last mission of the day

THE SEA FLIGHT TRAINING AND STANDARDIZATION CENTER (CASVM)

Established in 2023, the Center represents a center of excellence that brings together key skills and functions in the education and training of flight crews. With the establishment of the CASVM, a new impetus has been given to the ability to generate highly qualified and standardized crews, through a constant updating of training courses in full compliance with the aeronautical regulations in force. For its function, the Center uses advanced teaching aids such as the Full Crew Mission Simulators (FCMS) of EH-101 and SH-90A, state-of-the-art simulation tools that allow an immersive and realistic training experience. In addition, under the supervision of the Center, the operational tank operates with the forced ditching structure and the skills in survival at sea, a strategic asset for the education and training of flight crews.

Left: **Workplace of the simulator operator, who provides and checks all settings and configurations required by the pilots and crew for their training flight**

Right top: **The EH-101 full crew mission simulator is in use since 2012 and received a major software update in 2023**

Right bottom: **All cockpit panels and projectors give a realistic, immersive vision to the crew. The scenery displayed here is the Etna volcano area in Sicily**

EH-101 "Full Crew Mission Simulator"

The EH-101 Simulator was inaugurated in 2012 and received a major technical software update in 2023. It is an FCMS (Full Crew Mission Simulator), i.e. it allows the entire crew to be trained in any type of operational mission, allowing you to maximize the training return in a safe and immersive environment. Built by the Canadian company CAE with the support of Leonardo Helicopters, despite being a static simulator, it achieves a very high degree of realism thanks to a graphic system consisting of 8 projectors that allow pilots an immersive vision with a horizontal field of view of 220 ° and a vertical field of view of 60 °. The mission consoles of the flight operators are located in a different environment, inside a cabin called Rear Crew Trainer, which allows you to simulate all the sensors and weapons: Radar, Helras Sonar, Data Link 11, Missiles, and Torpedoes. The cockpit and system operator parts can function completely separately or in combination for integrated mission simulation. Both modules are supervised by a central "direction", consisting of a workstation capable of generating a very wide range of operational scenarios, weather conditions, emergencies, and threats, both in day and night conditions, also allowing the use of NVG viewers. In addition to anti-ship and anti-submarine missions, maritime Helicopter Assault operations, operations on board naval units, and Search and Rescue activities can also be simulated.

SH-90A "Full Crew Mission Simulator"

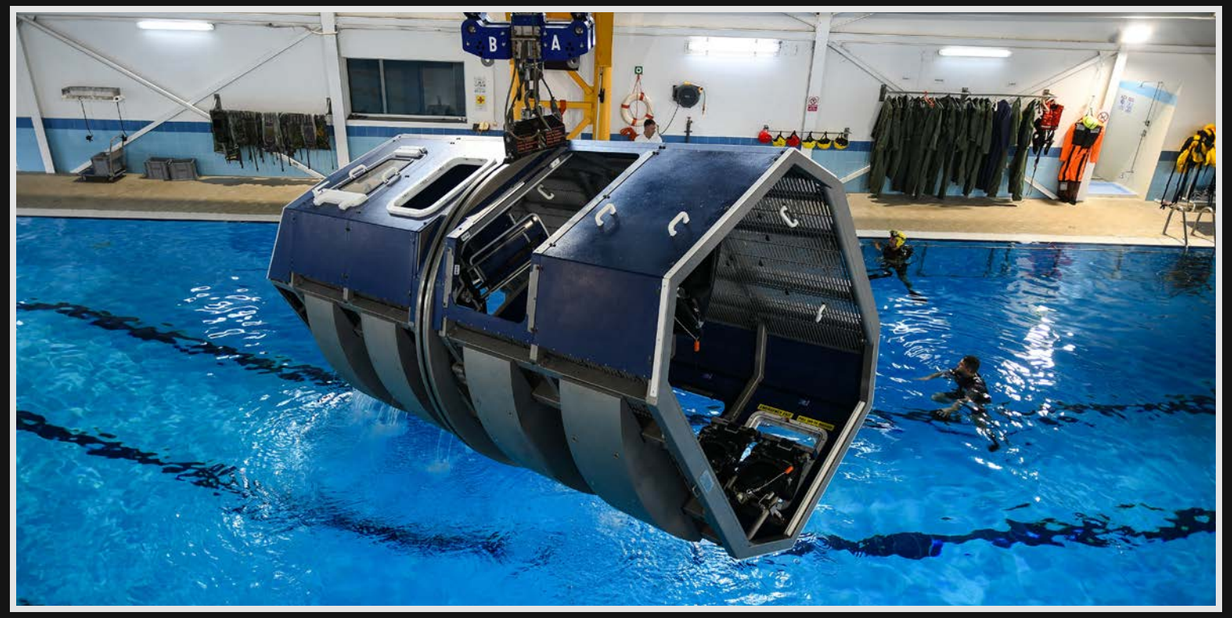
The simulator of the SH-90 A line was inaugurated in September 2023 and is a state-of-the-art system built and developed by Leonardo Helicopters. Unlike the FCMS of the EH-101 which is static, that of the SH-90A is full-motion with six degrees of movement, i.e. it allows the cabin to physically move in all directions up to an angle of 30°, thus ensuring perfect fidelity and realism in the execution of the mission. Outside the cockpit, there are two mission consoles identical to the real ones which, through a special software called Mission System Trainer, allow operators realistic and effective training with all the integrated systems on board. The simulation is programmed by instructors through a workstation dedicated to management and can also be controlled remotely via a console in the cockpit, like the FCMS EH-101. Also, in this case, a diversified range of missions can be generated in all weather and operational conditions, both day and night. We had the opportunity to sit inside the simulator to watch the demonstration of a short mission; this included a take-off, a visual flight of about 20 minutes, and a return to the Luni base; The realism is incredible, and the view is identical to what the live driver experiences and we assure you that we also felt a bit of "motion sickness" during the most accentuated maneuvers.

The Leonardo SH-90A FCMS is a full motion simulator and it is in use since 2023

Forced ditching - Helo Dunker

At the operating tank, there is the cabin of the Modular Egress Training System METS, the only military forced ditching simulator in Italy, and one of the few operating in Europe. In this structure, every year about 1,000 soldiers from all the Italian armed forces train to escape the emergency exit from a ditched helicopter. In the structure there is a 25m swimming pool whose depth varies from 1 to 5 meters; the METS simulates the helicopter cabin including all its characteristics; this is lowered into the water by means of a special overhead crane at a descent speed similar to that of a helicopter splashdown in a semi-controlled regime by the pilot. Once in the water, various scenarios and different profiles of rotation and sinking of the cabin can be simulated depending on the training phase to be faced. The METS is fully modular and configurable: it can become an EH-101, an NH-90 or an AW-139, with all the features in terms of emergency exits, cabin configuration, and installation of simulacra of onboard weapons.

The personnel who have to take the test are first subjected to a medical examination, and then go to the operational tank where they wear the normal equipment for the flight: suit, flight shoes, helmet, and ife jacket equipped with an emergency canister. The flight equipment also includes, in fact, a small oxygen tank, containing enough air to breathe underwater for about four minutes; It should be specified that the four minutes are theoretical because if a person is agitated and breathing heavily, the air could last drastically less. During this type of training, it is therefore essential to maintain the right mental approach, manage stress, and focus on the emergency maneuvers necessary to exit the cabin. Before facing the tests inside the METS, the staff practices in the pool with swimming tests, freediving, and a review of how to use the safety devices supplied. There are generally 3 tests of forced ditching. The first phase consists of a controlled ditching: the cabin enters the water and begins to sink slowly, allowing the crew to open the "tank", take air and evacuate the helicopter; Being a controlled ditching there is usually plenty of time to release the hatches and open the emergency exits before the helicopter sinks. The second phase simulates a forced ditching, followed by the sinking and capsizing of the cabin; At this stage, it is assumed that there was time for the pilot to warn the crew and to open the doors in advance. The third phase represents the worst case, because it simulates a violent impact in the water with the helicopter in a swooped or dived attitude, followed by an immediate sinking and capsizing of the cabin. In this situation, it was not possible to open the doors in advance, so they must be located, opened, and evacuated quickly. During these three tests, there are 10 military personnel providing assistance, including four divers, making the simulation extremely safe, even if the level of attention and stress is always high.

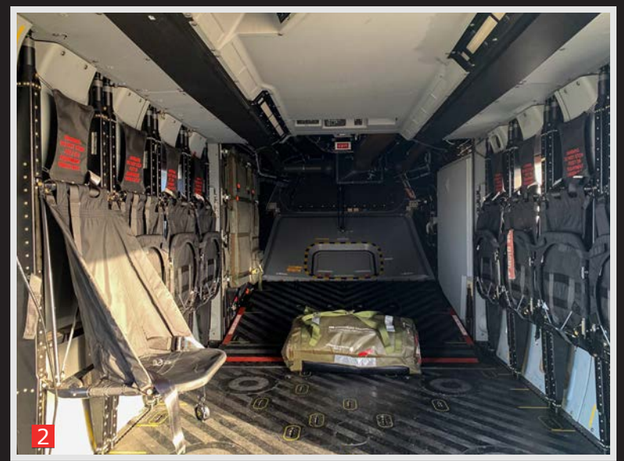


**The modular egress training system ("Helo Dunker") can simulate a forced landing of a helicopter in the water and is used to train crews to escape safely from an underwater, upside down position. This requires also the removal of one of the helicopter's doors.
Not an easy task that everyone has to pass every year to be qualified to operate in a Navy helicopter**

CONCLUSION

These two days spent at the Luni Sarzana Helicopter Station allowed us to document the activities of the Base and the characteristics of the EH-101A and MH-90A / SH-90A aircraft, but also to visit unique facilities such as the CASVM and the forced ditching, the EH-101A FCMS and the brand new SH-90A FCMS. We would therefore like to thank the Public Information and Communication Office of the Navy General Staff and the Commander of the Base Captain Leonardo Vivi. Particular thanks go to Lieutenant Captain Riccardo Ferri of CASVM who guided us throughout the route with refined kindness, genuine passion, and tireless support, not sparing anecdotes and fully satisfying our requests and curiosities.


