

**FREE POSTER!**

*Featuring XV582 Black Mike on Page 33 & 34*

# AVIATION MUSEUM

ISSUE #001  
APRIL 2023



## TBAG

*Guardians of the Last  
All-British Bomber*

## MUSEUM HIGHLIGHTS

*Farnborough Air Science Trust Museum*

## HURRICANE HERITAGE

*Preserving Flights for the Future*

## MIRAGES IN THE DARK

*Yorkshire Mirage IV Night Shoot Debut*



# EDITOR'S LETTER

JEANG HERNG  
AVIATION MUSEUM'S EDITOR

As a person who grew up with immense passion in aviation, yet born in a country without much aviation heritage, I spent my teenage years browsing aviation database, visiting the websites of various aviation museums giants in the world, had a virtual tour of the famous Davis Monthan Air Force Base, aka the Boneyard on Google Earth. Soon, I found out about the existence of aviation magazines, and the vibrant and lively pictures, along with the aviation stories have quickly pulled me further into the world of aviation, and inspired me to pick up a camera to start and learn about aviation photography. Growing into my mid-20s, going through the global pandemic called COVID which grounded me for 2 years without any travel and plane spotting, I suddenly found myself in the British Isles, a land that was once an aviation powerhouse, filled with aviation heritage, aviation museums, which includes the highly rated Imperial War Museum, and yet the first news I received after my landing in Heathrow, is the forced closure of the amazing Cornwall Aviation Heritage Centre, which recently had its death knell sounded by the forced eviction over the Easter weekends. The potential loss of the site's precious collection, The UK, having already losing its aviation industry to political reasons, is now losing the collections that served as a memorial to the glory days. In the recent years, the UK have lost so many highly rated aviation museum and heritage groups due to various political reasons, it makes me wonder, can a foreigner like me, create a magazine that is seeking to promote the preservation of the aviation heritage in the UK? It is that very idea that give birth to this magazine, Aviation Museum magazine issue #001.

*Vickers VC10 XR808 at RAF Museum Cosford, its sistership ZA148 is currently under threat after the forced closure of Cornwall Aviation Heritage Centre, if ZA148 is lost to the scrappers, the amount of complete VC10 airframes will drop to 5.*





# CONTENTS

## FEATURES

- 11. FOREIGN HIGHLIGHTS: VIGILANTE IN THE PHILIPPINES
- 16. TEN UNIQUE FOREIGN AIRCRAFT ON DISPLAY IN BRITISH AVIATION MUSEUM
- 20. MUSEUM HIGHLIGHT: FARNBOROUGH AIR SCIENCE TRUST MUSEUM
- 34. REMEMBERING AMERICAN COLD WARRIORS
- 40. HURRICANE HERITAGE: PRESERVING FLIGHTS FOR FUTURE
- 50. TBAG: GUARDIANS OF THE LAST ALL-BRITISH BOMBER

## AFTER REPORT/GALLERY

- 13. HO CHI MINH CITY: A CITY FULL OF WAR RELICS
- 26. AFTER REPORT: TALES AT THE VALE OF GLAMORGAN
- 31. PICTURES FROM SWAM
- 46. COTSWOLD: A SECOND LIFE
- 58. MIRAGE IN THE DARK
- 61. SHOTS FROM YORKSHIRE

## GENERAL

- 6. MUSEUM UPDATES
- 9. AIRSHOW UPDATES
- 32. FREE POSTER
- 62. NEXT ISSUE



# MUSEUM UPDATES

## WESTERN APPROACHES MUSEUM TO ACQUIRE IWM TBM AVENGER

Liverpool Western Approaches Museum is set to receive a Grumman TBM-3S Avenger from Imperial War Museum Duxford. The Avenger, currently resides in Duxford, is built by the Fairey Aviation Company of Canada as an Avenger AS.3. Completed after the war in 1950, the Avenger spent its time serving in the Royal Canadian Navy, for almost 10 years, before it was disposed to Skyway Air Services to serve as an aerial fire tanker. Acquired by IWM Duxford in 1977, it is painted in a scheme that represent 46214, the Avenger flew by US President George Bush during Second World War. Once displayed as part of the American Air Museum at Duxford, it has since been removed from the hall and put on display at the corner of Hangar 3 since 2015. On the 28th of January, Western Approaches Museum announced that they have reached an agreement with IWM Duxford, in which the Avenger will be transferred up northwest to the museum, to be part of the collection within the multi-million-pound Battle of the Atlantic Centre. While dismantling work on the Avenger have commenced since the 20th of February, there is no currently no confirmation date on when will the Avenger begin its journey to its new residence at the Liverpool Museum.



Imperial War Museum Duxford's Grumman TBM3-S Avenger when it is still residing at the museum's Hangar 3. It has been dismantled ahead of its impending transfer to Liverpool's Western Approaches Museum.

## IWM JAGUAR LISTED FOR SALE

SEPECAT Jaguar GR.1 XX108, which has been on display at the Imperial War Museum Duxford AirSpace Hangar since 2003, has been earmarked by the museum for disposal.

XX108 have the distinction to be the first ever production GR.1 airframe, and also to be a Jaguar to never enter official service with the Royal Air Force.

It was instead served as a test bed at DETO Boscombe Down from 1972 to 1999, after which it was transferred to BAE System to serve as an engine test bed until 2002, when it was retired to MoD St. Athan before it was acquired by the IWM organization.



Jaguar GR.1 XX108, seen hanging from the ceiling of IWM Duxford AirSpace Hangar, the currently listed for disposal by museum.

## SWAM ANNOUNCES NEW ACQUISITIONS

On the 25th of February, South Wales Aviation Museum (SWAM) have announced the arrival of its latest acquisition, Blackburn Buccaneer S.2 XX889 and Hawker Tempest II MW758.

XX889, donning the RAF Gulf War Desert Pink paint scheme, was formerly stationed at Bruntingthorpe as part of The Buccaneer Aviation Group from 2011, was moved to RAF Cosford for its 100th Anniversary airshow event in 2018. Since then, the airframe was stored at RAF Cosford, until it was finally acquired by SWAM.

As for the Tempest, MW758



Buccaneer S.2 XX901 of Yorkshire Air Museum, painted in the same Desert Pink scheme with XX889 which SWAM have recently received.

was completed after the war 1977 and arrived on the British and therefore declared as shore 2 years later. Sitting surplus, in which it was stored unrestored for 40 years and for 3 years before it was sold to purchased by a new owner in the Indian Air Force as HA580. 2021, the Tempest will now be put on display at SWAM, before the Retired from service in 1955, the Tempest was auctioned off in eventual restoration work begins.



# PHANTOM HANGAR CONSTRUCTION BEGINS AT COTSWOLD AIRPORT

In late February, the British Phantom Aviation Group (BPAG), announced the construction of its hangar at Cotswold Airport have finally commenced. The project, which was supposed to start in 2020, was put off by the COVID pandemic.

The construction will be the first step towards the group's eventual plan of setting up a Phantom Heritage Centre, a museum dedicated to the F-4 Phantom service in the United Kingdom.

For now, completing the hangar will finally allow the group's collection at Kemble, F-4K XT597 and F-4M XT905 to sit under cover. The two airframes, which have been experiencing the wrath of nature since their arrival at the site. The pair is expected to be joined by a third airframe, F-4J(UK) ZE360, which is currently located at the former RAF Manston's fire dump, in the near future.



*XT597 and XT905 sitting on the ground of Cotswold Airport, by April, they have been moved onto the concrete surface of the construction site.*

*Concreted foundation laid at the future site for the BPAG's hangar, located beside the Bristol Britannia C.1 XM496 'Regulus'.*



## OMEGA PHANTOM ARRIVES AT MORAYVIA

The Morayvia Aerospace Centre at Kinloss in Moray, have received a former Fleet Air Arm (FAA) Museum McDonnell Douglas Phantom FG.1 XV586 in late March.

Formerly a gate guardian at ex-RAF Leuchars, the Phantom was moved

from Leuchars to RNAS Yeovilton after the base's closure in 2012.

After XV586 was moved to the FAA Museum as part of the Navy Wings collection, it was then repainted back to its FAA 892 Naval Air Squadron paint scheme, which features the famous Omega badge.

A few years after its arrival at the museum, it was put into the museum's storage for years, until it was put up for sale by the Fly Navy Heritage Trust, before it was ultimately acquired by Morayvia Aerospace Museum.

## AIRSHOWS UPDATES

### DUXFORD ANNOUNCES 2023 FLYING DAYS SCHEDULE

Duxford Air Show, also known as Flying Days, which is welcoming its 50th anniversary this year, have published the schedule for its 2023 season.

The first of which will be the Flying Days: VE Days that is set to be held on 7th of May. VE Days, as its namesake, is a celebration of the historic Victory over Europe day, on the 8th of May in 1945, when Nazi Germany surrendered in the Second World War, the event is set to feature multiple Second World War fighter aircrafts.

Next on the list is the Flying Days: Commemorating D-Day on the 4th of June. Another event that commemorates the event of the Second World War, this airshow will serve as a tribute to those that sacrificed over the beach of Normandy. Once again types operated during the Second World War are expected for this show.

Then, a 2-days event will be held on 24th and 25th of June, as the Duxford Summer Air Show. This show is seeking to celebrate the 120th anniversary of flight. The Red Arrows have been confirmed on the second day of the show. Flying Days: The Americans will

be the next on schedule, to honor the American and British bond during the Second World War. Set to be held on 28th of July, nothing has been announced for the show yet but types operated by the United States and United Kingdom such as the P-51 Mustang and P-40 Warhawk are to be expected. Duxford will honor the first RAF squadron to operate the Supermarine Spitfire next, with Flying Days: 19 Squadron on 12th of August. While nothing has been confirmed on the flying list so far, there is no doubt that Spitfires will be attending this event.

2-weeks after Flying Day: 19 Squadron, Duxford Flying Evening will be held on 26th of August, nothing has been set for this show yet.

One of Duxford most famous air show returns on 16th and 17th of June. The 2-days Battle of Britain Air Show will feature mass Spitfire fly-by, reenactments of 1940s Duxford with living history groups and more.

Finally, on the 14th of October, the day the first Duxford Air Show was held 50 years ago, Duxford

will conclude its 2023 flying season with Duxford Flying Finale. There is currently no confirmation on the flying list of this event.

Entrance fees for all the Duxford Flying Days can be checked online on IWM's official website at [iwm.org.uk/airshows](http://iwm.org.uk/airshows), which the museum will also be posting regular updates over the feature displays of the events.



*One of the most celebrated fighter in the world, the Supermarine Spitfire is expected to participate in most of the Duxford Flying Days.*



## ABINGDON AIR SHOW TO BE HELD IN MAY

Originally set to be held last year, the Abingdon Air & Country Show was delayed due to the death of Her Late Majesty. Now the show will instead be held on 20th of May.

On the evening before the airshow on the 19th of May, the organizer will also be collaborating with the aviation photography group

Threshold Aero to hold the Abingdon Dusk Shoot, which will feature the following aircraft:

Consolidated Catalina 433915  
Rockwell OV-10B Bronco 99+18  
Taylorcraft Auster AOP.6 TW536  
Westland Lynx AH.7 XZ179  
Westland Scout AH.1 XV130  
Westland Sioux AH.1 XT131  
Yakovlev Yak-3 27 White

Other than those listed above, the Battle of Britain Memorial Flight (BBMF) will be participating in the flypast. The airshow is still waiting for a confirmation on the possible participation of the Royal Air Force C-130J Super Hercules, if confirmed, it will be the type's last airshow appearance before its planned retirement.

## RAF COSFORD AIR SHOW 2023

RAF Cosford is set to make a comeback on the 11th of June. It is the largest airshow held by the Royal Air Force since the demise of Waddington Air Show in 2014,

The highlights participants out from the confirmed list includes the Patrouille Suisse, Battle of Britain Memorial Flight, Rolls Royce Heritage Display, RAF Typhoon Solo Display, RAF Chinook Display Team, Royal Jordanian Falcons and Boeing B-17B Sally-B. Aside from the international

participants, visitors can expect the RAF to display its collection of retired aircrafts such as the SEPECAT Jaguar and Panavia Tornado that are currently serving as ground instructional frame for the RAF Engineers.

Visitors can also visit the nearby RAF Museum Midlands, which features multiple experimental types, such as 1 of the 2 remaining BAC TSR.2 tactical nuclear strike aircraft prototype, the BAe EAP demonstrator, ancestor to the

Eurofighter Typhoon currently in service with the RAF. Not to mention the museum is also the only place in the world to feature all 3 British V-Bomber, the Vickers Valiant, Handley Page Victor and Avro Vulcan.

