ROYAL AIR FORCE

HISTORICAL SOCIETY

JOURNAL

80

First published in the UK in 2023 by the Royal Air Force Historical Society

ISSN 1361 4231

Printed by Windrush Group
Windrush House
Avenue Two
Station Lane
Witney
OX28 4XW

ROYAL AIR FORCE HISTORICAL SOCIETY

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**Ex Officio*

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SELECTED GLOSSARY

AAA	Anti-Aircraft Artillery
AAR	Air-to-Air Refuelling
ACOS	Assistant Chief of Staff
AD	Air Defence
AFBSC	Air Force Board Standing Committee
AMP	Air Member for Personnel
AMRAAM	Advanced Medium Range Air to Air Missile
AMSO	Air Member for Supply and Organisation
AOT	Air Officer Training
AT	Air Transport
ATO	Air Tasking Order
AWACS	Airborne Warning & Control System
AWE	Atomic Weapons Establishment
CA	Controller Aircraft
CAOC	Combined Air Operations Centre
COMINT	Communications Intelligence
COS	Chief(s) of Staff
CSAR	Combat Search and Rescue
CTTO	Central Trials and Tactics Organisation
DCom Ops	Deputy Commander Operations
DEAD	Destruction of Enemy Air Defences
DMPI	Designated Mean Point of Impact
DOR	Director of Operational Requirements
EBRD	European Bank for Reconstruction and Development
EMALS	Electromagnetic Aircraft Launch System
EWO	Electronic Warfare Officer
EWOSE	Electronic Warfare Operational Support Establishment
FCO	Foreign and Commonwealth Office
FLIR	Forward-Looking Infra-Red
FRY	Federal Republic of Yugoslavia
GLCM	Ground Launched Cruise Missile(s)
GPS	Global Positioning System
HCDC	House of Commons Defence Committee
HARM	High-speed Anti-Radiation Missile
HERTI	High Endurance Rapid Technology Insertion
IBCC	International Bomber Command Centre
IFOR	Implementation Force
IMF	International Monetary Fund
IN	Inertial Navigation
JSDC	Joint Services Defence College

KFOR	Kosovo Force
MANPADS	Man Portable Air Defence System
MiD	Mention in Despatches
MPA	Maritime Patrol Aircraft
MTP	Multi-Terrain Pattern (ie camouflage)
NAC	North Atlantic Council
NMS	New Management Strategy
NVG	Night Vision Goggles
OAS	Offensive Air Support
OCA	Offensive Counter Air
ORB	Operations Record Book, ie the Forms 540/541
OSCE	Organization for Security and Co-operation in Europe
PGM	Precision Guided Munition(s)
PJHQ	Permanent Joint Headquarters
PSAB	Prince Sultan Air Base
PSO	Personal Staff Officer
PTSD	Post-traumatic stress disorder
PUS	Permanent Under Secretary
QCVSA	Queen's Commendation for Valuable Service in the Air
QWI	Qualified Weapons Instructor
RCDS	Royal College of Defence Studies
RHWR	Radar Homing and Warning Receiver
SDR	Strategic Defence Review
SDSR	Strategic Defence and Security Review.
SEAD	Suppression of Enemy Air Defence(s)
SFOR	Stabilisation Force
SH	Support Helicopter(s)
SR(A)	Staff Requirement (Air)
SWOT	Strengths, Weaknesses, Opportunities and Threats
TIALD	Thermal Imaging And Laser Designator
TIRRS	Tornado Infra-Red Reconnaissance System
TIW	Tactical Imagery-Intelligence Wing
UAV	Unmanned Aerial Vehicle(s)
UNPROFOR	United Nations Protection Force
UNSC	United Nations Security Council
UNSCOM	United Nations Special Commission
UNSCR	United Nations Security Council Resolution
WMD	Weapons of Mass Destruction

THE 1990s – A DECADE OF CHANGE

RAF MUSEUM, HENDON, 20 April 2022

WELCOME ADDRESS BY THE SOCIETY'S CHAIRMAN

Air Vice-Marshal Nigel Baldwin CB CBE

Ladies and gentlemen – good morning

Your Committee is very grateful to our Society's President, Sir Richard Johns, for not only agreeing to chair today's gathering but, even more importantly, for being the mastermind behind the subject matter in the first place. As Chief of the Air Staff from 1997 to 2000 he was, of course, heavily involved in several aspects of our agenda.

It was Sir Richard's idea that we should one day cover these areas, not least while we have many of the leading participants willing to contribute. To have him encouraging so many senior officers to take part tells you something about his powers of persuasion! This is the most star-studded meeting we have ever held.

Our numbers are a bit down this morning by our usual standards, but I think we can fairly blame Covid concerns for that. The important thing to remember is that, being a society of record, all the work our speakers have put into their presentations will eventually be turned into a Society journal and will go to over 600 members worldwide.

Before I hand over to Sir Richard, I would like to express our usual thanks to Maggie Appleton, the CEO of the RAF Museums, and to her always very helpful staff. We would be lost without you Maggie.

So, Sir Richard, you have control

CHAIRMAN'S INTRODUCTION

Air Chf Mshl Sir Richard Johns

Sir Richard joined the RAF via Cranwell and spent nine years flying Hunters before becoming a QFI (and teaching The Prince of Wales to fly). He was OC 3 Sqn (Harriers) 1975-77 and Station Commander at Gutersloh. 1982-84. More senior appointments included SASO RAF Germany, SASO HQ STC, AOC 1 Gp, AOCinC STC and CINCNORTHWEST before being appointed CAS in 1997. After leaving the Service he spent 2000-08 as Constable and Governor of Windsor Castle. He has been Chairman of the RAF Historical Society since 2015.

I am delighted to welcome you all to this RAFHS seminar that examines the history of the Service in the 1990s. A decade of change heralded by the dissolution of the Soviet Union and the end of the Cold War. A decade that ended with New Labour in government, committed to a defence policy within which power projection and intervention capabilities reflected the Prime Minister's conviction that our Armed Forces should operate on the global stage as a force for good and should not 'stand idly by and watch humanitarian disasters or the aggression of dictators go unchecked.'

In 1990 the RAF's front line combat strength was some 900 aircraft with a uniformed strength of 93,000 men and women. By the end of the decade these numbers had diminished to 590 aircraft and 53,000 personnel – principally the consequence of the unremitting search for the so-called 'peace dividend'.[1] But, in all fairness, I should acknowledge there were significant capability upgrades to aircraft in service and their weapons.

Paradoxically, as the war fighting strength of the RAF was steadily reduced in numbers, its commitment to operations, starting with Gulf

[1] UK Armed Forces; Quarterly Service Personnel Statistics as at 1 April 2022 (https://www.gov.uk/government/statistics/quarterly-service-personnel-statistics-2022/quarterly-service-personnel-statistics-1-july-2022) records a further decline to a Full-Time Trained Strength of 29,620 from an overall total of 33,320 regular RAF personnel. **Ed**

War I in 1990 and concluding with the Kosovo air campaign in 1999, required the Service to accommodate an ever-increasing load of operational tasks in the Balkans and the Middle East.

To give you an idea of the scale of effort committed to meet UN and NATO mandated operations, in one mid-decade year alone, our combat aircraft flew more than 2,000 sorties totalling 6,000 hours over north and south Iraq and a further 10,000 hours over the Balkans. These figures do not include the huge amount of flying undertaken by combat support aircraft.

The story of the 1990s, arguably the most transformative decade in RAF history since the end of World War II, most certainly merits the attention of this Society and we are fortunate to have with us today key players with experience of battles both within the MOD and at the sharp end of the RAF.

I only need to add that the today's seminar will focus primarily on combat operations as time precludes the vital contributions made by our combat support forces. The Society plans a second seminar which will address the activities of our tankers, AWACS and intelligence gathering aircraft, the air transport and the MPA forces, the RAF Regiment and, by no means least, logistic support.

All that is for the future so, to set the scene for today's seminar, I am delighted to welcome Sir Roderic Lyne, the son of a most distinguished airman, AVM Michael Lyne with three AFCs to his name and known to many of us here today as the Commandant of the RAF College Cranwell from 1963 to 1965. Sir Roderic has earned his own distinction as a former diplomat who served as the British Ambassador to the Russian Federation from 2000 to 2004 and who more recently was a member of the Chilcot Inquiry. He is going to talk about the issues that impacted on us during the 1990s as seen from a Whitehall perspective and the way the world changed during that decade.

THE END OF THE COLD WAR – GEOSTRATEGIC OVERVIEW AND NATIONAL POLITICAL REACTION

Sir Roderic Lyne

Sir Roderic joined the Diplomatic Service in 1970, subsequently serving in a variety of posts of increasing seniority in the USSR, in Senegal, at the UN, in Geneva and, inevitably, at the FCO. Of particular significance in the context of today's seminar, he was the Private Secretary to the Prime Minister for Foreign Affairs, Defence and Security 1993-96, and British Ambassador to the Russian Federation from 2000. Since 'retiring' in 2004, he has served as a member of the Chilcot Inquiry and on the governing bodies of Chatham House and Kingston University; and has worked as Chairman, Director or consultant to a number of public companies.

The End of the Threat

Did we get it all wrong in the 1990s?

Francis Fukuyama proclaimed the 'End of History' and the triumph of liberal democracy. In the Charter of Paris for a New Europe of November 1990 the 34 OSCE leaders declared that 'The era of confrontation and division of Europe has ended' and we had opened 'a new era of democracy, peace and unity.' By then, the UK had already begun the process of reshaping its armed forces under 'Options for Change'. NATO partners were doing likewise, spending what became known as the 'Peace Dividend'.

On 28 January 1992 President George Bush Senior delivered his last State of the Union address. He said:

> 'in the past twelve months the world has known changes of almost biblical proportions …'
> '… communism died this year …'
> 'By the grace of God, America won the Cold War …'
> '… for the first time in 35 years, our strategic bombers stand down …'
> 'A world once divided into two armed camps now recognises one sole and pre-eminent power: the United States of America.'

Bush said he would accelerate cuts in military spending; cease

production of the B-2 bomber; cease buying advanced cruise missiles; eliminate Peacekeeper missiles; reduce warheads on Minuteman and sea-based missiles. By May 1997 NATO and Russia were laying out the scope of future partnership, solemnly stating in the Founding Act that 'NATO and Russia do not consider each other as adversaries.'

In the 1998 Strategic Defence Review, looking ahead to 2015, the British Government was confident 'that there is today no direct military threat to the United Kingdom or Western Europe. Nor do we foresee the re-emergence of such a threat.' The Review said that the 'peace dividend' had already been taken. Defence expenditure had fallen by 23% in real terms since 1990 and our forces had been cut by nearly a third. We did not need 'large standing forces on the continent or in the Atlantic simply to defend ourselves and our Allies.'

A Decade of Optimism

From the end of the Cold War to '9/11', we lived through a decade of optimism. What else fed into this mood? The British economy improved steadily through the 1990s, rebounding after the Black Wednesday of 16 September 1992. Global GDP per head increased by about 14% during the decade.

The revolution in information technology was changing the way we lived and worked. The first 2G mobile network was launched in 1991. By 2001 we were into 3G and relatively cheap pocket-sized mobiles were commonplace. The clunky and expensive laptop computers of the 1980s were supplanted by the 1991 Apple PowerBook and a generation of competitors. Information technology became a driver of global-isation. It transformed capital markets and, for better or for worse, allowed capital to move around the globe in vast quantities at the click of a button, almost beyond the control of national governments.

Apartheid ended in 1991; multiracial elections were held in 1994. Five months later John Major paid a hugely successful visit to South Africa and was the first British Prime Minster since Harold Macmillan's 'Wind of Change' speech to address the Parliament in Cape Town. The end of apartheid caused a marked improvement in the UK's relations with the Commonwealth. British Prime Ministers had found themselves consistently under attack at Commonwealth Heads of Government Meetings since the 1960s over South Africa and, until 1980, Southern Rhodesia. In the 1990s Commonwealth Summits

became much friendlier and more constructive events and the Commonwealth's value as a network of soft power came into its own.

We were optimistic, too, about China. In 1990, China's nominal GDP was one quarter of the UK's; but, thanks to Deng Xiao Ping's reforms, China was growing fast. Its GDP quadrupled in a decade. The rapid development of a market economy and a more liberal society there appeared benign and positive for the world. After years of negotiation, we returned Hong Kong to China in 1997 under an agreement that Hong Kong's special status would be preserved for 50 years.

Closer to home, and of great importance to the British forces and the British public, the 'Troubles' in Northern Ireland finally came to an end. In February 1993, John Major was told that a message had been received from the IRA leadership beginning: 'The conflict is over, but we need your advice on how to bring it to a close.' The 'Troubles' had by then lasted for 24 years, claiming over 3,500 lives, one third of them members of the UK's security forces. Thus started the so-called Northern Ireland Peace Process which led, through the Downing Street Declaration of December 1993 and the paramilitary ceasefire and negotiations of 1994-96, to Tony Blair's Good Friday Agreement of 1998.

There was no great national debate over the UK's membership of the EU. When John Major signed the Maastricht Treaty in December 1991, it was seen as a triumph which consolidated the UK's place in the EU – with the ability to opt out of a single currency, of the Schengen agreement and of the Social Chapter. No one would then have foreseen that, less than two years later, Major would require a vote of confidence to get the Treaty through the House of Commons; or that a hard core of only about twenty anti-Europeans in his own party would become a constant drain on his premiership. Still less was it anticipated that the UK would vote to leave the Union in 2016. With Tony Blair's landslide victory in 1997, the question of Europe seemed to have been put to bed. The Labour Government's Strategic Defence Review of July 1998 declared unequivocally that:

> 'We are a major European state and a leading member of the European Union. Our economic and political future is as part of Europe. Our security is indivisible from that of our European partners and allies.'

The UK kept its distance from talk of an EU defence identity in place

of NATO, but Blair agreed with Jacques Chirac at St Malo in 1998 that the EU should develop autonomous defence capabilities.

Not all, however, was sweetness and light. On the debit side, we had a pandemic. HIV/AIDS – first diagnosed in 1981 – had run amok in the 1980s and was slowly coming under control in the 1990s. The world did not react to AIDS as it has done to the current coronavirus, although AIDS has now claimed some 36 million lives – many more than are attributed to Covid-19.

Most seriously, we were beginning to become aware of 'global warming' – a term used by the scientist James Hansen in a memorable testimony to the US Senate in 1988. Margaret Thatcher was the first world leader to warn about 'the threat to our global environment', notably when she addressed the UN General Assembly on 8 November 1989. Speaking one day before the fall of the Berlin Wall, she observed that, while conventional political dangers were receding, we faced the 'prospect of irretrievable damage to the atmosphere, to the oceans, to the earth itself'. Following the 1987 Montreal Protocol to curb ozone-depleting gases and the formation of the Intergovernmental Panel on Climate Change in 1988, the momentum picked up in the 1990s with the UN Framework Convention on Climate Change of 1994 and the Kyoto Protocol of 1997. The scientists argue that we are still lagging far below the curve.

International Peace and Stability

In the 1992 Defence Estimates, the Government defined three roles for the armed forces:

> To ensure the protection and security of the United Kingdom and our dependent territories, even where there is no major external threat.
>
> To insure against any major external threat to the United Kingdom and our allies.
>
> To contribute to promoting the United Kingdom's wider security interests through the maintenance of international peace and stability.

The absence of a direct threat did not lessen our concerns for the indirect threat which instability abroad could pose to British interests. Three areas, in particular, demanded attention.

First, the Middle East has been a constant preoccupation in British foreign policy for the past century. In the 1990s, while we had to pay careful attention to the Arab/Israel dispute; to Saudi Arabia, the Gulf and Oman; and to keep a wary eye on Libya and Iran, the focus was on Iraq. After the objective of removing Saddam's forces from Kuwait was achieved very successfully by a US-led 35-nation coalition in Operation DESERT STORM in early 1991, hopes that the Iraqi people would complete the job by removing Saddam himself were disappointed.

For twelve years Saddam intermittently flouted UN Security Council resolutions requiring him to disarm and he remained a contingent threat to the peace and security of the region. This obliged the USA and UK, with diminishing support from other coalition members, to contain Iraq through a combination of sanctions, arms embargoes, No-Fly Zones, naval patrols and deterrence, occasionally shown in muscular form as in the DESERT FOX bombardment of December 1998.

In the mid-1990s the Clinton Administration secretly looked at possible ways of generating a coup within Iraq, but could not devise a plan certain to be effective. In December 1998 both the US and UK governments ruled out an invasion. The US National Security Adviser, Sandy Berger, said that this would require 'hundreds of thousands of American troops to fight on the ground inside Iraq … the reward of success would be an American military occupation of Iraq that could last years.' Tony Blair said: 'Even if there were legal authority to do so, removing Saddam through military action would require the insertion of ground troops on a massive scale – hundreds of thousands. I cannot make that commitment responsibly.' Later events were to demonstrate that Blair and Berger were right in 1998.

Containment was expensive, unpopular, and not easy to sustain with no clear end in sight. It required a serious commitment by the RAF and the Royal Navy, with our US Allies. But it was effective. Invasion was not the last resort in 2003. It could most likely have been avoided, had the UN inspectors been allowed to finish their job.

Second, the Balkan wars, triggered by the break-up of Yugoslavia in the middle of 1991, became a first-order issue for the British government and our armed forces. The EU had tried and failed to broker agreements between the Yugoslav republics before

independence. War between Serbia and Croatia was followed by war in Bosnia and the three-year siege of Sarajevo from 1992. The refusal of the ex-Yugoslav parties to negotiate peaceful settlements presented NATO and the EU with difficult options. These ranged from doing nothing – unpalatable in a war on the European continent – to an all-out operation to suppress the conflict.

The Chiefs of Staff advised John Major in August 1992 that this would require the deployment of a NATO force of 400,000 troops for an indefinite period – something that was clearly infeasible without a massive American contribution. The Europeans therefore chose to focus on humanitarian support to the civilian population, while continuing diplomatic efforts to make peace. At its peak, the UN Protection Force numbered almost 40,000 troops from 42 countries, with the largest contributions coming from the UK and France.

We had to manage a serious disagreement over Bosnia with the United States. The Clinton Administration came into office in 1993 adamant that it would not commit US forces on the ground, but pressing for the lifting of the arms embargo on the former Yugoslavia and for NATO air strikes against the Serbs. We were convinced that this would make the situation worse, exacerbating rather than ending the conflict while requiring UNPROFOR to withdraw. We eventually persuaded the Americans to drop 'lift and strike' and to add their clout – and the formidable drive of the late Richard Holbrooke – to the diplomatic front. This led to the Dayton Agreement of November 1995, which still holds – just – to this day.

It should not be forgotten that President Yeltsin's government played a generally supportive role throughout this period. Russia contributed to UNPROFOR, under UK command in Bosnia; and applied pressure to Milošević in Serbia at critical moments through Foreign Ministers Kozyrev, Primakov and Ivanov.

Dayton left NATO and the UK with a continuing Balkan commitment in the implementation forces IFOR and SFOR. Another front then opened when war broke out in Kosovo in February 1998 and NATO intervened in the following year with a bombing campaign to force Milošević to withdraw his troops and accept the Kumanovo Agreement.

Last, but not least, the former Soviet Union. The UK and the West were faced, not with a threat of attack, but with a threat of frightening

instability. In 1990, the Soviet Union had the world's largest army: four million in the ground forces, including 650,000 in Central and Eastern Europe; 64,000 tanks; 12,200 military aircraft. And the KGB numbered nearly half a million.

No Empire, no Great Power in history has collapsed in peacetime as suddenly as the Soviet Empire collapsed between 1989 and 1991. It was a quadruple collapse: the end of Communist political dictatorship; the end of the Socialist command economy; the end of the Warsaw Pact and the international Communist network; and the fragmentation of the USSR into 15 nation states.

These epic changes were not the result of military defeat, but of decisions taken within Russia. Communism had failed and the majority of the Russian people saw its demise as a victory. They could accept the independence of the Central and Eastern European states. But they had never anticipated that their own State would break up – least of all that Ukraine and Belarus would become 'foreign', sovereign, independent countries. The Soviet Union fell apart so fast in the last five months of 1991 that no proper arrangements had been made for what would happen thereafter. There should have been an internal negotiation about the boundaries of the new states, citizenship rights within them and relations between them. This might have pre-empted subsequent tensions and conflicts which have afflicted almost all of the successor states, including Ukraine; but there was no time.

Russia had been a great power for three hundred years. In the minds of the Russians, the two great achievements of the Soviet Union, for which huge sacrifices had been made, had been the defeat of Nazi Germany and recognition as the world's second superpower, the counterpart of the United States. Now the Russians were being asked to swallow the notion that their country, reduced in population by two fifths, was a bankrupt minor power begging for hand-outs. They were undefeated. They had ended the Cold War. But President Bush was telling them that the Americans had won it. They found this deeply humiliating; and they felt very insecure.

How did we react to this collapse? Our objectives were clear. We were seeking to bury the Cold War, end the division of Europe, and, to the extent possible, help the post-Soviet and ex-Warsaw Pact states develop as stable, free enterprise economies and law-based democracies. We had few illusions about the scale of the task, but by

the end of the 1990s there were some notable successes.

Putin and his cronies claim that the West engineered the collapse of the Soviet Union and exploited Russia's weakness through the 1990s. The truth is the reverse. If we could have slowed the collapse, we would have done so. Our prime concern was over the stability of this vast region, and especially for secure control over its arsenal of weapons of mass destruction. We were worried about conflict, the humanitarian consequences of failing economies, and the risk of a flood of migrants across Europe. We succeeded in negotiating the peaceful reunification of Germany and withdrawal of Soviet forces. We ensured that the Soviet Union's international obligations, including arms control agreements, were sustained; and that nuclear weapons were removed from Ukraine, Belarus and Kazakhstan.

The West poured in help of every kind through the 1990s and up to 2003. Financial aid from the IMF, the EBRD and the EU. Technical assistance programmes. Under the Nunn-Lugar programme, the US, UK and other G7 states helped to dismantle weapons of mass destruction. I could provide a long list of partnership programmes in which the UK was involved with Russia. Under one such programme, managed by a multilingual RAF education officer, the UK funded and supervised the retraining for civilian life of twenty thousand Russian officers.

Another part of Putin's narrative of victimhood concerns NATO enlargement. NATO has an open door policy enshrined in the Washington Treaty, but it has no policy of enlargement *per se*. When the new democracies started applying in the 1990s, NATO reacted very cautiously. 'Partnership for Peace' was launched in 1994, explicitly including Russia. It was not until after the NATO-Russia Founding Act of 1997 that NATO moved towards the admission of the first three former Warsaw Pact states in 1999 – a decision in which President Yeltsin publicly, if reluctantly, acquiesced, just as Putin was to acquiesce in the second enlargement agreed in 2002.

Conclusion

In 1992, inflation in Russia reached 2,400%. People were begging in the streets. The government was barely in control. As the Head of the Foreign Office's Eastern Department, I was regularly asked to produce scenarios for use by Douglas Hurd in Cabinet. My most

optimistic scenario was that Russia might just about muddle through. Catastrophic outcomes were not unlikely. When I presented one paper to the Director of Defence and Intelligence, his comment was: 'the only thing to do is to go home and crawl under the bedcovers with a bottle of whisky.'

The optimism generated by the end of the Cold War had been replaced in Russia, and for those of us dealing with Russia, by a deep fear of instability arising from the Soviet collapse.

Ten years later, it all looked very different. Russia had muddled through the 1990s, fighting and losing a disastrous civil war in Chechnya, enduring an economic collapse in 1998 (when the oil price dropped to $10 per barrel and the rouble lost two thirds of its value against the dollar) but had survived and was beginning to prosper. By 2002, the UK and our Western partners, including the EU and NATO, had developed broad and constructive cooperation with a Russia which was stable, modernising, increasingly prosperous, generally free and partially democratic. Russia had leaped to America's side after 9/11. The Russian Federation was invited to become a full member of an enlarged G8. The Russia-NATO Council was relaunched and upgraded at a glitzy Summit in Rome. The EU was seeking to negotiate a 'strategic partnership'. Western banks and corporations were beginning to invest heavily in Russia.

But, alas, the world's decade of optimism had run its course. The thunderclap of '9/11' was followed by the disastrous and avoidable decision to invade Iraq in 2003 and the financial crash of 2008. The downsides of information technology began to show up in the growth of populist politics fed by distorted news. The rise of China no longer seemed benign: as the Chinese economy neared parity with the United States, President Xi began to flex his country's new-found muscle in a threatening way. With democracy under pressure in the USA and Europe, the Middle East in turmoil, the triangle of Afghanistan, Pakistan and Iran looking like a powder keg, international law and the post-war order creaking, the multipolar world of the past two decades has proved much harder to manage than the relatively stable bipolar world of the late Cold War. This in turn places huge demands on our defence planners.

And now there is the war in Ukraine. Its roots lie in the inability of Russians of Putin's generation to acknowledge that Ukrainians freely

voted for independence (over 92% of them on a turn-out of 84% in the 1991 referendum) and to accept the idea that Ukraine has a right to sovereign nationhood. Putin tried to impose his will on Ukraine in the rigged 2004 Presidential election. He was humiliated then by the Orange Revolution and humiliated again with the second rejection of his placeman Viktor Yanukovych in 2014 – at which point he began to use armed force against Ukraine. His decision to mount a full-scale invasion on 24 February 2022 (which almost no one in the Russian elite anticipated and many of them saw as irrational and dangerous for Russia) has changed the security situation in Europe for a generation.

In the decade of change and optimism under review in this seminar, the UK's defence spending dropped from 4% of GDP to just over half that. We are now in a situation where Russia's actions have forced radical change on NATO. We may well see Finland and Sweden joining the Alliance. We shall certainly see a sharp increase in defence spending across NATO, despite our economic struggles: as late as 1987 the UK was spending 5% of GDP on defence, or two and a half times the level of 2021. Although it is not for a civilian to say, a host of lessons will be drawn by British and NATO planners about future war-fighting, force postures and equipment.

The Cold War was essentially static and, after the Cuban crisis, developed a high degree of predictability. The threats to international peace and security which confront us now are dynamic and unpredictable and demand a more flexible, and at times kinetic, response. But one thing has not changed since the outbreak of the Cold War: the importance of Allies. We should never take them for granted.

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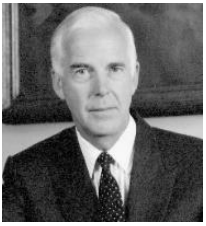
THE PEACE DIVIDEND – OPTIONS FOR CHANGE AND FRONT LINE FIRST

Air Chf Mshl Sir Michael Graydon



Sir Michael joined the RAF via Cranwell in 1957. After an initial tour as a QFI with No 1 FTS, and three on Lightnings, he was PSO to DCinC AAFCE before an Air Staff tour at the MOD. He was OC 11 Sqn 1977-79, subsequently commanding RAF Leuchars and RAF Stanley. Senior appointments included SASO 11 Gp, ACOS Policy at SHAPE, AOCinC Support Command and, during the 1991 Gulf War, AOCinC Strike Command and, from 1992, CAS. Since retirement in 1997 he has held a number of directorships and been associated with a variety of charitable organisations including the Air League, the Air Cadet Council and the Battle of Britain Memorial Trust.

The title of our subject today is 'The 1990s – A Decade of Change' which ushers in a host of thoughts. How does it compare to other decades in the RAF's history, those which might be considered transformational? Let's take the 1920s – Trenchard battling to preserve his newly formed independent Service, and creating the mould from which re-armament could build. By any standards the 1920s were a foundational decade. Some might say the 1930s were transformational, and in one sense they were, in that they saw a massive increase in numbers, and eventually capabilities, but I suggest that these changes were not a challenge of the magnitude of the '20s, rather a blessed relief for the RAF leadership as the money increasingly flowed.

The 1940s was a decade of change but really an inevitable consequence of a World War ending not, in my view, of such profundity as the 1920s. Then came the 1950s – the period in which NATO's MC 14/2 nuclear strategy ruled and Duncan Sandys introduced his missile-based Defence Review. I offer this decade as seriously trans-formational. But it was misguided in that, within 10 years, MC 14/3's Flexible Response strategy – believable, replacing unbelievable Mutual Assured Destruction – and the Arab-Israeli war of 1967 had demonstrated the impact that air power could have on modern operations. The 1970s and '80s presented the usual 'battles for the budget' with highs and lows and, if anyone was watching, the clearest

evidence of the vulnerability of the surface fleet to air attack – as seen in the Falklands War. But it was the latter part of that decade, 1989 and the end of the Cold War, which was the catalyst for the changes of the '90s, which history may judge to have been a decade of equal significance to the RAF as those of the 1920s and '50s. My task is to share with you why I believe that this is so and how the peace dividend – in reality the fancy name given to defence cuts 'Options for Change'[1] and 'Front Line First'[2] – inflicted a level of damage to the armed services, not just the Air Force, which has consequences that are still with us.

As the Cold War was ending, I was coming to the end of my time as ACOS Pol at SHAPE. It had been a fascinating three years, encompassing the stand-off between the Soviet Union and NATO over Russian introduction of the SS20 into Europe and our response with GLCM and Pershing. I had been involved in the reports from SHAPE to the NATO Council on nuclear arms reduction after Reykjavik, Reagan and Gorbachev, and some early work on conventional arms reductions. And let me pay tribute here to the brilliant work of John Willis, who was such a key member of the Policy Division.[3]

The euphoria that arose from this period is perhaps hard to imagine today. As one commentator said, 'It is the end of History.' It sent the NATO Governments, and indeed the Russians, into paroxysms of arms reductions. To borrow from Dean Acheson's 1962 description of the UK, NATO 'had lost an Empire and not yet found a role.' It came up with a threat that was 'multidirectional and multifaceted' – a surely British solution in its masterly use of the language which could mean more or less anything, but enabled survival in a world which would, before long, show its teeth.

In 1989 I went to Support Command, which was new to me. An integrated HQ with training, maintenance, and administrative functions, and many Directly Administered Units (DAU), well over 100 of them scattered across the UK and abroad. There were more than 40,000 personnel, military, civilian and contractors, and we had the RAF lead for the New Management Strategy (NMS). To remind you, the NMS introduced delegated budgets; it was a good strategy, which my predecessor, John Sutton, had embarked on enthusiastically, in that it offered incentives to commanders at all levels.

Support Command was just beginning its major post-Cold War

changes – the closure of many bases; a focus on centres of excellence and the introduction of further civilianisation and contractorisation. It also raised a number of issues. Our small bases were becoming blue suit wastelands. Sports and other activities were badly affected. Was this the environment in which to cultivate a Service ethos? There is surely a need to conduct a net review of some of these contracts as to their value for money and, equally important, whether the standards and flexibilities, that we used to have with blue suits, have been maintained.

In parallel, Ken Macdonald, the 2nd PUS, and David Omand, the rising star of the MOD, were conducting the Prospect Study with the aim of decentralising the MOD and moving much of it out of London. It proposed that the Principal Personnel Officers and Principal Supply Officers (PPOs and PSOs), that is to say AMP and AMSO for the RAF, were to be relocated as CinCs outside London as Personnel and Training, and Logistics Commands. Support Command would disband. Strike would assume a number of MOD roles. RAFG was to disband too, with its residual units coming under Strike Command, and so on. Whatever its merits, it was the Roman General's lament writ large, 'it seemed that every time we were beginning to form up into teams we were reorganized.'[4] And this obsession with re-organisation would go on, and on, and on.

Strike Command had been largely shielded from all this at the time I took over in 1991. Its operational tasks were to recover from the Gulf War and to disband a few of the squadrons that had performed so well in that war, but were now considered unnecessary under 'Options for Change'. This study had, of course, been initiated post-Cold War but pre-Gulf War. The House of Commons Library's *A Brief Guide to Previous British Defence Reviews* says, 'Options for Change was intended as a response to the changing strategic environment in the post-Cold War era. Nonetheless, the end of the Cold War saw a global opportunity to "reap the peace dividend" and make savings in defence and this was subsequently recognised' by the then Secretary of State, Tom King, in a Statement to the House on 25 July 1990.[5] For the RAF, the review envisaged: personnel reductions, down to 75,000 from the current roughly 90,000; small reductions in the MPA world; two Phantom and a number of Tornado squadrons to be disbanded; a weapons programme lost and several base closures. We might note that

within four months Strike Command squadrons would be sent back to the Gulf to police the No-Fly Zones, North and South, over Iraq.

But the budget challenges meant further big changes. Not least, we had to absorb the functions being devolved from MOD. While we devised and proposed massive changes to the AD posture of the UK, we debated at length the best Command/Group structure for the new era. Should we centralise, or decentralise as the NMS would dictate? We can come back to this in discussion, but I mention it now because these experiences, and my NATO pedigree, were the foundations for my views – or possibly prejudices? – when I took over the RAF in November 1992.

What did I find?

A Service grappling with all these issues certainly. But, despite the ongoing 30% reduction in the front line, it was still close to 90,000 strong and had largely avoided a redundancy programme. In one sense this was good; in another, the view was widely held, by the other Services in particular, that the RAF had had 'got away with Options'. Add to this, the widespread recognition, that Air Power had been the key to success in the Gulf War, which, I confess, we were not slow to exploit – in retrospect too much – meant that the knives were out for us if the chance arose.

There were other agendas being peddled. My first meeting as a COS was with the FCO whose mandarins were advancing the view that post-Cold War, and now post-Gulf War, future conflicts would more likely be small scale. Peacekeeping with soft power would be as important as hard power and the Services could therefore be re-structured accordingly – 'the blue beret syndrome'. We told them, forcefully, that only the retention of the full spectrum of war fighting capabilities would allow us to carry out all of these functions – being a militia would not. But the idea was already out there, and I have no doubt that it was transmitted widely, not least to the Treasury.

Then there was NATO, which was reinventing itself steadily towards Out Of Area (OOA) and Expeditionary structures, but would nations pay the necessary premium in the unseemly rush to disband their armed forces and take the peace dividend?

And finally, the political landscape, which Rod Lyne has described. But from my viewpoint, we had a Government with a narrow majority, capitalising on the public perception that Labour was still led by

unelectable personalities. It was a Tory Government beset by 'big beasts', many of whom had political ambitions for advancement.

In this light, what were my principle aims and objectives for my tenure?

I knew that we could not sustain our present blue suit numbers. So did my predecessor, and he had set up the Roberts study to map out the future manpower requirements of the RAF. It was in its infancy and in AVM Andrew Roberts we had a man of great ability who needed little encouragement to press on all the boundaries of change: centralisation, civilianisation, contractorisation, etc. But he sought to retain a coherent and robust career structure across the Service. All of this information would be digested, and we would then decide on how far we could go, and the timing. This then was a major objective.

Another concern was to bring a better balance in the equipment programme between platforms and weapons. Generations of CASs and CAs had, no doubt, been trying to do this and I accept that without platforms you have nothing. But for too long, in my view, weapons, which had increasingly long lead times, had been sacrificed on the budgetary alter, either in numbers or in capabilities. Getting this right was a priority.

I had other ambitions: building on our relationship with the USAF; improving the understanding of the importance of Turkey in NATO and Europe; finding a better answer to the stop/go of pilot training numbers. But the RAF's post-Cold War size and shape, and harmonisation of its platform/weapons, were to my mind real key goals. Get these right and the Service would have sound foundations for the future.

Needless to say, it wasn't long before the Government was looking for further savings from Defence. We were still digesting 'Options' when 'Front Line First', or Defence Costs Studies (DCS) as it became known, was launched.[6]

Throughout 1993, articles were appearing in the press comparing the RAF with the Israeli Air Force – unfavourably of course. The source of these articles is now, I think pretty well known, but I suspect that, at the time, the influence exerted on Ministers by 'Special Advisors' was not fully appreciated.

Let me say, for the record, that by and large the motives of those involved in this campaign were always to improve, as they saw it, our defence capability, the RAF's in particular. Cut out waste, improve the

equipment programme, sharpen our operational posture – admirable! The problem was that certain individuals saw defence savings as their passport to higher office and, more generally, to a re-election opportunity through redeploying this money in vote-winning ways.

Moreover, these savings, it was suggested, could come from the RAF which had: too much manpower; a wasteful training system and was, to use a popular term, 'unfit for purpose'. Savings from a major re-organisation would fund the equipment programme.

I was made aware of all this quite early. As always, there were elements of truth and shafts of sunlight in the scattering of facts and assertions. But, it was not a Service that I recognised, nor did it take account of the far-reaching work already in hand by Roberts or within Support Command, as I have described. Moreover, a central proposition was that a redundancy programme, generous but immediate, of up to 30,000 servicemen and women was in the best interests of the RAF. This was not something I could contemplate. In my judgement, it would have destroyed, at a stroke, the trust between the leadership and the Service which had taken many years to fully recover from the badly handled redundancy programme of the 1970s. Nor, of course, was there any guarantee that any money saved would actually benefit the RAF. A critical factor.

Nevertheless, Ministers were seized with the opportunity, and to the 18 or so individual Defence Costs Studies (DCS) into training, support, organisation, medical, etc was added a specific study into the RAF (DCS 19).[7] I was asked to agree to this. I did, but only on the condition that similar studies were carried out with respect to the Army and Navy by independent sources and to the same depth. This, in theory, is what happened but it was the RAF that was clearly the target, mainly because the study had already been trawled in front of Ministers who believed that the climate being generated would enable them to get away with such blatant selectivity.

Throughout the period of the DCS, its conception, gestation and delivery, a series of disasters beset us. I won't go into them now, but I would be happy to describe them in the discussion period. Just one will give you a flavour; on the day that we buried John Thompson, a major article, attacking the Air Force, appeared in *The Times* – it had fingerprints all over it.