1


2


3

A distinctive aspect of the NH-90 is its modularity, which allows for quick configurations of the helicopter to adapt to the specific operational needs.

1, 2, 4 **MH-90 configuration for troops transport and assault missions**

3, 5, 6: **An SH-90A configured with HELRAS sonar for anti-sub missions support. Note the two operator workplaces**


4


5


6

5th Helicopter Group mantenance hangar and operations with NH-90. The NH-90 fleet of the Italian Navy consists of 56 helicopters, divided into 46 of the SH-90A version and 10 of the MH-90A version

1st Helicopter Group manteinance hangar and operations with EH-101. The Italian Navy currently has 22 EH-101s in various versions, which underlines the versatility and efficiency of this helicopter platform

FLASHBACK

WILLIAM TELL 1994

REPORT BY PHILIPPE COLIN

Back in the Fall of 1994, the author was invited to attend WILLIAM TELL 94 to document the participation of the 158th Fighter Wing from the Vermont Air National Guard. It was a privilege to spend days on the flight line with Team Vermont and witness its members' great professionalism.

From 11 to 22 October 1994, Tyndall AFB, FL, hosted the USAF Air-to-Air Weapons Meet, better known as "WILLIAM TELL". Eight teams representing ACC, ANG, USAFE, PACAF, and Canada participated in four flying profiles and three maintenance competitions. 1994 marked forty years of WILLIAM TELL competition. It all started in June 1954 when the first meet took place at Yuma, AZ and was called the Air-to-Air Rocketry Phase of the Third Annual USAF Fighter Gunnery and Weapons Meet with the Air Defense Command and Air Training Command as sole competitors. In 1956, the meet was code-named "WILLIAM TELL" and had expanded to include nine teams representing seven major air commands. This third meet was the last held in Arizona. Two years later, Tyndall AFB, FL became the home for the USAF Worldwide Air-to-Air Weapons Meet. The radio-controlled Q-2A drone target and the PARAMI, an electronic scoring system, made their first appearances during this meet; and for the first time, competitors were divided into three categories, one for each aircraft participating.

Twelve teams competed in the 1958 meet and among them was an Air National Guard unit competing for the first time. For the 1961 WILLIAM TELL, three jets specifically designed for protecting North America appeared on the flight line; the F-102, the F-106; and the F-101. WILLIAM TELL 1965 was the largest in history with 16 teams and four categories. Canada became the first foreign country to participate in WILLIAM TELL and entered with the CF-101.

After five year period, imposed by the Vietnam War, WILLIAM TELL resumed at Tyndall AFB with nine teams competing. The 1972 meet was the year of the first "Top Gun" award, and the introduction of the subsonic BQM-34A target drone into the competition. The 134th FIS, VT ANG placed third with its F-102As. 1974 saw the Air National Guard teams take first place in three major categories and in 1976, the ANG continued its winning streak in two of the three.

The F-4 made its first appearance in the meet with the 4th TFW, Tactical Air Command's first WILLIAM TELL competitor. With the reorganization of air defense forces in 1979, TAC assumed sponsorship for WILLIAM TELL. The first TAC-sponsored meet in 1980 included 10 teams from active duty F-4 and F-106 units, ANG F-4, F-106; and F-101 units, and a Canadian Forces CF-101 unit.

In 1982, the name for the meet was officially changed to the USAF Air-to-Air Weapons Meet. That meet also marked the return of the Pacific Air Forces

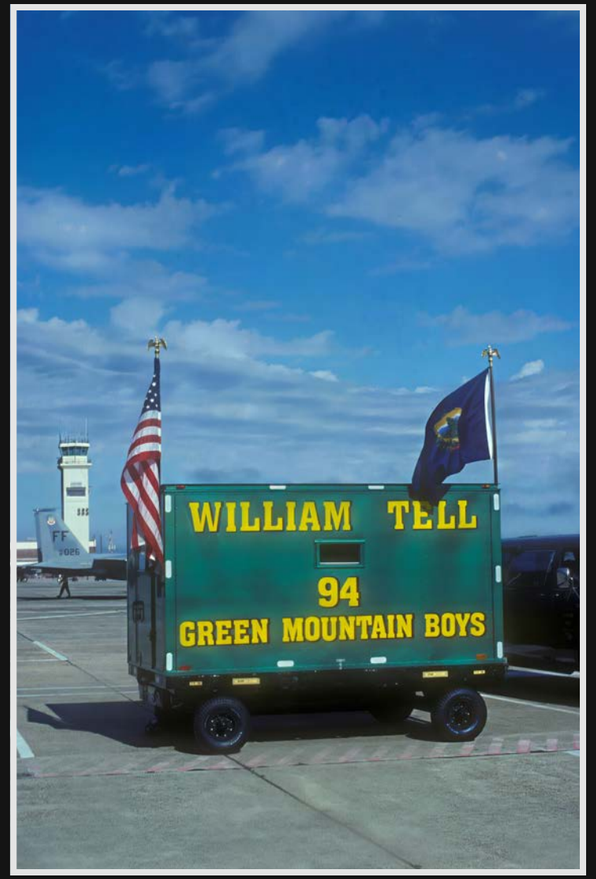
The 325th FW was tasked to launch three F-15D modified with a video down-link camera during Profile I to allow judges and spectators to observe real-time coverage of missile shots on the medium-altitude drones. SMU F-15s were also tasked to tow the Aerial Gunnery Target Set 36 during Profile II

and the USAF in Europe to the competition, and the first appearance of the F-15 "Eagle". WILLIAM TELL 1984 saw the introduction of the supersonic QF-100 full-scale drone as a WILLIAM TELL target and was the first meet in which only full-scale drones were used as missile targets. In 1986, the CF-!18 entered the competition for the first time with the Canadian team, finishing second overall behind the 33rd TFW with 38,295 points. A total of twelve teams from TAC, ANG, PACAF, USAFE, Alaskan Air Command, and Canada participated in the 1988 meet.

The 1990 competition was canceled due to Operation Desert Shield/Storm and resumed in 1992, held by the newly formed Air Combat Command. Eight teams competed and the 18th Wing from Kadena AB, Japan, walked away with the top team award for the second time. Hosted by Air Combat Command and the USAF Air Warfare Center, WILLIAM TELL 94 gave the USAF's best fighter units the opportunity to compete in all aspects of air-to-air operations. Competing that year were eight teams representing the 1st Fighter Wing from Langley AFB, VA, the 18th Wing from Kadena AB, Japan, the 33rd Fighter Wing from Eglin AFB, FL, the 52nd Fighter Wing from Spangdahlem AB, Germany, and the 159th Fighter Group from NAS New Orleans, LA, all flying the F-15. The 119th Fighter group from Fargo, ND, and the 158th Fighter Group from Burlington, VT, both flew the F-16 and Team Canada from 3rd Wing/Bagotville, Que., the CF-118.

Most of the maintenance teams arrived on October 11 and this was a particular long day for members of Team Vermont, arriving at 6:30 A.M. at their home base for the C-5 flight to Tyndall AFB. Due to mechanical problems with the C-5, the Team could not leave the ground before 3:00 P.M.. Forty minutes into the flight, the aircraft suffered windshield damage and had to be flown slower and at a lower altitude to prevent from anymore damages. In the approach to Tyndall AFB, crosswinds exceeded limits for a safe landing but after a few attempts, Team Vermont finally touched ground and was going to set some new standards. On October 12, the fighters arrived and preparations got underway for all teams to be ready to compete in all Profiles of the meet. Each team competed in seven different categories for a total possible of 50,000 points per team.

Profile I was a two-aircraft element firing live missiles in the over-water range against MQM-107 drones. Each pair of fighters was dual-loaded with radar and heat-seeking missiles of the same configuration, and AIM-120A (AMRAAM) was fired for the first time in the meet. Each pair was handled by a team of weapon directors controlling the fight who were scored through com-



Top: **An F-15C assigned to 33 Fighter Wing sits on the ramp, ready for the next sortie**

Right: **Team spirit was a key element in the competition for each team and Team Vermont made sure to bring with them a little extra**

Top left: The 1st Fighter Wing from Langley AFB was one of four teams flying the F-15 *Eagle*
Top right: Live missiles ready to be loaded for the next mission
Above: The 1st FW team was composed of F-15C from two different squadrons

pletion of the intercept. Flying this profile, Capt.D. Kriner of the 1st FW became the first WILLIAM TELL pilot ever to kill a drone with one of the Air Force's newest air-to-air missiles, the AIM-120A.

Profile II was a two-aircraft element performing 20mm aerial gunnery against a towed AGTS-36 target system released and dragged about 5,000 feet behind the F-15 towing aircraft. Fighters were limited to 500 rounds and two passes at the target with telemetry from the pod determining the scoring.

Profile III was a four-ship area defense against a mass raid of sixteen adversaries using evasion tactics and electronic countermeasures. To confuse weapons controllers, friendly forces were mixed with the bandits. During this profile, each fighter carried ACMI pods.

Profile IV was a timed element lane defense against four adversaries flying a different scripted maneuver for each element. Each element and its associated weapons director had five minutes in which to detect, sort, and engage four ingressing fighter adversaries.