Tickets can be bought via the airshow's official website at [cosfordairshow.co.uk](http://cosfordairshow.co.uk), where the officials will also continue to update the participant list.



*The British Aerospace (BAe) EAP, a proof-of-concept technology demonstrator built as a private venture, was later evolved into the multi-national Eurofighter Typhoon program, is preserved at the RAF Museum Midlands Test Flight Hangar, adjacent to the RAF Cosford Airshow site.*

## FOREIGN HIGHLIGHTS: *VIGILANTE IN THE PHILIPPINES*

ADRIAN ALZAGA



ADRIAN ALZAGA

*A park in the Philippines is probably not a place people expect to see a United States cold war state-of-the-art low level nuclear strike aircraft, but here at Marikit Park, is where this Vigilante calls home.*

Marikit Park, Olongapo City, Zambales, Philippines, a decommissioned North American Aviation RA-5C Vigilante stands behind a closed gate, angled skyward on top of a mural dedicated to the Filipino worker. Maintaining a sleek silhouette forty-five years after its retirement, having formerly stood out among the conglomeration of types on the carrier deck due to its immense size, itself becoming exceedingly rare, as its intended role, a supersonic, carrier-based, nuclear bomber, was quickly phased out as it was being introduced into service. Being rebuilt for tactical reconnaissance with the introduction of the RA-5C variant at the height of the Vietnam

War, it excelled, albeit with a significant loss rate, at its role.

### Airframe History

The airframe in focus is RA-5C BuNo (Bureau Number) 156627, delivered in March 1970. It was being shuffled around its native Reconnaissance Attack (Heavy) Squadrons (RVAH) throughout the decade. However, the fateful day for the aircraft came in late 1978 towards the end of RVAH-1 "Smokin' Tigers" Western Pacific deployment aboard USS Enterprise. Upon said occasion, the jet lost its brakes and nose wheel steering as it headed to the waist catapult, barely avoiding going overboard as its fuselage

ground it to a stop. The jet was still deemed serviceable after this incident. However, it would not fly again. Instead, it became a spare parts hulk for remaining aircraft, eventually being struck off from the Navy registry on March 26, 1979. With the deactivation of its type following budget cuts post-Vietnam War and its heavy reconnaissance role being passed on to nimbler types, the RVAHs soon met their end. The April-October 1978 deployment also marked the final cruise for RVAH-1. The Vigilante fully retired from the United States Navy service in late 1979.



Retirement Days

Without a mission, the jet was displayed on top of a hill overlooking Naval Base Subic Bay, strutting closer to the ground than its current mounting. This position left it, purportedly, as a canvas for art students, giving it a psychedelic, flowery scheme, taking on a false registration of “RP-2000,” far removed from the colorful tails, gull gray, and white underside of its service. However, upon the handover of the base to the Philippine government in 1992, it was inevitably defaced by vandals. It was then moved to its current location across the bay at Marikit Park and restored upon the instructions of the then Mayor and SBMA Chairman (now-Sen.) Richard “Dick” Gordon. It remains under the care of the Olongapo City government.

False Identity

By 2021, the Vigilante had seen better days. It did fare somewhat better than being left in a scrapyard. The paint was flaking off, not meant for aerospace use, with mold forming on the topside parts, and metal paneling, some



After decades under the unforgiving tropical weather, the Vigilante is currently in a rough shape.

of which were missing, clearly showed its age. A result of decades of torrential rains and weathering under the Philippine sun. It must be noted that mission-critical hardware had been removed even during the American era, particularly the Pratt & Whitney J79 engines. Apart from a lack of care for the piece, there was also censorship of its identity. The original identity of the aircraft as BuNo 156627 was brushed over for 147858. The aircraft’s paint scheme was drastically changed from the canvas-like psychedelic paint scheme, but it did not come close to restoring its true identity as a Navy reconnaissance aircraft. Instead, it was given a false NASA Flight

Research Centre meant to ape an actual Vigilante, which served in the research role; A-5A Vigilante BuNo 147858, which conducted flight tests in 1963. 156627 was not constructed until 1970.

A Relic of the Past

As an example of a rare type of a bygone era, it can be hoped that the city government can give it a better restoration, notably one that restores its old identity from its fleet service. While other Vigilantes on display have retained their service schemes, RA-5C 156627 has not. It remains the only example of an A-5 Vigilante displayed outside the continental United States.



A suspicious Vigilante:

Despite its true identity is 156627, the Vigilante is currently disguising itself as 147858, an A-5A variant served as a testbed for the NASA Flight Research Centre.

# HO CHI MINH CITY: A CITY OF WAR RELICS

JEANG HERNG

Aviation Museum Editor *Jeang Herng Loh* revisits his 2019 trip to Ho Chi Minh City in Vietnam, a city full of unknown and storied relics.

When it comes to Vietnam, Vietnamese delights such as Pho, Vietnamese Iced Coffee and Bahn Mi might be the first thing that sprung up to people’s mind, besides its wonderful delicacy, Vietnam is also well known for its amazing oriental culture and its mixture of historic Eastern and French colonial architecture. But Vietnam is also a country that went through a rather torturous history of multiple wars for independence, the divisions of North and South, which culminated in the Vietnam War.

The city formerly known as Saigon, was the capital of South Vietnam. It was also the centrepiece of multiple campaigns throughout the Vietnam War, serving as the stage of the Tet Offensive, Battle for Saigon, and ultimately, the Fall of Saigon, which concluded the decades long division and civil war in Vietnam. In the present time, Ho Chi Minh City is the largest city in Vietnam, and while the booming economy and development of the city means that most of the traces

and remnants from the wartime has been replaced by the new and modern high-rise buildings, the city still retained relics from the war to serve as a memorial to the past. Interestingly, most of these relics can be found within the city centre, all within a striking walking distance to each other. Aside from the war relics, there are also some surprising finds within the city, which includes some rather rare types originated behind the iron curtain.

War Remnants Museum:

Starting with the War Remnants Museum, which have the largest aviation collection in Ho Chi Minh City, the museum has an entrance fee of 40,000 VND.

USAF? USN! :

Ignore the US Air Force stencils, this Douglas A-1H Skyraider with the BuNo 139674, was actually a United States Navy aircraft, before it is donated to the Republic of Vietnam Air Force (RVNAF). Captured by the North Vietnamese after the reunification, it was later put on display at the museum.







**Wrong Colors:**

A Northrop F-5A Freedom Fighter with the serial 66-9170, this aircraft never served with the United States Air Force (USAF), instead it served the Imperial Iranian Air Force before it was transferred to the RVNAF. It currently sports an inaccurate USAF Tactical Air Command (TAC) South East Asia (SEA) pattern, along with the erroneous font for the USAF stencil, just like the Skyraider next to it.

**Air Force Museum:**

Close to Tan Son Nhat International Airport is the Air Force Museum, which feels more like a garden than a museum. It features a mixture of Soviet and American type aircraft.

**Rivals:**

Displayed alongside a F-5A Freedom Fighter, this Mikoyan-Gurevich MiG-21PFM Fishbed is credited with 13 kill scores, that being said, the actual identity of this airframe is not known as there is another 4236 on display at the Hanoi Air Force Museum.



**Air Force Chinook:**

Marked with a giant 'ARMY' stencil, Boeing-Vertol CH-47A Chinook serial 66-0086 was actually operated by the USAF instead of the United States Army. Unlike other collections in the museum, this was captured directly from the USAF and even served in the Vietnamese People's Air Force (VPAF) after the war.



**Early Hind:**

Part of the museum's collection is an early model Mil Mi-24 Hind heavy attack helicopter marked as 7403, which does not feature the iconic twin bubble canopy of the later Mi-24 model. The actual identity and exact variant of this Hind is unidentified.



**Vietnam War Symbol:**

Used extensively throughout the Vietnam War, the Bell UH-1 Iroquois, more commonly known as the 'Huey', revolutionized air cavalry combat, displayed at the Ho Chi Minh City Museum just a few minutes' walk away from the War Remnants Museum, the actual identity of this Huey is unidentified.

As the staple of the war, the Huey is also on display in multiple museums in Ho Chi Minh City, which includes the War Remnants Museum, Independence Palace and the Air Force Museum.

**Dragonfly in a Garden:**

Like most aircraft at the museum, this Cessna A-37B Dragonfly has an unknown identity, while carrying the marking of 0475. Judging by online pictures of the museum in 2020, all the greens have been trimmed and the aircraft were repainted and restored to good condition.



**A Hero's Jet:**

Probably the best conditioned display in the entire Ho Chi Minh City, this F-5E Tiger II serial 73-1638, preserved at the Independence Palace, was piloted by a dissident RVNAF pilot Nguyen Thanh Trung who bombed the South Vietnam Presidential Palace on April 8, 1975.



**Cold War Relic:**

While technically it never fought in the Vietnam War, this retired Vietnam Airlines Tupolev Tu-134 with the registration VN-A132 is still a product during the cold war. Parked at the far side of the airport with an unknown Douglas DC-3 Dakota and obstructed by scaffolding, this was certainly the most surprising spot of the trip.



# TEN UNIQUE FOREIGN AIRCRAFTS ON DISPLAY IN BRITISH AVIATION MUSEUMS

JEANG HERNG

When it comes to British aviation museums, notable RAF service types like the Spitfire, Hurricane, Meteor, Canberra and the Vulcan are fairly common, and they can be found scattered across the museums all over the British Isles. Putting the British types aside, there are some pretty notable foreign types in British aviation museums' collections, and we listed out 10 of the most unique type that is currently on display in British aviation museums, listed in no particular order.

## 10. Saab J-29 Tunnan, Midland Air Museum

The Saab J-29 Tunnan is a Swedish indigenous first-generation jet fighter, Tunnan, which means barrel in Swedish, is a perfect description for this round shaped fighter. First flown in 1948, the J-29 is the first Western European fighter to fly with a swept wing, after the German Messerschmitt Me262 of the Second World War. This particular J-29 unit is a J-29F variant, which is also the only J-29 in the UK. Donated by the Swedish Air Force to the now defunct Historic Aircraft Museum at



Southend, it was auctioned off after the museum's closure, in which the Midland Air Museum acquired it and put in on display since.

*The distinctive shape of the J-29 gave it a very fitting nickname of "Tunnan", which means barrel in Swedish.*

## 9. Mikoyan-Guverich MiG-23/27 Flogger, Newark Air Museum

While the Mikoyan-Gurevich MiG-23's predecessor, the MiG-21 Fishbed can be found in several museums across the UK, the MiG-23 Flogger can only be found at the Newark Air Museum. The MiG-23 is a Soviet third-generation fighter designed with a variable-geometry wing. The museum's

example, while currently wearing the colours of 458 Red of Polish Air Force, is actually a former Soviet Air Force example, 04 Red. Displayed alongside the MiG-23 is a MiG-27, a close air support variant of the MiG-23, which can be identified via the flat duckbill-like nose and a different air intake

design. While the MiG-27 is not the only type in the UK, this particular example, 71 Red of the Soviet Air Force, is the only one that is currently on display in a restored condition, as the other known unit is currently sit abandoned at Hawarden Airport in North Wales.

## 8. Saab AJ/SH-37 Viggen, Newark Air Museum

Another Saab type on the list, the Saab 37 Viggen is a Swedish third generation fighter developed in the 1970s to replace the Saab 32 Lansen and Saab 35 Draken. The Viggen is the first major production type to features a canard layout, which is appropriately reflected in the name Viggen, which means

'tufted duck' in Swedish, as 'canard' in French means duck. As Viggen is a double meaning word, it can also be interpreted as Thunderbolt, which suits the fast-accelerating interceptor. The Viggen at Newark Air Museum, is an AJ/SH variant that specializes in ground attack and maritime strike.

Arrived at the museum in 2006, it is currently on display along with its predecessor, a former Royal Danish Air Force Saab 35 Draken.

## 7. Dassault Mirage III/IV, Yorkshire Air Museum

The Yorkshire Air Museum in Elvington is the only place in the UK to feature the French delta wing fighter along with its larger, strategic nuclear bomber sibling. The Mirage III is a French third generation fighter developed by Dassault Aviation, which not only served as the main fighter type for the French Air Force during the cold war, but also saw considerable export success, serving multiple foreign air forces including Australia, Israel, Pakistan, Switzerland, and etc. The

Mirage IV, essentially a scaled-up Mirage III, is developed for the French's need of a strategic nuclear bomber, entered service in the 1960s, the type has an impressive service life as it was only retired in 2005, although by then it was relegated to reconnaissance duty. The Mirage IV at Yorkshire Air Museum is the only Mirage IV resides outside of France, arriving at the museum in 2017 as a donation from the French Government.