The opportunities for command, and the training ground for future

high rank, were increasingly diminishing in the 1990s. You may remember a time when the RAF had nine commands in the UK and four overseas. NATO appointments aside, by 1992 we had, at 3-star and above, just six posts and even these were on their way down to five. We were now in the uncertain world of competitive central staff appointments which previously had been 'Buggin's turn'. Actually, I do not remember any Buggin's turn incumbent letting the side down, but in the new world these posts were now to be fought over with all that this entailed for career planning. I suspect that today this is a total nightmare for any coherent plot if a previous joint post is to be part of the pathway which, ideally, it should be.

But back to DCS 19. I believe we saw off its worst excesses for our Service. How?

First, with respect to flying and ground training, the work already in hand was more convincing than most of the propositions in the DCS and the skills of John Willis3 and his excellent team at Support Command held off the barbarians. Indeed, they caused the first rift in the ranks of DCS 19. Secondly, Roberts spoke for itself. We were already aiming for a uniformed service of less than 60,000 with centres of excellence, further civilianisation and contractorisation and the closure of yet more bases. The only real issue was timing.

And finally, there was the infamous day when Ministers took the three Service studies in one afternoon in a packed COS room. The RAF inquisition lasted over two hours while the other Services were cantered over in under an hour. We held them off. A Minister with a sense of history, and not at the time a fan of the RAF, said afterwards, '*This* was *your* finest hour.'

In the context of attacks on our service post-World War 2, it was I think a major achievement. By the end of the afternoon the PUS and some of the central staff were actually arguing on our side! I was immensely proud of my team and its measured response to the wilder assertions and attacks on our record.

I apologise if I appear to have spent an unseemly amount of time on DCS, but this event and its ripples were to be the most disruptive influences on my time as CAS. And I cannot claim that we did not sustain any hits. We did, but we came through them pretty well under control and not marching to a tune over which we had little influence. Delivering the outcome of the DCS – the two major redundancy

tranches – was to occupy us for much of the remainder of my time as CAS. I believe it was well done. We bought time; we argued for, and won a voluntary redundancy scheme before embarking on the carefully structured compulsory programme; we accepted the possible disturbance to the career pyramid and, to give the Government its due, the redundancy terms were generous – eighteen months' tax free severance pay and one year's notice.

I have not mentioned the Bett Review, which was carried out by the Government at the same time; it was to be a fundamental study into personnel, rank structures and so on.[8] Its timing was awful but, luckily, the other Services were subject to it, just as we were, and I could be reasonably confident that they would be more reactionary than ourselves.

A last word or two on DCS. The amalgamation of the Staff Colleges is something you may wish to discuss; but, the Medical Study – DCS 15 – was, I think, one outcome which has been universally criticised. We were all exhausted; it was the last one and, although we in the RAF had been more outspoken against it than the other Services, we had to keep our ammunition primarily for DCS 19. All the COSs of that time would, I think, acknowledge that we took our eye off the ball just before stumps were pulled.

Now a canter through other things. The No-Fly Zones over Iraq continued. Despite my concerns over being trapped on the ground in Bosnia/Croatia, we went ahead, and this eventually demanded an air power presence and indeed its utilisation. This was a time, to my mind, when the other Services, primarily the Army, saw an opportunity to regain the limelight after the Gulf War – muscular peacekeeping, Special Forces and so on. Air Power, so it was said, had nothing to offer in this arena. It took the humiliation of the Dutch at Srebrenica and other blatant acts by the Bosnian Serbs to show that our excellent ground forces could not, without massive reinforcement, actually police the area required. This balance between ground and air, the application of hard and soft power and the involvement of allies, whose military credentials were not of the first order, were matters which arose in this period and have remained on the stage ever since. They will, I suspect, do so for some time to come – yet another reason to see the '90s as setting in motion great changes to our thinking. I look forward to the views of the next speakers on these matters.

Built on the Cold War and enhanced in Gulf War I, our relationship with the USAF remained strong. But there was a danger that the massive changes in NATO, an organisation once critical to USAF career-building, would mean that we would no longer have the close association which had fostered our relationship. The USAF's young officers were looking increasingly to the Pacific to get the joint and international tick-in-the-box required to ensure their promotion. Inevitably we would lose touch with them.

So, with Ron Fogleman, then the USAF COS, we set up opportunities for some of our one- and two-star bright hopes to meet, converse and get to know one another in small conference mode. Such actions and, of course, the continued operations in the Balkans, and then Afghanistan, Iraq, Libya and Syria have ensured that the air force to air force and personal relations have remained very strong. But, at that time, it was at risk.

And so to the equipment programme. You may recall that balancing better the platform/weapons equation was a key aim for my time. But the first challenges arose from the cost overrun on the Tornado GR1 to GR4 upgrade programme. Not until a £400m overrun had emerged on this £900m programme was the matter given a real airing at my level. There was a real danger of its being cancelled. Something had to give. At a long session in my office with ACAS, Tony Bagnall,[9] and key players from the Procurement Executive (PE) and Operational Requirements (OR) we thrashed out a solution which removed one of the capabilities and brought the programme back into order. The lesson on involving the Service earlier was obvious. Looking at certain Army programmes more recently, something isn't working . . .

Eurofighter (EF). This was rocky. The Treasury were against it, even though, as a collaborative programme there would have been major difficulties in cancellation. The Government appeared to be for it industrially and politically, but how many and what combination of AD and multi-role was uncertain. And there were forces at work to scotch the programme and buy American.

One morning I got a phone call from my Italian counterpart. Paraphrasing, he said, 'I need your help. My '104s are falling out of the sky. EF is years away. The Americans are offering F-16s for peanuts and if we accept we will never get EF. We need some Tornado F3s to stem the tide.' I could see that this was indeed a crisis. And the

MOD building, or at least the RAF part of it, with support from the SofS, dealt with it superbly. Much credit to Tony Bagnall and the team which unearthed the aircraft from store, refitted them, set up a training system and delivered the first F3 in a record time. I believe that this effort saved the EF programme from a major setback. But, later on, we too were under pressure to introduce F-16s to compensate for the deficiencies of the F3. There is quite a lot to be said about this particular campaign but, suffice to say that it sparked, in response, the Tornado F3 Capability Sustainment Programme (CSP) which, not only saw off the F-16 advocates at lower cost, but made the F3 one of the most effective all-weather AD machines in the world for its last years in service. Great work by the RAF team and especially Steve Nicholl.[10]

Among other landmarks during my time, the EH101 was a major event. It was pushed hard by Ministers and Civil Servants for industrial purposes, but our priority was uplift, which demanded additional Chinooks. In the end, Ministers gave way and agreed on a mixed fleet, and they were forced to admit, in the light of the extra costs associated the EH101 that emerged later, that this had been the right decision. In short, our steadfast position had maximised our uplift capability, and at the same time had provided sufficient '101s to address roles in which it had an operational advantage. All of us understand the industrial and political consequences of procurement decisions, but making the defence budget pay for these matters cannot go unchallenged.

We were the lead customer for the C-130J, and I am saddened to see that it is now being withdrawn from service when it still has many years of very useful life left.

Then there was the RMPA – the Replacement Maritime Patrol Aircraft aka Nimrod 2000. We got that one wrong. BAe briefed much better than they provided.

There were new weapons – principally the Conventionally-Armed Stand-Off Missile (CASOM) aka Storm Shadow to SR(A) 1236, and an anti-armour missile, Brimstone to SR(A) 1238. We also needed better laser-guided bombs, which turned out to be quite a battle. The Army argued for a more direct fire anti-tank weapon while the RN wanted more Tomahawks, while suggesting that there would then be no RAF requirement, which would have raised serious doubts about Harrier/Jaguar/Tornado GR1 replacements, and could have halved the front line strength of the RAF.

After a gruelling six months of operational analysis (OA) argument, cajoling and pleading over all of this, we finally won the day. The selection of Storm Shadow, Brimstone and the Nimrod MRA4 was announced as a package by Michael Portillo in 1997 after taking on the Treasury over SR(A) 1238; I believe that this had positioned the RAF as a force capable of meeting future High Intensity Conflict (HIC) challenges, and it was key to an Air Force capable of strategic independent action.

There was a requirement for enhanced ancillary equipment, not least new ground radars, capable of deployment, and we needed digital data links – the Tornado F3 was the first AD aircraft in the world to be fitted with Link 16, with an astonishing impact on its operational credibility. On top of that, there was an upgrade of Harrier GR7/9 which involved new weapons and avionics.

Looking further ahead, the Operational Requirement (OR) for the Future Strategic Tanker Aircraft (FSTA) was firmed up and new ORs were raised for the Future Offensive Air System (FOAS) and the Joint Strike Fighter (JSF), confirming the need for the manned element of future offensive operations. Unmanned Aerial Vehicles (UAV) were also recognised as a likely future option for Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR). All of this was laying the groundwork for today's concept of Network Enabled Capability/Network Centric Warfare (NEC/NCW).

Finally, let me record the debt we owe to Chris Coville,[11] Steve Nicholl and their teams for their strong and effective advocacy over much of this period.

On the face of it, we had survived a brutal cull and the equipment programme was enhanced. But the Service was now on its way to 53,000 and this has fostered a belief that people can be replaced: by outsourcing; by supplying 'Just in Time'; by technology and by reorganisation to a degree that leads to an inability to sustain and to react to unforeseen events. Furthermore, much of the time and money that had been spent on introducing civilian working practices had been wasted because this had been done just as they had passed their sell by date and been rejected in the civilian world. It also started the slide which has reduced our conventional force mass to such an extent that the strategy of flexible response, in the event of major aggression, is now close to incredible. It is worth taking a moment to contemplate

how we would cope with the losses recently sustained by Russia in Ukraine. I suggest that the reality is that we would have been out of business within three weeks.

In conclusion, the 1990s provided, in my view, the catalyst for a raft of outcomes that have changed the RAF immeasurably. Of course society has been changing since then, and the argument will inevitably go that the Service must therefore change too. But one needs to place that alongside the 'unconditional commitment' that Service life demands and understand that this demand has been shaped by pride in a way of life, an ethos that places the Service over self and a community that takes care of its own. Given the virtual absence of blue suits on many of our units, can we be sure that these tenets are still followed? What of the weekend ghost towns that are our Stations today? Trenchard would, I think, not recognise his Service today.

Options for Change and Front Line First had no strategic direction. There was never a serious discussion of our national objectives, other than to preserve our position in NATO, to resist a European Defence Force, and to hold on to our Security Council seat. 'Options' was too hasty in seeking defence savings, as the Gulf War and its aftermath demonstrated. DCS, or 'Front Line First', was not much more than a cost cutting exercise, hoping for savings to bolster votes for the election of 1997. There were some underlying ambitions within it which distorted its conduct and set some worrying precedents for the involvement of Special Advisors.

Transformational indeed. We have had a number of 'Reviews' since then, nearly all have seen decreased mass amid dubious assumptions. Has Ukraine changed this mind set? Surely we cannot go on deluding ourselves that we can conduct any protracted conventional war in which losses occur. I sincerely hope that reviews of the future are properly strategic in outlook and follow a process that will enable the Government's ambitions on the world stage to be properly funded.

Notes:

[1] https://publications.parliament.uk/pa/cm199798/cmselect/cmdfence/138/13805.htm

[2] https://researchbriefings.files.parliament.uk/documents/RP94-101/RP94-101.pdf

[3] Air Cdre J F Willis, later AOCinC Support Command 1992-94 and, ultimately, Air Chf Mshl Sir John Willis. **Ed**

[4] Widely attributed to the Roman satirist Gaius Petronius Arbiter (c.27-66 AD), it seems that this quote first appeared no earlier than 1945 and has been widely circulated ever since.

[5] https://researchbriefings.files.parliament.uk/documents/SN05714/SN05714.pdf

[6] https://researchbriefings.files.parliament.uk/documents/RP94-101/RP94-101.pdf

[7] Ideally, I would have provided an on-line reference to DCS 19 but, beyond the overall summary of 'Front Line First' at Note 5, I failed to turn up any of the specialised studies. **Ed**

[8] A little surprisingly, Sir Michael Bett's report does not appear to be available on-line, but it can be purchased via https://www.gettextbooks.com/isbn/9780117726932/

[9] AVM A J C Bagnall, at the time ACAS and, ultimately, Air Chf Mshl Sir Anthony Bagnall. **Ed**

[10] At the time Air Cdre, later AVM, S M Nicholl. See also p75. **Ed**

[11] At the time AVM C C C Coville, AOC Training Units and AOT, and ultimately, Air Mshl Sir Christopher Coville. **Ed**

OPERATIONS – THE BALKANS AND NORTHERN WATCH

Air Mshl Sir Stuart Atha

Sir Stuart joined the RAF via Glasgow University's UAS. Following a Hawk QFI tour, he flew the Harrier from 1990-2003, including combat missions over Bosnia, Kosovo and Iraq. As Station Commander and the inaugural Typhoon Force Commander at Coningsby 2006-08 he still found time to display the resident Spitfires and Hurricanes. He subsequently commanded No 83 Expeditionary Air Group and oversaw the MOD's Libyan operations team before becoming AOC 1 Gp, 2011-14. Ground tours included posts in the RAF Air Warfare Centre, as PSO to CAS, as Head of Joint Capability and as Deputy Commander of the PJHQ. His final tour was as Deputy Commander Operations 2016-2019. Since 2020 he has been with BAE Systems as Director of Defence Capabilities, and he still flies cadets with No 5 AEF at Wittering.

Good morning Sir Richard, lady and gentlemen. It is a great pleasure to be here this morning, although I must confess I feel like a schoolboy who has stumbled into the teacher's staff room, given the very many seniors here today, not least the headmasters, Sir Michael Graydon and Sir Richard Johns. Listening to both headmasters this morning reminds me of a quote/misquote of Sir Brian Burridge that I regularly use – 'Where you stand on any issue, depends on where you sit.' There are no universal truths to be told, just perspectives to be shared, whether it be from the cockpit, the CAOC, CAS's office or the Cabinet Office and today's session will be a valuable opportunity to fuse these perspectives together to draw a common picture we all recognise.

As has happened on many previous occasions, it is for Greg and me to bring the level of the discussion down a level, perhaps to that of the schoolboy or rather the cockpit. Joined by Ian McNicoll, we will provide a perspective from the tactical level that will look at the application of air power in the period between the two bookend operations, Gulf Wars I and II. The periodicity of operations in this time was almost Olympic, given the significant campaigns that

happened in 1991, 1995, 1999 and 2003. By separating out the RAF from air power, I aim to not just consider the technological advancements in the 1990s but also the consideration of how this technology was applied – this is not just a story about how kit changed in the 1990s but also about how we changed the way we used it.

I will present my account of the operational story in three parts. First, I will consider Operation PROVIDE COMFORT in Northern Iraq, which marked the arrival of both the No-Fly Zone concept and the Harrier II. The second part of the story will be Operation DELIBERATE FORCE, which marked the advent of NATO combat operations and the teaming together of airmen, both in terms of the USAF and the RAF, and of the Jaguar and the Harrier forces. The last part of the story will cover Operation ALLIED FORCE, which is considered, by some, to be either the zenith of air power or an example of its Achilles heel.

Operation WARDEN

Directly following the end of formal combat on Op GRANBY, a US-led Operation – PROVIDE COMFORT – delivered humanitarian relief to the Kurds in the North 'to create places and conditions in which refugees can feel secure' (Foreign Secretary Parliamentary Statement 15 April 1991). This marks quite a notable period in history, when ten countries deployed 20,000 troops into northern Iraq to establish the Kurdish Safe Haven. Lt Gen Andy Salmon RM talks movingly about this operation and the success it achieved, given that almost all the 400,000 Kurdish refugees who had fled into the mountains on the Iraq-Turkey border region returned to their homes or to camps constructed for them by coalition forces. On 24 July 1991, a United Nations Protection Zone was established for the Kurds. Under the banner of Op WARDEN, RAF Jaguars policed the associated No-Fly Zone north of the 36th parallel to prevent Saddam from attacking the Kurds. As will be covered separately, a similar No-Fly Zone was established in southern Iraq in August 1992 following Saddam's persecution of the Shia Marsh Arabs. Whilst there is no shared precise understanding of what constitutes a No-Fly Zone, the RAF followed the deployment of Jaguars, with subsequent roulements of the Harrier, the Tornado and the Jaguars again over the 12-year period up to 2003. Over the years, Operation PROVIDE COMFORT transitioned to Operation

NORTHERN WATCH or, in UK terminology, from Operation WARDEN to Operation RESINATE NORTH. Throughout this time, while the RAF's combat elements were being rotated into and out of theatre, its VC10 and TriStar aerial refuelling squadrons were the persistent and critical enablers of the mission.

By 1993, the Harrier Force was ready for its first operational outing with its latest mount. Much more GR7 potential had yet to be unlocked, but it had sufficient capability for the Harrier Force to replace the hard-pressed Jaguar squadrons operating in Turkey. In April 1993, therefore, No IV(AC) Sqn spearheaded a Harrier Force deployment to Incirlik – marking the first operational employment of the Harrier GR7.

When I deployed to Incirlik with the Harrier Force there were two striking features of the operation. The first was colocation with the French and United States Air Forces. Living and flying together promoted strong relationships and mutual understanding. Nevertheless, while we employed common tactics, techniques and procedures, there were distinct cultural identities that reflected some of the national stereotypes. The French demonstrated élan, the British pragmatism and the US offered mass. When stitched together successfully, the whole force was greater than sum of its parts.

The second compelling feature of the operation was the conflicting feeling we had about the operations being conducted into northern Iraq from Incirlik. When it involved the UK, US and French we conducted operations to protect the Kurds of northern Iraq/southern Kurdistan and, when it involved our NATO partner Turkey, it was to attack the subset of the Kurdish community represented by the PKK.[1] There is insufficient time today to consider the Kurdish issue more fully; suffice to say that we were proud to play a part in protecting the Kurds from Saddam Hussein's forces and grateful to those Kurds who supported us when we called upon them, such as that provided by the Peshmerga when an RAF pilot ejected over the mountains of northern Iraq in November 1993.

Fortunately, given its immaturity, the Harrier GR7 would be employed on relatively simple armed reconnaissance missions that exploited only a fraction of its potential capability. Operations were

[1] Literally, the *Partiya Karkerên Kurdistan* but, more conveniently, the Kurdistan Workers' Party.

conducted by day and were restricted to above 5,000 feet – unless operating in the Kurdish area. The GR3 could have been employed on the operation; however, the greatest challenge for the GR3 would have been that posed by operating at medium level in an aircraft designed for flying in the weeds of Germany. The losses suffered by the courageous Tornado crews during the First Gulf War drove a paradigm shift in RAF tactics and risk appetite. The sacrifices expected in the existential war of survival that NATO had been conceived to wage, were not acceptable in wars of choice. The 'mud moving' club, of which the Harrier Force was a fully paid-up member, needed to adapt. The Force needed to embrace the third dimension and join the 'cloud dancing' community that was previously the preserve of the 'air defenders'. The priority for the pilots and engineers of the Harrier GR7 community was to work out how the aeroplane could be made equally effective at all altitudes.

The 'big wing' of the GR7 was exploited with the standard load for Op WARDEN including two external fuel tanks, a pair of AIM-9L Sidewinders, a reconnaissance pod, a PHIMAT chaff pod and a couple of US CBU-87 cluster bombs. The integral electronic warfare systems, ZEUS, was rapidly tested and proven against the likely Iraqi SAM systems, although its tendency to provide spurious warnings prompted by other aircraft – or even the Iraqi telephone network! – was to prove particularly annoying. More seriously, and belatedly, pilots became aware that ZEUS was another system optimised for low level and therefore designed to look ahead, to the side and behind – but not below. This meant there was a black hole of ignorance beneath the Harrier that became bigger the higher you flew. Within this void, the enemy radars could find and target the Harrier GR7 without any warning from ZEUS. The only way to fill the gap was to regularly weave as a pair of aircraft, constantly checking each other's 'six-o'clock' below as well as behind. Whilst ZEUS was capable of this to a degree, it was not powerful enough to allow the RAF to operate at the same altitudes as the USAF or the USMC.

Consequently the RAF had a weapon inventory designed for low level delivery – in contrast to the US which had procured weapons that could be delivered from much higher altitudes. The Harrier's staple diet of BL755 cluster bombs needed to expand. Fortunately, given that the RAF and USMC operated a common platform, it was possible to

fast track clearance to deliver USMC weapons from RAF Harriers. Sadly this did not extend to the software that included the important US weapon ballistic data (eg how far forward a weapon would travel at a particular height and speed). As a result, Heath Robinson (if ever there was a man who should be made an honorary member of the Harrier Force . . .) was called into action yet again to allow the GR7 to be armed with the US CBU-87. The Qualified Weapon Instructors pulled out their calculators and trigonometric tables and quickly came up with a series of tables and delivery profiles that acted as a bridge between UK and US weapon performance.

Despite the GR7's in-built Dual Mode Tracker TV system and the addition of stand-off reconnaissance pods (the VINTEN Long Range Optical Reconnaissance Pod and the VICON 18 Series pod), the limited GR7 reconnaissance capability meant that old GR3 recce pods were dusted off and pressed back into service on the GR7. The GR3 pods were optimised for low level flying and had five cameras of varying focal lengths that provided 'horizon-to-horizon' coverage. At the heights being flown, it was only the outer cameras pointing just below the wing tips that could provide photographs of useable resolution. Yet again, innovation was required. With a 20º field of view, and the need to reduce slant range, pilots had to conduct a knife edge manoeuvre as they flew past their targets (guided by chinagraph lines drawn on the cockpit canopy) to have any hope of producing photographs of sufficient quality to allow the very talented imagery analysts back at Incirlik to exploit the photographs for any scraps of intelligence about the Iraqi Army. Frustrations were further compounded by ever-present oil smears on the camera lenses (sadly oil leaks were an enduring challenge for the Harrier, regardless of mark). Somehow, despite the abundance of challenge, some outstanding photographs were produced using the GR3 pod, including images of Iraqi barracks and the Roland surface-to-air missile sites around the town of Mosul and its dam. It is not known whether the best images were produced by pilots flying on a knife edge at 5,000 feet or those rumoured to have resorted to conducting 1980-style ultra-low level recce runs . . .

When taken together, the Harrier GR7 delivered a step increase in the RAF's medium-level operational capability, but it was still a platform that was equipped for low level, flown by pilots who had predominantly trained for low-level operations. It was going to take

much longer in this decade to address these shortfalls.

OPERATIONS IN THE BALKANS

In the winter of 1994/95, the focus of the Harrier Force was beginning to shift from Iraq to an even more complicated situation in the Balkans, where events were spiralling out of control. As had been the case in Northern Iraq, the Jaguar Force was the first to operate offensive air support aircraft in this new theatre. But mention should first be made of the RAF's Air Transport Force, and the Hercules Force in particular, who had been supporting Operation CHESHIRE since 1992, operating into Sarajevo despite a persistent threat from air-to-ground systems. Moreover, Tornado F3 squadrons had been operating in 1993 ahead of the Jaguars, policing the No-Fly Zone over Bosnia under the auspices of Operation DENY FLIGHT. Finally, mention must be made of the Support Helicopter Force who had been supporting the British Forces deployed as part of the UN Protection Forces since 1992.

Whilst the deployments to Incirlik had allowed the Harrier Force to re-establish its operational credibility, the challenge posed in the Balkans was significantly greater. After two years of rotational deployments between the three front-line Harrier Squadrons, Nos 1(F), 3(F) and IV(AC) Sqns, the Op WARDEN commitment was handed over to the Tornado, which now became responsible for policing both the Northern and Southern No-Fly Zones.

The deepening instability in the Balkans increased concerns over the risks of genocide and the direct threat posed to British Army units deployed throughout Bosnia, particularly in Gorazde. This drove the development of a top secret extraction plan, Operation SCREW-DRIVER, that required intimate night-time Close Air Support – a task ideally suited to the Harrier GR7.

Preparations for Op SCREWDRIVER were led by Sqn Ldr Mike Harwood, who had been christened the 'Prince of Darkness', aka POD, because of his exceptional contribution to the Harrier Force's night attack capability. Building on the experience gained in previous 'night seasons', POD orchestrated an intensive No 1(F) Sqn training programme in 1994/95, preparing the squadron to support the emergency evacuation of British soldiers from the Gorazde enclave. The contingent operation required the squadron to play an integral part

in a highly sensitive night-time heliborne extraction plan. Key to success would be the intimate synchronisation of Harriers, helicopters and Special Forces. In preparation, a series of rehearsals was conducted covertly in Wales and Scotland during 1994 and '95.

In the event, the trigger for action, and the bloodying of the Harrier GR7 in combat, was a mortar attack on a Sarajevo market in August 1995. Rather surprisingly, and less dramatically, rather than enacting Op SCREWDRIVER, the Welch Fusiliers simply drove out. It is perhaps worth remembering that, before the long wars in Iraq and Afghanistan, Close Air Support (CAS) had been something of a niche skill within the RAF, rather than a core competence. SCREWDRIVER highlighted three key aspects of CAS; first was the need to be able to do it at night; secondly it highlighted the natural synergies that exist between special forces and air forces and lastly, SCREWDRIVER highlighted shortfalls in the Harrier's ability to deliver precision weapons, something that was about to be further demonstrated during Op DELIBERATE FORCE.

The Balkans imploded in the summer of 1995. In July the town of Srebrenica was ethnically cleansed and many thousands of Muslims were slaughtered; the UN peacekeeping mission was failing and UN peacekeepers were becoming hostages. Over 100,000 Croat soldiers attacked the Serbs in Krajina and many innocents were killed in the mortar attack on Sarajevo. The patience of the international community was exhausted and on 30 August 1995 NATO responded with the launch of Operation DELIBERATE FORCE.

When DELIBERATE FORCE began, IV(AC) Squadron had done little more than read the orders and conduct familiarisation sorties. The mission required precision weapons, which was rather inconvenient, given that the Harrier GR7 was not yet equipped with the laser targeting pod necessary to guide precision bombs to their targets. This led to the recall of two TIALD-equipped Jaguars, flown by the hugely talented Sqn Ldr Alex Muskett and Flt Lt Simon Blake. While much banter was exchanged between the Jaguar and Harrier pilots about the relative merits of 'carrying' bombs, versus 'guiding' them, it is to the credit of all that the team, Jaguar and Harrier, operated as one.

Alongside shortfalls in capability, there was no consensus on the conceptual framework within which air power should be applied. Most of the air forces involved had still to move on from the deterrent posture

that had dominated the Cold War years. Within the USAF, the first Gulf War in 1991 had been seen to highlight the effectiveness of tactical air power when it was employed in a decisive manner. And yet in 1995, within NATO there was still a need to evolve and adopt the concept of integrating the judicious use of air power with hard-edged diplomacy. The consequence was the episodic application of precise air power over a 3-week period. Thankfully, the dual-key arrangement that required the agreement of senior decision makers from both the UN and NATO, and had been described by Richard Holbrooke as an 'unmitigated disaster', was removed immediately prior to the commencement of Operation DELIBERATE FORCE.

This was the first combat operation conducted by NATO and was characterised by the sophisticated integration of diplomacy and air power which was applied with precision and/or withheld in concert with political dialogue supporting a strategy that was more 'Talk and Act' than 'Shock and Awe'. Diplomats offered the carrot, while NATO's air forces wielded the stick in a strictly calibrated manner, synchronised with the diplomatic campaign. The Harrier and Jaguar Force flew 144 sorties delivering 48 laser guided and 32 free fall bombs against a range of targets, including ammunition dumps, communications sites and radar installations. The culmination of military action was a diplomatic success. NATO bombing alone may not have brought peace to Bosnia, but it had demonstrated both international resolve and the unity and utility of NATO, without the loss of any NATO life. As such, it had provided the catalyst that led to the signing of the Dayton Peace Accords and the years of relative peace that have ensued. Importantly, this campaign had demonstrated a politically attractive way to wage war when compared to the blunt approach of taking and holding ground, a policy that was to be implemented less than four years later – again in the Balkans.

At the operational level, the RAF continued to lack the capability required. The senior USAF airmen, General Mike Ryan, said, 'Dumb bombs are dead', but there was still a serious shortfall in the RAF's ability to designate precision weapons. The Harrier Force had no TIALD capability; the Jaguar Force had managed to rush it into service in 1994/95 but, alongside the Tornado Force, they simply did not have enough pods to both train the whole force and to support the operational requirement.

The Jaguar pilots demonstrated exceptional skill during the cooperative designation missions. There can have been few times in the RAF's history that our pilots have conducted such demanding missions. Whilst the Tornado navigator could operate the TIALD pod while his pilot flew the aircraft, Jaguar pilots had to simultaneously fly an under-powered single-seater, with no autopilot, while operating a pod that was sub-optimally integrated with his aircraft. Moreover, the mixed formations were operating in the cloudy skies of Europe, vice the better weather experienced (but not guaranteed) in the Gulf. The teamwork required between the Harrier and Jaguar pilots was exemplified by the need for the attack pilot to first identify and track the target prior to release and for the designating pilot to ensure that he would have a clear line of sight on the target throughout the 35-40 seconds time of flight of the bomb. The lack of training meant that the first time this was done, was with live bombs on operations.

One positive aspect of the Harrier's capability was the Dual Mode Tracker – the DMT – which allowed the pilot to identify targets and develop weapon solutions using the integrated Angle Rate Bombing System. In addition, the DMT had a Laser Spot Tracking system that would show, on the Harrier pilot's display, the target being illuminated by a laser designator, whether that be from a Jaguar or a Forward Air Controller (FAC) on the ground. I used this system for the first time with a FAC during DELIBERATE FORCE. This was the first use of airburst 1,000lb bombs by the Harrier. Unfortunately, they detonated as soon as they were armed, a mere 4·75 seconds after leaving my aircraft, further underlining shortfalls in our armoury of medium-level weapons.

Another shortfall in capability was the lack of secure communication. Unfortunately, my first mission of the operation was marked both by the shootdown of a French aircraft in my formation and fratricide on the strike frequency caused by the white noise generated by those with secure radios (US) on those without secure radios (everyone else). The white noise meant that we were unaware that the French aircraft had been shot down, so we flew on into the same target area and were promptly attacked by the same Bosnian Serb forces. They launched a couple of IR SAMs that we were fortunate enough to defeat, thanks to a very capable and observant wingman, Major Mike Hile USMC.

Lastly, and rather sensitively, there was no recognition of those who participated in Operation DELIBERATE FORCE. This may reflect problems within the broader defence community at the time, when it came to recognising the unique aspects of operations that are dominated by the application of air power. As an example of this challenge, it took almost 25 years for the squadrons involved in DELIBERATE FORCE to be allowed to emblazon their standards with this battle honour.

Operation ALLIED FORCE

It was in 1999 that Operation ALLIED FORCE, NATO's response to Slobodan Milošević's persecution and cleansing of ethnic Albanians in Kosovo, yet again tested the ability of NATO to integrate the levers of air power and diplomacy. The 78-day campaign involved the diverse use of air power, ranging from tactical attacks in Kosovo to strategic strikes into Serbia, synchronised with a belated, but effective, strategic communication effort. In many ways this was to be the high point of the international community's appetite for humanitarian intervention. This is partly because of the experience of Bosnia in 1995, the increased awareness of the Rwandan genocide in 1994 and the particular character and politics of Madeleine Albright (a Czechoslovakian immigrant to the US) and Tony Blair.

Operation ALLIED FORCE was, for some, the highwater mark of air power in the post-modern era and it has been claimed as the most successful 'air campaign' ever. 'A turning point in the history of warfare,' wrote the respected military historian Sir John Keegan, proof positive that, 'A war can be won by air power alone.' Whilst NATO's objectives were largely achieved in 1999, it is a stretch to claim this for air power alone. Milošević was coerced by a much more complex and sophisticated array of factors, of which 78 days of air operations were critical, but just a part. The debates during the operation, which can be characterised by the tactical air power focus of SACEUR (General Clarke) versus the more strategic application preferred by the Air Commander (General Short), combined with the debates after the operation, underline the challenge of establishing the ground truth and measuring air effect in such campaigns. General Clark argued that his approach was driven by the *real politik* involved when nineteen democracies fight one autocratic nation. Whilst the air campaign reflected the gradualism demanded by NATO, rather than the

decisiveness desired by the USAF, General Clark was not alone in believing that this was the only way to maintain the cohesion and consensus of the alliance.

The Alastair Campbell diaries covering Operation ALLIED FORCE provide a valuable insight into the importance of integrating the application of air power with both media and information operations as part of an Information Strategy, which must, in turn, be guided by carefully considered political objectives. This was not the case at the start of the operations but improved throughout the campaign, thanks to Campbell and others. The delivery of lethal and destructive force from the air over the 3-month operation had made clear, to Milošević, the nature of NATO's unity and its political resolve. At the same time, the application of air power on a strictly selective and proportionate basis had reassured the domestic audience – despite the occasional unfortunate mishap, such as the accidental bombing of the Chinese embassy in Belgrade.

In the Pentagon, the Chairman of the Joint Chiefs of Staff, General Henry Shelton, claimed that NATO's air forces had destroyed around 120 tanks, 220 armoured personnel carriers and up to 450 artillery pieces and mortars. However, when the US Munitions Effectiveness and Analysis Team (MEAT) deployed to Kosovo, they found these claims to have been grossly exaggerated. The issue of the number of 'tanks' destroyed therefore became a favoured measure by which to gauge the success or otherwise of air operations, an approach eagerly championed by those who were tired of a decade of airmen cockily proclaiming that 'Armies occupy, Air Forces conquer.'

So how relevant was the apparent 'failure' of air power to destroy the Serbian war machine, as imagined by those with a tank fixation? When George Robertson, the UK's Defence Secretary during the operation, was asked a year later, by then as Secretary General of NATO, how many tanks had been destroyed, his perceptive response was, 'Enough'. He went on to say, 'The aim was not to wage war against Yugoslavia or to bring about the fall of Milošević and his regime. The air campaign set out to disrupt the violence against the Kosovars and to weaken Serb military capabilities in a carefully controlled way. And that is what we did.'

It is sometimes forgotten that the RAF deployed its own equivalent of the MEAT, comprising scientists, engineers – and me. I opted to call

our team the Weapons Effectiveness Team or 'WET'; whimsically named, but with a serious purpose. I had the unique experience of flying combat missions during ALLIED FORCE and then returning when operations ceased to compare the view from above with the reality on the ground. Whilst the WET's focus was initially on assessing the physical effects of bombs on buildings, bunkers and bridges (as you might expect, we only found a couple of destroyed tanks), it was the surprising abundance of evidence of tactical cognitive effects that was of greatest interest. The popularity of NATO's action amongst Kosovan Albanians was widespread. Wherever the WET visited, we were quickly surrounded by large groups chanting support for NATO and Tony Blair. On one site, I met a Kosovan and his son who were rebuilding a house that a wayward UK bomb had destroyed. After showing him the aircraft video of the attack and explaining what had gone wrong, he said, 'Tell your friend, thank you. I have my health; I can rebuild the house and the Serbs have gone because of him.' On another occasion, a Kosovo Liberation Army fighter in Đakovica seemed strangely uninterested in the tank controversy. For him it didn't matter whether the tanks and the armed personnel carriers had been destroyed or been hidden in the Pristina Bus Station; he was content that the Serbs were not using them because of the air threat and the disruption to movement inflicted by the bridge attacks.

Part of the reason for the disparity between the number of targets claimed versus the number destroyed, was the extensive use of decoys by Serb forces, a tactic we are seeing much in use in Ukraine. Olive-coloured filing cabinets with plastic pipes and car wheels rested against them, looked very much like artillery from a couple of hundred yards, let alone 3 miles (the height of NATO aircraft). The Serbian deception measures ranged from the simplistic use of black polythene to create false roads and bridges for the Alliance to bomb, to the more sophisticated step of painting colourful squares on the surfaces of bridges to confuse the targeting systems within NATO weapons. The experience of Kosovo demonstrated that air systems are susceptible to concealment and deception measures. This vulnerability reinforces the importance of fused technical and human intelligence to develop an understanding of the situation on the ground.

To conclude, it can be seen that the 1990s was clearly a decade of change both for the RAF and air power. From the RAF's perspective

we gained an immense amount of operational experience but we struggled to adapt our capabilities to the demands of the decade. With respect to the provision of targeting pods we lagged throughout the decade. We simply failed to field enough pods quickly enough. Even by 1999, we had not procured sufficient for any of the Harrier pilots involved to have successfully guided a bomb to a target before doing this with a live weapon on operations. My argument then, and since, has been that, just as you would not even consider fielding an aircraft in the air defence role without a radar, you should not field an attack aircraft without a targeting pod. Moreover, we should never ask our aircrew to do things in wartime that we have not trained them for in peacetime.

But some lessons from the 1990s were addressed by the RAF. Our weapon inventory improved significantly with the development of the Storm Shadow, Brimstone and Maverick missiles and the Enhanced Paveway GPS-guided bomb. We also recognised that we had taken our eye of the expeditionary ball – witness the scandal of the 'Pristina Samsonites' in 1999.[1] Moreover, the challenge posed by mobile targets that are dispersed, and by forces that use concealment and deception, underlined the criticality of an ISR capability, fused intelligence and the development of Network Enabled Capabilities.

Another lesson from the 1990s was the importance of the USAF-RAF relationship and of ensuring that the RAF secured influence in the operational decision-making process, most importantly in the CAOC. The deployment of Air Cdre Vaughan Morris and Wg Cdr Paddy Teakle was critical both to protect and to promote national interests. But both of these airmen also made a significant contribution to the broader campaign, notably through the work that Paddy Teakle did in the establishment and operation of the Guidance, Apportionment and Targeting Cell.