During WILLIAM TELL 94, the teams were competing to merit some of the twelve awards and worked very hard to get into a winning position. The Top Team award recognized the team that compiled the highest overall score during the meet and the 119th FG from the North Dakota ANG won the competition with a total score of 41,593 points. The Top Operations Team award for the aircrew team that received the highest number of total points during the four profiles was also taken by the 119th FG with 22,638 points. The Top Element was for the pilot element that received the highest number of total points in all profiles. The Top Gun award was given to the pilot who received the highest number of total points in all four profiles. The Top Shooter award went to the pilot with the most points on Profile II. Winners of each Profile were the pilot, maintenance, and GCI teams that received the highest composite score for each Profile. The Top Weapons Director award was presented to the control team with the highest number of total points on Profile I, III, and IV. Top Scope was awarded to the control element with the highest number of points in the same Profile. The "Green Mountain Boys" swept away the maintenance trophy with an excellent performance and brought back to Vermont the award for the Top Maintenance Team and the Top Loadeo Team. During the meet, the most visible part of the competition for anyone attending was the static load and the ICT with a maximum of 2,500 points for each event. Team Vermont impressed everyone and set new standards when they performed a perfect static load and got a perfect score on the ICT. The static load consisted of aircraft preparation, a functional check of the weapons system, and the loading of missiles; two AIM-9s and two AIM-120s

52nd Fighter Wing F-15C ready to fly a Profile IV mission during the competition

Main: 52nd FW Eagles moments before launching to fly another mission in WT94
Left: F-15C from the 52nd FW ready for the static load
Right: F-15C from Team Spangdalhem during pre-flight maintenance

for the F-16, two AIM-7s and two AIM-9s for the CF-118, while the F-15 received four AIM-9s and four AIM-7s. In the Integrated Combat turnaround, six team members had to prepare an aircraft returning from Profile II for another mission. During a short period, the team had to refuel, conduct battle damage assessment, service all fluids, and rearm the fighter with missiles and ammunitions. Behind all the teams competing for the top awards in the meet were the units supporting WILLIAM TELL 94. Responsible for launch, recovery, and on-equipment maintenance of nine Wing's aircraft supporting Profile I and II was a group of fifty-two of the 325th Fighter Wing's finest maintenance people. This group, known as the Support Maintenance Unit, was tasked to launch three F-15D modified with a video down-link camera during Profile I to allow judges and spectators to observe real-time coverage of missile shots on the medium-altitude drones. SMU F-15s were also tasked to tow the Aerial Gunnery Target Set 36 during Profile II. Also playing an important part in the competition was the 475th Weapons Evaluation Group, an Air Combat Command unit organizing WILLIAM TELL. The 475th WEG flies two E-9A for range patrol and the 82nd Aerial Target Squadron is responsible for launching sub-scales drones toward the Gulf of Mexico for fighter pilots to try shooting them down. Playing the aggressor role during the competition in Profile III and IV were QF-106s and QF-4s from the 475th WEG. At other times, these aircraft are used as manned and unmanned drones at Tyndall AFB. Teamwork was a key element in the competition for each team and some of them made sure to bring with them a little extra. Team Vermont's captain, Lt.Col. Mark Fredenburgh was a F-16 pilot with the 50th TFW at Hahn AB, Germany in 1985 when he was selected to be part of the team to compete in GUNSMOKE 85 at Nellis AFB, NV. During that competition, he scored the most points of all pilots and was selected the Overall Top Gun. Lt.Col Fredenburgh brought his Gunsmoke experience with Team Vermont to WILLIAM TELL. The 158th Fighter Group began transitioning from the F-16 ADF to the newer C-model during March 1994 and it took a lot of work to bring these aircraft to higher standards and get ready for WILLIAM TELL. Leading the VT ANG maintenance team to excellence during the competition was Major Martha Rainville who did an outstanding job

Above left: F-15C from the 18th Wing from Kadena AB, Japan
Above right: The 159th Fighter Group of the Lousiana Air Nation Guard NAS New Orleans was the only ANG unit equipped with the F-15
Right: 18th Wing F-15C loaded with four AIM-9 and four AIM-7 during the static load

and was to become the first female Adjutant General of a State National Guard in March 1997. Team spirits were very high in the ranks of Team Vermont and Team Canada! Both the 158th FG and the 3rd Wing/Bagotville are part of NORAD and as such, work together in the North Eastern Air Defense sector. The two units are used to work and train together, and very good friendly relations exist between them at work and off work! During WILLIAM TELL, members of both teams could be seen cheering for each other, and the Canadian flag was displayed beside the American flag on top of the VT ANG's maintenance trailer. During the Loadeo competition, both teams were displaying banners and their flag in support of the crew participating in the event. The award ceremony took place on Saturday, 22 October, the last day of the meet. The overall results were very tight in the first three places, with 41,593 points for Team Fargo taking first place, followed by Team Canada with 40,993 points and Team Vermont with 40,846 points. All three teams competed very hard and merited to be in the first place. Everybody at all levels and in every unit participating and supporting WILLIAM TELL 94 did their best to make this meet a big success. WILLIAM TELL 94 was going to be the last full-scale competition and its format was altered for WILLIAM TELL 96. Significant changes took place in different ways. In the past, WILLIAM TELL players received invitations directly from the organizers, but in 1996, major commands formed a team of selected units able to spare aircraft and personnel, and included for the first time were teams from the Air Force Reserve and Air Education and Training Command. The length of the meet was reduced from two weeks to one, with only three days of flying. Two out of the four flying profiles were eliminated, along with one of two weapons loads.

An F-16C *Fighting Falcon* assigned to 58th Fighter Group is being prepared to fly its next mission. This was the unit's second participation in a WILLIAM TELL competition. The first was in 1972 when the 158th was flying the Convair F-102 *Delta Dart*

A member of Team Vermont is ready to launch one of its jets during the competition. Team Canada CF-118 *Hornet*s can be seen in the background

The 158th Fighter Group began transitioning from the F-16 ADF to the newer C-model during March 1994. It took a lot of work to bring these aircraft to higher standards and to get ready for WILLIAM TELL

Two F-16ADFs assigned to 119th Wing, North Dakota Air National Guard at Fargo Air National Guard Base during 'last chance' checks before launch

Team Fargo, the 119th Wing – nicknamed *Happy Hooligans* – from the North Dakota Air National Guard took first place in the competition with a total of 41,593 points

Main: Playing the aggressor's role during the competition in Profile III and IV were QF-106 *Delta Dart*s and QF-4 *Phantom II*s assigned to the 475th Weapons Evaluation Group (WEG). In other times, these aircraft are used as manned and unmanned drones at Tyndall AFB

Left: BQM-34A sub-sonic target launched by the 82nd Aerial Target Squadron (82nd ATS) toward the Gulf of Mexico for fighters pilots to try shooting them down

Right: MQM-107D is another remotely controlled sub-target used by the 82nd ATS

QF-106B flown as manned and unmanned drones by the 475th Weapons Evaluation Group at Tyndall AFB

During the competition, QF-106s were still present in large numbers but its replacement was starting to show up on the flight line. QRF-4Cs were starting to appear at the time of the meet

Main: Sharing the ramp with QF-106s were many types of F-4 Phantom converted to drones and operated by the 475th WEG. QF-4G 69-252 still wears the shark mouth from its previous owner.

Inset: QF-4E flown as a manned drone during the competition.

QF-4E (right) and QRF-4C (below) on the ramp during WILLIAM TELL. The F-4 *Phantom* drone program started in 1997, with a total of 314 airframes converted. The QF-4 was replaced by the QF-16 FSAT (Full Scale Aerial Target), nicknamed *Zombie Vipers*. The last flight of a QF-4 was in May 2015, when the aircraft was destoyed over the Gulf of Mexico. The first QF-16 was delivered in 2012, the first uncrewed flight test was in 2013. Full operational capability (FOC) was declared on 23 September 2016. According to an announcement in March 2025, the U.S. Air Force Life Cycle Management Center intends to maintaining a fleet of 90 QF-16s through at least the mid-2030s

Team Canada with its CF-118 *Hornet*s finished second in the competition with a total of 40,993 points followed by Team Vermont with 40,846 points. Team Canada also won 'Top Element' and 'Top Shooter'

TOP OVERALL TEAM		
Winner	119th FG, North Dakota ANG	41,953 points
1st runner-up	3rd Wing/Bagotville, Team Canada	40.993 points
2nd runner-up	158th FG, Vermont ANG	40,846 points
TOP ELEMENT		
Winner	Team Canada	12,219 points
1st runner-up	119th FG, North Dakota ANG	12,037 points
2nd runner-up	158th FG, Vermont ANG	11,440 points
TOP GUN		
Winner	Capt. J. Browne, 52nd FW	6,346 points
1st runner-up	Capt. F. Garceau, Team Canada	6,292 points
2nd runner-up	Maj. R. Edlund, 119th FG	6,114 points
TOP SHOOTER		
Winner	Capt. M. Charpentier, Team Canada	1,088 points
1st runner-up	Capt. S. Ruffin 18th Wing	1,027 points
2nd runner-up	Maj.G.Sinclair, Team Canada	1,000 points
PROFILE ONE		
Winner	18th Wing	6,320 points
1st runner-up	Team Canada	6,102 points
2nd runner-up	119th FG	5,877 points
PROFILE TWO		
Winner	Team Canada	5,080 points
1st runner-up	158th FG	3,660 points
2nd runner-up	18th Wing	3,657 points
PROFILE THREE		
Winner	18th Wing	16,850 points
1st runner-up	158th FG	16,145 points
2nd runner-up	33rd FW	15,790 points
PROFILE FOUR		
Winner	119th FG	13,060 points
1st runner-up	158th FG	10,480 points
2nd runner-up	52nd FW	10,119 points
TOP WEAPONS DIRECTOR TEAM		
Winner	158th FG	10,480 points
1st runner-up	119th FG	9,100 points
2nd runner-up	Team Canada	8,875 points
TOP SCOPE		
Winner	1stLt. Scott Summers, 158th FG	4,925 points
1st runner-up	Capt. Dan Talbot, 119th FG	4,700 points
2nd runner-up	Capt. Mark Matsushima, 158th FG	4,650 points
TOP MAINTENANCE TEAM		
Winner	158th FG, Vermont ANG	4,945 points
1st runner-up	119th FG, North Dakota ANG	4,905 points
2nd runner-up	52nd FW, Spangdahlem AB	4,854 points
TOP LOADEO TEAM		
Winner	158th FG	5,000 points
1st runner-up	119th FG	4,950 points
2nd runner-up	1st FW	4,917 points