*The exotic delta-winged Dassault Mirage III 3-QH/538 at the Yorkshire Air Museum, Elvington.*

## 6. Boeing B-52D Stratofortress, Imperial War Museum Duxford



One of the longest serving aircraft in history, the Boeing B-52 Stratofortress is still flying over 50 years after its first flight. While the B-52D, the example sitting in IWM Duxford has been retired for decades, the remaining fleet of B-52H is set to receive 4-pairs of new Rolls Royce F130 engines, and continue to fly for a foreseeable future. The B-52D in Duxford, 56-0689, is both a Cold War and Vietnam War veteran

that participated in the infamous 24-hour nuclear alert flights of Operation Chrome Dome, and carpet bombing over Vietnam of Operation Linebacker and Linebacker II. Donated to IWM Duxford in 1983, 56-0689 set the record of both being the heaviest aircraft to ever landed and Duxford, and also the shortest landing run of any B-52. To this date, 56-0689 remains as one of three complete B-52 airframes to be put on display outside of the United States, with the other two being 59-2596, a B-52G at Australia, and 55-0105, another fellow B-52D on display at South Korea.

*The B-52 is also nicknamed by its crews as the BUFF, short for 'Big Ugly Fat Fellow', with the last F being interchangeable with something more obscene.*



5. Boeing B-29 Superfortress, IWM Duxford

The B-29 Superfortress needs no introduction. To this date, and rather fortunately, the B-29 remained as the only aircraft type to ever drop a nuclear bomb in anger, twice. The B-29 is the first strategic bomber to enter service, and featured several novel features in 1940s, which includes cabin pressurization and remote-controlled turrets. While the B-29 in Duxford is neither Enola Gay nor Bockscar, it is still a Korean

War veteran that flew 105 missions over the Korean skies. While the example at Duxford 44-61748 It’s Hawg Wild never served in the Royal Air Force, it is noted that the RAF used to lease B-29 from the USAF after World War II, and designated them as the Boeing Washington B.1. It’s Hawg Wild remains as the only complete B-29 Superfortress to be put on display outside of the United States.



The fastest air-breathing crewed aircraft in the history of aviation, the Lockheed SR-71 Blackbird is a cold war strategic reconnaissance aircraft designed by the talented Clarence “Kelly” Johnson, which

is developed out in secrecy for the Central Intelligence Agency (CIA), to spy on military installation of the Eastern Bloc, most particularly the Soviet Union. The SR-71 holds the absolute speed record for a manned aircraft, hitting the speed of 3,529.6 km/h, or Mach 3.3 on the 28th of July, 1976, which is a record that still stands today. One of 32 ever built, this is currently the only SR-71 Blackbird resides outside of the United States mainland.

Both the B-29 and SR-71 are exhibited in the American Air Museum at IWM Duxford. It is hard to believe that these two aircraft only have a 22-years span between their first flight.



The Ju-88 utilize a pair of BMW 801 14-cylinder radial engines, in which the BMW logo can be seen on the engine cowling.

4. Junkers Ju-88, RAF Museum Cosford

The only German aircraft on the list, the Junkers Ju-88 is a German tactical bomber aircraft operated by the Luftwaffe during World War II. First flew in 1936, Ju-88 have participated in most of the German operations all across Europe and Africa, from the start to the end of the war. Spawning several different variants along the way, it served as reconnaissance aircraft, dive bomber, torpedo bomber, heavy fighter and night

fighter, proving its versatility. The Ju-88 in RAF Museum Cosford is one of two complete examples left in the world, and the Ju-88 R-1, 360043 in Cosford have a rather interesting history of being an aircraft piloted by defected aircrew, which surrendered the airframe to the RAF at Aberdeen. It was later operated by the RAF for evaluation purposes until 1945, and put on display at the RAF Museum in 1978.

3. Mitsubishi Ki-46 Dinah, RAF Museum Hendon

Developed as a high-altitude reconnaissance aircraft during World War II, the Mitsubishi Ki-46 is not only noted for its excellence high-altitude performance, but also its extremely sleek looks. Codenamed by the Allied as ‘Dinah’ during the war, the Dinah in RAF Museum Hendon is the only example left in the world. The aircraft a Ki-46III with an unidentified serial, was captured by the RAF from Malaya during World War II, before it was shipped to the United Kingdom in 1946. It then went to an interval of getting stored and put on



display throughout the years, before getting a comprehensive restoration with funds provided by its original manufacturer, Mitsubishi Corporation in the

1990s. Currently the Dinah lies in a disassembled state while on display at RAF Museum Hendon, awaiting for reassembly.

1. Kawasaki Ki-100, RAF Museum Hendon

One of the super-prop fighters emerged at the later stages of Second World War, the Kawasaki Ki-100 is quite possibly the pinnacle of Japanese propeller fighter aircraft, with the ability to match the all-conquering P-51 Mustang in a dogfight, and intercepts the high-flying B-29 Superfortress. Built too late and too few in numbers, the Ki-100 failed

to change the fate of the empire, and quietly faded into obscurity. This particular Ki-100 is not only the only one on display in the UK, it is only the sole survivor of its type in the world. Captured by the allied forces in 1945 from Vietnam, the Ki-100 was shipped to the UK for evaluation. Despite being a sole survivor, the Ki-100 was languished in storage for decades,

and misidentified as a different type, before it was restored and put on display in the 1960.

As of 2023, the Ki-100 is on display at the RAF Museum Hendon site in Edgware, London, next to the aforementioned Mitsubishi Ki-46 Dinah high-altitude reconnaissance aircraft.



The Ki-100 is an emergency development of the liquid-cooled inline-V12 piston engined Ki-61 Hien (Swallow Tail), which had the original piston Ha40 engine replaced by a Ha112 14-cylinder radial engine, the resulting aircraft greatly resemble the infamous Mitsubishi A6M Zero fighter operated by the Imperial Japanese Navy Air Service



# MUSEUM HIGHLIGHTS: FARNBOROUGH AIR SCIENCE TRUST MUSEUM

JEANG HERNG

For anyone that have never been to Farnborough, the Farnborough Air Science Trust Museum, also known as FAST, might seem to be an oddity in what seem to be a usual housing area, given if they did not notice the airport behind the museum. The main building of FAST blends in well with the surrounding houses, but its colorful aircraft collection makes it stood out among the rest. Aviation Museum had the chance to sit down and talk to FAST chairman *Graham Rood*, to discuss about the operations of the museum.

## Foundation and Attraction

Located at the town of Farnborough in the Hampshire County just outside of the Greater London Area, it takes around an hour of drive or couple of hours on train for anyone to visit the museum from central London. Given that London itself already have a couple of large aviation museum like the Royal Air Force (RAF) Museum in Hendon, the Imperial War Museum (IWM) at Lambeth and the Gatwick Aviation Museum adjacent to Gatwick Airport, both of which dwarves FAST when it comes to the number of aircraft in collection, what does FAST offer to make itself stood out its much larger competitor, to attract people to come down to Farnborough to visit the site? While talking to Graham Rood, he reveals that it is tied with the very location the museum is founded upon. FAST was founded in 1993 after the disestablishment of the Royal Aircraft Establishment

(RAE) in 1991 at Farnborough with the goal of preserving the both Farnborough and RAE's aviation heritage and archive. The archives FAST managed to inherited from the RAE gave it an extensive backlog of historical artefacts, wind tunnel models, films, research reports and photographs that dates all the way back to 1905. In fact, the backlog is so huge that the museum itself can only manage to display 2% of their total collections in the main building itself.

Speaking of the main building, it is also part of the history that FAST have managed to save as part of the quest to preserve the aeronautical heritage of Farnborough. Dating back to 1908, the main building, which is also known as the Balloon School Building, was built as the headquarters for the Royal Engineers Balloon School, it is currently a Grade 2 listed building protected by the English Heritage. According to Rood, the archives is how FAST distinguish itself from other aerospace museums,

he says that the existence of the archives makes FAST more than just an aviation museum, but also a science-based museum, similar to The Science Museum based in South Kensington. Which compared to the RAF Museum in Hendon, is mostly an aviation museum that showcase the operational side of the RAF alongside with its large amount of airframe in collection. As Rood says, the museum site itself exist as a place for the visitors to look at its aviation side of collections, which includes the 15 complete or partial airframes on display, and the various artefacts and flight simulators that can be experienced by the visitors, while for the scientific side of the museum, all of the stored archives that could not be viewed at the museum site are fully accessible for the public upon request. Rood have also revealed that the location of the museum, being adjacent to the Farnborough Airfield also have resulted in surge of visitors to the museum during the bi-annual Farnborough Air Show, in which the museum will also participate in with booths.



The museum is housed in the Grade 2 listed Balloon School Building.



## Operations

Similar to RAF Hendon and IWM London, FAST is also a free entry museum, but while the RAF Museums gets to get government funding as part of the RAF, and IWM have other paid sites and its own commercial and publishing arms that sells merchandises to sustain its operations, FAST is a volunteer organization and therefore does not receive any fundings. Which brings the question, how does FAST manage to sustain and survive despite being such a small organization compared to its peers the operates around London?

According to Rood, the volunteer structure is actually the key for FAST to sustain its operations, as the organization is fully run by volunteers, the museum does not have the burden to pay for wages, even though the structure is also the reason behind why FAST can only open for public visit on the weekends, compared to IWM or RAF Museum which runs daily operations. Aside from that, since the museum is situated on a heritage graded site, while the museum still has to lease the site for its operations from the local council, the lease rate is at absolute minimum as FAST only needed to pay for the insurance, electrical and water expenses, and the maintenance fee of the site, says Rood. And all the expenses mentioned above can be easily recouped, or covered by the membership program of FAST, alongside the donations from visitors and sales from the museums' souvenir shop. Rood also mentioned that there are also members that donated some of their inheritance to FAST via their will when they passed away, and

FAST also gets hired by schools to hold talks from time to time, which provided further funds for FAST to sustain its operations, while currently FAST is not sponsored by any company, Rood says that if there is any company that are willing to sponsor them, FAST will certainly accept it.

## Airframe Collections and Restorations

As the preserver of Farnborough's aeronautical heritage, FAST, unlike the other museums which needed to bid for their airframe in collections, managed to get all its current collection from direct donation from the RAE during its inception, which also explains why most of FAST collections are painted in the red and blue paint scheme as most of the airframe in FAST collections were once operated by the RAE for their various research and testing programs. Out of the 15 airframes that are currently in FAST's collection, only one airframe was bought by the museum itself, said Rood. The airframe in question is the Hawker Hunter T.7 XL563, which the museum first found its trace at a scrapyard, and managed to acquire it for restoration and display after negotiations with the scrapyard owner.

While visiting the museum, one of the most impressive sights is how FAST managed to squeeze all its airframe within the limited space at the site. When Rood is asked about if the limited space available have posed any sort of challenges for the museum when it comes to restoration of the aircrafts, he said as most of the volunteers at FAST used to be engineers that worked at the RAE, restoring the airframe



**Top:** Hawker Hunter XL563, the only airframe bought by FAST, which is currently the next in line for restoration.



**Bottom:** A row of airframe surrounding the main hall due to the lack of floorspace at the museum.



Without a roof to protect the airframe from nature, canvas is the only option for FAST to protect its airframe.

Harrier T.4 XW934, donated by Qinetiq, is the only airframe that come with complete components.