The issue of targeting has been touched on earlier, but there were two aspects that the RAF should learn from. First, 'We do bridges.' But should we? Bridges are attractive targets to air forces for a variety of reasons including their vulnerability to the available weapons and the management of collateral damage; but this does not make them the most appropriate targets. Secondly, the events of ALLIED FORCE demonstrated that not all targets require precise weapons to deliver a precise effect. One of Sir Richard's successes was to persuade our

politicians to allow so-called dumb bombs to be used to attack area targets. During ALLIED FORCE, the Harrier Operational Conversion Unit conducted a trial that demonstrated that the combination of the integrated GPS/INS allowed weapon solutions to be generated that delivered bombs with an accuracy of less than 100 feet. This allowed effects to be delivered regardless of the weather.

It is sometimes forgotten after the 21st Century experience of the long wars in Iraq and Afghanistan, that close air support was seen by many to be a niche role in the 1990s. Moreover, the presence of forces on the ground in the 21st Century has become an assumption that means, for some, that Airborne Forward Air Control or Fast Jet Airborne Coordination are redundant roles. ALLIED FORCE, however, demonstrated both the value of these roles and of the synergies that stem from collocation of assets as was the experience when the USAF A-10s joined the RAF Harriers at Gioia del Colle.

A final lesson for the RAF from the 1990s, and from ALLIED FORCE, was the critical importance of electronic warfare, whether this be an organic SEAD or DEAD capability, or the options provided by the Nimrod R1.

From the broader air power perspective, there are a number of other lessons that we can draw from operations in the 1990s. First, there is no obvious consensus on how air power can most effectively deliver coercive effect. This was a challenge that we saw again in Libya in 2011 and demands further study. The second lesson reflects the 'limitations of alliance warfare.' To what extent should we trade the decisive application of force for Alliance cohesion? Is this a false choice or a pragmatic reflection of international politics? The third lesson is that inter-service rivalry continues to have a detrimental effect on joint operations, particularly when the US are involved. While the 1990s marked an era when jointery made some significant steps forward in the UK, witness the Defence Academy and Joint Helicopter Command, I believe that we must make more progress if we are to instil jointery into our individual and institutional DNA.

In summary, the 1990s was a decade of change for both the RAF and air power; it was also a decade of capability lag, particularly when it came to the development and delivery of precision weapons. As we have seen during this discussion, it was a decade replete with lessons and one which air forces and students of air power should continue to

study. In conclusion, I believe that the 1990s should also be seen as a decade during which all RAF participants can be proud of their performance, whether in a cockpit, the CAOC or CAS's office!

Note:

[1] This remark may be lost on veterans of the pre-1990s air force. It was a reference to the fact that some of the RAF personnel earmarked for Pristina had turned up with shiny Samsonite suitcases, rather than a standard issue British Army 90L MTP Bergen rucksack ('with, or without, side pouches'). The Samsonite syndrome reflected the previously prevailing MOD policy with respect to the stars, which was summed up as 'The army sleeps under them; the Navy navigates by them and the RAF rates its hotels by them.' The practice of routinely checking-in to the nearest Ramada Inn, indicated that the Cold War RAF had lost something of its expeditionary edge. As a result, appropriate training was re-energised which led, in turn, to the establishment of the Expeditionary Air Wing construct. **Ed**

OPERATION SOUTHERN WATCH
The Iraqi Southern No-Fly Zone 1992-2003

Air Mshl Greg Bagwell

Greg Bagwell joined the RAF in 1981 and flew the Tornado, later becoming a QWI and, following an exchange tour on the F/A-18 Hornet, he was appointed OC 9 Sqn in 1997. Having flown operationally over Iraq and Kosovo, attended the Indian Staff College and been OC the CAOC at Al Udeid, by 2004 he was OC Marham. Senior appointments included a tour as an ACAS at the PJHQ and, as AOC 1 Gp from 2009, he commanded the air element participating in Operation ELLAMY. After a second stint at the PJHQ, he was the first Director Joint Warfare and in 2013 Deputy Commander Operations at Air Command. Since leaving the RAF in 2016 he has been a Director at Cobham.

At the conclusion of the swift liberation of Kuwait in 1991, the Coalition held its collective breath as it processed the aftermath of the short, and somewhat easier than expected, campaign that it had just prosecuted. Coalition casualties were sparingly small and the once feared Iraqi Republican Guard was a shattered and seemingly wholly ineffective force. Indeed the manner of the victory, and the clear impotence of any meaningful Iraqi resistance, meant that the ceasefire was as much a demonstration of mercy as the achievement of the main objective of ending Kuwait's occupation. In the coming hours and weeks, the enormity of the outcome became overshadowed by the fact that Saddam Hussein's regime and the Ba'ath Party showed no signs of relinquishing power. The unspoken and unauthorised hope for regime change was showing no signs of happening, and the small local uprisings (especially in the south around Basrah and in the north in the Kurdish region) were quickly and brutally snuffed out. Whilst the Coalition, and the US in particular, had cheered them on, the reality was that a lack of any meaningful external support, along with the still relatively intact Iraqi military machine and the regime's brutality meant that David had little or no chance of beating Goliath.

The euphoria of a decisive military victory and all the talk of a new

paradigm of modern warfare, with its precision and apparently bloodless (on one side anyway) nature, appeared to herald a new post-Cold War era. However, the truth slowly began to dawn that the underlying problem in Iraq remained and that its ire was now being viciously directed at the minorities in the north and south of the country in particular. Having proved to be the authority of choice yet again, the UN began to pass resolutions against Iraq and the atrocities it was carrying out. Initially, this resulted in the UN protection zone and the subsequent northern No-Fly Zone being set up to protect the Kurds above the 36th parallel. Yet UNSCR 688, issued on 5 April 1991, had made no reference to the zones themselves, nor the means to police them, but it did provide sufficient latitude to permit the Coalition's lawyers to approve the establishment of the No-Fly Zones. The northern safe haven was established on 16 April 1991. It encompassed the area above the 36th parallel, whereas the southern zone was not established until 27 August 1992 and initially covered the area of Iraq south of the 32nd parallel. Although known universally under its US name of Operation SOUTHERN WATCH, the UK adopted Operation JURAL as the UK name for the southern zone, and Operation WARDEN in the North

Op JURAL

The situations on the ground in the north and south were very different, as was the topography in each case. The southern zone was dominated by the Euphrates and Tigris rivers, the extensive marsh area between them, and the major Shia city of Basrah in the south-east corner. It was the Shia and the Marsh Arabs who now became the targets of a resurgent Saddam Hussein, and especially his Republican Guard, as their fledgling uprising was crushed.

The RAF initially deployed six Tornados (3 × GR1 and 3 × GR1A) based at Dhahran and a Victor tanker in Bahrain. For Op JURAL, the GR1 detachment comprised crews from Nos 617, II(AC) and 17(F) Sqns. The aircraft flew in pairs, with a 'looker' and a 'shooter'. The looker was either a Thermal Imaging And Laser Designator (TIALD)-equipped GR1 or a Tornado Infra-Red Reconnaissance System (TIRRS)-equipped GR1A; the shooter would act as a wingman purely to protect the looker who would be preoccupied with gathering imagery and thus more 'heads-in'. The shooter would also be equipped with

gyro-stabilised binoculars and a camcorder (with about as much resolution as you could muster in 1992).

Although the Iraqi armed forces were a shadow of their former selves, they still retained significant numbers of fighter aircraft and surface-to-air missiles. The aircraft were not really a concern, as the multiple F-16 and F-15 fighters put up by the USAF would have made quick work of them. However, the SA6 and SA3 missiles and S60 AAA were still a menace and numerous enough to be respected. This was achieved by avoiding them (we knew where most of them were), or by ensuring that an EA-6B and/or a Wild Weasel F-16 with a High-speed Anti-Radiation Missile (HARM) was watching your back, or by just flying high enough to stay out of their engagement zones. It was this latter technique which was to test the resolution of the early TIALD pods, and, even more so, the rather dated data screens in the rear cockpit of the Tornado (which were only designed to display a rather rudimentary set of symbols and text). However, these limitations aside, the real Achille's Heel turned out to be the TIRRS, which was designed for oblique imagery at extremely low level. Operating at higher altitude proved to be too much for the system and the GR1As would eventually be withdrawn.

The early missions quickly revealed the extent of the activity on the ground and, whilst not as close and personal as it became in the Northern Safe Havens, it was clear that the Iraqi regime was hell bent on clearing out the marshes between the Tigris and Euphrates. Despite providing plenty of imagery (especially with the superior camcorders!) that showed the unfolding crisis and ruthless suppression of the Marsh Arabs and the Shia population in the south, the Coalition aircraft were largely impotent, as the self-defence Rules of Engagement did not permit action against attacks on third parties. Furthermore, because the road infrastructure had been badly damaged, the ceasefire agreement had allowed for the continued use of Iraqi helicopters. In practice, these helicopters soon became Iraq's weapon of choice in the No-Fly Zones and attacks continued under the very noses of the patrolling Coalition aircraft.

Between 1992 and 1996, daily operations settled into a routine pattern, and the Coalition of the US, UK and France became a well-worked team. Whilst the regular daily flights set a rather predictable pattern, the overwhelming firepower at the Coalition's disposal meant

that Iraqi activity was sporadic and a nuisance at worst. In addition to the UK's enduring commitment of six attack/reconnaissance Tornados and a tanker (the Victor being replaced by a slightly less venerable VC10), the occasional appearance of a Nimrod R1 under Operation ARGENTIC was a welcome opportunity to gather more intelligence on the Iraqi forces deployed. This aircraft operated out of Bahrain alongside the UK tanker. It is worth noting, incidentally, that in addition to being essential to drag the Tornados up from Dhahran and back on a daily basis, the UK's double hose tanker provided equally invaluable support for the numerous probe-equipped US Navy aircraft operating from the ever present carriers in the Arabian Gulf.

During this initial period there was significant tension between the Iraqi regime and the UN over both the ongoing humanitarian crises and the increasingly frustrated Weapons Inspectors. It was Iraq's unco-operative attitude towards the Weapons Inspectors that ultimately led to the second Gulf War (Op TELIC) and thus brought an effective end to the No-Fly Zones. In the meantime, the 'running battle' between the Coalition, Iraq and the UN resulted in numerous new UNSCRs. It also became the catalyst that drove a number of reinforcements and more targeted action in the No-Fly Zone. Op INGLETON involved a number of limited actions carried out on 13 and 18 January 1993 after persistent incursions by Iraqi aircraft and the deployment of more potent SAM systems. In October 1994 Op DRIVER saw a surge of six additional GR1s and sixteen crews (previously the six GR1s in theatre, with a maximum of four sorties a day, had required an aircraft-to-crew ratio only slightly more than 1:1. This reinforcement had been in anticipation of a significant increase in sustained attacks, which ultimately were not carried out.

A most significant event took place on 25 June 1996, when Building 131 within the Khobar Towers complex in Dhahran was bombed in a terrorist attack (a precursor to what was to follow from Al Qaeda[1]). The Towers were used by the Coalition to house crews and support personnel and the US suffered significant casualties. Although no UK personnel had been injured, this incident prompted a reassessment of operating locations, which resulted in the redeployment of the GR1s to Prince Sultan Air Base (PSAB) at Al Kharj. Op LANCASTER in August 1996 was another call to surge aircraft numbers but, ultimately, it was not carried out. However, discussions about the areas to be

covered by the southern No-Fly Zone resulted in its expansion north to the 33rd parallel, almost to the gates of Baghdad and more than half the area of Iraq.

Sorties flown by the Tornados throughout the period of Op JURAL were a mix of attack sorties using TIALD and Paveway IIs as the primary weapons, and reconnaissance missions that employed the somewhat dated, but highly reliable and very high resolution, Vinten Vicon wet film recce pods. The latter become a prized asset of the Coalition due to the high quality of the images and the accompanying analysis – all thanks largely to the men and women of the RICs (Reconnaissance Intelligence Centre) and, later, the Tactical Imagery-Intelligence Wing (TIW). A photo reconnaissance processing lab is a hot place to work in any environment; in the depths of the Saudi desert it was quite a trial.

Op BOLTON

1997 would prove to be a pivotal year, seeing a change in the nature, the name and, ultimately, the outcome of the No-Fly Zones policy. Early May brought a marked increase in incursions and attacks on Coalition aircraft. The UN Special Commission (UNSCOM) had been set up as the inspection regime to ensure Iraq's compliance with the removal of any weapons of mass destruction (WMD), either in storage or production. It is worth noting here that, despite the many thousands of hours of monitoring from the air and the high resolution imagery of most of the areas covered, no evidence was ever produced from airborne surveillance of Iraq's non-compliance. That said, the behaviour of the Iraqis was very much that of a guilty party with something to hide. UNSCOM wrote a scathing report in late 1997, which spoke of the numerous obstructions being put in its way and effectively blocking its inspections. This, coupled with the spike in Iraqi military activity in the Zone, resulted in the US and UK drawing up plans to carry out significant attacks against Iraqi military assets within the Zone. This met resistance from some in the UN, including France, which was still a Coalition member. Nevertheless, in November 1997, UNSCR 1137 authorised the potential for 'further measures' as a result of Iraqi non-compliance.

As part of the UK's plans to escalate under the auspices of UNSCR 1137, consideration was given to the likelihood of Saudi Arabia giving

permission for attacks to be launched from its air bases. Since this was considered unlikely, options were reviewed for relocating the Tornados to either Kuwait or Bahrain and/or to add a UK carrier with Harrier GR7s and Sea Harrier FA2s. In preparation, in late 1997 HMS *Invincible* and the Harrier Force begun a short work-up in the Mediterranean before being deployed to the Gulf on 24 January 1998 (8 × GR7 and 8 × FA2). However, the GR7 did not yet have a fully integrated TIALD capability, so trials continued apace in parallel with the deployment.

Having gained the requisite permission from Kuwait, the UK redeployed its eight Tornado GR1s to Ali Al Salem. At the same time, to maintain cordial relations with Saudi Arabia, the GR1s that had been withdrawn from PSAB were replaced by six politically expedient Tornado F3s while an additional VC10 tanker was added to the one already in Bahrain. The increase in the size of the UK's deployment, and its mission intent, resulted in Op JURAL being rebadged as Op BOLTON. HMS *Illustrious* replaced *Invincible* in March but, having already flown several hundred hours over southern Iraq, operating Harriers from the deck in the increasing temperatures was beginning to become a struggle, so the carrier and its air wing departed on 15 April 1998. To compensate somewhat for the withdrawal of the Harriers, the Tornado detachment was increased to twelve GR1s, in effect a full squadron. In addition, in view of Ali Al Salem's proximity to Iraq, an RAF Regiment element was deployed to Kuwait to provide much needed, and welcomed, Force Protection. However, and despite all the activity, the much anticipated offensive operations did not occur until much later in 1998.

Op DESERT FOX

As tension and incidents increased in the Southern Zone, a political decision to strike became increasingly likely – in both the US and the UK. On 5 August 1998 Saddam ceased to co-operate with the UNSCOM inspectors and the situation deteriorated further on 31 October when Iraq stopped even the less intrusive monitoring programme. With all patience exhausted, Operation DESERT FOX was authorised for December and the inspection team was pulled out on the 15th. The decision to act had caused the French to withdraw from the Coalition as they lacked the political will, or perhaps the inclination,

to participate. As a result they had ceased to patrol the airspace and their small staff team departed from the Saudi-based Combined Air Operations Centre (CAOC).

After a false start, the first of four days and nights of attacks began on 16 December. Prior to DESERT FOX, ground targets had been limited to direct or indirect assets or systems that were involved in targeting or threatening Coalition aircraft. The DESERT FOX target set was significantly expanded to include Weapons of Mass Destruction (WMD), Command and Control nodes and key elements of the Republican Guard. Although perhaps not appreciated at the time by the wider community, or even the Iraqi regime itself, DESERT FOX proved to be the opening shots of what would eventually become the second Gulf War in 2003.

DESERT FOX comprised around 600 sorties, with over 1,000 weapons being expended against 97 of a planned 100 targets. Weapons included air-delivered bombs and cruise missiles launched from maritime assets. The results were heralded as a great success that had seriously degraded Iraq's WMD programme, although we now know that this claim was based on a false premise. However, notwithstanding the lack of any meaningful WMD, it had actually been something of a challenge to find 100 significant targets. Indeed, OC 12(B) Sqn had to intervene on a number of occasions to ask for better targets – target that would justify risking his crews. The squadron was also hampered by the scarcity of TIALD pods, a frequently reported deficiency that never quite seemed to get resolved. The consequent need to designate between aircraft, rather than self-designation, limited attack options, increased exposure and, on more than one occasion, resulted in targets not being attacked. Once the dust had settled, after three days of intensive operations, little seemed to have changed in practical terms. Indeed, when normal patrol activity resumed, the Iraqi response was if anything more robust, not less so. So was this operation a systematic erosion of Iraqi capability based on the effects desired? Or was it a show of force designed to beat Iraq into submission? On balance, it was more an attempt at the latter, although it had actually done little to change Iraq's behaviour. However, it had certainly served to confirm one fact: Saddam had decided on one approach and one only – he was going to double down and call the Coalition's bluff.

The Road To Op TELIC

Having committed so many assets to deliver DESERT FOX, the political pressure to maintain a stranglehold meant that numbers were not reduced to pre-DESERT FOX levels until late-1999. The maintenance of a squadron-sized Tornado GR1 detachment for nearly two years imposed a significant burden on a force that was simultaneously being reduced in size. Every squadron took its turn in the cycle, with each unit undertaking a three month stint in-country. However, when the work-up and the subsequent recovery period were factored-in, each deployment effectively took six months out of the notional training year, which had a significant impact on a unit's ability to absorb new crews and maintain other core skills. Even when the numbers of GR1s were cut back to eight from December 1999, the next three years, running up to March 2003, were to see some of the most intensive periods of activity (on both sides). Crews flew with ROs – Response Options – which were pre-planned attacks against systems that could either be targeted at short notice due to belligerent activity elsewhere or as punishment for some past transgression. No longer did the Coalition limit attacks to immediate and direct self-defence. Any legitimate target within the set could now be targeted if Iraq continued to threaten Coalition aircraft. Iraq duly obliged, the prize of downing a Coalition aircraft evidently being deemed worth the cost to its dwindling air defence assets.

Ever conscious of the nightmare scenario of a downed Coalition aircraft in Iraq, the patrol missions always had a very sophisticated, well-rehearsed and well-resourced CSAR (Combat Search and Rescue) package, either held at very high readiness or airborne during patrols. Within minutes, any downed aviator would have been swamped by dedicated Coalition air assets, which included the dedicated A-10 and specialist CSAR Sikorsky HH-53 'Jolly Green Giant' helicopter. Aircrew, who are not renowned for reading the rules as often as they should, committed the CSAR procedures to memory! Although the CSAR assets were never used in anger over southern Iraq, we were confident that they would have answered the call superbly.

On 11 September 2001 the terrorist attacks in the US meant that everything changed, and no more so than on SOUTHERN WATCH. The CAOC, which by now had moved to a 'tin shed' at Al Udeid in Qatar, was fully mobilised, and US Central Command (CENTCOM

responsible for the Middle East) set up a forward HQ at Doha. As a consequence of '9/11', operations in Afghanistan now took priority, although Iran was also never far from the minds of the Coalition. SOUTHERN WATCH missions continued, but supporting assets, such as strategic surveillance aircraft and tankers, tended to be drawn towards Afghanistan and this became a limiting factor in Iraq. However, as operations in Afghanistan reached their fifth month, George Bush's 'Axis of Evil' speech on 29 January 2002 meant that a wounded America now had a Ba'athist Iraq firmly in its cross hairs.

Perhaps Saddam never appreciated this shift, but his days were now numbered. His continuing belligerent behaviour in the No-Fly Zones and his refusal to permit a meaningful inspection regime sealed his eventual fate. And so, as Op TELIC began on 19 March 2003, Operation SOUTHERN WATCH (or RESINATE South as it had become in order to link the mission with that in the north) came to its conclusion. After more than ten years of constant operations over southern Iraq, not a single aircraft had been lost. It is an indication of the scale of effort that, during that time, while operating from three air bases in three separate countries, the Tornado GR1s alone had flown over 30,000 missions and some 60,000 hours – the equivalent of two squadron's worth of annual flying effort. It was a true feat of endurance, persistence and concentration. The potential for becoming complacent was ever present, whether flying a long AD CAP in an F3 or a long tanker towline over the Gulf; even the odd black puff of exploding AAA came to be treated with some disdain by Tornado GR crews. It is a credit to the supporting personnel who gave their all, and the men and women of each and every force that deployed that this mission was conducted with such professionalism over such a long period. But was it all worth it and what did we learn?

Observations/Lessons

This Operation began when air power advocates were euphoric over its success in the first Gulf War (remember Warden's Rings and the promise that air power is the answer to everything?[2]), and the new dawn after the Cold War. For the RAF it heralded a new era of medium level operations and precision, but it also harked back to the era of Trenchard and Churchill and the policing of Empire that had saved the RAF of the 1920s from an early demise. But the truth is that the No-Fly Zones were

set up under humanitarian auspices to protect the innocents who were being hounded and persecuted – a pattern repeated in every operation that has followed and one that persists today – and we failed to stop it. So, air power does have its limitations and airmen must take some responsibility for ensuring that the politically expedient No-Fly Zone response is not trotted out as the answer to every problem. To my knowledge there is still no meaningful definition, doctrine or tactics for No-Fly Zones – we aviators just adapt known air power practices and procedures to suit, which we do very well. But do politicians understand the differences, or even the limitations, inherent in the too simple label that is often applied?

Politically, No-Fly Zones are seen as low commitment and low risk, both proved to be somewhat true, although this shouldn't leave anyone with the impression that they are cheap or risk free. But, in this case, it was certainly cheaper in terms both of cost and of lives lost (on all sides) as the post-invasion occupation of Iraq and Afghanistan turned out to be. While victorious, there were, however, hidden costs for the forces deployed – in readiness, in fatigue and in erosion of capability. That said, the Tornado and tanker forces, in particular, became extremely battle hardened and very familiar with a *modus operandi* and operating region that remains to the forefront even today. But the effort in materiel and time did gradually erode capability, especially the more high-end skills that were not required over Iraq. We were fortunate in that a more capable foe never exploited the fact, but those ten years meant a steady, if almost imperceptible, erosion in readiness and capability that was never truly acknowledged. When you place that in the context of the 'capability resourcing' debates that raged through this decade and beyond, it would appear that the MOD never truly grasped the value for money that air power provided, nor the need for proper resourcing beyond just a platform purchase. Whereas the MOD normally only resources activity to achieve readiness, and has to seek additional funding to deploy and operate, in stark contrast, the RAF resourced SOUTHERN WATCH largely out of its annual training budget – effectively using the Annual Flying Task (AFT) as its currency.

As seen elsewhere since, the operation struggled to find meaningful metrics for success. Hours flown and weapons dropped were easily measurable, of course, and hugely impressive in terms of scale.

However, rolling over yet another *Spoon Rest* radar or S60 AA gun – that for all we knew was the one we had rolled over the previous week, or wasn't even serviceable – doesn't actually affect the enemy as much as one would like to think. After ten years of being surrounded, and having suffered a humiliating defeat in Kuwait, we should have convinced Saddam that the game was up and that resistance was futile – yet resist he did. Whilst Op TELIC was heralded as another great tactical military success, the resultant occupation and its bloody consequence (that still echoes today) was hardly the result we would have wanted. So, did the containment strategy, enforced through the No-Fly Zones, have a stabilising effect or merely put off the problem for another day? Or, worse, did the time we wasted in prosecuting it allow other dynamics to fester and develop with all the fall-out we see today? The truth is we don't really know. The lesson – and we were to be taught it again in Libya some 10 years later – is, be wary of falling for the tempting lure of an apparently low commitment/cost solution, and senior commanders need to make sure that its limitations are truly understood by those taking the political decision to commit.

But SOUTHERN WATCH was not a failure, and many Iraqis will have yearned for the stability it delivered, compared to the chaos and confusion that ensued in the decade that followed. Importantly, the deep relationship that the RAF enjoys with the USAF, USMC and USN today is largely due to the time we spent fighting together in the Middle East. Junior aircrew and commanders are now senior commanders and they know their opposite numbers from many years of shared experience. A mutual trust and respect now exists that has been forged in battle; while the US has always been the foundation of any successful Coalition due to its sheer mass, it has a very healthy respect for the ingenuity and sheer professionalism of the RAF. Whenever there was an especially challenging reconnaissance task or target set, the US Commander would slide it on to the RAF's line in the daily Air Tasking Order (ATO), knowing full well that it would be conducted to the highest standards and that, in the event of there being any doubt, the crews would make the right call and hold off rather than make a costly, and possibly strategic, error. The years of combat operations also meant that surely, if slowly, the UK's armed forces were resourced correctly, whether it be weapons stocks or critical role equipment such as EW or designator pods. Without a constant operational demand, however, I

fear that the lessons learned may quickly become lessons forgotten.

Endnote

Iraq and the Middle East have now been seared into the corporate memory of, or associated with, the personnel, aeroplanes and units, especially squadrons, involved. Several aircraft were retired whilst still in contact in Iraq, including the Nimrod R1, the Victor, the VC10, and the Tornado GR (switching to Mk 4 from Mk 1 over the long 25 year period it was deployed over Iraq). Nearly a quarter of the RAF's history is captured in this one theatre alone, and well over half of the Tornado GR force's history. From the Gulf War of 1991 to Operation SHADER (still ongoing as I write), the RAF has now been continuously engaged in this region for 31 years and seen four related operational awards. Three of them are the more 'coveted and eye-catching' campaign medals associated with Operations GRANBY, TELIC and SHADER. But it is the General Service Medal with the 'Air Operations Iraq' clasp, awarded to those who participated on Operations SOUTHERN and NORTHERN WATCH, that deserves to be admired with equal, if not more, pride because it recognises the professionalism and persistence displayed in the face of a constant threat every day for over 10 years.

Notes:

[1] The US embassies in Kenya and Tanzania in 1998, the USS *Cole* in 2000 and, ultimately, '9/11' 2001.

[2] For the benefit of readers of an older generation, this is a reference to a diagram consisting of five concentric rings representing an enemy's vulnerabilities – in order of priority, the Leadership, Organic Essentials, Infrastructure, Population and Field Forces. Conceived by Col John Warden USAF, the diagram did not feature in the 1988 paper in which he first articulated his ideas regarding the application of air power – https://apps.dtic.mil/sti/pdfs/ADA259303.pdf – but it does, certainly by 1995, in papers discussing his theory, eg *John Boyd and John Warden – Air Power's Quest for Strategic Paralysis* by Major David S Fadok, USAF School of Advanced Airpower Studies; Air University Press Maxwell AFB, AL. **Ed**

OPERATIONS – KOSOVO

Air Mshl Iain McNicoll

A member of the UAS while at Edinburgh University, Iain joined the RAF in 1975. He subsequently flew Buccaneers and Tornados much of this time, 12 years in all, being spent in RAFG at Laarbruch and Brüggen. Having attended Staff College, ground tours included two stints as a PSO and two MOD policy appointments. He commanded RAF Brüggen and was Senior RAF Officer Germany 1998-2000, bringing the Tornado GR4 into service and exercising OPCON of the station's participation in Op ENGADINE. Air rank appointments were as Director of Force Development, Director General of Joint Doctrine and Concepts, AOC 2 Gp and finally DCinC Operations at Air Command, whence he retired in 2010.

Introduction

Now, some 23 years later, when Europe is again struck by a war,[1] it somehow seems less surprising that the RAF mounted air operations from RAF Brüggen in the Kosovo conflict of 1999. However, it was certainly not expected at the time and the impact on the whole community that made up an RAF station in Germany was considerable.

It was not, of course, a surprise that the Balkans were heading for another war. Since the Dayton Agreement of 1995, tension within the Federal Republic of Yugoslavia (FRY) between Serbia and Kosovo had ramped up. In 1996, 16,000 ethnic Serb refugees from Bosnia and Croatia had been settled in Kosovo. The Kosovan Liberation Army came into existence as a force (of terrorists or freedom fighters, depending on perspective). In 1998 the UN Security Council passed two resolutions relating to the situation in Kosovo, 1160 on 31 March and 1199 on 23 September, the second of these under Chapter VII demanded the cessation of all hostilities, but did not authorise the use of force.[2]

Nevertheless, the North Atlantic Council (NAC) of NATO issued an 'ACTWARN' on 24 September 1998 instructing the Secretary General to prepare a limited air option, involving a phased air campaign. There was a 'false start' to NATO operations on 13 October 1998, when it

was announced that operations could begin in 96 hours, but it was not until 30 January 1999 that the NAC agreed that the Secretary General 'may authorise air strikes'. Intensive talks were hosted by NATO, initially at the Château de Rambouillet, and a proposal for a peace agreement between the FRY and the ethnic Albanian majority population of Kosovo was devised. Yugoslavia refused to sign this accord. On 23 March 1999, NATO's Secretary General, Javier Solana, directed SACEUR to initiate air operations in the FRY and on 24 March 1999 Operation ALLIED FORCE (UK name Operation ENGADINE) commenced.

What follows, however, is much less about this political and strategic backdrop, and much more about the impact of these factors at the tactical level for one RAF Station and its people.

RAF Brüggen

I had taken over as Station Commander of RAF Brüggen in mid-December 1998. My previous appointment was as Deputy Personal Staff Officer to the Chief of Defence Staff, and I had naturally been following the developing crisis, both in that appointment, with its high-level visibility, and in the lead-in training for my new role. I strongly suspected that RAF Brüggen's Tornados would be deployed on operations if NATO were to start its phased air campaign, so I was focused on operational readiness right from arrival. Throughout my own work-up to 'combat ready pairs lead'[3] in January and February 1999 I took the opportunity to judge at first hand where we were.

The readiness context at that time was heavily influenced by two factors. The first factor was the operations that squadrons had been employed on in the last eight years. For Brüggen's squadrons this had been SOUTHERN WATCH flying over Iraq, which had occasional brief 'hot' periods, but was mainly routine surveillance, with many flying hours but not much activity. It did, however, provide a lot of air-to-air refuelling (AAR) and some TIALD[4] experience. Secondly, the Tornado force, like all of the Service, had been heavily impacted by the numerous defence reviews, starting with the first post-Cold War 1991 review entitled 'Options for Change'. Cuts in numbers of aircraft and squadrons had resulted in an effort to maintain the maximum number of fighting units for the resources available: a reasonable strategy if

there was some optimism that the cuts might be reversed at some point. Even so, 17(F) Squadron was due to disband on 31 March 1999, reducing the Brüggen Wing from four Tornado squadrons to three. In addition, the RAF was planned to leave its last two bases in Germany: Laarbruch in 1999 and Brüggen in 2002. In what was otherwise good news, the Tornado GR4 upgrade was being introduced to service, although the GR4 was not yet fully operationally capable (for example, it had no TIALD integration), but the changeover required GR1s to be cycled through the upgrade programme, further reducing assets on the front line.

The unfortunate truth was that there was no reversal of the cuts and the consequent effect on operational capability had been quite marked. As an example, I had been a Flight Commander on a Tornado squadron in 1986-89, when the defence budget was rising at 3% per year in real terms. Comparing that with 10 years later, the crews per squadron had been reduced from 18 to 15, the flying hours per month per crew from 20 to 18, and the engineering manpower and spares provision by commensurate amounts (it seemed greater, as the Tornado was an 'engineering intensive' aircraft and 'robbing' one aircraft to provide spare parts became more common). Adding that situation to the many hours being supported on SOUTHERN WATCH, and therefore not available at home base,[5] meant that there were few squadrons, if any, achieving their training hours task, and this shortfall, as ever, fell disproportionately on the most junior crews, as each training sortie needed qualified leaders and supervisors, squeezing out the less well-qualified.

This was not as bad as it sounds. I had inherited some very capable Squadron Commanders and a good sprinkling of able Flight Commanders, while the junior crews had that sparkle and promise that have always existed, even if they were light on experience. Also, the functional wings were very well led and managed. I was reasonably confident that, provided we did not have to deploy all three squadrons, we could cope with the probable missions and the challenges faced. I asked the Squadron and Wing Commanders to look at how they would support a deployment (with strict instructions not to involve HQs, as I knew just how sensitive they would be to a hint of unwanted initiative in this area).

Preparing for Operations

The UK's contribution to NATO operations commenced on 24 March without RAF Brüggen involvement. Eight Harriers had been deployed to Gioia del Colle, supported by two TriStars; these numbers were increased as the conflict progressed by a further four Harriers, then four more, and a further TriStar, then one more. Also involved were seven Sea Harrier FA2s from HMS *Invincible*, three E-3D Sentrys and one Nimrod R1, not forgetting some cruise missiles from the submarine HMS *Splendid*. Every base in Italy was at maximum capacity. It seemed there was no place for RAF Tornados. Yet as the conflict progressed, and appeared to be slow in achieving its aims, the political imperative for the UK to do more was clear.

Accordingly, on 1 April 1999, Brüggen was tasked to provide eight Tornado GR1s for Operation ENGADINE, operating from home base, to fly six aircraft each night on TIALD self-designated precision guided attacks. AAR support would be provided by three (to fly two) VC10s from 101 Squadron, which would be based at Brüggen. I would have tactical control of all elements operating from Brüggen. This was not in my 'play book' and some rapid thinking and decisions were required.

Most decisions were taken in meetings with the executives on the station, but two in particular fell to me alone. First, should the task be given to one squadron (possibly 'do-able' with only a little reinforcement, despite the likely strain of the tempo of operations) or to the whole force? Noting my thoughts above on squadron crew numbers and groundcrew, readiness and capability, I was sure that allocating the task to one squadron would not provide the best possible force for the missions. I therefore decided that, although one squadron should have the lead for unity of command, the other two would be fully involved. Secondly, who should be the lead Squadron Commander? I was blessed with two absolutely exceptional Squadron Commanders (both of whom subsequently made three-star rank), and one very good Squadron Commander. I needed a differentiator for the two. This was provided by two factors: first, 14 Squadron was notionally[6] a TIALD squadron, while IX(B) Squadron (and 31 Squadron) were ALARM specialists. Secondly, and to me the clincher, 14 Squadron had an outstanding navigator Weapons Leader, (then) Squadron Leader S P (Rocky) Rochelle, who would provide exactly the knowledgeable and forceful, even uncompromising, direction for tactical success on the missions we

faced. So (then) Wing Commander 'Timo' Anderson and 14 Squadron had the lead, with the other squadrons and the functional wings fully in support. Wing Commander Greg Bagwell would have to wait his turn to lead.

Three six-ship constituted formations were formed, one from each squadron, with personal selection by each Squadron Commander. The plan was to rotate these formations through a cycle of planning day, fly the mission, then have a day off.[7] With a 3-day delay until Brüggen's Tornados could be fitted into the Air Tasking Order, training missions involving night AAR and TIALD operations were flown.

The Tornado GR1

It is worth at this point describing some of the Tornado GR1's capabilities. Its navigation and weapon-aiming systems had been optimised for low-level overland Cold War missions. Its ground-mapping radar only provided an excellent picture within a maximum of 2 miles slant range to the point being looked at. The IN was, through very clever 'Kalman Filter' software using the long-term velocity stability of Doppler radar, and 'fixes' of its position (radar or visual) in tune with half the Schuler oscillation of 84·4 minutes, capable of being very accurate, but only if managed in exactly that manner. So oversea and/or no fixes available, as would be the case for much of the lengthy high-level transit flying, would degrade the accuracy that was absolutely essential for weapon release and for TIALD designation. This problem was solved by some local initiative. One of the squadrons had a contact with Garmin GPS connections. Hand-held Garmins were rapidly procured,[8] which allowed accurate fixes during transit to target, or at least good enough for offsets and targets to be identified. And the Doppler radar was switched off over the sea.

The TIALD system was good, but – as mentioned – required accurate fixing to be pointed in the right direction. It also had a sub-optimal display to the navigator; the video screens in the Tornado were small and green/black, rather than black and white, and had been designed for text and simple graphics, not a thermal image video. This put a premium on operator familiarity and competence. When combined with the electronic warfare task, the navigator had very little time for lookout and the pilot was not helped during quite lengthy target runs by having to fly smoothly and mainly wings level. It was decided

that, since on most missions, we had spare weapons and TIALD to take account of failures, the spare aircraft could act as the eyes of the attack aircraft and give warning of missile or AAA threats.

Combined with TIALD's inherent limitations, the weapon we would be using, the UK Paveway 2 (1,000lb HE) or 3 (2,000lb HE) was really only useable against fixed targets and, even then, because of its first-generation guidance system ('bang-bang', rather than proportional), it required precise timing and exact lasing of the point of designation to avoid missing its capture 'basket' or running out of energy. Crucially, line of sight to the target was required throughout the designation period. If the guidance failed, the weapon would fall short of its intended target.

The EW system was excellent for Cold War early-generation threats – which were exactly what we faced. The Radar Homing and Warning Receiver gave good visual and audible warnings, and the Skyshadow jamming pod was effective when used in conjunctions with the BOZ chaff (and flare) dispenser and appropriate three-dimensional manoeuvre.

None of the above should be taken as being critical of the equipment. It is always the case that adaptation is required and that improvements can subsequently be made from the lessons learned. However, it did put a premium on coolness and competence under pressure by the crew to make it all come together to deliver the desired effect.