Team spirits were very high in the ranks of Team Vermont and Team Canada. Both the 158th FG and the 3rd Wing/ Bagotville are part of NORAD and as such, work together in the North Eastern Air Defense sector. The two units are used to work and train together, and very good friendly relations exist between them at work and off work

1st Fighter Wing

18th Wing

33rd Fighter Wing

52nd Fighter Wing

119th Fighter Group

158th Fighter Group

159th Fighter Group

3rd Wing

Members of Team Vermont formed for a group photo at the end of the competition. Leading the VT ANG maintenance team to excellence during the competition was Major Martha Rainville who did an outstanding job and was to become the first female Adjutant General of a state National Guard in March 1997

NHV NOORDZEE HELIKOPTERS VLAANDEREN

ARTICLE BY ROELOF-JAN GORT AND BJÖRN VAN DER FLIER

One H175 awaits its next flight while a second example returns to Esbjerg

NVH IS EXPANDING ITS CONTRACTS AT ESBJERG AIRPORT

INTRODUCTION

Esbjerg Airport, located on the western coast of Denmark, has long served as a vital hub for aviation and transportation. Among the notable operators at this airport, one stands out with their bright yellow Helicopters, which is NHV (Noordzee Helikopters Vlaanderen), a company known for its significant contributions to the offshore helicopter industry, particularly in the North Sea region. Roelof-Jan Gort and Björn van der Flier went to Esbjerg Airport to find out more and talked with the Base Manager Gitte Eriksen, pilot Jahne Dethlefsen, and the Head of Maintenance Steve McNeill about this.

EARLY YEARS AND DEVELOPMENT

Originally founded in 1997, NHV quickly established itself as a reliable operator in the offshore transportation sector, expanding its footprint across Europe, Africa, and beyond, offering tailored helicopter transport services. The company initially focused on providing helicopter services for the oil and gas industry, which was burgeoning in the North Sea. Esbjerg Airport, with its strategic location and modern facilities, became a key operational base for NHV.

The airport's history dates back to 1948, but it was the rise of the offshore energy sector in the late 20th and early 21st centuries that transformed Esbjerg into a critical logistics hub. The presence of NHV further solidified this role, as the company expanded its fleet and service offerings to meet the growing demands for the offshore industry.

EXPANSION AND FLEET DEVELOPMENT

As NHV grew, so did it's fleet. Initially operating smaller helicopters, the company invested in larger, more advanced aircraft to accommodate the increasing passenger and cargo demands of the offshore sector. Notable aircraft types included the EC155, EC225 Super Puma, H175, AW139, AW169, H145 and the AS365.

The United Kingdom was always at the forefront of the offshore flying sector, quickly adopting flight safety concepts that led to the development of twin-engine helicopters with a two-crew concept. The main issue was that while UK had its own helicopter manufacturing industry, companies like Westland Helicopters and Denmark did not have any of this, and thus was completely dependent on foreign OEMs. In the end, the EC155s and AS365s became the very first safety-enhanced offshore helicopters in Denmark, and a newly formed operating company called DanCopter took over some contracts from Maersk in 2003.

Since the introduction of a new helicopter type, the offshore flying industry has experienced some difficulties. On July 1st, 2012, a new helicopter type was introduced by NHV's predecessor DanCopter, the EC225, allowing for the transportation of up to 19 offshore workers to platforms and back to shore. However, just four months after its introduction, another Helicopter Operator's EC225 helicopter carrying fourteen offshore workers ditched at sea, resulting in a temporary industry-wide grounding for safety reasons. Although the EC225 returned to service by the end of the year. Unfortunately, in 2016 another EC225 engaged in a tragic fatal incident at Bergen Norway, where the main rotor detached from the helicopter, causing the death of all onboard. This led to the end of the EC225 in the North Sea offshore business and the closure of several operators.

In 2015, NHV Group acquired DanCopter, beginning a new chapter for the Danish offshore helicopter business. Following the EC225 disaster, all oil and gas customers refused to accept new helicopter models. Despite discussions with Airbus Helicopters about a new helicopter model, which eventually became the H175, which is currently the best helicopter for their operations. In comparison to the EC225, the aircraft has a smaller passenger capacity with three seats less, which suits NHV's needs. With the smaller cabin size of the H175, they are now achieving close to 100% occupancy in this helicop-

OPERATIONS AT ESBJERG AIRPORT

Esbjerg Airport serves as a key operational base for NHV's Danish entity, NHV A/S, facilitating the transportation of personnel and equipment to offshore installations as well serving offshore wind in the North Sea. The airport's proximity to major oil and gas fields makes it an ideal location for NHV's

Top: Normally the helicopters land on the airport ramp, but when maintenance is required they land on the platforms next to the hangars
Above: A H175 taxiing in at the ramp at the NHV hangars

operations, which include passenger transport, cargo services and training and safety programs.

At Esbjerg Airport, NHV currently has a fleet of three H175 helicopters. NHV now has thirty-six employees that are working for them at Esbjerg Airport, split into fourteen pilots, fourteen technicians and eight in supporting office.

STRATEGIC PARTNERSHIPS AND COLLABORATIONS

We asked Ms. Eriksen about the tenders and what was the reason for choosing NHV for the Danish oil and gas operations. Ms. Eriksen explained: "It is the customer who chooses us. We bid on the tender with a lot of other companies in the world. But I think it is because of the product we deliver, our safety policy and the price. We do not compromise safety at all." She goes further: "When we bid on a tender we investigate, what will be the best type of helicopter according to our customers' requirements. How far shall we fly, and how many passengers shall we move? Then we try to give the best price, payload & flight time for customer."

EASA HELI SA CAT 1 OPERATIONS

In March 2024, NHV Group announced that their Danish entity is the first operator in the North Sea to be approved to provide "Operations with Operational Credits — Helicopter Special Authorization Category I (Heli Sa Cat I) Operations" from the European Union Aviation Safety Agency (EASA).
This new approval has been introduced to increase the number of available and accessible alternates within the available fuel range. This gives NHV a huge advantage over competitors, when they are forced to stay on the ground NHV can still perform their flights, providing better service to their customers.

Key components of Heli Sa Cat 1 are the Safety Management Systems (SMS), pilot training and competence, maintenance standards, and operational procedures.
Compared to the standard regulation, this special approval gives them better operational benefits including:

- Reduced minimum visibility to 300m from the usual requirement of 550 meters, so the special

Top left: Base manager Gitte Erikson with one of her helicopters
Top right: Almost back, a marshaller directs a H175 towards its parking position
Right: The passengers are waiting in line to hop on their shuttle to one of the platforms

Lining up onto the Esbjerg runway ready for departure

approval offers a significant reduction.

- With the use of the Instrument Landing System (ILS), they can now descend down to 150 feet. If the airport has the capability to use Low Visibility Procedures (LVP), then they are authorized to descend to 130 feet. This is a significant difference from the usual minimum descent altitude on an ILS, which is typically 200 feet.
- Lower weather requirements for alternate airfields when the weather is marginal at their destination. This offers us a substantial improvement in the number of operational days and a better payload for our clients. The weather requirements for alternate airfields are reduced from a 1000-meter visibility to a 600-meter visibility, and the cloud ceiling is reduced from 400 feet to 30 feet.

To obtain this approval, NHV needed to use a helicopter with a 4-axis autopilot featuring automatic level-off capabilities, a feature present in all H175 helicopters. Additionally, the crew needed to undergo theoretical and practical simulator training to meet the approval requirements. All the pilots have completed this training during the most recent training sessions in the simulator in Marseilles.

PILOT TRAINING PROGRAMS

NHV invests heavily in pilot training, adhering to EASA's high standards. The company implements rigorous training programs that include simulator training, emergency response drills, and regular assessments. This commitment ensures that pilots are not only proficient in operating helicopters but are also prepared for unexpected situations.

Ms. Eriksen explained: "We do all the training ourselves, here at the base and at Airbus Helicopters in Marseilles in the simulator. There is a minimum of hours they need to have in the simulator and there are also some requirements about flying hours

A nH175 makes it way to the coast over the Danish countryside

from our customers before a pilot is allowed to fly for them. If you are a new pilot on this helicopter type, the first training starts at the office with classroom training. Later they are sent to Marseilles in SIM. And if they pass, they will continue to do some line training in the helicopter for a period. There are about three weeks of classroom training, two weeks in SIM, and seven to fourteen days of flight training with a Line trainer. Then you might be ready to be a new co-pilot, but you are only allowed to fly with experienced captains".

EXPERIENCES FROM A CO-PILOT'S VIEW

Janne Dethlefsen, a 32-year-old co-pilot who has about 1400 flight hours, will elaborate on her experiences and training: "I started my PPL in Esbjerg Airport on the R22, civilian and modular. In that way, I was able to work during my helicopter education. I took my ATPL in Billund Air Center and came back to Esbjerg to finish my CPL on the R44. After I finished my education, I flew a lot of sightseeing for the next 5 years. My dream was to fly offshore, but I needed a lot more flying hours to meet the hiring criteria. Meanwhile, I got my IR and FI. In 2021 I started my training on the H175 with Babcock and flew till 2023 at Babcock/CHC on the H175".

She continues: "Since 2023, I've been flying with NHV on the H175. The reason I have chosen NHV is that I was already type-rated on the H175, and that was the same type NHV Esbjerg was using. And nonetheless, I had heard incredibly positive rumors about NHV. At NHV we always fly with two pilots, the co-pilot and the pilot in command. Because we fly to the oil and gas platforms, my job as co-pilot is to cooperate with the commander to complete a safe operation".