Archives from the Dark

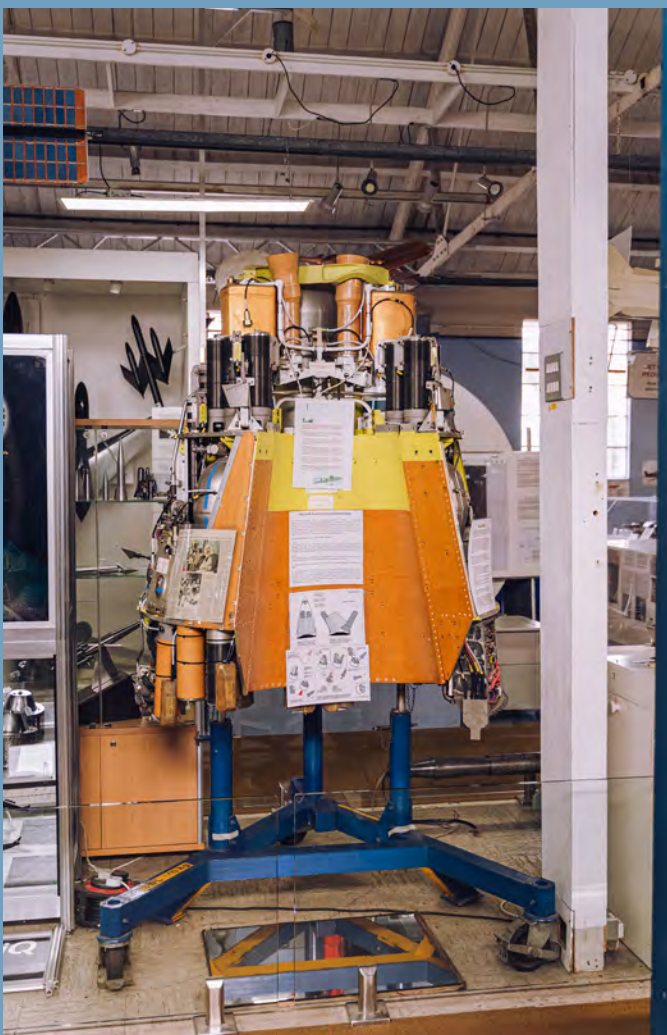
Similar to its airframe collections, FAST also acquired all of its archives from the RAE, and until this day, the museum is still receiving some of the recently declassified archives from the British Ministry of Defence (MoD), Qinetiq, a defence company that served as the privatised successor to the RAE, and BAE Systems, the largest defence company in the United Kingdom. A quick visit to the museum might give the visitors some surprise as part of the archives on display included what can be considered as sensitive technologies. Within the museum displays, there are numerous wind tunnel models on display, which includes several stealth wind tunnel research models constructed by the RAE, and to this day, stealth technologies is still considered one of the more secretive and sensitive technologies, but the link of FAST to the RAE means that the museum gets to inherit these once secretive and classified documents and artefacts, when asked what are the chances of the museum landing into troubles with these sort of displays, Rood says that the museum draw the line carefully when it comes to their archives, so that they would not land themselves into any legal



FAST's extensive collection of wind tunnel models includes this stealth model, the last designed by the RAE Bedford site, developed for the Future Air Offensive System (FOAS) program which was cancelled when the MoD opted for the United State's F-35 Joint Strike Fighter Program.

troubles. But when it comes to the aforementioned archives related to sensitive technologies such as stealth, Rood emphasised that everything that is on display in the museum have already been declassified by the government and therefore they are completely safe to be put on display.

In fact, Rood says that when it comes to making the archives accessible to the public, what worries the museum more is on how the more recent archives the museum has received might contains contents that are patented by defence companies, and publicizing those might land the museum into legal troubles. Therefore, the museum will run through the archive thoroughly to ensure that any archives that are accessible to the public will not contain the patented materials.



Other than the wind tunnel models, FAST also have a cutaway model of the Chevaline nuclear warhead which was used in the Polaris Submarine Launched Ballistic Missile (SLBM).

Aside from offering its visitors a peek into the dark programs, FAST also provides them with fun interactive exhibitions such as this Concorde Flight Simulator.



Future

When he is asked about the future development plans for the museum, Rood says that while the museum has received help from local architecture firm to draw up plans for future build up, there are currently no plans expand the museum area, and any future plans are down to the financial situation of the museum. The plans are all set up and primed, so should the museum ever receive a large sum of funds that can allow the expansion plan, they can start it immediately, but yet again, the Grade 2 status means that FAST will need to request for a permit from the local council before any work can be started. That being said, Rood says that any plans for land acquisition for the museum to expand its ground area will be impossible as the surrounding area are already occupied by either housings, or are part of the Farnborough Airfield.

The museum is also currently under a digitalising process of turning their old hand-written archives, and film-based photos and videos collection into digital form, allowing them to publicise the archives online, further broadening the accessibility of

the archives in their possession. Aside from that, the museum currently has its eye set on Hunter XL563, which still lacks some interior parts, according to Rood. A full restoration on XL563 will commence after the museum is finished with their current projects. Besides the restoration, Rood says that FAST is also currently eyeing for new airframe acquisition, should any of the former RAE airframe with historical significance came up for sale, but the museum's lack of space means that if any new airframe were acquired, FAST will seek to donate or sell off airframes that are deemed to be less historically significant to the RAE. FAST will also avoid to acquire American types to avoid the potential issues posed by the USAF protocols on the ownership of American airframes.

For the future, the museum is looking to setup interactive displays, to reduce their dependencies on the volunteers, as Rood says that whenever there are some personal issues that caused the volunteer to miss out on the public opening days, the museum might face a shortage on manpower, and with the help of interactive display, not only the museum can reduce the manpower



Graham Rood, chairman of FAST, next to the aircraft with the most historical significance to the RAE, Hunter T.7 WV383, which was used for low level flights research.

issues, it can also be a fun addition for the visitors. All and all, it can be easily said that FAST, while small in size, have all the necessary ingredients to make it stands out among its peers, and it also have the ambitions to modernise and keep up with the latest technologies to keep itself competitive. With its futureproofed plans, FAST is looking bright into the future.

On loan from Richard Hall, the aircraft owner, this English Electric Lightning T.5 XS420 interceptor serves as a gate guard for the museum. The aircraft's cockpit is available for visitors's experience.





# AFTER REPORT: TALES AT THE VALE OF GLAMORGAN

JEANG HERNG

On the 4th of February, the South Wales Aviation Museum (SWAM) held a night shoot in conjunction with the aviation photography group Threshold Aero. The shoot marks the return of night shoot event at the museum

since the COVID restrictions were lifted. On this special occasion, Aviation Museum have sent its editor, *Jeang Herng Loh* to participate in the event. And from *Jeang Herng*, this is the event after report from the SWAM Night Shoot.

## 4-hours journey for a lesson of a lifetime

As a London residence without a car, travelling to Wales via public transport is a long journey, while the original plan was to have a stayover at Cardiff, I was shocked to find out all the affordable rooms were sold out throughout the Southern Wales and even Bristol area. Not really sure what is the reason behind it, I reduced the plan back to a one-day trip, and went to Paddington Station at 10 in the morning. Turns out, the welcoming sight at Paddington is even more of a shocker, the Great Western Railway service is so packed that I barely squeezed onto one of the carriages, as missing the train means a 2-hour delay on arrival at SWAM, I could not afford to have the trip derailed (no-

pun intended) by an unexpected crowd. It was only when the train started its departure that I only realized the day was also a day where there is a Six Nations Rugby Cup match being held in Cardiff. As a foreigner that knows nothing about the sports activities in UK, this serves as a pretty good lesson on pre-planning trip on public transport in the UK. As I have to endure my whole trip on the train from Paddington to Bridgend for 2 hours long. As SWAM is adjacent to the MoD St. Athan site at Vale of Glamorgan, it is considered as a somewhat remote place when it comes to direct public connection, and therefore a transit has to be made at Bridgend, where I had to board a further train to head to the town of Llantwit Major, and from

there, a bus took me to the nearby village of Picketstone Close, which is around 10-minute walk away from SWAM. In the end the travel alone took me close to 4 hours to come from London to SWAM.

## The Stars of SWAM

That being said, the amazing collections at SWAM made the trip completely worth the hassle. SWAM, as one of the fastest expanding aviation museums in UK, have made some amazing acquisition over the years. Upon

arriving at SWAM, I was first greeted by its Avro Shackleton MR.3 WR974, which the museum acquired from Bruntingthorpe in 2020, the Shackleton, currently still sit in a partly dismantled state, is a long-term restoration project for the museum. Heading into the main hangar, sitting in the front center of the building is one the star of the night shoot. ZA326, a colorful Panavia Tornado GR.1 in the famed 'Raspberry Ripple' Royal Aircraft Establishment (RAE) paint scheme, originally slated to be part of the trainer rosters of the Tri-National Tornado Training

Establishment (TTTE), ZA326 had its rear end destroyed by severe fire caused by mechanical failure during an engine test, which put it out of service for 3 years. Upon its lengthy repair, it was instead assigned to RAE Bedford, where it spent its entire 22-years career at ZA326 also have the distinction of being the last flying Tornado GR.1 in the world when it retired after its last flight in 2005. The airframe was then stored at the MoD Boscombe Down site until 2013, when it was moved to Bruntingthorpe for restoration, unfortunately, the closure of Bruntingthorpe means that the aircraft had to be move again, only this time it arrived at SWAM, which it calls home until this day.

Sitting right next to ZA326, is another star of the show, a



Tornado GR.1 ZA326 was the last flying GR.1 variant in the world  
AFTER REPORT | 27



McDonnell Douglas Phantom FG.1 with the serial XV582 also known as ‘Black Mike’. Painted in a very striking all black scheme with a dash of yellow, is arguably the most famous Phantom in RAF service. The airframe in question, once set a record-breaking flight from John O’Groats, the most northern point of the UK in Scotland, to Land’s End, the most southern point of the UK in Cornwall, in a timeframe of 46-minutes and 44-seconds in 1988.

That being said, Black Mike did not wear the paint scheme during its record-breaking flight, as the paint scheme was only applied on the aircraft near the end of its service life for the Battle of Britain Airshow at RAF Leuchars, as a nod to its 111 squadron’s roots to ‘The Black Arrows’, one of the early RAF aerobatics team that operated Hawker Hunters in the 1950s to 1960s. The paint scheme, which generated enormous public interest, was therefore retained on the aircraft, even after it was retired from active service in 1990. Since then, the aircraft was stored at RAF Leuchars, only to be rolled out to the public eyes annually during the annual Leuchars Air Show.



Cockpit section of AeroSpacelines Super Guppy F-BTGV, converted from Boeing 377 Stratocruiser and used by Airbus to support its multi-national manufacturing operations, comes the joke of “Every Airbus is born on the back of a Boeing”.

Unfortunately, when RAF Leuchars is set to close down in 2015, the airframe was not taken up by any museums or organization, which put it under the threat of getting scrapped. With the scrapman’s axe looming above the head, the folks from the British Phantom Aviation Group (BPAG) then quickly stepped in and acquired the airframe from

the MoD, and Black Mike was moved from Leuchars to Cosford, which it stayed there until late 2018 during its entire restoration period, when SWAM acquired the airframe from BPAG, finally giving it a permanent home.



Wreck of Russian Air Force aircraft might be common over Europe these days, but it was not the case back in the 1990s, when the MiG-29 is still considered as a state-of-the-art fighter. SWAM have managed to obtain the wreck of the MiGs from the 1993 RIAT crash.

### Unique Collections and Airside Troubles

The scheduled event starting time at 16:00 gave me a plenty of time to visit the museum’s unique collection, which includes a wreckage of a Russian Air Force MiG-29, which is the subject of the infamous mid-air collision that happened over the skies of Fairford

during the Royal International Air Tattoo in 1993, fortunately, nobody was killed in the incident. Other than the wreckage, the museum also has several cockpit sections in its collection, which includes a Boeing 707 and 747, and the AeroSpacelines Super Guppy oversized cargo transport aircraft. The Super Guppy, once a residence at Bruntingthorpe, was

chopped up by the site’s owner after its closure to much of the enthusiasts’ dismay. Fortunately, the cockpit section was saved and today it resides at SWAM.

As dawn arrives, the crew started to work on the arrangement of the aircrafts, the hangar door was pulled open, and the crew fired up the aircraft tug, which was then used to tow ZA326 into the open. Some hiccups happened when the crew tried to tow Black Mike out, when a part failure on the Phantom means that the aircraft have to be towed out with a different angle, in which the tight nature of the SWAM main hangar made it hard for the aircraft to move from side to side. Fortunately, the perseverance of the crew made it happened, and Black Mike was finally on its way out after a 20-minute delay. The delay caused the rest of the aircrafts included in the shoot, which include Tornado GR.4 ZA612 with a unique RAF 100th Anniversary decal on its fin, the recently restored Westland Wessex HAS.3 XM833, ex-Netherlands Naval Aviation Service Westland SH-14D Lynx 272 and a pair of Hunting Jet Provosts, T.3A XN584 and T.5A XW420 to be towed to their designated position later than expected, which hindered the chances of a daylight shoot. That being said, majority of the photographers that came to the event were looking forward for the night portion of the shoot, so the in the end the delay did not cause any fuss within the crowds.



Phantom FG.1 XV582, which still holds the speed record travelling from the most northern point to the most southern point of the UK.