Operations Begin

The command and control of operations was clear, but complex. NATO, under SACEUR (General Wesley Clark) was running the operation, through Commander Air Forces Southern Europe, Lieutenant General Mike Short, and the CAOC in Vicenza was the tasking authority. We had a UK Air Component Commander, Air Commodore Vaughan Morris (detached from No 1 Group) and a team in the CAOC led by the very experienced 'Paddy' Teakle. MOD, through the PJHQ, had national command. Fortunately (then) Air Commodore Glenn Torpy was their Air Operations Commander. Full command was exercised by CinC Strike Command, the recently in-post Air Chief Marshal Sir Peter Squire, with DCinC, Air Marshal Tim Jenner, and AOC No 1 Group, Air Vice-Marshal John Thompson. By good fortune, and because our air force was small and shrinking, my

previous postings meant that I was well known by all of the UK team; I was aware that keeping everybody appropriately informed in the right sequence was key to maintaining confidence in Brüggen (and in me). That said, it is only fair to reflect that I felt enormously well supported by all of the UK command chain.

The first mission flown by Brüggen's Tornados was on the night of 4/5 April 1999 by the 14 Squadron six-ship. The route to the scene of action was over France and Italy. Brüggen to Kosovo, via this slightly circuitous track, is some 1,200 nautical miles,[9] so the total sortie time was 6-7 hours. The VC10s were exceptionally good at managing the transit and the AAR brackets, the close coordination undoubtedly helped by the colocation of all the crews for planning and briefing. This really helped reduce the burden on the Tornados, even if lengthy night formation, often in cloud, was taxing in itself. The target was a bridge and tunnel on a main supply route from Serbia to Kosovo. Three of the four weapon drops (ie six of the eight bombs) were on target.

The Station

The Station routine for operations was built on a daily meeting in the Combined Operations Centre (COC), attended by Wing and Squadron Commanders (or their deputies if they were flying). Met briefings, followed by Intelligence and Electronic Warfare briefings, set the scene and then all relevant aspects of past, current and future missions were covered. Focused discussions were also held on other topics. Flight safety was a concern, noting the considerable risks of lengthy night-time missions on the wing of a tanker, and the scope for incidents. Crews were well briefed by Squadron Commanders that not relaxing until after climbing out of the aircraft was essential and, for example, only straight-in radar singleton approaches would be flown. One discussion, held very early in our involvement, and only with the Squadron Commanders, was on striking the balance between minimising operational and target area risk versus mission success. We all agreed that the risk of an operational loss should be minimised and that if target defences proved to be unexpectedly heavy, then aborting the mission was reasonable. However, in practice, only one mission was called off, by the CAOC, for this reason. It simply proved impossible to communicate to crews about setting the risk threshold against the duty to carry out the task set, while acting consistently with

the great traditions of our Service. This made getting the tasking right, in terms of risk-justifiable targeting, absolutely key and Vaughan Morris and Paddy Teakle did a fine job of feeding appropriate inputs into the NATO system.

One particular concern was security of the station and its people. There was a large Serbian population in Germany of some 300,000 to 400,000 and, while few were likely to be supporters of Milošević, there was at least the potential for action against us. The RAF Police and their links to the local police were helpful. Increased, and very visible, patrolling, by our own people inside the wire and by Germans outside it, were as good a deterrent as we could manage. At the same time, personnel were advised to be security aware, especially off-base. In fact, there was no action apart from one poorly-attended demonstration at the main gate, for which 12 Flight Army Air Corps provided an 'eye in the sky' with a Gazelle helicopter. The combination of a cause that was generally supported by the population, and strong support from local government on both sides of the German-Dutch border, was notable.[10] There were not even any noise complaints, despite the shattering of the night peace by Tornados and VC10s; all the years of work by many people on community relations, often apparently fruitlessly, had paid off.

The greatest risk to aircrew was clearly the possibility of combat losses. The support of the executive team's spouses, my own very much included, was invaluable in reaching the wives[11] of the aircrew. I attended meetings that my wife organised in the Mess and spoke and answered questions from them as best I could. It was sobering to reflect on the difficulties posed by aircrew coming home in the early morning after a sortie and having to provide some sort of response to explain to children at the breakfast table where they had been. Sleeping during the day often required the use of the married quarter cellars for darkness and quiet. In addition, everybody on the station, and in the local area for some miles, could hear every take-off and every landing, so counting them out and in was a reality. Time would therefore have been tight if an aircraft went missing.[12] I had detailed discussions with OC Administration Wing and OC Personnel Management Squadron and we carefully went through the plan for how we would handle any losses. I told the Squadron Commanders I had done so, but did not communicate this fact further.

A major factor was the nature of an RAF Germany station. With housing, schools and NAAFI, RAF Brüggen was a busy village of more than 5,000 people. I was conscious that all wanted to support the main effort and, indeed, many across the station were actively involved, but many on the periphery still wanted to feel involved and to be informed. I set up a series of visits to replace the routine Station Commander's Inspections, but could not be everywhere or reach everyone. The station Tannoy was of limited use; I tried it once, and again after the conflict finished, but it could not provide the personal touch in communication that was needed. As ever, delegation was the only durable solution with Wing Commanders reminded of their responsibility within their areas to get agreed messages (from morning briefs) over. Social media, had it existed, might have helped, but on balance I remain grateful that this double-edged sword was not available.

On a lighter note, the Officers' Mess staff, with the late Bert de Vries to the fore, produced post-mission breakfasts for the crews at a very high standard. The bar was opened, and the RAF Police provided 'blue light taxis' to ensure that any temptation to drink-drive was contained.

The station had a good number of senior visitors: military, political and Royalty all spent time at Brüggen during the conflict. The military were easy to handle and were all excellent value. Somewhat surprisingly to me, so were the politicians, at least when away from the media throng; Tony Blair and, even more so, George Robertson were excellent. My visit schedule for politicians included meeting the wives of the aircrew who were flying, with accompanying pre-school children too, and I was impressed by how the politicians survived this daunting experience. The Royal visit was less satisfactory; enough said.

Targets and Defences

The three phases of the air campaign were: neutralising the integrated air defence system by targeting SAM sites, airfields, and command and control sites; attacks on fielded forces in Kosovo and southern Serbia, and interdiction of supply routes and logistics, such as fuel and ammunition storage; and wider military targets in Serbia, which was expanded to include regime targets. RAF Tornados were used principally on the interdiction element of the second of these phases, but there were also some targets from the first and third phases.

The weight of air power available to NATO was greater than the target sets required, but there was considerable political pressure to keep ramping up the campaign numbers. This led to the selection by the CAOC of some targets of dubious value. Fortunately, our links with the CAOC were good enough to negotiate some changes. In addition, on one occasion the target did not require six aircraft and it was agreed with the CAOC that the mission would be reduced to four. This led me to be involved in a four-cornered communication with the UK Air Component Commander, the PJHQ and No 1 Group. The UK desire to have maximum air involvement and the justification of the targeting received a lot of attention, but the debate was carried out professionally and in my view improved the situation somewhat.

Serbian air defences were not modern, but they were large in number and effective. There were re-locatable, but static, SA-3, mobile SA-6, and MANPADS SA-7 and SA-16. Heavy AAA consisted of ZSU-57-2 and Bofors L/70 40mm. NATO suffered two aircraft shoot-downs; both were USAF, an F-117 (visible to SA-3 radar on its bomb run when the bomb doors opened) and an F-16CJ, also by SA-3, from 555th Fighter Squadron based at Aviano (its home base). Both pilots were picked up by Combat Search and Rescue (CSAR) helicopters. Two A-10s were hit by SA-16 but both were able to return to base. The Tornado force tactics against the threats were well-developed by the Air Warfare Centre, Electronic Warfare Operational Support Establishment and the Strike/Attack Operational Evaluation Unit. The minimum height for our operations, to remain clear of MANPADS and light AAA, was set at 15,000 feet and, as mentioned, the aircraft had good capability against the SA-3 and SA-6, provided there was enough warning.[13]

Each package of attack aircraft was supported by EW jamming and by USAF HARM – high speed anti-radiation missiles. However, on 2 May one of our formations entered a 'SAMbush' near Obvra in Serbia. At that stage the HARM shooters – the F-16CJs – had exhausted their weapons and matters were extremely tense. One of the TIALD videos even captured an SA-3 flashing through the screen. I usually attended crew debriefs and on this occasion asked if our ALARM missile would have been of benefit. The next day, Vaughan Morris was visiting Brüggen and I asked 31 Squadron to brief him on how ALARM[14] might be used to enhance our protection. He was convinced and Squadron Leader Dean Andrew accompanied him by HS125 to

brief Lieutenant General Short. He was also convinced of its potential utility and a rapid request was made by NATO to the UK (already prepared for such a request by Vaughan Morris and me). ALARM was duly approved, but in 'Target of Known Location' – TKL[15] – mode to avoid unintended consequences and collateral damage. In fact, the number of occasions on which it was appropriate to use it were relatively few and only six missiles were fired (two missiles on three occasions).

Brüggen Missions

The main factor throughout the campaign affecting our operations was weather. Although a six-aircraft formation was planned and briefed every night, approximately half the missions were cancelled before launch because of poor weather. 'Poor weather' meant significant (5/8th or more) cloud in the target area. It was accepted that some missions would therefore reach the release point and find some cloud obscuring the line of sight. Excellent discipline was shown by crews and there were quite a number of 'no drops'; it was more than a bit demoralising to carry the weapons all the way there and then carry them all the way back. Given that the missions were at night, it also occurred that the line of sight from the designating aircraft to the target was obscured after weapons release. In this case, the now unguided weapons fell well short; the line of attack was always planned to ensure there was nothing at this point.

Brüggen aircraft flew 26 missions (129 sorties) plus 52 VC10 sorties in the 67 days in which we were part of the overall 87 days of the campaign. To put this in context,[16] the RAF flew a total of 1,008 strike sorties, so the Tornado effort was approximately one eighth of that. However of the 244 precision guided munitions dropped by the RAF, the Tornados released two thirds. To compare, the Harriers dropped 230 gravity bombs, 531 cluster munitions and the remainder of the precision weapons. Weapons effects were subsequently studied by the Air Warfare Centre and their classified report was exceptionally useful to both Tornado and Harrier forces.

To give some flavour of what a mission could be like, the following is a report[17] by Flight Lieutenant Stuart Hulley of 31 Squadron:

> 'On 25 May we were tasked against an ammunition dump just south of Belgrade and a highway bridge south east of that at a

place called Velika Plana. Intel had the targets within multiple SA-3 and SA-6 Missile Engagement Zones (MEZs) and whilst I planned to attack by avoiding the MEZs as much as possible, the intel was always some way out of date by the time we flew the missions. I don't remember why, but ALARM was not authorised despite, as it turned out, this being the mission on which we most needed it. As anticipated, shortly after the push point and well before the targets we encountered multiple SA-3 trimphones[18] then firings and a few kojaks[19] plus heavy AAA. The RT went into overdrive with launch and 'Mud 3 defending' calls plus the F-16CJ calling out their Magnums.[20] The situational awareness problem was exacerbated by a B-52 jamming in the package and swamping our RHWRs (though we did not know that at the time). We initiated multiple **** manoeuvres; most crews jettisoned fuel tanks. The engagement lasted a considerable time and we must have manoeuvred into multiple MEZs. As we continued to fight our way eastwards towards the targets, and with the SA-3 firings mostly from the left and particularly targeting the back of the formation, **** and I were fired at by a single SA-6 from head on. It was a classic engagement (ie Target Acquisition, Target Tracking, then Missile Guidance) and I clearly remember the very different nature of the missile launch and manoeuvring. Again we ****, chaffed etc and the missile missed us and exploded above and behind us. Both targets were hit: the ammunition dump by **** and **** and the highway bridge by **** and ****, who took over the attack at late notice from **** and me, as we had manoeuvred well away from the target. As the intensity died down, we formed up again and headed east toward Romania, skirted the border flying north then egressed Serbia into Hungary and home. We landed, debriefed and drank Champagne as I had achieved 1,000 hours Tornado on that mission.'

Solenzara

While we had shown that operating from Brüggen was possible and effective, it was clearly not ideal to have such extended transit times. The UK eventually negotiated space close to the operational theatre at Solenzara, a French Air Force base on the east coast of Corsica. On

15 May 1999 it was announced that twelve Tornado GR1s plus supporting VC10s would deploy to Solenzara by the end of the month.

Initially, the intention by Strike Command was to task RAF Marham with this deployment. I said to both No 1 Group and the PJHQ, with the support of the UK Air Component Commander, that Brüggen was not only well able to manage this deployment concurrently with supporting operations, but that to do so would be most effective, given that the crews that would be deploying were already experienced in the operation. This argument prevailed and I tasked IX(B) Squadron under Wing Commander Greg Bagwell to lead the deployment, with 31 Squadron in support. Meanwhile 14 Squadron, with smaller elements of IX(B) and 31 Squadron, continued operations from Brüggen.

The deployment proceeded smoothly and the detachment was ready for tasking at the beginning of June, although the start was again delayed slightly by the 3-day wait to get on the Air Tasking Order. The first mission on 5 June 1999 was aborted since the assigned target had already been hit by other assets. Two further missions were flown before the operation concluded.

On 3 June 1999, Milošević had accepted the terms offered by a Finnish-Russian negotiating team for an international peace plan to end the fighting. On 10 June, the NAC ratified the agreement and suspended air operations. On 12 June, after Milošević accepted the conditions, the UN-authorised, NATO-led KFOR of 30,000 soldiers began entering Kosovo. ALLIED FORCE formally concluded on 20 June 1999 and the Solenzara detachment then returned to Brüggen.[21] A 'happy hour' in the Officers' Mess to celebrate the end of the conflict was enhanced by a Methuselah[22] of Champagne, shared among all present, that I had been saving for the New Year 2000.

Conclusion

Notwithstanding the post-Cold War reduction in numbers and in readiness, the Brüggen Tornados successfully contributed to the operation as tasked, flying long and difficult night missions without suffering any loss. Operating from home base had some advantages, but was not easy and there was good reason for the whole Station to be proud of this achievement. This was reinforced by the subsequent award of the Stainforth Trophy for 1999 to RAF Brüggen. For individuals, 'Timo' Anderson was awarded the DSO for his exceptional

operational leadership and 'Rocky' Rochelle was awarded the DFC for his outstanding contribution to mission success. There were two MiDs, well-earned as the above sortie example shows. In addition, with the aid of a timely intervention from CAS, Air Chief Marshal Sir Richard Johns, every Tornado pilot and navigator who flew on Operation ENGADINE was awarded the NATO Kosovo medal. In December 2002, the Battle Honour 'Kosovo' was granted to IX(B), 14, 31 and 101 Squadrons.[23]

However, the lessons were clear. Capability is built on all the lines of development (LOD[24]) and in the post-Cold War reductions we had not been able to keep these in balance. We had been fortunate that only eight years had elapsed since 'Options for Change', so there remained considerable 'muscle memory' among our people. On equipment, the GR4 upgrade, which had originally been due in 1993, reached full operational capability in 2000 and, by the time I retired in 2010, the weapons available and the targeting pods had been enormously improved.[25] The RAF has, however, not got a full suppression of enemy air defence (SEAD) capability nor CSAR.

Returning to the strategic considerations, the debate continues about why Milošević accepted the peace plan. There is no doubt in my mind that the air campaign played a major part, not least as the campaign targeting moved beyond the military to encompass regime targets and put at risk the prosperity of the Serbian elite.[26] The massing of ground forces, despite a marked reluctance by the USA to have troops in a ground war, also contributed. Perhaps most importantly, the fact that Russia made no moves to offer practical support to Serbia must have demoralised Milošević. After his extradition to the Hague in 2001, he died in 2006 before his trial was concluded, removing the only person who could definitively answer the question.

Notes:

1 The Russia-Ukraine conflict was nearing the end of its second month as this paper was being written, although arguably, if the invasion of Crimea is taken as the starting point, it was 8 years and two months.

2 The UNSC, blocked as it was by Russia and China, never did authorise force. The 'Blair Doctrine' on humanitarian intervention was proposed in Chicago on 22 April 1999 in response to this deadlock and to the humanitarian disaster that had been unfolding in Kosovo.

3 The minimum sensible standard to be able to take part in all training sortie without

being a burden.

[4] TIALD – the Thermal Imaging Airborne Laser Designator pod.

[5] The additional cost of operations was paid by the Treasury, but not as extra flying hours for training.

[6] 'Notionally' because training with TIALD was very limited. There were not enough pods to spread round the force and also trials for the GR4 introduction took some of them.

[7] A month later, the number of formations was increased to four, allowing a decreased tempo for each formation. This decision was due to operating from home base; a higher tempo would have been more easily sustained on deployed operations.

[8] The great thing about being on operations was being able to short-cut bureaucracy and ask for permission later, when it was too late for any objection.

[9] Diplomatic Clearance was sought by the UK, and eventually obtained by mid-May, for the much more direct routing through Germany, Austria and Hungary (Brüggen to Belgrade is some 700 nautical miles, so the mission times were 4-5 hours).

[10] I did make a point of thanking each local leader individually afterwards.

[11] We had no female aircrew at Brüggen then.

[12] We did have one aircraft divert with an aircraft problem, but I knew about that from the CAOC long before the rest of the team returned, so was able to communicate this message to the squadrons and the executives.

[13] The Serbian tactics evolved to waiting until aircraft were near the overhead, launching missiles and only then switching on radars; this gave very little time to react.

[14] The UK's Air-Launched Anti-Radiation Missile.

[15] ALARM was mainly designed for Cold War corridor defence suppression, but also had a point target mode.

[16] The following figures are from HCDC Fourteenth Report of 23 October 2000. https://publications.parliament.uk/pa/cm199900/cmselect/cmdfence/928/92803.htm

[17] Edited by me to remove names of individuals who have not given permission to be mentioned and any potentially still classified information.

[18] 'Trimphone' – RHWR audible warning of target tracking.

[19] 'Kojak' – RHWR audible warning of missile guidance.

[20] 'Magnum' – HARM launch.

[21] I visited the detachment from late on 18 April to early on 20 April and had a most enjoyable social time.

[22] Methuselah: 6 litres = 8 bottles.

[23] Also to 1 (Harrier), 7 (Chinook), 8 and 23 (Sentry), 51 (Nimrod R1), 216 (TriStar) Squadrons.

[24] LODs: Concepts and Doctrine, Equipment, Information, Infrastructure, Interoperability, Logistics, Organisation, Personnel, Training.

[25] The GR4 upgrade integrated a GPS, a MIL-STD-1553 avionics databus and a MIL-STD-1760 weapons databus, a FLIR/NVG electro-optical fit and other modifications which, in due course, enabled the introduction of the Litening III targeting pod, Dual Mode Seeker (laser as well as millimetric wave radar) Brimstone, and the Paveway 4 proportionally-guided GPS and laser guided bomb.

[26] Many of them corrupt and even criminal.

SDR 97/98 – THE CONDUCT OF THE REVIEW AND CONSEQUENCES FOR THE RAF

AVM Steven Nicholl

Steve Nicholl joined the RAF in 1965 via a University Cadetship at Oxford. He subsequently flew Phantoms as a pilot and QWI, culminating in command of No 228 OCU. Ground tours included a stint with OR at the MOD and as Gp Capt Air Defence & Plans at Rheindahlen. After commanding RAF Leuchars 1991-93, he attended the RCDS before serving in Whitehall as Director Air Operations, Director Air Plans (during SDR 97/98) and Capability Manager (Strike). Following 'retirement' in 2001, he spent ten years with BAE Systems setting up inter alia *an industry-managed combined maintenance and upgrade programme for RAF fast jets.*

When Labour formed a new government in May 1997, they had been out of power for 18 years. They had not needed to construct, or even think through, coherent plans for defence in the round until Mr Blair made his party face election realities. In those circumstances, it must have been impossible to write an election manifesto with specific detail on defence. Instead, the Labour Manifesto for the May 1997 election (written in autumn 1996) deferred decisions until they had had time – nominally 6 months – to review and consider the issue. The actual manifesto contained just six paragraphs on defence matters: three under a heading 'Arms Control' and three under a heading 'Strong Defence through NATO'. One of the latter paragraphs said:

> 'Labour will conduct a strategic defence and security review to reassess our essential security interests and defence needs. It will consider how the roles, missions and capabilities of our armed forces should be adjusted to meet the new strategic realities. The review we propose will be foreign policy led, first assessing our likely overseas commitments and interests and then establishing how our forces should be deployed to meet them.'

I think it would be fair to say that there was considerable scepticism about the process within the MOD before it started, not least because of the Treasury-led approach that previous speakers/papers have just outlined

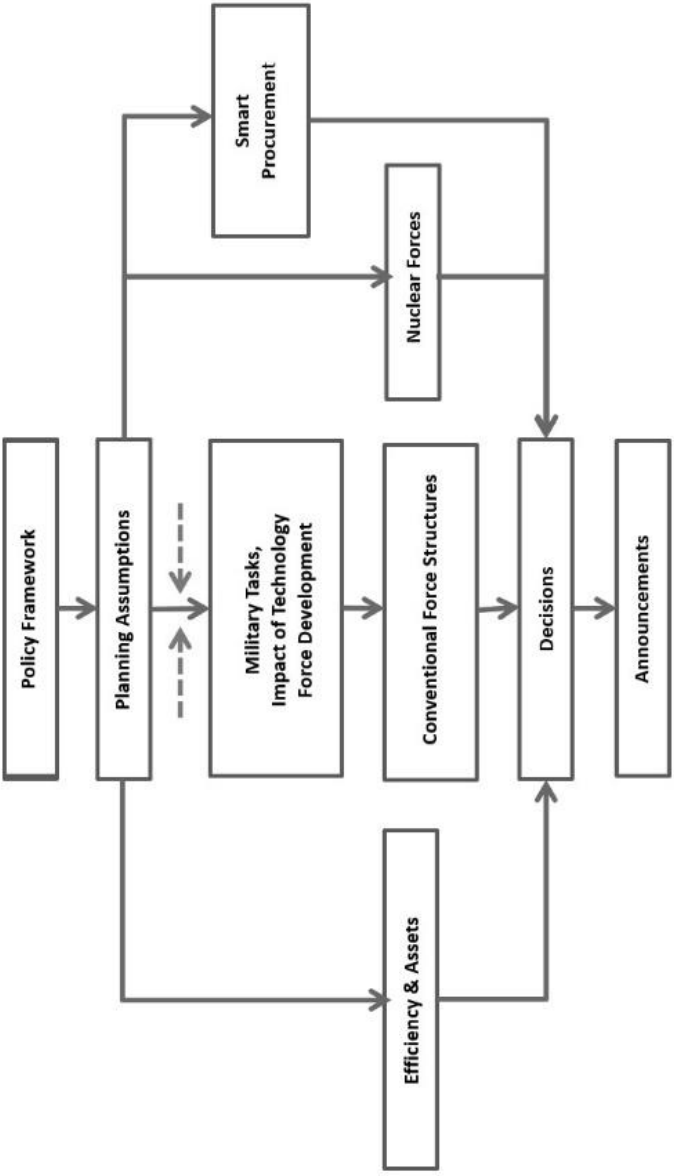


Fig 1. The Structure of the 1997/98 Strategic Defence Review.

I also have to say that the process set out by Labour ministers matched exactly what they had foretold in their election manifesto.

This gave an overall structure to the Strategic Defence Review – the SDR – that looked, when it was presented to the nation after it was all finished, like the diagram at Figure 1.[1]

This was not quite how the review was originally planned. Smart Procurement was a slightly later initiative announced in July 1997, almost two months after the start of the SDR. Indeed, the Smart Procurement Steering Group did not convene until November that year, when MOD had effectively completed its work on the SDR. As the resultant changes did not directly affect the outcome of the SDR or, indeed, the shape of the RAF during the 1990s, I do not intend to discuss Smart Procurement here. I also do not intend to discuss nuclear issues. Following a 1995 decision, all the WE177 air-delivered nuclear weapons had gone by March 1998 and the SDR discussions on nuclear matters were solely concerned with Royal Navy Trident submarine posture and the nation's stockpile of warheads and fissile material.

In this seminar, our prime interest is in the effects of the 1997/98 Defence Review on the RAF, both for the short term and in setting the scene for the longer term. I shall keep discussion of the process as short as possible whilst, I hope, highlighting the good and not so good in each of the key stages and in the flow of information between stages.

Policy Framework

As the Labour Manifesto had promised, the process started with a genuinely Foreign Office-led, not Treasury-led, review of geopolitics and an attempt to describe the strategic consequences for the armed forces. Moreover, open seminars were held to debate the policy framework and inputs were requested from all interested parties, including the general public!

Within the MOD, our expectation was that, once the Foreign Office review had been completed, it would be agreed by the Cabinet and then passed to us as the start point for the defence review itself. In practice, at least at my level, the outcome of this stage was never actually seen as a complete document. Indeed, it was <u>never</u> officially published in full, nor was it seen by Parliament. However, an 'essay' summarising it was attached as part of the Defence Review White Paper. Throughout the review, MOD staffs worked instead from summaries basically

saying that our national priorities would be. First, European stability, including consolidating the transition of ex-Warsaw Pact states to democracy; second, security and trade in the Mediterranean and the Middle East, then stability in North Africa as required to keep the Mediterranean secure. NATO would be at the heart of our security; the United States and its armed forces would be key to success in demanding operations, although we would look to work with our European allies when appropriate. All of this was further summarised amongst staffs into a simple mantra that, 'we could and would only procure, equip and train forces for contingencies north of the Sahara and West of the Persian Gulf although we could expect humanitarian, disaster relief and perhaps peace-keeping operations outside this arc.'

Although the concept of the policy framework was thus all we could have hoped for, the fact that the review itself was not available meant that no-one could go back to the source document, whether to challenge, or to seek detail on, the rationale for its outcomes. Everyone at desk level worked to the internal mantra. Over the months, I must have heard 'North of the Sahara, West of the Gulf' said a hundred times and never once challenged. Moreover, there were no exemplar contingencies or possible opponents that might have to be addressed, even if they had been set out during the framework formulation.

Let me give two examples of the consequences of this. First, for me personally, the prime argument for procuring fixed-wing carriers lay in West Africa, where there were huge British interests, considerable and growing instability but a paucity of airfields. However, the all-pervasive mantra about only procuring equipment for use north of the Sahara and west of the Gulf meant that the contingencies that seemed, at the end of the '90s, to be most likely to require UK carrier-borne aviation could not be considered, let alone subjected to operational analysis. Moreover, with no useful exemplar scenarios, operational analysis science staffs reverted to very broad 'Measures of Effectiveness'. These would become a thorny issue for Joint Strike Fighter a couple of years later.

Planning Assumptions

Even while the Foreign Office review was underway, a structure of working groups was being set up to analyse, for defence:

- Missions

- Tasks
- Scales of Effort

And for the first time, I believe, what the rules or guidance should be on

- Concurrency and
- Recuperation

In the interests of time, I do not intend to go through each of the Military Missions, line by line, but they are listed at Figure 2.[2]

They are exactly what you would expect, with just two points of note. First, Defence Diplomacy was a new specific mission, although no additional forces or force structures were assigned to the relevant tasks. Second, there was a specific decision that no forces would be maintained solely to defend against a Strategic**,** as opposed to Regional, Attack on NATO, the difference between the two being simply one of timescales.

Before turning to the Military Tasks, initially 50 of them reduced rapidly to 'just' 28, I need to make the point that *How* the military was to undertake its tasks was as critical to the Review as *What* those tasks were and *When* they might be needed.

From *How*, a raft of work and working groups flowed. Some outcomes were explicitly highlighted in the subsequent SDR White Paper. For example, led directly by Sir Richard Johns and his fellow Chiefs, there was an enormous emphasis on 'jointery'. The most obvious examples were the setting up of a Joint Rapid

a: Peacetime Security.
b: Security Of The Overseas Territories.
c: Defence Diplomacy.
d: Support To Wider British Interests.
e: Peace Support And Humanitarian Operations.
f: Regional Conflict Outside The NATO Area.
g: Regional Conflict Inside The NATO Area.
h: Strategic Attack On NATO.

Fig 2. The Missions of the Armed Forces.

Reaction Force structure, a Joint Helicopter Command and a Joint Harrier Force, initially designated Joint Force 2000. The SDR also planned the introduction of Joint Ground Based Air Defence (GBAD), and Joint Nuclear, Biological and Chemical (NBC) Defence.

In simple numerical terms, the largest of the new Joint structures was probably the formation of the Defence Logistics Organisation (DLO). Apart from the merging of RAF Logistics Command with its counterparts in the other Services, this also envisaged the formation of a unified Defence Transport and Movements Organisation, a Defence Aviation Repair Agency and a Defence Storage and Distribution Agency. Nevertheless, for much of the RAF, I suspect that the effect of the creation of the Defence Logistics Organisation did not feel like really radical change – it was still largely RAF engineers analysing serviceability and supply issues for RAF aircraft, alongside the civil servants with whom they had worked for years. However, for the Army the imposition of 'Whole Fleet Management' was a hugely controversial issue. A regiment would no longer 'own' its tanks, whether in maintenance, training or deployed. Instead, the vehicle fleet would be managed much as the RAF manages a fleet of Tornados.

Alongside those headline Joint *How* issues, there were major questions to be addressed on 'people issues' – essentially, how were our people to live and enjoy life? Within the SDR, a team was formed to go out and identify the issues. I will not go into detail on things like education opportunities, addressed as part of a new 'Learning Forces' initiative, or entitlement to welfare telephone calls whilst deployed, part of a wider attempt to address welfare issues. The point is that these things *were* addressed, as were basic problems on under-manning and roulement. As the House of Commons Research Staff said later: the SDR was 'notable in devoting, in comparison with predecessor reviews, considerable space to Armed Forces and Civil Service personnel issues.'[3]

Returning to the *What* and *When*, much of the work of the nearly 50 working groups was concerned with the 28 Military Tasks, the associated Scales of Effort and the forces required for each task, bearing in mind potential concurrency.

In the absence of any exemplar contingencies, the work on scales of effort had perforce to rely on comparison with recent operations.

Now recall my earlier points about the Policy Framework. There

Small – ‘battalion size’. RAF ≈ Iraq No-Fly Zone
Medium – ‘brigade size’. RAF ≈ IFOR Bosnia
Large – ‘division size’. RAF ≈ Gulf war
Very Large/Full – All NATO-declared
Concurrency – 2 × Small – indefinite 2 × Medium – max 6 months, only 1 war fighting

Fig 3. Scales of Effort.

were no pointers to the specifics of any contingencies that we should consider. Yet past operations could not be taken as a detailed example – remember we were going to be asked, in effect, to be accurate to better than 1%! Should we have 154 Offensive Support aircraft or 155? Whatever might happen in Bosnia or Iraq, it could not possibly be a direct re-run of previous operations in which we had clearly demonstrated to potential opponents that they would lose unless they did something radically different or in greater force. There was no help to be had from the Operational Analysis community – they need numerical data to crunch against specific contingencies.

Fortuitously for us in Air Plans, the Scale of Effort comparisons provided to the Army gave us a firm basis on which to work – see Figure 3.

It very rapidly became obvious that the key commitment setting the size of the RAF would be the requirement to be able to conduct a Medium Scale (ie brigade sized) war fighting operation for 6 months whilst concurrently sustaining another Medium Scale (brigade sized) non-war fighting operation.

In a very effective piece of work that became known as ‘sizing the Air Force on a brigadier’s brain’, very largely led by the then Wg Cdr Graham Wright, we considered a wide range of geographies and scenarios. In each case, we asked ‘How much recce *could* the UK brigade (or battalion) HQ process? How many targets could they want us to hit in a day? How wide a frontage would need air defence to meet the UK commander’s needs?’ Discussions with Army staff colleagues led to the conclusion that there was a degree of stability in the responses. In dense or intense environments, the UK Brigade/Battalion Area of

Responsibility (AOR) would necessarily be small, compared to operations in a more open, less intense environment. Playing through required Offensive Support sortie rates gave, we felt, a reasonably robust force requirement over a wide range of circumstances. However, in operations with less dense land threats, a wider Area of Responsibility might require increased emphasis on Air Defence and Recce. As a result, within the defined scales of effort, there would be a need to choose the right team mix of Offensive Support, Air Defence and Recce from a larger squad. This element of choice, along with crew ratios, became key elements for the RAF in the conversion factors to get from the required scale of deployable forces to the peacetime forces from which they would be drawn, as illustrated at Figure 4.[4]

This approach, sizing ourselves on what the Army could really use, had the spin-off benefit of ensuring that there really was no element of inter-Service rivalry between us at any level at this stage. The same applied to Support Helicopters and Transport – they wanted us to get as much of each as we could realistically expect, although in the end it only proved possible to get real support for full ownership of a usefully sized C-17 fleet by going through an expensive lease period to prove to them how much they wanted it!

Returning to the start point – the SDR framework at Figure 1 – I have brought you down the central column of debate and calculation to 'Decisions' and cheated slightly by using finally announced numbers against force elements. In fact, this line of debate was all complete as far as MOD staffs were concerned by the end of 1997 but then the Treasury got involved. The feedback loop of Efficiency and Assets dragged on, as part of the Treasury's Comprehensive Spending Review, all through to a final White Paper in July 1998! The overall impact of the Treasury's inquisition felt small at the time. We had robust arguments for our deployed force elements and could take some additional risk against our peacetime frontline, cushioned by the assurance that we had continuing ministerial commitment to 232 Eurofighters. However, I am sure that Sir Richard will shortly show that this apparently satisfactory outcome depended on papering over a very sizable financial hole.

Force element	Enduring non-war fighting	One shot war fighting	Continuing commitments	Factors	Total
AWACS	**2**	**3**			**5**
AD	**14**	**17**	**6**	**33**	**70**
MPA & Recce	**5**	**5**	**4**	**8**	**22**
OAS	**24**	**42**		**88**	**154**
SH	**20.5**	**26.5**	**7.5**	**9.75**	**64.25**
AAR & AT	**51**	**82**			**82***
RAF Regt Sqns (Field & Rapier)	**1**	**7**	**3**	**2**	**13**

* While it was anticipated that more than one operation might be running concurrently, it was considered highly unlikely that two would be initiated simultaneously, so the total, in the context of AAR and AT, reflects only the *worst case* situation.

Fig 4. Two Concurrent Medium Scale Operations.

Announcements

When authorised comprehensive announcements finally came, as opposed to various titbits and leaks, the package looked very fair for the RAF. True, one Tornado GR squadron and one F3 squadron were to disband. 12 × GR1s, 9 × Harriers and 2 × Jaguars (all the least capable in their fleets) would go into store, bringing the OS force down from 177 aircraft to 154, and we would lose 13 × Tornado F3s, bringing the AD force down from 100 to 87. However, all the notional manpower savings would actually be retained in the Service, easing overstretch. The remaining squadrons (after a last-ditch battle to retain the Jaguar Force) would meet the needs of operational roulement.

On the positive side, there was a commitment to Eurofighter and A400M. Planned procurements of Chinook, Merlin and C-130J were to go ahead. In addition, we had a 'loss leader' lease of four C-17s – which were certain to hook Army commanders on the need for more. Projects ranging from a Beyond Visual Range Air-to-Air Missile, via Brimstone and Storm Shadow, to an Airborne Stand Off Radar were endorsed. And the scene was set for full participation in what became the Joint Strike Fighter. Important 'people issues' had also been addressed, with as much rigour as force sizing, making it a good review on balance for the majority of people in the RAF.

Which brings me to the crucial issues of aircraft carriers and the planned Carrier Air Group. I have mentioned them before but return to them to set the scene for the future.

While I believe that it was discussions around the white board in Wg Cdr Wright's office that brought the Army staffs on side, there is no doubt that the CAS-to-CNS relationship killed any nascent interservice rivalry with the Navy. However, both the envisaged carrier and the Joint Strike Fighter would face difficulties engendered right at the outset of the SDR. Although I personally strongly backed the procurement of 30-40,000 ton carriers, because of their utility if, for example, things went badly wrong in Nigeria, Navy staffs providing the procurement case for the carriers had to stay with the 'North of the Sahara and West of the Gulf' mantra. The resulting 'Poland Restore' scenario required a sizeable airfield and big Air Wing, magically available in the Baltic! Similarly, science staffs had no exemplar contingencies to analyse. Nevertheless, based on measures of effectiveness detached from any other realities, they lobbied hard for

the conventional carrier-borne variant of the Joint Strike Fighter, the F-35C, and thus caused multiple costly re-designs of carriers without or with catapults, both steam and electro-magnetic (EMALS).

Notes.

1 Cm 3999 – Strategic Defence Review, July 1998, p79.
2 *Ibid*, p135.
3 House of Commons Library Research Paper 98/91, 15 Oct 1998, p57.
4 Cm 3999, p175; RAF element of Table 8, Annex B to Essay 6.

WHERE AND WHY DID IT ALL GO WRONG?

Air Chf Mshl Sir Richard Johns

Throughout the duration of the Cold War and its aftermath successive governments launched reviews to cut defence expenditure under a cloak of readjusting strategic objectives. While this inevitably provoked bitter inter-service rivalry as most convincingly demonstrated during the Nott Defence Review of 1980/81, in reality the UK followed the American lead to protect, in part political, addiction to our so called 'special relationship' with the USA. And when the strategic certainties of the Cold War evaporated with the dissolution of the Soviet Union, attachment to US military hegemony remained constant throughout the '90s and indeed beyond.