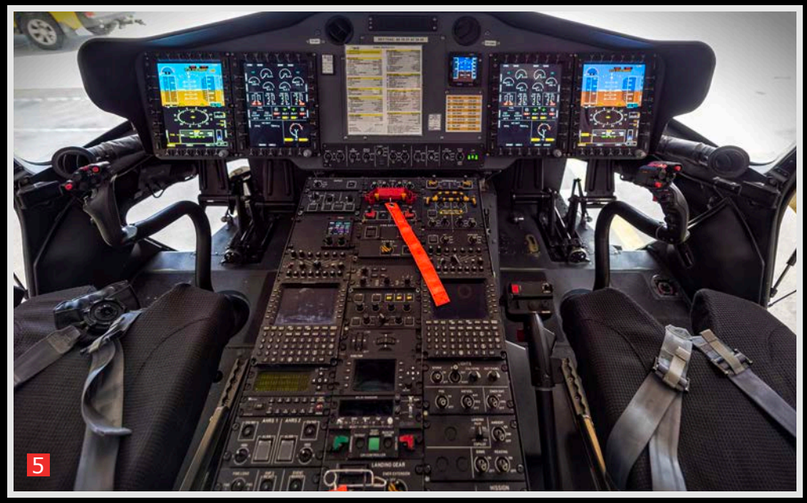
Janne Dethlefsen flies about six hundred hours every year on the H175. Before departure, the pilots check the latest weather package, which also contains information about the offshore installations. After completing the flight plan, they change into their flight suits and walk out to the helicopter to conduct a preflight check. This process takes about one hour before they are ready to fly for their new flight. On their flight, they can accommodate about sixteen passengers with a maximum payload of 2028 kg. However, this depends on the weather, fuel availability offshore, and the routing of the flight.

About the flying on the H175 she said: "The H175 is extremely comfortable, featuring high automation, low vibration, and excellent air conditioning that works well even in hot climates, ensuring great comfort for both passengers and pilots. The state-of-the-art autopilot with "Auto hover" and "Autoland" is especially noteworthy. With a maximum range of 650NM, we can reach all the oil and gas installations in the North Sea".

Janne Dethlefsen would like to add something about flying to the various installations and the possible dangers that exist and that she should take into account: "Yes, we are dropping people off at the offshore installations, and every time before our landings, we are performing a small risk assessment, where we as crew are trying to identify all the threats and which countermeasures we take to mitigate the risk. The risks could be wind direction causing a lot of turbulence, exhaust gases from the platform, supply vessels in the vicinity of the platform, etc. But every time I fly, I try to provide the safest flight, so I try to practice my skills to the highest level possible every time."

For flying the H175 over the North Sea, NHV's helicopters are all equipped with floats. These floats allow for emergency water landings. Co-pilot Janne Dethlefsen explains that the floats are always armed when flying over the sea, and they can be inflated when needed below a specific airspeed. This type of training is standard every year during SIM training, which includes ditching over the sea with and without engine power. Additionally, every third year, the crew needs to train on how to exit the helicopter when ditching. This training is conducted at RelyOn Nutec using a dummy helicopter that is lowered into a pool of water. During the training, participants practice exiting the helicopter using the emergency exits and swimming to the surface, even when upside down. Each trainee has their own safety diver, and the training is conducted in a controlled environment. All passengers must undergo the same type of training before they are allowed on board for an

Left: An H175 on itsv way to the coast over the Danish countryside
Right: H175 flying across the Danish shoreline ready to head out to the North Sea



offshore flight. This preparation is necessary due to the rapidly changing weather conditions in the area. Therefore, we need to plan everything carefully and besides this, we have a safety kit with us. This safety kit has extra undies and a toothbrush because you never know if you need to sleep somewhere unexpected".

About her experiences with night flying, she goes further in detail about this: "Flying at night presents unique challenges. It is more difficult to make a smooth landing due to the decreased visibility. There are several factors to consider:

- Night Vision: Our eyes require about 30 minutes to adjust to the darkness. If a flashlight is used in the cockpit, the white light can instantly ruin our night vision.
- Autokinesis: Staring at a single light can make it appear to be moving. To prevent this, we need to keep scanning the horizon.
- False Horizon: Certain combinations of streetlights or clouds can create a false horizon. To avoid this, we rely on our instruments for guidance.
- Black Hole Effect: When approaching an airport with minimal lighting, it is challenging to accurately judge our height and distance from the runway. The same applies to offshore landings, where we sometimes only have a green ring of light on the helideck. This is particularly difficult when landing at night on a Normally Unmanned Installation in adverse weather conditions."

MAINTENANCE AND OPERATIONAL EXCELLENCE

NHV's maintenance procedures are designed to meet and exceed EASA's regulatory requirements. The company utilizes advanced technology and best practices to conduct thorough maintenance checks, ensuring that all aircraft are safe and dependable. Operational protocols are continuously reviewed and updated to reflect the latest safety standards and best practices.

Steve McNeil was the Chief of Maintenance in Africa for ten years and is now the Chief of maintenance in Denmark for the last five years. At the NHV base in Esbjerg Airport, they run a progressive maintenance schedule, both calendar and flying hours wise, on all inspections up to eight hundred flight hours. Some of the engineers are qualified with a B1.3 license which means you can work on different helicopters having one or more than one turbine engines. A B1.3 licensed engineer oversees all aspects of the maintenance of helicopters. Some are qualified with a B2 license which means that their work is related to instrumentation and electronic equipment. And some are qualified with a C license. This person manages the maintenance tasks of the aircraft to ensure conformity to the maintenance manual as well as regulatory requirements and issues certificates of release to service following base maintenance on the aircraft. Regarding the maintenance schedule, he explained: "We do a first check every 10 flight hours, then there are 50 flight hours, 100 flight hours, 150 flight hours, 200 flight hours, 280 flight hours, 400 flight hours, 600 flight hours before BMX at 800 flight hours". The availability of the operational deployment of the helicopters is now above 85% despite flying five days a week, sometimes seven days a week considering the mixed defects, etc.

EXPANDING CONTRACTS IN THE OIL AND GAS INDUSTRY

In May 2023, NHV A/S secured a new contract with TotalEnergies EP Denmark to support offshore operations in the Danish sector of the North Sea. The contract

1 **Even the fabulous range of the H175 sometimes fall short and some refueling is required**
2 **H175 waiting for its load of passengers at one of the oilrigs in the North sea**
3 **Last passengers loaded, door is closed ready for take off**
4 **Janne Dethlefsen after finishing her cockpit preflight checks, ready to go**
5 **The modern and clean flightdeck of the H175, all the switches are with hands reachable on the center pedestal**

Main: After a long day of flying their H175 returns to Esbjerg during dusk
Left: NightOps on the Esbjerg runway
Right: NightOps at the Esbjerg helipad

involved that NHV at Esbjerg Airport deploy a dedicated H175 helicopter to transport personnel and equipment to TotalEnergies installations in the Dan and Tyra field.

Ms. Eriksen explains that "In July 2024, NHV successfully secured a 3 + 2-year contract renewal with INEOS plus further potential extensions. What we are doing is flying people offshore every day for a crew change. We must fly every day to the rigs and if they suddenly need an extra flight, we need to be able to support them with this". She continues: ”For INEOS and TotalEnergies we have about 2 to 4 flights a day. Sometimes they ask for more if they must catch up due to the severe weather. Then we try to find a solution to help them and if possible, with more flights than we normally have. But each flight takes between 2,5 to 4 hours and then the pilots need to plan for their next flight. So, the engineers sometimes need to look at the helicopter to check everything between the flights. So, this is one big coordination every day for our team."

Regarding the number of people, they are flying to the platforms she added: "On a daily basis we fly between two and sixteen passengers (pax) during each flight. We have also flown with only one passenger, if our customers need to take that person offshore, we will do this for them. But normally we fly with twelve to sixteen people on each flight. The only reason we cannot fly to the platforms is due to the weather. When there is bad weather like lightning or high waves (six meters or higher), we have to wait a day or two before the weather is better again. So, the weather has an enormous impact on the flights we perform on a daily basis."

PROSPECTS

As the global energy landscape evolves, NHV Group continues to adapt to new realities, including the increasing focus on renewable energy sources. The company is exploring opportunities in the offshore wind sector, which is gaining momentum in the North Sea. This shift aligns with global sustainability goals and promises to keep Esbjerg Airport at the forefront of aviation logistics in the region.

The authors would like to express their gratitude to Jessicca Gordon and Delphine Demeyer of the NHV Group headquarters in Oostende and a special thanks goes to Base Manager Gitte Eriksen, co-pilot Janne Dethlefsen, and Chief Maintenance Officer Steve McNeil, and the people of Esbjerg Airport for making this article possible.

Early rise and shine for the NHV, before commencing a four hour long journey to the oil fields, which includes one refueling at the platform

NightOps at the Esbjerg helipad

Two H175s hovering over the active runway at Esbjerg airport

Even though the sun just came out this NHV H175 leaves on an early morning flight towards the North Sea

EYES ON THE PRIZE

AN INTERVIEW WITH F-16 PILOT «VRIESKE»

ARTICLE
BY
JORIS VAN BOVEN
AND
ALEX VAN NOIJE

Commander-pilot(commandant-vliger) Steven de Vries (callsign VRIESKE) is a Belgian F-16 pilot with the most operational F-16 flying hours in Europe: 5,489 hours. In March 2021, he reached the magic threshold of 5000 F-16 flying hours. During his operational life, he participated in many exercises like RED FLAG and deployments over Bosnia, Kosovo, Serbia, Afghanistan, the Baltic States, Iraq, and Syria.

During the last two display seasons (2022, and 2023), he flew the famous black/green 'Dream Viper' F-16 at many airshows in Europe. In April 2025, he retired from flying after 31 years, and in May 2025, we had a long interview at Kleine-Brogel AB with VRIESKE about his life as an F-16 pilot.

Who am I and how did I join the Air Force?