*With the hangar wide open, and the towbar attached, ZA326 is primed and readied to be pulled to its designated spot.*

### A Successful Wrap Up

After all the aircraft were towed into position, the Threshold Aero crew started their usual briefing on the rules of the shoot, which included a stern warning for the photographers to not to trespass into area that are not the museum grounds, and if anyone were to caught by the crew to defy the rules, will be blacklisted for all the future Threshold events. As the night crawls in, the lighting has slowly lit up the aircraft one by one, and the event went on rather uneventfully. Later in the shoot, the crew went on and put on some LED lights on the wingtips on some



*Panavia Tornado GR.4 ZA612, one of the recent acquisition by SWAM, a perfect companion for GR.1 ZA326.*

of the jets, which bring out more life from the airframes, as if they are still an active aircraft, even when they were decommissioned years ago. Even though the event officially ends at 20:30 at night, I have elected to leave an hour early as my dependencies on public transport means that I might not be able to head back to London if I stayed until the event finish. Even though I did not stay until the very end, from the joy emitted by the other photographers, basically confirmed that the professional crews from both Threshold Aero and SWAM have pulled off a very successful and satisfactory night shoot event.

*Crews from both SWAM and Threshold Aero trying their best to move the stubborn Black Mike out from the main hangar.*



# PICTURES FROM SWAM:

FEATURING OTHER AIRCRAFTS FROM THE NIGHT SHOOT

*Formerly part of the collection at the North East Land Sea & Air Museum (NELSAM) at Usworth, Wessex XM833 was acquired by SWAM in 2019.*



*2 out of the 3 Jet Provosts at SWAM were put together side-by-side to provide a unique twin-shoot opportunity.*

*Retired by Netherlands Naval Aviation Service (MLD) in 2011 and used as a ground instructional airframe until 2019, 272 was then acquired by SWAM late last year.*









# REMEMBERING AMERICA'S COLD WARRIORS

ADRIAN ALZAGA

The Cold War generated quantum leaps in military aircraft technology. Though luckily not used in a full display of modern warfare, with Western and Communist blocs only in a standoff, it motivated concerted efforts to modernize the armed forces. This division resulted in aircraft, remembered and, in some cases, iconized or mythologized, hailed as being on the cutting edge during their introduction and becoming a generation behind in a decade. Performing a pantheon of operational

## Hell's Protocol

The United States is stringent when it comes to aircraft in museums. This strict protocol places the airframe, even those in the hands of domestic and overseas museums, as still on loan to the United States Department of Defense (DoD) or service branches. Ronnie touches on avionics, typically those involved with encrypted communications, mission-critical targeting and navigation, and even those of analog type, which are deemed particularly sensitive. They are removed by military personnel as part of their demilitarization before handover to the museum.

A few examples cited were the Republic F-105 Thunderchief, Convair B-36 Peacemaker bomber, and the Boeing EC-135 Looking Glass flying command post, which contains still-classified nuclear targeting and communications systems. However, some earlier derivatives of aircraft still in active service globally or within the United States armed forces have also been relegated to museums. For maintenance reasons, parts that can be of potential use are also removed as they can be used to replace defective parts in other aging airframes. This removal includes sensitive components such as radars, engines, radios,

etc. Among other reasons, it presents a unique point for former American jets. While the airframe is deactivated and struck from the list, the US service branches retain a right to repossess the exhibit from the museum.

However, the process of getting an aircraft as a museum exhibit varies. Some museums directly buy the airframe through bidding or are donated directly by the armed forces. Foreign museums

roles, some of which have evolved, folded, or rendered obsolete by the march of technological progress. The United States operated a wealth of these aircraft. Some numbered in fleets, and others but a few, which had been retired with the end of the Cold War. Their fates vary, some being placed in storage, altogether stripped and scrapped, or preserved as vintage pieces. Interviewing defense analyst Ronnie Serrano, valuable insight is gained into the preservation of these American Cold War warriors.

which receive former American aircraft, and display them with their American colors, are often restricted in how they can alter the airframe. Some European museums have highly advanced aircraft, such as the F-15 Eagle, B-52 Stratofortress, U-2 Dragon Lady, and SR-71 Blackbird, which have been donated to museums deemed the fittest to care for these aircraft. It also depends on the condition of foreign relations of the United States to these states. Korea and Germany host former USAF aircraft as museum exhibits and enjoy positive ties to Washington. They also retain US bases within their territories. The degrees of preservation vary, some being left to the elements

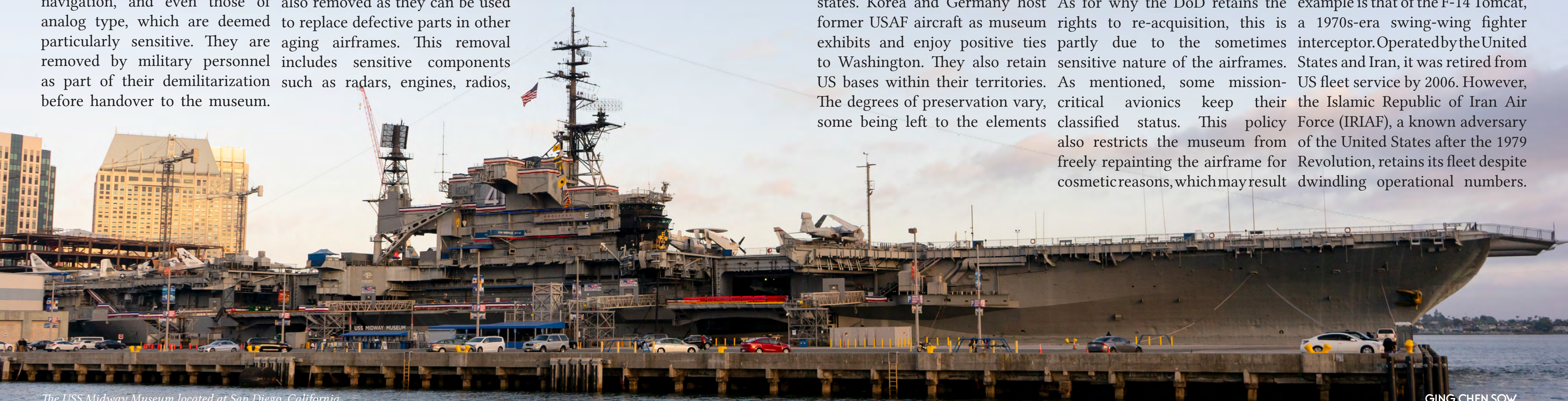
and others looking ready for duty. There have been movements from within museum staff and civilians lobbying for their restoration. However, funding and sourcing suitable parts remain an issue. It must be noted that non-USAF-operated American fighters are an exception, being left to their respective operators concerning their preservation.

## Down to Politics

As for why the DoD retains the rights to re-acquisition, this is partly due to the sometimes sensitive nature of the airframes. As mentioned, some mission-critical avionics keep their classified status. This policy also restricts the museum from freely repainting the airframe for cosmetic reasons, which may result

in an incorrect repaint. However, this is not limited to gaining parts to restore certain visual features of the aircraft. Museums were noted to have opted for visually passable replica parts instead, in some instances, even including period-correct weaponry. Geopolitics is another deciding factor in which planes can be exhibited.

In some instances, foreign policy can dictate which airframes can be handed over or not. An infamous example is that of the F-14 Tomcat, a 1970s-era swing-wing fighter interceptor. Operated by the United States and Iran, it was retired from US fleet service by 2006. However, the Islamic Republic of Iran Air Force (IRIAF), a known adversary of the United States after the 1979 Revolution, retains its fleet despite dwindling operational numbers.





Having received similarly coded F-14As, coupled with their generation-leading Phoenix long-range missiles, the Iranians have a vested interest in maintaining this fleet. Until the early 2000s, this fleet sustainment program was done through back channels and smuggling of F-14 parts from the United States through third parties tied to the Iranian regime. This black market strategy informed the decision to scrap the remaining F-14 airframes in storage indiscriminately, leaving few examples in the hands of museums. Another example mentioned was that of the F-5E Tiger and F-4 Phantom, which Iran also operates. The F-5E and F-4 are export successes with spare parts that can be outsourced from non-American operators. Iran

has embarked on unsuccessful attempts at modernizing the F-5 platform. The F-4 Phantom is less so despite the decreasing potency of the platform and the number of operational airframes worldwide. It was noted in the interview that the United States continues to restrict how other air forces source spare parts for maintenance or export of such to third parties from operators retiring them. Sometimes even blocking upgrades by nations with indigenous aviation industries, namely Israel. This policy has drawn its own criticism as it restricts how the jets are operated, possibly reducing their upgrade potential and combat readiness in the process. In a personal instance, Ronnie recounted a third-person occurrence of repossession, namely that of an aircraft cannon. The MiG-21 “Fishbed” is a third-

generation Soviet fighter widely exported within the Communist bloc. Most museum examples exist in Eastern Europe, the former Soviet Union, China, and other former operators. In this instance, it was bought and delivered to the museum with the original Soviet autocannon attached. Upon the National Museum of the United States Air Force (NMUSAF) learning of this detail, military personnel seized the cannon but left the airframe with the museum without compensation. This particular airframe had been tested in the United States under the classified “Constant Peg” flight test program by American pilots with other foreign-sourced MiG-21s.

## Preservation in Controlled Environment

As museums are typically civilian-owned, finding authentic parts takes a lot of work, even for long-retired types. The reasons mentioned were: the age of the design, financial and spacing constraints, strict guidelines, and



A MiG-21 Fishbed at RAF Museum Cosford, similar to the one at the SAC Museum in Nebraska, where the US authorities have seized the museum’s Fishbed’s cannon due to improper demilitarisation of the airframe.

the status of the aircraft itself. Firstly, the age of the design presents a unique condition in that the availability of parts often comes from other museum pieces or, in some cases, salvaged airframes. Some countries also limit the spread of spare parts to the military operators, who often dispose of them with the aircraft upon retirement and scrapping. Secondly, financial and spacing constraints continue to face museums, sometimes limiting the degree of restoration

possible for the exhibit airframes. Procuring available specific parts, even replicas, requires time and funding, which many museums are short of. An example Ronnie mentioned was an EC-135 Looking Glass, which required components outsourced from another exhibited C-135. It also does not have its wings attached as available space is limited within its display area. The C-135 family was first introduced to the United States Air Force in 1961.

Third, strict guidelines, as already mentioned for former American aircraft, restrict what museums can do with their exhibits. F-4C 63-7414, located at Midland Air Museum, Coventry Airport, is an example. Its wings are

disassembled and kept in an overall weathered state. Being on loan from the USAF, this has prevented significant restoration work from being conducted, the least of which is its reconstruction. Lastly, the status of the aircraft itself is also considered. Despite lower production numbers, some aircraft are considered iconic, while others are ordinary. This status also motivates how the museum prioritizes working on the airframe. However, the preceding factors may come and restrict this. Operational examples may also be prioritized for the use of spare parts. However, stealth and partially classified aircraft are a step above when it comes to museum exhibits.

Due to political reasons with Iran, aircraft like the F-4 Phantom, F-5 Tiger and F-14 Tomcat are all under intense security protocol when it comes to demilitarisation and donation to museum.

F-4N Phantom II BuNo 153030 on the deck of USS Midway Museum



In 2007, 4 F-14 Tomcats were seized from Yanks Air Museum, Chino Plane of Fame Air Museum and a private aviation warehouse for destruction, in fear of Iran obtaining the parts for their Tomcats that still remains in service to this day. Photo below shows F-14A Tomcat BuNo 158978 under restoration at USS Midway Museum.





National Securities

It is no secret that the USAF held a significant stealth advantage towards the end of the Cold War. The F-117A is an icon of this era for its triangular planform and low-observable characteristics. Despite being officially retired in 2008, select airframes have been reported as in “Type 1000” storage, requiring minimal maintenance to return them to flight status. They have also been spotted flying around the Nevada desert, their original testing ground. In the interview, Ronnie mentioned that some museums have had to improvise external parts for the F-117A, namely the fabrication of replica noses. The classified infra-red targeting systems, among others, have also been removed. A critical component that was changed was the paint, as stealth aircraft have been noted to have a Radar Absorbing Material (RAM) applied above the standard coat. In the F-117A, all museum pieces are repainted only in flat black, their original coat, which also contained hazardous chemicals, having been removed beforehand. A simpler explanation would be

the possible ease of exploitation, as a museum piece is not as heavily guarded, and anybody, as Ronnie noted, “Someone with a little knife or chisel can take the paint off and take it back anywhere they want.” The process described was the case for YF-117A 79-10781, now displayed at the NMUSAF, which flew its final ferry flight bare naked in metal finish, the sensitive coating having been removed through a complicated process, earning it the name “Toxic Death” before being stripped of other sensitive parts. This increased complexity also extends to black project flight test aircraft, ones mentioned as the Boeing Bird of Prey and the SR-71A Blackbird, unique-looking aircraft that served specific and often classified roles. Ronnie had noted the delivery and acquisition of spare parts for these partially declassified aircraft as “Being given a Lego set with no instructions.” Continued difficulty in acquiring authentic spare parts and increased restrictions on external tinkering were also mentioned. These black projects were often used, in an official capacity, to collect valuable flight test data, which remain classified to this day.