Post-Cold War, as we have heard, the unremitting search for the 'peace dividend' to enhance key elements of the welfare state was the political priority. Between 1990 and 1997 the mass and capabilities of our armed forces were cut back while their assumed capability to punch above their weight was taken for granted by politicians and the general public alike. Punching above your weight is a most unfortunate cliché that in military reality means that the claimant has insufficient forces in reserve.

It thus came as something of a relief when New Labour, in 1997, announced that their strategic defence review would be foreign policy led to ensure that the future shape and size of our armed forces would be decided by defence and security needs rather than a Treasury-led quest for further financial savings. The roles, missions and capabilities of our armed forces would be adjusted to meet strategic realities. Steve Nicholl has taken you through the significant stages of the process and the eventual outcome as it affected the RAF. Please do not forget that this was all before '9/11' upset the strategic apple cart.

I signed up to the outcome of the SDR recognising that future scales of effort required of the Service were based on the three key assumptions that were rightly stressed by Steve. Although we lost 36 aircraft from the front line, I was confident that we could meet future operational commitments and was delighted that personnel numbers within the uniformed strength of the Service had been stabilised.

I had inherited from Sir Michael Graydon an excellent future equipment programme which the new government accepted. This

included a most welcome commitment to the Eurofighter programme and a whole arsenal of new weapons that included Storm Shadow, the Brimstone anti-armour weapon and a beyond visual range air-to-air missile. It is perhaps worth adding that throughout the 1990s there was considerable ill-informed criticism, from a variety of sources, of the RAF's investment in Eurofighter that ignored the Service's desperate need for an air superiority fighter to replace Tornado F3 and eventually the Jaguar. I well recall Sir Max Hastings telling me that the aircraft was no more than an expensive bauble and asking if I really thought we would be squaring up to the Russians again. But military judgement concerning the importance of Eurofighter to the future combat capabilities of the RAF prevailed. Clear recognition that air power was, and remains, fundamentally based on a foundation of scientific and technological superiority.

Taken in the round, and after publication of the Defence White Paper in July 1998, I considered the time ripe to develop a strategic plan for the future of the RAF that would be based on an honest and critical analysis of the RAF's strengths and weaknesses before opportunities and threats were identified – what is commonly known as a SWOT analysis.

All uniformed members of the Air Force Board contributed to a lively discussion moderated by the recently retired ACM Sir John Willis. The debate was shaped primarily by the outcome of the SDR within which power projection and intervention capabilities reflected the Prime Minister's conviction that the armed forces should operate on the global stage as a force for good and should not, as George Robertson had put in his Introduction to the SDR, 'stand idly by and watch humanitarian disasters or the aggression of dictators go unchecked.'

Whilst this gave the armed forces a new sense of purpose, I was acutely aware that at the end of the SDR process the Defence Council, of which all the Chiefs were members, accepted a financial settlement that would require future cuts in defence spending. The Treasury had pressed for long term cuts of £2Bn but after some serious wrangling this was eventually reduced to £685M. The Defence Council accepted the settlement on the premise that we were not going to get a better deal and we lived to fight another day.

This meant that our strategic plan had to be developed within a financial straight jacket with future spending contained within the

bounds of the planning assumptions. And the strategic plan also had to acknowledge that, if our operational resources, both material and human, were unavoidably stretched beyond the bounds of these assumptions, Ministers had to understand the need for a commensurate period of recuperation if the problem of retention was to be kept within acceptable limits.

The Air Force Board recognised that the planned equipment programme was a key strength enabling the retention of operational effectiveness. But the quality of its personnel was identified as the RAF's principal strength. This required the recruitment and training of servicemen and women of the necessary quality. Thereafter it was essential to maintain their commitment to the Service while contributing effectively to military operations that would involve deploying into both joint and multi-national environments and organisations. The Board recognised that continuing deterioration in the standard of the RAF's estate, that affected both morale and commitment, was a matter of concern. But rectification of long-standing deficiencies was not going to be easy, given the financial settlement. Shortly afterwards the SDR settlement took a turn for the worse when a change to its final agreement, as published in the Defence White Paper, added a further and unexpected burden to the Defence Budget.

My optimism for the future of the RAF as set out in our strategic plan, which had been circulated throughout the Service, was soon proven to have been misplaced and naïve. In January 2000, a meeting of the Air Force Board Standing Committee was joined by Admiral Sir Peter Abbott – VCDS and an old friend and colleague – and Vice Admiral Sir Jeremy Blackham, (Deputy Chief of Defence Staff Equipment Capabilities) who introduced a Central Staffs Paper setting out concerns about the MOD's financial position. The paper established a framework for taking options for savings (cuts) on operational capabilities and the equipment programme. For the RAF, cuts in operational capabilities included a further reduction in the Tornado F3 Force, to be taken on top of the SDR cut, which was itself not fully justified by planning assumptions. Other measures included dispensing with two BAe 146 communications aircraft, reducing the number of VC10 tankers and a cut back in Strike Command's annual flying task by 20% – a reduction that, if implemented, would save no

more than £20M a year but leave only half of the Tornado strike/attack squadrons combat ready.

The final outcome of these proposals was not decided until after I left the Service in April 2000. However, before then, the AFBSC had recognised that proposed cuts to our budget would have most unwelcome consequences. These would include cutting back on a number of planned infrastructure improvements and quality of life matters to accommodate the pressure of continuing operational commitments. In the longer term, the introduction of new equipment to service would be delayed and future projects cancelled or postponed. The sum of these measures ran counter to the SDR outcome which, in terms of combat power alone, aimed to promote increased levels of readiness and much improved logistic sustainability.

The credibility of the SDR was thus undermined and I handed over to my successor a plateful of problems. This was not a happy note on which to conclude my service career, recognising that during my three years as CAS the war fighting and operational capabilities of the RAF had declined. To give some balance to my disappointment, I could count success in: protecting the Jaguar Force from disbandment, as had been proposed by the Secretary of State's Special advisor, Mr Bernard Gray; the procurement of four C-17 heavy lift aircraft under a lease agreement; and the stabilisation of RAF personnel numbers with a return to normal promotion quotas that had been frozen during the draw down in the uniformed strength of the RAF. Concerning the C-17s, I would have far preferred an outright purchase rather than leasing, a far more expensive option but the only way to guarantee the procurement of the aircraft. Some years later I was told that the eventual cost of leasing was sufficient to have purchased outright eleven C-17s – which had been our calculated requirement within the SDR process! While I cannot guarantee the validity of this claim, it does underline a consistent theme in the financial management of the MOD – spending always focussed on the short term, rather than seeking real value for money with longer term investment in key operational needs.

While today's seminar is focussed on the 1990s, I cannot conclude without reference to two particularly controversial matters that stemmed from the 97/98 SDR. The first concerned aircraft carriers. Once the government had decided that the UK was to remain in the power projection business with intervention capabilities, I supported the

replacement of the *Invincible* Class carriers with two new ships, of no more than 40,000 tonnes as agreed with the First Sea Lord and recorded in the eventual Defence White Paper. I thought the ships would be similar to the US Navy's *Wasp* Class amphibious assault ships that could operate a mix of fixed wing aircraft and helicopters with Royal Marines embarked as required by operational circumstances. I had no idea that sometime after I left the service, the ships would morph into 65,000 tonne monsters with the original budget, as agreed in the SDR, then exceeded by some £2Bn.

The growth in the size and cost of the carriers led, not only to a substantial decrease in the surface and sub-surface fleet numbers required to protect them, but also to a distortion of the future equipment programme to the disadvantage of both the Army and the RAF. How this came about still remains to me a sweet mystery of life. I will say no more than to observe that discussion on the future of the carriers in the SDSR of 2011 provided a prime and distressing example of muddled thinking, indecision and contradictions in Whitehall. While the carrier programme remained intact, the overall conclusion of the SDSR cuts in the defence budget reduced the strength of our fighting forces by about one third.

My second concern centred on hubris. While our national engagement in the Iraq war has been subject to the most detailed scrutiny, the decision to mount a concurrent deployment to Afghanistan rendered irrelevant the planning assumptions that were the bedrock of the 97/98 SDR. There is no doubt in my mind that the Army was not without fault within a process that ignored the assumptions associated with commitment to two medium level operations at the same time. In consequence we fought two campaigns between 2006 and 2008 without the capacity to resource either of them properly. Subsequent events in Basra and Helmand provided the most damning evidence of the inconsistency between political aspirations and the military resources required. In essence, the Armed Forces were left devoid of the necessary wherewithal to undertake, let alone complete, their missions. And the blame for that cannot be placed solely on politicians who listened to their military advisors in the MOD.

Hard earned experience in Iraq and Afghanistan, still entirely relevant, demonstrated that an unsophisticated enemy, not at all dependent on cyber and advance electronic systems at the operational

and tactical levels, could inflict unacceptable losses on ground forces of high capability sophistication. In the aftermath of the Cold War, when it seemed that liberal democracy had prevailed, successive governments indulged in a spree of social democratic largesse while, at the same time, refusing to make difficult decisions on defence. Ministers feared the electoral consequences of slashing other budgets to sustain, let alone bolster, military capabilities. Competition between government departments to spend tax payers' money favoured those with short term relevance to personal wellbeing. So perhaps it is not altogether surprising that, while the 97/98 SDR gave some hope that defence would be protected from Treasury raids, this sadly soon proved to be an illusion.

It is, however, too simplistic to pin all the blame on politicians for the decline in defence capabilities as we entered the new millennium. The 97/98 SDR placed much increased emphasis on 'jointery' as subsequently evidenced in its outcome; the formation of Joint Force Harrier and the Joint Helicopter Force are prime examples. But within the armed forces there were still military obsessives who were unable, or unwilling, to think outside the boundaries of their own operational domains. As the financial screw was turned it was predictable that protecting single Service interests once more came to the fore, which both upset the balance of military capabilities and ignited fierce competition for influence within both Whitehall and Westminster. After the events of '9/11' I can find no clear evidence that the Chiefs of Staff collectively played their part in defining a defence strategy derived from a clearly defined defence policy. The consequence perhaps of the influence and authority of the Chiefs of Staff being diminished by their dispersal some distance from Whitehall, and from each other. In theory, military commanders are required to respond to political ambitions with practical realism that reflects their understanding of the nature of war. But this process appears to have been supplanted by another that decides how much money is available and then requires the Service Chiefs to fit their capabilities within the allocated budget.

Thus the outcome of the 97/98 review, underwritten by the definition of a defence policy and relevant planning assumptions, did not survive the geostrategic turbulence that followed in the wake of '9/11'. The campaigns in Iraq and Afghanistan failed to achieve a lasting victory in

either country, thus discrediting Prime Minister Blair's concept of deploying the military as a force for good. Failure was the inevitable consequence of conducting simultaneous campaigns in Basra and Helmand each impacting heavily on the other.

Post-Cold War there appeared to be little justification for continuing to divert resources from the civilian economy to defence spending. This assumed continuing American commitment of its protective power to NATO, the continuing technological superiority of the West and the continuing absence of a direct threat to the United Kingdom.

By the turn of the century the government had set out the role it wished the UK to play on the world stage. Since then a catalogue of strategic miscalculations, fiscal incompetence in the MOD, poor procurement and a constant process of salami slicing to cut defence expenditure have left our armed forces with a Royal Navy unable to muster sufficient ships to protect their new aircraft carriers, an Army at its smallest since the Napoleonic Wars and an RAF less than half its size of 25 years ago.

As I write, Russia's bloody onslaught in Ukraine demonstrates that a military threat to western Europe has never disappeared, as assumed in post-Cold War reviews of defence spending. Moreover, military thinking in the MOD, understandably and progressively, focussed on new forms of conflict such as cyber and space warfare. That said, there appeared to be an institutional failure to recognise that new additional threats were not substitutes for existing threats that required substantial naval, military and air forces. Moreover, the development in western democracies of hybrid warfare capabilities and a presumption that future fighting would be conducted in cyber space has proven to be no deterrent to Russian aggression.

From a national viewpoint it seems that the retention of influence and credibility with our allies requires an uplift in defence spending from the present 2% of GDP to 3% if we are to replenish our stock holdings, having gifted so much to the hard-pressed and gallant Ukrainians, as well as doing more than just increasing our currently diminished national defence capabilities. In present economic circumstances I for one am not holding my breath in confident anticipation. But, should an uplift be agreed, would the money be wisely and effectively spent? The story of national defence since the end of the Cold War does not bode well.

Q&A and Discussion

Chris Brockbank. Isn't the basic problem money? I suspect that the carriers you spoke of actually had less to do with 'defence' than being a political gesture in favour of the constituency where the carriers were to be built.

Air Chf Mshl Sir Richard Johns. Oh dear! (*Laughter*) Taking the second part of your question first, I should perhaps point out that I left the service in 2000, so my fingerprints weren't on the increase in the size of the carriers. That said, there can be no doubt that, while these ships were getting bigger, Chancellor Gordon Brown would have been influenced by the prospect of increasing the amount of work going to the Glasgow shipyard. There was no strategic discussion regarding the size of the ships, which is an issue that people are currently struggling to explain. After all, we haven't heard anything about aircraft carriers in relation to the recent Ukrainian crisis . . . one wonders what utility they might have in that context.

I think it's also worth pointing out that the decision to replace our *Invincible* Cass carriers was made before the events of '9/11'. The original proposal had been for something like the *Wasp* Class carriers that the US Navy and Marine Corps use. They could have embarked an air wing of Harriers, which we already had, along with a Royal Marine commando with its amphibious assault craft plus helicopters. You could cram all of that into a *Wasp* Class ship and that was what I had hoped the Navy would look at.

AVM Steven Nicholl. Perhaps I could add something, from the perspective of my time at BAE Systems, rather than from an RAF viewpoint. It was certainly true that there was enormous pressure to keep industry going, and the military shipbuilding business in particular, a major factor being to sustain the pensions of the associated workforce.

When BAE Systems took over the running of all military ship-building, as part of the Government's 2005 Defence Industrial Strategy, it did so with rather bad grace, not least because it cost the company £540M to buy out the holes in the pension pots of the various inherited shipyards and other facilities – and there were dozens of them. But it did so in anticipation of orders for two 40,000 ton aircraft carriers and

a steady flow of work on good sized destroyers, all of which would keep the business viable. However, within weeks of the agreement being signed, Gordon Brown tried to welch on the deal by cancelling one of the carriers. That didn't happen because – and, while I have no direct knowledge of this – I am told that Ian King walked into his office and said, in effect, 'What don't you understand about the fact that this piece of paper has two signatures on it – mine and yours?' The Chancellor was obliged to stick to the two carrier-contract but he got his pound of flesh by cutting back elsewhere, hence the lack of ships to support the carriers.

AM Iain McNicoll. With respect to the question – yes, of course it's all about money, and the effect is one of imbalance. While there are some issues with respect to the air force, the maritime imbalance is actually even worse. I'm thinking of the lack of appropriate air defence cover for the carriers, the paucity of anti-submarine warfare and, indeed, the lack of submarines themselves.

Johns. As a final observation, I think the Air Force is currently in a much healthier position compared to both the Navy, as we have just heard, and the Army. Most of you are probably aware of the ongoing problems with the Ajax armoured vehicle, and indeed the equally troubled Future Rapid Effect System (FRES) project that had preceded it. Ajax was the great talking point within the Army when I was still serving, and they still haven't got it right . . .

Paul Burton – from the AWE. I have two questions. For Sir Roderic, you spoke about the rapid collapse of the Soviet Union. How much might that have been to do with the Moscow coup? For Steven, with my proper nuclear hat on, you glossed over the nuclear aspects of 1998 by saying that the WE177s had already gone. We actually dismantled the last of them in 1998, so when was that decision made?

Sir Roderic Lyne. How much of the speed of the collapse of the Soviet Union could be attributed to the coup and the shift from Gorbachev to Yeltsin? Quite a lot. The Soviet Union was collapsing anyway. Gorbachev didn't know where he was going. He had lost his way by then. He was trying to hold it together, but it was going to fail. Without a coup, I think it might have failed more slowly – there were the beginnings of a negotiation about what would happen afterwards. But

the coup interrupted that process and we accelerated towards independence. There had been a variety of independence movements up and running before the coup, but it was the one in the Ukraine that precipitated the collapse. You may recall that on 1 December 1991, the Ukraine held a referendum in which every single district, including the Crimea, registered a majority for independence from Russia, the overall majority being slightly over 92% on an 84% turnout – the sort of turnout we never get in a fairly conducted referendum in the UK! The Ukraine was going to go anyway, so the coup only served to confirm that.

Nicholl. On the nuclear issue, my point was that all of the RAF's WE177s had been withdrawn from active service by mid-1992. They couldn't just be buried somewhere to rot, of course, and I believe they went to Navy storage facilities. We ran those down over time, but when you were dealing with them, in the late 1990s, I think that they would have been delivered to the AWE from RN, rather than RAF, storage.

Johns. I need to make a slight correction here; Ian thinks that the WE177s weren't withdrawn until 1998 and I think he's right.

Just as a matter of interest, at much the same time as the WE177 was withdrawn, the increasing international distaste for anti-personnel sub-munitions also meant that we lost the JP233 airfield denial weapon and the BL755 cluster bomb.

AVM Johnny Stringer. First off, thank you all for wonderful presentations. I think that the day really met its remit. Two questions if I may, and I don't know how easy they are to answer. First, did the Air Force struggle to tell its story during the 1990s and, if so, why? Secondly, from today's presentations, I sense that the elephant in the Air Force room of the '90s might have been the force structures we imposed on it as a result of decisions made in the mid-'60s through to about the mid-'70s. And I wonder whether you have any thoughts on the RAF's take on air warfare in the 1990s compared to that of the USAF.

Air Chf Mshl Sir Michael Graydon. As to the first question, I did try – and I got slapped down for it. Without going into detail, there were, shall we say, 'forces of darkness' operating against us. They had the ear of two powerful members of the Government to whom they laid out possible routes to becoming Prime Minister. Some of this is beyond

belief, but that *was* what was actually happening! But one could hardly go along to the newspapers and say, 'Do you know what's happening in the Secretary of State's office – and with his adviser?' Much the same sort of thing was going on at the Treasury, so we really were fighting with both hands tied behind our back.

All we could do was rely on the arguments that we were able to bring to bear via the denouement of the Defence Costs Study (DCS), ie 'Front Line First', which was simply a cost cutting exercise – there was no more to it than that. But then, out of the blue, came DCS 19, a specific study into the RAF and a clear indication that 'they' already knew what they wanted to do. I have actually been briefed on this. Surprisingly enough they even saw fit to invite me – as CAS! – to join the group! Needless to say, I declined, and the eventual outcome was the formal inquisition in the Chief of Staffs' Conference Room that I referred to in my presentation. I wasn't able to publicise this prior to the event, and I certainly couldn't involve the press, so the best I could do was to visit all the stations in the aftermath.[1]

What was the second question?

Johns. Was the Royal Air Force, as structured in the 1960s, a deciding factor as to how it was equipped in the '70s and '80s? I think that was the gist of it. Yes?

Stringer. In the mid-1960s through to the early-'70s, defence policy was fundamentally driven by our commitment to NATO's Central Region and this bequeathed us the Air Force with which we inevitably entered the post-Cold War 1990s. While similarly committed, the USAF had always had a slightly different tactical perspective as a result of its experience in Vietnam and, perhaps, by studying the Yom Kippur war. Today's presentations gave us excellent snapshots of the '90s. I just wondered to what extent the RAF's capabilities in the '90s, compared to those of the USAF, had been determined by the decisions we had made twenty years earlier.

Graydon. Two comments on that and then others might like to contribute. First, we simply couldn't afford a strategic bomber capability. The Americans had the muscle – the money – to maintain a fleet of long-range bombers. We simply had to live within our available resources and deal with those things that we were capable of dealing

with. The immediate threat prior to the 1990s had been the Soviet Union, hence the continental strategy that we had adopted, and I think that we got that right at the time.

During that time – the later years of the Cold War – the big difference between ourselves and the Americans was the fallout from Vietnam. The Americans had delivered mass raids by B-52s and tactical strikes by fighter-bombers, all made from medium level, supported by anti-radar missiles, electronic warfare and so on. We didn't have any of that – and we still haven't, not really. The upshot was that we opted to seek the protection provided by operating at low-level and that determined the weapons that we would use. I recall that there was a great debate about this in the 1970s. The conclusion was that it was very useful for NATO to have both the USAF armada *and* be capable of delivering at low level – which *we* were good at.

In the long term, it probably proved not to have been the right thing to do, although it had seemed OK at the time. And at that time – pre-the 1990s – it probably *was* the right thing to do. And, of course, as your question suggested, it was low-level tactics that drove the development of our aircraft. I think we've got it about right now, and stealth has been a positive factor too. But, as I said earlier, in my comments on Front Line First, in the end it's all about money. We simply couldn't afford strategic bombers, nor the aircraft that would have been needed to support them at medium level.

Johns. Can I just add something to that? Do remember that in the 1960s we were withdrawing from the final remnants of empire, which was a central Government priority. I was in Aden for the last couple of years before we withdrew from there in some haste. While we did succeed in getting ourselves out in good order, we left behind a bit of a mess which still has echoes in what's happening in the Yemen today. It wasn't quite so bad in the Far East, although even there we had the Confrontation with Indonesia, which was costing a lot of money.

When the imperial dust had settled, our focus was on Europe and NATO. There was some debate about priorities – should we concentrate on protecting the transatlantic reinforcement route or the security of the Central Region? The 1980 defence review made the Central Region the priority and, as a consequence, the RAF got more manpower and aircraft. We were the winners on that occasion, but only

two years later the applecart was upset by the Falklands campaign . . .

Nevertheless, we continued to make a significant contribution in the Central Region, not least by fielding tactical nuclear weapons. From as early as 1960 up to eight of RAFG's Canberras were standing QRA at 15 minutes' readiness armed with US-supplied bombs, and from 1971 these were replaced by the WE177 and that remained the case until 1998. Talking to RAF people of a later generation, however, I have been surprised at how many of them are quite unaware of this. Nuclear weapons aside, RAFG was heavily committed to supporting NORTHAG, and 1(BR) Corps in particular.

AM Sir Stuart Atha. I want to pick up on the ability 'to tell a story' and 'what's an Air Force for' and 'combat air mass' and join those three things together.

It's interesting to reflect on the demands of the Central Region, the air forces deployed in response and the basis for this force structure. In this regard, it was really interesting to listen to Steve Nicholl refer to the absence of this thinking at the top. Of course, the reality is that you will never have the combat air mass that you would like. At the start of this century, we survived the Medium-Term Work Strands (2004)[2] relatively unscathed. I believe we were helped in some regards by the language of 'force elements at readiness', but it was considered a black art to understand why we needed to buy a certain number of aircraft in order to deliver a much smaller number of *ready* aircraft. There's one person in this room, however, who I've seen do this very effectively and that is Greg Bagwell. When presenting at Staff College, Greg used to ask students to stand up to represent the total fleet size and then progressively sit down as he listed those factors, such as deep maintenance and attrition, that take you from a total fleet size of 232 Typhoons to a certain number of Force Elements at Readiness.

As well as describing the size of the force you also need to explain what they are at readiness to do. We did this effectively during the Medium-Term Work Strands, protected our combat air forces. But then there was the Strategic Defence and Security Review (SDSR) of 2010[3] and the decimation of 'combat air'.

The significant reduction in 'combat air' that was an outcome of SDSR 2010, and a consequence of the decision to focus on operations in Afghanistan and the short-to-medium term needs of the Armed

Forces, knowingly took risks against the longer-term ambition. This is perhaps an understandable approach given the national investment, in terms of blood and treasure, in Afghanistan. However, the risk taken was exposed by the emergence of a resurgent Russia and the events in Ukraine in 2014/15 which led to the SDSR 2015 policy headmark of Warfighting at Scale,[4] against a near-peer adversary in an Article V-type operation.[5]

The challenge was then how to translate this into a requirement. For the Navy it meant the delivery of the independent deterrent and the carrier strike group; for the Army it was a manoeuvring division in continental Europe, but for the Air Force it was 'to do stuff'. And therein lies the problem. What are air forces for and what is the unifying concept of employment for our forces? I suggest that we struggle to tell this story and therefore why we need greater combat air mass. This is a challenge made even more critical when you add the 2021 Integrated Review ambition for a Global Britain.[6] When taken together you have to say 'hang on a minute' – as Sir Michael said earlier, size matters. Look at the operational challenge facing the Air Force today, and ask yourself if 107[7] Typhoons are really enough?

Nicholl. Might I make a point? I think that Sir Michael was right when he made the point about there being a pivotal difference between the RAF and the USAF during the 1960s and '70s and he also made a passing reference to 'stealth'. There is a popular perception that stealth was an American invention. I was the RAF's 'stealth officer' in 1980 and at that stage 70% of all stealth material used by the American forces was actually British.

Furthermore, and interestingly, the first attempt to produce a stealthy aeroplane that I know of, and that includes any early American efforts, was also British – a Boulton Paul Balliol no less – although it could barely lift the radar absorbent material that was put on it.[8] There was a subsequent much better project, which I won't enlarge upon.[9]

Unfortunately, with hindsight, in the '60s the Air Force Board decided – and I have seen the paper – that stealth was a waste of time. The logic underpinning that decision was based on the fourth power law for radar[10] and a study, done at the time, that concluded that, in order to drop a bomb accurately, you had to be within 3,000 feet slant range of your target. That implied low-level, with its associated limited

exposure to contemporary Soviet radars. Since this minimised the need for stealth, work stopped. Within a couple of years, the first lasers had appeared and these had the potential to permit weapons to be delivered as accurately from 30,000 feet as they could from 3,000 feet, but at altitude you would be far more exposed to enemy radars, and stealth would be critical. Once you cancel a research programme however, the scientists involved move on to other things; the momentum rapidly decays and is soon virtually irrecoverable.

Johns. I can offer a couple of other thoughts. The first relates to Johnny Stringer's question about the RAF's struggle to tell its story in the 1990s. Little has changed, even today, and I have often reflected on the position of the Royal Air Force within national society. I live in Wiltshire, the cradle of military aviation in this country – Upavon, the CFS and Salisbury Plain was where it was all happening in 1912. Today the RAF has no operational presence in Wiltshire and no one there is telling the story of the historical relationships between the county and the RAF, although there is something of a link via the Boscombe Down Aviation Collection in Hangar 1 at Old Sarum.

My second thought is right up to date. I listened to the *Today* programme this morning, which dealt with the crisis in the Ukraine. I picked-up on a statement to the effect that 'of course the British generals and admirals all agree that . . .' and I thought, what about the air marshals, since control of the air will be essential if the Ukraine is to survive.

My point is that the media tend to invite all sorts of people, like generals, to give their views on such things as No-Fly Zones about which they know, to put it politely, relatively little . . . So that's my first moan. The second is that I am second to none in my admiration of the United States Air Force. I have often worked with them over the years, and the relationships between the RAF and USAF has always been very strong – but you can't always rely on them . . .

As an example, during the first Gulf War, I was in the Joint Headquarters when 7th Armoured Brigade deployed in-theatre. We asked about SH support, but the US Marines, who were already there said 'No need to bring any helicopters. We have more helos than we know what to do with; if you need SH support we'll provide it.' That lasted until, I think, December when the offer was withdrawn so, at

short notice, we were suddenly obliged to deploy our own helicopters – and there were quite a lot of them.

The second incident involved laser pods. Some might reasonably ask, why we didn't deploy our own earlier? Apart from the fact that there was a potential problem over finding parking space for Buccaneers, the USAF had assured us that, if we needed laser designation, they could and would oblige. But when the intensity of operations increased they didn't have the spare capacity, leaving us to scrabble about getting the Buccaneers into theatre so that they could support the Tornados.

McNicoll. I think that we in the RAF are sometimes rather too hard on ourselves. With respect to Johnny's question about the 1960s and '70s – and indeed the '80s – geopolitics, national politics, European politics, all pushed us into becoming an exceptionally well-trained, and organised, Cold War, low-level, central European air force. But Gulf War I threw a very large spanner in the works. Our equipment, our training, everything just wasn't right for that and adjusting to a new reality, through a decade during which finances became more and more constrained, was bound to be difficult. So, with respect to what has already been said today, I recognise that, especially with hindsight, a lot of things could perhaps have been done better and been better organised. But I think it important to understand that what was done, had to be done within the prevailing, and very real, constraints.

Graydon. Could I add another comment – related to Sir Richard's observations on the RAF's relationship with Wiltshire. I live in Lincolnshire, which has always been home to a substantial proportion of the RAF. One might have thought that, in a county with such a large air force presence, the RAF would be quite well known but, in practice, the Army is better known – and there isn't much Army in Lincolnshire. The reason is that the 'regimental system' is very powerful and it exploits the local links that the Army does have, and the work that it puts into them – hosting charitable events and the like – means that people support them.

Most of the support for the RAF seems to come from museums – like this one. In Lincolnshire it comes from the International Bomber Command Centre, which is now a centre point for Air Force publicity.[11] In fact the Centre gets more exposure via radio interviews and TV than

does the local RAF. So that is something that the RAF is not getting right; we should take a lesson from the Army, and possibly the Navy as well.

Wg Cdr Andrew Brooks. One thing we didn't touch on this morning was unmanned aerial vehicles – UAVs. We've now reached the stage where even the Turks are selling very good UAVs, in contrast to the UK, which doesn't seem to have done very well in this field. There is (was?) the Mantis programme which first flew back in 2009 but we still don't have any. Same with HERTI and Taranis. I think that there was – and perhaps is? – always a sense within the Air Force in general, and the pilot Mafia in particular, that these things weren't 'real'. Have we missed a trick by not producing world-beating UAVs?

Johns. I have to say, I'm all for them. But it's a very good question, and you're absolutely right. The Royal Air Force's *raison d'être* has always been to generate air power – full stop. And one does that using any means available that will give you a technological edge and superiority in combat. In the fullness of time, UAVs will eventually do it better than manned aeroplanes. But having said that, I suspect that there may be some roles that will always require a hands-on man in the loop – and not in some remote ground station.

I have heard it said that US Navy aviators have been criticised for having slowed down, or stopped, the development of an unmanned long-range strike programme. One can perhaps have some sympathy for that attitude – after all, turkeys don't for vote for Christmas. But so far as the Brits are concerned, we have made some progress with Reaper and the forthcoming Protector, although both are American, so I do have to concede your point.

AM Greg Bagwell. Stu and I, certainly in our times as the DCom Ops regarded the Reaper/Predator force as the go-to solution for so many of the more recent conflicts, whereas here we have largely talked about the manned elements of the '90s. But in the last two decades the remotely piloted force has been at constant war – even harder when you're doing it from Lincolnshire, and then you go home at night and go back into your cabin. So, I don't think we disregard it. I think unmanned has its place. I think it will have more places to come. Looking at Ukraine, the biggest surprise to me is how survivable they have been because, if

you had asked my opinion on Day One, I would have said they'd all been gone within a week. They would have been shot down – the S300s, 400s would have taken care of them. So, there's some stories that come out of Ukraine that don't quite add up. Because they currently aren't as survivable as we'd like them to be. We've been able to use them in operations where we've had air superiority and have been able to pretty much operate at will.

So I don't buy your argument. I don't think we've slowed down their production, or their introduction into service, because we've been trying to keep our cockpits alive. And I think that what we have brought into service in the Royal Air Force we should be quite proud of, and I think you'll see more over time. But there's also a balance; they are less survivable. They are also less flexible – and they don't go very quick. That needs to be solved. And over time, I'm sure we'll see increase in their use.

Air Cdre Bill Tyack. In the early to mid-'90s I was DOR (Air Systems) working for Ian Macfadyen and Chris Coville. On the issue of 'were we slow to pick up on UAVs?' – we certainly looked at it. At the time, there was no shortage of people advocating the acquisition of UAVs, but the arguments that were being put forward amounted, in effect, to 'a manned aircraft without a man in it.'

The central theme was that, if you are going to save lives, you ought not to put people in harm's way. It followed from there that UAVs would be cheaper because, if you don't have a pilot, you don't need to provide for life support or survival. But this was a rather simplistic approach, as it envisaged aeroplanes that could do everything that a manned aircraft could do, which was way beyond our reach at the time – and it still is. The upshot was what we have today, UAVs that are very capable but only within relatively constrained roles and with air superiority a prerequisite.

Chris Brockbank – again. Can you comment on the problem of informing the public about what the Royal Air Force does? As Sir Michael, indirectly my boss, has indicated, he is well aware of this problem through his association with the International Bomber Command Centre. I have done a lot of interviews with wartime Bomber Command personnel and I detect, among the public in general, not just the veterans, an antipathy towards the idea of bombing people. There

is less concern about fighters, because they were – and potentially, at least, could be again – our salvation. So, it's okay to buy fighters but less easy to explain to the public that we need to spend a lot of money on aeroplanes with which to bomb people. Any thoughts?

Sqn Ldr Peter Crispin. I was maritime. Is one of the Air Force's problems a lack of collective memory, both military and industrial? I left the Air Force in 1989 because I was asked to start the Nimrod Mk 2 replacement programme. I was told that it was going to take 10 years to 2000. I said, 'No, I'm leaving the service – and it's going to be *at least* three years late.' And, of course, the Mk 4 was late – and cancelled.[12] The lack of memory aspect refers to the state of the Mk 2 airframes that were to be recycled into Mk 4s. They were all different sizes; they had corrosion; I could go on and on. The point is that various people in various places knew all that, but there was no 'collective memory' in BAE, nor in the RAF. How do we overcome that?

Johns. Gosh! When I took over from Mike, the Nimrod MRA4 was well underway, and I did my best to get it scrubbed. The reason I was against it was that I had previously been involved in the Nimrod AWACS project, and I knew how much that had cost before it was cancelled. We eventually replaced it with the Boeing Sentry, of course.

While I confess that it was purely intuitive, the MRA4 problem seemed quite simple to me. As I saw it, without getting into any of the facts and figures generated by British Aerospace or BAE Systems whichever they were at the time,[13] the basis of the project was to put new wings on an old fuselage. You can provide a smart glass cockpit, of course, but the fuselage is exactly the same size as it was when it was a Comet back in the 1950s. So how could we squeeze into that relatively small airframe all the electronics, sensor stations, operational supervisors, etc and then knit the whole lot together to create an integrated working system – and guarantee that it would *work*?

I explained my concerns to the then Secretary of State and he asked me what I would do to replace it. My immediate thought was to acquire some of the P-3 Orions mothballed out in the desert in Arizona. Some say that they were already knackered. I wasn't so sure of that, but the point was never resolved because the idea went no further. In the meantime, the Secretary of State accepted BAE's assurance that the MRA4 would work – and work really well. When I raised my eyebrows

at this, I recall George Robertson saying, 'Oh, and by the way, if it was scrubbed (I can't remember the precise figure, but it was something like) 1,500 people will be put out of work at Warton – and there are two Labour constituencies right next door to Warton.' End of story until 10 years later when the MRA4 was cancelled.

That's my personal perspective. Mike – you might see it differently.

Graydon. With due respect to my friends at British Aerospace, they conned us. I remember going up to Warton and being told, 'We've done all this to the first one,' and they had a wonderful model of it. They showed me how they had put the wings on and assured me that it was all going to be perfectly alright. And, naively, I believed them.

Richard Folkes. I'm also from Wiltshire, Sir John, although I'm Army, so I'm a bit of an imposter here today. But thank you for a fascinating day.

At the time of the Strategic Defence Review, I was working for, then Colonel, Richard Shirreff in Army Plans. And I remember the day, it was the glorious 12th of August, that Air Vice-Marshal Tim Jenner, who was ACAS at the time, injected a loose minute suggesting that the SDR should examine the idea of a 'defence helicopter force'. I just wondered what that might involve. Would it have included the Navy's helicopters – possibly run from High Wycombe? Or was the expectation always, as it turned out to be, a battlefield helicopter command, with infantry, artillery and engineers all part of that same command?

Johns. I have something of a history in this because, way back in 1986, I used to go to Corps Study Periods and so on, and my wartime appointment was as Commander Air, 1st British Corps. During exercises, I used to go out and run the Air Support Operations Center – the ASOC. I did it about nine times – in the most ghastly, wet, cold, miserable cellars around North Rhine Westphalia. It was about then that I first heard the take-over argument being publicly put forward by the then Commandant of the Army Air Corps. 'Why does the Royal Air Force have a support helicopter force under its own command? Why can't it come over and join the Army Air Corps?' This was a blatant 'cap badge' issue, and it was very easily countered. An appropriate study was commissioned and, come the 1997/98 Defence

Review, I was pretty certain that this would be resurrected again, if not by ourselves, or General Roger Wheeler, who was CGS at the time, probably by a civil servant. Because I had previously spent quite a lot of time working with the Army, notably via the Harrier Force and having had the SH Force at Gütersloh under command, I did know a little bit about this.

In the event nothing happened at first in '97/98, but I was sure that it soon would, so I went along to see Roger Wheeler to suggest that we should get our act together before the Civil Service took the initiative and appointed someone to lead the study – quite possibly not someone we would welcome . . . I suggested that the RAF had an ideal candidate, someone who had done exchange tours with the Fleet Air Arm and the Army Air Corps and with Special Forces. CGS agreed and Joint Helicopter Command was established in 1999 with AVM David Niven, who is here with us today, as its first commander.

There was (and perhaps still is?) a perceived problem, certainly within the RAF, with the concept of 'jointery'. How would air force careers be managed while folk were working within, what was bound to be, an Army environment? Why would it? Because I had agreed that operational command of this force should go to CINC Land, and it would have made no sense to have a joint helicopter command with two bosses. This initiative was not welcomed within the RAF and I spent some time going around the Service to explain the implications of full command and operational command and the differences between them. In the event, I think that concerns about careers had probably been misplaced because, less than 10 years later, both CAS and ACAS were support helicopter people.