My name is Steven de Vries, but within the Air Force everyone knows me as VRIESKE, that is my callsign in our limited circle. I am also known as a demo pilot. The last year that I flew was actually only a small part of my entire career, and it was not even my core business.

Ever since I was a child I have been fascinated by fighter planes. I wanted nothing more than to fly one myself. That was really my goal, although that idea was not really in my head at first. It was something that did not seem obvious; you cannot just become a fighter pilot.

How do I know that? Well, it goes back to my toddler days. Maybe you recognize this: at school, we had these plaster casts-cups where you could scratch and draw when the plaster was still soft. I had already drawn two F-104 Starfighters, with a big star in the background. I turned out to have a talent for drawing and even attended the drawing academy for a while, on Wednesday afternoons and Saturdays, for six years. I would actually like to do that again. But at a certain point, it didn't seem realistic to become an artist.

It wasn't until I was about fourteen or fifteen in high school that the idea of flying really hit home. A classmate said he was going to be an F-16 pilot. I asked him how that was possible because he wasn't a nobleman and his father wasn't in the Air Force, which I thought was necessary. He showed me a newspaper clipping that said they were looking for F-16 pilots, and that you could just apply. That used to be the case: you filled out a form and then you could be selected.

I originally wanted to be a mathematician but my math teacher said my grades weren't good enough for that. When I knew I could become a pilot, my commitment and motivation increased and I got very good results in math in the fourth, fifth, and sixth year.

There were many candidates and also many people needed in the air force, but the process to get in was impressive and you didn't really know anything in advance. Social media didn't exist yet; it was a matter of waiting and trust.

I remember even writing down the wrong address and being in the middle of Brussels while my father was leaving. I really had to learn to make my own plans.

The Air Force has evolved and shaped itself over the years, as have I. But the most important thing is that I got into it by studying hard and being very motivated.

When did I start and how did my training go?

I started in 1990, fully operational.

'Vrieske' takes a seat in one of the 'coolest' workplaces one can imagine as an aviation enthusiast

I made my first flight about half a year later, in May 1991, on the SIAI-Marchetti. At that time the training was still in Goetsenhoven, a location I remember well.

In Goetsenhoven I was selected as one of the possible candidates to study in the United States. That was not a standard procedure at the time; there were only two spots available for our group. I was chosen from about twenty candidates for this opportunity. I thought that was quite special.

I was making good progress and felt on track. But then I was unexpectedly told I was going to be on leave for two weeks. During that time I was with a few colleagues who went on holiday, while others continued training.

When I came back, our colleagues had already flown solo and left for the United States. I wondered where the competition had actually been. That was a shame, although it later turned out that the two selected did not make it in the end. But that is not the point; the story shows that sometimes things can go strangely. You want certain things, but you do not always get them. Yet everything turns out well in the end.

There is always a way around, and a setback doesn't mean you have to give up. You pick yourself up, overcome the obstacles, and move on. Other opportunities will always come along. If you want something, there is always a way. It's that simple.

Everything was new to me because I had never flown before. Together with a friend, who also wanted to become a pilot, I signed up for the so-called Air Cadets. At that time we were fourteen or fifteen. We never got a response and we didn't investigate further what had happened to it. It was probably an old-fashioned note that we had sent, and it simply got lost. When I became a demo pilot years later, I brought it up with the PR department, and they said it was strange, but there were plenty of candidates.

The great thing is that I started with zero experience, which in retrospect may have been an advantage. You step into a fast train that goes very fast. It is a matter of getting used to the speed and learning how to process all the information and convert it into something productive. Studying is constantly necessary because every step you take takes you one step further.

Things can go very quickly, and if you're not prepared, things can go wrong very quickly. It seemed like a real elimination race. Sometimes you started on Monday and could be sent home on Sunday. That stress was part of it.

Experiences as a young pilot in training

As a young guy, it was sometimes hard. In the past there was hardly any psychological support; it was a boy's dream that was broken for some people. You see that then and still now. Fortunately, there is more support nowadays, but those were different times, certainly in the way you dealt with your instructors.

In Goetsenhoven, the candidate pilots had their "cellar", a place where you studied and relaxed. Where you only came out when the instructors called you with the intercom. That could be for a flight or to get the sandwiches, but you never knew exactly what for. That was exciting, the flight schedule was never given to us in advance.

In retrospect, I have 6,000 flying hours, so there was clearly a path that worked.

Of course, there were also people who dropped, out who

might have had a better chance in a more modern system. Some might have needed more time or become discouraged more quickly.

During the training you are formed; you develop a certain resistance. I myself was quite timid and I stood rather in the background. But, you learn to make yourself heard, to stand up for yourself and always know where you want to go.

It's about speeding up everything you do. Not trying, but just doing it, right away, with full commitment. That's exactly what people are looking for in pilots: people who don't take everything for granted, who want to improve and always go the extra mile. It's a top sport in a mental sense.

We didn't think about it at the time, but now I can imagine how my parents felt. At that time, they had during the week total no contact with me. If I didn't call, they didn't know anything. They couldn't just call me, I had to wait until the weekend for my stories.

Nowadays, fortunately, things are very different. Candidate pilots can go home every day if they wish. And of course, communication with the home front is much easier now. The advantage of our time was that the bond with your colleagues quickly became stronger. You could only go to them with your problems. We had a 'Band of Brothers', so to speak.

Personal change and responses in emergencies

During that period, your character is obviously influenced. I think that certain character traits are really addressed, or matured more quickly, which gives you an advantage over others in certain areas. The job involves very little emotion and pure focus on the task. That doesn't mean I don't have emotions, absolutely not. But we are trained to respond to crisis situations purposefully, with apparent calm.

I've mentioned it before, but people are sometimes amazed at how cool you can stay in such intense moments. The result of years of training, I suspect.

An example: we were warming up on the tennis court in our club. A man next to our court was dragging his court at the end of his lesson. When he suddenly stopped. And went down on his knees, I knew enough. I dropped everything and immediately walked over to him. It was clear to me that he was having a heart attack and I immediately started first aid. In the meantime asking a bystander to call 112 and others to get the defibrillator.

It was in the middle of coronavirus time, so I knew I couldn't ventilate him. But only the minutes of heart massage proved effective enough to get him through. And luckily he is still playing tennis at our club.

First aid is one of the many annual extra training

Ready to go - a member of the ground crew performs final checks of the "DREAM VIPER"

courses we receive. Personal safety first and taking the right action immediately is added to a manner of speaking that has been instilled in us.

Another moment: When I was practicing with my son one last time just before his driving test, we passed a car that was on fire. I saw a small starting fire at the bottom of the car and immediately had my son pull over to the side. He parked neatly while I rushed to the other car with my fire extinguisher, which had stopped in the meantime.

A driver who was driving behind the car in question had also gotten out and started telling the driver that his car was on fire. Which caused more panic than action. I arrived at the scene and only asked if I could put out his car and insisted it that he also takes his fire extinguisher. In all the panic he could not find it. Fortunately, my fire extinguisher was enough to put out the fire, but this fuel leak could have quickly gotten out of hand.

Putting out fires, is also something that is on our training menus. That this would come in handy, who would have thought? In short, you can say that we become trained to stay calm, analyze quickly, and take appropriate action.

Flight training

We started in Bevingen with the initial military training. That lasted a few weeks. Then you went to Goetsenhoven for the elementary basic training at SIAI-Marchetti. First, you get to know the plane through theory lessons. Then the actual flying begins. Basic exercises such as landing, take-off, go-around, etc. Then comes your solo. Then you do more sector work, such as aerobatics and spins.

The first solo was of course impressive. You always sit next to each other in the plane, and for that solo, it is suddenly that spot next to you completely empty. You go up in the air alone. That gives goosebumps, goosebumps. You take off and just shout with joy, such a wonderful feeling. For a young guy of 18 or 19 years old, with just over ten hours of flying, that is indescribable.

Furthermore, the training consisted of visual and low-altitude navigation, formation flying, aerobatics, and even the first movements of air-to-air combat. BFM (Basic Fighter Maneuvers), "air battles", that translated mainly into maneuvering behind the other aircraft. As it were, the first principles of air combat.

At Alpha Jet, we had two schools: the basic training in the 7 Squadron and then the operational advanced flight training in the 11 Squadron.

Which was then completely located in Belgium, in Brustem completed. After the 7 Squadron earned you your wings and only after the 11 Squadron you could choose: continue as a fighter pilot or other directions. The best-ranked were allowed to choose first.

Continued training on Alpha Jet and F-16 at the OCU

What you in the 7 Squadron did on Alpha Jet, was basically the same as what you did before on SIAI-Marchetti, but in a jet. It was like pressing the fast-forward button: everything goes much faster. You have to constantly think ahead, to stay ahead of the plane.

It wasn't really my thing, it was hard to gauge what exactly was being asked of you. There was a lot of variation among the instructors and consequently also the quality of briefings and debriefings. But eventually, you get your wings after this and this phase is also behind you.

Once in the 11 Squadron, I decided to go for it completely, this was going to be my thing. And I succeeded if I may say so myself. Flying operationally with such an aircraft suited me very well and I really enjoyed it.

I chose F-16 and got that place. But at that moment the previous F-16 class was not ready yet. There was a delay of six months, which meant that our F-16 candidates had to fly an extra half year on Alpha Jet. For that, the C-Flight was set up where we performed a diverse package of flights with 'visitor' pilots in anticipation of our dream.

Finally, in 1994, we started the F-16 training in the OCU (Operational Conversion Unit).

It was also the time that the Mirage 5 was being phased out. Some experienced Mirage pilots joined our promotion. Since they already had experience on fighter planes, they received a shortened training.

All in all, I really had a fantastic education at the OCU. Also thanks to the innovations they had introduced during our training. For example, various instructors in the operational squadrons had to support the OCU to help us train. This gave us a good idea of how things were in the operational units and the tactics they explained to us were also the most recent.

The first operational unit, the 23 Squadron

During the OCU training, we were allowed to indicate our preference for the next step. My preference then was for air combat. The only possibility then was to stay in Bevekom, but unfortunately, there were no places then.