As Ronnie recalls, only the United States has a policy for retired aircraft preservation. In contrast, the Royal Air Force (RAF) typically dispossesses the airframe upon stripping it of usable and classified material, leaving it in the care of the museum. Among other reasons, often causing difficulty, mentioned concerning their preservation and continued existence as museum exhibits, the aircraft retains many visual cues that make it stand out. However, this stringent policy presents a positive point for preserving American aircraft, as it makes complete dismantling and scrapping the aircraft challenging to do without approval. The bidding system also prevents the sale of former aircraft and their parts unabated to private buyers or, in some cases, governments the United States considers as adversarial.

Future of US Aviation Museum

As for the role of the US service branches in preserving historical airframes, the NMUSAF, and its sister museums, are the primary examples of this. As these

museums are directly owned and operated through Air Force funding, making them able to care for its massive collection of aircraft exhibits. However, other museums rely on donations and concessions from individuals and visitors. Ronnie noted that this was being done through virtual tours and interactive displays, particularly with the use of improved simulation technologies, like virtual reality goggles, and software, like flight simulators, that aim to provide a level of realism. However, there remains some pushback and constraints in pursuing this. It continues to be a nascent venture, and with the COVID-19 pandemic, an exception as opposed to the norm.

A Special Case

Ultimately, the preservation of American aircraft is a unique case. As these Cold War warriors have been put to pasture, their journey does not end with retirement. All were formerly cogs of an arsenal whose task was to be the airborne sword and shield of the United States, whether foreign or domestic. Museum exhibits have been seen as status symbols thanks in no small part to this distinction. In turn, this has led to the placement of strict protocols regarding their preservation, one motivated not just by their status but also by foreign policy. For aviation museums, however, they continue to present a challenging but worthwhile part of the collection, and so, a fitting retirement for the jets that helped keep an uneasy peace.



Countries that enjoys close ties with the United States does get special permit sometimes, for example IWM Duxford was able to get a Lockheed SR-71 Blackbird into its collection, despite the program is still shrouded in much secrecy decades after its retirement.



The sensitiviy surrounding stealth technologies is no joke for the United States, even when this Lockheed Martin F-22A Raptor 10-4195 was sent for public exhibition at Singapore, a nation the United States government considers a close ally, the Raptor is still purposely assigned to the corner slot, in order to hide its secretive engine nozzle design from the people who came prepared.



# HURRICANE HERITAGE:

## PRESERVING FLIGHTS FOR THE FUTURE

JEANG HERNG

With the resumption of its flight operations this month, Aviation Museum took the chances and had an interview with *James Brown*, the boss of Hurricane Heritage, a heritage flight company founded in 2015 and based at White Waltham Airfield, Maidenhead, and talk about the company's inspirational goal of preserving heritage for the future.

### Inception of a Hurricane

"Ever since I was a child, I had passion for aircraft," said James Brown, and that very passion, buried the seed for the foundation of Hurricane Heritage in 2015. With a background in software, Brown have been running software companies, and when he managed to sold one of his businesses, he

put himself into a position that he was able to obtain a Hawker Hurricane. The Hurricane, a Mk.1 model with the serial R4118, was acquired by Brown in 2015, and according to Brown, it is the most original British aircraft to have survived the Second World War. That being said, Brown have also mentioned that even when the

aircraft is the most original aircraft to survive the war, there are still newly manufactured modern components on it. These were necessities done to maintain the airworthiness of the aircraft, said Brown, while raising examples of warbirds restoration with newly fabricated wings, and how a lot of the warbirds flying out there were rebuilt from crashed aircraft,



To fulfill the company's commitment to raise the public's awareness towards the Hurricane, the company had sent the 2 Hurricanes in the company's roster to participate in IWM Duxford's 'Hurricane: Unsung Hero' exhibition late last year.



R4118, the first Hurricane Heritage aircraft, and the most original Battle of Britain surviving Hurricane Mk.1. While it has received modern components during its restoration, the aircraft still retained an impressive 75% to 80% of its original parts

like something that has been dug out from the Thames Estuary. Still, Brown said even in those cases, the engine is still mainly consisting of original parts, and the new components are mostly on the exterior of the aircraft. R4118 still have around 75% to 80% of original components, said Brown.

It is the acquisition of R4118, that inspired Brown to establish Hurricane Heritage in late 2015 with a simple but noble goal. The Hawker Hurricane, the mainstay of the Royal Air Force in the early days of the Second World War, damaged and destroyed more enemy aircraft during the Battle of Britain more than any other defences combined, more than the anti-aircraft units and more than other squadrons, said Brown, but even with its superior numbers, both in number built and confirmed kills, the Hurricane was always overshadowed by its stablemate, the sleeker and more modern Supermarine Spitfire. Therefore, the Hurricane have been largely relegated in the public minds, and

with that in mind, Brown founded Hurricane Heritage, with the goal to raise the profile of the Hurricane and commemorate the people who flew the Hurricane during the war.

### Twin Hurricanes and a Harvard

R4118, as Brown said, is the most original British aircraft to survive in the war. It is the first aircraft acquired by Brown and the company, and it is also an aircraft with a significant history. Delivered to the RAF squadron service in September 1940, R4118 entered service with 605 Squadron during the Battle of Britain, which it immediately participated in the battle from 5th of September until the end of October 1940. It is during that time; the aircraft managed to damage or destroy 5 enemy aircraft.

6 years after the foundation of the company in late 2021, it managed to acquire a second Hurricane, which is also a unique airframe. BE505, as the company referred the second Hurricane as, is also known

as the "Hurri-bomber", a fighter-bomber variant of the Hurricane. According to Brown, BE505 was restored by Peter Teichman sometime ago, before it was ultimately acquired by Hurricane Heritage, and converted into a 2-seater. Since then, Hurricane Heritage has been operating BE505 in their flight operations, throughout the 2022 season, and recently over the Easter Weekends the group have commenced their flying season for 2023.

Aside from the Hurricanes, Hurricane Heritage have also acquired a North American Harvard, also known as the T-6 Texan in the United States. The Harvard, FE511, like R4118, was also acquired in 2015. Unlike the Hurricanes, which fought in front line service, the Harvard was mainly serve as a trainer during the war. As for FE511, it was built in 1942 at Canada, and pressed into service to train the Allied fighter pilots in Canada, which it served at until 1947, when it was transferred to the Swedish Air





*BE505, not just the only twin-seater Hurricane in the world, it is also the only flying “Hurri-bomber” Hurricane Mk.IIB variant, that being said, Hurricane Heritage have removed the underwing bomb rack from the aircraft.*

Force. Since acquiring the aircraft in 2015 from Sweden, Brown said that he had spent some time into restoring the Harvard, and putting it in an RAF color scheme.

According to Brown, the Harvard, with 600 horsepower and its complex systems similar to the fighter aircraft such as retractable undercarriage and variable pitch propeller, served as an excellent platform and a good stepping stone to train pilots to be familiarise with the larger and more powerful fighters. The pilot will do a couple of 100 hours flight on the Harvard before transferring to Operational Conversion Unit to fly the fighters, and just like the pilots in the 1940s, Brown himself had also trained on the Harvard, as he flew a couple of 100 hours flight on it, before going into the Hurricane, as he said, pilots need to be reasonably proficient with the bigger aircraft, before stepping into the single seater and fly it. While on the topic of how Hurricane Heritage managed to acquire all these aircraft in its roster, Brown said that he himself have funded the purchase of the couple of aircraft, namely the single seater Hurricane R4118 and Harvard FE511.

## Eye of the Hurricane

When it comes to the daily operations of Hurricane Heritage, Brown said that the main operation of Hurricane Heritage is to provide passenger flights on the Hurricane. The company does around 12 to 20 air display per year, across its aircraft, and they provide various packages for its customer to choose from, which can be seen from their website.

The packages can be break down into two to three different categories, but for Hurricane

flights, the company will put the passenger into the rear seat of BE505, which will then fly the passenger out to the Isle of Wight, where the famed Battle of Britain movie was shot at. The longest flight options involve a 65-minutes flights, and Brown described the experience of flying over the cliff over the sea as a beautiful experience, while on the way back to the company’s base at White Waltham, the Hurricane will also perform aerobatics. Aside from Hurricane flights, the company also provide the same option in the Harvard, albeit it is overall a cheaper package as the Harvard is less expensive to fly. Once again, just like the 1940s, the Harvard is available for training flights, which the company also offer trips of various lengths on it, as a full flight training course, so for anyone that have never flew but is interested in flying, the company provides the options for their customer to learn it in the Harvard.

Besides the solo flights, the company also offers paired flights, should the customer wish to experience what it feels like to have a Hurricane flying alongside them, if that option is chosen, the

customer can choose to either fly in the backseat of BE505, or FE511, then Brown will bring the single-seat R4118 up, for some nice photograph opportunities. While the predominant activities of the company involve passenger flights and air shows that occur over the summertime, the company will also sometimes fly its aircraft across the country onto different airfield for the people to come and take a look at. Outside of the flying season when the aircraft are not in use, R4118 will mainly goes

Heritage is predominantly a group that focus on flying activities.

## Operational Cost

Even though the company have a comprehensive passenger flight operation, it is still not an easy task when it comes to maintaining these heritage aircrafts. Brown is willing to share the cost for the company to run and maintain the aircraft in their rosters, although on a more general figure instead of a precise one. The costs for

100 hours of flight per year, the overhaul fee is an expense that the company will need to incur every four to five years. Based on these figures provided by Brown, it is estimated that Hurricane Heritage needs to spend around 170,000 pounds annually for the flight operation of a single aircraft.

Brown have also revealed that while the 2-seaters operations are profitable thanks to the addition of a passenger in the back, the single-seat flights are loss-making for the



*According to Brown, the 2-seater operation carried out by BE505 is profitable, while the single-seater operations operated by R4118 is loss-making.*

into the Imperial War Museum at Duxford for the public to visit. Last but not least, Hurricane Heritage also host photoshoots for the aviation enthusiasts to take pictures. The shoots are often held as a night shoot, which Hurricane Heritage will fire up the aircraft at night, giving the photographers a chance to capture the Merlin engine spitting blue flames out from its exhaust manifold, providing an amazing, fun and impressive photo opportunities. That being said, Brown once again emphasised that Hurricane

running the operations, can be break down into several different categories, for both insurance and maintenance checks, they both cost around 40,000 pounds each, then the thirsty Merlin engines burns around 200 liters of fuel per hour, which with a cost of around 2 pounds per liter, equates to 400 pounds for an hour worth of flight of fuel. Next to the standard fees, when it is time for the engine overhaul, that alone will cost around 250,000 pounds, with an engine that last around 500 hours and the planes generally making

company, even when the company tried to make sure it makes profit with its flight operations, it is still a very difficult task due to the associated cost in running them. Then there are two external factors, the close to zero airshow environment under the COVID period and the sharp reduction in the numbers of airshow that are held in the country since the Shoreham Crash, which both impacted the company’s ability to display their aircraft, said Brown. Unfortunately, in the end, this



*When the flying season is over, the single-seater R4118 will go into IWM Duxford to serve as part of the museum’s display.*



is a loss-making enterprise, said Brown, as the aircrafts are passion projects, they are run by people that are willing to invest in them because they believe they are assets that are worth saving, while it is hard to make profit from them, profits were never the goal of these projects. So, in order to be sustainable, it is important to cover the costs, which again, remained as a hard task to achieve. According to Brown, even when Hurricane Heritage is able to recoup some of the cost from its flight operations, it still needs to rely on private fundings to sustain its operations.