The Royal Marines' 'jungly' helicopters, were also absorbed into Joint Helicopter Command but it was agreed that, since they had nothing to do with 'battlefield' operations, the Navy's anti-submarine helicopters would remain outwith the new structure.

My understanding is that, having been field tested in Iraq and Afghanistan, and indeed Northern Ireland, for more than twenty years, Joint Helicopter Command is still a going concern with command having been vested in 2-star officers drawn from all three services.

Maggie Appleton. Can I perhaps finish by thanking you all for what has been an amazing day. Needless to say, I have to pick up on the

references to 'telling the RAF story', because that is, of course, central to what we do here at the Museum. There are other great ways of telling our story and I think that 'The Reds' and the Battle of Britain Memorial Flight do it brilliantly. But, in terms of the current public mood, I think it's really sad that there's been a wave of positive support for our Armed Service because of the dreadful things that are happening in Ukraine – it shouldn't take that.

But all of us who work in the museum sector – our colleagues at Bristol, at Montrose, at Cosford, of course, and here at the National Museum, and at the memorial at Lincoln – see it as an absolute privilege to be responsible for telling the RAF's story, and that includes *today's* story, not just the past. Apart from coming to see the aeroplanes, many of the visitors to our museums have gifted objects, but, like some of you perhaps, many say, 'Oh, we're ancient history.' Well, you're not! We are about telling *today's* stories, and tomorrow's stories – and we keep on collecting. We need to record current developments, like environmental issues – electric aircraft, the greening of airfields, and the space story. So I will end with a plea to all of you. If you haven't already shared your story with one of us, please do. And equally, if you have a small object, a keepsake that tells your story in a powerful way, come and talk to us, because it's important that we preserve and share these things. Most of our visitors aren't military people, so it's really important that we fly the flag on the RAF's behalf. Thank you all very much indeed.

Johns. Maggie – thank you very much for those words, which were very, very important to us.

Notes.

[1] Ideally, I would have provided an on-line reference to DCS 19 but, beyond the overall summary of 'Front Line First' at https://researchbriefings.files.parliament.uk/documents/RP94-101/RP94-101.pdf I failed to turn up any of the specialised studies. **Ed**

[2] Medium-Term Work Strands are/were element of a revision of MOD policy, which were of critical importance to the RAF, carried out in 2004-05, eg Ground Based Air Defence was transferred from the RAF to the Army as a consequence.

[3] A summary of the provisions of the SDSR 2010 may be accessed at: https://www.gov.uk/government/publications/the-strategic-defence-and-security-review-securing-britain-in-an-age-of-uncertainty

[4] A summary of the provisions of the SDSR 2015 may be accessed at: https://www.gov.uk/government/publications/sdsr-2015-factsheets

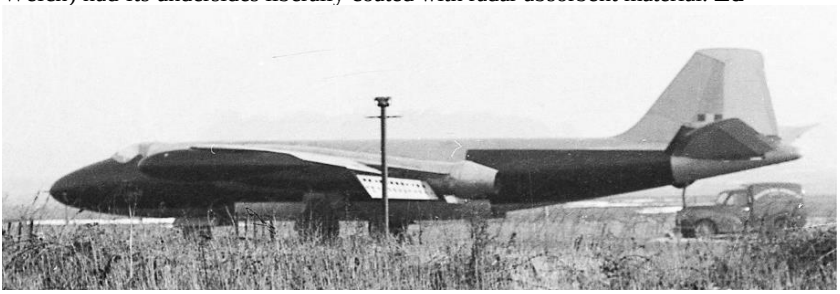
[5] Article V, of the 1949 North Atlantic Treaty, is its central tenet; it commits all signatories to mutual defence, the principle being that an attack on one is an attack on them all. **Ed**

[6] 'Global Britain in a Competitive Age' may be accessed at: https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy

[7] In 1998, the UK formally committed to acquiring 232 Typhoons, but this figure was subsequently reduced to 160. In 2021 it was announced that early 'Tranche 1' airframes, of which the UK had received 53, were to be prematurely retired, leaving a notional total of 107. **Ed**

[8] WG125, the 'stealth Balliol' (Secret Projects Forum website). **Ed**

[9] Following work on the Balliol, Canberra WK161 (photo courtesy of Dave Welch) had its undersides liberally coated with radar absorbent material. **Ed**



[10] Needless to say, it's complicated but, in essence, this law means that the intensity of radiation passing through any unit area, directly facing a point source, is inversely proportional to the square of the distance from that point source, outbound from the radar to the target and again after reflection to the radar seeker. **Ed**

[11] Sir Michael is Chairman of the Board of Trustees of the IBCC.

[12] The MRA4 protype first flew in 2004; the programme was cancelled in 2010. **Ed**

[13] Having operated as British Aerospace since 1977, the company merged with Marconi in 1999 to create BAE Systems. **Ed**

CLOSING REMARKS

Air Chf Mshl Sir Richard Johns

And so, to wind-up. This has been a fascinating day, I think, for all of us, certainly for the presenters. But when I gave my pitch as the concluding speaker I did so with all the benefit of hindsight informed by observation rather than professional involvement in the consequences of the 97/98 Review and what happened post-'9/11'.

Today it seems to me that, since the end of the Cold War, our national defence strategy boils down to one of limited scope. In essence, no matter what else, there is to be no reduction in the UK's global influence. Thus, our Armed Forces were to be prepared to do almost anything anywhere. In quieter times, at the end of the 1990s, the SDR at least achieved some balance within our Armed Forces firmly based on precise and carefully calculated planning assumptions.

But while possessing capabilities that spanned the spectrum of conflict, the Armed Forces were never allocated sufficient resources to do the job properly. Moreover, post-'9/11', and lacking clear political direction, it was inevitable that the military unity achieved in the SDR would soon dissolve as the battle for resources re-ignited embedded rivalries between the individual Services.

In 20 years' time I do hope this Society will arrange another seminar to investigate and record the RAF's contribution to the campaigns in Iraq and Afghanistan and operations elsewhere. And, most importantly, to what effect our Services were modernised to meet the conflicting demands of wars of choice on one hand, and on the other, the procurement of advanced technology to win a war of vital national interest and survival.

Meanwhile, the presentations you have heard today will be published in the Society's journal and on your behalf I would like to thank our guest speakers for their individual contributions to the story of the RAF in its most transformative decade since the end of World War II.

And finally I must record the Society's thanks to Maggie Appleton and the Staff of the RAF Museum for allowing us to enjoy the comfort of this remarkable establishment for our Seminar.

I wish you all a speedy and safe journey home.

To lighten the tone a little, compared to the preceding exclusively air officer perspectives, this paper provides a first-hand impression of the run-up to, and execution of, an attack mission flown during Operation ALLIED FORCE – the Kososvo campaign of March-June 1999. At the time, the author was 350 hours into his first Tornado tour, having previously logged over 900 hours on Buccaneers, latterly as an EWO. Within the Tornado force he became No 14 Sqn's Nav Leader and a QWI. Following an instructional tour with No 15(R) Sqn, he returned to No 14 Sqn as its Weapons Leader.

'THEN IT WAS OVER' (Tornado Operations in Kosovo)

by Wg Cdr Ewan Fraser

We'd been there before. Piece of cake. '*All would be fine,'* I told myself.

'All will be fine,' I told the junior members of the formation. All *would* be fine, wouldn't it? Well, it very nearly wasn't . . .

Ladevci airbase, Obrva, home to J-22[1] light ground attack/ reconnaissance combat jets and Gazelle light attack helicopters, was our target. Well-defended with SA-3 SAMs[2] and radar-laid AAA,[3] we had attacked it, at night, some three weeks earlier in the campaign. There had been a fair bit of AAA on that occasion but we had been above most of it. There hadn't been any SAMs – '*Used them all up,*' I assumed, with the confidence and bravado of the flight lieutenant who had, '*Done it all before.*' What a reckless assumption that was to prove! So I had been pretty relaxed when tonight's task meant that we were going to go there again.

However, our Intelligence Officer wasn't smiling at the final brief, just before we walked to the jets. She had new stuff to tell us. The look on her face said it wasn't good – and it wasn't. Intel had come through that the top Serbian SA-3 Battalion Commander, an expert of some reputation in employing these missiles and in training operators to use the system, had been deployed to oversee the defence of Obrva and was under 'Weapons Free' orders. That meant that he could fire at any aircraft not positively identified as friendly. It was the least restrictive rule that could be authorised.

Nor did it escape our attention that an SA-3 had brought down an F-117 Nighthawk only a month ago, and Intel also had information that

another aircraft, a USAF F-16, had been taken down earlier today.[4] To make matters worse, the Former Republic of Yugoslavia had been regarded somewhat as the Eastern Bloc's authority regarding SA-3 training. As we walked to the jets, two things were on our minds – success and survival.

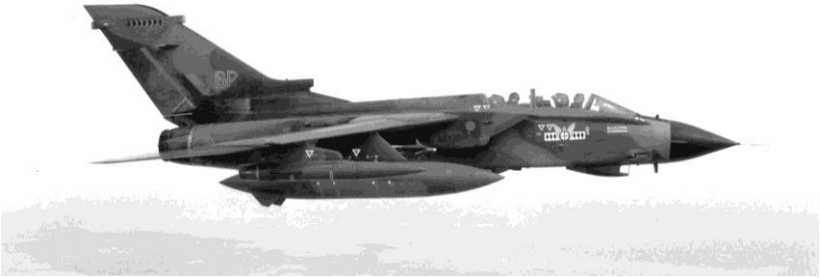
But before I take this story any further, let us take a short step back in time.

First, a health warning. These events occurred more than 20 years ago and my efforts to keep my head above water at the time – simply trying to understand and do what was expected of me, never mind recording anything for posterity – meant that I kept no journal nor do I have any other relevant contemporary documents. What follows is, therefore, a personal recollection, perhaps enthusiastically embellished (or tainted?) with the passage of time. I shall not be addressing the higher levels of strategy and/or politics that governed the Kosovo campaign, nor the rationale regarding the employment of the Tornado or even discuss the operational complexities. My intention is to present an impression of a mission as seen from the perspective of the lead navigator of a 6-ship attack formation. Secondly, there were eleven other participants that night and I do not speak for them, although they agree that my account reflects the events as they recall them. Sadly, one of those who came home that night – and another who flew with us on an earlier mission, to which I refer later in this narrative – are no longer with us. But I know that I can speak on behalf of the rest of us when I say, 'Leggo, Slagman, have a cool one on us.' For those of the others that have contributed to what follows, thank you.

So, a step back . . .

I remember clearly when Operation ENGADINE, the UK's contribution to NATO's Operation ALLIED FORCE, kicked off on 24 March 1999, and the Kosovo campaign began. Three Tornado stations remained operational – Lossiemouth, Marham and Brüggen – all operating the GR1. At the time the Tornado fleet was being upgraded, but the GR4 had not yet gained an operational clearance, so any jets used in action could only be GR1s.

I was serving on 14 Squadron, the 'Crusaders', at Brüggen. The station was also home to 9, 17 and 31 Squadrons, although No 17 Sqn was scheduled to disband at the end of the month. The Crusaders had just returned to base from an air combat detachment to Leeuwarden,



A Tornado GR1 of No 14 Sqn. (Michael Napier)

which had involved a week of great flying and relaxation following an intense year for the squadron, much of it spent in the Middle East. Operations in Kosovo had started on the Wednesday after we had returned, but this had had no impact at Brüggen where routine training simply continued. Any youthful opinions as to the futility of such training when there was clearly real work to be done, were quickly quashed by our Flight Commanders.

To begin with, the only effect of Op ENGADINE on the Brüggen Tornado Wing was to provoke some curiosity as to where Kosovo actually was and the emergence of a number of instant experts on Balkan politics, each with his own view of how to resolve the crisis – specifically through employment of the Tornado of course. The Wing carried on with little inkling of what was to come – it simply wasn't in the frame to deploy. And anyway, since all of the air bases in Italy were already jammed full, there was no ramp space for any more aircraft. Therefore, if anyone had told me that within a week we would be prosecuting targets in Kosovo and Serbia I simply would not have believed them.

But if warfare has one certainty, it is that it is unpredictable, and Brüggen was soon buzzing. Word had come through that Tornados were to be used in the campaign. But which squadrons, from which station, and where would they fly from? Rumours incoming – it was going to be the Brüggen Wing. Okay, but again, where from? We were to operate from Brüggen?! That couldn't be true, could it? Tornado crews had never flown offensive operations from their home base before. That would be bizarre. And how could it be done? Kosovo

Above, a 1,000lb Paveway 2; below, the TIALD pod. (Crown Copyright)

was some 3 to 4 hours flying time away, at the far side of the most complex civilian airspace in Europe, with numerous countries sandwiched in between, each with their own official, yet somewhat vaguely-defined, diplomatic stance regarding offensive operations being staged through their territorial airspace.

So, on the Monday after Op ENGADINE had started, the Wing was called to the main station briefing room to be addressed by the Station Commander. His arrival hushed the almost childlike banter from the assembled hundred or so aircrew and Ops Wing personnel gathered that afternoon. Big picture stuff from the Station Commander – yes, operations were to be conducted from Brüggen, starting as soon as possible; weapons to be PW2 and 3 LGBs,[5] designated using TIALD.[6] Tasking was to be a 6-ship per ATO[7] (ie one 6-ship attack formation per 24 hour period), prosecuting up to four DPIs.[8] All missions would

be medium level attack profiles, at night, and be round-trips using up to four air-refuelling brackets, integrated into larger composite attack packages.

The three Squadron Commanders followed up with more detail. Unknown to us, the previous morning the Station Commander had called them to a meeting, at which he had relayed orders that Brüggen was to prepare to mount offensive operations. The COs had been working on the detail ever since. While OC 14 Squadron would have TACOM,[9] it was to be a joint effort. Operations would be overseen from the 14 Squadron PBF.[10] TIALD-qualified aircrew would be selected from all three squadrons, plus some ex-17 Squadron personnel who had yet to move to their new postings. Up to four of 101 Squadron's VC10 tankers were already en route Brüggen from Brize Norton as they spoke. Yet more information followed with various Sections and individuals being tasked to sort out specifics, with some crews already programmed to fly training sorties that evening to ensure that everyone was night and AAR[11] current.

The station became a hive of activity. The Crusaders' PBF was effectively ripped apart and transformed to become a tactical HQ. The three Squadron Commanders, together with the relevant Flight Commanders, selected the crews that would make up each formation. From now on, they would fly together whenever possible. The tactical construct of the formations was also decided – the 6-ships would fly as two 3-ship elements within which, two aircraft would prosecute a DPI apiece as 'Shooters', with the third aircraft flying 'Cover'. Since the Tornado Force had only recently begun training with NVGs[12] and only a few crews (mostly 9 Squadron) were qualified, these crews would fly Cover.

Once formation leaders and their crews had been nominated, detailed tactics were discussed and decided. Attacks would be self-designated using TIALD from medium level. Routes would have to be parallel track, although height deconfliction would allow cross-over turns, which made planning easier, and the Cover aircraft could, of course, fly visually on the rest of the formation. Weather? The Balkans spring, which does not favour medium-level LGB operations, would be a major factor. So the standard attack profiles, which had been used in the fairer weather of the Middle East, were adapted, and weapons release ROE[13] studied and developed together with the Legal Adviser,[14]

who had deployed from HQ Strike Command.

In conjunction with 101 Squadron, and advice and assistance from MOD, the routing to and from Kosovo was planned. At the time, our options were somewhat limited because diplomatic clearance to fly such large, and offensively armed, formations had only been granted by Germany, France and Italy. In practice, flying through such complex peacetime European airspace, followed by a transition into a 'war zone' was to prove almost as challenging as those parts of the missions in Kosovo and Serbia. The sortie would begin with night-time SIDs[15] in stream, possibly in cloud, initially using mission numbers as callsigns. Following a rendezvous with our tankers, we would switch to RAFAIR callsigns for the 'peacetime' transit across Europe. Having dropped-off from the tankers somewhere over Italy, we were to check-in with the AWACS[16] on both mission and package callsigns, as we integrated ourselves into the operational airspace structure and joined our composite attack package somewhere over the Adriatic. All of this would have to be done again in reverse, of course, often involving long periods in cloud, to arrive back at base, probably at night and on instruments.

But it was not just the aircrew who were busy. The logisticians had to arrange the movement of weapons and other mission-critical equipment from the UK and the engineers had to service and arm the aircraft. Additional aircraft were flown in from Lossiemouth and Marham, all needing acceptance and turnround. LGBs, AIM-9L Sidewinders, chaff and flares were broken out of ammunition dumps. Have Quick 2 encrypted frequency-hopping radios and Mode 4 IFF – both essential for operations – were checked and, for some jets, actually re-installed.[17] Meanwhile, the wider station was equipping the aircrew with everything from gold to 'goolie chits' and preparing them medically while receiving and accommodating the many additional personnel on temporary attachments and ensuring that all of this behind-the-scenes work was done efficiently.

Critical to operations, and in addition to the deployment of 101 Squadron, a largely unseen, but no less important, group of personnel arrived at Brüggen – Intelligence Officers. Drafted in from far and wide, they were essential to the mission's success, disseminating vital Intel and breaking-out the unit's tasks from the ATOs. Initially, simply acquiring the ATOs was a problem because, bizarrely, Brüggen had no

secure channel through which to receive them – nor the ACOs[18] and SPINS.[19] This was due to the changed nature of Brüggen's business, its original Cold War nuclear strike role having been replaced over the previous decade by conventional operations always conducted – until now – on a deployed basis. The upshot was that the station's dedicated, NATO-sponsored, secure strike communications infrastructure had long since been withdrawn. Unsurprisingly, this deficiency caused great concern and a single secure landline was quickly installed in the PBF. However, this offered only voice to/from the UK planning element within the CAOC[20] and, while the transmission of data was resolved in due course, the time imperative demanded that, for the first couple of days, ATOs, ACOs and SPINS had to be collected by RAF communications aircraft and flown from Vicenza to Brüggen as hard copy.

That all of this was accomplished, and that ten aircraft were available for operations, in only a couple of days was clear evidence of the effort, resourcefulness and single-mindedness of purpose demonstrated by personnel, not just at Brüggen, where these traits were readily apparent, but across the whole of the Defence community. So, after a very tight schedule, early in the morning of 5 April six Tornado GR1s successfully prosecuted simultaneous attacks on a highway bridge at Jezgrovice using PW2s, and on a rail bridge and tunnel near Mure delivering PW2s and PW3s.[21]

Together with Sqn Ldr Dave Gallie, a fellow Scotsman, known affectionately as 'The Bat', I had led the rear element on that attack. It was a cold, pitch black German night as we took off just before midnight on the 4th. It was a long trip, some 7½ hours, routing through German, French and Italian airspace, tanking from VC10s en route before negotiating the maze of ACO routes criss-crossing the Adriatic for a final AAR bracket with two TriStars in 'cell formation'[22] over the mountains of Macedonia in very testing turbulent IMC.[23] I still remember this as being perhaps the most terrifying aspect of that mission. Tanking from the rear TriStar – who appeared to be cycling his throttles between full thrust and idle in order to stay with his leader – was extremely difficult for the Tornados. Flying with a full warload meant that they were very 'thrust limited', with most of the pilots having to use reheat on at least one, if not both, engines just to stay on the tanker's wing. As a result, we were using up fuel almost as fast as

we were taking it on board! Indeed, more than one of the Tornados was 'spat out of formation', and had to find its way back to the tanker while at the same time flying in and out of towering cloud over the mountainous terrain.

Thereafter, and a ROLEX[24] later, we successfully integrated our 6-ship into the much larger attack package as we entered Kosovan airspace from the south. The ATO had required all NATO attack aircraft to have the same TOT[25] thus simultaneously taking out the transport links into Kosovo. Kosovo is a relatively small area, so the resultant effect lit up the night sky all around us – an impressive sight. We experienced a lot of AAA well up to our operating heights, but nothing more. Then, of course, the whole route had to be flown in reverse. With the last hour or so being flown in daylight, I still recall the beautiful sight of the sunrise as we descended over France, approaching the German border from the south west, for recovery back to Brüggen. Once on the ground, there was a positive debrief, albeit with many lessons learned, followed by a quick beer and a short bike ride home. This last point was thought-provoking. While returning home after a combat mission had been the norm for the generations of aviators who had done this sort of thing in the past, it was a novel experience for the Tornado Force. Views were mixed, but I found returning to the daily peacetime routine, both at home and on the wider Station, somewhat of a challenge.

The result? We had hit our targets and our films made the lunchtime TV news and, while a shorter, northern, transit route across the Czech Republic, Slovakia, Hungary and Croatia would subsequently gain political approval, the format of that first mission was to become the baseline for subsequent operations. The Wing adopted a 4-day cycle with constituted 6-ships, each planning their missions late in the evening of the first day, a mission brief late in Day 2, then straight into execution early in the third, followed by a day off then back into the cycle.

Friday, 30 April, saw our formation turn up for duty at around 2300hrs. The Bat and I had already been in for a couple of hours. Squadron postings in mid-April, not to mention keenness for the role, meant that we had been designated as a 6-ship lead – so we had been liaising with the CAOC via our single secure landline to get a feel for the task and to start putting a skeleton plan together prior to the ATO

'drop' at 2300.

The target was Ladevci air base, near Obrva – referred to simply as Obrva, as that was how the maps and, I think, the ATO referred to it. The DPIs were a hangar, the combined base Operations Centre and air traffic control tower, and two hardstandings. We had also been able to ascertain the composition of the wider attack and support packages and determine which individual formation was to be overall package lead/co-ordinator. Lead was to be an F-15E Strike Eagle formation and we were to be supported in the target area by F-16CJ Wild Weasels and USN EA-6B Prowlers, both types being SEAD[26] aircraft, the Weasels firing HARMs[27] and the Prowlers carrying an array of ECM and ECCM[28] equipment. Other package aircraft, attacking different, but co-ordinated, targets, included a further Strike Eagle formation (also giving the package an air-to-air defensive capability if needed) and B-52s. On top of all this, we were also supported by an E-3 AWACS, callsign Magic, and our VC10 tankers from 101 Squadron.

Throughout, co-ordination with package leaders proved to be very challenging, at times almost impossible. All we had to handle this was the, aforementioned, single secure landline between the PBF at Brüggen and the UK desk in the CAOC at Vicenza. However, in this respect I was greatly assisted by an old buddy, Flt Lt Gordon 'Gordo' Carr, who had been attached to the CAOC as a UK liaison officer. An experienced Tornado operator, with whom I had gone through flying training some 10 years previously, Gordo understood how I thought and knew the kind of information that I would need. He was an extremely effective interface with his allied counterparts who were, in turn, representing their aircraft types and formation leaders.

Thus, by the time that the other ten members of the formation reported in, The Bat and I already had a rough outline for our tactical plan. Diplomatic approval had recently come through for the shorter northern route between Brüggen and Kosovo and we would be the first formation to use it. This would cut our transit times down significantly, although it did require much thought and thorough planning as we would be flying through very unfamiliar airspace, and over equally unfamiliar territory.

At 2300hrs on 30 April, along with a planning crew from the VC10s, the Tornado team assembled for a formal task brief from Intel. 'The team' comprised 'The Bat' and I (aka 'Westie'), OC 14 Squadron, Wg

Cdr 'Timo' Anderson (aka the Boss), Flt Lt Chris 'Platty' Platt, Sqn Ldr Darren 'Leggo' Legg, Flt Lt Darren 'Doris' Howett, Flt Lt Hugh Smith, Sqn Ldr Pete 'Rocky' Rochelle, Flt Lt Kev 'Kev G' Gambold, Flt Lt Grant Page, Flt Lt Dave 'Woody' Wood and Sqn Ldr Paul 'Leanman' Lenihan.

The ATO was in and it confirmed that the target was to be Obrva airfield with its pre-nominated DPIs. Package composition was now set, along with its designation as RGB-1C. Individual assigned callsigns were Dagger 11, 12 and 13 and Cutlass 21, 22 and 23. Mission Numbers were 4251G to 4256G, RAFAIR callsigns 7011 to 7016. Our formation's TOT bracket was 0140-0152hrs Zulu[29] on 2 May, and the longer package 'Vul time'[30] – the time during which we would have SEAD and other support – was confirmed as 0130-0200Z. Two VC10 tankers were allocated, Buck 31 and 32 from the Brüggen detachment – flying the shorter northern route meant we needed no more AAR support than this. Then, with the need for immediate information now satisfied, Intel provided their briefing – stepping down through the political, strategic, operational and tactical levels with the last of these being, of course, of the greatest concern to those being briefed. A Met brief followed. The weather in the target area was looking reasonably favourable for tomorrow night, although the forecast for the transit was less good.

The floor was then The Bat's and mine. Tasks were dealt out. Hugh and Rocky were to get together with The Bat and me to look at weapon-to-target matching – fuze and code settings for the bombs; specific aim points for best weapon effects; the effects of wind and any secondary explosions, specifically considering spacing in time and the physical distances between the DPIs (all of which were within 500m of each other) to allow the dust and debris time to settle between individual attacks. Thereafter, the best LOAs[31] would be selected and the order of hitting the DPIs decided. Throughout, I would liaise with Gordo at the CAOC and, through him, the package leader, to ensure that he was kept aware of our plan, and that we were of his.

Platty was to start prepping the half-mil maps for the relevant areas of Kosovo and Serbia, specifically annotating known SAM and AAA locations and MEZs.[32] Leanman and Doris, with one of the tanker crew, were to start planning the medium level transit from Brüggen to a pre-defined tanker drop-off point north of Serbia, and to begin to draft the

'peacetime' flight plan that would be required to get us across Europe. Leggo and the tanker rep were to look at departure from Brüggen and how we would rendezvous with the tankers and decide the best en-route transit formations as we headed east. Our resident EWOs,[33] Kev G and Grant, were to look at hostile defences in the target area and advise on the most appropriate ECM/ECCM. The Boss and Woody were to start prepping the detailed 50 thousand scale target maps, extract all relevant codewords, radio frequencies and IFF[34] codes from the ATO/ACO/SPINS, allocate each aircraft individual height blocks for deconfliction and look at the CSAR/SERE[35] plan relevant to our operating area.

The planning room was now the focus of our activity. Aircrew, Intel officers, Ops personnel, with the occasional engineer thrown in for good measure, charged purposefully in every direction carrying maps, more maps, orders, manuals and all the other paraphernalia needed to get six aircraft across Europe, engage their targets, and get them back again. Sometimes noisy, sometimes silent, to the outsider it would likely have appeared chaotic. But each of us knew what he had to do, got on and did it, only stopping when someone needed to draw everyone's attention to a new or unforeseen input or development or to pause to discuss aspects that someone felt uncomfortable with, or where an explanation as to the rationale for a particular course of action was needed.

The result of this activity? Each 3-ship element would fly 'escort'[36] into a split axis attack on Obrva from the west and north west. Unfortunately, limitations imposed by other packages, attacking targets to the north and south of ours, and the overall leader's requirement that the whole effort was to flow from west to east, severely restricted the choice of LOAs. The leader's constraints were entirely rational, however, as they permitted him to make the best possible use of the SEAD assets available to cover the whole force. We had decided to hit our TOT bracket at the start as that gave us the maximum scope to ROLEX the formation if needed. The Tornados would hit their DPIs at 40 second spacing, the maximum compression we could achieve given their proximity. The wind was from the south so we would hit the DPIs in the order north to south. The nature of the targets demanded instantaneous fusing on the bombs and, due to DPI proximity, no two aircraft would employ the same laser codes. The package would marshal over Bosnia before 'pushing' to its targets, come off target to

the south east initially, then turn south before finally egressing to the west.

We would have to penetrate SA-3 and SA-6 MEZs but would have SEAD support from a pair of Weasels and a Prowler in our target area, although there would be more SEAD holding to the west.[37] Our transit from Brüggen would be via the northern route as two elements of three aircraft, each on the wing of a VC10. The tankers would drop us in the south of Hungary as they had no clearance to go further – we would find them in the same area 'post-Vul' and return to Brüggen with them. Maps and mission briefing sheets were all prepared. Routes had been recorded onto tapes ready to load into the aircraft. Then, after a quick discussion on the format of, what would now be, this evening's mission brief, everyone stood down at around 0300hrs to be back in at 2100.

The Bat and I were in slightly earlier. At about 1930hrs we checked with Intel for any major changes of which there were none. The Met man was optimistic; the weather was looking clear in the target area. I gave Gordo a quick call for any words from the package leader. No change; all running 'as fragged'[38] – he would get hold of me if anything changed. The Bat and I ran through the plan together as a last check.

2100 hours. All Dagger, Cutlass and Buck crews assembled in the PBF briefing room. Time hack first then a Met brief. Weather as expected, good in the target area, broken cloud from 15,000 to 25,000 feet on the transit; weather at Brüggen would necessitate an IFR[39] departure and, on the current TAF,[40] we would have to hold enough fuel for individual GCAs[41] on recovery, with Laarbruch as our emergency diversion. Importantly, the Met office was now able to give us the 'D-factors', the specific differences between the aircraft barometric altitude readings and real altitudes, for each aircraft's weapon release height, which we would need to manually apply to the weapon release solutions. Intel next, an update on the general situation – no change. And no change in the target area. Reports from missions flown earlier in the day had reported good weather and pretty much business as usual in terms of hostile activity.

Then back to The Bat and me. He ran through the mission 'domestics' in detail. A myriad of callsigns to note although, within the formation, we would operate simply as '1' to '6' on the secondary radio. Then: walk times; aircraft allocations; where the aircraft were parked; weapon checks on the ground; radio check-in times; take off speeds;

departure details; how we would rendezvous with the tankers; formation procedures on a tanker's wing and, finally, how he wanted the recovery to Brüggen to be conducted.

Then over to me. The transit route to our drop-off point and potential emergency diversions en route. The fuel plan, specifically what was needed post drop-off to complete the task and get back to the tanker. Then the plan from drop-off to target and back to tanker rendezvous was briefed in great detail. How we would check-in with AWACS and the package leader; which frequencies to be monitoring and which to transmit on; where we would marshal while waiting for all package assets to be in place; when we would 'push'; the route thereafter; when and where to complete pre-push checks and initiation of IFF, weapon switches and ECM kit; our timing and deconfliction plans; the speeds to be flown; where we could expect other aircraft to be and how we would deconflict from them. The codewords to be transmitted and what they meant and when: WATERSHED – formation on station; SUNSHINE – MEZ active; CACTUS – formation off station; AARDVARK – mission successful.

Then back to The Bat for the detailed pilot aspects for the attacks themselves – drop/no-drop criteria; switches to be made and pre-target checks; the 'loser plots' – what to do if an aircraft hadn't made it to the target area or if there were equipment issues. There were no alternative targets for this mission, so any retained weapons would be brought home. Then to me for the TIALD targeting aspects. What we could expect to see. How we would identify the DPIs, and our ROE for dropping. As this was a military airfield, with no civilian structures within a safe area either side of the LOAs, this was more straightforward than many other targets, especially those in suburban areas. Laser codes and D-factors – don't forget them. When to fire lasers – and don't forget that either!

Then to Grant for an EW brief. Detailed information on the potential hostile systems that we might come up against. Confirmed SA-3 and SA-6 sites together with SA-8 in the target area, but no known recent activity. Then the ECM we had available to counter them, and a timely revision on how to actually use that ECM. Then followed specifics of the manoeuvres that should be flown to defeat any of the various types of SAM engagements that we might encounter.

A final sortie recap from The Bat, including CSAR – safe routes,

A Tornado, in this case, one of No 9 Sqn's in one of Brüggen's HAS. (Crown Copyright via Tim Ripley)

pre-defined pick-up points should any of us have to eject, all the relevant codewords and a reminder to check individual EPAs.[42] Then a change into flying kit and outbrief in 15 minutes, an hour pre take-off.

I take the advice and check my EPA. Pleasingly, the pre-nominated pick-up point I had identified for this area of Kosovo was the right-hand side of a bikini-bottom shaped wood – at least that's what it looked like to me – I'd remember that if nothing else. The crotch would have been better, of course – but it was much better than a Y-front shaped wood to the north . . .

Cold-weather flying kit and G-suit on, followed by LSJ[43] and CSW[44] on top of those. Then back for the outbrief. Pistols and ammo issued; gold, goolie chits and evasion maps issued – all stowed in the CSW. Jets and their locations briefed – two spare aircraft if needed. Runway 27, the duty runway; diversion fuel for Laarbruch. Plus the routine items – everything from NOTAMs to flight plans and deconfliction procedures while checking that we all had everything we needed. Finally we all signed to indicate that we all understood what we had been authorised to do.

Then the Intel outbrief.

The Intel officer still wasn't smiling and she had new stuff to tell us.

It wasn't good. That SA-3 Battalion Commander was at Obrva and he was 'Weapons Free'.

'All will be fine,' I told myself.

Our jet, BU, was in HAS[45] 14. We walked up to the heavily laden

aircraft, silhouetted by harsh sodium lights in the black German night. Two PW2s and a TIALD pod hanging under the fuselage, wings weighed down with two huge drop tanks, an ECM pod, a fully loaded chaff and flare pod and, just in case, a pair of Sidewinders for self-defence against any Serbian fighters. A bit of nervous banter with the groundcrew, then a thorough check of the weapons and weapon settings, then into the cockpit. 'Clear for electrical power,' and the jet comes alive; lights flicker and stay on; the whine of systems winding up fills the space. We strap in. No problem for us, everything serviceable. All mission data loaded and checked front-to-back. Have Quick radios tested with Squadron Ops. Bit of radio traffic in the background that one of the crews had gone for a spare, but nothing of concern. Check-in time arrived. All aircraft on frequency except one. I check my mission briefing sheet – 'That one's at the back of the Q site,'[46] I say to The Bat, 'Comms are bad over there.'

We taxi for RW 27, only a short run from the HAS site. Two VC10s ahead of us and I count five other Tornados. So far so good. A hold on the parallel taxiway while the VC10s get airborne. A good opportunity to uncage the TIALD pod and look at its boresight along the taxiway all the way to the perimeter fence – there were some people there – '*A bit late to be up*,' I thought, but who knows their motive. The VC10s were airborne on time to start an extended circuit downwind before turning back onto the runway heading and climbing for a SID South from the overhead. That would give each Tornado 3-ship time to line up on the runway for brakes-off as their respective VC10 passed directly above, the aircraft to roll as a pair followed by a singleton at 30 second stream then again for the second element.

With everyone on departure frequency The Bat calls for take-off for Missions 4251G to 4256G. SID South confirmed and cleared take-off. Line up on the runway, engines wound up to check all operating correctly. The Bat passes me the engine readings to note down and pass to the engineers later – I write them somewhere amidst the pile of maps and target images I was carrying – I can't recall whether I found them later or if I just looked at the previous entries in the F700[47] and copied them . . . My apologies to all engineers – this wasn't my usual practice, but things would be different tonight. Our Number 2, the Boss with Platty, flashes his landing light. He was ready. Buck 31 overhead, brakes off, reheat good, the Boss is rolling with us. Accelerating slowly

A VC10 refuelling a pair of Tornados (in this case F3s). (Crown Copyright: SAC Sarah Burrows)

at first the speed quickly rises, rotate at 176 knots for unstick at 186. After take-off checks quickly done, The Bat confirms that all is well in the front, then I'm into the radar searching for the VC10 as we go into cloud. I find it and get a good radar lock – that's a relief. I can see from our RHWR[48] that Leggo and Doris have, in turn, locked us up as Number 3, so they are there, good lads. I hear Number 4, Hugh and Rocky, call locked onto Buck 32 with 5 (Kev G and Grant) aboard. Woody and Leanman call '6 airborne' so we are all on our way, just before midnight on 1 May 1999.

We sat on our respective VC10's wings under RAFAIR callsigns for a fairly uneventful, albeit testing in terms of cloud, transit flight across northern Europe at around 22,000 feet. Fuel was taken aboard, but not to full – only enough to see us through the mission phase, with a pre-determined amount for contingency. No point filling to full. Any excess weight would only serve to reduce aircraft performance, which might be needed. Dropped-off at the south of Hungary, I took Dagger and Cutlass to Magic's check-in frequency. Comms established with Magic, she informs us – in a classic New York accent – that the package

is running as fragged, and chops us to Magic's primary Have Quick frequency. We check-in, all the while transiting via an ACO safe route running north/south down through Croatia to our hold points over Bosnia. The package commander initiates a roll call which confirms all assets are on state as fragged. Again, so far so good. Established in our holds, I inform Magic that we are WATERSHED. We wait for our push time, busying ourselves in the cockpit with last minute checks, recalling and re-briefing the target run. We push on time – 'Dagger pushing.' Fuel is good, we have the planned contingency. Final pre-'sausage-side'[49] checks are done; master armament safety switch to live; TIALD laser live and tested; peacetime IFF modes switched off; Mode 4 on; ECM on; chaff is primed and a single flare is released to check that they work; aircraft external lights are off; radar in standby.

So we push. Straight to 480kts as there's only a few minutes flying time to the Serbian border with the target itself only a few minutes more – at least not too much time 'over there' tonight. In the darkness the cockpit seems to fill with an eerie silence but, at the same time, the jet feels like it's thundering beneath us. '*Must be a hell of a racket out there*,' I think. The Boss and Platty will be five miles behind us on their track. Leggo, flying Cover on NVGs, will be offset to the left and have us visually. Bit of radio chatter going on; all the package elements are pushing. That's good. Weasels and Prowler push – that's better! Rocky transmits 'Cutlass is pushing.' I check my watch, exactly 1 min 20 secs after our push – he's on time. 40 miles from the target, The Bat pushes the speed up. 520kts, we're shifting now. Last pre-target checks completed; correct weapons and stations selected; the Late Arm switch goes live. Plenty of AAA coming up. It's usually a bit lower than this. This stuff is up around us and ahead on our track. Press on. 30 miles, just over 3 minutes, to run; the ground rushes beneath.