Therefore, it did not really matter to me where I would end up. As a funny anecdote: In contrast to the rest of my colleagues, I was the only one who did not get my choice. As a result, I only had to ring the bell once, while others had to 'do' twice. In the end, it was decided that I would go to Kleine Brogel in the Air-to-Ground role, together with two colleagues. The 23 'Devil' Squadron, had with 31 Squadron agreed that I would eventually become a 'Devil'.

On my first day as the commandant, I was welcomed at the office with the words: "We have the whip on". That was a bit of a shock, but in the end, it was the only way to get us Combat Ready in a short time. After a few adaptation flights, a test

flight followed, after which we were 'combat ready'.

We had about a hundred hours of flying time on the F-16 at that time. Despite the seemingly strict regime, I felt supported by a good team that was all looking in the same direction. I was eager to learn and went for it. It actually went smoothly, without the stress of having to perform constantly.

After each flight, we had thorough debriefings where feedback was given, without feeling like they didn't know what to do. This allowed me to grow quickly in my role and gain more and more responsibility today.

At that time, Electronic Warfare (EW) and the use of radar warning systems were still in their infancy. We had our F-16s purchased without a standard RWR (Radar Warning Receiver). With the intention of installing a Belgian system. In the end, this did not happen, so we had to make tactical adjustments.

We were preemptively chaffing and constantly maneuvering, making it difficult for enemy systems to get past us. That period required a lot of skill and alertness from us, something that is much less of an issue now with modern systems.

My first air-to-air battle

When I ended up in the squadron, there were a few extra systems that required our attention. But step by step something extra was built in regularly. A new RWR was purchased, new armament, and new instruments, there was something new every year so that we could learn something new at a leisurely pace without it overwhelming us and so we could also sharpen our tactics.

The year after I joined 23 Squadron we went on to participate in 'RED FLAG'. Officially you had to have about 500 flying hours to be allowed to participate in the RED FLAG exercise in the USA — the tactical training flights where real combat situations are simulated to prepare you as well as possible for a real conflict. Unfortunately, I only had 300 hours on the F-16 and was therefore going to drop out. But our CO had a different view on that. He said: If a conflict breaks out, you will go, so you will go now too with me. "I sign for that." That trust gave me a huge boost!

My very first flight in RED FLAG was a great experience. My CO was sitting in the back of the cockpit and kept a close eye on everything. We flew extremely low, right along rock walls and cliffs. My CO could hardly believe how low we dared to go, considering the little experience we had. But low-flying turned out to be my thing. It was exciting, but also magical.

During that flight, I got my chance: 'MiG One' (an American F-16 in the role of an opponent) suddenly appeared in the middle of our formation. I saw it first, called out and the rest of the formation started turning and reacting defensively. I turned my F-16 towards that 'MiG One' because he himself was maneuvering behind someone, I was suddenly too close to use my missiles. I knew immediately: this was my moment. I fired my on-board cannon empty at 'MiG One' (simulated though), just instinct and training. It felt like everything came together in that one moment. In our debriefing, it was validated as a valid kill.

The whole RED FLAG experience made you know how to stand your ground and get confirmation of it. I became a wingman who could contribute, despite my relatively small number of flying hours. It gave me the confidence to continue, to grow, and to become better and better.

From wingman to leader – and the leap to MLU

In the beginning, you're just a wingman. You do what you have to do, you stick with your leader, and you learn as you go. You listen, you observe, you execute. And as you grow, it starts to change. They don't just expect you to follow, they expect you to start thinking ahead. They want you to see the bigger picture. You feel the moment coming: you're no longer a burden in the formation, you start contributing effectively. And then … then comes the next step: Leadership.

Becoming a leader of a formation is something else. First, you learn to lead two-ship, then four-ship. To finally be able to take the lead no matter how many planes. But that doesn't happen by itself. There's a whole process behind it. You start with the element leader course, and every flight in it is judged. It is not an easy course: if you miss a flight, you have to do it again. Do you need too many retakes? Then they say: "Maybe this isn't for you." That's tough but fair. Another route, maybe transport or helicopter, might be a more suitable direction.

For me, it went well. I flowed through, did the necessary courses, and eventually also participated in the TLP – Tactical Leadership Programme. In my time FWIT (Fighter Weapons Instructor Training) was the absolute top. In 2000, I was going to do that, but due to the busy missions and the switch from OCU F-16 to the MLU (Mid Life Update) F-16 it was postponed until 2001.

That was special because it was the first time with the new MLU system. It felt like pioneering. I came back from FWIT as one of the first to have flown

on that new MLU, and right after that held the 23 Squadron to exist. Early in 2002, we merged, and I moved to 31 Squadron. At that time they were still flying with the old F-16, the OCU variant. We, the former 23 Squadron pilots, helped train them.

That switch to MLU was really a huge step forward. The old F-16, the OCU, was certainly a capable machine, and in those days we did a lot of air-to-air at relatively short range. BVR weapons (Beyond Visual Range) were already available, but often it was still about battles where you could see your opponent with the naked eye. You still had to guide the missile to impact. Everything took place in a 'tactical bubble' that was much smaller than what we know today.

With MLU, all that changed. The systems got smarter, the sensors got more accurate, and the communication improved dramatically. It wasn't just "see and shoot" anymore – it was a fully integrated network of information. Different separate systems that now talk to each other, and even give feedback on the threat. We also got a datalink, a precursor to Link-16, so to speak.

We gained access to systems that were previously unthinkable – and suddenly we could do things that just a few years before were the preserve of top nations. For example, during the second RED FLAG, we flew with a completely new Carrapace System on board (Carrapace Passive RWR system), by far the best we had in Europe at the time. That gave us so many more tactical options.

There was a sense of pride in that whole period. I had seven years in the 23 Squadron where I finally got my huge base. Then, with FWIT in my pocket and the transition to the 31 Squadron, I felt like I was getting the most out of my career. We were really on the cusp of a new generation of combat. And to be a part of that, that was pretty special.

It was sometimes tough and technically complex, and you had to keep proving yourself. But at the same time, I felt privileged. You are at the cutting edge of what air forces can do at that moment. And if you are allowed to participate in that, then you know: this is what I do it for.

Specialist in Air-to-Ground – technology, experience and vision

There is a clear moment when you realize: this is not just flying. This is specialization. In my case, that was when we made the switch from the old LANTIRN targeting pod to the Sniper pod.

These choices are not simply imposed from above. No, they come from below. The tactical choices are made by guests who are on FWIT or WIC (Weapon Instructor Course) as it is now called experts. They are given the space to dream. And from that operational dream it is said: general, this is what we need. It is not up to us to determine what exactly we have to do, but how we have to do it. And for that, we need the right tools. The SNIPER targeting pod was one of them. Of course, the budget also has to be there and that is where the shoe pinched several times. We did not always have the numbers we would have liked to see in order to be able to be deployed in a conflict and at the same time continue our necessary training at home.

Ammunition changed too: AGM-65 *Mavericks* for example – that was revolutionary at the time. I've fired several of them. In the theatre of operations, not on the range. End the 90s, during the Serbia campaign, those were our precision weapons. And believe me, they worked, but you had to know what you were doing. It was then, still on OCU F-16, a very complex weapon to use properly and even after that, you had to know how with it to go.

At that time, the targeting was still done with the *Maverick* head itself – we still had no separate targeting pod. You flew towards the target, looked at a green screen between your legs, a kind of TV-scope, and tried the target area to 'match'. But if your navigation system had drifted by then, we had no GPS then, only INS, then you had to do it with your experience visually following your symbols, and then only on the green screen. That was pure flying skill and preparation.

There was no centralized doctrine or training system as we know it now. Each unit was a world of its own. Everything revolved around the squadron. Tactics, techniques, lessons learned – these often remained local. But with the conflicts, we were confronted with flying together with pilots from other squadrons. From this, the need for standardization grew.

That standardization only came with initiatives like FWIT, where we set up tactical operating procedures that went beyond national borders. Because we saw during joint operations – like in the Balkans with the

Dutch in 1998 – that we flew the same missions, but did not always speak the same language. Literally and figuratively.

Our FWIT course then wrote a Tactical Operating Procedure, a kind of bible for multinational operations. It laid the foundation for interoperability as we know it today. FWIT became not just a course, but a platform that really pushed for standardization across squadrons and borders. Since then we have spoken one language – tactically speaking.

I dare say that we within the 23 Squadron were at the forefront. We turned every proverbial stone over. Something new came out? Then we made sure that we mastered everything in no time. We were the reference point. And later, when everything was centralized, we saw that the foundation we had laid worked.

And that is perhaps the best part of it all: technology is just a tool. What counts is the knowledge, the preparation, the experience – and the drive to make it better. That is what air-to-ground expertise is really about.

Language of Tactics – Standardization, Intel, and the F-16 Collective

During the first missions with NL, it was quite clear. One mission, one ops room, one team. Everyone was literally together. You could discuss, plan together, take the map, and say: this is how we tackle it. But over time that started to shift. Several systems were no longer the same in the F-16s of Belgium and the Netherlands and due to safety classifications there was a distance. Some things could no longer be shared outside your bubble.

Except within FWIT – the Fighter Weapons Instructor Training. There was a Memorandum of Understanding signed between countries. Within that framework, you could talk more easily. Tactics, lessons learned, operational experiences. There you spoke the same language.

But in the operations, you could feel that that disappeared. Everyone was on their own island. And yet... We were always just one phone call away from each other. Whether it was about Afghanistan, Iraq, or Syria – we were usually together, on the same

base. We saw each other at the weekly meetings and therefore kept in contact. Then realize that this mutual cooperation is not based on protocols but on people. On trust. On shared experience. FWIT was the connecting factor in this. That is not a course – that is a culture.