An Irreplaceable Experience

Ever since the 2015 Shoreham Crash, and the Dallas Mid-Air Collision from last year, there has been arguments online regarding the safety of heritage flights, and there are also some voices that ask for the ban of heritage flights, in order to save these vintage aircraft that are already in dwindling numbers from further accidents. As a response to these arguments, Brown said that while any of those accidents are absolutely tragic, everyone also works incredibly hard to avoid those things to happen, and if they did, they will learn from it too. According to Brown, ever since the Shoreham Crash, regulations around airshows have been tightened up dramatically, and a lot more safety procedures have been implemented in place. He also emphasizes that Hurricane Heritage is held to a very high standard to ensure no such accident will happen, and even if it happened, they will ensure the public will not be harmed by it. Brown also agreed that the significant changes in

44 | FEATURES



*Flying activities aside, Hurricane Heritage also held photoshoot from time to time, the shoots, which usually involves the Hurricanes firing up their Rolls Royce Merlin, give the enthusiasts a chance to capture some amazing flaming shots.*

how airshows were run post Shoreham is a correct move. As on why heritage aircraft should be kept in flight conditions instead of getting grounded for their safety, Brown said that while it is interesting to see the aircraft preserved in a museum, the experience of seeing, hearing and smelling them running, is an experience that could not be replaced. Not only the flying experiences can be used to engage the future generations and help them to learn about the history of how the pilots flew these machines back in the 1940s, it can also get them excited in learning about the engineering and STEM side of activities, said Brown. Therefore, it is important that these aircraft can be preserved in flying condition, which is their natural habitat, as the experience to see them fly is a completely different experience compared to seeing one gathering dust in a museum, said Brown.

in a way that it poses minimum risk to both the aircraft or anybody, so that they can be preserved as long as possible. “It would be very sad if we were not allowed to fly the aircraft anymore,” said Brown. Brown have also compared the situation to looking at a picture of The Beatles, instead of watching them playing live in a concert. “You know, the experiences are totally, totally, different”. Brown claims through their time spend at the airfield, with the high impact of the sights and sounds generated by the airplane, they can see how excited the kids wanted to get up close and look at the airplanes, he said it is nice to see how the aircraft gets to generates enthusiasm in people of all generations. “I think it is really important that we encourage kids to get into engineering, maybe some of them will come on and be engineers that (work) on our aircraft in the future,” said Brown.

Moving Forward

On the future operations of Hurricane Heritage, Brown

emphasizes that the current plan is to continues to operate the aircraft they have and focus on providing the amazing flying experience to the passengers that are looking to fly with them on either the Hurricane or the Harvard, while Hurricane Heritage is would like to acquire further aircraft, right now the plan is just to gradually build up the flight operations, as 2022 was only the first year the company have operated with BE505, the twin-seater Hurricane, Brown said he wanted to make sure the company can build upon that experience and provide an even greater experience to their customers, but he did not rule out the idea of the company acquiring more, or different type of aircraft.

Other than that, everything that have been outlined will remained as the predominant activities of Hurricane Heritage, right now the company is looking to hold another shoot later this year, but if there are any good opportunities or suggestions came up, Hurricane Heritage will be more than happy to entertain the ideas.



*Why let it collect dust indoor, when you can inspire generations with its sound, smell, and noise? Flying is just the natural habitat of these beautiful machines, it is what they are built to do.*



On the 5th of March, when The Buccaneer Aviation Group (TBAG) held a night shoot in conjunction with Threshold Aero, Aviation Museum's Jeang Herng took the chance to visit Cotswold Airport and take a look at its surrounding activities and the various aircraft that are preserved at the site.

The former RAF Kemble site, now a thriving private aviation hub, is a main base of multiple aircraft scrapping and reclamation company, it is also where several different aviation heritage groups calls home, which gives Cotswold Airport a rather unique charm of having modern and vintage, military and civilian aircraft grouped together under the same umbrella. Its tenant, just like the airport itself, has been given a second lease of life.

*G-CIVB, the former British Airways centenary commemoration Boeing 747-400 jumbo jet, wearing the retro 'Négus' scheme, which had a premature retirement due to the COVID pandemic, is now preserved as a permanent addition to the airport.*

# COTSWOLD: A SECOND LIFE

JEANG HERNG



M-FTOH, a vintage Boeing 727-200Adv formerly belongs to the Kuwaiti Royal Family investment arm Al Futooh Investment Corporation, this 727 was captured by the Iraqi during the Gulf War, now owned by Strong Aviation and under care of Air Salvage International, it is currently kept in a ground-running condition.



Painted in a Red Arrows scheme as XR540, this Folland Gnat's actual identity is actually XP502. Along with the Hunter it was once owned by the now collapsed Delta Jets, which is turn, is now owned by the airport. Displayed close to the Hunter, this paint scheme is suits right at home at Kemble, a former Red Arrows home base.



Unlike the M-FTOH, this much younger and much modern Airbus A319-100, CS-TTH, and its sister behind it, last operated by Portuguese flag carrier TAP Air Portugal is already getting parted out, and is slated to meet the scrapman's axe soon. While the airframe will be gone, its parts will live on for years to come.

XM467, a Bristol Britannia C.1 named 'Regulus' is operated and preserved by the Bristol Britannia XM467 Preservation Society. Maintained in an excellent condition with the RAF Transport Command Paint Scheme, Regulus and its crew held open day event regularly.



Hawker Hunter T.4 XE665, is a Hunter that been through a lot of history. Built as an F.4 and operated by the RAF, the jet was converted into a T.4 and transferred to the FAA. Post retirement, it went through several private operators that seek to put it back in the air, which they all failed, now owned by the airport, it is currently on display next to the AV8 restaurant.



TF-AAK, the 747 once operated as The Iron Maiden's 'Ed Force One', is sadly, having its days numbered. Its sistership 9H-AZB is much more fortunate, having getting flown out from the airport few days after this picture was taken.



# TBAG: GUARDIANS OF THE LAST ALL-BRITISH BOMBER

JEANG HERNG

Based in Cotswold Airport, The Buccaneer Aviation Group, also known as the TBAG (pronounced as 'teabag', a rather fitting British name), is a volunteer group that seek to preserve the Blackburn Buccaneer, the last all-British designed bomber aircraft that served in both the Royal Navy's Fleet Air Arm (FAA) and Royal Air Force (RAF) throughout the Cold War. Interviewing the group's chairman *Frank Wallace*, Aviation Museum will seek to find out the history and the operations of the volunteer group.

## Foundation

While the current iteration of TBAG was founded in 2010, the history of the group went further back to the early 2000s. According to Wallace, the group used to be two separate groups, with one operating XX894, and the other group with XW544. But even when the group were two separate entities, since 2006 the group had always worked together on the aircrafts, and shared their

knowledges with each other, as such, by 2010, both groups have decided to merge their operations as one, and with the amalgamation of the groups, the combination on the spare parts backlog, ground support equipment used to run the aircraft, and the combination of knowledges from both sides have streamlined the operations and created more efficiency. As Wallace said, the groups felt that they had more strength in numbers, so the move to bring the two groups together as one just made sense.



XX894, fully powered up and getting readied for the night shoot.



## Buccaneers in Collections

As aforementioned, the group's ancestry traced all the way back to the early 2000s, and as such, the current aircraft in TBAG's inventory also have different history, and were acquired in different time and under different circumstances. XX894, which is currently painted in the colors of the FAA's 809 Squadron 'Immortals', was acquired in 2003 by Guy Hulme, when it was on display at Farnborough. While Hulme himself was not related to anything flying related, his father used to fly on the Buccaneer, and was unfortunately killed while flying the jet during a flying accident at Tain Range. Hulme, who bought the aircraft with the intention of having it to serve as a memorial to his father, ultimately brought the aircraft over to Bruntingthorpe, and brought a team together there to kickstart the restoration of the airframe.

Meanwhile, XW544, currently painted in a green and grey camouflage scheme, was first founded by member George Palmer, who sighted the jet being abandoned in a scrapyard named Parry's Yard in Shawbury. Palmer, then notified the group about its condition, bought the jet alongside with Dave Webber and Andy Webber, and had it moved to Bruntingthorpe by 2004.

Aside from the two complete airframes, TBAG currently also possess the cockpit section of XX550. According to Wallace, XX550 was owned by a gentleman at Essex named Ricky Kelley, who bought the cockpit during the 1990s from a metal scrapyard called Hanningfield Metals. Kelley, who first bought the cockpit with the intention of restoration, ended up storing the cockpit in his

garage for 20 years without any work done on it. Eventually, when Kelley needed to move, he put the cockpit section up for sale and knowing the group personally, he notified the group about it, and Wallace himself purchased the section from Kelley, and moved it up to Bruntingthorpe by 2016. Wallace says that even though the group officially have the three airframes, in actual all the airframes are belonged to the members who bought the airframes, and they are loaned to TBAG.

Wallace also mentioned that when the group was based in Bruntingthrope, they used to have a third complete airframe, XX900, which is owned by David Walton. When the group have to move away from Bruntingthorpe, the group had a discussion and it was decided it is better to split into two so they can work on two aircraft separately, and XX900

was moved to Tatenhill Airport, while the rest of TBAG moved to Cotswold Airport at Kemble.

## Journey to Kemble

Since its foundation, TBAG have always based its operation at Bruntingthorpe Airfield, and TBAG also conducted multiple taxi runs when they were based there. That was until 2020, when sadly, an announcement was made by the owner of Bruntingthorpe, Walton Limited, that the site has been leased to a group named Cox Automotive for 35 years. Cox Automotive, a group with activities based around vehicle and vehicle storage, have leased the site with the intention of using the airfield as a storage site, which means that the airfield will become unavailable for TBAG to perform its taxi run operations. While Wallace says the group are allowed to stay at Bruntingthorpe, it was suggested that if TBAG ever wanted to conduct its taxi run again, it will be better for them to look for elsewhere to move.

At first, the group surveyed three different airfields, which includes North Weald Airfield, White Waltham Airfield and Cotswold Airport. In the end, TBAG chose to relocate to Cotswold Airport, located at Kemble, as the airfield is within reasonable travel distance for the group's members compared to the other candidates, said Wallace. Of course, the travelling distance was not the only reason why the group chose to relocate to Kemble, which Wallace mentioned that Cotswold Airport also offered the best future for the aircrafts, due to its unique background with vintage jet aviation. Cotswold Airport used to be an RAF based called RAF Kemble, and it served as a base for the RAF aerobatic display team, the famed Red Arrows when they operated the Gnat. When the airbase was privatised, the airport owner, which owns Delta Jets, operated Hawker Hunter out from the site, and there was also Midair, which operated Canberra and also Hunter from the site up until 2014.

Nevertheless, identifying for a new location to move was not the biggest issue, as the real challenge that lies ahead for TBAG is the process of relocating its entire collection from Bruntingthorpe down to Kemble. The move, which happened in 2020, was an immense challenge for the group. First there is the engineering challenge that involves in the group's needs to move its aircrafts that are maintained in operational conditions. According to Wallace, most of the aircraft moving across the country these days are non-operational, so any dismantling and even cutting of the aircraft would not matter as much, but for TBAG, any cuttings or dismantling might cause damage to the aircrafts which the group could not afford to do so. Therefore, the group have to find the lowest sitting lorries, rotate the bomb bays of the aircrafts to make it flat, and then retract the undercarriage, and let the aircraft sit on it. After solving the engineering challenges, there is now the financial challenges, which involves in arranging for police and wide load vehicle escorts through the various counties the group will travel through throughout the moving process. What's worse, was the fact that



XX994 was bought as a tribute to Guy Hulme's father, who died in a crash while flying the Buccaneer

XW544 was rescued by the group after member George Palmer discovered it at a scrapyard.



the group have to arrange all these during COVID times, which means they have to adhere to all the social distancing rules and restrictions while pulling the relocation off, said Wallace, all of these made the relocation more complicated.

Besides the aircrafts itself, there are also the spare parts and ground support equipment that have to be moved, and the group have to purchase 240-foot shipping containers and move it via lorries, and the rest of the stuff were moved by the members cars, or according to Wallace, “anything we can get stuff into”. This process took an entire month to complete, before the eventual move of the aircraft, said Wallace. Then on the day of moving the jets group had to hire crane companies to lift them onto the flatbeds, which then travelled on a two days journey on the M5 motorway, with an overnight stay spent at the Strensham Services. The challenge was so huge that there were multiple sleepless nights, and a lot of long days for the crews, which were finally paid off when the aircraft touched down at Kemble safely. “It was just such a huge sigh of relieve that we had managed to do it,” said Wallace.

The transport of the aircrafts was supposed to be a three days journey, but the group compressed it into two to save the vehicle hire fees. According to Wallace, in the

end the approximate cost for the group to facilitate the relocation is around 35 to 40,000 pounds, and since then the price for these hire services have gone up significantly, which is why Wallace said that he would not want to experience that again, and he hopes that the group does not have to go through the process again.