I start looking on the TIALD pod for the target – it's all up to me now. Target area breaks through the green IR[50] murk on my TV screen, then the target. I check what I see against the target imagery in my hand. The Bat gets me to do a last check of the laser code – it's good. Right, I have the target positively identified and the ROE are satisfied. The Bat can't help me much here; he can't see the TIALD. I'm tracking the target now and happy to drop. 'You sure?' he quips. 'Affirm!' In my peripheral vision I can see more AAA streaking skywards. I steal a glance at the RHWR – it's clear. The Bat counts down the ranges to

An image from No 4's TIALD during the Obvra attack. His marker is on the hardstanding in the centre of the screen; smoke is rising from drops made by Nos 1 and 2 on hangar and operations/ATC buildings. (Crown copyright)

release. Two dull thuds rock the jet, and two PW2s, our offering to Serbia that night, are on their way. I hear and feel my breathing getting heavier. Fire the laser to guide the bombs in, then two 'splashes' right on target. Good job, now back to the real world. Head back out of the cockpit now – quick check of the RHWR. Jink right to give Number 2 some cross-cover; they'll be busy on their attack run; Platty will be heads-in.

Then it starts.

'Missile launch! Missile launch!' comes tersely from Leanman.

Woody and Leanman, watching the world through NVGs, see two missiles burn and bloom on their launchers. Then an American voice calls it too. We look. Nothing ahead. Behind? The Bat pulls hard on the stick – then we see them. I had seen SAMs before in DESERT STORM, but this was different. Back then, it had been in daylight and they had nice smoky corkscrews that you could see and thus judge their aspect. This was *really* different. Just, what looked like, two cigarette ends glowing red in the dark, racing skywards. But no aspect. 'Magnum. Magnum.' Two words, in a sluggish southern US drawl this time, indicating that a Weasel has fired his HARMs, come over the radio

from a person I had never met, nor probably ever would. I see two HARMs, snaking slightly, come from high on the right, streaking earthwards with venomous purpose.[51] At that moment that American Weasel was God! The cigarette ends keep coming. Then I can't see them – their booster motors have burned out. But they're still out there – somewhere. Our RHWR has had nothing more than the odd bit of target track; no missile guidance. Nonetheless, The Bat is now defensively manoeuvring the aircraft. A few seconds, that feel like a lifetime, then I see two red starbursts above us – they look high but it's difficult to tell.

Meanwhile the Boss and Platty have had to aggressively manoeuvre their aircraft, throwing the jet around the sky. The missiles had been for them. Their RHWR had gone all the way through to missile guidance. They break low and right into the missiles, dispensing chaff. Then there's another one low under their nose. More HARMs tear through the sky. That SA-3 also bursts above. The Weasels call, 'WINCHESTER'[52] – we know two more jets bristling with more HARMs will be racing towards us from their hold to the west, but we need them *now!* The SAM operators can now target us with impunity. They won't know that straightaway – but they'll realise it soon enough.

Magic transmits, 'SUNSHINE' – MEZ active. '*We know!*' I think to myself.

The back element can see all this happening ahead of them. Rocky spots one of the missiles, targeting Number 2, streaking across his TIALD screen. Numbers 4 and 5 continue to prosecute their attacks. 'Busy tonight,' remarks Kev G in-cockpit to Grant. Never a truer word – two more missiles come up under the rear element. As the Serbian radar identifies, then acquires, tracks and engages Woody and Leanman's Tornado, the SA-3s begin to home on it. Yep, the operators have 'realised it'. Twisting and turning their aircraft across the sky, through their NVGs the crew are able to see the missiles tailing them. Jettisoning their external tanks, they throw the jet into a hard turn in full burner, in the process flashing across the nose of Kev G, who is in turn defending his aircraft. The missiles explode above their canopy. Now supersonic, Woody and Leanman egress north, low above the mountains, only to be faced with a wall of radar-laid AAA. It's a classic 'SAM trap' – engage you with SAMs then, if they don't get you, you will have been forced to go down low into the heart of the AAA, and

they get you with that instead.

Meanwhile, Hugh and Rocky, followed by Kev G and Grant, continue and press home their attacks. All bombs on target. But it was not yet over for Kev and Grant. Immediately their bombs hit, their RHWR goes haywire, into missile guidance, lit up like a Christmas tree. Two more cigarette ends coming up and at them. 'Not happy with this. We're right over the top,' remarked Grant, 'Bang the tanks!'[53] yelled Kev. 'F**k it, the tanks have already gone,' the terse reply. Fully defensive, following the tactics they'd briefed and which we all practised regularly, they lived, albeit they too were rapidly running out of height – over Serbia – in the dark . . .

Then it was over. As quickly as it had started. Now there was silence.

But a job still to do. A quick radio check on the formation chat frequency. All six aircraft are there, but 5 and 6 have no tanks. We all knew what to do next. Get back to height and into formation. Egressing westwards, gradually all of the jets call 'Aboard,' and we are in pretty good shape by the time we get back to the border. Switch to the egress frequency. 'Magic, Dagger, Cutlass CACTUS,' I transmit, letting the AWACS know that we are off station. Magic comes back, that New York accent again. In an anxious voice she asks, 'Are *all* the Daggers and Cutlasses still there?' 'Affirmative – AARDVARK,' I reply, in a voice that, I hope, sounds composed, 'But we need to expedite a tanker.' And then, from the ether, a familiar voice, 'Buck 31 and 32 established in a racetrack just north of Sarajevo.' Not far from us. Top job from 101, they had been listening to our little tête-ê-tete with the Serbs and had anticipated that some of us would be needing gas and, in true British officer fashion, had harangued their way into Croatian airspace to meet us. Just have to find them now, and find them we did. We settle on their wings, 5 and 6 to tank first. Buck asks how much they want. 'To full please, 2·5 tonnes,' Leanman answers. I detect a mildly pressing undertone; he doesn't have much left. Buck questions, clearly puzzled as to how 2·5 tonnes will fill an 8·5 tonne capacity Tornado. Then, a think-bubble and, clearly, the use of the VC10's 'shufti scope'[54] – 6 was clean, no external tanks. 'Ah; sorry; understood; 2·5 tonnes it is.' Thereafter, a comparatively uneventful transit back home via the northern route with a couple of extra AAR plugs for 5 and 6 and, of course, a slightly longer formation IFREP[55] for Leanman to transmit,

the duty of the Number 6. Back at Brüggen the weather was kinder than forecast so it seemed entirely appropriate when The Bat called for a 6-ship run-in and break.

Taxy in. Shutdown. Silence. 'How'd it go sir?' the groundcrew shout up, 'Nice day here.'

'Fine,' I reply, 'It was fine.'

The mighty Fin,[56] first-rate training, excellent tactics, superb support – together with a hefty dose of luck perhaps – had got us all home. It *had been* 'fine'; we could enjoy that 'nice day'.

After I copy the engine figures from the previous logbook entry, it's into an extended mission debrief, tape analysis, Intel debrief, MISREP,[57] then that quick beer and another bike ride back to reality and home. During that mission we had felt every emotion: anticipation, exhilaration, alarm, distress, desperation, panic, elation.

What a trip! – literally. But life was now just normal – weekly family shop to Tesco's in the afternoon to think about . . .

Oh, and SpongeBob SquarePants debuted on Nickelodeon later that day . . . and some photos of Tornado fuel tanks lying in a Serbian farmyard made it into *The Telegraph* – perhaps they're still usefully employed as cattle troughs? The Tornado lived on.

Notes.

1 The Soko J-22 Orao.

2 Surface-to-Air Missiles.

3 Anti-Aircraft Artillery.

4 Lt Col David Goldfein's F-16 was shot down on 1 May 1999; he was recovered by helicopters of the USAF's 55th Special Operations Squadron the following day.

5 Paveway 2 and 3, 1,000lb and 2,000lb, Laser Guided Bombs (notably without GPS).

6 Thermal Imaging Airborne Laser Designator pods – a scarce resource; all Tornado squadrons only had a cadre of TIALD-trained aircrew.

7 Air Tasking Order – the method through which air assets are assigned to specified tasks.

8 Desired Points of Impact – aim points for weapons.

9 Tactical Command (of the Wing, in this case).

10 Planning and Briefing Facility – a concrete bunker designed to withstand a specified level of air or ground attack.

11 Air-to-Air Refuelling.

12 Night Vision Goggles.

13 Rules of Engagement.

14 Legal Adviser – a military lawyer.

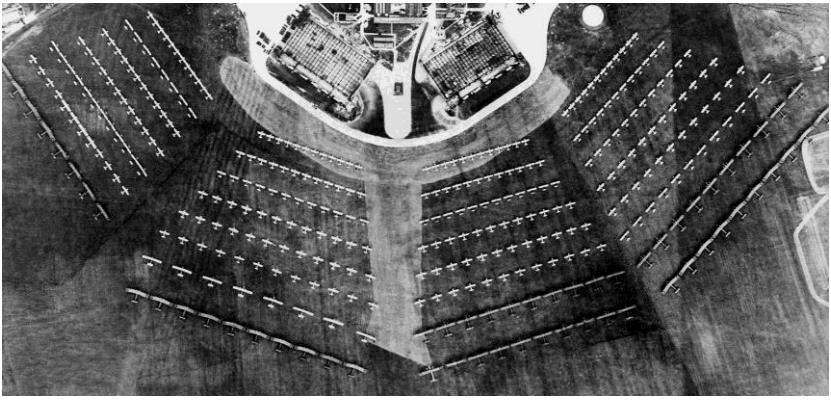
[15] Standard Instrument Departure.
[16] Airborne Warning and Control System – the Boeing E-3 Sentry.
[17] At this point in the rolling upgrade programme, some of the GR1s had had their Have Quick radios removed and transferred to GR4s so these had to be recovered and reinstalled.
[18] Airspace Co-ordination Order – the method through which wartime airspace structures are disseminated.
[19] Special Instructions – the method through which any orders additional to the ATO or ACO are disseminated.
[20] Combined Air Operations Centre – the Op ALLIED FORCE air planning and operations HQ at Vicenza in Italy.
[21] The Wing had actually stood ready, to the extent that crews had manned their aircraft, to execute this mission 48 hours previously, only for it to be cancelled by the CAOC due to adverse weather.
[22] Manoeuvring as a single unit, one behind the other, albeit with some distance between them.
[23] Instrument Meteorological Conditions (ie in cloud).
[24] ROLEX is a codeword indicating a synchronised and identical change in TOT for all aircraft in a package or formation.
[25] Time on Target.
[26] Suppression of Enemy Air Defences.
[27] HARMs – High Speed Anti-Radiation Missiles designed to suppress radar systems.
[28] Electronic Counter Measures and Electronic Counter Counter Measures.
[29] Zulu is the time zone that aligns with Universal Time Co-ordinated (UTC), formerly referred to as Greenwich Mean Time, commonly used by the military in general and aviation community in particular.
[30] 'Vul – or vulnerability – time' refers to the period during which air assets tasked for attack operations are directly exposed to hostile forces, and during which various support measures are deployed to defend them; such support can only be expected during 'the Vul'.
[31] Lines of Attack.
[32] Missile Engagement Zones.
[33] Electronic Warfare Officer.
[34] Identification Friend or Foe.
[35] Combat Survival and Recovery/Survive Escape Resist Extract.
[36] 'Escort' – a three-aircraft triangular formation, with one aircraft in front followed by two behind – in this case with a spacing of around 5 miles between individual aircraft.
[37] While four Wild Weasels and two Prowlers had been assigned, the intent was that because these aircraft could not remain on state without refuelling, they would 'Yo-Yo' to/from a tanker (the tanker holding safely to the west), thereby ensuring that a pair of Weasels and a Prowler were always available throughout the entire Vul.
[38] Prior to the introduction of the NATO-standard ATO, tasking had been assigned, in US-speak, via a Fragmentary Order (FRAGORD). But, despite the universal use of ATOs, terms such as the 'the frag' and 'as fragged' remained in use as convenient colloquialisms.

[39] Instrument Flight Rules.
[40] Terminal Aerodrome Forecast.
[41] Ground Controlled Approach.
[42] Evasion Plan of Action.
[43] Life Saving Jacket.
[44] Combat Survival Waistcoat.
[45] Hardened Aircraft Shelter.
[46] Q Site – Brüggen's, by then non-operational, Quick Reaction Alert site for strike-armed aircraft, but still available for routine operations.
[47] The aircraft's technical logbook.
[48] Radar Homing and Warning Receiver.
[49] For the benefit of those who (like your Editor) may not have grasped the significance of 'sausage side', it is a reference to BBC TV's *Blackadder*, Series 4 of which was broadcast in 1989. Its eponymous WW I hero declared that he was 'going sausage-side' when he set off to fly over the German lines. Only a year later, that term was still familiar enough to be adopted as a convenient short hand for penetrating enemy airspace during Gulf War 1 and it remained in use as a cheery colloquialism thereafter. **Ed**
[50] Infra-Red.
[51] The Wild Weasel flight lead later reported that, even on the most intense of training exercises, he had never seen the display of his HARM Targeting System so active with valid threats as it had been during this engagement.
[52] WINCHESTER – a codeword indicating that all ordnance has been expended.
[53] ie jettison the external underwing fuel tanks.
[54] The TV camera through which VC10 operators can look at aircraft behind them waiting to take on fuel.
[55] Inflight Report.
[56] The Tornado was known to its familiars as 'the mighty fin'.
[57] Mission Report.

THE 'PARADE OF SQUADRONS' AT MILDENHALL

by the Editor

Sources differ as to the number of aeroplanes drawn up for HM's inspection at the Royal Review of the RAF held at Mildenhall on 6 July 1935 (eg 356 and 370 – see book review on pp157-158) while others maintain that there were 9 aircraft per squadron of single-engined types and 10 per squadron of Overstrands and 'heavies'. Intrigued by these differing figures, I thought it worth trying to nail the actual number. It was not too difficult to do, as there is an excellent vertical photograph of the event. Using that, blown up to a more practical size, it was a straightforward exercise to count the aeroplanes. The answer is 350.



The 'Parade of Squadrons'. (Crown Copyright, AHB)

12 × Gauntlet	12 × Fury	12 × Fury	12 × Fury
8 × Wapiti	12 × Bulldog	12 × Bulldog	12 × Bulldog
12 × Hart	12 × Bulldog	12 × Bulldog	12 × Bulldog
12 × Hart	12 × Demon	12 × Hart	12 × Audax
12 × Wallace	12 × Hart	12 × Hart	12 × Audax
12 × misc CDDU[1] a/c	12 × Hart	12 × Hart	12 × Gordon
4 × Virginia + 4 × Hinaidi	8 × Overstrand	10 × Heyford	10 × Heyford
	10 × Virginia	10 × Heyford	10 × Virginia
76	**90**	**92**	**92**

[1] CDDU – Coastal Defence Development Unit; 4 × Vildebeest + 8 × Hart/Osprey.

THE AIR HISTORICAL BRANCH NARRATIVES

Until very recently, apart from a handful that had been published commercially, accessing the AHB Narratives involved mounting an expedition to RAF Northolt or the National Archives at Kew or the RAF Museum at Hendon. RAF Hist Soc members will wish to know that all of the Narratives are now available on-line at:

https://www.raf.mod.uk/our-organisation/units/air-historical-branch/ahb-narratives/

That said, simply Googling 'AHB Narratives' should take you there.

The list below provides a good indication of the breadth of coverage, but not the depth. Just as examples, there are six volumes within 'Air Defence of Great Britain' and no fewer than eleven in 'Middle East Campaigns'.

The Second World War: Thematic Studies

- Airborne Forces
- Armament
- Balloon Defences
- Flying Training
- Intelligence and Photographic Reconnaissance
- Signals

War: Campaign Narratives

- Air Defence of Great Britain
- Campaign in Norway
- Campaign in France and the Low Countries
- Middle East Campaigns
- North African Campaign
- Operations in Dodecanese Islands
- RAF in the Maritime War
- Sicilian Campaign
- Italian Campaign
- Bombing Offensive Against Germany
- Liberation of North West Europe
- Campaign in Southern France

Regional Studies and the Cold War Era

- The RAF, Small Wars and Insurgencies
- Bomber Role
- Changi
- Defence Policy
- Falklands
- Flight from the Middle East
- Germany
- Helicopters
- Malayan Emergency
- Mediterranean and Middle East
- RAF Strategic Nuclear Deterrent Forces

Post-Cold War Studies

- Operation Granby – The First Gulf War

OBITUARY – GROUP CAPTAIN KEVAN DEARMAN

Gp Capt Kevan Dearman, who died, quite suddenly, aged 82, on 15 July 2022 was a long-serving member of this Society's Committee.

Having been awarded a Flying Scholarship, Kevan qualified for a Private Pilot Licence after 30 hours of instruction on a Miles Magister at Elstree. He was 17 and had yet to pass his driving test. Not long afterwards he entered the RAF as a Flight Cadet on 77 Entry at Cranwell. While he was at the College, it became evident that music was important to him; he played the piano and the violin and even produced a Gilbert & Sullivan opera. Having gained his 'wings' on the Provost and Vampire, he graduated in July 1960.

After a tour flying Canberras with No 6 Sqn at Akrotiri, he expected to be posted to the TSR2, but that was cancelled, as was the F-111 that had been intended to replace it. The upshot was that Kevan eventually went to the CFS and, having qualified as a QFI, he spent two years with Oxford UAS. From there he moved to the Vulcan, first as a captain with No 50 Sqn at Waddington and then, having been elevated to squadron leader in 1969, back at Akrotiri as a Flight Commander with No 9 Sqn. Completion of that tour was marked by the award of a QCVSA.

Staff College was followed by tours with CTTO and the MoD and a one-year stint as OC the RAF detachment at Goose Bay. A wing commander since 1980, he was CO and CFI of the Vulcan OCU at Scampton followed by a tour on the staff at Bracknell. Promoted to group captain in 1988, he filled posts at the MoD and HQ Strike Command until retirement in 1994.

But that was not the end of his association with aviation as he had been teaching people to fly at Booker, mostly at weekends, since the mid-1970s and when he left the RAF that became his full time occupation, along with teaching aviation subjects as a ground instructor and lecturer at Brunel University.

Post the RAF he continued to play the violin, notably with the Royal Orchestral Society in London and giving regular concerts in St John's Smith Square. Sailing was another pastime and he owned a series of

boats, culminating in a 40 ft cruiser which was moored on the Thames at Oxford.

Which brings us back to 2000 when he joined the RAFHS Committee. As our Secretary he was the main point of contact with the membership and those who had dealings with him will remember his patience, efficiency, courtesy and understanding. When I contacted a number of contemporaries and colleagues while preparing a eulogy for his memorial service, which was held at Middleton Stoney on 16 August 2022, it elicited a number of responses, among them: 'a gentleman in the true sense of the word'; 'an absolute stalwart'; 'blessed with character, charm, competence'; 'earned respect and friendship throughout his RAF career and subsequently'; 'patience, courtesy, loyalty'; 'respected and beloved friend and colleague.'

That was Kevan.

NBB

ERRATA

Gp Capt Chris Finn has pointed out two errors in his contributions to *The Buccaneer in RAF Service*. The first, which was actually perpetrated by the Editor, is on p85 where the caption to the right hand picture should have identified the Pavespike (not Paveway) display.

Having re-examined the data in the central paragraph on p118, the final section reading 'Of the 33,706 weapons (. . .) of the land campaign' should read: 'About 400,000 air-delivered weapons were used in the campaign but just 4·5% were precision guided. However, PGMs were used in 46% of the strikes (individual DMPIs) against OCA targets, and 40% of the Interdiction targets.'

BOOK REVIEWS

Note that the prices given below are those quoted by the publishers. In most cases a better deal can be obtained by shopping around on-line.

Royal Air Force Squadron Losses, 1st January 1921 – 31st December 1930 by W R Chorley and P J McMillan. Mention the War Ltd; 2022. £18.00.

As an opening remark, W R 'Bill' Chorley is the author of all nine-volumes of *Bomber Command Losses of the Second World War*. Anyone familiar with that series knows that his work is unsurpassed in its detail and its accuracy. Having established the level of his expertise, what of his latest venture?

This mighty book, a 466-page A4 softback, is the fourth volume of a series. Between them, the first three run to another 1,115 pages covering 1 April 1918-31 December 1920. These 'wartime' editions also cover the Australian Flying Corps.[1] For the purposes of this review, I will focus on the latest volume, which covers the 1920s, although most of my comments apply universally.

First, a word about the depth of research. The book has six pages of bibliography and sources, including the *London Gazette*, pieces at The National Archives, numerous published histories and works of reference, sundry respected websites and well over 100 newspapers running from *The Daily Telegraph* at one extreme to *The Biggleswade Chronicle and Bedfordshire Gazette* at the other – no stone has been left unturned.

The structure is chronological, presented as annual segments. Each year begins with a listing of all accidents occurring to aeroplanes assigned to squadrons, at home and abroad – date, type, serial number, names of crew, casualties and a description of the incident. This information is amplified by a series of appendices that provide:

A – The annual totals of write-offs and fatalities broken down by aircraft type.

B – Locations and COs of all squadrons.

C – A listing of officers granted short service commissions, with a

[1] The other Dominions declined to sponsor flying services of their own during WW I so their nationals simply joining the RFC/RNAS/RAF.

Roll of Honour.

D – A listing of cadets graduating from the RAF College with a Roll of Honour for each entry.

E – A Roll of Honour listing those who died in-year.

But these are mere headings. In each case there is a wealth of embedded information. For example, each Appendix B features extensive footnotes expanding on selected COs, quoting perhaps the citation for an MC or DFC, or summarising an individual's exploits in WW I or the career of another who would achieve air rank in WW II. Appendices C and D provide, for each individual, full name, date of commissioning and date of, and reason for, termination of service, typically resignation, dismissal, retirement or death. In the majority of entries there is an amplifying note and in the case of a death the unit is identified. These notes may be just a line or two recording, for instance, that the individual eventually became an air marshal or that he was cashiered for bouncing cheques. Some are extracts from the *London Gazette*, or a copy of a WW I Service Record (an Army Form B103) or extracts from local newspapers describing a post-war accident, these sometimes running to a whole page. If I add that Appendices B-D, which comprise well over half of the page count, are presented in 9 point typeface, like this, you will begin to appreciate just how much information has been packed into this book.

But it gets complicated. Although the title of each book is 'Squadron Losses', and that is what is reflected in the annual listing of accidents and in Appendices A and E, the nature of Appendices C and D exceeds this constraint. Why? Because they record *all* officers who were commissioned each year and their fates, so the death of a cadet while undergoing flying training will be noted, but not in the main listing nor in Appendix E – because the incident did not involve 'a squadron'. The same is true of Station Commanders, Wing Leaders, staff officers, QFIs and the like who died in accidents, or in combat – but not while serving on 'a squadron'. These losses are noted, often in some detail, but you have to winkle them out. You have to dig deeper than Appendices A and E.

The amount of information presented is prodigious, simply because of the number of accidents. The Appendices A tell us that in the ten years covered by this book there were no fewer than 658 serious accidents resulting in the deaths of 355 personnel. That could reasonably be described as 'living dangerously', but those figures relate

only to squadrons – they do not reflect accidents that occurred in training or on other units.

This book – these books – should be accompanied by a health warning – they are terrible time wasters. If you refer to them to nail down a specific detail – who wrote off a particular aeroplane, or what happened on a particular date, you are likely to be distracted by an adjacent incident and an hour later you will still be browsing. This book is an almost inexhaustible source of fascinating incidental information providing numerous insights into the early years of the RAF. And at a mere £18 it is remarkable value for money.

Strongly recommended. Work is already underway to extend the series to 3 September 1939, which must surely amount to another 1,000 pages and two more volumes. This reviewer can't wait.

CGJ

Typhoon by Wing Commander Mike Sutton. (Random House; 2021). £20.00 (also available as a softback).

The author was the first squadron commander to take the Typhoon into combat operations when No 1(F) Sqn deployed to Akrotiri to participate in Operation SHADER, the extended campaign against the Islamic State of Iraq and the Levant (ISIL) dissident forces in Syria and Iraq which began in 2014. The Typhoon was procured by the RAF as a highly manoeuvrable air defence fighter and in 2009 was deployed to the Falkland Islands to serve in this role. However it was inevitable that it would be developed as a multi-role platform or, in old money, a fighter bomber. It was in this all-purpose guise that the Typhoon FGR4 went to war led by Wg Cdr Mike Sutton, hence the book's expanded title of *Typhoon, the inside story of an RAF Fighter Squadron at War.* Half of this excellent, 375-page, autobiography describes his time in command with a focus on the lengthy detachment to Akrotiri and events surrounding the exacting demands of combat operations over the Middle East theatre in 2016 which covered the several thousand square miles of Syrian and Iraqi air space.

Early chapters cover the usual boyhood ambitions and enthusiasm but at the age of seventeen his application to join the RAF was rejected by the selection board at Cranwell, much to his disappointment. His initial optimism was tempered so, instead he attended Southampton University where he joined the Air Squadron and his appetite for flying

was stimulated despite erratic performance where his confidence in the cockpit took several knocks. After graduating, his second application to the RAF was successful and he followed the customary pattern of flying training from Cranwell to Linton-on-Ouse but, instead of going on to Valley for the fast jet phase, he was selected for the NATO training programme in Canada, flying a version of the BAE Systems Hawk.

On his return to the UK he attended the Jaguar OCU followed by his posting to No 6 Sqn which specialised in operations using an early generation of night vision goggles, a challenging role for a newcomer. His tour included the usual NATO squadron exchanges with a highlight being a detachment to a Romanian base where his experiences with former Warsaw Pact adversaries in air combat manoeuvring and practice weapons deliveries brought some exciting variations from standard RAF practices. Having completed the Qualified Weapons Instructor course he was posted to No 41 Sqn as the unit QWI and, as such, which took him to RED FLAG at Nellis AFB. In 2007, shortly after the squadron's return to the UK, another defence policy decision led to the closure of Coltishall and the disbandment of the Jaguar Force.

This gloomy news was tempered by his posting to the Typhoon where his QWI experience was relevant to the task of introducing ground attack tactics into the concept of operations for the Typhoon Force through the OCU and No XI Sqn, the first of the multi-role units. Via a brief detachment to Afghanistan and a ground tour as a PSO, followed by Staff College he was promoted to command No 1 Sqn in 2015, one of the first of the designated multi-role units and within a year he found himself in action over Syria and Iraq, sharing the airspace with other coalition counterparts, drones and support aircraft together with the surface-to-air missiles which threatened their safety. It is here that his description of cockpit activities are riveting where modern displays and linked communications have revised today's concept of operation and procedures, far beyond the experience of this reviewer.

Written as a series of commentaries covering vital procedures before weapons delivery, including the necessity to receive clearance from legal advisers within the command chain, his words convey the urgency of immediate responses to requests for air support where troops on the ground were under serious threat. Incidents include a near miss with an Australian tanker at night, almost head on, in the crowded airspace, a

tanker from which he later was to receive fuel to extend his time on station. While on airborne standby for further tasking, sortie lengths of up to eight hours were not exceptional where the practical limit was either pilot fatigue or the suitability of the Typhoon's unexpended weapons. Within these detailed accounts however, is it wise to describe current tactics, techniques and equipment being advertised to potential adversaries? Procedures have advanced over the years, but denying the enemy any operational intelligence remains as critical as ever.

The author describes the close working relationship with his ground crews where their 'home comforts' at a stable Akrotiri were in marked contrast to the dynamic activities in cockpits some five hundred miles to the east. In marked contrast to the intense focused activities in the air, from a personal standpoint he acknowledges the mental pressures which face servicemen and women which he describes as subtle, constant and intense. During his early career on the Jaguar he was troubled that elsewhere two very able pilot colleagues had taken their own lives, for reasons unknown. Possibly as a tribute to such domestic pressures, his book is dedicated to his contemporaries and to those families who have to cope with the disruption and uncertainties of service life. A mixture of serious observations together with humorous asides and verbatim exchanges with his troops contain a coarser vocabulary than is the norm in such autobiographies, but the essence of such bantering is a vivid illustration of the life and times of a modern RAF squadron at war. *Typhoon* is accompanied by many of the author's colour photographs with a comprehensive annex and a glossary of abbreviations and is recommended as an exceptional account of modern aerial warfare.

Gp Capt Jock Heron

Rearming the RAF for The Second World War – Poor Strategy & Miscalculation by Adrian Phillips**.** Pen & Sword History; 2022. £25.00.

Even before reading Page xviii of the author's introduction to this volume, the reader will have a fair idea of what is in store. The last line of the book's title on the dustcover gives a clear hint as to what he or she (they?) may expect of it, something quickly confirmed by the endorsement on the first inside page, by an Australian academic and blogger, Brett Holman. He writes of a 'detailed and highly readable

account of how the RAF became obsessed with the bomber in the decades before the Second World War' and argues that 'Adrian Phillips skilfully uses archival sources to show how the clash of personalities inside Whitehall combined with false orthodoxies within the Air Ministry to leave Britain with no counter to Hitler's *Luftwaffe* – except, almost by accident, the Spitfires and Hurricanes of Fighter Command.' What follows is an extensively researched near-polemic in which criticism of the political, military, mandarin and industrialist influencers of the direction and development of the Service in the inter-war years is unsparing. Sometimes acerbic and consistently unforgiving, this is a book in which praise is grudgingly offered and in very short supply, perhaps for good reason.

It is hard to judge decisions and events of nearly a century ago without applying today's standards, with the benefit of hindsight. Adrian Phillips's book is based on deep research of the workings of government between the wars and acknowledges the societal and economic factors surrounding defence planning in that period. He makes some acknowledgement of the gap between concepts developed by contemporary air power theologians and practical experience of its application, but seems unable to forgive those whose enthusiasms ran ahead of what was achievable or achieved by the early days of WW II. Perhaps inevitably, his focus throughout the book is largely on the persona and perceived deficiencies of Lord Trenchard and on the doctrines attributed to him. In these, the bomber reigned supreme. He suggests that instead of Trenchard, who was an infantry officer, a naval officer would have been far more attuned to technical change and, by implication, would have made a better fist of the creation of the post-war RAF.

But it is not Trenchard alone who attracts Phillips's scrutiny and, in many cases, censure in his account of the development of the so-called 'Expansion Schemes', from Scheme A in 1934 to Scheme M in 1938. He writes clearly and in great detail of the many personalities involved in the labyrinthine processes of Government and of the Air Ministry. A recurring theme, and clearly one close to the author's heart, is that of the balance between bomber and fighter aircraft, a balance that he argues was consistently and sometimes dishonestly skewed in favour of the former, in pursuit of what he dismisses as Trenchardian Doctrine. That numbers of fighters and the resources devoted to defence would

understandably be kept to a necessary minimum – a perfectly respectable basis for force planning – is scarcely acknowledged, such is Phillips's evident conviction that air defence was wilfully neglected in the belief that offensive action was the best basis for defending the country.

Inevitably the two decades leading to the outbreak of war in 1939 saw many personalities involved, politicians, serving officers, senior civil servants and industrialists, some of whom today would be described as 'Spads'. For many of these, harsh criticism was their reward for their part in affairs in which, one suspects, they behaved very much in the ways of the times. They were large in number, some names familiar even today but many whose reputation does not emerge unscathed from the savage analysis of this book. Foremost of these, apart from Trenchard himself, were the then CAS, Sir Edward Ellington who is judged harshly, perhaps fairly so, and his Secretary of State, Lord Londonderry. Other accounts are rather more generous, especially to Londonderry. Their successors fare only marginally better. Particular and very severe opprobrium is cast in the direction of Sir John Slessor who was dismissed as a disciple of Trenchard. Others rate more highly, but only slightly so, faint and often only qualified praise being their reward. Foremost of these was Sir Wilfrid Freeman, but Sir Hugh Dowding is smiled upon. All in all, the reader is left with the impression that, at best, the many involved at senior levels should have done better and this near-blanket condemnation does leave a question mark over the validity of the author's individual judgements. Despite the depth of the research supporting his verdicts, it is hard nonetheless not to suspect that in the circumstances of the 1930s the players did rather better than is suggested here.

One chapter of the book, with the catchy title *Per Astra ad Ardua*, is more down to earth. It is an account of the deficiencies in bomber navigation finally laid bare in the Butt Report of 1941 and the failures to espouse 'radionavigation tools' (*sic*), memorably described by various senior RAF officers according to Professor R V Jones as 'adventitious aids'. Sir Arthur Harris himself dismissed them as 'not even really useful'. Such was the prevailing view at the top until Butt laid bare the extent of Bomber Command's inadequacies which reflect badly on those at the helm in the late 1930s, not least given the very different approach to navigation taken in Goering's young *Luftwaffe*.

Rearming the RAF for The Second World War offers an exhaustive account of the debates at the highest levels between the wars, about air doctrine and resulting force structures. It views events through the prism of the 21st century, seemingly making little allowance for the ways and methods of government nearly a century ago, nor giving due credit to the difficulties of preparing for future conflicts for which no precedents had yet been set. It is not always an easy or agreeable read, but it makes a substantial contribution to the historiography of the period.

AVM Sandy Hunter

Harrier – How to be a Fighter Pilot by Commander Paul Tremelling. Penguin Random House; 2022. £20.

The title of this lively and compelling autobiography, is something of a misnomer – although the author is well qualified to tackle the subject, it is certainly not a book of instructions. Rather it is a proud record of Cdr Tremelling's career which he summarises as '. . . so I joined the Royal Navy, made it to the Sea Harrier (SHar) front line, then went to the Harrier GR9, then flew a tour with the US Navy and then left having had a hoot and a roar.' These words don't do justice to his adventurous time as a dark blue fighter pilot which began while watching air days at RNAS Yeovilton.

The route from school was via Southampton University, Dartmouth and elementary flying training at Barkston Heath where, to his huge disappointment, and despite good results, he was streamed to helicopters. Circumstances, and persistent requests that he be reconsidered, led finally to his reselection for fast jet training. Despite some near failure escapades on the Hawk, he moved to Yeovilton for SHar FA2 conversion with 899 Naval Air Squadron (NAS). After CORPORATE, the shortcomings of the early FRS1 had been identified and a major improvement programme led to the much more capable F/A2. Entering service in 1994, it had improved avionics, including the multi-mode Blue Vixen radar, and the ability to carry the AIM-120 AMRAAM. Notwithstanding the occasional training mistake, Tremelling eventually joined 800 NAS as a junior pilot.

His posting to the front line coincided with the announcement that the SHar was to be absorbed into Joint Force Harrier (JFH) and his resentment at this development shines through, as does his reaction to

the premature retirement of the aircraft in 2006. However, he had made the most of his SHar time and, despite its planned withdrawal, his experience was consolidated by jousting with UK-based Tornado F3s and, with a high degree of success, participation in a RED FLAG exercise at Nellis AFB.

Following a desk tour at High Wycombe, where he was responsible for planning the integration of the F-35B into the successor organisation to JFH, he and several of his SHar contemporaries converted to the RAF's Harrier GR7/9 at Cottesmore where, in 2007, 800 and 801 NASs were amalgamated to become the Naval Strike Wing (NSW) alongside the two RAF squadrons. He compares the performance of the SHar with the GR9, frustrated that the latter had no radar but impressed by its longer range, improved handling and extensive ground attack capability, acknowledging that each type had its advantages. As an aside, his comparisons of RN v RAF habits and practices are similarly judged, occasionally with tongue in cheek.

In 2008 the NSW replaced No 1(F) Sqn in Afghanistan as the British ground attack contribution to the coalition and it is here that his detailed accounts of combat operations are riveting. He captures the drama and urgency of providing air support to ground forces under immediate attack, describing the judgements and actions in the cockpit while under pressure. Following this demanding tour he spent four months afloat, as a liaison officer with relevant recent theatre experience, on board the aircraft carrier *Charles de Gaulle*. This gave him an insight into the French way of doing things over Afghanistan where her embarked Rafales were prohibited, by national politics, from delivering weapons, much to the frustration of the ship's company, particularly the pilots. His experience as an operational air adviser saw him deployed later aboard HMS *Ocean* for Operation ELLAMY where a degree of close air support was provided by embarked British Army Apaches, alongside Italian and USMC Harriers. He expresses understandable frustration that British Harriers, the aircraft of choice, had been grounded some months earlier to await disposal, that HMS *Ark Royal* had been decommissioned and that British fixed-wing air support was based as far away as Italy, with lengthy transit times to the operational theatre.

As a result of these unpalatable changes in defence policy, which had closed the door on his RN career options, he became disillusioned

and considered retiring to become a civilian pilot. But he changed his mind when he was offered an exchange tour with the US Navy flying the F/A-18 Super Hornet. Only a few pages are devoted to flying this 'superb aircraft from a big deck' but he was much impressed by the experience which included another RED FLAG where he offers huge praise for the Super Hornet's capabilities and acknowledges the skill of his USN pilot contemporaries. On his return he decided to retire with a full collection of memories rather than remain and tarnish the whole experience.