I'm not saying that everyone should follow FWIT. But those who have done FWIT come back with a backpack full of knowledge and an irresistible urge to share it. You are so full: listen, guys, I know – take it from me now before it slips away. You know it's valuable. Not out of arrogance, but because you realize how much better you can become together.

Not every country has that culture. You notice that during large exercises. Some partners are not there yet. You take them under your arm - subtly, politely, because you do not know their aircraft, their limitations, their context. What they do may seem inefficient, but it often comes from their reality: their doctrine, their systems, their environment.

But within the F-16 community... that was different. There was cross-pollination. Initially mainly with the Netherlands, but later also with Norway, Denmark, and Portugal. You end up adopting elements of each other's tactics. The best from each country. And that worked. That's how we all became better. That openness simply did not exist in all aircraft types. The F-16 was truly unique in that.

Over time, FWIT also grew to be more than just a course for fighter pilots. C-130s were involved. Personnel from Ground Control Intercept, Intelligence, etc. are now also trained in detail. FWIT became broader – a platform for fully integrated operations.

That is the true effect of standardization. Not just the same procedures, but shared values, and shared understanding. One community, one mindset. Whether you fly an F-16 or are in an F-35. Whether you do intel, or JTAC, or support. It's about that one principle: operating together, at the highest level.

5,000 flight hours — every flight counts

Five thousand hours in an F-16. That sounds like a number. A milestone. But in reality, it's much more than that — it's a story of dedication, of availability. And important to me: they are five thousand hours flown in an operational squadron.

Because tactical flying is not a hobby. You don't fly for an hour "to keep in touch". Every flight is a Champions League match. You prepare those days in advance. You think up scenarios, analyze targets, and coordinate with colleagues. And yes, that applies even more when you are a leader - then you carry out the mission. Then you have everyone with you. There is no flying "to do something" and then into the bar. There is always a goal. An objective. A lesson for someone. Every sortie is training, evaluation, and education. For yourself and others.

You brief the weakest member of your formation. Not because he is weak, but because the one who

Heritage formation of the F-16 AM *Fighting Falcon* 'DREAM VIPER' and a Supermarine Spitfire Mk-XVI at the Belgian Air Force Days 2023

sets the standard. Can you get him or her on board? Then you get the whole group on board. And then you make every pilot stronger. That's what it's all about. That's how you build a squadron, a culture of professionalism. And that's how you stay sharp yourself. Because when you coach others, you're constantly testing your own knowledge. And the questions they ask? They keep you awake.

And then you land, and the real work begins. Debrief. In detail. What were the objectives? What did we achieve? What not? Was it skill? Or luck? You learn to be critical. Honest. Also towards yourself. And that, every day again, thousands of times — that is what 5,000 hours really stand for.

Along the way your role shifts. From mission lead to instructor. From a tactical specialist to a wing aviation safety officer. A whole new world. Suddenly you are responsible for flight safety across the entire base. Procedures. Risk analysis. The work that no one sees, but that makes everything possible. You fly less, but the responsibility is greater.

And then the question arises: do you want to become a demo pilot? A role that many dream of. I had considered it before but preferred to fly my tactical missions as a squadron pilot. But since I was no longer in an operational squadron shortly after achieving my 5,000 hours, that door suddenly opened. And I applied.

The task was not easy to reconcile with my job as WASO Weapons and Systems Officer, as an F-16 instructor attached to the training squadron. But I felt like being able to present the F-16 in a different way. To inspire the youth, to make them dream.

So five thousand hours is not just a number. It is a journey. From wingman to leader. From pilot to instructor. From tactician to ambassador of your platform. And along the way? You do not just learn to fly. You learn to decide under pressure. Emotionless when necessary. Calm when necessary. Because your colleagues are counting on you. Always.

And those five thousand hours? They have shaped me. Not as someone who knows everything — but as someone who understands what is needed. And anyone who wants to learn that can always sit next to me.

Demo flying: a mission with a message

I knew exactly what I wanted to do with the demo story. Those who want to participate get into a moving train. As soon as you're in, you're off. And that train? It doesn't stop anymore.

Even though I was the only official candidate, suddenly others seemed interested. It caused a month's delay. But in the end, I was chosen.

I was not an obvious choice. There were reservations. "Too old", some said. "Difficult to deal with." And yes, I should have heard it: "You are not our choice". As blunt as that. And then you think: okay. But here I am. "Let's do this”.

For me it was simple: if I was going to do it, it had to be good. No half measures. I grabbed it with both hands. Everything was focused on recruitment. That plane, it had to carry a message. No stickers, no 'quick something nice'. It was going to be a story. And that's how Dream Viper came into being.

I built that entire branding myself. From the design to the narrative. No three proposals, just one vision. Take it or leave it. But I wasn't reckless. No child's drawing or joke on a fighter jet. This must be professional. Impactful. With a message. I had support from a few people around me, I still remember how the first months were, with trial and error. Many weekends we are working on the concept and against a timeline.

And then comes the second part: to be present. Not just flying. Also getting out of your cockpit after the show, going to your tent, talking to people. Being approachable. When you recruit, you have to be visible. Then you have to be real. You have to take pictures with children, explain to parents, and inspire young people. That is part of the job. And for me: just as important as the air show itself.

You can say what you want. Difficult person? Too old? Well. But I have filled this role with honor and conscience. With respect. With content. And no room for excuses. If it had failed, then it was my fault, and I was prepared to bear that.

So Dream Viper is more than a name. It's a message: dare to dream. And when you get a chance, grab it. With both hands.

Last flight, deep friendships: Swiss precision and Belgian pride

There is something special between Belgium and Switzerland. Something that goes beyond airspace and engines. Something human. Because the bond with the Swiss — just like with the Dutch and the French — has always been there. And with Switzerland, it just clicks. Maybe because we speak the same languages. Maybe because we understand each other, even without words.

When my last flight was coming up, the 'Tiger community' knew: VRIESKE was taking a leave. People were invited. Unfortunately busy schedules, operations, training … and the fact that it is simply not easy to just come here from Greece for an evening. But still — Fönsi (Yannick "Fönsi" Zanata), my Swiss colleague demo pilot, he found a way. He himself is not a Tiger, but he could arrange it. And so he stood there: with two F-18s, especially for that one flight.

That last flight itself? Nothing spectacular, no complicated scenario with maximum number of planes. Just a navigation flight to France.

But very thankful that Fönsi, my demo buddy from Switzerland, could still join me in a formation flight. Grateful that he had made the effort to make this happen!

A farewell without theatre. But full of meaning. For me, it was a crowning achievement. Not a spectacle to impress, but a signal.

Because it is their time. The F-16 is getting old. Literally. It is now old age ailments that are rearing their heads. It is more often on the ground than in the air. And honestly: it is also up to the young guard to fly. It is up to them. With fresh energy, with new ideas.

If there is one thing to remember, it is not the hours. Not the demos. But the attitude. "**Eyes on the prize**". Don't dwell on what went wrong. Don't get bogged down in complaining or regret. Every setback is a new opportunity. And you make your own story. Like I made mine, since 1990.

Was it always easy? Of course not. But at the end of the day, I don't look back with regret. I mainly remember the good moments, the bad ones have no place in my archive. What counts is the total picture. And I'm happy with that.

So no, no bitter ending. No missed hours. Just gratitude. For the chance, for the team, for the adventure. And now? On to the next chapter. With the same look forward.

Remembrance of Mollis Airshow in Switzerland

And then I think of Mollis. Switzerland in a nutshell: mountains, precision, and challenge. An air show there is not self-evident. The valley is narrow, and the space is limited. But that forced me to be creative. My entire demo approach was atypical anyway: I didn't want to do the show the way it had always been done. No standard loops. No 'look at me' moments. My starting point was: close to the audience, be present, and bring energy.

In Mollis, I had to adapt my show. The mountains determined the rhythm. But I used them precisely: as a backdrop, as a contrast. A manoeuvre upwards? With that wall behind you, it looked twice as powerful. The spectators were full of praise. They didn't get a moment to get a chip from me. And that was what it was all about for me. Keeping attention. Touching people.

The technical adjustments seemed small but were well thought out. No improvisation — optimization. Approaching things a little differently. Using vertical where horizontal was not possible. And always with safety as a limit. Because that is what it must be. Demo flying is not just pulling and tugging at the flight controls. There are a lot of rules that you have to adhere to. They are also checked for compliance. And rightly so.

Of solidarity, professionalism, and above all: respect. For the audience. For the plane. And for the people you met along the way. Like a Hair dryer. Like the Tigers. Like all the colleagues from across the border who once flew next to you, or just dropped by to say hello.

"Eyes on the Prize": Farewell to a career, not a life

And then suddenly it was time: the last flight with the F-16 was over. No big speech, no theater. Just a moment to stand still. Not to look back on every hour, every mission, every detail — but to feel that it is good. That it meant something.

When I stepped down, I only had a short speech. Off the cuff. No lists, no figures. Just a thank you. To the people I worked with for years, flew with, built with. Every colleague, every face, brings back memories. A walk through my entire career, as it were.

Yes, 35 years. Yes, almost 5,500 hours. But those hours … are secondary. They are not a goal in themselves. You fly because you like it. Because you want to be there. And when you are there, then you do it. That's how the hours pile up. Not to brag, but because it happens naturally when you say every day, "I am available." Missions, exercises, lessons, you just say yes. And you fly.

At one point my CO said in the early years: "Would you don't even take a leave?" And I thought: leave? Why would I take a leave if I can fly the F-16? Of course, taking a leave is a must, recharging your batteries can never hurt.

Those hours also led to criticism, unfortunately. "He flies too much." "Isn't it enough?" But I didn't take anything away from anyone. Everyone had the same opportunities. My motto was always: be available. Then the opportunities will come automatically.

We are entering a period with fewer available hours on the F-16, and then there is no place for someone like me, I think. Rightly more space for the youngsters.

THE AVIATION MAGAZINE

Since 2009 we bring you the BEST for FREE Aviation Magazine