That being said, the relocation does pay off well for the group, as Cotswold Airport, in comparison to Bruntingthorpe, was overall better and more professional environment. As Wallace mentioned, Cotswold Airport is an active airport, and the group have to adhere to the health, safety and insurances guidelines, along with the strict operating procedure of the site, which were not present when they were based in Bruntingthorpe. Wallace said that as long as the group follow the rules and which they do, the group will be fine, and overall Cotswold is just a nice place to be at. Wallace also pointed out that the more professional environment also made a difference when it comes

to the group’s operations, which he says that when the group was based in Bruntingthorpe, they had to hire in fire cover service, and had to muck around for the deliveries and stillage of fuels, which mostly come from the aircrafts that came in for recycling. In comparison, at Cotswold the fire cover services were provided all the time and the group can just call the control tower for fuel whenever they needed it and the airport will just send it in via a fuel truck.

## Restorations and Maintenance

The restoration progress started when the XX894 and XW544 came into Bruntingthorpe a year apart from each other. According to Wallace, this was also when he first joined the group, at the year of 2004. With a background in electronics and electrical

engineering, he joined the team to work on the electrics and restore the electrical sides of things on the Buccaneer. According to Wallace, when the group first acquired the jets, while they come along with the four pair of engines, all of them were not runnable and the condition was so bad that they were beyond repair. Therefore, the group have to source for new set of engines, and over the years they replace all the engines on both aircraft, which were then removed and replaced again during their scheduled maintenance, as it is often faster to prep a spare engine than removing and repair it over a period of time, said Wallace. While for the parts used for the engine’s maintenance, Wallace said that they managed to salvage

as much of the functional parts that were left on the original set of unusable engines, which included parts like fuel control units, hydraulic pumps and generators, and the group have also managed to bought two extra set of spare engines that were used for test environments few years ago, and along with all the parts the groups managed to acquire over the 20 said years of operations from scrapped or reclaimed aircraft, the group have managed to amassed their own spare parts backlogs to cover the maintenance of the aircrafts.

The challenges lie in the early days of the group’s operations, said Wallace, aside from the engines,

XX894 was first used as a part donor for the flying operations of Buccaneers operated by Thunder City over in South Africa, so it was cut through and had a lot of electronics and hydraulics parts missing. To obtain the parts for the restorations, the group managed to do it via good contacts with people in the preservation industry, and the group build up a good relationship with Thunder City over time, which they traded parts with each other to help out the restorations on both sides. TBAG gets to accumulate parts from the various contacts and people that are helpful to the groups, which Wallace points out that there are some other people that owns Buccaneers will come up and share their surplus parts, in which TBAG will do the same. It is like a community effort, said Wallace, which then says that TBAG have been asked to help out the restoration of Buccaneer XV168, which is located at the Yorkshire Air Museum in Elvington. “The Buccaneer community is a small but friendly community that helps each other out, and I do not think that it would have worked if we did not, I think we need that community”, said Wallace.



*XW544 with most of its panel opened up, exposing its complex internal wiring that has been fully restored.*



## Operations

Moving onto the operational sides of TBAG, besides the general taxi run events, the group is mainly doing stuff like general maintenance on both the aircraft and ground equipment, which have to be serviced regularly, and the group have also kept a catalogue on the spares inventory, which they update it whenever there are new parts that came in or went out for maintenance use. The group will also have to take care of the site that they are based on, to make it presentable whenever there is an event.

Aside from that, the group also runs their own merchandise shop, in which they get discuss on what sells and what does not, and comes up with new ideas for the merchandise. Apart from those, the group will also seek to pre-plan the events, so that it would not collide with other events that are occurring at the airport. All of these were done as a part for the group to sustain its operations, said Wallace, as the group will make a budget for a 12-months period, in which the group will seek to calculate how many events

the group will need to held, and how many stocks they will need to sell, the events and shops are a key to TBAG operations as the money that came from it are used to recoup the cost the group used to do their engine runs, and pay for their leasing fee for the site, along with the fuel and insurance, which cost up to somewhere along 10,000 pounds per year, said Wallace. As a non-profit organisation, it will be nice if they can say they have made profit, said Wallace, but in actual it is money sunken, lost. The members also pay subs into the group, but those only covers the bare minimum, according to Wallace. As such, TBAG tries their best to keep their operations cost as low as possible.

## Planning for the Future

Regarding if the group have any plans for future acquisition or expansion in operations, such as restoring Canberra PR.9 XH134 to running condition, which is currently under their cosmetic

care, Wallace said that currently there are no such plans as the Canberra belongs to the airport, and Wallace also revealed that aside from the Canberra, the group is also responsible to take care of the condition of the Hunter and Gnat that are preserved at the airport.

Other than that, the group also have no plans to acquire another additional Buccaneer airframe, as it will only increase the group's workload, that being said, Wallace said that if there are any Buccaneers that came under the threat of getting scrapped, the group will look into their options to see if they could do anything to save it. Right now, the what is planned for the future of TBAG is the repaint of XW544, which is currently in preparation stage.

According to Wallace, over the upcoming two years, both aircraft will be repainted as they both suffer from sun damage. Besides that, further taxi run and night shoots event for this year are currently in plans, which might happen sometime around May and August, said Wallace.

In the end, the long-term plan is to build a cover and put the aircraft undercover. "The parts won't be there forever," said Wallace. Currently, the TBAG's goal is to keep the aircrafts running as long as possible. A lot of the crowd that came to visit the group had never seen the Buccaneer in the air, and the fact that they can provide them a chance to see it up close and running, unfolding its wings gives the group a lot of

satisfaction, said Wallace. But as the parts ran out, one day they will become static display, and by then, TBAG hopes that they can retire them into a building alongside with all the ground equipment, spares and artefacts, to build up a museum dedicated for the Buccaneer, said Wallace.

*Yorkshire Air Museum's Buccaneer XV168, when it was still parked outside of the museum's hangar. TBAG has been tasked to assist in the Buccaneer's restoration work, which has been started recently.*



*XX994 during a wingfolding action.*  
FEATURES | 57



# MIRAGES IN THE DARK

JEANG HERNG

On the evening of February 25th, the Yorkshire Air Museum organized a night shoot for the aviation enthusiasts featuring the sole French Dassault Mirage IV strategic nuclear bomber on display in the United Kingdom. Aviation Museum's *Jeang Herng* had the chance to participate in the event and was able to share his first-hand experience of the Mirage's first ever night shoot appearance.

## Last Minute Trip Up North

An untimely diagnosis on covid positive means that the night shoot was almost going to be a mirage for Aviation Magazine, but fortunately, I was recovered just a mere couple of days before the shoot. Not to miss out on a date with one of the most gracious looking bombers of the Cold War, a last-minute ticket booking sent me up north to York, on a rather gloomy day that comes with long drizzles and occasional hails. Coming from The Shambles of York via an uber ride, I reach the museum at half past three, half an hour before the museum close to public visit, and an hour before the briefing starts. Upon arriving, all five aircrafts that are earmarked to be part of the shoot was already arranged in place, with the rest of the museum outdoor exhibits, sans the two heavyweights Nimrod and Victor, towed to the far side of the field to provide a clear view for the photoshoot subjects. Taking advantage of the free time before the briefing, I took a stroll around the museum, take a look at another gem of the museum, Halifax HR792, the only fully complete Halifax airframe left in Europe. A quick tour behind the

hangar also gave us a view of the various stored airframes awaiting for restoration, which includes Buccaneer XV168, which has since been moved into the hangar for the start of its restoration.

*A golden hour with the exotic French nuclear bomber*



## A Warm Welcome

After the quick tour, I began to position my camera around various spots, to try out the possible photo angles for the night, and also take some quick shots before the daylight started to faint away. The museum staffs passed by kindly reminded us of the upcoming briefing, and soon I find myself in the museum's café, which as part of the deal, provided the photographers with some nice hot food and drinks to warm themselves up before the

night shoot begins. Afterwards a quick but informative briefing session started, with some gently reminders for the photographers to not trespass the lines set up by the museum, and to not criss-cross into the shots of each other's. While we wait for the daylight to fades away for the start of the night shoot, the photographers also couldn't give up the chance to capture the planes under the sunset, in which most of them set foot and prepared for the shoot right after the briefing ended. That being said, the chilling weather, along with the lull state

*As the lights slowly fade away, out comes this amazing dark blue hue.*



in between the sunset and dark skies, means that most of the photographers also quickly went back to the museum café to have a rest and some chit-chats, and wait for the darkness to consume all the remaining lights, to finally commence the eventual debut of the Mirage IV's first ever night shoot.

## Historic Ties

As the night time arrives, the photographers moved out of the café, and quickly surrounded the star of the show, the Mirage IV. Now fully lit up by the lights, the Mirage IV in question, with the designation code of 45/BR, arrived at the museum in 2017, when the French government donated the airframe from its previous residence at the Cité des Sciences et de l'Industrie (City of Science and Industry) museum in Paris. The move, is the first and still the only time a Mirage IV has been relocated outside of France for display.

Meanwhile, its elder sister, the Mirage III, designated 3-QR, is also currently the only Mirage III in display in the United Kingdom, and it arrived much earlier in 1993 when it is donated by the French Air Force. Both aircraft have historical ties with the museum

site, which is the former RAF Elvington. Back in the World War II days, RAF Elvington hosted the Free French Air Force's heavy bombers squadron, which went on to operate the Mirage IV in France during the Cold War, 3-QR in particular, was also flown by the museum's member Colonel Denis Turina, whose father flown from Elvington during the war.

Today both 3-QR and 45/BR serve as a remembrance to the ties the French used to have at Elvington. Surrounding the Mirage duo are the remaining three aircraft, which includes Blackburn Buccaneer S.2 XN974, Canadair CT-133 Silver Star 133417 and Westland Firefly HR.5 WH991. Of these, the Buccaneer have the distinction of being the only Buccaneer that flew as both an S.1 and S.2 variant, and is currently maintained by the museum in a taxi condition. The Silver Star just received a new paint job and the Firefly has its retracted blades opened up for the first time in five years.

## End on a High

Throughout the four-hour shoots, the photographers take turns at their favoured angles, had some friendly exchanges over different shooting techniques and positions, and the museum

staff also provided help over the adjustment on the brightness of the lights shining on the aircrafts, and removed the towing bar in front of the Mirage IV on the request of the photographers. While pretty much nothing happened during the night shoot, a short drizzle occurred halfway through the shoot, which forced some photographers to quickly ran to the café to avoid the rain, while others chose to stayed and continued the shoot in the rain. Fortunately, the drizzle was rather short and the shoot went on without further hindrances.

During the final ten minutes of the event, the most anticipated moment of the shoot finally arrived, when the staffs started to reposition the lighting equipment, to let the lights shine on the other side of the Mirage IV, giving the photographers a rare chance to capture both the Mirage twins under the night sky, and with that, the night shoot concluded well with all the participants smiling, satisfied with their products.

*The elder, but smaller sister. The Mirage IV is basically a scaled up Mirage III.*

# SHOTS FROM YORKSHIRE

FEATURING OTHER AIRCRAFTS FROM THE NIGHT SHOOT



*Former Fleet Air Arm Dragonfly HR.5 WH991 is a long-term tenant with the museum, having first arrived at the site at 1994.*

*1 of the 3 Buccaneer at Yorkshire Air Museum, XN974 is painted in the Buccaneer initial service scheme, wore when it first entered service with the Fleet Air Arm*



*The freshly repainted Silver Star 133417, the Silver Star is a licensed version of the Lockheed T-33 Shooting Star built by Canadair of Canada.*



# NEXT ISSUE

## AVIATION MUSEUM

ISSUE #001  
APRIL 2023

### Museum Highlight: Newark Air Museum

The highly rated museum just celebrated its 50th anniversary, how has the museum been doing post COVID recovery?

### Air Show Season

After a long and chilly winter, the return of warm weather also signals the start of 2023 air show season, look forward to our special report on the RAF Cosford Airshow and Royal International Air Tattoo, 2 of the largest air show in the UK.

### Soviet Invasion at Hawarden

Hawarden Airport in North Wales have been the home to multiple Soviet-era aviation relics. Who brought them in? What's their current status and what are the future for those airframes?

*The golden shot.*

*What are the chances of shooting both Mirage III and Mirage IV under the night sky? It probably is not high but the folks at Yorkshire Air Museum made it happened.*