His accounts, written in a punchy, free-flowing style, occasionally laced with a hint of sarcasm and peppered with naval aviation slang, are accurate reflections of his life and times on the SHar. Coarse language, particularly in verbatim quotes, while bantering with colleagues or thinking aloud, could be excused by the pressures of his work load in the cockpit, but adds little to the narrative. I spotted only one minor typo (an AH-46D vice AH-64D) and this entertaining tale of a naval fighter pilot's career in three very capable aircraft is embellished by many coloured photographs illustrating his pride in contributing to the humanitarian cause in a limited war. However he has major reservations about Afghanistan where his postscript's observations about the long campaign were written long after the coalition's withdrawal from Kabul. In Tremelling's view, 'When you consider that we are back where we started, the only sensible conclusion to draw is that ***our*** war in Afghanistan was a complete waste of life, blood, tears and time.'

Contentious perhaps, and written from the point of view of his personal cockpit experience, I have no reservation in strongly recommending this worthy record of a cockpit career, with peripheral activities.

Gp Capt Jock Heron

Mosquito Intruder Pilot by Jeremy Walsh. Air World; 2022. £25.00.

Written by his son, who was briefly (1969-75) in the RAF himself, this 341-page hardback is the biography of Ben Walsh. While it covers his whole life, as the title indicates, the core of the book concerns his wartime experiences.

Having told a porky when registering his age, Walsh succeeded in enlisting in March 1941, just nine days after his seventeenth birthday,

ie a year early. His progress through the contemporary training sequence is recorded, culminating in the award of his 'wings' in May 1942, with just shy of 200 hours in his log book. He spent a year flying Bostons with No 418 Sqn before, in September 1943, ferrying one of the first batch of six operational Mosquito VIs to India; only three of them stayed the course. This saga had involved eleven stages, in the course of which Walsh had infringed neutral Spanish airspace, had his Service watch and revolver stolen and coped with two single-engined landings – par for the course in 1943 perhaps, but not bad going for a teenager. He joined No 27 Sqn which was expecting to convert from Beaufighters to become the first Mosquito fighter bomber unit in theatre. But, having flown several Mosquito sorties, the squadron changed its mind and opted to stick with its Beaus, so Walsh moved to No 45 Sqn which became the *de facto* first squadron on type. As has been well-documented elsewhere, the Mosquito's glued wooden structure was not well-suited to the climate and there were a number of fatal accidents and groundings before the squadron hit its stride in early 1945 – Walsh flew 78 operational hours in March.

Post-VJ Day, his three years of war and 75 operational sorties finally caught up with him. He began to suffer occasional black-outs and developed a 'twitch'. Repatriated by sea, he was home by Christmas and demobbed in July 1946. In 1947 he married Pat, a girl he had corresponded with since 1943, and began to train with Boots to become a pharmacist. By 1949 he had regained his health and, having graduated from Manchester University, his career took off. He became a leading light in British pharmaceuticals culminating in 1971 in the establishment of his own company, the first of several such successful enterprises. He died in 2008.

So what of the book? There is a slight downside in that, despite having been independently proof-read, twice, there is a tendency to repetition which could usefully have been edited out, and there are some minor residual errors. For example: the Boston III had Wright (not P&W) Cyclones (p14); the Oxfords flown by Ben in 1941 would have had Cheetah engines, not Wasps (the first batch of Wasp-powered Mk 5s didn't appear until 1942 – p29); VMC should have been Vmc – there is a difference (p96); there is no 's' in aircraftman (p174); some names have been misspelt, eg Milan should have been Malan (p152), Zuzzen should have been Zussen (p212) and Kirmagon should have been

Kinmagon (p230); the Warwick referred to on p223 would have belonged to No 221 Gp Comm Flight (not 221 Comm Sqn) the same unit would almost certainly have provided the 'Beechcraft' noted on p201 as belonging to 45 Squadron – No 45 Sqn never 'owned' an Expediter.[2] None of these are of any great significance, of course, but they do tend to provoke the occasional doubletake.

That aside, Ben's story has been very well researched using preserved personal correspondence, extensive published works, unit ORBs, his log book with its associated annotations, and notes made in the course of interviews conducted towards the end of his life. In addition to an insert with about 50 photographs, these sources have been used to create two really interesting, and innovative, styles of outline maps. One illustrates the routes flown on representative individual sorties and on the ferry to India; the other plots his periodic changes of base, in the UK and in India. There are amplifying notes in all cases. Chapter 25 lists the twenty incidents/accidents in which he was involved in the course of accumulating a little over 900 flying hours – again, par for the wartime course perhaps.

What comes through in this book is its honesty. Three issues evidently caused Ben particular concern and these percolate through the narrative. First, there is some sense of discontent at being a *sergeant* pilot – occasional references to being at the bottom of the pecking order. Secondly, while the RAF defined tour lengths in terms of numbers of operations flown, it seems to have been incapable of recognising sorties flown with a previous unit, so every mid-tour posting meant resetting the tally to zero. Finally, Ben was evidently very aware of (perhaps even obsessed with?) the risks he was running and he kept a tally of friends and colleagues who 'went missing'. His personal Roll of Honour recorded eighty-one men who had died and eight who became PoWs. These are listed in Chapter 33 but the author has expanded the original list to identify those merely noted as 'and crew' which raises the overall total to 158, which is a sobering statistic.

[2] There is a collage of images on the dust jacket that includes a shot of one of No 45 Sqn's Mosquitos, but the publisher couldn't resist touching-up the B&W image by tinting the pale blue elements of the SEAC-style national markings to make them red. That defeated the object of the exercise, of course, which was to avoid any possibility of confusing the red centre of an RAF roundel with the Japanese 'meatball'. **Ed**

A good read and a valuable insight into an aspect of the Burma campaign – the 'Forgotten War'.

CGJ

Chinook Crew 'Chick' – Highs and Lows of the Longest Serving Female RAF Chinook Force Crew Member by Liz McConaghy. Pen & Sword; 2022. £20.00.

This Society's autumn 2022 seminar dealt with the latter days of RAF helicopters, first reviewed in 2000 (see Jnl 25). It is perhaps appropriate, therefore, to consider an issue that has changed markedly in the last couple of decades – the RAF's employment of women, not just in the complete range of ground duties but as operational aircrew.

The author, who spent a decade and a half as a crewman (I shall doubtless be corrected in that title by the gender police!) on the Chinook support helicopter (SH) force takes the reader through her childhood aspirations to fly and documents the highs and lows of her career. Whilst she appears not to have been subjected to the negative attitudes that some female aircrew have experienced, she was perhaps lucky to have found herself in the close-knit world of rotary wing crewmen and the equally close bonds of the wider SH community.

McConaghy's 178-page hardback, with its 33 photographs, is written in a straightforward style. She shares with the reader the constant cycle of detachments, first through Iraq and then Afghanistan, relieved by the occasional trip to the Falklands. Whilst the experiences she relives is common to those who pursue this lifestyle we see it through the eyes of a woman who was something of a trailblazer.

Whilst the author is modest about her own role, she leaves the most powerful commentary to the last part. She first suffers neck and shoulder problems, probably brought on by 3,000 flying hours wearing a helmet and all the items which now adorn protective headgear. With a flying career which was drawing to a close, she lost first her aircrew category followed by a personal loss and the onset of PTSD. She records her feelings in an honest and undramatised fashion culminating in her attempt at suicide as things fell apart around her. Fortunately, she had a supportive network of friends and relations and began to get her life back on track. But, while the frankness with which she has described her experiences has seen her through, I suspect that many others may have similar stories to tell – there were two dozen suicides

amongst service personnel in 2021, and there may have been more among veterans who left the forces with unresolved mental issues.

Hopefully, Liz McConaghy's exposure of her own experiences will serve to help others. She tells her story well and it will be an 'eye opener' for those who have had little or no exposure to the harsher consequences inherent in service life.

Wg Cdr Colin Cummings

The Workhorse Of Helmand – A Chinook Crewman's Account of Operations in Afghanistan & Iraq by Michael Fry. Pen and Sword; 2022. £ 22.00.

It is said that one waits for an age for a bus and then several come along at once: something similar might be said of this book, as it is the second generally similar account of the back-end crew who have sustained the RAF's use of the Chinook for the last several decades. However, this book is sufficiently different from that reviewed above, for both to be considered. Nonetheless, I found it difficult to avoid a 'compare and contrast' exercise.

The author was already an experienced crewman (loadmaster) when he came to the Chinook and his account begins in the early days of the British involvement (this time around) in Afghanistan. After '9/11', Fry returned from Australia to the UK and shortly afterwards, flew from HMS *Ocean* to the regional base at Bagram. There followed a seemingly endless round of deployments within Iraq and Afghanistan, punctuated by periods of training and leave. A degree of stability was provided by the concept of 'fight by flight', which ensured that, as far is possible, people would be committed to action with the team with which they had trained.

The narrative is well presented and the reader is treated to considerable detail as to how the crews operated and approached the operational task. As the story progresses so does the author's account of his advancing responsibilities including the training, categorisation and mentoring of less experienced personnel. Whilst the traumas encountered by crews operating under great pressure are described, notably when responding to incidents or evacuating casualties, the coverage is measured and appropriate to the situation.

In all of this, the author finds time to complete a master's degree and finish his '22' ranked as master aircrew. The final aspect of his tale

shares with the reader how he coped with life post-the RAF.

Whilst this 201-page hardback is well illustrated with 37 colour or monochrome photographs, some of the maps are a trifle basic and whilst there is a very decent glossary, I found the use of the term 'mate' for just about everybody, somewhat wearing.

As I write this review, I see on the website 'pprune.org' a comment to the effect that in today's air force, it is the rotary wing crews who are doing the war fighting – and the fast jet people? – 'well they fly fast jets!' Behind that statement lies the fact that whilst many pilots of helicopters have been decorated, there seems never to have been a DFC awarded to a crewman (who are mostly SNCOs) and for that I blame John Major's reform of the medal system, which was supposed to make everybody equal, but in practice appears to have deprived some exceptionally gallant personnel of their just desserts.

Having got that off my chest, I commend this book which, together with *Chinook Crew 'Chick'*, serves to focus attention on helicopter rear crew and thus go some way to providing them with the recognition that they surely deserve.

Wg Cdr Colin Cummings

Gnat Boys by Rick Peacock-Edwards and Tom Eeles. Pen & Sword; 2022. £25.00

This book on the Folland Gnat follows on in the successful 'Boys' series of books of aircraft type tales told by those who flew them. As before, it is a collection of personal stories and reminiscences, told by no fewer than 70 people who were among the best pilots of their day, which is to say the 1960s and '70s, although, in the case of the Indian Air Force, as late as the 1990s. As with some other jet warbirds, a few Gnats continue to fly to this day.

The, aptly named, diminutive Gnat was a concept designed to reduce the ever-spiralling cost of fighter aircraft. Its compact design had some unique features brought about by the necessity to fit a quart into a pint pot, for example the novel idea of the partial lowering of the undercarriage to use as air brakes. It had its own Folland-designed ejection seat which again had a novel way of reminding the pilot if the seat was ready to use. Being so small, with a 22 feet wingspan, people often described the Gnat as having been wrapped around them. The

view from the front cockpit was terrific, even if cramped for taller people. Above all it was nippy and a delight to fly.

There are stories from instructors and pupils of the RAF trainer version, some of which remind one of the dangers of flying a more than usually complex training machine and the joys of flying in the more relaxed days of The Cold War. Despite its complexities and relatively short range, it became well recognised as an advanced trainer that properly tested young aircrew, particularly in preparation to fly the Lightning, another aircraft that lacked range, particularly in its early versions.

There is history here, too, of both the formation of the Red Arrows arising out of the unofficial Yellowjacks aerobatic team at RAF Valley, and of the early development of their world-renowned air displays. The authors have been thorough in their research with an examination of the aircraft in both the Finnish and Indian Air Forces who received the fighter export version. There are some great stories of the success of the Gnat in combat against Pakistan where its small size made it very difficult to spot in air-to-air combat.

Inevitably in a book of personal collective stories, there is a degree of repetition. Nevertheless, there is plenty of interest about an aircraft and its aircrew. Although a delight to fly, the Gnat could become a real handful if things went wrong, as indeed they quite frequently did. Alas, too many gave their lives flying the Gnat and the book is rightly partly dedicated to those who did so on this wonderful little aeroplane.

This book is not for everyone but if you enjoy flying tales, there is plenty of interest.

Air Mshl Sir Ian Macfadyen

Flying Backwards Facing Forwards by Jim Walls. Grub Street; 2022. £25.00.

In a Preface, the author makes the point that, ‘This book does not pretend to be an authoritative source of technical and historical information. It is simply a distillation of personal memories, observations and opinions . . .’ It is exactly that but, notwithstanding that proviso, this book is a very worthwhile addition to the annals of the Service because it presents a view from the perspective of two of the less well-known aircrew categories – the Air Electronics Operator and Officer (AEOp/AEO) – and it does it very well.

In brief, Jim Walls joined the RAF as a boy entrant via Cosford in 1958. As an air radar tradesman, during subsequent postings to Leeming, Waterbeach, Leuchars, Kinloss and Seletar he worked on a variety of contemporary equipment including AI 17, AI 22, GEE Mk 3, Rebecca and some of the more exotic kit installed in No 51 Sqn's Wyton-based Comets and Canberras. After remustering as aircrew, he graduated from Topcliffe as an AEOp in 1970. He spent 1971-75 on Nimrods with No 120 Sqn followed by a brief stint with No 51 Sqn. Following commissioning, he flew in Vulcans with No 617 Sqn, 1977-81. He spent the next four years at HQ 1 Gp and EWOSE before returning to No 51 Sqn in 1985. Ten years later, he made his last move, to the Defence Evaluation and Research Agency (DERA) at Great Malvern.

After 40 years in uniform, as a squadron leader since 1991, Walls left the Service in 1998 but he continued to work on Nimrod R-associated projects at Malvern, which had, in the meantime, been restyled as Dstl – the Defence Science and Technology Laboratory. He finally retired in 2008, although he had, in 2001, renewed the PPL that he had originally gained while in Singapore, and over the next four years he logged more than 1,300 glider tows in a variety of tugs.

Interestingly, although he spent fifteen years on No 51 Sqn's Nimrods, compared with just four on Vulcans, 60% of his tale (117 of the book's 197 pages of narrative) is devoted to his time on No 617 Sqn. That may be partly to do with some of the less well-publicised aspects of what No 51 Sqn got up to, but it may equally be that his time on Vulcans was particularly satisfying as it included trips to the USA, Canada and Australia, 1979 being a notably busy year in which he participated in the USAF's annual GIANT VOICE bombing competition and an Exercise RED FLAG.

But, as his prefaced remarks indicate, Walls' account covers far more than interesting trips. He provides, for instance, some insight into No 51 Sqn's activities in the Middle East and the Balkans *aka* Operations GRANBY and DENY FLIGHT. He goes on to discuss his participation in Project Star Window, which saw the Nimrods being provided with an updated COMINT fit. But the book's main focus is on No 617 Sqn and the Vulcan, and not just his personal involvement with the aeroplane. He reflects on broader issues, such as the likelihood of a Vulcan successfully completing a typical Cold War nuclear

mission, and on its participation in the Falklands campaign. He also regrets (as does this reviewer) that it proved impossible (because unaffordable, as all available funding was being channelled towards the forthcoming Tornado) to retain three squadrons of Vulcans with upgraded avionics to provide a worthwhile long-term, long-range (relatively) heavy strike/attack force *á la* the USAF's B-52s.

The book has two particularly useful appendices. One is a table clarifying, at a glance, the confusing, certainly to the electronically less fluent, mismatch between the military's logical assignment of 'band' names to frequencies, compared to the apparently random assignments made by the International Telecommunications Union – why can't there just be one L-Band?! The other provides seven pages-worth of definitions of terms which decodes many acronyms and initialisms.

Apart from presenting views from 'down the back' of a Nimrod and a Vulcan, which are unusual in themselves, it is the musings and opinions of a very experienced and well-informed operator that make this book well worth reading. As a trip down memory lane, I think it will have a particular appeal to Vulcan veterans of 40+ years ago.
CGJ

Rise of the War Machines by Raymond O'Mara. Naval Institute Press; 2022. £51.20.

Sub-titled *The Birth Of Precision Bombing in World War II*, this 336-page hardback is concerned solely with that process in the context of the US Army Air Corps and, post-1941, the US Army Air Forces, essentially the UK-based 8th Air Force. The author has adopted, what he terms, a sociotechnical approach, which is to say that he considers the interactions between the crew and their machine and how they functioned together as an entity within the limits imposed by evolving doctrine. The first chapter discusses that concept and the three that follow examine how each member of 'the bombing team' – the pilot, the navigator and the bombardier – contributed to the overall construct and functioned within its constraints.

Beginning with their origins in WW I, the evolution of each of the three key crew members is recounted and analysed. As in most other contemporary air forces, while it was necessary to co-opt enlisted men for 'secondary' functions, as gunners for example, American pilots were generally able to manage navigation and bomb-aiming by

themselves until the advent of four-engined, long-range heavy bombers in the mid-1930s, hence the subsequent need for dedicated navigators and bombardiers. Taking the B-17 as the model, the narrative describes the adoption of HADPB – High Altitude Daylight Precision Bombing – as the chosen means of conducting an offensive and the way in which tactics and procedures were modified and adapted in response to the challenges that were encountered during WW II. These developments included such issues as commissioning policy, captaincy and the impact of technology, notably, and discussed in some detail, the Norden bombsight and the Minneapolis-Honeywell C-1 autopilot. Appropriate space is devoted to the concept of formation flying, the fundamental building block being three 6-aircraft squadrons to create an 18-aircraft Group. Three of those made a 54-aircraft Combat Wing and, as time went by, missions would be mounted by increasing numbers of these, eventually amounting to more than 1,000 aircraft at a time – escorted by almost as many fighters. The procedures and problems involved in assembling and marshalling such numbers are described, although only a passing reference is made to the way in which formation patterns changed over time.

In concluding, the author considers how the functions of the key members of a B-17 crew continued to evolve after the war, culminating in the F-111 which could be flown hands-off at low level by an autopilot which avoided terrain by reference to a dedicated radar and followed a flight plan programmed within an inertial navigation system. Only two men vice the original three, with most of the intensive manual activity of yesteryear replaced by the monitoring of machines.

There is a tendency to repetition within the narrative, and a sightly academic tone, although this is certainly not excessive and frequently relieved by brief quotations from the many referenced sources. O'Mara's analysis is *very* thoroughly underpinned – no fewer than eighteen pages of primary and secondary sources, and thirty pages of references to them. But there is practically no mention of the RAF, so why is this book being featured in this Journal? Because it would provide a very useful tool for anyone who might wish to conduct a 'compare and contrast' exercise between the American method and the RAF's very different – as different as night from day – approach to air bombardment in WW II. While their tactics were very different, however, the results were much the same. As has been pointed out

elsewhere, despite claims of being able to drop bombs 'in a pickle barrel', the Americans actually delivered their bombs from large formations with only the leader actually aiming, the inevitable result being area bombing of a precise target. By contrast, each British bomber attempted to attack the same nominal point, but most missed, so the *de facto* result was precise bombing of an area target.

This is an informative, authoritative and well-constructed account. Pity about the price.

CGJ

RAF in Camera – 100 Years on Display by Keith Wilson. Pen & Sword; 2022. £50.00.

This book follows the pattern set by the author's three previous 'RAF in Camera' essays which were individually dedicated to the RAF in the 1950s,'60s and '70s (reviewed in Journals 63 and 68). This one is a little different in that it focuses on a function, rather than a timeframe but, beyond that, the style, and the quality, are the same. The content is presented as ten themed chapters devoted to aspects such as 'Pageants and Parades', 'Royal Connections', 'Flying the Flag' and 'RAF100 and the Flypast of the Century'. One could take issue with the last of these as the current century still has a long way to run and, while the RAF100 Centenary Flypast was certainly impressive, its 103 aircraft were rather dwarfed by the more than 300 that took part in the Victory Flypast over London in 1946 or the 600+ that flew past at the Coronation Review at Odiham in 1953 but, in a book celebrating the RAF's 100 years of service a spot of hyperbole is forgivable.

This book is significantly larger than it three predecessors – 472 A4(ish) pages and, by my count, a remarkable 544 photographs, a little over half of them, the post-1970s images, in colour. All but a handful have been drawn from the collection held by AHB and the reproduction is first class throughout. Each chapter has a descriptive narrative but the book is really about the pictures and their lengthy captions. There is a nine-page index, but this appears to be confined to the captions, so folk named in the narrative do not feature.

Errors? Almost bound to be a few in a book of this size. One of particular interest concerns the number of aeroplanes on parade at Mildenhall for the Royal Review in 1935. The 144+104+58+24 noted on p101 do not add up to the, also cited, total of 356. That figure has

often been quoted elsewhere, although other sources claim 370.[3]

That aside, in a book covering 100 years, there were almost bound to be some errors. The occasional typo aside, these included, just as examples: Heyford K4025 (on p99) belonged to No 10, not 99, Sqn; while Spitfires could be fitted with overload tanks – 'over-wing' (p144) was not an option; the Hastings on p146 belonged to No 511 (not 242) Sqn; there is no 'e' in Longvic (p156); the Indian language is Hindi, not Hindu (p169), which is a person; Song Song Range was NW, not NE, of Butterworth (p176); I seriously doubt that Hardit Singh Malik flew a Sopwith Camel from the UK to India (p339); and the missiles toted by the Tornado on p353 are ALARMs, not HARMs. I could go on – there are a few more like these – but suffice to say that, while your browsing may be disturbed by the odd double-take, this book really isn't about words; it's about the pictures and they are as good a selection of crisply reproduced images as you will find anywhere.

Notwithstanding my cavilling, this book is a bargain. The publisher's list price noted above is, as ever, negotiable and copies may be found for less that £40, which works out at about 7·3p per picture. It's a bargain and it is unreservedly recommended.

CGJ

Nine Lives by Chris Burwell. Grub Street; 2022. £25.00.

Not be confused with the much earlier *Nine Lives*, the reminiscences of Battle of Britain fighter pilot Al Deere, the title of this autobiography is entirely appropriate in the light of the author's several near misses during a long flying career. It is an interesting canter through Chris Burwell's 8,500 hours in cockpits, both military and civilian, between 1969 and 2011.

His RAF service began with a flying scholarship, followed by a Cranwell cadetship and being 'creamed off' as a QFI. His accounts of life as a flying officer instructor are mainly light-hearted, although his observations on his time with the Standards Squadron at Linton raise the sensitive issue of how to handle the below average flying abilities of some pilots versus their perceived potential as officers. He cites the tragic case of an officer whose flying skills had been criticised during a QFI tour as a squadron leader Flight Commander who subsequently

[3] For the right answer, see p133.

died, along with his crew, in a flying accident while commanding a squadron as a wing commander. Burwell notes that 'this was the first time (but not the last) when I would come across a case of an officer progressing through the ranks on his abilities as an officer despite his shortcomings as an aviator'; an observation shared by many.

A brief fighter refresher course on the Hunter with No 45/58 Sqn preceded his long association with the Harrier GR3 with sequential tours on No 1 Sqn and the OCU. During his time at Wittering, while detached to Germany to participate in a field deployment exercise, he was obliged to eject, thus using up one of his 'nine lives'. Promotion to squadron leader saw him back in Germany as a Flight Commander on No 3 Sqn at Gutersloh interspersed with two detachments as OC 1453 Flt at RAF Stanley. After more than eight years flying the Harrier GR3 he was posted to Bracknell, but his time with the Staff College was cut short by an urgent posting to Barnwood. After attending the JSDC at Greenwich, he returned to his old department at Barnwood for a further spell behind a desk, albeit by now as a wing commander. When he finally left staff duties on posting to Wittering as OC No 1 Sqn, Burwell considers that he had spent too long away from the cockpit and, since that is the opinion of a very experienced personnel officer, it must surely carry some weight.

No 1 Sqn was the first unit to fly the Harrier GR5 and conversion to the new mark was already complete when he took command. Unfortunately, the aircraft was grounded shortly afterwards due to an electrical fault which required a considerable amount of work to rectify. Frustratingly, in order to maintain currency, the squadron had to revert to flying the GR3 for several months. Subsequent re-equipment with the much-modified GR7 introduced a night attack capability and the squadron was tasked with developing the techniques that were needed to exploit this enhancement. Burwell describes the challenge of converting experienced day fighter ground attack pilots, with minimal night experience, into proficient Harrier operators at low level in the dark using NVGs and forward looking infrared sensors. It was no mean task but it resulted in the Harrier becoming the RAF's principal offensive air support asset.

In 1994, by then a group captain, he took command of RAF Scampton where one of his lodger units was the headquarters of the CFS. This tour returned him to his QFI roots and he made the most of

the opportunity to fly the wide variety of aircraft within the training system before a year at the RCDS saw him posted to HQ Logistics Command where he began to doubt that his qualifications were being used to the full, hence his decision to retire prematurely at age 48. He spent the next twelve years with Cobham in a management capacity while also flying the Falcon 20 and King Air 200, followed by a final four years as a manager with Flight Training Europe.

The book's last four chapters, which deal with the relatively unfamiliar civilian environment, provide a marked contrast with the account of his Service career. His considerable QFI experience allows him to compare the customary high standards of instruction within the military with the less disciplined culture which pervaded his civilian career. He expresses concern too at the lack of aviation awareness by higher level management where money is the driver and regulations are considered to be a 'tick in the box' exercise rather than a genuine understanding of performance and safety versus cost in operating aircraft in an airline environment. While his criticism may be seen as counter to the successful operation of a business, it will surely strike a chord with those who must measure risk against the balance sheet.

Apart from two minor typos (No 1453 Flt is misidentified and the airfield at Machrihanish is misspelt) Chris Burwell's profusely illustrated, 224-page hardback is an immensely readable account of flying as a profession, both in and out of uniform. For Harrier Force devotees there are entertaining reminders of times past and for those who seek a career in civilian flying his words will serve as guidance in judging priorities. Strongly recommended.

Gp Capt Jock Heron

Air Power Supremo by William Pyke. Pen and Sword; 2022. £25.

'*Let us now praise famous men -*
Men of little showing -
For their work continueth,
And their work continueth,
Broad and deep continueth,
Greater than their knowing.'

These words were written by Rudyard Kipling, who was born in British India in 1865. John Slessor, better known as 'Jack', was born

in the Himalayan foothills 32 years later. Slessor, a polio victim who always walked with a stick, became a First World War pilot in the Sudan and on the Western Front, and then a squadron and wing commander in India between the wars. At a time when aerial warfare was a relatively new concept, he was one of the first to develop practical air-land cooperation tactics and interdiction strategies alongside his Army colleagues. In the Second World War, he served first as AOC 5 Group then as AOCinC Coastal Command during the Battle of the Atlantic and finally as CinC Mediterranean and Middle East when he made a remarkable contribution to the success of allied air power in the Italian and Balkan campaigns. After the war, as CAS he established himself as one of the foremost experts on strategic bombing and nuclear deterrence. In this respect, he was particularly adept at working closely and sympathetically with his army and navy counterparts but, possibly more importantly, with the leaders of the newly established USAF.

Bill Pyke, who completed the Birmingham University MA programme with distinction, wrote this book during the Covid 19 lockdown because he felt that Jack Slessor was neglected as an air power thinker and that a new biography was long overdue. I empathise with that. I was privileged to interview Sir John in 1976 and it is obvious from his writings – especially *Air Power and Armies*, *Strategy for the West*, *The Central Blue* and *The Great Deterrent* – that he had a tremendous influence over UK and Anglo-US strategic thinking spanning forty years. Yet when I was a Group Director at the RAF Advanced Staff College in the mid-'90s, Sir John's thoughts and legacy hardly ever got a mention. However, Jack Slessor's example is very timely today. He was a passionate believer in 'jointery' and inter-allied command structures. He knew that of which he spoke. One quote from his time as CAS still resonates: 'I'm afraid that if the Treasury push really hard, the eyes of the cabinet will turn not to teeth and spectacles, or housing and welfare generally, but to the bomber force as a means of saving money.'

Back in 1976, Sir John was asked if the UK should have opted out of the strategic deterrent business after the demise of the Blue Steel V-Force. He replied that, 'There were lots of people who wanted to do that, and they may have been right. I think they certainly are right now. I mean, I think the existence of our four Polaris submarines don't make the smallest difference. I think there were a great many better things

we could be spending our money and effort on than four, rather out of date, missile nuclear submarines.' Given that the RAF of 2022 has been reduced to just seven combat air squadrons to help keep Trident going, Sir John was very prescient.

The recent Ukraine experience proves that the UK needs dedicated and informed defence and security staffs to walk the walk that Sir John did. I doubt he would have been happy to see limited defence funding spent on two minimally supported aircraft carriers show-boating around the South China seas. Which is why this book should be compulsory reading for the latest and next generations of tri-service officers and MoD civil servants to enable them to tell their political masters some hard truths.

In sum, Bill Pyke has written a very readable and timely study of a man who rose to the top and who lived and breathed Air Power strategy and tactics. In this modern age of convoluted Venn diagrams and verbose 'doctrine', *Air Power Supremo* is very readable – helped by the fact that Sir John could write – and the illustrations are first rate (admission: several of them are mine). Overall, this is an extremely well-researched biography that has arrived not a moment too soon.

Very highly recommended.

Wg Cdr Andrew Brookes

Close Call, Vol II – Sicily to Victory in Italy 1943-1945 by Vic Flintham. Hikoki; 2022. £29.95.

Vol I of *Close Call* was reviewed in Jnl 75 *qv* and, since the style and content of Vol II mirrors that of its predecessor, it must, inevitably, attract similar comments. The 'problem' is the precision of the sub-title, *RAF Close Air Support in the Mediterranean*, because the book actually covers much more than that. In reviewing Vol I, to make the point, a definition of CAS – close air support – was cited. This had been taken from a present-day doctrinal manual, but it was no new-fangled, post-war revision. While the precise wording differed, the meaning was the same as it had been in WW II. Vol II actually quotes from a contemporary Desert Air Force document that defined CAS as, 'the immediate availability of fighter-bombers to attack and destroy, at the request of the Army, targets engaging or being engaged by our front-line troops.' It follows that anything else is *not* CAS, but, as with Vol I, Vol II is, in effect, an account of much of the significant air action that

took place, in this case, in Sicily and Italy, with chapters devoted to the Balkans and the invasion of southern France. While that has been done well enough, it means that CAS tends to 'get lost in the noise'. And, as with Vol I, the constraint implied by the 'RAF' in the sub-title is frequently breached by references to the Americans in what was, of course, a joint campaign.

As explained in his Preface, the author's interest in CAS had been prompted by notes referring to 'Rover David' in the log book of an uncle who had flown Austers in Italy. Intrigued by this obscure term, he began to investigate and the result was the two volumes of *Close Call*. This reviewer also knew nothing of the Rover system which, it transpires, was the term applied, but only in Italy, to forward air control (FAC) of fighter bombers exercised by an observer on the ground in relatively close contact with the enemy. That said, because the story is embedded within the narrative, the detail remains indistinct. There are sufficient references to Rover David, and Rover Joe, to get a feel for who/what they were – essentially British and US FACs, but it is not entirely clear how they differed from Rovers Paddy, Jack, Tom, Frank, etc. There is a passing reference to Midnight Rover techniques (p229), but no explanation as to what that involved, and Timothy (without the Rover prefix) appears to have been an associated ground attack technique, but again, not explained.

I suspect that the author may well know the answers to some of these residual 'Rover questions' but had, perhaps, become so familiar with the subject matter that he was unable to see what might need explaining to the uninitiated. If that was the case, the problem could/should have been spotted by the independent proof-reader but, perhaps not, because the book has many niggling residual errors. For example, a map of the Liri Valley (p116) is captioned 'Lirri Valley' and a map of the Côte d'Azur (p140) is captioned 'Cote Dazur'. The map of the Gothic Line (p162) doesn't actually show the Gothic Line. The text on p184 says that the army planned to advance on Bologna via Route 65 and Imola via Route 66 but, according to the map on page 183, these should be Routes 64 and 65 respectively. Incidentally, while the narrative usually (but not exclusively) refers to 'Routes', the maps invariably show them as 'Highways', a trifling detail perhaps, but it does not inspire confidence. The numerous maps in the book are bespoke, which was an excellent idea as they exclude many irrelevant place names and

topographical detail, but to work, it was necessary to indicate all of the places mentioned in the text. Many are not, leaving the reader uncertain as to how events unfolded, or having to find the missing links himself. Operation OTTRINGTON was a spoof suggesting an imminent assault on the east coast of Italy, not the 'eastern coast of the Adriatic' (p161), which would be Yugoslavia. On page 180 an entry made by No 250 Sqn's Adjutant in Annex E to 'the unit's ORB' is cited as having come from WO204/7932/14. That reference does not work. It does if you delete the '/14', but it is not the squadron's Form 540; it is an Army file containing Rover reports. This is not the only scrambled reference.

So what? So I appear to have formed a very poor impression of this book. That really, really is not the case. It does have its defects, not least the imprecision of its title, and I needed to make that clear. But, while it does need to be read with care, the acid test is, would I buy one? To which the answer is a very positive 'Yes'. Notwithstanding some shortcomings, the narrative provides a very readable account of the use of, largely tactical, air power during the last two years of the war in southern Europe. The text is backed up by numerous tabulated ORBATS on various dates, 43 relating to Allied Air Forces, 19 to Allied Armies, 7 to Axis Air Forces and 4 to Axis Armies. There are nineteen of the aforementioned bespoke maps, five very clear 'wiring diagrams' that show how information flowed around the FAC/fighter bomber net as the system evolved, more than 300 well-reproduced photographs, many unfamiliar, and a few in colour, and, to top it off, nineteen excellent colour profiles of representative Allied aeroplanes, nine of them American, which again belies that very specific 'RAF' in the subtitle – and there are really only eighteen aeroplanes, because a USAAF P-47 on p127 is duplicated on p158 – and we are back to proof-reading . . .

This handsome 284-page A4 hardback is well up to Hikoki's customary high production standard. Printed on gloss paper, it is a pleasure to handle and to browse. Recommended.

CGJ

ROYAL AIR FORCE HISTORICAL SOCIETY

The Royal Air Force has been in existence for more than one hundred years; the study of its history is deepening, and continues to be the subject of published works of consequence. Fresh attention is being given to the strategic assumptions under which military air power was first created and which largely determined policy and operations in both World Wars, the interwar period, and in the era of Cold War tension. Material dealing with post-war history is now becoming available under the 20-year rule. These studies are important to academic historians and to the present and future members of the RAF.

The RAF Historical Society was formed in 1986 to provide a focus for interest in the history of the RAF. It does so by providing a setting for lectures and seminars in which those interested in the history of the Service have the opportunity to meet those who participated in the evolution and implementation of policy. The Society believes that these events make an important contribution to the permanent record.

The Society normally holds three lectures or seminars a year in London, with occasional events in other parts of the country. Transcripts of lectures and seminars are published in the Journal of the RAF Historical Society, which is distributed free of charge to members. Individual membership is open to all with an interest in RAF history, whether or not they were in the Service. Although the Society has the approval of the Air Force Board, it is entirely self-financing.

Membership of the Society costs £18 per annum and further details may be obtained from the Membership Secretary, Wg Cdr Colin Cummings, October House, Yelvertoft, NN6 6LF. Tel: 01788 822124.

THE TWO AIR FORCES AWARD

In 1996 the Royal Air Force Historical Society established, in collaboration with its American sister organisation, the Air Force Historical Foundation, the *Two Air Forces Award*, which was to be presented annually on each side of the Atlantic in recognition of outstanding academic work by a serving officer or airman. The British winners have been:

1996	Sqn Ldr P C Emmett PhD MSc BSc CEng MIEE
1997	Wg Cdr M P Brzezicki MPhil MIL
1998	Wg Cdr P J Daybell MBE MA BA
1999	Sqn Ldr S P Harpum MSc BSc MILT
2000	Sqn Ldr A W Riches MA
2001	Sqn Ldr C H Goss MA
2002	Sqn Ldr S I Richards BSc
2003	Wg Cdr T M Webster MB BS MRCGP MRAeS
2004	Sqn Ldr S Gardner MA MPhil
2005	Wg Cdr S D Ellard MSc BSc CEng MRAeS MBCS
2007	Wg Cdr H Smyth DFC
2008	Wg Cdr B J Hunt MSc MBIFM MinstAM
2009	Gp Capt A J Byford MA MA
2010	Lt Col A M Roe YORKS
2011	Wg Cdr S J Chappell BSc
2012	Wg Cdr N A Tucker-Lowe DSO MA MCMI
2013	Sqn Ldr J S Doyle MA BA
2014	Gp Capt M R Johnson BSc MA MBA
2015	Wg Cdr P M Rait
2016	Rev (Sqn Ldr) D Richardson BTh MA PhD
2017	Wg Cdr D Smathers
2018	Dr Sebastian Ritchie
2019	Wg Cdr B J Hunt BSc MSc MPhil
2020	Gp Capt J Alexander BA MBA MA MSt MSc RAuxAF
2021	Wg Cdr P Withers BSc(Hons) MA MSc CEng

THE AIR LEAGUE GOLD MEDAL

On 11 February 1998 the Air League presented the Royal Air Force Historical Society with a Gold Medal in recognition of the Society's achievements in recording aspects of the evolution of British air power and thus realising one of the aims of the League. The Executive Committee decided that the medal should be awarded periodically to a nominal holder (it actually resides at the Royal Air Force Club, where it is on display) who was to be an individual who had made a particularly significant contribution to the conduct of the Society's affairs. Holders to date have been:

Air Marshal Sir Frederick Sowrey KCB CBE AFC
Air Commodore H A Probert MBE MA
Wing Commander C G Jefford MBE BA
Air Vice-Marshal N Baldwin CB CBE

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